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# Relays, Contactors, Timers, Transformers and Circuit Breakers for General Purpose Industrial \& Commercial Applications 

This technical databook includes specification information for a broad selection of components. Electromechanical relays, contactors, timers, solid state relays, input/output modules, sensors, protective relays, magnetic circuit breakers, themal circuit breakers and transformers are all described in the databook.

## Locating a product in this databook

Immediately following this introductory page is an alphanumeric index bf the product series in this databook. This is helpful if you already know the series designator of the product for whichyou are seeking specifications. The index is followed by a selector guidethat provides a brief overview of the various series in our extensive product line. This is intended to help you quickly detemine which product series may be best suited foragiven application. The selector guide also lists the page number in the databook where much more detailed specifications for each series may be found.

## Need more help selecting a product series?

The body of this databook is divided into 14 major product categories. Each section begins with an alphanumeric index of the product series contained therein. Additionally, a "question tree" is included on the first or second page of several sections to help in narrowing your search to product series that may be appropropriate for a given application. While by no means definitive, these tools can prove to be an effective starting point.

## Finding out more details

If you need additional specification information, please contact Tyco Electronics Technical Support(see inside) back cover for Technical Support contact information.) Information about our products also can be found on our website at http://relays.tycoelectronics.com. Our website is updated more frequently than the printed technical databook, so you may find information there which is more current than our databook.

## Note regarding product availability

This databook lists a broad range of products which are available with varying leadtimes. Some are normally maintained in stock for immediate delivery. Many other products are available within what would be considered "normal" leadtimes for our industry. However, there may be extended leadtimes for some nonstock items. Additionally, there are minimum quantity requirements. You should consult with your Tyco Electronics authorized distributor or sales engineer regarding availability and minimum order requirements before specifying a particular non-stock model.

## Changes in specifications/ availability

We constantly endeavor to enhance the quality of our products and update our product offering; therefore, specifications and product availability are subject to change without notice.

## Disclaimer

While Tyco Electronics has made every reasonable effort to ensure the accuracy of the information in this databook, Tyco Electronics does not guarantee that it is error-free, nor does Tyco Electronics make any other representation, warranty or guarantee that the information is accurate, correct, reliable or current. Tyco Electronics reserves the right to make any adjustments to the information contained herein at any time without notice. Tyco Electronics expressly disclaims all implied warranties (and all express warranties, except as otherwise stated in this databook) regarding the information contained herein, including but not limited to any implied warranties or merchantability or fitness for a particular purpose. It is recommended that you test any new or replacement product before incorporating into a system.

The dimensions in this databook are for reference purposes only and are subject to change without notice. Dimensions are in inches over (millimeters), unless otherwise specified. Specifications are subject to change without notice. Consult Tyco Electronics at 1-800-522-6752 for latest dimensions and design specifications, or use the global contact list shown on inside back cover.

## Alphanumeric Index





## Mature and Low Volume Products

Some product series are not described in the databook, as they may not represent the most effective solution for many new design requirements. How ever, many of the non-cataloged products are still available for sale. Contact a Tyco Electronics Technical Specialist (see inside back cover) for more details about AGASTAT, AXICOM , CII, HARTM AN, KILOVAC, OEG, P\&B, PRODUCTS UNLIM ITED, SCHRACK or TYCO relay or circuit breaker products that you cannot find in this databook.

| Circuit Breakers ........................ 101-124 | $\mathbf{1}$ |
| :--- | :---: |
| Transformers ............................. 201-212 | $\mathbf{2}$ |
| Low -signal PC Board Relays .... $301-338$ | $\mathbf{3}$ |

M id-Range PC Board Relays ... 401-498 4

Power PC Board Relays<br>501-512

|  <br> Special Application Relays ......901-920 | $\mathbf{9}$ |
| :--- | :--- |
| Automotive Relays ................1001-1026 | $\mathbf{1 0}$ |


|  |  |
| :--- | :--- |
| Input/Output M odules ...........1101-1126 | $\mathbf{1 1}$ |


|  |
| :--- |
| M odules.................................1201-1256 |

## Contact Designators and Materials／Agency Approvals

## Contact Forms

| Design | Sequence | Symbol | Form |
| :---: | :---: | :---: | :---: |
| SPST－NO | Make（1） | $\bullet \quad \quad_{\square}^{1}$ | A |
| SPST－NC | Break（1） | $\bullet \quad 又_{1} \square^{\uparrow}$ | B |
| SPDT | Break（1）－Make（2） | $\stackrel{-}{2}{ }_{1}^{2}{ }^{\uparrow}$ | C |
| SPDT | Make（1）before Break（2） | $: \quad x_{2} \underbrace{0}_{1}$ | D |
| $\begin{aligned} & \text { SPDT } \\ & \text { (B-M-B) } \end{aligned}$ | Break（1）－Make（2） before Break（3） | $8^{3}$ | E |


| Design | Sequence | Symbol | Form |
| :---: | :---: | :---: | :---: |
| SPDT－NO | Center OFF |  | K |
| SPST－NO （DM） | Double Make（1） |  | X |
| SPST <br> （DB） | Double Break（1） | $\bullet \mathbf{x} \mathbf{K}_{1}$ | Y |
| SPDT－NC－NO （DB－DM） | Double Break（1） Double Make（2） | $\bullet \mathbf{8}$ | Z |
| SPST－NO （DM） | Double Make |  | U |

P\＆B Numbers for Contact Arrangements
To simplify the listing of contact arrangements，P\＆B standard relays carry code numbers to designate the various contact forms listed in the follow－ ing table．These numerals are used as abbreviations of the switching
arrangements；for example：a PM17 relay has a 4PDT（four－pole－double－ throw）contact arrangement．

## Contact Code and NARM Designator

1－1A SPST－NO<br>2－1B SPST－NC<br>3－1X SPST－NO－DM<br>4－1Y SPST－NC－DB<br>5－1C SPDT<br>6－1Z SPDT－NC－NO（DM－DB）<br>7－2A DPST－NO<br>8－2B DPST－NC<br>9－2X DPST－NO－DM<br>10－2Y DPST－NC－DB<br>11－2C DPDT<br>12－3A 3PST－NO<br>13－3B 3PST－NC<br>14－3С 3PDT<br>15－4A 4PST－NO<br>16－4B 4PST－NC<br>17－4C 4PDT<br>18－5A 5PST－NO<br>19－5B 5PST－NC<br>20－5C 5PDT<br>21－6A 6PST－NO<br>22－6B 6PST－NC<br>23－6C 6PDT<br>24－7A 7PST－NO<br>25－7B 7PST－NC<br>26－7C 7PDT<br>27－8A 8PST－NO<br>28－8B 8PST－NC

SP－Single Pole
DP－Double Pole

3P－Three Pole 4P－Four Pole

29－8C 8PDT
30－9A 9PST－NO
31－9B 9PST－NC
32－9C 9PDT
33－10A 10PST－NO
34－10B 10PST－NC
35－10C 10PDT
36－11A 11PST－NO
37－11B 11PST－NC
38－11C 11PDT
39－12A 12PST－NO
40－12B 12PST－NC
41－12C 12PDT
42－3X 3PST－NO－DM
$43-2 X+1 Y$ DPST－NO－DM＋SPST－NC－DB
44－2X DPST－NO－DM
$45-1 X+2 Y$ SPST－NO－DM＋DPST－NC－DB
46－3Y 3PST－NC－DB
47－4X 4PST－NO－DM
$48-2 \mathrm{X}+2 \mathrm{Y}$ 2PST－NO－DM +2 PST－NC－DB
49－4Y 4PST－NC－DB
50－1A +1 B SPST－NO＋SPST－NC
$51-1$ A +1 C SPST－NO＋SPDT
$52-1 B+1 C$ SPST－NC＋SPDT
$58-1 \mathrm{~A}+2 \mathrm{~B}$ SPST－NO＋DPST－NC
$59-2 A+1 B$ DPST－NO＋SPST－NC
$60-2 A+2 B$ DPST－NO＋DPST－NC
$61-2 A+1 C$ DPST－NO＋SPDT
$\begin{array}{ll}\text { SB－Single Break } & \text { ST－Single Throw } \\ \text { DB－Double Break } & \text { DT－Double Throw }\end{array}$
$62-1 \mathrm{~A}+2 \mathrm{C}$ SPST－NO＋DPDT
$63-1 \mathrm{~B}+2 \mathrm{C}$ SPST－NC＋DPDT
$64-2 B+1 C$ DPST－NC＋SPDT
$65-1 \mathrm{~A}+1 \mathrm{~B}+1 \mathrm{C}$ SPST－NO＋SPST－NC ＋SPDT
$67-3 \mathrm{~A}+1 \mathrm{~B}$ 3PST－NO＋SPST－NC
$68-3 A+1 \mathrm{C}$ 3PST－NO＋SPDT
$69-3 B+1 C$ 3PST－NC＋SPDT
70－3A +3 B 3PST－NO +3 3STT－NC
$71-2 A+2 C$ DPST－NO＋DPDT
$72-2 B+2 C$ DPST－NC＋DPDT
$73-1 \mathrm{~A}+3 \mathrm{C}$ SPST－NO +3 PDT
$74-3 \mathrm{~A}+2 \mathrm{C}$ 3PST－NO＋DPDT
$75-1 B+3 C$ SPST－NC＋3PDT
$76-1 \mathrm{~A}+3 \mathrm{~B}$ SPST－NO +3 3PST－NC
$77-1 \mathrm{~A}+1 \mathrm{~B}+2 \mathrm{C}$ SPST－NO + SPST－NC ＋DPDT
$78-1 \mathrm{~A}+2 \mathrm{~B}+1 \mathrm{C}$ SPST－NO＋DPST－NC
＋SPDT
$79-2 A+1 B+1 C$ DPST－NO＋SPST－NC ＋SPDT
$80-2 A+6 B$ DPST－NO＋6PST－NC
$81-4 \mathrm{~A}+4 \mathrm{~B} 4$ PST－NO +4 PST－NC
$82-2 A+4 C$ DPST－NO +4 PDT
$83-4 \mathrm{~A}+1 \mathrm{~B} 4$ PST－NO + SPST－NC
84－4A＋2B 4PST－NO－DPST－NC
$85-3 A+2 B$ 3PST－NO－DPST－NC

DM－Double Make
NO－Normally Open

CO stands for changeover，a term sometimes used for a double throw configuration．

## Common Contact Material Abbreviations Used in this Databook

Ag is silver．
AgCdO is silver－cadmium oxide．
AgNi 0.15 is fine grain silver．
AgNi or AgNi 20 is silver－nickel alloy．
AgPd is silver－palladium alloy．
AgSn is silver－tin alloy．

AgSnO is silver－tin oxide．
Au is gold．
AuAgNi is gold－silver－nickel alloy．
AuPtAg is gold－platinum－silver alloy．
AuRh is gold－rhodium alloy．
Hg is mercury．

PdCu is palladium－copper alloy．
PdNi is palladium－nickel alloy．
Rh is rhodium．
Ru is ruthenium．
W is tungsten．

## Logos of Various Approval Agencies／Laboratories Used in this Databook

민－UL Recognized for USA．
© 9 －UL Recognized for Canada．
${ }^{\boldsymbol{c}} \mathrm{NS}_{\mathrm{us}}$－UL Recognized for USA \＆Canada．
（41）－UL Listed．
（18）－CSA Certification．
© ${ }^{\text {P1 }}$－－CSA Component Acceptance．
食－VDE Approved
—OE－VDE Component Mark
（ －－TUV Approved．
（D）－Demko Approved．
트－CECC Approved．
（土）－SEV Approved．
＜－Factory Mutual Approved．
KEURAR－Kema－Keur Certification．

| Circuit Breakers |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | P\&B | P\&B | P\&B | P\&B | P\&B |
| Series | W57 | W54 | W58 | W28 | W51 |
| Type | Thermal | Thermal | Thermal | Thermal | Thermal |
| Features | - Compact design <br> - Quick connect terminals <br> - Button extends for visible trip indication <br> - Push-to-reset operation <br> - Optional protective boot ${ }_{c} \mathbf{N B}_{\mathrm{us}}$ | - Quick connect or screw terminals <br> - Button extends for visible trip indication <br> - Push-to-reset operation <br> - Optional protective boot | - Quick connect or screw terminals <br> - Button extends for visible trip indication <br> - Push-to-reset operation | - Replaces slow blow glass cartridge fuse and holder <br> - Snap-in mounting <br> - Button provides visible trip indication <br> - Push-to-reset or switchable version | - Rocker actuated breaker/ switch <br> - Convenient, snap-in mounting <br> - Optional indicator light <br> - Quick connect terminals <br> - Push-to-reset operation |
| Approximate Size and Weight (per pole) | $\begin{gathered} .575 " \times 1.15 \text { " } \times .889 \text { "d } \\ (14.6 \times 29.2 \times 22.6 \mathrm{~d}) \\ .5 \mathrm{oz}(14.3 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .575^{\prime \prime} \times 1.378 \text { " } \times 1.22^{\prime \prime} \mathrm{d} \\ (14.6 \times 35.0 \times 31.0 \mathrm{~d}) \\ .9 \mathrm{oz} .(25 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .66 " \times 1.38 " \times 1.38 \text { "d } \\ (16.8 \times 34.9 \times 34.9 \mathrm{~d}) \\ 1.5 \mathrm{oz} .(43 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .54 " \times .63 " \times 1.54 " \mathrm{~d} \\ (13.7 \times 15.9 \times 39.0 \mathrm{~d}) \\ .35 \mathrm{oz}(10 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .598 " \times 1.311^{1 "} \times 1.2322^{\mathrm{ld}} \\ (15.2 \times 33.3 \times 31.3 \mathrm{~d}) \\ .37 \mathrm{oz} .(10.5 \mathrm{~g}) \\ \hline \end{gathered}$ |
| No. of Poles | 1 | 1 | 1 | 1 | 1 |
| Circuit Function | Series Trip | Series Trip | Series Trip | Series Trip | Series Trip |
| Current Rating | 4-20 Amps | 5-40 Amps | 1-30 Amps | 0.5-20 Amps | 5-20 Amps |
| Max. Operating Voltage | $\begin{aligned} & \text { 50VDC } \\ & \text { 250VAC } \end{aligned}$ | $\begin{gathered} \text { 50VDC } \\ 250 \mathrm{VAC} \end{gathered}$ | $\begin{gathered} 50 \mathrm{VDC} \\ \text { 250VAC } \end{gathered}$ | $\begin{gathered} 32 \mathrm{VDC} \\ \text { 250VAC } \end{gathered}$ | 50 VDC 125 or 250 VAC (model dependent) |
| Trip Time at 200\% of Rating | 4 to 40 Sec . | 5 to 30 Sec . | 1-4A Models - <br> 10 to 45 Sec . <br> 5-30A Models - <br> 6 to 30 Sec . | 0.5-2A Models 4.5 to 28 Sec. 3-15A Models 2.2 to 15 Sec . | 4 to 40 Sec . |
| Interrupt Capacity | 1,000A | 1,000A | $\begin{aligned} & \text { 2,000A @ 50VDC } \\ & \text { 1,000A @ 250VAC } \end{aligned}$ | $\begin{aligned} & \text { 1,000A @32VDC } \\ & \text { or } 250 \mathrm{VAC} \end{aligned}$ | 1,000A |
| Terminal Options | $\begin{gathered} .250 "(6.35) \\ \text { Quick Connect } \end{gathered}$ | .250" (6.35) Quick Connect, \#8-32 Screw | .250" (6.35) Quick Connect, \#6-32 Screw | .250" (6.35) Quick Connect (Do not solder) | 250" (6.35) Quick Connect or PC terminals |
| Mounting Options | 3/8"-24 Threaded Bushing, M11-1.0 Threaded Bushing or M12-1.0 Threaded Bushing | 3/8"-24 Threaded Bushing, M11-1.0 Threaded Bushing or M12-1.0 Threaded Bushing | 7/16"-28 Threaded Bushing, 15/32" - 32 Threaded Bushing | Snaps into 5/8" (15.9) panel cutout from the front | Snaps into . $531 \times 1.122^{\prime \prime}$ ( $13.5 \times 28.5$ ) panel cutout from the front |
| Page Number | 103 | 105 | 107 | 110 | 112 |

[^0]| Circuit Breakers |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | P\＆B | P\＆B | P\＆B | P\＆B | P\＆B |
| Series | W33 | W23 | W31 | W6 | W9 |
| Type | Thermal | Thermal | Thermal | Magnetic | Magnetic |
| Features | －Rocker actuator in various colors <br> －Convenient，snap－in mounting <br> －Optional lighted rockers <br> －Models with aux．switch available <br> －Designed to meet IEC and VDE requirements <br> 可（18） | －Push／pull actuation for manual on／off and reset <br> 데（ब1） | －Toggle actuation for manual on／off and reset <br> 규（ㅏㅏ | －Compact design <br> －Variety of time delay options <br> －Toggle actuation for manual on／off and reset <br> －Optional aux．switch <br> 凫（18） | －Variety of time delay options <br> －Toggle actuation for manual on／off and reset <br> －Optional aux．switch <br> 吹（18 |
| Approximate Size and Weight （per pole） | $\begin{gathered} .98 " \times 1.89 \text { " } \times 1.72^{\prime \prime} \mathrm{d} \\ (24.9 \times 48.0 \times 43.8 \mathrm{~d}) \\ 1.2 \mathrm{oz} .(35 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .69 \mathrm{"} \times 1.38 \mathrm{l} \times 1.6 \mathrm{kd} \\ (17.5 \times 34.9 \times 40.6 \mathrm{~d}) \\ 2 \mathrm{oz} .(57 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .69 " \times 1.38 " \times 1.6 \mathrm{ld} \\ (17.5 \times 34.9 \times 40.6 \mathrm{~d}) \\ 2 \mathrm{oz} .(57 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .75 " \times 2.0 \mathrm{~N} \times 1.64 \mathrm{ld} \\ (19.1 \times 50.8 \times 42.1 \mathrm{~d}) \\ 2.5 \mathrm{oz} .(71 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .75 \mathrm{"} \times 2.5 \mathrm{~F} \times 2.1 \mathrm{ld} \\ (19.1 \times 63.5 \times 53.0 \mathrm{~d}) \\ 2.5 \mathrm{oz}(71 \mathrm{~g}) \end{gathered}$ |
| No．of Poles | 1 or 2 | 1 | 1 | 1 through 4 | 1 through 4 |
| Circuit Function | Series Trip，both poles or <br> Series Trip，one pole； Switch only，one pole | Series Trip | Series Trip | Series Trip w／or w／o Aux．Switch | Series Trip w／or w／o Aux．Switch |
| Current Rating | 5－20 Amps | 1－50 Amps | 1－50 Amps | ．25－50 Amps | ．25－50 Amps |
| Max．Operating Voltage | $\begin{aligned} & \text { 50VDC } \\ & \text { 250VAC } \end{aligned}$ | 50VDC <br> 250VAC | $\begin{gathered} 50 \mathrm{VDC} \\ \text { 250VAC } \end{gathered}$ | $\begin{gathered} \text { 65VDC } \\ 277 \text { VAC } \\ \text { 480VAC 3ø-Wye } \end{gathered}$ | $\begin{gathered} \text { 65VDC } \\ 277 \text { VAC } \\ \text { 480VAC } 3 \varnothing \text {-Wye } \end{gathered}$ |
| Trip Time at 200\％of Rating | 10 to 45 Sec ． | 1－3A M odels－ <br> 11 to 30 Sec ． <br> 5－50A Models－ <br> 6 to 22 Sec ． | 1－3A Models－ <br> 11 to 30 Sec ． <br> 5－50A Models－ <br> 6 to 22 Sec ． | 30 ms to 150 Sec． depending upon trip curve specified． | 30 ms to 150 Sec ． depending upon trip curve specified． |
| Interrupt Capacity | $\begin{aligned} & \text { 1,000A @ 50VDC } \\ & \text { 2,000A @250VAC } \end{aligned}$ | 1－25A Models－ 2，000A＠50VDC 1，000A＠250VAC 30－50A Models－ 1，000A＠50VDC or 250VAC | 1－25A Models－ 2，000A＠50VDC 1，000A＠250VAC 30－50A M odels－ 1，000A＠50VDC or 250VAC | 0．25－20A Models－ <br> 2，000A＠65VDC <br> 5，000A＠277VAC <br> or 480VAC，30－Wye <br> 21－50A Models－ <br> 2，000A＠65VDC <br> 2，500A＠277VAC | $\begin{gathered} \text { 2,000A @65VDC } \\ \text { 5,000A @ 277VAC } \\ \text { or 480VAC, 3Ø-Wye } \end{gathered}$ |
| Terminal Options | $\begin{gathered} .250 "(6.35) \\ \text { Quick Connect, } \\ \text { Solder } \end{gathered}$ | \＃8－32 Screw | \＃8－32 Screw | $\text { . } 250 \text { " (6.35) }$ <br> Quick Connect， \＃10－32 Screw | \＃10－32 Stud |
| Mounting Options | Snaps into $.875 \times 1.75 "$ <br> （ $22.2 \times 44.5$ ） <br> panel cutout from the front | 3／8＂－24 Threaded Bushing | 15／32＂－32 Threaded Bushing | \＃6－32 Tapped Holes， M3 Tapped Holes | \＃6－32 Tapped Holes， M3 Tapped Holes |
| Page Number | 114 | 116 | 116 | 119 | 119 |


|  | Specifications and／or agency recognitions do not necessarily apply to all models within a particular series．When multiple ratings are listed，no individual rating may be exceeded by the combination of others． |  |
| :--- | :--- | :--- |
| Dimensions are shown for | Dimensions are in inches over | Specifications and availability |
| reference purposes only． | （millimeters）unless otherw ise | subject to change． |



| Transformers |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | PRODUCTS UNLIMITED |  | PRODUCTS UNLIMITED | PRODUCTS UNLIMITED | PRODUCTS UNLIMITED |
| Series | 4000 | 4000 | 4700 | 4700 | 57 |
| Type | Class II UL1585 Transformer <br> Non-Inherently Energy Limited <br> Secondary Fusing Required (Opt. integral fuse or breaker) | Class II UL1585 Transformer <br> Non-Inherently Energy Limited <br> Secondary Fusing Required (Opt. integral fuse or breaker) | UL506 <br> Transformer <br> Non-Fused | UL506 <br> Transformer <br> Non-Fused | Transformer <br> Relay <br> Inherently <br> Energy Limited <br> 9100 or 9400 Series <br> Relay |
| VA Rating | 60 \& 75VA | 60 \& 75VA | $60,100 \& 150 \mathrm{VA}$ | $60,100 \& 150 \mathrm{VA}$ | 40VA |
| Terminal Options | Wire Leads | Quick Connect | Wire Leads | Quick Connect | Wire Leads and Screws (optional Quick Connects) |
| Mounting Options | Foot or Panel | Foot or Panel | Foot | Foot | Plate |
| Agency Approval | ${ }^{\text {c }}$ | ${ }^{\text {c }} \mathbf{M s}_{\text {us }}$ | ${ }^{\text {c }}$ | ${ }^{\text {c }} \mathbf{N s}_{\text {us }}$ | ${ }^{\text {c }} \mathbf{M s}_{\text {us }}$ |
| Page Number | 209 | 210 | 211 | 211 | 212 |

Specifications and/or agency recognitions do not necessarily apply to all models within a particular series. When multiple ratings are listed, no individual rating may be exceeded by the combination of others.

| Low－Signal Printed Circuit B oard Relays |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | P\＆B | P\＆B | OEG | OEG | P\＆B | AXICOM | OEG |
| Series | JWS | JWD | OL | OMR | 159／160 | V23026 | TSC |
| Features | －10W rating <br> －Dry reed relay <br> －SIP configuration <br> －Molded package <br> －Wave solderable and immersion cleanable <br> 吅（18 | －10W rating <br> －Dry reed relay <br> －DIP configuration <br> －Molded package <br> －Wave solderable and immersion cleanable <br> 미（18 | －10W rating <br> －Dry reed relay <br> －Plastic dust cover <br> －Consult factory for wave solderable and immersion cleanable model | －10W rating <br> －Dry reed relay <br> －Open or with plastic dust cover | －10W rating <br> －Hg wetted reed relay <br> －Fast operating speed <br> －No contact bounce <br> －Single，dual and bifilar coils <br> －Single－side stable or bistable contacts | －1A rating <br> －Miniature relay <br> －Sealed case <br> －Through－hole or surface mount <br> －Low coil power requirement <br> －Latching or non－ latching <br> 包（18） | －1A rating <br> －Miniature relay <br> －Meets FCC Part 68 isolation <br> －Sealed，immerssion cleanable case <br> －Sensitive coil <br> 呮（18 |
| Approximate Dimensions | $\begin{gathered} .80 " \times .26 " \times .31 \mathrm{~h} h \\ (20.3 \times 6.6 \times 7.8 \mathrm{~h}) \\ 0.08 \mathrm{oz} .(2 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .77^{\prime \prime} \times .30 \text { " } \times .32 \mathrm{~h} h \\ (19.6 \times 7.62 \times 8.0 \mathrm{~h}) \\ 0.08 \text { oz. }(2 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .795 " \times .31 " \times .26 \mathrm{~h} h \\ (20.2 \times 7.9 \times 6.6 \mathrm{~h}) \\ 0.07 \mathrm{oz} .(2 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .8 \times \times .32 " \times .35 " h \\ (20.3 \times 8.0 \times 9.0 \mathrm{~h}) \\ 0.16 \text { oz. }(4.5 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .4^{4 " \times .535 " \times 1.56 \mathrm{~h}} \\ (10.2 \times 13.6 \times 39.6 \mathrm{~h}) \\ 1 \mathrm{oz} .(28 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .51 " \times .31 " \times .27 \mathrm{~h} \\ (13 \times 7.9 \times 6.9 \mathrm{~h}) \\ 0.06 \mathrm{oz} .(1.7 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .49^{\prime \prime} \times .29 " \times .39 \mathrm{~h} \\ (12.5 \times 7.5 \times 10.0 \mathrm{~h}) \\ 0.1 \mathrm{oz} .(3 \mathrm{~g}) \end{gathered}$ |
| Contact <br> Arrangements | 1 Form A | 1 Form A， 1 Form B 1 Form C， 2 Form $A$ | 1 Form A， <br> 2 Form A | 1 Form A， <br> 2 Form A | 1 Form C， <br> 1 Form D | 1 Form C | 1 Form C |
| Contact Material | Ru | Ru | Rh \＆Ru | Rh \＆Ru | Hg | RhAu overlay PdNi | Au overlay AgNi |
| Maximum <br> Contact <br> Rating | 10W | $\begin{aligned} & 10 \mathrm{~W} \\ & \text { Form } \mathrm{A} \& B \\ & 3 \mathrm{~W} \\ & \text { Form C } \end{aligned}$ | 10W | 10W | 2 A | 1A，AC or DC 125VAC，150VDC 60VA，30W resistive | 1A，AC or DC 30VDC，120VAC 24 W or 120VA resistive |
| Expected <br> Mechanical Life | $1 \times 10^{8}$ Ops． | $1 \times 10^{8}$ Ops． | $1 \times 10^{8} \mathrm{Ops}$. | $1 \times 10^{8} \mathrm{Ops}$. | $1 \times 10^{9} \mathrm{Ops}$. | $1 \times 10^{8} \mathrm{Ops}$. | $5 \times 10^{7}$ Ops． |
| Expected Electrical Life at Rated Load | $1 \times 10^{6}$ Ops． | $1 \times 10^{6}$ Ops． | $1 \times 10^{6}$ Ops． | $1 \times 10^{6}$ Ops． | $1 \times 10^{9} \mathrm{Ops}$. | $\begin{gathered} 2.5 \times 10^{5} @ 0.4 \mathrm{~A}, \\ 125 \mathrm{VAC} \\ 3 \times 10^{6} @ 1 \mathrm{~A}, \\ 24 \mathrm{VDC} \end{gathered}$ | $1 \times 10^{5}$ |
| Nominal Coil Voltage | 5－24VDC | 5－24VDC | 6－24VDC | $5-24 \mathrm{VDC}$ | 2．2－9，000 ohms | 5－24VDC | 5－24VDC |
| Nominal Coil Power | 50－272mW | 50－288mW | 100－270mW | $100-280 \mathrm{~mW}$ | 20－115mW | 67－128mW | 150 mW |
| Mounting Options | PC board | PC board | PC board | PC board | PC board | PC board （THT and SMT） | PC board |
| Sockets／ <br> Connectors | － | Fits 14 －pin IC socket | － | － | － | － | － |
| Page Number | 303 | 303 | 304 | 306 | 308 | 314 | 316 |


| Specifications and／or agency recognitions do not necessarily apply to all models within a particular series．When multiple ratings are listed，no individual rating may be exceeded by the combination of others． |  |  |
| :--- | :--- | :--- |
| Dimensions are shown for | Dimensions are in inches over | Specifications and availability |
| reference purposes only． | （millimeters）unless otherwise | subject to change． |


| Low－Signal Printed Circuit Board Relays |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | P\＆B | OEG | AXICOM | AXICOM | AXICOM | AXICOM | AXICOM |
| Series | T81 | OUAZ | IM | FP2 | V23079 | FT2／FU2 | FX2 |
| Features | －0．5－1A rating <br> －Miniature，high density package <br> －Tape sealed， immersion cleanable case <br> －Sensitive coil option <br> －Meets FCC Part 68 isolation <br> 包（18） | －0．5－1A rating <br> －Miniature，high density package <br> －Tape sealed， immersion cleanable case <br> －Sensitive coil option <br> －Meets FCC Part 68 isolation <br> 미（자 | －2A rating <br> －Ultraminiature relay <br> －High sensitivity coil <br> －High mechanical shock resistance <br> －Low coil power requirement | －2A rating <br> －Low profile relay <br> －High sensitivity coil <br> －High mechanical shock resistance <br> －Latching and non－ latching versions <br> －Sealed immersion cleanable case <br> 只（ब18） | －2A rating <br> －Vertical mount <br> －High dielectric <br> －Latching and non－ latching versions <br> －Meets FCC Part 68 insulation <br> －Sealed immersion cleanable case | －2A rating <br> －Vertical mount <br> －High dielectric version <br> －Meets FCC Part 68 insulation <br> －Sealed immersion cleanable case | －2A rating <br> －Vertical mount <br> －Latching and non－ latching versions <br> －Meets FCC Part 68 insulation <br> －Sealed immersion cleanable case |
| Approximate Dimensions | $\begin{gathered} .61 " \times .45 " \times .43 " \mathrm{~h} \\ (15.4 \times 11.4 \times 11.0 \mathrm{~h}) \\ 0.14 \mathrm{oz} .(4 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .61^{\prime \prime} \times .45^{\prime \prime} \times .43^{\prime \prime} \mathrm{h} \\ (15.4 \times 11.4 \times 11.0 \mathrm{~h}) \\ 0.14 \mathrm{oz} .(4 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .393^{\prime \prime} \times .236 \text { " } \times .2222^{\prime \prime} h \\ (10 \times 6 \times 5.65 \mathrm{~h}) \\ 0.03 \text { oz. (.75g) } \end{gathered}$ | $\begin{gathered} .574 " \times .35 " \times .196 \mathrm{~h} h \\ (14.02 \times 9.02 \times 5.0 \mathrm{~h}) \\ 0.08 \mathrm{oz} .(2 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .574^{\prime \prime} \times .283 \text { " } \times .389^{\prime \prime} h \\ (14.6 \times 7.2 \times 9.9 \mathrm{~h}) \\ 0.084 \text { oz. }(2.5 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .590 " \times .295 " \times .377 " \mathrm{~h} \\ (15.0 \times 7.5 \times 9.6 \mathrm{~h}) \\ 0.12 \mathrm{oz} .(3 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .587 " \times .283 " \times .421 \mathrm{~h} \\ (14.9 \times 7.3 \times 10.7 \mathrm{~h}) \\ 0.1 \mathrm{oz} .(2.5 \mathrm{~g}) \end{gathered}$ |
| Contact <br> Arrangements | 1 Form C | 1 Form C | 2 Form C | 2 Form C | 2 Form C | 2 Form C | 2 Form C |
| Contact Material | Au overlay AgPd | Au overlay AgPd | Au overlay PdRu | Au overlay AgNi | Au overlay AgNi | Au overlay AgNi | PdRu |
| Maximum <br> Contact <br> Rating | $\begin{gathered} \text { 1A @ } 24 \mathrm{VDC} \text { or } \\ 0.5 \mathrm{~A} @ 120 \mathrm{VAC}, \\ \text { resistive } \end{gathered}$ | 1A＠24VDC or 120VAC， resistive | 2A，AC or DC 250VAC，220VDC 60 W or 62.5 VA ， resistive | 2A，AC or DC 125VDC，250VAC 30 W or 62.5 VA ， resistive | $\begin{aligned} & 2 \mathrm{~A}, \mathrm{AC} \text { or DC } \\ & 220 \mathrm{VDC}, 250 \mathrm{VAC} \\ & 60 \mathrm{~W} \text { or } 60 \mathrm{VA}, \\ & \text { resistive } \end{aligned}$ | 2A，AC or DC 125VDC，250VAC 30 W or 62.5 VA ， resistive | $\begin{gathered} 2 \mathrm{~A}, \mathrm{AC} \text { or } \mathrm{DC} \\ 220 \mathrm{VDC}, 250 \mathrm{VAC} \\ 60 \mathrm{~W} \text { or } 62.5 \mathrm{VA}, \\ \text { resistive } \end{gathered}$ |
| Expected <br> Mechanical Life | $5 \times 10^{6}$ Ops． | $5 \times 10^{6}$ Ops． | $1 \times 10^{8}$ Ops． | $1 \times 10^{8}$ Ops． | $1 \times 10^{8}$ Ops． | $1 \times 10^{8}$ Ops． | $1 \times 10^{8}$ Ops． |
| Expected <br> Electrical <br> Life at <br> Rated Load | $\begin{aligned} & 1.5 \times 10^{5} @ 1 \mathrm{~A}, \\ & 24 \mathrm{VDC} \\ & 1 \times 10^{5} @ 0.5 \mathrm{~A}, \\ & 120 \mathrm{VAC} \end{aligned}$ | $1 \times 10^{5} @ 1 \mathrm{~A}$ | $\begin{gathered} 5 \times 10^{5} @ 1 \mathrm{~A}, \\ 30 \mathrm{VDC} \\ 1 \times 10^{5} @ 2 \mathrm{~A}, \\ 30 \mathrm{VDC} \end{gathered}$ | $\begin{gathered} 3 \times 10^{5} @ 1.25 \mathrm{~A} \\ 24 \mathrm{VDC} \end{gathered}$ | $\begin{gathered} 2 \times 10^{5} @ 2 \mathrm{~A} \\ 30 \mathrm{VDC} \end{gathered}$ | $\begin{gathered} 1 \times 10^{5} @ 1.25 \mathrm{~A}, \\ 24 \mathrm{VDC} \end{gathered}$ | $\begin{gathered} 5 \times 10^{5} @ 2 \mathrm{~A} \\ 30 \mathrm{VDC} \end{gathered}$ |
| Nominal Coil Voltage | $3-24 V D C$ | 5－24VDC | 1．5－24VDC | $3-48 \mathrm{VDC}$ | $3-48 \mathrm{VDC}$ | $3-48 \mathrm{VDC}$ | $3-48 \mathrm{VDC}$ |
| Nominal Coil Power | （standard） 450 mW （sensitive） 200 mW | （standard） 450 mW （sensitive）200mW | $100-200 \mathrm{~mW}$ | 80－200mW | 70－140mW | $200-300 \mathrm{~mW}$ | $80-300 \mathrm{~mW}$ |
| Mounting Options | PC board， Socket | PC board， Socket | PC board （THT and SMT） | PC board （THT） | PC board （THT and SMT） | PC board （THT and SMT） | PC board （THT） |
| Sockets／ <br> Connectors | Fits 12－pin IC socket | Fits 12－pin IC socket | － | － | － | － | － |
| Page Number | 318 | 319 | 321 | 323 | 325 | 327 | 329 |

[^1]|  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Low－Signal PC Board Relays |  |  |  |  | Mid－Range PC Board Relays |  |  |
|  | P\＆B | AXICOM | AXICOM | AXICOM | SCHRACK | SCHRACK | OEG |
| Series | 190 | V23105 | MT2 | MT4 | PE | RE | PCN |
| Features | －2A rating <br> －Mini DIP relay <br> －Various coil sensitivity options <br> －Sealed immersion cleanable case <br> －Meets FCC Part 68 insulation | －3A rating <br> －Mini DIP relay <br> －High sensitivity coil <br> －Sealed immersion cleanable case <br> －Meets FCC Part 68 insulation | －1．25A rating <br> －Miniature，telecom relay <br> －Meets FCC Part 68 isolation <br> －Sealed，immersion cleanable case | －1．25A rating <br> －Miniature，telecom relay <br> －Meets FCC Part 68 isolation <br> －Sealed，immersion cleanable case | －5A rating <br> －Sensitive coil <br> －Flux－tight case for wave soldering <br> －Class F coil | －6A rating <br> －Sensitive coil <br> －DIP cofiguration <br> －4kV coil－to－contact isolation <br> －Immersion cleanable case with knock－off nib <br> －VDE 0110 ${ }^{2} \mathbf{N D}_{\text {us }}$ | －3A rating <br> －Ultra slim ．197＂ （5mm）package <br> －Sensitive coil <br> －3kV coil－to－contact isolation <br> －Immersion cleanable case cinus vDE |
| Approximate Dimensions | $\begin{gathered} .807 " \mathrm{x} .398 \text { " } \times .453 \mathrm{hh} \\ (20.5 \times 10.1 \times 11.5 \mathrm{~h}) \\ 0.21 \mathrm{oz}(6 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} .795 " \times .394 " x .45 " \mathrm{~h} \\ (20.2 \times 10.0 \times 11.43 \mathrm{~h}) \\ 0.2 \mathrm{oz} .(6 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} .795 " x .393 " x .433 " h \\ (20.2 \times 10.0 \times 11.0 \mathrm{~h}) \\ 0.18 \text { oz. ( } 5 \mathrm{~g} \text { ) } \\ \hline \end{gathered}$ | $\begin{gathered} .795 " \times .582 " \times .433 " \mathrm{~h} \\ (20.2 \times 14.8 \times 11.0 \mathrm{~h}) \\ 0.25 \text { oz. }(7 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} .79 " \times .39 " \times .39 " \mathrm{~h} \\ (20 \times 10 \times 10 \mathrm{~h}) \\ 0.18 \mathrm{oz} .(5 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} .79 \text { " } \times .39 \text { " } \times .42^{\prime \prime} \mathrm{h} \\ (20 \times 10 \times 10.6 \mathrm{~h}) \\ 0.18 \mathrm{oz} .(5 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} .79 " x .197 " x .492 \mathrm{~h} \\ (20 \times 5 \times 12.5 \mathrm{~h}) \\ 0.1 \mathrm{oz} .(3 \mathrm{~g}) \\ \hline \end{gathered}$ |
| Contact <br> Arrangements | 2 Form C | 2 Form C | 2 Form C | 4 Form C | 1 Form C | 1 Form A | 1 Form A |
| Contact Material | Au overlay Ag | Au overlay AgNi | Au overlay AgNi | Au overlay AgNi | AgNi 90／10 | AgCdO or Au overlay AgNi | AgNi |
| Maximum <br> Contact <br> Rating | $\begin{gathered} 2 \mathrm{~A}, \mathrm{AC} \text { or DC } \\ 125 \mathrm{VDC}, 125 \mathrm{VAC} \\ 60 \mathrm{~W} \text { or } 62.5 \mathrm{VA}, \\ \text { resistive } \end{gathered}$ | 3A，AC or DC 250VDC，230VAC 60 W or 120VA， resistive | 1．25A，AC or DC <br> 150VAC or VDC <br> 30 W or 62．5VA， resistive | $1.25 \mathrm{~A}, \mathrm{AC}$ or DC <br> 150VAC or VDC <br> 30 W or 62．5VA， resistive | 5A＠250VAC | 6A＠250VAC | 3 A ＠250VAC |
| Expected Mechanical Life | $15 \times 10^{6}$ Ops． | $15 \times 10^{6}$ Ops． | $1 \times 10^{8}$ Ops． | $1 \times 10^{8}$ Ops． | $15 \times 10^{6}$ Ops． | $3 \times 10^{7}$ Ops． | $2 \times 10^{7}$ Ops． |
| Expected <br> Electrical <br> Life at <br> Rated Load | $\begin{gathered} 1 \times 10^{5} @ 1.8 \mathrm{~A} \\ 30 \mathrm{VDC} \end{gathered}$ | $\begin{gathered} 1 \times 10^{5} @ 2 \mathrm{~A} \\ 30 \mathrm{VDC} \end{gathered}$ | $\begin{gathered} 2 \times 10^{5} @ 1.25 \mathrm{~A} \\ 24 \mathrm{VDC} \end{gathered}$ | $\begin{gathered} 2 \times 10^{5} @ 1.25 \mathrm{~A}, \\ 24 \mathrm{VDC} \end{gathered}$ | $1 \times 10^{5}$ | $5 \times 10^{5}$ | $1 \times 10^{5}$ |
| Nominal Coil Voltage | $3-48 \mathrm{VDC}$ | $3-48 \mathrm{VDC}$ | 4．5－48VDC | 4．5－48VDC | $5-48 \mathrm{VDC}$ | $5-48 \mathrm{VDC}$ | 5－24VDC |
| Nominal Coil Power | $150-500 \mathrm{~mW}$ | $150-500 \mathrm{~mW}$ | $150-550 \mathrm{~mW}$ | 300 mW | 200 mW | 200 mW | 120 mW |
| Mounting Options | PC board | PC board | PC board | PC board | PC board | PC board | PC board |
| Sockets／ <br> Connectors | Fits 16－pin IC Socket | Fits 16 －pin IC Socket | Fits 16 －pin IC Socket | － | － | － | － |
| Page Number | 331 | 333 | 335 | 337 | 403 | 405 | 407 |

Specifications and／or agency recognitions do not necessarily apply to all models within a particular series．When multiple ratings are listed，no individual rating may be exceeded by the combination of others．

| Electronics |  |  | Issued | d 3－03 |  | S | ECTOR GUID |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Mid－Range Printed Circuit B oard Relays |  |  |  |  |  |  |  |
|  | SCHRACK | SCHRACK | P\＆B | OEG | OEG | P\＆B | OEG |
| Series | V23092 ${ }_{\text {（SNR）}}$ | RY II | T75 | PCJ | PCH | T77 | OJ／OJE |
| Features | －6A rating <br> －Ultra slim ．197＂ （5mm）package <br> －Low coil power requirement <br> －Immersion cleanable case <br> －DIN mount module available ${ }^{2} \mathbf{N S}_{\text {us }} \text { VDE }$ | －8A rating <br> －Meets international specifications <br> －Sensitive coil <br> －Low profile design <br> －Flux－tight or washable case <br> ${ }^{c} \mathrm{NN}_{\text {US }}$（VOE） | －8－14A rating <br> －Meets international specifications <br> －Sensitive coil <br> －Low profile design <br> －Immersion cleanable case | －5A rating <br> －Slim profile for high density mount <br> －200mW coil <br> －4，000Vrms coil－to－ contact breakdown <br> －UL508 | －5－10A rating <br> －Small size relay <br> － 1 Form C contact arrangement <br> － $4,000 \mathrm{Vms}$ coil－to－ contact breakdown <br> －UL873 <br> －UL Class F coil available | －3－10A rating <br> －Small size <br> －4，000 Vrms coil－to－ contact breakdown <br> －Sealed or flux tight case <br> －Class F coil insulation | －3－10A rating <br> －Small size <br> －4，000 Vrms coil－to－ contact breakdown <br> －Sealed or flux tight case <br> －Sensitive models available |
| Approximate Dimensions | $\begin{gathered} .20 " \times 1.1^{1 "} \times .59 \mathrm{~h} h \\ (5 \times 28 \times 15 \mathrm{~h}) \\ 0.21 \mathrm{oz}(6 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 1.12 " \times .40^{\prime \prime} \times .48^{\prime \prime} \mathrm{h} \\ (28.5 \times 10.1 \times 12.3 \mathrm{~h}) \\ 0.28 \mathrm{oz} .(8 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.12 \text { " } \times .39 \text { " x } .59 \text { "h } \\ (28.5 \times 10 \times 15 \mathrm{~h}) \\ 0.65 \mathrm{oz} .(18.5 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .80 \times .28 \times .59 \mathrm{~h} \\ (20.4 \times 7 \times 15 \mathrm{~h}) \\ .14 \mathrm{oz}(4 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .78 \times .39 \times .60 \\ (19.8 \times 9.9 \times 15.2 \mathrm{~h}) \\ .25 \mathrm{oz}(7 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .72 " \times .39 " \times .57 \mathrm{~h} \\ (18.2 \times 10.0 \times 14.7 \mathrm{~h}) \\ 0.36 \mathrm{oz} .(9 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .72 " \times .39 " \times .57 \mathrm{~h} \\ (18.2 \times 10.0 \times 14.7 \mathrm{~h}) \\ 0.36 \mathrm{oz}(9 \mathrm{~g}) \end{gathered}$ |
| Contact <br> Arrangements | 1 Form A， <br> 1 Form C | 1 Form A， 1 Form C | 1 Form A， <br> 1 Form C | 1 Form A | 1 Form C | 1 Form A | 1 Form A |
| Contact Material | AgSnO， Au plated AgSnO， AgNi 90／10 | AgCdO，AgNi 0．15， au plated AgNi0．15， AgSnO | AgCdO | AgNi | AgSnO | Ag Ag Alloy | Ag Ag Alloy |
| Maximum <br> Contact <br> Rating | 6A，25VAC | 8A＠250VAC | $\begin{gathered} \text { 14A @ 120VAC, } \\ \text { resistive } \\ 10 \mathrm{~A} @ 240 \mathrm{VAC} \\ 8 \mathrm{~A} @ 24 \mathrm{VDC} \end{gathered}$ | $\begin{aligned} & \text { 5A @ 250VAC or } \\ & 28 \mathrm{VDC} \\ & \text { resistive } \end{aligned}$ | 10A＠125VAC（NO） 5A＠277VAC or 30VDC（NO） 3A＠277VAC or 30VDC（NC） resistive | $\begin{gathered} 3 \mathrm{~A} @ 28 \mathrm{VDC} \text { or } \\ 250 \mathrm{VAC} \\ \text { 10A @28VDC or } \\ 120 \mathrm{VAC} \end{gathered}$ | $\begin{gathered} 3 \mathrm{~A} @ 28 \mathrm{VDC} \text { or } \\ \text { 250VAC } \\ 5 \mathrm{~A} @ 28 \mathrm{VDC} \text { or } \\ 250 \mathrm{VAC} \\ \text { 10A @28VDC or } \\ \text { 120VAC } \end{gathered}$ |
| Expected Mechanical Life | $2 \times 10^{7}$ Ops． | $3 \times 10^{7}$ Ops． | $2 \times 10^{7}$ Ops． | $5 \times 10^{6}$ Ops． | $5 \times 10^{6}$ Ops． | $1 \times 10^{7} \mathrm{Ops}$. | $1 \times 10^{7}$ Ops． |
| Expected <br> Electrical <br> Life at <br> Rated Load | $5 \times 10^{4}$ | $1 \times 10^{5}$ | $5 \times 10^{4}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ |
| Nominal Coil Voltage | 12－24VDC | 5－48VDC | $3-60 V D C$ | 5－24VDC | $5-48 \mathrm{VDC}$ | $3-24 V D C$ | $5-48 \mathrm{VDC}$ |
| Nominal Coil Power | 210 mW | 220 mW | 230 mW | 200 mW | $200-400 \mathrm{~mW}$ | 200－450mW | 200－450mW |
| Mounting Options | PC board | PC board | PC board | PC board | PC board | PC board | PC board |
| Sockets／ <br> Connectors | － | － | － | － | － | － | － |
| Page Number | 409 | 412 | 414 | 416 | 418 | 420 | 422 |


| M id-Range Printed Circuit B oard Relays |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | OEG | SCHRACK | SCHRACK | P\&B | OEG | P\&B | OEG |
| Series | PCD/PCDF | PB | V23148 (U/UB) | T73 | OUDH | T7N | PCE |
| Features | - 10-15A rating <br> - Low-profile relay <br> - Sensitive coil <br> - Sealed or flux tight case <br> - Available with quick connect terminals for load | - 10A rating <br> - Miniature relay <br> - Low complexity design <br> - Flux tight case <br> - Available Class F coil insulation ${ }^{c} \boldsymbol{N}_{\text {us }}^{\circ} \text { VDE }$ | - 7A rating <br> - Standard or latching type <br> - Sensitive version available <br> - 2 kV or 4 kV dieleectric options <br> - Sealed case <br> ${ }_{c} \mathrm{Ni}_{\mathrm{us}}$ | - 10A rating <br> - Low-profile relay <br> - Sealed case <br> - UL508 <br> - Class F coil insulation standard | - 10A rating <br> - Low-profile relay <br> - Flux tight or sealed case <br> - Class A coil insulation standard | - 10A rating <br> - Low-profile relay <br> - UL Class F coil standard <br> - Immersion cleanable sealed case | - 10A rating <br> - Low-profile relay <br> - UL Class F coil standard <br> - Immersion cleanable sealed case |
| Approximate Dimensions | $\begin{gathered} .90 " \times .63 " \times .40 " \mathrm{~h} \\ (23.0 \times 16.1 \times 10.2 \mathrm{~h}) \\ 0.35 \mathrm{oz} .(10 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} .59 " \times .59 " \times .79 " \mathrm{~h} \\ (15.0 \times 15.0 \times 20.0 \mathrm{~h}) \\ 0.2 \mathrm{oz} .(5.4 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} .64 " \times .84 " \times .59 \mathrm{~h} \mathrm{~h} \\ (16.2 \times 21.2 \times 14.9 \mathrm{~h}) \\ 0.34 \mathrm{oz} .(9.5 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .88 " \times .69 " \times .61 \mathrm{~h} h \\ (22.3 \times 17.6 \times 15.5 \mathrm{~h}) \\ 0.42 \mathrm{oz} .(12 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} .88 " \times .69 " \times .61 \mathrm{~h} h \\ (22.3 \times 17.6 \times 15.5 \mathrm{~h}) \\ 0.42 \mathrm{oz} .(12 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .87 " \times .63 " \times .65 " \mathrm{~h} \\ (22.0 \times 16.0 \times 16.4 \mathrm{~h}) \\ 0.38 \mathrm{oz} .(11 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{array}{\|c} .87 " \times .63 " \times .65 " \mathrm{~h} \\ (22.0 \times 16.0 \times 16.4 \mathrm{~h}) \\ 0.38 \text { oz. }(11 \mathrm{~g}) \\ \hline \end{array}$ |
| Contact <br> Arrangements | 1 Form A | 1 Form A | 1 Form A, 1 Form B, 1 Form C | 1 Form A, 1 Form C | 1 Form A, <br> 1 Form C | 1 Form A, 1 Form C | 1 Form A, 1 Form C |
| Contact Material | AgSnO | AgNi 90/10 | AgNi 0.15 | AgCdO | Ag Alloy | AgCdO | AgCdO, AgSnO |
| Maximum <br> Contact <br> Rating | 15A @ 125VAC (QC version only) 10A @ 28VDC or 250VAC resistive | 10A @ 240VAC (NO) <br> 3A @ 240VAC (NC) | $\begin{aligned} & \text { 7A @ 250VAC or } \\ & 24 \mathrm{VDC} \\ & \text { resistive } \end{aligned}$ | $\begin{gathered} \text { 10A @ 120VAC } \\ \text { 6A @ 24VDC } \end{gathered}$ | $\begin{gathered} \text { 10A @ 120VAC } \\ \text { 6A @ 24VDC } \end{gathered}$ | $\begin{gathered} \text { 10A @ 240VAC } \\ \text { or 28VDC } \end{gathered}$ | $\begin{gathered} \text { 10A @ 250VAC } \\ \text { or 28VDC } \end{gathered}$ |
| Expected Mechanical Life | $1 \times 10^{7}$ Ops. | $5 \times 10^{6}$ Ops. | $2 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7} \mathrm{Ops}$. |
| Expected <br> Electrical <br> Life at <br> Rated Load | $1 \times 10^{5}$ | $\begin{gathered} 1 \times 10^{5} \text { at } 6 \mathrm{~A}, 240 \mathrm{VAC} \\ (\mathrm{NO}) \\ 2.5 \times 10^{4} \text { at } 10 \mathrm{~A}, \\ 240 \mathrm{VAC}(\mathrm{NO}) \end{gathered}$ | $5 \times 10^{4}$ at 7A (NO) | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ Ops. | $1 \times 10^{5}$ Ops. |
| Nominal Coil Voltage | 5-48VDC | 6-24VDC | 6-48VDC | $3-48 \mathrm{VDC}$ | 5-48VDC | $3-48 \mathrm{VDC}$ | 6-48VDC |
| Nominal Coil Power | 200-250mW | 360 mW | $330-800 \mathrm{~mW}$ | 450-660mW | 450-660mW | 360 mW | 360 mW |
| Mounting Options | PC board | PC board | PC board | PC board | PC board | PC board, Socket | PC board, Socket |
| Sockets / <br> Connectors | - | - | - | - | - | PC terminals (10A rated) | PC terminals (10A rated) |
| Page Number | 424 | 426 | 428 | 430 | 432 | 434 | 436 |

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| Mid-Range Printed Circuit B oard Relays |  |  |  |  |  |  |  |
|  | OEG | P\&B | OEG | OEG | P\&B/SCHRACK | SCHRACK | SCHRACK |
| Series | ORWH | T7C | SRUDH | SRUUH | $\mathbf{R T}$ (DC) | RT (AC) | RT (Sens.) |
| Features | - 10A rating <br> - Low-profile relay <br> - Flux-tight or sealed case ${ }_{c} \boldsymbol{M}_{\text {us }}^{\circ} \Delta$ | - 5-12A rating <br> - Compact design <br> - $1,500 \mathrm{Vms}$ coil-tocontact breakdown <br> - Immersion cleanable or fluxtight case <br> - UL Class F coil standard | - 12A rating <br> - Compact design <br> - $1,500 \mathrm{Vms}$ coil-tocontact breakdown <br> - Immersion cleanable or fluxtight case $c \mathbb{N}_{\text {us }}^{\circ} \Delta$ | - 15A rating <br> - Compact design <br> - 1,500 Vrms coil-tocontact breakdown <br> - Immersion cleanable or fluxtight case <br> ${ }^{\circ} \mathrm{NH}_{\text {us }} \Delta$ | - 8-16A rating <br> - Immersion cleanable or fluxtight case <br> - Low profile case <br> - 10 mm coil-tocontact spacing for 5 kV isolation | - 8-16A rating <br> - Immersion cleanable or fluxtight case <br> - Low profile case <br> - 10 mm coil-tocontact spacing for 5 kV isolation $c \mathbb{N}_{\text {Us }}^{\circ}$ | - 10A rating <br> - Sensitive coil <br> - Immersion cleanable or fluxtight case <br> - Low profile case <br> - 10mm coil-tocontact spacing for 5 kV isolation ${ }^{c} \boldsymbol{N}_{\text {US }}^{\circ} \text { VOE }(\stackrel{+}{5})$ |
| Approximate Dimensions | $\begin{gathered} .75 " \times .61 " \times .6 \mathrm{~h} \\ (20.3 \times 16.5 \times 20.6 \mathrm{~h}) \\ 0.33 \mathrm{oz} .(9.5 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .80 " \times .65 " \times .81 \mathrm{~h} \\ (20.3 \times 16.5 \times 20.6 \mathrm{~h}) \\ 0.42 \mathrm{oz} .(12 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .80 " \times .65 " \times .81 \mathrm{~h} \\ (20.3 \times 16.5 \times 20.6 \mathrm{~h}) \\ 0.42 \mathrm{oz} .(12 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .80 " \times .65 " \times .81^{\prime \prime} \mathrm{h} \\ (20.3 \times 16.5 \times 20.6 \mathrm{~h}) \\ 0.42 \mathrm{oz}(12 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.14^{\prime \prime} \times .50 \text { " } \times .62^{\prime \prime} \mathrm{h} \\ (29 \times 12.7 \times 15.7 \mathrm{~h}) \\ 0.42 \mathrm{oz} .(12 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.14^{\prime \prime} \times .50 \text { " } \times .62^{\prime \prime} \mathrm{h} \\ (29 \times 12.7 \times 15.7 \mathrm{~h}) \\ 0.42 \mathrm{oz} .(12 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.14^{\prime \prime} \times .50 \text { " x } .62^{\prime \prime} \mathrm{h} \\ (29 \times 12.7 \times 15.7 \mathrm{~h}) \\ 0.42 \mathrm{oz} .(12 \mathrm{~g}) \end{gathered}$ |
| Contact <br> Arrangements | 1 Form A, 1 Form C | 1 Form A, <br> 1 Form C | 1 Form A, <br> 1 Form C | 1 Form A, <br> 1 Form C | 1 Form A, 2 Form A, 1 Form C, 2 Form C | 1 Form A, 2 Form A, 1 Form C, 2 Form C | 1 Form A, 1 Form C |
| Contact Material | AgCdO | AgCdO, Ag | AgCdO | AgCdO | AgNi 90/10 | AgNi 90/10 | AgNi 90/10 |
| Maximum <br> Contact <br> Rating | 10A @ 277VAC or 28VDC (NO) 15A @ 120VAC (NO) 10A/6A @ 250VAC or 28VDC (NO/NC) | 10A @ 240VAC or 28VDC 12A @120VAC | 10A @ 240VAC or 28VDC 12A @ 120VAC | 10A @ 240VAC or 28VDC 15A @ 120VAC | 16A, AC or DC 250VAC, 30VDC (16A version) | 16A, AC or DC 250VAC, 30VDC (16A version) | $\begin{aligned} & \text { 10A, AC } \\ & \text { 250VAC } \end{aligned}$ |
| Expected Mechanical Life | $1 \times 10^{7} \mathrm{Ops}$. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7} \mathrm{Ops}$. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. |
| Expected <br> Electrical <br> Life at <br> Rated Load | $\begin{gathered} 1 \times 10^{5} \text { Ops. at } \\ 10 \mathrm{~A} @ 250 \mathrm{VAC} \text { (NO) } \end{gathered}$ | $1 \times 10^{5}$ Ops. | $1 \times 10^{5}$ Ops. | $1 \times 10^{5}$ Ops. | $\begin{gathered} 5 \times 10^{4} \\ \text { (16A version) } \end{gathered}$ | $\begin{gathered} 5 \times 10^{4} \\ \text { (16A version) } \end{gathered}$ | $1.5 \times 10^{5}$ |
| Nominal Coil Voltage | $3-48 \mathrm{VDC}$ | $3-48 V D C$ | 6-48VDC | $3-48 \mathrm{VDC}$ | 5-110VDC | 24-230VAC | 5-60VDC |
| Nominal Coil Power | 360 mW | 360 mW | 360 mW | $360-510 \mathrm{~mW}$ | 400 mW | .75VA | 250 mW |
| Mounting Options | PC board, Socket | PC board, Socket | PC board, Socket | PC board, Socket | PC board, Socket | PC board, Socket | PC board, Socket |
| Sockets/ <br> Connectors | PC terminals (10A rated) | PC terminals (10A rated) | PC terminals (10A rated) | PC terminals (10A rated) | Screw terminals, PC terminals | Screw terminals, PC terminals | Screw terminals, PC terminals |
| Page Number | 438 | 440 | 442 | 442 | 446 | 448 | 451 |

Specifications and/or agency recognitions do not necessarily apply to all models within a particular series. When multiple ratings are listed, no individual rating may be exceeded by the combination of others.
Dimensions are shown for Dimensions are in inches over Specifications and availability www.tycoelectronics.com


Specifications and/or agency recognitions do not necessarily apply to all models within a particular series. When multiple ratings are listed, no individual rating may be exceeded by the combination of others.

| Electronics |  |  | Issue | d 3－03 |  |  | ECTOR GUIDE |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| M id－Range Printed Circuit B oard Relays |  |  |  |  |  |  |  |
|  | OEG |  | OEG | OEG | OEG | OEG | OEG |
|  | OMIF | PCI | OSA | OSZ | SDT | SDT－R | PCK |
| Features | －20A rating <br> －Flux－tight case <br> －5，000 Vrms coil－to－ contact breakdown <br> －Quick connect terminals for load <br> 只（（1） | －3A rating <br> －Slim design <br> －Sealed or flux－ tight case <br> －Magnetic blowout option for DC loads <br> －Handles audio speaker loads <br> 只（1） | －TV－3／4 rating <br> －Flux－tight case <br> －Low profile case <br> －3，000 Vrms coil－to－ contact breakdown | －TV－8 rating <br> －4，000 Vms coil－to－ contact breakdown <br> －Sealed or flux－tight case | －10A／TV－5 rating <br> －4，000 Vms coil－to－ contact breakdown <br> －Sealed or flux－tight case | －TV－8／TV－5 rating <br> －Standard or sensitive coil <br> － $4,000 \mathrm{Vms}$ coil－to－ contact breakdown <br> －Flux－tight case | －16A rating <br> －5，000 Vrms coil－to－ contact breakdown <br> －Quick connect terminals for load <br> －Flux－tight case |
| Approximate Dimensions | $\begin{gathered} 1.14 \text { " } \times .50 \text { " } \times .96 \text { "h } \\ (29.2 \times 12.8 \times 24.5 \mathrm{~h}) \\ 0.53 \mathrm{oz} .(15 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .945 \text { " x } .394 \text { " x } .984 \text { "h } \\ (24 \times 10 \times 25 \mathrm{~h}) \\ 0.41 \text { oz. (10.5g) } \end{gathered}$ | $\begin{gathered} .96^{\prime \prime} \times .508^{\prime \prime} \times .976 \mathrm{~h} \\ (24.4 \times 12.9 \times 24.8 \mathrm{~h}) \\ 0.46 \mathrm{oz} .(13 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} .96 " \times .508 " \times .9766^{\prime \prime} \mathrm{h} \\ (24.4 \times 12.9 \times 24.8 \mathrm{~h}) \\ 0.46 \text { oz. (13g) } \end{gathered}$ | $\begin{gathered} .96 " \times .409 " \times .984^{1 " h} \\ (24.4 \times 10.4 \times 25 \mathrm{~h}) \\ 0.39 \mathrm{oz} .(11 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .945 " \times .394 \text { " } \times .984^{\prime \prime} \mathrm{h} \\ (24 \times 10.4 \times 25 \mathrm{~h}) \\ 0.39 \text { oz. (11g) } \end{gathered}$ | $\begin{gathered} .866 \times .417 \times 1.05 \mathrm{~h} \\ (22 \times 10.6 \times 26.7 \mathrm{~h}) \\ .46 \mathrm{oz}(13 \mathrm{~g}) \end{gathered}$ |
| Contact <br> Arrangements | 1 Form A | 2 Form A | 2 Form A | 1 Form A | 1 Form A | 1 Form A | 1 Form A |
| Contact Material | AgSnO | Ag Alloy | AgSnO（DM5 type） AG－GS Alloy（DM3） | AgSnO | AgSnO | AgSnO | AgSnO |
| Maximum <br> Contact <br> Rating | 20A＠125VAC， <br> 16A＠240VAC， <br> 16A＠24VDC | $\begin{gathered} 3 \mathrm{~A} @ 120 \mathrm{VAC} \text { or } \\ 24 \mathrm{VDC} \end{gathered}$ | $\begin{array}{\|c} \text { TV-3 @ 120VAC (UL) } \\ \text { TV-4 @120VAC (CSA) } \\ \text { 5A @120VAC or } \\ 30 \mathrm{VDC} \text { (DM5) } \\ \\ \text { 3A @120VAC or } \\ 24 \mathrm{VDC} \text { (DM3) } \end{array}$ | $\begin{gathered} \text { TV-8 @ 120VAC (UL) } \\ \text { 16A @120VAC or } \\ \text { 24VDC } \end{gathered}$ | $\begin{aligned} & \text { TV-5 @ 120VAC (UL) } \\ & \text { 10A @ 250VAC or } \\ & \text { 30VDC } \end{aligned}$ | $\begin{aligned} & \text { TV-8 @ 120VAC (UL) } \\ & \text { 10A @ 250VAC or } \\ & \text { 30VDC (Std. Coil) } \\ & \text { TV-5 @120VAC (UL) } \\ & \text { 5A @ 250VAC or } \\ & \text { 30VDC (Sens. Coil) } \end{aligned}$ | $\begin{aligned} & \text { 16A @ 250VAC or } \\ & \text { 24VDC } \end{aligned}$ |
| Expected Mechanical Life | $1 \times 10^{7}$ Ops． | $1 \times 10^{7}$ Ops． | $1 \times 10^{7}$ Ops． | $1 \times 10^{7}$ | $1 \times 10^{7}$ | $1 \times 10^{7}$ | $2 \times 10^{6}$ |
| Expected <br> Electrical <br> Life at <br> Rated Load | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $\begin{gathered} 1 \times 10^{5} \\ 2.5 \times 10^{4} \\ \text { at TV-8 } \end{gathered}$ | $\begin{gathered} 1 \times 10^{5} \\ 2.5 \times 10^{4} \\ \text { at TV-5 } \end{gathered}$ | $\begin{gathered} 1 \times 10^{5} \\ 2.5 \times 10^{4} \\ \text { at TV-5 or TV-8 } \end{gathered}$ | $1 \times 10^{5}$ |
| Nominal Coil Voltage | 12－24VDC | $5-24 \mathrm{VDC}$ | 5－48VDC | $5-48 \mathrm{VDC}$ | 5－48VDC | $5-48 \mathrm{VDC}$ | 5－24VDC |
| Nominal Coil Power | 540 mW | 350 mW | 540 mW | 540 mW | 540 mW | 250mW（Sensitive） <br> 540mW（Standard） | 500 mW |
| Mounting Options | PC board， Socket | PC board | PC board | PC board | PC board | PC board | PC board |
| Sockets／ <br> Connectors | Screw terminals， PC terminals | － | － | － | － | － | － |
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Dimensions are shown for Dimensions are in inches over Specifications and availability ww．tycoelectronics．com

|  |  |  | Issu | 3-03 |  |  | CTOR G |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| M id-Range Printed Circuit B oard Relays |  |  |  |  |  |  |  |
|  |  |  | SCHRACK | SCHRACK | SCHRACK | SCHRACK | SCHRACK |
|  | V23057 (Card E) | RP \|1/2 | RP \|//1 | RP 3 SL | 0409 | V23077 (IF) | 0410 |
| Features | - 8A rating <br> - Horizontal or vertical version <br> - Single or bifurcated contacts <br> - 4,000 Vrms coil-tocontact breakdown <br> - Washable case <br> ${ }^{c} \mathrm{Ni}_{\text {us }}$ (VOE | - 8A rating <br> - Slim design <br> - Sealed or fluxtight case <br> - 4,000 Vrms coil-tocontact breakdown | - 8-16A rating <br> - Slim design <br> - Sealed or fluxtight case <br> - 4,000 Vrms coil-tocontact breakdown | - 120A inrush rating <br> - 16A rating <br> - Standard and latching types <br> - Sealed or flux-tight case <br> - 4,000 Vrms coil-tocontact breakdown <br> ${ }^{c} \mathrm{ND}_{\text {us }}$ VDE | - 500A inrush rating <br> - 10A rating <br> - Flux-tight case <br> - 4,000 Vrms coil-tocontact breakdown | - 16 rating <br> - Quick connect terminals for load <br> - 4,000 Vrms coil-tocontact breakdown <br> - Flux-tight case | - 16A rating <br> - Quick connect terminals for load <br> - 4,000 Vrms coil-tocontact breakdown <br> - Form X model provides 3 mm contact gap <br> - Flux-tight case |
| Approximate Dimensions | $\begin{gathered} 1.10 " \times .984 " \times .425 \mathrm{hh} \\ (28.0 \times 25.0 \times 10.8 \mathrm{~h}) \\ 0.28 \mathrm{oz} .(8 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 1.14^{\prime \prime} \times .496 " \times 1.0^{\prime \prime} \mathrm{h} \\ (29.0 \times 12.6 \times 25.5 \mathrm{~h}) \\ 0.63 \mathrm{oz} .(18 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.14 " \times .496 " \times 1.0^{\prime \prime} \mathrm{h} \\ (29.0 \times 12.6 \times 25.5 \mathrm{~h}) \\ 0.63 \mathrm{oz} .(18 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.12 " \times .48 " \times .996 \mathrm{~h} \\ (28.5 \times 12.2 \times 25.3 \mathrm{~h}) \\ 0.63 \mathrm{oz} .(18 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .96 " \times .409 " \times .984 \mathrm{~h} h \\ (24.4 \times 10.4 \times 25 \mathrm{~h}) \\ 0.35 \mathrm{oz} .(10 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.594^{\prime \prime} \times .52^{\prime \prime} \times 1.14^{\prime \mathrm{h}} \mathrm{~h} \\ (40.5 \times 13.2 \times 29 \mathrm{~h}) \\ 0.92 \mathrm{oz} .(26 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.594 " \times .492 " \times 1.12 " \mathrm{~h} \\ (40.5 \times 12.5 \times 28.5 \mathrm{~h}) \\ 0.85 \mathrm{oz} .(24 \mathrm{~g}) \\ \hline \end{gathered}$ |
| Contact Arrangements | 1 Form A. 1 Form C | $\begin{aligned} & 2 \text { Form A, } \\ & 2 \text { Form C } \end{aligned}$ | 1 Form A, <br> 1 Form C | 1 Form A | 1 Form A | 1 Form A, 1 Form B, | 1 Form A, 1 Form B, <br> 1 Form X (only VDE) |
| Contact Material | $\begin{gathered} \text { AgNi 0.15, } \\ \text { AgNi 20, AgCdO } \end{gathered}$ | $\begin{gathered} \mathrm{AgCdO} \\ \text { AgNi } 0.15 \end{gathered}$ | $\begin{gathered} \mathrm{AgCdO}, \\ \text { AgNi } 0.15 \end{gathered}$ | AgSnO | AgCdO with W prerun | AgCdO | AgSnO, AgNi (1 Form X only) |
| Maximum Contact Rating | 8A @ 250VAC <br> 5A @ 250VAC with AgNi 0.15 | 8A @ 250VAC | 16A @ 250VAC 12A @ 250VAC <br> 8A @ 250VAC | 120A peak inrush 16A @ 250VAC TV-8 @ 120VAC | 500A peak inrush 10A @ 250VAC | 16A @ 250VAC | 16A @ 250VAC |
| Expected <br> Mechanical Life | $2 \times 10^{7} \mathrm{Ops}$. | $2 \times 10^{7} \mathrm{Ops}$. | $3 \times 10^{7}$ Ops. | $3 \times 10^{7}$ | $3 \times 10^{7}$ | $3 \times 10^{7}$ | $1 \times 10^{7}$ |
| Expected <br> Electrical <br> Life at <br> Rated Load | $2.5 \times 10^{5}$ | $\begin{gathered} 1 \times 10^{5} \\ (\text { AgCdO) } \end{gathered}$ | $\begin{aligned} & 1.5 \times 10^{5} \\ & (\mathrm{AgCdO}) \end{aligned}$ | $\begin{gathered} 2 \times 10^{5} \\ 2.5 \times 10^{4} \\ \text { at TV-8 } \end{gathered}$ | $2.5 \times 10^{5}$ | $\begin{aligned} & 1 \times 10^{5}(\text { Form } A) \\ & 5 \times 10^{4}(\text { Form B) } \end{aligned}$ | $\begin{gathered} 1 \times 10^{5}(\text { Form A) } \\ 1.5 \times 10^{5}(\text { Form B) } \\ 3 \times 10^{4}(\text { Form X) } \end{gathered}$ |
| Nominal Coil Voltage | 6-60VDC | 5-110VDC | 5-110VDC | 5-60VDC | 6-60VDC | 6-48VDC | 6-60VDC |
| Nominal Coil Power | 450-500mW | 500 mW | 500 mW | 500mW-1.5W | 820 mW | 360 mW | 360 mW |
| Mounting Options | PC board | PC board, Socket | PC board, Socket | PC board | PC board | PC board | PC board |
| Sockets / <br> Connectors | - | Screw terminals, PC terminals | Screw terminals, PC terminals | - | - | - | - |
| Page Number | 480 | 482 | 484 | 486 | 488 | 489 | 491 |

[^3]|  |  |  |  |  |  |  |  |  |
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| Mid-Range P. C. Board Relays |  |  |  | Power Printed Circuit B oard Relays |  |  |  |  |
|  | OEG | SCHRACK | P\&B | OEG | P\&B | P\&B | P\&B | P\&B |
|  | PCG | 0430 | 600 | PCF | T90 | T9A | 491 | T92 |
| Features | - TV-5 rating <br> - 4,000 Vrms coil-to-contact breakdown <br> - Flux-tight case | -10-16A rating <br> - 4,000 Vrms coil-to-contact breakdown <br> - Plastic dust cover <br> - PC board, bracket or panel mount <br> - 3 mm contact gap version w/ or w/o magnetic blowout 7) VDE | - 15A rating <br> - Sensitive coil <br> - Unsealed dust cover or sealed case <br> - Range of contact materials, ratings | - 25A rating <br> - $5,000 \mathrm{Vms}$ coil-to-contact breakdown <br> - Flux-tight case <br> - Quick connect terminals for load <br> 只 (18) $\triangle$ | - 30A rating <br> - Less than 1W coil power requirement <br> - Class F insulation <br> - Open, dust cover or immersion cleanable case | - 30A rating <br> - QC and PC terms. <br> - Meets UL 873 / UL 508 spacings <br> - Optional flanged case for panel mounting <br> 미 (18) | - 20A rating <br> - QC and PC terms. <br> - Meets UL 873 / UL 508 spacings <br> - Optional flanged case for panel mounting <br>  | - 30A rating <br> - Two pole unit can break both sides of the AC line <br> - PC board or panel mount <br> - Ideal for HVAC / appliance apps. <br> - 8mm spacing <br> 민(자 $\because(4)$ |
| Approximate Dimensions | $\begin{gathered} 1.11^{\prime \prime} \times .56 " \times .98 \mathrm{~h} \\ (28.2 \times 14.2 \times 24.9 \mathrm{~h}) \\ 0.63 \mathrm{oz} .(18 \mathrm{~g}) \end{gathered}$ | $\begin{array}{\|c} 1.15 \times .51 \times .81 \mathrm{~h} \\ (29.2 \times 12.9 \times 20.6 \mathrm{~h}) \\ .46 \mathrm{oz}(13 \mathrm{~g}) \end{array}$ | $\begin{gathered} 1.25^{\prime \prime} \times .775^{\prime \prime} \times 1.2^{\prime \prime} \mathrm{h} \\ (31.8 \times 19.7 \times 30.5 \mathrm{~h}) \\ 1.6 \mathrm{oz} .(45 \mathrm{~g}) \end{gathered}$ | $1.2^{\prime \prime} \times .63$ " $\times 1.04^{\prime \prime} \mathrm{h}$ $(30.4 \times 16.0 \times 26.5 \mathrm{~h})$ $.99 \mathrm{oz} .(28 \mathrm{~g})$ | $\begin{array}{\|c} 1.20 " \times .95 " x .67 " h \\ (30.5 \times 24.1 \times 16.9 \mathrm{~h}) \\ 0.9 \mathrm{oz} .(26 \mathrm{~g}) \end{array}$ | $\begin{gathered} 1.27 " \times 1.08 \text { " } \times 1.10^{\prime \prime} \mathrm{h} \\ (32.3 \times 27.4 \times 27.9 \mathrm{~h}) \\ .9 \text { oz. }(26 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.26 \text { " } \times 1.08 \text { " } \times 1.10 \text { "h } \\ (32.5 \times 27.4 \times 27.9 \mathrm{~h}) \\ 1.2 \text { oz. }(33 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 2.06 " \times 1.36 \text { " } \times 1.21 \mathrm{~h} \\ (52.3 \times 34.5 \times 30.7 \mathrm{~h}) \\ 3 \mathrm{oz}(86 \mathrm{~g}) \end{gathered}$ |
| Contact <br> Arrangements | 2 Form A | 1 Form A through 2 Form C | 1 Form A, 1 Form B, 1 Form C | 1 Form A | 1 Form A, <br> 1 Form C | 1 Form A, 1 Form C | 1 Form A, 1 Form B 1 Form C | 2 Form A, <br> 2 Form C |
| Contact Material | AgSnO | $\begin{gathered} \mathrm{AgCdO} \text { or } \\ \mathrm{AgCu} 3 \end{gathered}$ | Au flashed AgCd, AuAg, AgCdO, Au flashed Coin Ag, Fine Ag, AgCd, Pd | AgSnO | AgCdO | AgCdO | AgCdO | AgCdO |
| Maximum Contact Rating | $\begin{aligned} & \text { TV-5 @ 120VAC } \\ & \text { 8A @ 250VAC } \\ & \text { 5A @ 250VAC } \end{aligned}$ | 16A @ 250VAC <br> (1 pole types) <br> 10A @ 250 VAC <br> (2 pole types) | $\begin{gathered} \text { From15A @150VAC } \\ \text { for AgCdO } \\ \text { to 2A @ 28VDC } \\ \text { for Pd } \end{gathered}$ | $\begin{aligned} & \text { 25A @ 250VAC } \\ & \text { 23A @277VAC } \end{aligned}$ | $\begin{gathered} \text { 30A @ 240VAC } \\ \text { 20A @ 28VDC } \\ \text { 6A @ 277VAC } \\ 2 \text { HP @240VAC } \\ \text { (Form A) } \end{gathered}$ | $\begin{gathered} \text { 30A @ 240VAC } \\ \text { 20A @28VDC } \\ \text { 10A @277VAC } \\ \text { 98LRA/22FLA @ } \\ \text { 120VAC } \\ 2 \text { HP @240VAC } \\ \text { (Form A) } \end{gathered}$ | $\begin{gathered} \text { 20A @ 240VAC } \\ \text { 20A @28VDC } \\ \text { 10A @277VAC } \\ \text { 98LRA/22FLA @ } \\ \text { 120VAC } \\ 2 \text { HP @240VAC } \\ \text { (Form A) } \end{gathered}$ | 30A @ 277VAC 20A @ 28VDC 10A @ 600VAC TV10A @120VAC 2.5 HP @ 240 VAC 1 HP @120VAC |
| Expected Mechanical Life | $1 \times 10^{7}$ Ops. | $2.5 \times 10^{5}$ | $1 \times 10^{7} \mathrm{Ops}$. | $1 \times 10^{7} \mathrm{Ops}$. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $5 \times 10^{6}$ Ops. |
| Expected <br> Electrical <br> Life at Rated Load | $\begin{gathered} 1 \times 10^{5} \text { at } 5 \mathrm{~A} \\ 5 \times 10^{4} \text { at } 8 \mathrm{~A} \\ 2.5 \times 10^{4} \text { at TV-5 } \end{gathered}$ | $\begin{gathered} 2.5 \times 10^{5} \\ \text { except } \\ 1.5 \times 10^{5} \text { for } \\ 3 \mathrm{~mm} \text { gap type } \end{gathered}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5} \mathrm{Ops}$. |
| Nominal Coil Voltage | 5-48VDC | $\begin{aligned} & 12-110 \mathrm{VDC} \\ & 24-230 \mathrm{VAC} \end{aligned}$ | $3-48 \mathrm{VDC}$ | 6-48VDC | 5-110VDC | 5-110VDC | 12-220VAC | $\begin{aligned} & \text { 12-110VDC } \\ & \text { 24-240VAC } \end{aligned}$ |
| Nominal Coil Power | 540 mW | $\begin{aligned} & \text { 1.0W (DC) } \\ & \text { 1.8VA (AC) } \end{aligned}$ | 110mW (3-5A types) 240mW (15A types) | 900 mW | 850-930mW | 900 mW , 1.0W | 2.0VA | $\begin{gathered} \text { 1.7W (DC) } \\ \text { 4.0VA (AC) } \end{gathered}$ |
| Mounting Options | PC board | PC board, Bracket, Panel | PC board | PC board | PC board | PC board, Panel mount | PC board, Panel mount | PC board Panel mount |
| Sockets/ Connectors | - | - | - | - | - | - | - | - |
| Page Number | 493 | 495 | 497 | 502 | 504 | 506 | 509 | 511 |


| Relays with Forcibly Guided Contacts |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |
|  | SCHRACK | SCHRACK | SCHRACK | SCHRACK | SCHRACK |  |
|  | V23047 (SR2M ) | SR4 | SR6D/M | V23050 (SR6) | SR6-Sensitive | SR6Z |
| Features | - 6A rating <br> - Forcibly guided contacts <br> - Two poles <br> - Use for emergency shutoff; machine, elevator,escalator, light barrier control <br> ${ }^{c} \mathrm{ND}_{\mathrm{us}}$ | - 8A rating <br> - Forcibly guided contacts <br> - Four poles <br> - Compact size <br> - Use for emergency shutoff; machine, elevator,escalator, light barrier control <br> ${ }^{\mathrm{c}} \mathrm{NB}_{\mathrm{us}}$ | - 8A rating <br> - Forcibly guided contacts <br> - Four poles <br> - Larger spacings for increased isolation <br> - Use for emergency shutoff; machine, elevator,escalator, light barrier control | - 8A rating <br> - Forcibly guided contacts <br> - Six poles <br> - Use for emergency shutoff; machine, elevator,escalator, light barrier control ${ }^{\mathbf{M}} \mathbf{N}_{\text {US VDE }} \Delta$ | - 8A rating <br> - Forcibly guided contacts <br> - Six poles <br> - Sensitive, polarized coil <br> - Use for emergency shutoff; machine, elevator,escalator, light barrier control | - 8A rating <br> - Forcibly guided contacts <br> - Six poles <br> - DIN mount module <br> - Use for emergency shutoff; machine, elevator,escalator, light barrier control |
| Approximate Dimensions | $\begin{gathered} 1.14 \text { " } \times .50 \text { " } \times 1.0^{\prime \prime} \mathrm{h} \\ (29 \times 12.7 \times 25.4 \mathrm{~h}) \\ 0.6 \mathrm{oz} .(18 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.57 \text { "x } .51 \text { "x } .63 \text { "h } \\ (40 \times 13 \times 16 \mathrm{~h}) \\ 0.56 \mathrm{oz} .(16 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 2.165 " \times .65 " \times .63^{\prime \prime} \mathrm{h} \\ (55 \times 16.5 \times 16 \mathrm{~h}) \\ 1.06 \mathrm{oz} .(30 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 2.17 " \times .65 " \times .63 " h \\ (55.0 \times 16.5 \times 16.0 \mathrm{~h}) \\ 1.01 \mathrm{oz} .(30 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 2.17 " \times .65 " \times .63 \text { "h } \\ (55.0 \times 16.5 \times 16.0 \mathrm{~h}) \\ 1.01 \mathrm{oz} .(30 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.81^{\prime \prime} \times 3.42^{\prime \prime} \times .2 .12^{\prime \prime h} \\ (46 \times 87 \times 54 \mathrm{~h}) \\ 3.17 \mathrm{oz} .(90 \mathrm{~g}) \end{gathered}$ |
| Contact Arrangements | 1 Form $A+1$ Form B, 2 Form C | $\begin{aligned} & 2 \text { Form } A+2 \text { Form } B \text {, } \\ & 3 \text { Form } A+1 \text { Form } B \end{aligned}$ | $\begin{aligned} & 2 \text { Form } A+2 \text { Form B, } \\ & 3 \text { Form } A+1 \text { Form B } \end{aligned}$ | $\begin{aligned} & 4 \text { Form } A+2 \text { Form } B \text {, } \\ & 3 \text { Form } A+3 \text { Form B, } \\ & 5 \text { Form } A+1 \text { Form } B \end{aligned}$ | 4 Form $A+2$ Form B, <br> 3 Form $A+3$ Form $B$, <br> 5 Form $A+1$ Form B | $\begin{aligned} & 4 \text { Form } A+2 \text { Form } B \text {, } \\ & 3 \text { Form } A+3 \text { Form B, } \\ & 5 \text { Form } A+1 \text { Form } B \\ & \hline \end{aligned}$ |
| Contact Material | AgNi | AgNi | AgNi | AgNi | AgNi | AgNi |
| Maximum <br> Contact <br> Rating | 6A @ 250VAC | 8A @ 250VAC | 8A @ 250VAC | 8A @ 250VAC | 8A @ 250VAC | 8A @ 250VAC |
| Expected Mechanical Life | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7} \mathrm{Ops}$. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. |
| Expected <br> Electrical <br> Life at <br> Rated Load | - | - | - | - | - | - |
| Nominal Coil Voltage | 5-110VDC | 5-110VDC | 5-110VDC | 5-110VDC | 5-48VDC | 24VDC, 24VACNDC, 115VACNDC, 230VAC |
| Nominal Coil Power | 700mW | 800 mW | 1.2W | 1.2W | 800 mW | - |
| Mounting Options | PC board, Socket | PC board | PC board | PC board | PC board | PC board |
| Sockets/ Connectors | Screw terminals, PC terminals | - | - | - | - | - |
| Page Number | 603 | 606 | 607 | 609 | 611 | 613 |

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| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Plug-in / Panel M ount Relays |  |  |  |  |  |  |  |
|  | P\&B | P\&B | OEG | SCHRACK | P\&B | P\&B | SCHRACK |
| Series | R10 | KHA/KHS | PCL(H) | PT | K10 | KUP | RM2/3/7 |
| Features | - 0-7.5A rating <br> - Up to 8 poles <br> - Highly sensitive coils available <br> - Many contact options <br> - Various case, terminal and mounting styles <br> 品 (1) | - 0-5A rating <br> - Compact package <br> - 2PDT \& 4PDT <br> - Smoked dust cover <br> - Various mounting configurations <br> - Indicator lamp available <br> - Hermetically sealed case option <br> 미(ㅏㅇ | - 3-15A rating <br> - Compact package <br> - One through four poles <br> - Smoked dust cover <br> - AC and DC coils <br> 미(ㅛㅏ | - 6-12A rating <br> - Low profile <br> - DPDT, 3PDT \& 4PDT <br> - Mechanical indicator <br> - Manual test with locking tab option <br> - AC and DC coils <br> ${ }^{C N} \mathrm{~N}_{\text {US }}$ VOE | - 15A rating <br> - Compact package <br> - DPDT <br> - Smoked dust cover <br> - Various mounting configurations <br> - AC and DC coils <br> 이 (18 | - 10A rating <br> - Open or enclosed <br> - Plain or bracket mount dust covers <br> - Optional indicator lamp and push-totest button <br> - Several socket styles <br> 只 (18) | - 10-16A rating <br> - Mechanical indicator standard <br> - Plain or bracket mount dust covers <br> - Several socket styles |
| Approximate Dimensions | $\begin{gathered} 1.17^{\prime \prime} \times .74^{\prime \prime} \times 1.18^{\prime \prime} \mathrm{h} \\ (29.6 \times 18.7 \times 30.2 \mathrm{~h}) \\ 1.0 \mathrm{oz} .(28 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.11^{\prime \prime} \times .86 " \times 1.28 \mathrm{~h} \\ (28.2 \times 21.8 \times 34.9 \mathrm{~h}) \\ 1.6 \mathrm{oz} .(45 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.08 \times .83 \times 1.32 \mathrm{~h} \\ (27.5 \times 21.2 \times 33.6 \mathrm{~h}) \\ 1.13 \mathrm{oz}(32 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} .886 " \times 1.1^{1 "} \times 1.14^{\mathrm{H}} \mathrm{~h} \\ (22.5 \times 28 \times 29 \mathrm{~h}) \\ 1.06 \mathrm{oz} .(30 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.11^{\prime \prime} \times .86 " \times 1.28 \mathrm{lh} \\ (28.2 \times 21.8 \times 34.9 \mathrm{~h}) \\ 1.8 \mathrm{oz} .(51 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.53^{\prime \prime} \times 1.41^{\prime \prime} \times 1.91^{\prime \mathrm{h}} \\ (38.9 \times 35.7 \times 48.4 \mathrm{~h}) \\ 3 \mathrm{oz} .(85 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.52^{\prime \prime} \times 1.40^{\prime \prime} \times 1.91^{\prime \mathrm{h}} \\ (38.5 \times 35.5 \times 48.4 \mathrm{~h}) \\ 3.2 \mathrm{oz} .(92 \mathrm{~g}) \end{gathered}$ |
| Contact Arrangements | 1 Form C to 8 Form C | $\begin{aligned} & 2 \text { Form C, } \\ & 4 \text { Form C } \end{aligned}$ | 1 Form A through 4 Form C | 2 Form C, 3 Form C 4 Form C | 2 Form C | 1 Form A to 4 Form C | 2 Form C, <br> 3 Form C |
| Contact Material | AgCdO, Ag, Au overlay Ag | Ag, AgCdO, AuAgNi, Au overlay Ag, Au diffused Ag | Ag (4 pole only), Ag Alloy | AgNi 90/10, Au plated AgNi 90/10 | AgCdO | $\begin{gathered} \mathrm{Ag} \\ \mathrm{AgCdO} \end{gathered}$ | AgCdO |
| Maximum Contact Rating | Dry circuit to 7.5A @ 28VDC or 115VAC 1/8HP @ 110-120VAC 1/6HP @ 220-240VAC | Dry circuit to 5A <br> @ 28VDC or 240VAC 1/10HP @ 120-240VAC | 3 A to 15A <br> @ 250VAC or 24VDC resistive | 12A@240VAC (DPDT) 8A@240VAC (3PDT) 6A@240VAC (4PDT) | 15A @ 30VDC or 120VAC 10A @ 277VAC 1/3HP @ 120VAC 1/2HP @ 240VAC | $\begin{gathered} \text { 5A @ 28VDC or } \\ \text { 240VAC } \\ \text { 10A @28VDC or } \\ \text { 240VAC } \\ \text { 1/3HP @120VAC } \\ 1 / 2 \mathrm{HP} @ 250-600 \mathrm{VAC} \end{gathered}$ | $\begin{aligned} & \text { 16A @ 400VAC } \\ & \text { (RM2/7) } \\ & \text { 10A @ 400VAC } \\ & \text { (RM3) } \end{aligned}$ |
| Expected Mechanical Life | $1 \times 10^{8}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{8}$ Ops. | $3 \times 10^{7}$ Ops. (DC coil) $2 \times 10^{7}$ Ops. (AC coil) | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $2 \times 10^{7}$ Ops. |
| Expected <br> Electrical <br> Life at Rated Load | $\begin{gathered} 2 \times 10^{4} \\ \text { to } 6 \times 10^{5} \end{gathered}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ |
| Nominal Coil Voltage | $\begin{aligned} & 3-115 \mathrm{VDC} \\ & 6-115 \mathrm{~V} / \Delta C \end{aligned}$ | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-220 \mathrm{VDC} \\ & 6-230 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-110 V D C \\ & 6-240 V A C \end{aligned}$ | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-220 \mathrm{VDC} \\ & 6-400 \mathrm{VAC} \end{aligned}$ |
| Nominal Coil Power | $\begin{gathered} 36 \mathrm{~mW} \text { to } 1.6 \mathrm{~W}(\mathrm{DC}) \\ 1.5 \mathrm{VA}(\mathrm{AC}) \end{gathered}$ | $\begin{aligned} & 0.9 \mathrm{~W} \text { (DC) } \\ & 1.2 \mathrm{VA}(\mathrm{AC}) \end{aligned}$ | $\begin{gathered} 0.9-1 \mathrm{~W}(\mathrm{DC}) \\ 1.4 \mathrm{VA}(\mathrm{AC}) \end{gathered}$ | $\begin{aligned} & 0.75 \mathrm{~W} \text { (DC) } \\ & \text { IVA (AC) } \end{aligned}$ | $\begin{aligned} & 0.9 \mathrm{~W} \text { (DC) } \\ & 1.2 \mathrm{VA} \text { (AC) } \end{aligned}$ | $\begin{gathered} 1.2-1.8 \mathrm{~W}(\mathrm{DC}) \\ 2.0-2.75 \mathrm{VA}(\mathrm{AC}) \end{gathered}$ | $\begin{aligned} & \text { 1.2-1.6W (DC) } \\ & \text { 2.3-2.8VA (AC) } \end{aligned}$ |
| Mounting Options | Socket, Panel mount, PC board | Socket, Panel mount, PC board | Socket, Panel mount, PC board | Socket, PC board | Socket, Panel mount, PC board | Socket, Panel mount, PC board | Socket, Panel mount |
| Sockets/ Connectors | Screw terminal, Solder terminal, PC terminal | Screw terminal, Solder terminal, PC terminal | Screw terminal, Solder terminal, PC terminal | Screw terminal, Solder terminal, PC terminal | Screw terminal, Solder terminal, PC terminal | Screw terminal, Solder terminal, PC terminal, Quick connect terminal | Screw terminal, Solder terminal, PC terminal, Quick connect terminal |
| Page Number | 703 | 709 | 713 | 717 | 720 | 723 | 733 |


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| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Plug-in / Panel M ount Relays |  |  |  |  |  |  |  |
|  | P\&B | P\&B | P\&B | SCHRACK | P\&B | P\&B | P\&B |
| Series | KUEP | KUIP | KUGP | RM5/6 | KUMP | KUP93 | KRPA/KRP |
| Features | - 10A rating <br> - Switches DC currents. <br> - Magnetic blowout <br> - Plain or bracket mount dust covers <br> - Optional indicator lamp | - 10A rating <br> - 8 mm coil-tocontact spacing <br> - Plain or bracket mount dust covers <br> - Several socket styles | - 10A rating <br> - 3mm contact gap <br> - 8 mm coil-to- contact spacing <br> - Plain or bracket mount dust cover <br> - Several socket styles | - 10-16A rating <br> - Mechanical indicator standard <br> - Optional push-totest button <br> - $3 m m$ contact gap <br> - Plain or bracket mount dust cover <br> - Several socket styles <br>  | - 15A rating <br> - Open or enclosed <br> - Plain or bracket mount dust covers <br> - Optional indicator lamp and push-totest button <br> - Several socket styles <br> 미(ㅏ) | - 3-10A rating <br> - Designed primarily for HVAC industry <br> - Accepted pin pattern for HVAC <br> - Plain dust cover | - 10A rating <br> - Octal-type plug <br> - Dust cover <br> - Optional indicator lamp |
| Approximate Dimensions | $\begin{gathered} 1.53 " \times 1.41 " \times 1.91 \mathrm{~h} \\ (38.9 \times 35.7 \times 48.4 \mathrm{~h}) \\ 3 \mathrm{oz} .(85 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 1.53 " \times 1.41^{\prime \prime} \times 1.91 \mathrm{~h} \\ (38.9 \times 35.7 \times 48.4 \mathrm{~h}) \\ 3 \mathrm{oz} .(85 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 1.53^{\prime \prime} \times 1.41^{\prime \prime} \times 1.91^{\prime \mathrm{h}} \\ (38.9 \times 35.7 \times 48.4 \mathrm{~h}) \\ 3 \text { oz. }(85 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 1.52^{\prime \prime} \times 1.40 " \times 1.91^{\prime \prime h} \\ (38.5 \times 35.5 \times 48.4 \mathrm{~h}) \\ 3.2 \mathrm{oz} .(92 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 1.53 " \times 1.41^{\prime \prime} \times 1.91^{\prime \prime} \mathrm{h} \\ (38.9 \times 35.7 \times 48.4 \mathrm{~h}) \\ 3 \mathrm{oz} .(85 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 1.53 " \times 1.41^{\prime \prime} \times 1.91^{\prime \prime} \mathrm{h} \\ (38.9 \times 35.7 \times 48.4 \mathrm{~h}) \\ 3 \mathrm{oz} .(85 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.41^{\prime \prime} \times 1.41^{\prime \prime} \times 2.00^{\prime \prime h} \\ (35.7 \times 35.7 \times 50.8 \mathrm{~h}) \\ 3 \mathrm{oz} .(85 \mathrm{~g}) \\ \hline \end{gathered}$ |
| Contact Arrangements | $\begin{gathered} 1 \text { Form } X, 2 \text { Form A, } \\ 2 \text { Form C } \end{gathered}$ | 1 Form A to 3 Form C | 1 Form A, 2 Form A, 3 Form A, 1 Form X | 2 Form A 3 Form A | 1 Form A to 3 Form C | 3 Form C | 1 Form C to 3 Form C |
| Contact Material | AgCdO | Ag, AgCdO | AgCdO | AgCdO | AgCdO | $\begin{gathered} \mathrm{Ag} \\ \mathrm{AgCdO} \end{gathered}$ | $\begin{gathered} \mathrm{Ag} \\ \mathrm{AgCdO} \end{gathered}$ |
| Maximum <br> Contact <br> Rating | 10A @150VDC (1X) 5A @150VDC (2A) 3A @150VDC (2C) | $\begin{gathered} 5 \mathrm{~A} @ 28 \mathrm{VDC} \text { or } \\ 240 \mathrm{VAC} \\ 10 \mathrm{~A} @ 28 \mathrm{VDC} \text { or } \\ 240 \mathrm{VAC} \\ 1 / 3 \mathrm{HP} @ 120 \mathrm{VAC} \\ 1 / 2 \mathrm{HP} @ 250-600 \mathrm{VAC} \end{gathered}$ | 5A @ 28VDC or 240VAC 10A @ 28VDC or 240VAC <br> 1/3HP @120VAC 1/2HP @ 250-600VAC | $\begin{gathered} \text { 16A @ 400VAC } \\ \text { (RM5) } \\ \text { 10A @ 400VAC } \\ \text { (RM6) } \end{gathered}$ | $\begin{gathered} \text { 15A @ 277VAC } \\ \text { 10A @28VDC or } \\ 240 \mathrm{VAC} \\ 1 / 3 \mathrm{HP} @ 120 \mathrm{VAC} \\ 1 / 2 \mathrm{HP} @ 250-600 \mathrm{VAC} \end{gathered}$ | $\begin{gathered} \text { 3A @ 32VDC or } \\ \text { 250VAC } \\ 5 \mathrm{~A} \text { @ 28VDC or } \\ \text { 240VAC } \\ \text { 10A @ 28VDC or } \\ \text { 240VAC } \end{gathered}$ | $\begin{gathered} \text { 5A @ 28VDC or } \\ 120 \mathrm{VAC} \\ 10 \mathrm{~A} @ 28 \mathrm{VDC} \text { or } \\ 240 \mathrm{VAC} \\ 1 / 3 \mathrm{HP} @ 120 \mathrm{VAC} \\ 1 / 2 \mathrm{HP} @ 240 \mathrm{VAC} \end{gathered}$ |
| Expected Mechanical Life | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7} \mathrm{Ops}$. | $2 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. |
| Expected <br> Electrical <br> Life at Rated Load | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ |
| Nominal Coil Voltage | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-220 \mathrm{VDC} \\ & 6-400 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-240 \mathrm{VAC} \end{aligned}$ |
| Nominal Coil Power | $\begin{aligned} & \text { 1.2-1.8W (DC) } \\ & \text { 2.0-2.7VA (AC) } \end{aligned}$ | $\begin{gathered} 1.2 \mathrm{~W}(\mathrm{DC}) \\ 2.0-2.7 \mathrm{VA}(\mathrm{AC}) \end{gathered}$ | $\begin{aligned} & \text { 1.8W (DC) } \\ & \text { 2.7VA (AC) } \end{aligned}$ | $\begin{aligned} & \text { 1.6W (DC) } \\ & \text { 2.8VA (AC) } \end{aligned}$ | $\begin{aligned} & 1.2 \mathrm{~W} \text { (DC) } \\ & \text { 2.7VA (AC) } \end{aligned}$ | $\begin{gathered} 1.2 \mathrm{~W}(\mathrm{DC}) \\ 2.0-2.7 \mathrm{VA}(\mathrm{AC}) \end{gathered}$ | $\begin{gathered} 1.2 \mathrm{~W} \text { (DC) } \\ \text { 2.0VA (AC) } \end{gathered}$ |
| Mounting Options | Socket, Panel mount, PC board | Socket, Panel mount, PC board | Socket, Panel mount, PC board | Socket, Panel mount | Socket, Panel mount, PC board | Socket | Socket |
| Sockets/ <br> Connectors | Screw terminal, Solder terminal, PC terminal, Quick connect terminal | Screw terminal, <br> Solder terminal, PC terminal, Quick connect terminal | Screw terminal, Solder terminal, PC terminal, Quick connect terminal | Screw terminal, Solder terminal, PC terminal | Screw terminal, Solder terminal, PC terminal, Quick connect terminal | PC terminal | Screw terminal |
| Page Number | 723 | 723 | 723 | 733 | 723 | 731 | 737 |

[^5]|  |  |  |  | 3－03 |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Plug－in／Panel M ount Relays |  |  |  |  |  |  | Power Relay |
|  | SCHRACK | P\＆B | P\＆B | P\＆B | SCHRACK | SCHRACK | P\＆B |
| Series | MT | KR－E | KA | KRP－3H | RM8 | 0419 | KUHP |
| Features | －10A rating <br> －Lockable push－to－ test button <br> －Octal－type plug <br> －Optional LED， protection and timing modules <br> －Mechanical indicator <br> 品（18） | －10A rating <br> －Hermetically sealed steel case for use in hazardous locations <br> －Octal－type plug <br> 只 | －10A rating <br> －Compact，open－ style relay <br> －Ruggedly constructed <br> －Cost effective <br> －Highly efficient for switching light power loads | －20A rating <br> －Available as open relay or with dust cover and octal－ type plug | －25A rating <br> －Enclosed <br> －Integral mechanical indicator standard <br> －Bracket mount case <br> －2，500Vrms coil－to－ contact breakdown | －16A rating <br> －Compatible with RAST 5 connector <br> －3mm contact gap <br> － $4,000 \mathrm{Vrms}$ coil－to－ contact breakdown <br> －Designed for European domestic appliances <br> cNㅔㄴ（S）（N） （VOE（D） | －20－30A rating <br> －Various mounting options <br> － $3,750 \mathrm{~V}$ rms coil－to－ contact breakdown |
| Approximate Dimensions | $\begin{gathered} 1.40^{\prime \prime} \times 1.40^{\prime \prime} \times 2.24 \mathrm{hh} \\ (35.5 \times 35.5 \times 57 \mathrm{~h}) \\ 2.82 \mathrm{oz} .(80 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.44 \text { " } \times 1.66 \text { " } \times 2.12^{\prime \prime h} \\ (36.6 \times 42.2 \times 53.8 \mathrm{~h}) \\ 4.8 \mathrm{oz} .(136 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.92^{\prime \prime} \times 1.47 \text { " } \times 1.38^{\prime \prime h} \\ (48.8 \times 37.3 \times 34.9 \mathrm{~h}) \\ 1.7 \mathrm{oz} .(48 \mathrm{~g})-\mathrm{KA} \end{gathered}$ | $\begin{gathered} 1.53 \text { " } \times 1.41 \text { " } \times 2.28 \text { "h } \\ (38.9 \times 35.7 \times 57.9 \mathrm{~h}) \\ 2 \mathrm{oz} .(57 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.52^{\prime \prime} \times 1.40^{\prime \prime} \times 1.91^{\prime \prime h} \\ (38.5 \times 35.5 \times 48.4 \mathrm{~h}) \\ 3.2 \mathrm{oz} .(92 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.85 " \times .98 " \times 1.85 \mathrm{~h} h \\ (47 \times 24 \times 47 \mathrm{~h}) \\ 3.2 \mathrm{oz} .(92 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.53 \text { " } \times 1.41^{\prime \prime} \times 1.91 \mathrm{~h} \\ (38.9 \times 35.7 \times 48.4 \mathrm{~h}) \\ 3.2 \mathrm{oz} .(92 \mathrm{~g}) \end{gathered}$ |
| Contact <br> Arrangements | 2 Form C， <br> 3 Form C | 1 Form $A$ to 3 Form C | 1 Form A to 3 Form C | 1 Form X | 2 Form C | 2 Form A | 1 Form C to <br> 2 Form C |
| Contact Material | AgNi 90／10 <br> Au overlay AgNi 90／10 | $\begin{gathered} \mathrm{Ag} \\ \mathrm{AgCdO} \end{gathered}$ | $\begin{gathered} \mathrm{Ag} \\ \mathrm{AgCdO} \end{gathered}$ | AgCdO | AgCdO | AgCdO， AgNi | AgCdO |
| Maximum <br> Contact <br> Rating | 10A＠250VAC （4A＠250VAC for bifurcated contacts） 1／2HP＠240VAC 1／4HP＠120VAC | $\begin{gathered} 5 \mathrm{~A} @ 28 \mathrm{VDC} \text { or } \\ 120 \mathrm{VAC} \\ 10 \mathrm{~A} @ 28 \mathrm{VDC} \text { or } \\ 240 \mathrm{VAC} \\ 1 / 6 \mathrm{HP} @ 120 \mathrm{VAC} \end{gathered}$ | $\begin{gathered} \text { 5A @ 120VAC } \\ \text { 10A @120VAC } \\ \text { 6A @240VAC } \\ \text { 1/6HP @120VAC } \\ 1 / 3 \mathrm{HP} @ 240 \mathrm{VAC} \end{gathered}$ | $\begin{aligned} & \text { 20A @ 120VAC } \\ & \text { 1HP @120/240VAC } \end{aligned}$ | $\begin{gathered} \text { 25A @ 250VAC } \\ \text { 2HP @240VAC } \\ 1.5 \mathrm{HP} @ 120 \mathrm{VAC} \end{gathered}$ | 16A＠250VAC | （1C）30A＠240VAC <br> 25A＠28VDC <br> 1HP＠120VAC <br> （2C）20A＠240VAC or 28VDC <br> 3／4HP＠120VAC |
| Expected Mechanical Life | $2 \times 10^{7}$ Ops． | $1 \times 10^{7}$ Ops． | $1 \times 10^{7}$ Ops． | $2.5 \times 10^{6}$ Ops． | $2 \times 10^{7}$ Ops． | $2 \times 10^{6}$ Ops． | $1 \times 10^{7}$ Ops． |
| Expected <br> Electrical <br> Life at <br> Rated Load | $3 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $3 \times 10^{4}$ | $\begin{gathered} 1 \times 10^{5} \text { (AC coil) } \\ 2.5 \times 10^{5} \text { (DC coil) } \end{gathered}$ | $1 \times 10^{5}$ |
| Nominal Coil Voltage | $\begin{aligned} & 6-220 \mathrm{VDC} \\ & 6-230 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-240 \mathrm{VAC} \end{aligned}$ | $\begin{gathered} 12-24 \mathrm{VDC} \\ 24-115 \mathrm{VAC} \end{gathered}$ | $\begin{gathered} 12-24 \mathrm{VDC} \\ 110-400 \mathrm{AC}, 50 \mathrm{~Hz} . \end{gathered}$ | $\begin{gathered} 12-24 \mathrm{VDC} \\ 24-120 \mathrm{VAC} \end{gathered}$ |
| Nominal Coil Power | $\begin{aligned} & 1.2 \mathrm{~W} \text { (DC) } \\ & \text { 2.3VA (AC) } \end{aligned}$ | $\begin{aligned} & 1.2 \mathrm{~W}(\mathrm{DC}) \\ & \text { 2.0VA (AC) } \end{aligned}$ | $\begin{aligned} & \text { 1.2W (DC) } \\ & \text { 2.0VA (AC) } \end{aligned}$ | $\begin{aligned} & \text { 1.2W (DC) } \\ & \text { 2.0VA (AC) } \end{aligned}$ | $\begin{gathered} \text { 1.2W (DC) } \\ \text { 2.8VA (AC) } \end{gathered}$ | $\begin{gathered} 1.3 \mathrm{~W}(\mathrm{DC}) \\ 2.0-2.5 \mathrm{VA}(\mathrm{AC}) \end{gathered}$ | $\begin{aligned} & \text { 1.2W (DC) } \\ & \text { 2.7VA (AC) } \end{aligned}$ |
| Mounting Options | Socket | Socket | Panel mount | Socket， Panel mount | Panel mount | Panel mount | Panel mount |
| Sockets／ <br> Connectors | Screw terminal | Screw terminal | － | Screw terminal | Screw terminal， Solder terminal， PC terminal， Quick connect terminal | － | － |
| Page Number | 742 | 737 | 737 | 737 | 733 | 745 | 803 |

Dimensions are shown for $\quad$ Dimensions are in inches over $\quad$ Specifications and availability $\quad$ www．tycoelectronics．com

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| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Pow er Relays \& Definite Purpose Contactors |  |  |  |  |  |  |  |
|  |  | P\&B | P\&B | P\&B | PRODUCTS UNLIMITED |  | PRODUCTS UNLIMITED |
| Series | RM C/D | S86/S87 | PM | PRD | 9400 | 9100 | 38 |
| Features | - 30A rating <br> - Enclosed <br> - Optional push-totest button, LED indicator and protection diode <br> - Bracket mount case <br> - 2,500Vrms coil-tocontact breakdown | - 20A rating <br> - Economical switching in a compact package <br> - Choice of two mounting brackets <br> 데 (ब18) | - 25A rating <br> - 4PDT <br> - High dielectric strength <br> - Screw or quick connect terminals <br> - Dust cover available | - 10-50A rating <br> - High inrush capacity <br> - Available with magnetic blowouts <br> - Optional auxiliary switch | - 8-12FLA rating <br> - Used extensively in HVAC applications <br> - Double make and double break contacts <br> - Various mounting bracket options <br> ${ }_{c} \mathrm{NI}_{\text {us }}$ | - 3-12FLA rating <br> - Used extensively in HVAC applications <br> - Single and double pole models <br> - Multi-positional mounting | - 35A rating <br> - Used extensively in HVAC applications <br> - Potential motor starting relay <br> - Various mounting postions and brackets <br> - Custom-built to customer specs ${ }_{c} \boldsymbol{N}_{\mathrm{us}}$ |
| Approximate Dimensions | $\begin{gathered} 1.52 \mathrm{\prime} \mathrm{\prime} \times 1.40 \mathrm{~N} \times 1.91^{1 \mathrm{~h}} \\ (38.5 \times 35.5 \times 48.4 \mathrm{~h}) \\ 3.2 \mathrm{oz} .(92 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.31 " \times 2.07^{\prime \prime} \times 2.42^{\prime \prime} \mathrm{h} \\ (33.3 \times 52.6 \times 61.5 \mathrm{~h}) \\ 2.9 \mathrm{oz} .(82 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 3.39 " \times 2.66 " \times 2.72 \mathrm{~h} \\ (86.2 \times 67.5 \times 69.1 \mathrm{~h}) \\ 14 \mathrm{oz} .(397 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 3.38 " \times 2.51 " \times 2.50^{\prime \prime} \mathrm{h} \\ (85.7 \times 63.8 \times 63.5 \mathrm{~h}) \\ 10 \mathrm{oz} .(284 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.84^{\prime \prime} \times 1.26^{\prime \prime} \times 1.5^{\prime \prime} \mathrm{h} \\ (46.8 \times 32.1 \times 38.1 \mathrm{~h}) \\ 2.9 \mathrm{oz} .(82 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 2.11 " \times 1.83 " \times 2.36 \mathrm{~h} h \\ (53.6 \times 46.5 \times 60.1 \mathrm{~h}) \\ 6.1 \mathrm{oz} .(173 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 2.03 " \times 1.82 " \times 1.82^{\prime \prime} \mathrm{h} \\ (51.6 \times 46.2 \times 46.2 \mathrm{~h}) \\ 5.8 \mathrm{oz}(164 \mathrm{~g}) \end{gathered}$ |
| Contact Arrangements | 1 Form $X$, <br> ! Form Z | 1 Form C, 2 Form C | 4 Form C | 1 Form A to 2 Form C | 1 Form X, 1 Form Y, 1 Form Z, 1 Form C (jumpered 1 Form X) | 1 Form A through 2 Form C, including mixed forms | 1 Form B |
| Contact Material | AgCdO | Ag, AgCdO | AgCdO | Ag, AgCdO | Fine Ag (pilot), AgAlloy | Ag, <br> Fine Ag, AuAlloy (pilot) | AgCdO |
| Maximum Contact Rating | 30A @ 250VAC | $\begin{aligned} & \text { 20A @ 277VAC } \\ & \text { 1HP @125VAC } \\ & \text { 2HP @250VAC } \end{aligned}$ | $\begin{aligned} & \text { 25A @ 277VAC } \\ & \text { 10A @28VDC } \\ & 1 \mathrm{HP} @ 240 \mathrm{VAC} \end{aligned}$ | 50A @ 277VAC <br> 30A @ 277VAC <br> 20A @ 125VDC <br> 1.5HP @ 120VAC <br> 2HP @ 250VAC | ```12FLA/60LRA @ 125VAC 8FLA/48LRA @ 240/277VAC 25A @240/277VAC, resistive (Form X)``` | $\begin{gathered} \text { 12FLA/60LRA @ } \\ \text { 125VAC } \\ \text { 6FLA/35LRA @ } \\ \text { 250/277VAC } \\ \text { 25A @240/277VAC, } \\ \text { resistive (Form A) } \end{gathered}$ | 35A @ 277VAC, inductive |
| Expected <br> Mechanical Life | $1 \times 10^{7}$ Ops. | $1 \times 10^{6}$ Ops. | $1 \times 10^{7}$ Ops. | $2 \times 10^{6} \mathrm{Ops}$. | $1 \times 10^{6}$ Ops. | $1 \times 10^{6}$ Ops. | $7.5 \times 10^{5} \mathrm{Ops}$. |
| Expected <br> Electrical <br> Life at <br> Rated Load | $4.5 \times 10^{4}$ | $5 \times 10^{4}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $\begin{gathered} 1 \times 10^{5} \\ \text { (inductive load) } \\ 2.5 \times 10^{5} \\ \text { (resistive load) } \end{gathered}$ | $1 \times 10^{5}$ (inductive load) $2.5 \times 10^{5}$ <br> (resistive load) | $2.5 \times 10^{5}$ |
| Nominal Coil Voltage | $\begin{gathered} 6-220 \mathrm{VDC} \\ 24-400 \mathrm{VAC} \end{gathered}$ | $\begin{gathered} 6-125 \mathrm{VDC} \\ \text { 12-240VAC } \end{gathered}$ | $\begin{aligned} & 6-125 \mathrm{VDC} \\ & \text { 12-20VAC } \end{aligned}$ | $\begin{aligned} & 6-110 \mathrm{VDC} \\ & 6-480 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & \text { 12-24VDC } \\ & 6-277 \mathrm{VAC} \end{aligned}$ | $\begin{gathered} 12-24 \mathrm{VDC} \\ 24-277 \mathrm{VAC} \end{gathered}$ | 130-495VAC |
| Nominal Coil Power | $\begin{aligned} & 1.2 \mathrm{~W} \text { (DC) } \\ & \text { 2.8VA (AC) } \end{aligned}$ | $\begin{aligned} & \text { 1.13-4.5W (DC) } \\ & \text { 4.0VA (AC) } \end{aligned}$ | $\begin{aligned} & 4.4 \mathrm{~W}(\mathrm{DC}) \\ & \text { 14VA (AC) } \end{aligned}$ | $\begin{aligned} & \text { 2.0W (DC) } \\ & \text { 9.8VA (AC) } \end{aligned}$ | $\begin{aligned} & 3.0 \mathrm{~W}(\mathrm{DC}) \\ & \text { 4.0VA (AC) } \end{aligned}$ | $\begin{aligned} & \text { 5.75W (DC) } \\ & 9.5 \mathrm{VA} \text { (AC) } \end{aligned}$ | 5VA |
| Mounting Options | Panel mount | Panel mount | Panel mount | Panel mount | Panel mount | Panel mount | Panel mount |
| Sockets / <br> Connectors | - | - | - | - | - | - | - |
| Page Number | 805 | 807 | 809 | 811 | 814 | 816 | 818 |


| Specifications and/or agency recognitions do not necessarily apply to all models within a particular series. When multiple ratings are listed, no individual rating may be exceeded by the combination of others. |  |  |
| :--- | :--- | :--- |
| Dimensions are shown for | Dimensions are in inches over | Specifications and availability |
| reference purposes only. | (millimeters) unless otherwise | subject to change. |


Dimensions are shown for Dimensions are in inches over Specifications and availability www.tycoelectronics.com

| Power Relays \& Definite Purpose Contactors |  |  |  | Latching, Impulse, Rotary \& Special Application Relays |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | PRODUCTS UNLIMITED | PRODUCTS UNLIMITED | SCHRACK | OEG | SCHRACK | P\&B |
| Series | 93-3100 | 96-3186 | A-3100 | PE (latching) | PCKWK | RT (latching) | KUL |
| Features | - 25-40FLA rating <br> - 4 pole <br> - Arc cover standard on 40FLA types, optional on others <br> - Convenient mounting plate <br> - Optional auxiliary switches <br> ${ }^{\mathrm{F}} \mathrm{N}_{\mathrm{us}}$ | - 75-90FLA rating <br> - 3 pole <br> - Arc cover standard <br> - Convenient mounting plate <br> - Optional auxiliary switches <br> ${ }_{c} \mathrm{HN}_{\text {us }}$ | - 120FLA rating <br> - 3 pole <br> - Arc cover standard <br> - Convenient mounting plate <br> - Optional auxiliary switches | - 5A rating <br> - Magentic latching relay <br> - Single coil ${ }_{C N} \mathbf{N}_{\text {us (VOE }}$ | - 16A rating <br> - Magentic latching relay <br> - Dual coil | - 16A rating <br> - Magentic latching relay <br> - Single or dual coil ${ }^{C T} \mathbf{N}_{\text {us }} \text { VOE }$ | - 10A rating <br> - Magentic latching relay <br> - Single or dual coil <br> - Sockets available <br>  |
| Approximate Dimensions | $\begin{gathered} 3.05 " \times 3.75 " \times 2.63^{\prime \prime h} \\ (77.6 \times 95.2 \times 66.9 \mathrm{~h}) \\ 24 \mathrm{oz} .(683 \mathrm{~g}) \\ \hline \end{gathered}$ | $3.75^{\prime \prime} \times 5.0^{\prime \prime} \times 4.06^{\prime \prime} h$ ( $95.2 \times 127 \times 103 \mathrm{~h}$ ) 64 oz. (1,820g) | $\begin{gathered} 4.625^{\prime \prime} \times 6.375 " \times 5.0 \mathrm{~h} \\ (117.5 \times 161.9 \times 127 \mathrm{~h}) \\ 128 \text { oz. }(3,640 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} .787 \text { " } \times .394^{\prime \prime} \times .394^{\prime \prime} \mathrm{h} \\ (20 \times 20 \times 10 \mathrm{~h}) \\ .18 \mathrm{oz} .(5 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} .957 \text { " } \times .457 " \times 1.05 \mathrm{~h} \\ (24.3 \times 11.6 \times 26.7 \mathrm{~h}) \\ .49 \mathrm{oz} .(14 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.14^{\prime \prime} \times .50 \text { " x } .62^{\prime \prime h} \\ (29 \times 12.7 \times 15.7 \mathrm{~h}) \\ .46 \mathrm{oz} .(13 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.53 " \times 1.41^{\prime \prime} \times 2.16^{\prime \prime} \mathrm{h} \\ (38.9 \times 35.7 \times 54.8 \mathrm{~h}) \\ 3.4 \mathrm{oz} .(96 \mathrm{~g}) \\ \hline \end{gathered}$ |
| Contact <br> Arrangements | 4 Form X | 3 Form X | 3 Form $X$ | 1 Form C | 1 Form A | 1 Form C, 2 Form C | 1 Form C, 2 Form C, 3 Form C |
| Contact Material | AgCdO | AgCdO | AgCdO | AgNi 90/10 | AgSnO | AgNi 90/10 | $\begin{gathered} \mathrm{Ag} \\ \mathrm{AgCdO} \end{gathered}$ |
| Maximum <br> Contact <br> Rating | 40FLA/240LRA @ <br> 240/277VAC <br> 40FLA/200LRA @ 480VAC <br> 40FLA/160LRA @ 600VAC <br> 50A res. @600VAC | 90FLA/540LRA @ 240VAC 90FLA/450LRA @ 480VAC 90FLA/360LRA @ 600VAC <br> 120A res. @ 600VAC | $\begin{gathered} \text { 120FLA/720LRA @ } \\ \text { 240VAC } \\ \text { 120FLA/600LRA @ } \\ \text { 480VAC } \\ \text { 120FLA/480LRA @ } \\ \text { 600VAC } \\ \text { 150A res. @600VAC } \\ \hline \end{gathered}$ | 5A @ 250VAC | 16A @ 277VAC | $\begin{gathered} \text { 16A @ 240VAC } \\ \text { (1 pole) } \\ \text { 8A @ } 240 \mathrm{VAC} \\ \text { (2 pole) } \end{gathered}$ | $\begin{gathered} 5 \mathrm{~A} @ 28 \mathrm{VDC} \text { or } \\ 240 \mathrm{VAC} \\ 10 \mathrm{~A} @ 28 \mathrm{VDC} \text { or } \\ 240 \mathrm{VAC} \\ 1 / 4 \mathrm{HP} @ 120 \mathrm{VAC} \\ 1 / 3 \mathrm{HP} @ 250-600 \mathrm{VAC} \end{gathered}$ |
| Expected Mechanical Life | - | - | - | $5 \times 10^{6}$ Ops. | $5 \times 10^{6}$ Ops. | $\begin{aligned} & 5 \times 10^{6} \text { Ops. (1 pole) } \\ & 2 \times 10^{6} \text { Ops. (2 pole) } \end{aligned}$ | $1 \times 10^{7} \mathrm{Ops}$. |
| Expected <br> Electrical <br> Life at <br> Rated Load | - | - | - | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $\begin{aligned} & 1 \times 10^{4} \text { (1 pole) } \\ & 3 \times 10^{4}(2 \text { pole }) \end{aligned}$ | $1 \times 10^{5}$ |
| Nominal Coil Voltage | 24-480VAC | 24-480VAC | 24-480VAC | $32-24 V D C$ | 312 VDC | $5-24 \mathrm{VDC}$ | $\begin{gathered} 12-48 \mathrm{VDC} \\ 24-240 \mathrm{VAC} \end{gathered}$ |
| Nominal Coil Power | 9.0-9.5VA | 27.0VA | 40.0-48.0VA | 360 mW | 1,800mW (set) 800 mW (reset) | 400mW (1 coil) <br> 600 mW (2 coil) | 1.6W (DC dual coil) <br> 1.2W (DC single coil) |
| Mounting Options | Panel mount | Panel mount | Panel mount | PC board | PC board | PC board | Socket |
| Sockets / Connectors | - | - | - | - | - | - | Screw terminal, Solder terminal, PC terminal, Quick connect terminal |
| Page Number | 836 | 838 | 840 | 902 | 904 | 906 | 908 |

[^6]|  | P\&B | P\&B | P\&B |  | AGASTAT | AGASTAT | AGASTAT |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Series | KB-KBP | S89/S90 | MDR | 136 | GP | ML | TR |
| Features | - 10A rating <br> - Dual coil, mechanical latching relay <br> - Available as an open relay or in a clear dust cover with plug-in base <br> - Up to 5 poles <br> - Sockets available <br> ロ | - 10-20A rating <br> - Low cost, bistable, impulse relay <br> - Optional dust cover with plug-in base <br> - Up to 4 poles | - 10A rating <br> - Rotary relay <br> - Withstands highimpact shock blows with no contact chatter <br> - Latching \& nonlatching types <br> - Up to 24 poles | - 20A rating <br> - Traffic control (flash transfer) relay <br> - Clear plastic dust cover with 8position J ones plug <br> - CALTRANS and NEMA approved | - 10A rating <br> - Control relay <br> - Articulated design produces wide contact gap <br> - Plastic dust cover <br> - Optional mag. blow-out <br> - Sockets available <br> (IIL) (SA) | - 10A rating <br> - Magnetic latching control relay <br> - Articulated design produces wide contact gap <br> - Plastic dust cover <br> - Optional mag. blow-out <br> - Sockets available <br> (II) (SA | - 10A rating <br> - On- delay timing control relay <br> - Articulated design produces wide contact gap <br> - Plastic dust cover <br> - Optional mag. blow-out <br> - Sockets available <br> (II) (SH) |
| Approximate Dimensions | $\begin{array}{\|c} 1.78 " \times 2.41^{\prime \prime} \times 3.56 \mathrm{~h} \\ (45.2 \times 61.1 \times 90.4 \mathrm{~h}) \\ 10.8 \text { oz. }(306 \mathrm{~g}) \\ \hline \end{array}$ | $\begin{gathered} 2.70 " \times 2.00^{\prime \prime} \times 2.42^{\prime h} \\ (68.6 \times 50.8 \times 61.5 \mathrm{~h}) \\ 7.8 \text { oz. }(241 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 2.63 " \times 2.63 " \times 3.13^{\prime \prime h} \\ (66.7 \times 66.7 \times 79.5 \mathrm{~h}) \\ 32 \mathrm{oz} .(900 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 2.375 " \times 1.75 " \times 2.8^{\prime \prime h} \\ (60.3 \times 44.4 \times 71.1 \mathrm{~h}) \\ 11 \mathrm{oz} .(312 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 1.77 " \times 1.77 \mathrm{"x} 4.3 \mathrm{hn} \\ (45.0 \times 45.0 \times 109.0 \mathrm{~h}) \\ 10.3 \mathrm{oz} .(288 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 1.77 \text { " } \times 1.77 \text { " } \times 4.3 \text { "h } \\ \text { (45.0x45.0x109.0h) } \\ 10.3 \text { oz. (288g) } \end{gathered}$ | $\begin{gathered} 1.77 \text { " } \times 1.77 \text { " } \times 4.3 \text { "h } \\ \text { (45.0×45.0x109.0h) } \\ 10.3 \mathrm{oz} .(288 \mathrm{~g}) \end{gathered}$ |
| Contact <br> Arrangements | 2 Form C to 5 Form C | 1 Form A to 4 Form C | 4 Form C to 24 Form C | 2 Form C | 4 Form C | 4 Form C | 4 Form C |
| Contact Material | AgCdO | $\begin{gathered} \mathrm{Ag} \\ \mathrm{AgCdO} \end{gathered}$ | $\begin{gathered} \mathrm{Ag} \\ \mathrm{AgCdO} \end{gathered}$ | AgPd | Ag Plated | Ag Plated | Ag Plated |
| Maximum <br> Contact <br> Rating | 10A @ 120VAC | $\begin{gathered} \text { (S89) 15A @ 250VAC } \\ 1 / 2 \mathrm{HP} @ 125 \mathrm{VAC} \\ (\mathrm{~S} 90) \text { 20A @ 277VAC } \\ 2 \text { HP @ 250VAC } \end{gathered}$ | 10A @ 115VAC 3A @ 28VDC 800mA @ 125VDC | $\begin{aligned} & \text { 20A Tungsten @ } \\ & \text { 120VAC } \end{aligned}$ | 10A @ 120VAC | 10A @ 120VAC | 10A @ 120VAC |
| Expected Mechanical Life | $5 \times 10^{5}$ Ops. | $1 \times 10^{5} \mathrm{Ops}$. | - | $5 \times 10^{6}$ Ops. | $1 \times 10^{8}$ Ops. | $1 \times 10^{8}$ Ops. | $1 \times 10^{8}$ Ops. |
| Expected <br> Electrical <br> Life at <br> Rated Load | $5 \times 10^{4}$ | $5 \times 10^{4}$ | - | $2.5 \times 10^{5}$ | $1 \times 10^{6}$ | $1 \times 10^{6}$ | $1 \times 10^{6}$ |
| Nominal Coil Voltage | $\begin{aligned} & 12-110 \mathrm{VDC} \\ & 24-240 \mathrm{VAC} \end{aligned}$ | $\begin{gathered} 6-24 \mathrm{VDC} \\ 24-240 \mathrm{VAC} \end{gathered}$ | $\begin{aligned} & \text { 28-125VDC } \\ & 115-440 \mathrm{VAC} \end{aligned}$ | 120VAC | $\begin{aligned} & 12-250 \mathrm{VDC} \\ & 24-220 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 12-250 \mathrm{VDC} \\ & 24-220 \mathrm{VAC} \end{aligned}$ | $\begin{gathered} \text { 24-215VDC } \\ \text { 120VAC } \end{gathered}$ |
| Nominal Coil Power | $\begin{gathered} \text { 2.7W (DC) } \\ \text { 5.3-7.8VA (AC) } \end{gathered}$ | $\begin{aligned} & \text { 6.33W (DC) } \\ & \text { 9VA (AC) } \end{aligned}$ | 5.1-21.8W | 10VA | $\begin{aligned} & \text { 6W } \\ & \text { 6VA } \end{aligned}$ | $\begin{aligned} & \text { 6W } \\ & \text { 6VA } \end{aligned}$ | $\begin{aligned} & \text { 6W } \\ & \text { 6VA } \end{aligned}$ |
| Mounting Options | Socket | Panel mount, Socket | Panel mount | Socket | Socket | Socket | Socket |
| Sockets/ Connectors | Screw terminal, Solder terminal | Screw terminal | - | 8-position J ones plug | Screw terminal | Screw terminal | Screw terminal |
| Page Number | 910 | 912 | 914 | 916 | 917 | 917 | 917 |

Dimensions are shown for Dimensions are in inches over Specifications and availability www.tycoelectronics.com

|  |  |  |  | Issued 3-03 |  |  | SELE | ECTOR GUID |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Automotive Relays |  |  |  |  |  |  |  |  |
|  | TYCO ELECTRONICS | TYCO ELECTRONICS | TYCO ELECTRONICS | TYCO ELECTRONICS | TYCO ELECTRONICS | TYCO ELECTRONICS | TYCO ELECTRONICS | TYCO ELECTRONICS |
| Series | V23086 | T72M | VKP | V2R | VFM | VF4 | VF7 | VTF |
| Features | -20A rating <br> - Micro-miniature PC board relay -60\% less volume than comparable relays <br> - Sealed case | -20A rating <br> - Miniature PC board relay <br> - Sealed case <br> - $105^{\circ} \mathrm{C}$ Ambient | - 40A rating <br> - PC board relay <br> - Available open or with sealed case <br> - Various contact arrangements <br> - Minimum PCB real estate | - 20A rating <br> - Motor reversing contact arragement <br> - Sealed case <br> - Miniature PC board relay <br> - $105^{\circ} \mathrm{C}$ ambient | -20A rating <br> - Miniature relay for plug-in or PC board mounting <br> - Plastic enclosure <br> - Various contact arrangements | - 40A rating <br> - Plug-in or PC board mountable relay <br> - Various enclosure options <br> - Various contact arrangements <br> - Optional mounting bracket | - 70A rating <br> - Plug-in or PC board mountable relay <br> - 1 Form A contact arrangement <br> - Optional mounting bracket | - 279W rating <br> - Turn signal, hazard, or combination versions <br> - Flash rate not sensitive to load current <br> - Electronic timing with relay output <br> - Meets applicable U.S. standards |
| Approximate Dimensions | $\begin{gathered} .472^{\prime \prime} \times .508 " \times .39 \mathrm{~h} h \\ (12.0 \times 12.9 \times 9.9 \mathrm{~h}) \\ 0.14 \mathrm{oz} .(4 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} .89 " \times .65 " \times .67 \mathrm{H} h \\ (22.5 \times 16.5 \times 17 \mathrm{~h}) \\ 0.4 \mathrm{oz} .(12 \mathrm{~g}) \end{gathered}$ | .911"x.748"x.715"h ( $23.1 \times 19.0 \times 18.2 \mathrm{~h}$ ) 0.7 oz. (20g) | $\begin{gathered} 1.46 \text { " } \times .65 \text { " } \times .67 \mathrm{~h} \mathrm{~h} \\ (37.1 \times 16.5 \times 17 \mathrm{~h}) \\ 0.9 \mathrm{oz} .(25 \mathrm{~g}) \end{gathered}$ | $\begin{aligned} & .610 " x .906 " \times 1.02 \mathrm{~h} \\ & (15.5 \times 23 \times 26 \mathrm{~h}) \\ & 0.7 \mathrm{oz} .(19.8 \mathrm{~g}) \end{aligned}$ | $\begin{array}{\|c\|} \hline 1.12^{\prime \prime} \times 1.12^{\prime \prime} \times .987 \mathrm{~h} \\ (28.5 \times 28.5 \times 25.1 \mathrm{~h}) \\ 1.1 \mathrm{oz} .(31 \mathrm{~g}) \\ \hline \end{array}$ | $\begin{gathered} 1.04 " \times 1.04 " \times .992 \mathrm{~h} \\ (26.5 \times 26.5 \times 25.2 \mathrm{~h}) \\ 1.1 \text { oz. }(31 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.12 " \times 1.12 " \times 1.6^{\prime \prime} \mathrm{h} \\ (28.5 \times 28.5 \times 40.5 \mathrm{~h}) \\ 1.3 \mathrm{oz} .(37 \mathrm{~g}) \end{gathered}$ |
| Contact <br> Arrangements | 1 Form C | 1 Form C | 1 Form A, <br> 1 Form C | $\begin{aligned} & 2 \times 1 \text { Form C } \\ & \text { (H-Bridge) } \end{aligned}$ | 1 Form A, <br> 1 Form C | 1 Form A, <br> 1 Form C | 1 Form A | 1 Form A |
| Contact Material | AgNi 0.15 AgSnO | AgNi 0.15 AgSnO | AgNi 0.15 PdCu, AgSnO AgSnO | AgNi 0.15 | $\begin{gathered} \text { AgSnO } \\ \text { AgNi } 0.15 \end{gathered}$ | $\begin{gathered} \mathrm{AgSnO} \\ \text { AgNi } 0.15 \end{gathered}$ | AgNi 0.15 | PdCu <br> AgCu |
| Contact <br> Rating @ $85^{\circ} \mathrm{C}$ (Form A only, nominal coil voltage) | 20A @ 14VDC | 20A @ 14VDC | 40A @ 14VDC | 20A @ 14VDC | 20A @ 14VDC | 40A @ 14VDC | 70A @ 14VDC | 55W to 275W (Lamp) |
| Expected Mech. Life | $1 \times 10^{7} \mathrm{Ops}$. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. | $1 \times 10^{7}$ Ops. |
| Expected <br> Electrical <br> Life at <br> Rated Load | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $1 \times 10^{5}$ | $\begin{gathered} 1 \times 10^{6}-3 \times 10^{6} \\ \text { (Load dependent) } \end{gathered}$ |
| Nominal Coil Voltage | 12VDC | 12 \& 24VDC | 12 \& 24VDC | 12VDC | 12VDC | 12 \& 24VDC | 12VDC | 12VDC |
| Nominal Coil Power | .55W | .8W | 1.6W | $\begin{aligned} & .64 \mathrm{~W} \\ & .91 \mathrm{~W} \end{aligned}$ | 1.6W | 1.6W-1.81W | 2.0 W | 1.6W |
| Mounting Options | PC board | PC board | PC board | PC board | Plug-in | PC board, Plug-in, Bracket | Plug-in, Bracket | Plug-in |
| Sockets / <br> Connectors | - | - | - | - | PC terminal socket, wiring harness style connector | PC terminal socket, wiring harmess style connector with or without bracket | Wiring harness style connector | PC terminal socket, wiring hamess style connector with or without bracket |
| Page Number | 1002 | 1005 | 1007 | 1012 | 1014 | 1017 | 1021 | 1024 |

[^7]| Electronics Issued 3－03 |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Solid State Relays \＆Input／Output M odules |  |  |  |  |  |  |  |  |
|  | P\＆B |  | P\＆B | P\＆B | I <br> P\＆B | P\＆B | $T$ $\begin{aligned} & \text { E } \\ & 50 \\ & 50 \end{aligned}$ <br> P\＆B | P\＆B |
| Series | SSRT | SSR | SSRD | SSRO | IAC | OAC | IDC | ODC |
| Features | －10－25A rating <br> －＂Hockey Puck＂ package <br> －LED indicator <br> －Triac output <br> －AC \＆DC input | －25－125A rating <br> －＂Hockey Puck＂ package <br> －LED indicator <br> －Inverse parallel SCR output <br> －AC \＆DC input | －25－40A rating per output <br> －Two independent solid state relays in one＂Hockey Puck＂package <br> －Inverse parallel SCR output <br> ${ }_{c} \mathrm{MB}_{\mathrm{us}}$ | －20A rating per output <br> －Four independent solid state relays in one＂Hockey Puck＂package <br> －Triac output <br> ${ }^{c} \mathrm{~N}_{\mathrm{us}}$ | －0．05A output rating <br> －AC input module <br> －Industry standard 0.6 ＂（15．2mm） wide package <br> －Series operation compatible | －5A output rating <br> －AC output module <br> －Industry standard $0.6^{\prime \prime}(15.2 \mathrm{~mm})$ wide package <br> －Series operation compatible | －0．05A output rating <br> －DC input module <br> －Industry standard 0.6 ＂$(15.2 \mathrm{~mm})$ wide package <br> －Series operation compatible | －3A output rating <br> －DC output module <br> －Industry standard $0.6^{\prime \prime}$（15．2mm） wide package <br> －Series operation compatible |
| Approximate Dimensions | $\left\lvert\, \begin{gathered} 1.75 " \times 2.25 " \times .87 " \mathrm{~h} \\ (44.4 \times 57.2 \times 22 \mathrm{~h}) \\ 3.5 \mathrm{oz} .(98 \mathrm{~g}) \end{gathered}\right.$ | $\begin{gathered} 1.75^{\prime \prime} \times 2.25 " \times .87 \mathrm{~h} \\ (44.4 \times 57.2 \times 22 \mathrm{~h}) \\ 3.5 \mathrm{oz}(98 \mathrm{~g}) \end{gathered}$ | $\left\lvert\, \begin{gathered} 1.75 " \times 2.25 " \times .89 " \mathrm{~h} \\ (44.4 \times 57.2 \times 22.6 \mathrm{~h}) \\ 3.5 \mathrm{oz} .(98 \mathrm{~g}) \end{gathered}\right.$ | $\left\lvert\, \begin{gathered} 1.75 " \times 2.3^{\prime \prime} \times .85 \mathrm{~h} \\ (44.4 \times 58.4 \times 21.6 \mathrm{~h}) \\ 3.5 \mathrm{oz} .(98 \mathrm{~g}) \end{gathered}\right.$ | $\begin{gathered} 1.7^{\prime \prime} \times .60 \text { " } \times 1.25^{\prime \prime} \mathrm{h} \\ (43.2 \times 15.2 \times 31.8 \mathrm{~h}) \\ 1.48 \mathrm{oz} .(42 \mathrm{~g}) \end{gathered}$ | $\left\lvert\, \begin{gathered} 1.77^{\prime \prime} \times .60 \times 1.255^{\prime \prime} \\ (43.2 \times 15.2 \times 31.8 \mathrm{~h}) \\ 1.48 \text { oz. }(42 \mathrm{~g}) \end{gathered}\right.$ | $\left(\begin{array}{c} 1.7^{\prime \prime} \times .60^{\prime \prime} \times 1.25^{\prime \prime h} \\ (43.2 \times 15.2 \times 31.8 \mathrm{~h}) \\ 1.48 \mathrm{oz}(42 \mathrm{~g}) \end{array}\right.$ | $\begin{gathered} 1.7^{\prime \prime} \times .60^{\prime \prime} \times 1.25^{\prime \prime} \mathrm{h} \\ (43.2 \times 15.2 \times 31.8 \mathrm{~h}) \\ 1.48 \mathrm{oz}(42 \mathrm{~g}) \end{gathered}$ |
| Switch Arrangement | 1 Form A | 1 Form A | （2）$\times 1$ Form A | （4）$\times 1$ Form A | 1 Form A （sinking） | 1 Form A | 1 Form A （sinking） | 1 Form A |
| Coupling | Optical | Optical | Optical | Optical | Optical | Optical | Optical | Optical |
| Input | $\begin{gathered} 3-32 \mathrm{VDC} \\ 90-280 \mathrm{VAC} \end{gathered}$ | $\begin{gathered} 3-32 \mathrm{VDC} \\ 90-280 \mathrm{VAC} \end{gathered}$ | 4－15VDC | 4－15VDC | 18－36VACNDC 90－140VACNDC 180－280VACNDC | 5VDC 15VDC 24VDC | $\begin{gathered} 3.3-32 \mathrm{VDC} \\ 4-32 \mathrm{VDC} \\ 10-60 \mathrm{VDC} \end{gathered}$ | $\begin{gathered} 5 \mathrm{VDC} \\ \text { 15VDC } \\ \text { 24VDC } \end{gathered}$ |
| Output Switching | Zero | Zero， Random | Zero， Random | Zero， Random | Random | Zero | Random | Random |
| Min．Output Current | ．1A | .05 or ．1A （model dependent） | ．1A | ．15A | $>0$ | ．05A | $>0$ | ．01A |
| Max．Output Current | 25A | 125A | 40A | 20A | 0．05A | 3 A to 5A | 0．05A | $\begin{gathered} \text { 1A @ } 250 \mathrm{~V} \\ 3 \mathrm{~A} @ 60 \mathrm{~V} \end{gathered}$ |
| Min．Output Voltage | 24V | 24 or 48 V （model dependent） | 24 V | 24V | $>0$ | 24V | $>0$ | 3 V |
| Max．Output Voltage | 280 V | 280 or 660V （model dependent） | 280V | 280V | 30 V | 280 V | 30 V | $\begin{aligned} & 60 \mathrm{~V}, \\ & 250 \mathrm{~V} \end{aligned}$ |
| Output Type | AC | AC | AC | AC | DC | AC | DC | DC |
| Terminals | Screw | Screw | Quick connect | Quick connect | Printed circuit | Printed circuit | Printed circuit | Printed circuit |
| Mounting | Chassis mount | Chassis mount | Chassis mount | Chassis mount | Mounting board | Mounting board | Mounting board | Mounting board |
| Page Number | 1102 | 1104 | 1106 | 1108 | 1110 | 1110 | 1110 | 1110 |

[^8]|  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Solid State Input／Output M odules |  |  |  |  | Time Delay Relays |  |  |
|  | P\&B | P\＆B | P\＆B | P\＆B |  |  | AGASTAT |
| Series | IACM | OACM | IDCM | ODCM | Series | 3RP1 | 48K |
| Features | －0．05A output rating <br> －Slim line AC input module <br> －Only $0.4^{\prime \prime}$（ 10.2 mm ） wide package <br> －Series operation compatible | －5A output rating <br> －Slim line AC output module <br> －Only $0.4^{\prime \prime}$（ 10.2 mm ） wide package <br> －Series operation compatible | －0．05A output rating <br> －Slim line DC input module <br> －Only $0.4^{\prime \prime}(10.2 \mathrm{~mm})$ wide package <br> －Series operation compatible | －3A output rating <br> －Slim line DC output module <br> －Only $0.4^{\prime \prime}(10.2 \mathrm{~mm})$ wide package <br> －Series operation compatible | Features | －3A rating <br> －Programmable time delay relay <br> －Universal or fixed input voltage <br> －Fits 35 mm DIN track <br> －Consult factory for VDE file | －10A rating <br> －Programmable time delay relay <br> －Universal input voltage <br> －LED status indicators <br> －1／16 DIN style enclosure <br> 只（18）$C \in$ |
| Approximate Dimensions | $\begin{gathered} 1.7^{\prime \prime} \times .4^{\prime \prime} \times 1.0^{\prime \prime} \mathrm{h} \\ (43.2 \times 10.2 \times 25.4 \mathrm{~h}) \\ 0.9 \mathrm{oz}(25.5 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.7^{\prime \prime} \times .4^{\prime \prime} \times 1.0^{\prime \mathrm{h}} \\ (43.2 \times 10.2 \times 25.4 \mathrm{~h}) \\ 0.9 \mathrm{oz}(25.5 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.7^{\prime \prime} \times .4 \text { " } \times 1.0^{\prime \prime} \mathrm{h} \\ (43.2 \times 10.2 \times 25.4 \mathrm{~h}) \\ 0.9 \mathrm{oz} .(25.5 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.7^{\prime \prime} \times .4^{\prime \prime} \times 1.0^{\prime \prime} \mathrm{h} \\ (43.2 \times 10.2 \times 25.4 \mathrm{~h}) \\ 0.9 \mathrm{oz} .(25.5 \mathrm{~g}) \end{gathered}$ | Approximate Dimensions | $\begin{gathered} 4.02 \text { " } \times .886 \text { " } \times 3.39 \text { "h } \\ (102 \times 22.5 \times 86 \mathrm{~h}) \\ 5.3 \mathrm{oz} .(150 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.89 \text { " } \times 1.89 " \times 2.73 \mathrm{lh} \\ (48.0 \times 48.0 \times 69.3 \mathrm{~h}) \\ 5.0 \mathrm{oz} .(142 \mathrm{~g}) \end{gathered}$ |
| Switch <br> Arrangement | 1 Form A （sinking） | 1 Form A | 1 Form A （sinking） | 1 Form A | Contact Arrang． | 1 Form C， <br> 2 Form C | 2 Form C |
| Coupling | Optical | Optical | Optical | Optical | Contact Rating | 3A＠250VAC | 10A＠30VDC or 120／240VAC |
| Input | 18－36VACNDC 90－140VACNDC 180－280VACNDC | $\begin{gathered} \text { 5VDC } \\ \text { 15VDC } \\ \text { 24VDC } \\ 3-15 V D C \end{gathered}$ | $\begin{gathered} 3.3-32 \mathrm{VDC} \\ 4-32 \mathrm{VDC} \\ 10-60 \mathrm{VDC} \end{gathered}$ | $\begin{gathered} \text { 5VDC } \\ \text { 15VDC } \\ \text { 24VDC } \\ \text { 3-15VDC } \end{gathered}$ | Mode of Operation | Programmable： $8-16$ timing functions or Delay On | Programmable 8 functions（11－pin） 4 functions（8－pin） or Delay On |
| Output Switching | Random | Zero， Random | Random | Random | Delay Time | 0.05 sec ．to 100 hr ． | 0.1 sec ．to 10 hr ． |
| Minimum Output Current | $>0$ | ．05A | $>0$ | ．01A | Type of Control | Rotary switches \＆ Potentiometer Adj． | Knob \＆ Rotary switches |
| Maximum Output Current | 0．05A | 3A to 5A | 0．05A | 3 A | Maximum Repeatability | $\pm 1 \%$ | $\pm 0.5 \% \pm 0.02 \mathrm{sec}$. |
| Minimum Output Voltage | $>0$ | 24V | $>0$ | 3 V | Precision | Tolerance $\pm 5 \%$ | Overall Accuracy $\pm 1.0 \% \pm 0.02 \mathrm{sec} .$ |
| Maximum Output Voltage | 30 V | 280 V | 30 V | 60 V |  |  |  |
| Output Type | DC | AC | DC | DC | Temp．Range | $-25^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ | $-25^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ |
| Terminals | Printed circuit | Printed circuit | Printed circuit | Printed circuit | Input Voltage | 24－240VACNDC； 24VACNDC．110VAC； 24VACNDC．220VAC | $\begin{gathered} \text { 24-240VAC; } \\ \text { 24-125VDC; } \\ \text { 120VAC } \end{gathered}$ |
| Mounting | Mounting board | Mounting board | Mounting board | Mounting board | Mounting | DIN Mount | Plug－in |
| Page Number | 1118 | 1118 | 1118 | 1118 | Page Number | 1207 | 1210 |



|  | Every <br> 1444 <br> P\&B | P\&B | P\&B | AGASTAT | AGASTAT | P\&B | P\&B |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Series | CNT | CNS | CNM5 | SSF | SCF | CN1 | CG |
| Features | - 10A rating <br> - Programmable timer/counter <br> - Digital display <br> - Universal input voltage <br> - 1/16 DIN style enclosure <br> 기 (18) | - 10A rating <br> - Programmable time delay relay <br> - Universal input voltage <br> - 1/16 DIN style enclosure | - 10A rating <br> - Economical, programmable time delay relay <br> - Digital accuracy <br> - LED shows status <br> - 1/16 DIN style enclosure | - 10A rating <br> - Programmable time delay module with replaceable relay <br> - Universal input voltage | - 10A rating <br> - Programmable time delay relay <br> - Slim plug-in package with mating socket | - 10A rating <br> - Economical single function (on delay) time delay relay <br> - Digital accuracy <br> - LED shows status <br> - 1/16 DIN style enclosure | - 10A rating <br> - Top of the line P\&B non-programmable time delay relays <br> - Extended timing ranges |
| Approximate Dimensions | $\begin{gathered} 1.88^{\prime \prime} \times 1.88 \text { " } \times 2.83^{\prime \prime h} \\ (47.8 \times 47.8 \times 71.9 \mathrm{~h}) \\ 4.3 \text { oz. (122g) } \end{gathered}$ | $1.88^{\prime \prime} \times 1.88^{\prime \prime} \times 2.83^{\prime \prime} h$ <br> $(47.8 \times 47.8 \times 71.9 \mathrm{~h})$ <br> 4.3 oz. (122g) | $\begin{gathered} 1.88 " \times 1.88 " \times 2.83 \text { "h } \\ (47.8 \times 47.8 \times 71.9 \mathrm{~h}) \\ 4.3 \mathrm{oz} .(122 \mathrm{~g}) \end{gathered}$ | $3.81 " \times 2.19$ " $\times 2.67$ " $h$ ( $97 \times 56 \times 68 \mathrm{~h})$ 5.5 oz. (156g) | $\begin{gathered} 2.84 " \times 1.42 \text { " } \times 3.53 \mathrm{~h} \\ (72 \times 36 \times 90 \mathrm{~h}) \\ 3.5 \mathrm{oz} .(99 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.88 \text { " } \times 1.88 \text { " } \times 2.83^{\prime \prime} h \\ (47.8 \times 47.8 \times 71.9 \mathrm{~h}) \\ 4.3 \text { oz. (122g) } \end{gathered}$ | $\begin{gathered} 2.41^{\prime \prime} \times 1.788^{\prime \prime} \times 2.94^{\prime \prime h} \\ (61.1 \times 45.2 \times 74.6 \mathrm{~h}) \\ 8 \mathrm{oz} .(227 \mathrm{~g}) \end{gathered}$ |
| Contact Arrang. | 2 Form C | 2 Form C | 2 Form C | 2 Form C | 2 Form C | 2 Form C | 2 Form C |
| Contact Rating | 10A @ 30VDC or 277VAC | $\begin{gathered} \text { 10A @ 30VDC or } \\ 277 \mathrm{VAC} \end{gathered}$ | 10A @ 30VDC or 277VAC | $\begin{gathered} \text { 10A @28VDC or } \\ \text { 120VAC } \end{gathered}$ | $\begin{aligned} & 5 \text { or 10A @ } 28 \mathrm{VDC} \text { or } \\ & \text { 120VAC } \end{aligned}$ | 10A @ 30VDC or 277VAC | 10A @ 240VAC |
| Mode of Operation | Programmable: 10 timing functions 2 counting functions | Programmable: 8 functions (11-pin) 4 functions (8-pin) | Programmable: 5 timing functions | Programmable 4 functions | Programmable 4 functions | On Delay | Delay on Operate Delay on Release Interval On |
| Delay Time | 0.1 sec . to 9,990 hr. | 0.1 sec . to 100 min . | 0.1 sec . to 9,990 hr. | 0.1 sec . to 10 hr . | 0.1 sec . to 10 hr . | 0.1 sec . to $9,990 \mathrm{hr}$. | 1 min . to 50 min . |
| Type of Control | Thumbwheel switches | DIP switches \& Potentiometer Adj. | Thumbwheel switches \& Rotary switch | Recessed Potentiometer Adj. | Recessed dials and Potentiometer Adj. | Thumbwheel switches | Potentiometer Adj. |
| Maximum Repeatability | $\pm 0.1 \% \pm 0.05 \mathrm{sec}$. | $\pm 0.2 \%$ | $\pm 0.05 \% \pm 0.04 \mathrm{sec}$. | $\pm 1 \% \pm 0.01 \mathrm{sec}$. | $\pm 1 \% \pm 0.01 \mathrm{sec}$. | $\pm 0.05 \% \pm 0.04 \mathrm{sec}$. | $\begin{aligned} & \pm 0.5 \% \text { (AC) } \\ & \pm 0.1 \% \text { (DC) } \end{aligned}$ |
| Precision | $\begin{gathered} \text { Tolerance } \\ \pm 0.1 \% \pm 0.05 \mathrm{sec} . \end{gathered}$ | Tolerance Min. spec. at min.; $+20 \%,-0$ at max. | $\begin{gathered} \text { Tolerance } \\ \pm 0.05 \% \pm 0.04 \mathrm{sec} . \end{gathered}$ | Overall Accuracy $\pm 3 \% \pm 0.01 \mathrm{sec} .$ | Overall Accuracy $\pm 3 \% \pm 0.01 \mathrm{sec} \text {. }$ | $\begin{gathered} \text { Tolerance } \\ \pm 0.05 \% \pm 0.04 \mathrm{sec} . \end{gathered}$ | Tolerance $+0,-10 \%$ at min. $+10 \%,-0$ at max. |
| Temp. Range | $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$ | $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$ | $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$ | $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$ | $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$ |
| Input <br> Voltage | $\begin{gathered} \text { 12VDC } \\ \text { 24-240VACNDC } \end{gathered}$ | 24-240VACNDC | 120VAC | $\begin{gathered} \text { 24-125VDC } \\ \text { 24-240VAC or } \\ \text { User-selectable } \end{gathered}$ | $\begin{aligned} & \text { 12-125VDC } \\ & \text { 24-240VAC } \end{aligned}$ | 120VAC | $\begin{gathered} 12-24 \mathrm{VDC} \\ 120-240 \mathrm{VAC} \end{gathered}$ |
| Mounting | Plug-in | Plug-in | Plug-in | DIN-mount or panel mount | Plug-in | Plug-in | Plug-in |
| Page Number | 1211 | 1213 | 1215 | 1217 | 1218 | 1219 | 1220 |

Dimensions are shown for Dimensions are in inches over Specifications and availability


[^9]| Electronic |  |  |  | Issued 3－03 |  |  | SELE | CTOR GUIDE |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time Delay Relays \＆M odules |  |  |  |  |  |  |  |  |
|  |  | AGASTAT | AGASTAT | AGASTAT |  |  <br> AGASTAT | AGASTAT | AGASTAT |
| Series | SSC | SCB／SCC | STA | SRC | SST | SCE | VTM－1 | VTM1 |
| Features | －10A rating <br> －Specification grade <br> －Choose from 13 different timing ranges | －10A rating <br> －Specification grade <br> －Choose from 13 different timing ranges <br> －Premium components | －10A rating <br> －Specification grade <br> －Choose from 13 different timing ranges <br> －LED indicators <br> －Space－saving quick connect plug－in terminals <br> 쑈 | －10A rating <br> －Specification grade <br> －Repeat cycle timer <br> －Choose from 13 different timing ranges <br> －Premium components $c \in$ | －10A rating <br> －Industrial grade <br> －Wide choice of functions <br> － 9 different timing ranges | －10A rating <br> －Specification grade <br> －True Off Delay <br> － 6 different timing ranges | －1A rating <br> －Specification grade <br> －In－line timing module <br> －Solid state output switch <br> －Universal input voltage <br> 听（18） | －1A rating <br> －On Delay timing module <br> －Solid state output switch <br> －External Res． adjustable 只 (1) |
| Approximate Dimensions | $\begin{gathered} 1.97 " \times 1.97 " \times 3.25^{\prime \prime} \mathrm{h} \\ (50 \times 50 \times 83 \mathrm{~h}) \\ 4 \mathrm{oz} .(112 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.97 \text { " } \times 1.97 \text { " } \times 3.25 \text { "h } \\ (50 \times 50 \times 83 \mathrm{~h}) \\ 4 \mathrm{oz} .(112 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 1.5 " \times 1.39 " \times 3.045 \mathrm{~h} \\ (38 \times 35 \times 77 \mathrm{~h}) \\ 4.2 \mathrm{oz} .(119 \mathrm{~g}) \\ \hline \end{gathered}$ | $\begin{gathered} 1.97 \text { " } \times 1.97 \text { " } \times 3.25 \text { "h } \\ (50 \times 50 \times 83 \mathrm{~h}) \\ 5.3 \mathrm{oz} .(149 \mathrm{~g}) \end{gathered}$ | $\left(\begin{array}{c} 2.0^{\prime \prime} \times 2.0^{\prime \prime} \times 3.2^{\prime \prime} \mathrm{h} \\ (50.8 \times 50.8 \times 81.3 \mathrm{~h}) \\ 4 \mathrm{oz} .(112 \mathrm{~g}) \end{array}\right.$ | $\begin{gathered} 1.97 " \times 1.97 " \times 3.255^{\prime \prime} \mathrm{h} \\ (50 \times 50 \times 83 \mathrm{~h}) \\ 4 \mathrm{oz} .(112 \mathrm{~g}) \end{gathered}$ | $\left\lvert\, \begin{gathered} 2.13 " \times 2.65 " \times 0.76 " \mathrm{~h} \\ (54 \times 67 \times 19 \mathrm{~h}) \\ 3 \mathrm{oz} .(84 \mathrm{~g}) \end{gathered}\right.$ | $2.0 " \times 2.0 " \times 1.25 \mathrm{~h} h$ $(50.8 \times 50.8 \times 31.8 \mathrm{~h})$ $4 \mathrm{oz} .(112 \mathrm{~g})$ |
| Contact． Arrang． | 2 Form C | 2 Form C | 2 Form C | 2 Form C | 2 Form C | 1 Form C， 2 Form C | 1 Form A | 1 Form A |
| Contact Rating | $\begin{gathered} \text { 10A @ 28VDC or } \\ \text { 120VAC } \end{gathered}$ | $\begin{gathered} \text { 10A @ 28VDC or } \\ \text { 120VAC } \end{gathered}$ | 10A＠28VDC or 120VAC | $\begin{gathered} \text { 10A @ 28VDC or } \\ \text { 120VAC } \end{gathered}$ | 10A＠120／240VAC | 10A＠120／240VAC <br> （1 pole）or <br> 5A＠120／240VAC | 1A＠240VACNDC | 1A＠240VACNDC |
| Mode of Operation | On Delay Off Delay Interval | On Delay Off Delay Interval | On Delay <br> Off Delay Interval Accum．On Delay | Repeat Cycle | On Delay，Off Delay， Interval，One Shot， Repeat Cycle | True Off Delay | On Delay | On Delay |
| Delay Time | 0.1 sec ．to 10 hr ． | 0.1 sec ．to 10 hr ． | 0.1 sec ．to 10 hr ． | 0.1 sec ．to 60 min ． | 0.1 sec ．to 120 min ． | 0.1 sec ．to 10 min ． | 1 sec ．to $1,000 \mathrm{sec}$ ． | 0.5 sec ．to 60 min ． |
| Type of Control | Fixed， Potentiometer Adj．， Ext．Res．Adj． | Fixed， Potentiometer Adj．， Ext．Res．Adj． | Fixed， Potentiometer Adj．， Ext．Res．Adj． | Potentiometer Adj． | Potentiometer Adj． | Fixed， Potentiometer Adj．， | Ext．Res．Adj． | Ext．Res．Adj． |
| Maximum Repeatability | $\pm 1 \% \pm 0.004 \mathrm{sec}$ ． | $\pm 0.5 \% \pm 0.004 \mathrm{sec}$ ． | $\pm 0.5 \% \pm 0.004 \mathrm{sec}$ ． | $\pm 1 \% \pm 0.004 \mathrm{sec}$. | $\pm 1 \%$ | $\pm 1 \%$ | $\pm 2 \%$ | $\pm 1 \%$ |
| Precision | Overall Accuracy $\pm 5.25 \%$ | $\begin{gathered} \text { Overall Accuracy } \\ \pm 2 \% \end{gathered}$ | $\begin{gathered} \text { Overall Accuracy } \\ \pm 2 \% \end{gathered}$ | Overall Accuracy $\pm 2.25 \%$ | $\begin{gathered} \text { Overall Accuracy } \\ \pm 5 \% \end{gathered}$ | $\begin{gathered} \text { Overall Accuracy } \\ \pm 5 \% \end{gathered}$ | $\begin{gathered} \text { Overall Accuracy } \\ \pm 2 \% \end{gathered}$ | $\begin{gathered} \text { Overall Accuracy } \\ \pm 2 \% \text { at } \\ R=1 \text { megohm } \end{gathered}$ |
| Temp．Range | $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$（SCB） | $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-23^{\circ} \mathrm{C}$ to $+54^{\circ} \mathrm{C}$ | $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ |
| Input Voltage | $\begin{aligned} & 12-120 \mathrm{VDC} \\ & 24-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & \text { 12-120VDC } \\ & \text { 24-240VAC } \end{aligned}$ | $\begin{aligned} & 12-120 \mathrm{VDC} \\ & 24-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & 12-120 \mathrm{VDC} \\ & 24-240 \mathrm{VAC} \end{aligned}$ | $\begin{aligned} & \text { 12-120VDC } \\ & \text { 24-120VAC } \end{aligned}$ | $\begin{aligned} & 24-125 \mathrm{VDC} \\ & 24-120 \mathrm{VAC} \end{aligned}$ | $\begin{gathered} 24-240 \text { VACNDC } \\ \text { or 12VDC } \end{gathered}$ | 12－120VACNDC |
| Mounting | Plug－in | Plug－in | Plug－in | Plug－in | Plug－in | Plug－in | Panel mount | Panel Mount |
| Page Number | 1234 | 1235 | 1236 | 1237 | 1238 | 1239 | 1240 | 1241 |

Specifications and／or agency recognitions do not necessarily apply to all models within a particular series．When multiple ratings are listed，no individual rating may be exceeded by the combination of others．
 reference purposes only．

|  |  |  |  | Issued 3－03 |  |  | SEL | ctor GuId |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time Delay Relays \＆M odules |  |  |  |  |  |  |  |  |
|  |  | AGASTAT | AGASTAT | AGASTAT | AGASTAT | AGASTAT | AGASTAT |  |
| Series | VTMA1 | VTMR1 | VTM2 | VTM3 | VTM4 | VTM7 | 7000 | 2100 |
| Features | －1A rating <br> －On Delay timing module <br> －Solid state output switch <br> －Internal potentiometer | －8A rating <br> －On Delay timing module <br> －Electromechanical relay output <br> －Internal potentiometer | －1A rating <br> －Off Delay timing module <br> －Solid state output switch <br> －External Res． adjustable | －1A rating <br> －Interval timing module <br> －Solid state output switch <br> －External Res． adjustable | －1A rating <br> －One Shot timing module <br> －Solid state output switch <br> －Extemal Res． adjustable | －1A rating <br> －Repeat cycle timing module <br> －Independently adjustable on and off times <br> －Solid state output switch <br> －External Res． adjustable <br> 미（ㅏㅏ | －20A rating <br> －Electropneumatic time delay relay <br> －Calibrated timing head <br> －Front terminals <br> －Optional auxiliary switches <br> －Many options <br> （1L）$\subset \in$ | －10A rating <br> －Miniature electropneumatic time delay relay <br> －Knob or key adj． <br> －Hermetically sealed，high shock and vibration option $c \epsilon$ |
| Approximate Dimensions | $\begin{gathered} 2.0 \mathrm{O} \times 2.0 \mathrm{0} \times 1.25 \mathrm{~h} \\ (50.8 \times 50.8 \times 31.8 \mathrm{~h}) \\ 4 \text { oz. }(112 \mathrm{~g}) \end{gathered}$ | $2.0 " \times 2.01 \times 1.25 \mathrm{H} h$ $(50.8 \times 50.8 \times 31.8 \mathrm{~h})$ 4 oz．$(112 \mathrm{~g})$ | $\begin{array}{\|c\|} 2.0 " \times 2.01 " \times 1.25 " \mathrm{~h} \\ (50.8 \times 50.8 \times 31.8 \mathrm{~h}) \\ 4 \mathrm{oz} .(112 \mathrm{~g}) \end{array}$ | $2.01 \times 2.01 \times 1.25 \mathrm{~h}$ $(50.8 \times 50.8 \times 31.8 \mathrm{~h})$ 4 oz．$(112 \mathrm{~g})$ | $\begin{array}{\|c} 2.0 \mathrm{O} \times 2.0 \mathrm{0} \times 1.25 \mathrm{~h} \\ (50.8 \times 50.8 \times 31.8 \mathrm{~h}) \\ 4 \mathrm{oz} .(112 \mathrm{~g}) \end{array}$ | $\begin{gathered} 2.0 " \times 2.0 " \times 1.25 \mathrm{~h} h \\ (50.8 \times 50.8 \times 31.8 \mathrm{~h}) \\ 4 \mathrm{oz} .(112 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 4.52 " \times 2.57 " \times 2.83 \text { "h } \\ (114.8 \times 65.3 \times 71.9 \mathrm{~h}) \\ 36 \mathrm{oz} .(1.02 \mathrm{~kg}) \end{gathered}$ | $1.52 " \times 1.52 " \times 4.26 \mathrm{~h} h$ $(38.6 \times 38.6 \times 108.2 \mathrm{~h})$ $17 \mathrm{oz} .(482 \mathrm{~g})$ |
| Contact． <br> Arrang． | 1 Form A | 1 Form C | 1 Form A | 1 Form A | 1 Form A | 1 Form A | 2 Form C， 4 Form C | 2 Form C |
| Contact Rating | 1A＠240VACNDC | 8A＠120VAC | 1A＠240VACNDC | 1A＠240VACNDC | 1A＠240VACNDC | 1A＠240VACNDC | $\begin{gathered} \text { 20A @ 120/240VAC } \\ 15 \mathrm{~A} @ 30 \mathrm{VDC} \end{gathered}$ | 10A＠120VAC or 30VDC |
| Mode of Operation | On Delay | On Delay | Off Delay | Interval | One Shot （Latching Interval） | Repeat Cycle | On Delay， Off Delay， On Delay－Off Delay | On Delay， Off Delay |
| Delay Time | 0.5 sec ．to 60 min ． | 15 to 300 sec ． | 0.5 sec ．to 60 min ． | 0.5 sec ．to 60 min ． | 0.5 sec ．to 60 min ． | 0.5 sec ．to 60 min ． | 0.1 sec ．to 60 min ． | 0.03 to 180 sec ． |
| Type of Control | Potentiometer Adj． | Potentiometer Adj． | Ext．Res．Adj． | Ext．Res．Adj． | Ext．Res．Adj． | Ext．Res．Adj． | Knob | Knob |
| Maximum Repeatability | $\pm 5 \%$ | $\pm 5 \%$ | $\pm 1 \%$ | $\pm 1 \%$ | $\pm 1 \%$ | $\pm 1 \%$ | $\pm 5-15 \%$（model \＆ delay dependent） | $\pm 5-8 \%$（temp． dependent） |
| Precision | Overall Accuracy $-0 \%,+10 \%$ at Max． $-30 \%,+10 \%$ at Min． | Overall Accuracy $-0 \%,+10 \%$ at Max． $-30 \%,+10 \%$ at Min． | $\begin{gathered} \text { Overall Accuracy } \\ \pm 2 \% \text { at } \\ R=1 \text { megohm } \end{gathered}$ | $\begin{gathered} \text { Overall Accuracy } \\ \pm 2 \% \text { at } \\ R=1 \text { megohm } \end{gathered}$ | $\begin{gathered} \text { Overall Accuracy } \\ \pm 2 \% \text { at } \\ R=1 \text { megohm } \end{gathered}$ | $\begin{gathered} \text { Overall Accuracy } \\ \pm 2 \% \text { at } \\ R=1 \text { megohm } \end{gathered}$ | － | － |
| Temp．Range | $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$ | $-29^{\circ} \mathrm{C}$ to $+74^{\circ} \mathrm{C}$ | $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$ |
| Input <br> Voltage | 24－240VACNDC | 120VAC | 12－120VACNDC | 12－120VACNDC | 12－120VACNDC | 12－120VACNDC | $\begin{aligned} & \text { 12-550VAC } \\ & \text { 28-550VDC } \end{aligned}$ | $\begin{aligned} & \text { 120-240VAC } \\ & \text { 12-125VDC } \end{aligned}$ |
| Mounting | Panel Mount | Panel Mount | Panel Mount | Panel Mount | Panel Mount | Panel Mount | Panel Mount | Panel Mount |
| Page Number | 1242 | 1243 | 1244 | 1245 | 1246 | 1247 | 1248 | 1254 |

[^10]|  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Sensors，M onitors \＆Protective Relays |  |  |  |  |  |  |  |
|  | P\＆B | AGASTAT | AGASTAT | AGASTAT |  | KILOVAC | KILOVAC |
| Series | CS | VCA | VMA | PMA／PMB | SDAS－01 | WD25 | WD2759 |
| Features | －Single phase voltage sensor <br> －Functions as either an overvoltage or an undervoltage sensor <br> －Choice of fixed pick－up and knob adjustable drop－out or knob adjustable pick－up and drop－ out <br> 可（148 | －Single phase undervoltage relay <br> －Fixed pick－up and internal potentiometer adjustable drop－out <br> －Compact design | －Single phase undervoltage relay <br> －Fixed pick－up and internal potentiometer adjustable drop－out <br> －Locking potentiometer <br> P1 | －Three phase power quality monitor <br> －Monitors voltage， phase imbalance， phase sequence， phase loss． <br> －Start－up delay and locking potentiometer options． | －Single phase current sensor <br> －AC current sensor is offered in both overcurrent and undercurrent types <br> －Inductive coupling to power line <br> －Potentiometer adjustable | －Paralleling（snych check）relay <br> －Checks synchroniza－ tion of two circuits for voltage，phase relationship and frequency <br> －Adjustable setpoints <br> －Single dead bus， double dead bus and generator to generator types | －Overvoltage／ undervoltage relay <br> －User adjustable sensing voltages， number of phases， over and under－ voltage setpoints， and time delays． |
| Approximate Dimensions | $\begin{gathered} 2.41 " \times 1.78^{\prime \prime} \times 2.94^{\prime \prime} \mathrm{h} \\ (61.1 \times 42.2 \times 76.6 \mathrm{~h}) \\ 8 \mathrm{oz} .(227 \mathrm{~g}) \end{gathered}$ | $2.0^{\prime \prime} \times 2.0^{\prime \prime} \times 1.25^{\prime \prime} \mathrm{h}$ （ $50.8 \times 50.8 \times 31.8 \mathrm{~h}$ ） 3.2 oz．（90．7g） | $\begin{gathered} 1.94 \text { " } \times 1.94 \text { " } \times 3.25 \text { "h } \\ (49 \times 49 \times 83 \mathrm{~h}) \\ 6 \text { oz. (168g) } \end{gathered}$ | $\begin{gathered} 3.85 " \times 2.18 \text { " } \times 5.31 \text { "h } \\ (98 \times 55 \times 135 \mathrm{~h}) \\ 24 \mathrm{oz} .(625 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 1.53 \text { " } \times 1.41 \text { " } \times 2.72 \text { "h } \\ (38.9 \times 35.7 \times 70.6 \mathrm{~h}) \\ 3.2 \mathrm{oz} .(90 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 2.95 " \times 2.87 " \times 4.41 \mathrm{~h} \\ (75 \times 73 \times 112 \mathrm{~h}) \\ 14.4 \mathrm{oz} .(400 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 2.95 " \times 2.87 " \times 4.41 \mathrm{~h} \mathrm{~h} \\ (75 \times 73 \times 112 \mathrm{~h}) \\ 14.4 \mathrm{oz} .(400 \mathrm{~g}) \end{gathered}$ |
| Contact／Switch Arrangement | 2 Form C | 1 Form C | 2 Form C | 1 Form $\mathrm{A}+1$ Form C | 2 Form C | 2 Form C | 1 Form C for undervoltage and 1 Form C for overvoltage |
| Contact／Switch Rating | $\begin{gathered} \text { 10A @ 28VDC } \\ \text { or 120VAC } \end{gathered}$ | $\begin{aligned} & \text { 7A @ 250VAC } \\ & \text { 3A @ 30VDC } \end{aligned}$ | $\begin{aligned} & \text { 7A @ 250VAC } \\ & \text { 3A @ 30VDC } \end{aligned}$ | $\begin{aligned} & \text { 8A @ 250VAC } \\ & \text { 3A @ 30VDC } \end{aligned}$ | 2A＠28VDC or 1A＠120VAC | $\begin{aligned} & \text { 5A @ 120VAC or } \\ & \text { 30VDC } \end{aligned}$ | $\begin{aligned} & \text { 5A @ 120VAC or } \\ & \text { 30VDC } \end{aligned}$ |
| Monitor／Sense Range or Threshold | 16 to 140 VAC or VDC in various ranges | 120VAC or 240VAC， nominal | 15 to 240 VAC or VDC in various ranges | 110 to 600VAC in various ranges | 1.5 to 15A AC | 120 to 480VAC， nominal 575VAC，Max． $40-400 \mathrm{~Hz}$ ． | 120 to 480 VAC ， nominal 700VAC，Max． $50-400 \mathrm{~Hz}$ ． |
| Temperature Range | $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$ | $-23^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$ | $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$ | $-10^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ | $-25^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$ | $-40^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ | $-40^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ |
| Terminals | Octal plug | Quick Connect | Octal plug | Screws | Quick connect | Screws | Screws |
| Mounting Options | Socket | Panel | Socket | DIN－rail，Panel or Machine Tool Rail （with optional adapter plate） | Socket | DIN－rail or Panel | DIN－rail or Panel |
| Sockets | Screw terminal | － | Screw terminal | － | Screw terminal， Solder terminal， PC terminal， Quick connect terminal | － | － |
| Page Number | 1302 | 1303 | 1304 | 1305 | 1307 | 1308－1309 | 1308 \＆ 1310 |

Specifications and／or agency recognitions do not necessarily apply to all models within a particular series．When multiple ratings are listed，no individual rating may be exceeded by the combination of others．
Dimensions are shown for Dimensions are in inches over ww．tycoelectronics．com
reference purposes only．
Specifications and
subject to change．

|  | KILOVAC | KILOVAC | KILOVAC | KILOVAC |
| :---: | :---: | :---: | :---: | :---: |
| Series | WD32 | WD47 | WD5051 | WD810U |
| Features | - Reverse power relay <br> - Monitors the direction of power from AC generators <br> - Adjustable trip set and time delay | - Phase sequence relay <br> - Monitors the correct phase rotation and loss of phase. <br> - No adjustments or calibration necessary. | - One and three phase overcurrent relay <br> - Nominal sensing current, instantaneous over current (IOC) setpoint, time over current (TOC) setpoint and time overcurrent time delay are user configured. <br> 9 | - Over/ underfrequency relay <br> - User selectable nominal frequency, underfrequency (UF) trip set, overfrequency (OF) trip set, UF time delay and OF time delay. <br> TJ |
| Approximate Dimensions | $\begin{gathered} 2.95 " \times 2.87 " \times 4.41 \mathrm{~h} \\ (75 \times 73 \times 112 \mathrm{~h}) \\ 14.4 \mathrm{oz} .(400 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 2.95 " \times 2.87 " \times 4.41 \mathrm{~h} h \\ (75 \times 73 \times 112 \mathrm{~h}) \\ 14.4 \mathrm{oz} .(400 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 2.95^{\prime \prime} \times 2.87 " \times 4.41^{\text {"h }} \\ (75 \times 73 \times 112 \mathrm{~h}) \\ 14.4 \mathrm{oz} .(400 \mathrm{~g}) \end{gathered}$ | $\begin{gathered} 2.95 " \times 2.87 " \times 4.41 \mathrm{lh} \\ (75 \times 73 \times 112 \mathrm{~h}) \\ 14.4 \mathrm{oz} .(400 \mathrm{~g}) \end{gathered}$ |
| Contact / Switch Arrangement | 2 Form C | 2 Form C | 1 Form C for IOC and 1 Form C for TOC | 1 Form C for UF and 1 Form C for OF |
| Contact / Switch Rating | $\begin{aligned} & \text { 5A @ 120VAC or } \\ & \text { 30VDC } \end{aligned}$ | $\begin{aligned} & \text { 5A @ 120VAC or } \\ & \text { 30VDC } \end{aligned}$ | $\begin{aligned} & \text { 5A @ 120VAC or } \\ & \text { 30VDC } \end{aligned}$ | $\begin{aligned} & \text { 5A @ 120VAC or } \\ & \text { 30VDC } \end{aligned}$ |
| Monitor / Sense Range or Threshold | 120 to 480VAC, nominal 575VAC, Max. $40-400 \mathrm{~Hz}$. 5A, nominal | 120 to 480VAC, nominal 575VAC, Max. $50-400 \mathrm{~Hz}$. | $\begin{gathered} 1,3,6 \text { or } 8 \mathrm{~A} \\ 40-400 \mathrm{~Hz} . \end{gathered}$ | 50,60 or 400 Hz ., nominal 1000 Hz, ,Max. 20 to 480VAC, 575VAC, Max. |
| Temperature Range | $-40^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ | $-40^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ | $-40^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ | $-40^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ |
| Terminals | Screws | Screws | Screws | Screws |
| Mounting Options | DIN-rail or Panel | DIN-rail or Panel | DIN-rail or Panel | DIN-rail or Panel |
| Sockets | - | - | - | - |
| Page Number | 1308 \& 1311 | 1308 \& 1312 | 1308 \& 1313 | 1308 \& 1314 |

## Need Protective Relays in Steel Cases?

Our steel-cased protective relays are not desribed in this technical databook as they do not represent the most cost-effective solution for many design requirements. While the plastic-cased WD... series products are more appropriate for many new industrial applications, we still offer our steelcased protective relays. For details on KILOVAC steel-cased protective relays, consult technical support (see inside back cover)] or visit our website at www.tycoelectronics.com.

## Looking for high performance relay products?

Our KILOVAC high voltage relays; HARTM AN and KILOVAC high performance power relays, sensors and contactors; and CII high performance signal level relays, timers, sensors and solenoids are not described in detail in this technical databook. We have included an overview of those product lines in section 14 beginning on page 1401 For detailed information on our broad high performance relay product line, consult technical support (see inside back cover) or visit our website at www.tycoelectronics.com.


## Alphanumeric Index

| Series | Type | Page |
| :---: | :---: | :---: |
| W6. | M agnetic Circuit Breaker | 119 |
| W9. | . M agnetic Circuit Breaker | 119 |
| W23 | . Thermal Circuit Breaker | 116 |
| W28 | . Thermal Circuit Breaker | 110 |
| W31 | . Thermal Circuit Breaker | 116 |
| W33 | . Thermal Circuit Breaker | 114 |
| W51 | . Thermal Circuit Breaker | 112 |
| W54. | .Thermal Circuit Breaker | 105 |
| W57. | . Thermal Circuit Breaker | 103 |
| W58.... | . Thermal Circuit Breaker .. | 107 |

NOTE: A question tree that may help you in selecting an appropriate circuit breaker for your application can be found on the next page.

## $\mathrm{P}_{\&} \mathrm{~B}$ Circuit Breaker Question Tree

This guide helps the user select one or more circuit breaker series which may be appropriate for a given application. The user should then refer to detailed specifications elsewhere in this catalog to determine the actual part number to be specified. Of course, the user must assume ultimate responsibility for determining the suitability of a breaker for a particular application.



## W57 <br> series

## Compact, Push To Reset Only Thermal Circuit Breaker

${ }^{c} \mathrm{MN}_{\mathrm{us}}$

## Features

- New, compact, design.
- 4 to 20 amp ratings.
- Cannot be manually tripped.
- Button extends for visual trip indication.
- Push button to reset breaker.
- Numerous mounting and termination options.


## Agency Approvals

W57 series is UL 1077 Recognized as Supplementary Protectors, File E69543, for Canada and the United States.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also sek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Electrical Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Calibration: Will continuously carry 100\% of rating.
May trip between $101 \%$ and $134 \%$, but must trip at $135 \%$ of rating within one hour at $+25^{\circ} \mathrm{C}$.
Dielectric Strength: 1,500VAC ( 60 seconds).
Insulation Resistance: 100 megohms.
Maximum Operating Voltages: 50VDC; 250VAC, $50 / 60 \mathrm{~Hz}$.

Interrupt Capacity: 1,000 amps in accordance with UL standard 1077.
Resettable Overload Capacity: Ten times rated current.
Reset Time: 60 seconds.

Typical Resistance vs. Current Rating @ $+\mathbf{2 5}^{\circ} \mathrm{C}$

| Current <br> Rating <br> in Amps | Typical <br> Resistance <br> in Ohms | Current <br> Rating <br> in Amps | Typical <br> Resistance <br> in Ohms |
| :---: | :---: | :---: | :---: |
| 4.0 | 0.062 | 10.0 | 0.025 |
| 5.0 | 0.050 | 12.0 | 0.021 |
| 6.0 | 0.042 | 15.0 | 0.017 |
| 7.0 | 0.036 | 20.0 | 0.012 |
| 8.0 | 0.031 |  |  |

## Mechanical/Environmental Data

Operating Temperature Range: $0^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.
Termination: .250 " ( 6.35 mm ) quick connects.
Mounting: Various options. See Ordering Information and drawings.
Approximate Weight: 0.5 oz . (14.3g).

## Time vs. Current Trip Curve @ +25 ${ }^{\circ} \mathrm{C}$



## Ambient Compensation Table

| Ambient <br> Temperature <br> in ${ }^{\circ}$ C | Rating Correction Factor |  |
| :---: | :---: | :---: |
|  | 3-6A Models | 7-20A Models |
| 10 | .80 | .80 |
| 20 | .90 | .90 |
| 25 | 100 | 100 |
| 30 | 110 | 105 |
| 40 | 125 | 115 |
| 50 | 161 | 125 |
| 60 | 2.15 | 140 |

To use this chart: Divide the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve.
Do not use these devices outside their specified operating temperature ranges.

## Outline Dimensions



Optional Protective Boot
Silicone rubber boot is bonded to integral alumimum nut.


1-1423696-5
Black boot for W57 with 3/8"-24 bushing.

1-1423696-7 Clear boot for W57 with $3 / 8$ "-24 bushing.


1-1423696-4
Black boot for W57 with M $11 \times 10$ bushing.

1-1423696-6
Clear boot for W57 with M $11 \times 10$ bushing.

## Ordering Information



Our authorized distributors are more likely to stock the following items for immediate delivery.

| W57-XB1A4A10-5 | W57-XB1A4A10-15 | W57-XB1A7A10-5 | W57-XB1A7A10-15 |
| :--- | :--- | :--- | :--- |
| W57-XB1A4A10-10 | W57-XB1A4A10-20 | W57-XB1A7A10-10 | W57-XB1A7A10-20 |

ORDERING NOTE: Many options illustrated below are not listed in the "Ordering Information" chart above. Options denoted by "Special" or "Special Order" in their descriptions are only offered on a special order basis. Additionally, mounting hardware can be ordered separately. These options are subject to extended leadtimes and significant minimum order quantities. Your Tyco Electronics sales engineer must consult with the factory before providing price and availability information regarding these options.

## Mounting Bushings and Recommended Panel Cutouts



Standard Option 1 - M11 X 1.0 Thread Standard Option 2 \& 6-3/8" - 24UNF Thread Standard Option 7 - M12 X 1.0 Thread


## Termination Options



## Mounting Hardware Options

| $\rightarrow \mid(15.0)$ | $\rightarrow \underset{(14.0)}{.551 \mathrm{DIA}}$ | $\text { . } 740 \mathrm{DIA}$ | $\rightarrow \left\lvert\, \begin{gathered} 740 \mathrm{DIA} . \\ (18.8) \end{gathered}\right.$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |
| Standard Knurled Nut | Standard Hex Nut | Special Integrated Knurled Nut | Special Integrated Knurled Nut with Small Holes | Special Embossed Aluminum | Special Silver Printing On Black |



## Features

- New design.
- 5 to 40 amp ratings. (35A and 40A models will not be submitted for UL).
- Cannot be manually tripped.
- Button extends for visual trip indication.
- Push button to reset breaker.
- Numerous mounting and termination options.


## Agency Approvals

W54 series (except 35A and 40A models) is UL 1077 Recognized as Supplementary Protectors, File E69543, for Canada and the United States.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Electrical Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Calibration: Will continuously carry 100\% of rating.
May trip between $101 \%$ and 134\%, but must trip at 135\% of rating within one hour at $+25^{\circ} \mathrm{C}$.
Dielectric Strength: 1,500VAC (60 seconds).
Insulation Resistance: 100 megohms.
Maximum Operating Voltages: 50VDC; 250VAC .

## W54 series

## Push To Reset Only Thermal Circuit Breaker

## ${ }^{c} \mathrm{HN}_{\mathrm{us}}$

Interrupt Capacity: 1,000 amps in accordance with UL standard 1077.
Resettable Overload Capacity: Ten times rated current.
Reset Time: 60 seconds.

## Typical Resistance vs. Current Rating @ $25^{\circ} \mathrm{C}$

| Current <br> Rating <br> in Amps | Typical <br> Resistance <br> in Ohms | Current <br> Rating <br> in Amps | Typical <br> Resistance <br> in Ohms |
| :---: | :---: | :---: | :---: |
| 5.0 | 0.050 | 15.0 | 0.017 |
| 6.0 | 0.042 | 20.0 | 0.012 |
| 7.0 | 0.036 | 25.0 | 0.010 |
| 8.0 | 0.031 | 30.0 | 0.008 |
| 10.0 | 0.025 | 35.0 | 0.007 |
| 12.0 | 0.021 | 40.0 | 0.006 |

## Mechanical/Environmental Data

Operating Temperature Range: $0^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.
Termination: .250 " ( 6.35 mm ) quick connects or \#8-32 screws.
Mounting: Various options. See Ordering Information and drawings.
Approximate Weight: 0.9 oz. (25.0g).

Time vs. Current Trip Curve @ $+25^{\circ} \mathrm{C}$


## Ambient Compensation Table

| Ambient <br> Temperature <br> in ${ }^{\circ} \mathbf{C}$ | Rating Correction Factor |  |
| :---: | :---: | :---: |
|  | 4-8A Models | 9-30A Models |
| 10 | .90 | .80 |
| 20 | .98 | .90 |
| 25 | 100 | 100 |
| 30 | 110 | 105 |
| 40 | 125 | 115 |
| 50 | 161 | 131 |
| 60 | 2.00 | 155 |

To use this chart: Divide the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve.
Do not use these devices outside their specified operating temperature ranges.

Outline Dimensions


Optional Protective Boot
Silicone rubber boot is bonded to integral alumimum nut.


1-1423696-5
Black boot for W54 with 3/8"-24 bushing.

## 1-1423696-7

Clear boot for W54 with 3/8"-24 bushing.


1-1423696-4
Black boot for W54 with M 11 X 10 bushing.

1-1423696-6
Clear boot for W54 with M $11 \times 10$ bushing.

## Ordering Information

1. Designator:
W = Circuit breaker
2. Series Number:
$54=$ Single Pole, Push-to-Reset, Thermal Model
Circuit Function:
3 $=$ Series Trip

Our authorized distributors are more likely to stock the following items for immediate delivery.
W54-XB1A4A10-5
W54-XB1A4A10-10
W54-XB1A4A10-20
W54-XB1A4A10-15

## Mounting Bushings and Recommended Panel Cutouts



## Termination Options



Mounting Hardware Options


Optional Nameplates


## ORDERING NOTE:

Many options illustrated here are not listed in the "Ordering Information" chart above. Options denoted by "Special" or "Special Order" in their descriptions are only offered on a special order basis. Additionally, mounting hardware can be ordered separately. These options are subject to extended leadtimes and significant minimum order quantities. Your Tyco Electronics sales engineer must consult with the factory before providing price and availability information regarding these options.


## Features

- 0.5 amp to 30 amp ratings.
- Cannot be manually tripped.
- Button extends for visual trip indication.
- Push button to reset breaker.
- Termination is screw or .250 " QC.


## Agency Approvals

W58 Series is UL 1077 Recognized as Supplementary Protectors, File E69543, and CSA Certified as Appliance Component Protectors, File LR15734.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Electrical Data @ +25 ${ }^{\circ} \mathrm{C}$

Calibration: Breaker will continuously carry 100\% of rated load. It may trip between 101\% and 145\% of rated load, but must trip at $145 \%$ at $25^{\circ} \mathrm{C}$.
Dielectric Strength: Over 1,500 volts RMS.
Maximum Operating Voltages: 50VDC; 250VAC.
Interrupt Capacity: 2,000 amps at 50VDC (0.5-30 amp models).
$1,000 \mathrm{amps}$ at 250VAC ( $0.5-30 \mathrm{amp}$ models). Note: 30 Oamp model not UL or CSA.
Resettable Overload Capacity: Ten times rated current.

## W58 series

## Push To Reset Only Thermal Circuit Breaker

## 只

(18)

Maximum Resistance vs. Current Rating @ +25 ${ }^{\circ} \mathrm{C}$

| Current <br> Rating <br> in Amps | Maximum <br> Resistance <br> in Ohms | Current <br> Rating <br> in Amps | Maximum <br> Resistance <br> in Ohms |
| :---: | :---: | :---: | :---: |
| 0.5 | 5.0 | 8 | 0.020 |
| 1 | 135 | 9 | 0.020 |
| 2 | 0.32 | 10 | 0.014 |
| 3 | 0.18 | 12 | 0.010 |
| 4 | 0.10 | 15 | 0.010 |
| 5 | 0.026 | 20 | 0.005 |
| 6 | 0.026 | 25 | 0.006 |
| 7 | 0.020 | $30^{*}$ | 0.004 |

*No UL/CSA

## Mechanical/Environmental Data

Shock: Withstands to 10 g .
Endurance Cycling: Over 1,000 cycles at 200\% of rated load.
Vibration: Withstands to 10 g at $10-55 \mathrm{~Hz}$.
Weight: Less than $11 / 2 \mathrm{oz}$. (42.5g).

Time vs. Current Trip Curve @ $\mathbf{+ 2 5}^{\circ} \mathrm{C}$


## Ambient Compensation Chart



Ambient Temperature In Degrees Centigrade ( ${ }^{\circ} \mathrm{C}$ )

To use this chart: Read up from the ambient temperature to the curve, and across to find a correction factor. Multiply the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve.

## Ordering Information

| Typical Part No. | W | 58 | -X | B |
| :---: | :---: | :---: | :---: | :---: |
| 1. Designator: W = Circuit breaker |  |  |  |  |
| 2. Series Number: $58=$ Single Pole, Push-to-Reset |  |  |  |  |
| 3. Circuit Function: $X=$ Series Trip |  |  |  |  |
| 4. Button: |  |  |  |  |
| A = White, plain, no rate marking, no trip band <br> $B=$ White with red rate marking, red trip band <br> $\mathrm{C}=$ White with black rate marking, red trip band | $\begin{aligned} & E=\text { White wit } \\ & F=\text { White wit } \end{aligned}$ | rate ck rat | king, | and band |

5. Mounting Bushing:
$1=7 / 16^{\prime \prime} \times .500^{\prime \prime}(12.70 \mathrm{~mm})$ long
$4=15 / 32^{\prime \prime} \times .300^{\prime \prime}(7.62 \mathrm{~mm})$ long, black
$6=3 / 8^{\prime \prime} \times .465 "(1181 \mathrm{~mm})$ long, round
6. Terminals:

A $=$ Quick connect .250 " ( 6.35 mm ) straight
C $=6 / 32$ screw $90^{\circ}$ (screws installed)
$D=6 / 32$ screw $90^{\circ}$ (screws bulk packed)
7. Mounting Hardware:
$\begin{array}{ll}4=\text { Knurled nut/hex nut } & 15=\text { Two hex nuts/lock washer } \\ 6=\text { Knurled nut/hex nut/lock washer } & 99=\text { No mtg. hardware supplied (Use C, Step \#8) } \\ 12=\text { Knurled nut/lock washer } & \end{array}$
Note: For other hardware combinations, order separately. See mounting hardware Ordering Information table.
8. Mounting Hardware Packaging:

A = Assembled to bushing
B = Bulk unassembled
$\mathrm{C}=$ No mounting hardware
9. Specify Amp Rating:

| 9. Specify Amp Rating: |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 0.5 | 3 | 6 | 9 | 15 | $30^{*}$ |  |
| 1 | 4 | 7 | 10 | 20 |  |  |
| 2 | 5 | 8 | 12 | 25 |  | *Not UL or CSA |

Stock Items - Authorized distributors are more likely to stock the following items.

| W58-XB1A4A-1 | W58-XB1A4A-6 | W58-XB1A4A-15 | W58-XC4C12A-2 | W58-XC4C12A-15 |
| :--- | :--- | :--- | :--- | :--- |
| W58-XB1A4A-2 | W58-XB1A4A-7 | W58-XB1A4A-20 | W58-XC4C12A-3 | W58-XC4C12A-20 |
| W58-XB1A4A-3 | W58-XB1A4A-8 | W58-XB1A4A-25 | W58-XC4C12A-5 | W58-XC4C12A-25 |
| W58-XB1A4A-4 | W58-XB1A4A-10 | W58-XB1A4A-30 | W58-XC4C12A-7 | W58-XC4C12A-30 |
| W58-XB1A4A-5 | W58-XB1A4A-12 | W58-XC4C12A-1 | W58-XC4C12A-10 |  |

## Outline Dimensions

## Terminal Options




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## Mounting Hardware

Hex Nut
Knurled Nut
Lockwasher
Pal Nut


## Mounting Bushing

Type 1


Recommended Cutout


Type 4


Type 6


# W28 series 



## Features

- Switchable version combines on-off switch and circuit protection in a single unit.
- Approved to many international standards (push to reset type).
- Replaces slow blow glass cartridge fuse.
- Labor-saving snap-in mounting.
- Button extends for visual trip indication on push to reset model.
- Rocker on switchable model moves to "overload" position upon trip.


## Agency Approvals

W28 series is UL 1077 Recognized as Supplementary Protectors, File E69543, and CSA Certified as Appliance Component Protectors, File LR15734. W28 breakers have been issued Certificate of Suitability CS2190N as supplementary Equipment Protectors by the Energy Authority of New South Wales, Australia. W28 breakers are also DEMKO (Denmark) and SEV (Switzerland) approved. VDE approved for use in office equipment and provides 8 mm isolation. 16 amp and 20 amp models do not have VDE, DEMKO and SEV approvals at present. W28-S is UL 1077 Recognized, and CSA Certified for models up to and including 15 amps.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Electrical Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Calibration: Will continuously carry $100 \%$ of rating.
3-20 amp models - may trip between 101\% and 134\%, but must trip at $135 \%$ of rating within one hour at $+25^{\circ} \mathrm{C}$. 0.25-2 amp models - may trip between 101\% and 174\%, but must trip at $175 \%$ of rating within one hour at $+25^{\circ} \mathrm{C}$.
Dielectric Strength: Over 1,500 volts RMS.
Maximum Operating Voltages: 32VDC; 250VAC, $50 / 60 \mathrm{~Hz}$.
Interrupt Capacity: 1,000 amps at 250VAC, $50 / 60 \mathrm{~Hz}$. and 32VDC in accordance with UL standard 1077.

## Switchable or <br> Push to Reset <br> Fuseholder-Type <br> Thermal Circuit Breaker


Note: VDE, Demko, Semko not available on 16A and 20A W28 only.

Resettable Overload Capacity: Six times rated current for 0.25 through 2 amp models. Ten times rated current for 3 through 20 amp models.
Reset Time: 180 seconds max. for 0.25 through 2 amp models. 10 to 60 seconds for 3 through 20 amp models.

Typical Resistance vs. Current Rating @ $\mathbf{+ 2 5}^{\circ} \mathrm{C}$

| Current <br> Rating <br> in Amps | Typical <br> Resistance <br> in Ohms | Current <br> Rating <br> in Amps | Typical <br> Resistance <br> in Ohms |
| :---: | :---: | :---: | :---: |
| 0.25 | 14.0 | 8.0 | 0.016 |
| 0.50 | 3.55 | 9.0 | 0.014 |
| 0.75 | 2.0 | 10.0 | 0.011 |
| 10 | 0.89 | 110 | 0.01 |
| 2.0 | 0.17 | 12.0 | 0.009 |
| 3.0 | 0.069 | 13.0 | 0.009 |
| 4.0 | 0.043 | 14.0 | 0.007 |
| 5.0 | 0.030 | 15.0 | 0.007 |
| 6.0 | 0.026 | 16.0 | 0.007 |
| 7.0 | 0.017 | 20.0 | 0.006 |

## Mechanical/Environmental Data

Endurance Cycling(switchable type): Typically 30,000 operations at 100\% of rating.
Termination: . 250 " $(6.35 \mathrm{~mm})$ quick connects. Soldering to terminals is not recommended.
Mounting: Snaps into panel from front. See Recommended Panel Cutouts. Approximate Weight: 0.35 oz ( 10 g ).

Time vs. Current Trip Curve @ $+25^{\circ} \mathrm{C}$


Ambient Compensation Chart


To use this chart: Read up from the ambient temperature to the curve, and across to find a correction factor. Multiply the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve. Do not use these devices outside their specified operating temperature ranges.

## Ordering Information



| Stock Items - Authorized distributors are more likely to stock the following items. |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :---: |
| W28-XQ1A-0.25 | W28-XQ1A-2 | W28-XQ1A-6 | W28-XQ1A-12 | W28-XT1A-12 |  |
| W28-XQ1A-0.50 | W28-XQ1A-3 | W28-XQ1A-7 | W28-XQ1A-15 |  |  |
| W28-XQ1A-0.75 | W28-XQ1A-4 | W28-XQ1A-8 | W28-XQ1A-20 |  |  |
| W28-XQ1A-1 | W28-XQ1A-5 | W28-XQ1A-10 | W28-XT1A-10 |  |  |

## Outline Dimensions

## Push-to-Reset Type



## Switchable Type



Recommended Panel Cutouts



## Features

- Compact, trip-free, rocker-actuated design.
- 5 to 20 amp ratings.
- Provides circuit protection and power switching in a single unit.
- Available with optional indicator lamp.
- Snaps into the same cutout as many common power switches.
- Various color, marking and termination options.


## Agency Approvals

W51 series is UL 1077 Recognized as Supplementary Protectors, File E69543, for Canada and the United States.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Electrical Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Calibration: Will continuously carry 100\% of rating.
May trip between 101\% and 134\%, but must trip at 135\% of rating within one hour at $+25^{\circ} \mathrm{C}$.
Dielectric Strength: 1,500VAC ( 60 seconds).
Insulation Resistance: 100 megohms.
Maximum Operating Voltages: 50VDC; 125 or $250 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. (model dependent).

## W51 series

## Rocker-Actuated <br> Thermal Circuit Breaker/Power Switch With Optional Indicator Lamp

## ${ }_{c} \mathrm{NH}_{\text {us }}$

Interrupt Capacity: 1,000 amps in accordance with UL standard 1077.
Resettable Overload Capacity: Ten times rated current.
Switch Endurance Cycling: Typically 6,000 operations at 100\% of rating. Reset Time: 60 seconds.

## Typical Resistance vs. Current Rating @ +25 ${ }^{\circ} \mathrm{C}$

| Current <br> Rating <br> in Amps | Typical <br> Resistance <br> in Ohms | Current <br> Rating <br> in Amps | Typical <br> Resistance <br> in Ohms |
| :---: | :---: | :---: | :---: |
| 5.0 | 0.050 | 10.0 | 0.025 |
| 6.0 | 0.042 | 15.0 | 0.017 |
| 7.0 | 0.036 | 20.0 | 0.0125 |
| 8.0 | 0.031 |  |  |

## Mechanical/Environmental Data

Operating Temperature Range: $0^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.
Termination: . 250 " ( 6.35 mm ) quick connects, solder terminals or right angle PC terminals.
Mounting: Snaps into $1122 \times .531(28.5 \times 13.5)$ panel cutout.
Approximate Weight: 0.37 oz . (10.5g).

## Time vs. Current Trip Curve @ $\mathbf{+ 2 5}^{\circ} \mathrm{C}$



## Ambient Compensation Table

| Ambient <br> Temperature <br> in ${ }^{\circ} \mathbf{C}$ | Rating Correction Factor |  |
| :---: | :---: | :---: |
|  | 5-6A Models | 7-20A Models |
| 10 | .80 | .80 |
| 20 | .90 | .90 |
| 25 | 100 | 100 |
| 30 | 110 | 105 |
| 40 | 125 | 115 |
| 50 | 161 | 125 |
| 60 | 2.15 | 140 |

To use this chart: Divide the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve
Do not use these devices outside their specified operating temperature ranges.

## Outline Dimensions



## Recommended Panel Cutout



## Panel Thickness

W51 series circuit breakers accommodate panel thicknesses from 0.030 in . to 0.118 in . $(0.75 \mathrm{~mm}-3.0 \mathrm{~mm}$ ).

## Ordering Information



## Our authorized distributors are more likely to stock the following items for immediate delivery.

| W51-A121B1-5 | W51-A121B1-15 | W51-A122B1-5 | W51-A122B1-15 | W51-A152A1-5 | W51-A152A1-15 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| W51-A121B1-10 | W51-A121B1-20 | W51-A122B1-10 | W51-A122B1-20 | W51-A152A1-10 | W51-A152A1-20 |

ORDERING NOTE: Some options illustrated below are not listed in the "Ordering Information" chart above. Options denoted by "Special" or "Special Order" in their descriptions are only offered on a special order basis. Other base and button colors and intermediate amp ratings are also available on a special order basis. All special order items are subject to extended leadtimes and significant minimum order quantities. Your Tyco Electronics sales engineer must consult with the factory before providing price and availability information regarding items with these options.

## Case Styles



Angular Button Design
 Design

## Marking Options



## Terminal Types




## Features

- Combines on/off switch and circuit protection in a single unit.
- 2 to 20 amp ratings ( $<2 \mathrm{~A}$ types available as special order).
- One or two pole sensing.
- Lighted or non-lighted rocker actuator in various colors.
- Convenient, snap-in mounting.
- Optional auxiliary switch available.
- Trip-free operation.


## W33 series

## One- and Two-Pole, Switchable Thermal Circuit Breaker / Power Switch With Optional Indicator Lamp

## 枵 (18)

## Electrical Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Calibration: Breaker will continuously carry 100\% of rated load. It may trip between $101 \%$ and $135 \%$, but must trip at $135 \%$ within one hour at $+25^{\circ} \mathrm{C}$.
Dielectric Strength: Over 2,000 volts RMS.
Maximum Operating Voltages: 50VDC; 250VAC to 400 Hz .
Interrupt Capacity: 1,000 amps at 50VDC; 250VAC, 60 Hz . and
125/250VAC, 400 Hz.
$1,500 \mathrm{amps}$ at $125 / 250 \mathrm{VAC}, 60 \mathrm{~Hz}$.
Resettable Overload Capacity: Ten times rated current.

## Mechanical/Environmental Data

Termination: Poles 1\&2: .250" (6.35mm) quick connect/solder terminals. Opt. Aux. Sw.: . 110 " ( 2.79 mm ) quick connect terminals.
Mounting: Snaps into panel from front.
Actuator: Rocker or lighted rocker.
Shock: 30 g tested to IEC 68-2-27, test Ea.
Vibration: 8 g tested to IEC 68-2-6, test Fc.
Switch Endurance Cycling: 50,000 operations at rated load.
1,000 operations at $200 \%$ rated load.

Time vs. Current Trip Curve @ $+\mathbf{2 5}^{\circ} \mathrm{C}$


## Ambient Compensation Chart



Ambient Temperature In Degrees Centigrade ( ${ }^{\circ} \mathrm{C}$ )
To use this chart: Read up from the ambient temperature to the curve, and across to find a correction factor. Multiply the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve.

## Ordering Information



## Stock Items - Authorized distributors are more likely to stock the following items.

| W33-S1N1Q-5 | W33-S4B1Q-10 | W33-T4B1Q-5 |
| :--- | :--- | :--- |
| W33-S1N1Q-15 | W33-S4B1Q-15 | W33-T4B1Q-10 |
| W33-S1N1Q-20 | W33-T2N1Q-20 | W33-T4B1Q-15 |

## Outline Dimensions



## Schematic



NEON - AC
INCANDESCENT-DC


W23


W31

## Features

- 0.5 amp to 50 amp ratings may be used as on/off switch.
- Cannot be reset against overload.
- W23 has visible trip indicator.
- Screw termination
- Trip-free operation.


## Agency Approvals

W23 and W31 are UL 1077 Recognized as Supplementary Protectors. File E69543, and CSA Certified as Appliance Component Protectors, File LR15734.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Electrical Data @ +25º

Calibration: Will continuously carry 100\% of rating, may trip between $101 \%$ and $134 \%$ of rating at $25^{\circ} \mathrm{C}$. Must trip at $135 \%$ in one hour.
Maximum Operating Voltages: 50VDC or 250VAC (to 400 Hz ).
Interrupting Capacity:
With 4X Max. Series Fuse Protection
0.5-50 amp models - 1000 amps at 240VAC.

30-50 amp models - 1000 amps at 50VDC.
Without 4X Max. Series Fuse Protection
0.5-25 amp models - 2000 amps at 50VDC.
$10-20 \mathrm{amp}$ models - 2000 amps at 120VAC.
Resettable Overload Capacity: Ten times rated current.
Dielectric Strength: Over 1,500 volts RMS.

## W23/W31 series

## Toggle or <br> Push/Pull Actuator Thermal Circuit Breaker

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## Maximum Resistance vs. Current Rating @ +25 ${ }^{\circ} \mathrm{C}$

| Current <br> Rating <br> in Amps | Maximum <br> Resistance <br> in Ohms $\pm \mathbf{3 0 \%}$ |
| :---: | :---: |
| 1 | .61 |
| 5 | .03 |
| 10 | .01 |
| 15 | .006 |
| 20 | .004 |
| 30 | .003 |
| 40 | .002 |
| 50 | .002 |

## Mechanical/Environmental Data

Endurance Cycling: More than 6,000 cycles at 100\% of rating, or 10,000 mechanical cycles.
Humidity: Will meet requirements of MIL-STD-202, Method 106.
Salt Spray: Will meet requirements of MIL-STD-202, M ethod 101, Test Condition B.
Termination: Two \#8-32 screw terminals.
Mounting: W23 - Threaded bushing, 3/8" (9.53mm) diameter. W31 - Threaded bushing, 15/32" (1191mm) diameter, with or without anti-rotation flats.
Weight: Less than 2 oz. (57g).

Time Vs. Current Trip Curve @ $+25^{\circ} \mathrm{C}$


Ambient Compensation Chart


Ambient Temperature In Degrees Centigrade ( ${ }^{\circ} \mathrm{C}$ )

To use this chart: Read up from the ambient temperature to the curve, and across to find a correction factor. Multiply the breaker rating by the correction factor to determine the compensated rating. Calculate the overloads in terms of the compensated rating to use the published trip curve.

## Ordering Information



Stock Items - Authorized distributors are more likely to stock the following items.

| W23-X1A1G-1 | W23-X1A1G-7.50 | W23-X1A1G-25 | W23-X1A1G-50 |
| :--- | :--- | :--- | :--- |
| W23-X1A1G-2 | W23-X1A1G-10 | W23-X1A1G-30 |  |
| W23-X1A1G-3 | W23-X1A1G-15 | W23-X1A1G-35 |  |
| W23-X1A1G-5 | W23-X1A1G-20 | W23-X1A1G-40 |  |

## Ordering Information



## Stock Items - Authorized distributors are more likely to stock the following items.

| W31-X2M 1G-1 | W31-X2M 1G-10 | W31-X2M 1G-35 |
| :--- | :--- | :--- |
| W31-X2M1G-2 | W31-X2M1G-15 | W31-X2M 1G-40 |
| W31-X2M1G-3 | W31-X2M1G-20 | W31-X2M 1G-50 |

## W23 Outline Dimensions

Terminal Style 1


Hex Nut
(55-001D - Silver Color)

Lockwasher
(88-006B - Silver Color)

Knurled Nut (55-008A - Silver Color)

## Terminal Style 3



All dimensions are given as $\underset{(\mathrm{mm})}{\substack{\text { inches }}}$


## W31 Outline Dimensions

## Terminal Style 1



Terminal Style 5


Mounting Hardware

(55-001B - Silver Color)

Lockwasher
(88-002B - Silver Color)


Knurled Nut (55-010B - Silver Color)



## Features

- Designed for the international market. UL Recognized, CSA Certified, and VDE approved.
- Ratings to 50 amps .
- Heavy duty \#10-32 stud connections. (W9)
- Quick-connect or screw terminals. (W6)
- Optional 10 amp auxiliary switch.
- Several delay curve options.
- Trip-free operation.


## Agency Approvals

UL: Recognized as Supplementary Protector under UL 1077. File E69543.
CSA: Certified as a Supplementary Protector. File LR15734.
VDE: Approved to VDE 0642/EN 60934 (Circuit Breakers for Equipment) License No. 73782.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Electrical Data

Auxiliary Switch: See Auxiliary Switch Ratings Table 2 for details. Calibration: Breakers will hold 100\% of rated current. Breakers may trip between $101 \%$ and $124 \%$ of rated load ( $149 \%$ for 400 Hz . units and $134 \%$ for AC/DC units). Breakers must trip at $125 \%$ of rated load and above ( $150 \%$ for 400 Hz . units and 135\% for AC/DC units).
Dielectric Strength: 50/60 or 400 Hz ., 1500V: DC, 1100 V .
Insulation Resistance: 100 M egohms at 500VDC.
Endurance: 10,000 on/off cycles - 6000 at rated load, 4000 at no load. Units tested at six cycles per minute, 1 second on and 9 seconds off at $25^{\circ} \mathrm{C}$ ambient.

## W6/W9 series

## Magnetic Hydraulic Circuit Breakers

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## Typical Resistance and Impedance

| Current <br> (Amps) | DC <br> Resistance <br> (Ohms) | $\mathbf{5 0 / 6 0 ~ H z}$ <br> Impedance <br> (Ohms) | $\mathbf{4 0 0 ~ H z}$ <br> Impedance <br> (Ohms) |
| :---: | :---: | :---: | :---: |
| 0.2 | 90 | 90 | 180 |
| 10 | 12 | 12 | 2.0 |
| 2.0 | 0.28 | 0.28 | 0.50 |
| 5.0 | 0.04 | 0.04 | 0.05 |
| 10.0 | 0.013 | 0.013 | 0.025 |
| 20.0 | 0.004 | 0.005 | 0.0065 |
| 30.0 | 0.0027 | 0.004 | 0.004 |
| 40.0 | 0.002 | 0.002 | 0.003 |
| 50.0 | 0.0015 | 0.0015 | 0.0025 |

Tolerance: $0.1-4.99 \pm 15 \% ; 5-9.99 \pm 20 \% ; 10-15 \pm 25 \% ; 16-30 \pm 50 \%$.

## Mechanical/Environmental Data

Operating Temperature: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Humidity: Meets requirements of Mil-STD-202 method 103.
Shock: Tested per Mil-STD-202, method 213, test condition C (100g @ 6 ms ).
Vibration:Tested per Mil-STD-202, method 201, 10-55 Hz., 0.06" (152mm) total excursion in 2 planes.
Fungus And Moisture Resistance: Special moisture resistant finish applied to all ferrous parts. Plastic parts are made of inherently fungus resistant material.
Marking: W6 units have ON and OFF molded on the rocker of rocker actuated units (rocker actuated VDE units have international " 1 " and " 0 "). W9 units have ON and OFF molded into the area at the base of the toggle. International " 1 " and " 0 " symbols are marked on the toggle for both W6 and W9.
Mounting: Units are mounted with two \#6-32 screws from the front of the panel. Metric models for use with M3 x 0.5 screws are available. To maintain published performance specifications, units should not be mounted more than $90^{\circ}$ from their nomal upright position.
Weight: Approximately 2.5 ounces per pole.

Approvals and Ratings Table 1

| 6 Series ULCSA (All Circuit Functions) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Maximum Voltage | Frequency (Hz) | Phase | Current <br> Rating <br> (Amps) | Interrupting Capacity (Amps) |
| 65 | DC |  | 0.2-50 | 2,000 |
| 277 | 50/60 | 1 | 0.2-20 | 5,000 |
| 277 | 50/60 | 1 | 21-50 | 2,500 |
| 277/480 | 50/60 | 30-Wye | 0.2-20 | 5,000 |
| 250 | 400 | 1 | 0.2-20 | 2,500 |
| 250 | 400 | 1 | 21-50 | 1,250 |
| 250 | 400 | 30-Wye | 0.2-20 | 2,500 |
| W9 Series UL/CSA (All Circuit Functions) |  |  |  |  |
| Maximum Voltage | Frequency (Hz) | Phase | Current Rating (Amps) | Interrupting Capacity (Amps) |
| 65 | DC | - | 0.2-50 | 2,000 |
| 277 | 50/60 | 1 | 0.2-50 | 5,000 |
| 277/480 | 50/60 | 30-Wye | 0.2-20 | 5,000 |
| 250 | 400 | 1 | 0.2-50 | 2,500 |
| 250 | 400 | 3Ø-Wye | 0.2-50 | 2,500 |

W6 Series VDE (Circuit Function X)

| Maximum <br> Voltage | Frequency <br> (Hz) | Phase | Current <br> Rating <br> (Amps) | Interrupting <br> Capacity <br> (Amps) |
| :---: | :---: | :---: | :---: | :---: |
| 65 | 50 | - | $0.2-50$ | 2,000 |
| 250 | $50 / 60$ | 1 | $0.2-30$ | 5,000 |
| 250 | $50 / 60$ | 1 | $31-50$ | 2,000 |
| $415 / 240$ | $50 / 60$ | 30 | $0.2-30$ | 5,000 |
|  |  |  |  |  |

W9 Series VDE (Circuit Function X)

| Maximum <br> Voltage | Frequency <br> (Hz) | Phase | Current <br> Rating <br> (Amps) | Interrupting <br> Capacity <br> (Amps) |
| :---: | :---: | :---: | :---: | :---: |
| 65 | DC | - | $0.2-50$ | 2,000 |
| 250 | $50 / 60$ | 1 | $0.2-30$ | 5,000 |
| 250 | $50 / 60$ | 1 | $31-50$ | 2,000 |
| $415 / 240$ | $50 / 60$ | $3 \varnothing$ | $0.2-30$ | 5,000 |

## Approvals and Ratings Table 2

ULCSA

| Switch <br> Number | Voltage <br> $\mathbf{5 0 / 6 0} \mathbf{~ H z}$ | Current <br> (Amps) | Terminals <br> WxTxL |
| :---: | :---: | :---: | :---: |
| A | 125 | 10 | $.093 \times .020 \times .250$ <br> $(2.36 \times .51 \times 6.40)$ |

Time vs. Current Trip Curves For W6 Series and W9 Series
AC $50 / 60 \mathrm{~Hz}$.


MOTOR START
CURVE 10 HIGH INRUSH $50 / 60 \mathrm{~Hz}$. AC

 OF BREAKER RATING


CURVE 12 HIGH INRUSH $50 / 60 \mathrm{~Hz}$.




AC 400 Hz .


CURVE 3 AC VOLTAGE 400 Hz.


Note:
For instantaneous curves for all voltages refer to Curve 0 Non-Time Delay under the AC $50 / 60 \mathrm{~Hz}$. heading.

## Pulse Tolerance Specifications

Pulse tolerance is defined as a single pulse of a half sine wave ( $1 / 2$ cycle or 8 milliseconds) that will not trip the breaker. An inertia wheel for increased pulse tolerance is available by specifying " P " after the time delay curve number in the ordering information. The table at right lists pulse tolerance values of standard and inertia delay models.

|  |  | Pulse Tolerance Value |  |
| :---: | :---: | :---: | :---: |
| Voltage | Time <br> Delay <br> Curve | Standard | Inertia <br> Delay |
|  | 2 | 7.5 | 18 |
| AC | 3 | 6 | 18 |
| $50 / 60 \mathrm{~Hz}$. | 10 | 18 | 30 |
|  | 12 | 18 | 30 |
| AC | 13 | 18 | 30 |
| 400 Hz. | 2 | 6.5 | 18 |

To determine pulse tolerance multiply breaker rating by value in table. For example, a 2A breaker with time delay curve 3 has a standard pulse tolerance of $12 A(2 A \times 6)$. The same breaker with an inertia delay has a pulse tolerance of $36 A(2 A \times 18)$.

## Ordering Information

W6 Series

9. VDE Approval:

Blank = UL/CSA approved breaker
$\mathrm{V}=\mathrm{VDE}$ approved breaker without auxiliary switch

## Authorized distributors are more likely to stock the following items.

| W67-A2Q12-5 | W67-X2Q12-5 | W67-X2Q13-1 | W67-X2Q13-25 | W67-X2Q52-15 | W68-X2Q12-5 | W68-X2Q12-30 |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| W67-A2Q12-10 | W67-X2Q12-7 | W67-X2Q13-2 | W67-X2Q13-30 | W67-X2Q52-20 | W68-X2Q12-7 | W68-X2Q13-15 |  |
| W67-X2Q10-3 | W67-X2Q12-10 | W67-X2Q13-3 | W67-X2Q50-5 | W67-X2Q52-30 | W68-X2Q12-10 | W68-X2Q110-10 | W69-X2Q12-20 |
| W67-X2Q10-5 | W67-X2Q12-15 | W67-X2Q13-10 | W67-X2Q50-10 | W67-X2Q110-15 | W68-X2Q12-15 | W68-X2Q110-20 |  |
| W67-X2Q12-2 | W67-X2Q12-20 | W67-X2Q13-15 | W67-X2Q52-5 | W67-X2Q110-20 | W68-X2Q12-20 | W69-X2Q12-5 |  |
| W67-X2Q12-3 | W67-X2Q12-30 | W67-X2Q13-20 | W67-X2Q52-10 | W68-X2Q12-3 | W68-X2Q12-25 | W69-X2Q12-10 | W69-X2Q110-20 |

Ordering Information

8. VDE Approval:

Blank = UL/CSA approved breaker
$\mathrm{V}=$ VDE approved breaker without auxiliary switch
Authorized distributors are more likely to stock the following items.

| W91-X112-1 | W91-X112-15 | W91-X113-15 | W91-X152-40 | W92-X112-5 | W92-X112-30 | W92-X1110-30 | W93-X112-30 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| W91-X112-2 | W91-X112-20 | W91-X150-5 | W91-X152-50 | W92-X112-7 | W92-X112-40 | W93-X112-5 | W93-X112-40 |
| W91-X112-3 | W91-X112-40 | W91-X152-10 | W91-X1110-20 | W92-X112-10 | W92-X112-50 | W93-X112-10 | W93-X112-50 |
| W91-X112-5 | W91-X112-50 | W91-X152-15 | W92-X112-1 | W92-X112-15 | W92-X113-15 | W93-X112-15 | W93-X1110-20 |
| W91-X112-7 | W91-X113-5 | W91-X152-20 | W92-X112-2 | W92-X112-20 | W92-X113-20 | W93-X112-20 | W93-X1110-30 |
| W91-X112-10 | W91-X113-10 | W91-X152-30 | W92-X112-3 | W92-X112-25 | W92-X1110-20 | W93-X112-25 |  |
| Dimensions are reference purpos |  | Dimensions are in inches over (millimeters) unless otherwise specified. |  | Specifications and availability subject to change. |  | www.tycoelectronics.com <br> Technical support: <br> Refer to inside back cover. |  |

## Outline Dimensions - Toggle Actuator Models

## W6 Series



W6 Series


2 Pole


Not
Multi-pole models furnished with separate handle tie hardware.

## Panel Mounting Cutout



## 3 Pole



## 4 Pole



Notes
1 Terminal protrusion dimensions are referenced from back of mounting panel.
2. Main terminals are male quick connect type .250 (6.35) wide $x .031$ (.79) thick $\times .377$ (9.58) long. Optional $8-32 \times .250$ (6.35) or 10-32 x . 250 (6.35) screw type.
3. Panel mounting cutout detail mtg. detail tol.: $\pm .005$ (.13) unless noted. Add additional cutouts to correspond to number of poles. Outline drawing tolerance $\pm .015$ (.38) unless noted. Dimensions in brackets ( ) are in millimeters

UL/CSA Models W/Screw Terminals

ULCSA/VDE Models W/Aux. Switch



## Outline Dimensions - Rocker Actuator Models

## W6 Series



## Panel Mounting Cutout



## Outline Dimensions

## W9 Series

## Series Trip Model



Series Trip Model
With Common Enclosed Auxiliary Switch


1 Pole


VDE Rocker Marking



Notes:
1 Outline drawing tolerance $\pm .015$ (.38) unless noted. Dimensions in brackets ( ) are in millimeters.
2. Mounting Detail Tol.: $\pm .005$ (.13) unless noted

## Series Trip Model



Panel Mounting Cutout Detail


## Alphanumeric Index

| Series | Type | Page |
| :---: | :---: | :---: |
| 4000 | 5-30VA, Wire Leads, Class II | 204 |
| 4000 | 10-30VA, QC Terminals, Class II | 205 |
| 4000 | 20-40VA, Plate Mount, Class II | 206 |
| 4000. | 40-50VA, Wire Leads, Class II | 207 |
| 4000 | 40-50VA, QC Terminals, Class II | 208 |
| 4000 | 60-75VA, Wire Leads, Class II | 209 |
| 4000 .. | 60-75VA, QC Terminals, Class II | 210 |
| 4700. | 60-150VA, Wire Leads or QC, UL 508 | 211 |
| $57 . .$. | ... Transformer Relay for HVAC | 212 |

## Transformers...Questions and Answers

## What is a Transformer?

A transformer is a passive electrical device which is designed to change one AC voltage to another by magnetic induction. It "steps-up" or "steps-down" voltage in order to match incoming supply voltage from the utility to the voltage required by the user's end product. Typical USA supply voltages are 120, 208, 240, 277, 480 (and 575 in Canada). Common International voltages include 110, 220, 380, and 415.

## What is an Isolation Transformer?

An isolation transformer is a transformer whose primary and secondary windings are separate for the purpose of isolating the circuit from the supply source.

## What is an Autotransformer?

An autotransformer has only one winding, which is shared by the primary and secondary circuits. Autotransformers do not provide isolation but offer a substantial savings when used to obtain small increments of voltage above or below the input voltage.

## What is a Class II Transformer?

A Class II transformer is used to supply Class II circuits. Class II transformers have a maximum VA (Volt-Ampere) rating of less than 100 and a maximum secondary output of 30 VAC . The maximum VA generally offered is 75 and the most common secondary voltage is 24 VAC . All Class II transformers are either inherently or non-inherently limited. This means that the maximum output current of the transformer is limited, either by the intrinsic coil impedance or by a fuse or circuit breaker. These transformers are designed to meet the requirements of U.L. 1585.

Inherently Energy Limited Transformers - Class II transformers up to 50 VA are "Inherently Limited" which means that the transformer, if overloaded, will short itself out and fail safely, not requiring a fuse.
Non-Inherently Energy Limited Transformers - 60 thru 75 VA Class II transformers are generally protected by a resettable circuit breaker or a fuse within the transformer secondary. Without this overload protection, the transformer would not satisfy the safety requirements for a Class II circuit.

## What is a General Purpose Transformer?

General purpose transformers include any VA rating along with primary and secondary voltage ratings up to 600 VAC. Although internal fusing is an option, no fusing is required. However, applicable U.L. specifications may require fusing in the end product. These transformers are designed to meet the requirements of U.L. 506
What is Voltage Regulation?
Voltage regulation is the percent of change in the output voltage when the load is reduced from full load to no load while the input voltage remains constant.
What is the effect of a load on a control transformer?
A control transformer is designed to provide rated output voltage at full VA. As the load decreases, the output voltage will go up. Conversely, increases in load will result in lower output voltages. Typically, the smaller the VA size of the unit, the greater difference there is between no-load and full-load voltage.

## Part Numbering System

This chart illustrates a breakdown of our part numbering system on a few of our most popular models. Consult factory for your specific requirements.


Example: 4000-01E07BB999 This part number is a Class II transformer with a 120 V primary and 24 V secondary. It is 40 VA and inherently energy limited. This is a foot mount transformer with quick connect terminals (line \& load) exiting out of the same side of the transformer cover.
Note: This is a partial listing only. Consult factory for your specific requirements. All combinations of voltage and VA may not be available.

## Custom Transformer Capabilities

In addition to our industry leading standard transformer series (see the following pages), We have a proven track record of being an innovative leader in custom transformer designs. We specialize in working with our customers in the initial stages of their design process, offering ideas and suggestions which lead to a transformer product that can be manufactured with the lowest Defective Parts Per Million (DPPM) levels and at the highest value to the customer. The following is a list of guidelines for transformer products which compliment our Demand Flow Manufacturing system.

Leaded Transformers - Quick Connect Transformers - PC Mount Transformers - Inductors

- 5 VA through 400 VA
- Spray on rust preventative
- Butt stack and weld lamination construction
- Molded bobbin construction
- Numerous welded bracket options
- Molded cover with integral strain relief for lead or quick connect terminal

When a transformer fits the above criteria and the customer is willing to share in the design process with us, we can both benefit from Design For Manufacturing (DFM), as demonstrated in the following example:


Our electrical and mechanical design groups are ready to work with you on your specific product needs.


## 4000 series

## Class II UL 1585 Transformer 5 VA - 30VA Inherently Energy Limited No Secondary Fusing Required Wire Leads

cTus File E87824


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Specifications

Wire Size: All leads are 18 AWG stranded 2/64" (. 794 mm ) insulation thickness. Standard parts have 12" (305 mm) total length with $1 / 2^{\prime \prime}(12.7 \mathrm{~mm})$ strip.
Frequency: $50 / 60 \mathrm{~Hz}$.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Weight: 5VA - $10.56 \mathrm{oz} .(300 \mathrm{~g}) ; 10 \mathrm{VA}-10.88 \mathrm{oz}$. ( 308 g );

## Features

- Type K Foot M ount - features a steel bracket welded to the bottom of the laminations for easy mounting
- Type G Panel M ount - features .179" ( 4.55 mm ) diameter holes in each corner to allow direct mounting to a panel.
- Multiple voltage combinations are available. Consult factory for availability.

20VA - 14.24 oz. ( 404 g ); 30VA - 19.2 oz. ( 544 g ).

Standard "999" Models Available

| Primary V | Secondary V | 20VA |
| :---: | :---: | :---: |
| 120 | 24 | $4000-01$ C02K999 |
| 120 | 24 | $4000-01$ C02K999 |

For more details about standard models see Part Numbering System table at beginning of transformer section in this catalog .

## Partial Listing of Custom Models

| Primary V | Secondary V | 5VA | 10VA | 20VA | 30VA |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 120 | 24 | 4000-01X19K* | 4000-01A19K* | 4000-01C02K* | 4000-01M 04K* |
| 240 | 24 | 4000-02X19K* | 4000-02A19K* | 4000-02C02K* | 4000-02M04K* |
| 277 | 24 | 4000-03X19K* | 4000-03A19K* | 4000-03C02K* | 4000-03M 04K* |
| 480 | 24 | 4000-04X19K* | 4000-04A19K* | 4000-04C02K* | 4000-04M $04 \mathrm{~K}^{*}$ |
| 208/240 | 24 | - | - | 4000-09C02K* | 4000-09M04K* |
| 120 | 12 | - | - | 4000-20C02K* | - |

* A three digit customer ID suffix will be assigned by the factory.

All custom model part numbers are listed as Type K Foot M ount. To specify Type G Panel Mount, replace K in above part numbers with G .

## Outline Dimensions



Details regarding leads on standard models

|  | Primary Leads |  |  |  |  |  |  |  | Secondary Leads |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Voltage | COM | 120 | 208 | 240 | 277 | 480 | 575 | 24 | VAC |  |
| Color | Black | White | Red | Orange | Brown | Black/Red | Gray | Blue | Yellow |  |
| Length [inches (mm)] | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ |  |
| Strip Length [inches (mm)] | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ |  |



## 4000 series

## Class II UL 1585 Transformer 10VA - 30VA Inherently Energy Limited No Secondary Fusing Required Quick Connect Terminals

c(1) us File E87824


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Specifications

Terminals: Standard male quick connects are $.250^{\prime \prime} \times .032^{\prime \prime}(6.35 \times .81$
mm ). Other available quick connects include $.187^{\prime \prime} \times .032^{\prime \prime}$ ( $4.75 \times .81 \mathrm{~mm}$ ) and $.187^{\prime \prime} \times .020^{\prime \prime}(4.75 \times .51 \mathrm{~mm})$.
Frequency: $50 / 60 \mathrm{~Hz}$.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Weight: 10VA - 10.9 oz . ( 308 g ); 20VA - 14.1 oz . ( 399 g ); 30VA - 18.6 oz. ( 525 g ).

## Features

- Type BB Same Side Termination - features quick connect terminals with line and load terminations on the same side of transformer.
- Type AE Laydown Termination - features quick connect terminals with line and load terminations on the top of transformer.
- Type AB Opposite Side Termination - features quick connect terminals with line and load terminations on opposite sides of transformer.
- Multiple voltage combinations are available. Consult factory for availability.

Standard "999" Models Available
No standard models are offered.

For more details about standard models see Part Numbering System table at beginning of transformer section in this catalog .

Partial Listing of Custom Models

| Primary V | Secondary V | 10VA | 20VA | 30VA | 30VA |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 120 | 24 | 4000-01A19BB* | 4000-01C02BB* | 4000-01M 04BB* | 4000-01M 04BB* |
| 240 | 24 | 4000-02A19BB* | 4000-02C02BB* | 4000-02M 04 BB* $^{\text {* }}$ | 4000-02M 04BB* |
| 277 | 24 | - | - | 4000-03M04BB* | 4000-03M 04BB* |
| 480 | 24 | - | - | 4000-04M 04 BB* $^{\text {* }}$ | 4000-04M 04BB* |
| 208/240 | 24 | - | - | 4000-09M04BB* | 4000-09M 04BB* |
| 120 | 12 | - | 4000-20C02BB* | - | - |

* A three digit customer ID suffix will be assigned by the factory.

To specify Type AE Laydown Termination, replace BB in above part numbers with AE.

## Outline Dimensions

Type BB
Same Side
Termination

Type AE
Laydown
Termination


Type AB
Opposite Side Termination




## Features

- Type BC Plate Mount - mounted on a 4" ( 1016 mm ) square plate designed to fit a standard 4" ( 1016 mm ) square electrical box.
- The line voltage is connected inside the electrical boxto the color-coded leads on the transformer. The low voltage is terminated to either $1 / 4$ " $(4.75 \mathrm{~mm})$ quick connects and/or \#6-32 screw furnished on the secondary side.
- Multiple voltage combinations are available. Consult factory for availability.

Standard "999" Models Available

| Primary V | Secondary V | 20VA | 40VA |
| :---: | :---: | :---: | :---: |
| 120 | 24 | $4000-01 C 02 B C 999$ | $4000-01 \mathrm{~V} 18 B C 999$ |

For more details about standard models see Part Numbering System table at beginning of transformer section in this catalog .

## 4000 series

## Class II UL 1585 Transformer <br> 20VA - 40VA Inherently Energy Limited <br> No Secondary Fusing Required Plate for Electrical Box Mounting

${ }^{\text {ch }}{ }_{\text {us }}$ File E87824

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Specifications

Wire Size: All leads are 18 AWG stranded 2/64" (. 794 mm ) insulation thickness. Standard parts have 12 " $(305 \mathrm{~mm})$ total length with $1 / 2^{\prime \prime}(12.7 \mathrm{~mm})$ strip.
Frequency: $50 / 60 \mathrm{~Hz}$.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Weight: 20VA - 19.2 oz. ( 544 g ); 40VA - $32 \mathrm{oz} .(906 \mathrm{~g}$ ).

Partial Listing of Custom Models

| Primary V | Secondary V | 20VA | 40VA |
| :---: | :---: | :---: | :---: |
| 120 | 24 | $4000-01 C 02 B C *$ | $4000-01 \mathrm{~V} 18 \mathrm{BC*}$ |
| $208 / 240$ | 24 | $4000-09$ C02BC* $^{*}$ | $4000-09 \mathrm{~V} 18 \mathrm{BC}^{*}$ |

* A three digit customer ID suffix will be assigned by the factory. All custom model part numbers are listed as Type K Foot Mount. To specify Type G Panel Mount, replace K in above part numbers with G.

Outline Dimensions


Details regarding leads on standard models

|  | Primary Leads |  |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Voltage | COM | 120 | 208 | 240 | 277 | 480 | 575 | 24 |
| Color | Black | White | Red | Orange | Brown | Black/Red | Gray | Blue |
| Length [inches (mm)] | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ |
| Strip Length [inches (mm)] | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ |



## 4000 series

## Class II UL 1585 Transformer 40 VA - 50VA Inherently Energy Limited No Secondary Fusing Required Wire Leads

${ }_{\text {c }}$ (Nus File E87824

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Specifications

Wire Size: All leads are 18 AWG stranded 2/64" (. 794 mm ) insulation thickness. Standard parts have $12^{\prime \prime}(305 \mathrm{~mm})$ total length with 1/2" (12.7 mm) strip.
Frequency: $50 / 60 \mathrm{~Hz}$.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Weight: 40VA - 24.3 oz ( 600 g ); 50VA - 33.6 oz . ( 953 g ).

Standard "999" Models Available

| Primary V | Secondary V | 40VA | 50VA |
| :---: | :---: | :---: | :---: |
| 120 | 24 | 4000-01E07K999 | 4000-01AW18K999 |
| 277 | 24 | 4000-03E07K999 | 4000-03AW18K999 |
| 480 | 24 | 4000-04E07K999 | 4000-04AW18K999 |
| 120/208/240 | 24 | 4000-05E07K999 | - |
| 208/240 | 24 | 4000-09E07K999 | 4000-09AW18K999 |

For more details about standard models see Part Numbering System table at beginning of transformer section in this catalog .

Partial Listing of Custom Models

| Primary V | Secondary V | 40VA | 40VA | 50VA |
| :---: | :---: | :---: | :---: | :---: |
| 120 | 24 | 4000-01V18K* | 4000-01E07K* | 4000-01AW18K* |
| 240 | 24 | 4000-02V18K* | 4000-02E07K* | 4000-02AW18K* |
| 277 | 24 | 4000-03V18K* | 4000-03E07K* | 4000-03AW18K* |
| 480 | 24 | 4000-04V18K* | 4000-04E07K* | 4000-04AW18K* |
| 120/208/240 | 24 | - | 4000-05E07K* | - |
| 208/240 | 24 | 4000-09V18K* | 4000-09E07K* | 4000-09AW18K* |
| 208/240/480 | 24 | - | 4000-13E07K* | - |
| 380/415 | 24 | 4000-51V18K* | 4000-51E07K* | 4000-51AW18K* |
| 575 | 24 | 4000-78V18K* | 4000-78E07K* | 4000-78AW18K* |

* A three digit customer ID suffix will be assigned by the factory

All custom model part numbers are listed as Type K Foot Mount. To specify Type G Panel Mount, replace K in above part numbers with G .

## Outline Dimensions

Type K Foot Mount

Type G Panel Mount

[1] Applies to V18 models.
[2] Applies to E07 \& AW18 models.
" $A$ " and " $B$ " Dimensions

|  | 40 VA / V18 | 40 VA / E07 | 50 VA / AW18 |
| :--- | :--- | :--- | :--- |
| "A" Dimension [inches (mm)] | $2.25(57.15)$ | $2.125(53.98)$ | 2.56 (65.02) |
| "B" Dimension [inches (mm)] | $125(3175)$ | $0.875(22.22)$ | $125(3175)$ |

Details regarding leads on standard models

|  | Primary Leads |  |  |  |  | Secondary Leads |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Voltage | COM | 120 | 208 | 240 | 277 | 480 | 575 | 24 |
| Color | Black | White | Red | Orange | Brown | Black/Red | Gray | Blue |
| Length [inches (mm)] | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ |
| Strip Length [inches (mm)] | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ |



## Features

- Type BB Same Side Termination - features quick connect terminals with line and load terminations on the same side of transformer.
- Type AE Laydown Termination - features quick connect terminals with line and load terminations on the top of transformer.
- Type AB Opposite Side Termination - features quick connect terminals with line and load terminations on opposite sides of transformer.
- Multiple voltage combinations are available. Consult factory for availability.


## 4000 series

## Class II UL 1585 Transformer 40VA - 50VA Inherently Energy Limited No Secondary Fusing Required Quick Connect Terminals

c ${ }^{\text {ch }}$ us File E87824


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application


## Specifications

Terminals: Standard male quick connects are .250" x .032" (6.35 x . 81
$\mathrm{mm})$. Other available quick connects include $.187^{\prime \prime}$ x $.032^{\prime \prime}$
$(4.75 \times .81 \mathrm{~mm})$ and $.187^{\prime \prime} \times .020^{\prime \prime}(4.75 \times .51 \mathrm{~mm})$.
Frequency: $50 / 60 \mathrm{~Hz}$.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Weight: $\quad$ 40VA - 22.4 oz . ( 636 g ); 50VA - 35.2 oz . ( 999 g ).

Standard "999" Models Available

| Primary V | Secondary V | 40VA |
| :---: | :---: | :---: |
| 120 | 24 | $4000-01$ E07AE999 |
| 120 | 24 | $4000-01 E 07 B B 999$ |
| $208 / 240$ | 24 | $4000-09 E 07 A E 999$ |

For more details about standard models see Part Numbering System table at beginning of transformer section in this catalog .

Partial Listing of Custom Models

| Primary V | Secondary V | 40VA | 40VA | 40VA | 50VA |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 120 | 24 | 4000-01E07BB* | 4000-01V18BB* | 4000-01V18AB* | 4000-01AW18BB* |
| 240 | 24 | 4000-02E07BB* | 4000-02V18BB* | 4000-02V18AB* | 4000-02AW18BB* |
| 277 | 24 | 4000-03E07BB* | 4000-03V18BB* | 4000-03V18AB* | 4000-03AW18BB* |
| 480 | 24 | 4000-04E07BB* | 4000-04V18BB* | 4000-04V18AB* | 4000-04AW18BB* |
| 208/240 | 24 | 4000-09E07BB* | 4000-09V18BB* | 4000-09V18AB* | 4000-09AW18BB* |
| 380/415 | 24 | 4000-51E07BB* | 4000-51V18BB* | 4000-51V18AB* | 4000-51AW18BB* |
| 575 | 24 | 4000-78E07BB* | 4000-78V18BB* | - | 4000-78AW18BB* |

To specify Type AE Laydown Termination, replace BB in above part numbers with AE.

## Outline Dimensions

Type BB
Same Side
Termination

Type AE
Laydown
Termination

[1] Applies to V18 models.
[2] Applies to E07 \& AW18 models.

|  | $40 \mathrm{VA} / \mathrm{V} 18$ | 40 VA / E07 | $50 \mathrm{VA} / \mathrm{AW} 18$ |
| :---: | :---: | :---: | :---: |
| "A" Dimension [inches (mm)] | 2.25 (57.15) | 2.125 (53.98) | 2.56 (65.02) |
| "B" Dimension [inches (mm)] | 125 (3175) | 0.875 (22.22) | 125 (3175) |



## Features

- Type K Foot M ount - features a steel bracket welded to the bottom of the laminations for easy mounting.
- Type G Panel Mount - features .218" ( 5.54 mm ) diameter holes in each cormer to allow direct mounting to a panel.
- For agency approval, $60 \& 75 \mathrm{VA}$ transformers must have one of the following overcurrent protectors in series with the secondary winding: Internal fuse, integral circuit breaker. Any customer-supplied fusing or protection must be approved by the factory.
- Multiple voltage combinations are available. Consult factory for availability.

Standard "999" Models Available

| Primary V | Secondary V | 75 VA |
| :---: | :---: | :---: |
| 120 | 24 | $4000-01 \mathrm{1} 15 \mathrm{K999}$ |
| 277 | 24 | $4000-03 \mathrm{~J} 15 \mathrm{K999}$ |
| $208 / 240$ | 24 | $4000-09 \mathrm{~J} 15 \mathrm{K999}$ |
| 575 | 24 | $4000-78 \mathrm{~J} 15 \mathrm{K999}$ |
| $120 / 208 / 240 / 480$ | 24 | $4000-08 \mathrm{~J} 15 \mathrm{~K} 999$ |

For more details about standard models see Part Numbering System table at beginning of transformer section in this catalog. All 75VA standard models come with an integral circuit breaker.

## 4000 series

## Class II UL 1585 Transformer 60VA -75VA Non-Inherently Energy Limited Secondary Fusing Required Wire Leads

c ${ }^{\text {™ }}$ us $\quad$ File E87824


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Specifications

Wire Size: All leads are 18 AWG stranded 2/64" (. 794 mm ) insulation thickness. Standard parts have 12" ( 305 mm ) total length with $1 / 2^{\prime \prime}(12.7 \mathrm{~mm})$ strip.
Frequency: $50 / 60 \mathrm{~Hz}$.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Weight: 60VA - 35.2 oz . $(997 \mathrm{~g}$ ); 75VA - 38.4 oz . ( 1087 g ).
Partial Listing of Custom Models

| Primary V | Secondary V | 60VA | 75VA |
| :---: | :---: | :---: | :---: |
| 120 | 24 | $4000-01 \mathrm{~L} 15 K^{*}$ | $4000-01 \mathrm{~J} 15 K^{*}$ |
| 240 | 24 | $4000-02 \mathrm{L15K}$ | $4000-02 \mathrm{~J} 15 \mathrm{~K}^{*}$ |
| 277 | 24 | $4000-03 \mathrm{~L} 15 K^{*}$ | $4000-03 \mathrm{~J} 15 \mathrm{~K}^{*}$ |
| 480 | 24 | $4000-04 \mathrm{~L} 15 \mathrm{~K}^{*}$ | $4000-04 \mathrm{~J} 15 \mathrm{~K}^{*}$ |
| $120 / 208 / 240$ | 24 | $4000-05 \mathrm{~L} 15 \mathrm{~K}^{*}$ | $4000-05 \mathrm{~J} 15 \mathrm{~K}^{*}$ |
| $208 / 240$ | 24 | $4000-09 \mathrm{~L} 15 \mathrm{~K}^{*}$ | $4000-09 \mathrm{~J} 15 \mathrm{~K}^{*}$ |
| $208 / 240 / 480$ | 24 | - | $4000-13 \mathrm{~J} 15 \mathrm{~K}^{*}$ |
| $380 / 415$ | 24 | - | $4000-51 \mathrm{~J} 15 \mathrm{~K}^{*}$ |
| 575 | 24 | - | $4000-78 \mathrm{~J} 15 \mathrm{~K}^{*}$ |

* A three digit customer ID suffix will be assigned by the factory. For Type G Panel Mount, replace K in above part numbers with G.

Outline Dimensions

## Type K

Foot Mount Internally Fused

Type K
Foot Mount -
Integral
Circuit
Breaker

Type G
Panel Mount

" $A$ " and " $B$ " Dimensions for 60VA \& 75VA Models

|  | L15K \& J 15K Internally Fused | L15K \& J 15K <br> w/ Integral Circuit Breaker | J 41K <br> Standard Part |
| :---: | :---: | :---: | :---: |
| "A" Dimension [inches (mm)] | 2.475 (62.86) | 3.25 (82.55) | 3.45 (87.63) |
| "B" Dimension [inches (mm)] | 100 (25.4) | 100 (25.4) | 1125 (28.58) |

## Details regarding leads on standard models

|  | Primary Leads |  |  |  |  |  |  | Secondary Leads |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Voltage | COM | 120 | 208 | 240 | 277 | 480 | 575 | 24 | VAC |
| Color | Black | White | Red | Orange | Brown | Black/Red | Gray | Blue | Yellow |
| Length [inches (mm)] | 12 (305) | 12 (305) | 12 (305) | 12 (305) | 12 (305) | 12 (305) | 12 (305) | 12 (305) | 12 (305) |
| Strip Length [inches (mm)] | 0.5 (12.7) | 0.5 (12.7) | 0.5 (12.7) | 0.5 (12.7) | 0.5 (12.7) | 0.5 (12.7) | 0.5 (12.7) | 0.5 (12.7) | 0.5 (12.7) |



## 4000 series

## Class II UL 1585 Transformer 60VA -75VA Non-Inherently Energy Limited Secondary Fusing Required Quick Connect Terminals

## ${ }^{\text {c }} \mathbf{N H}_{\text {us }}$ File E87824


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Specifications

Terminals: Standard male quick connects are .250 " x $.032^{\prime \prime}(6.35 \times .81$
$\mathrm{mm})$. Other available quick connects include $.187^{\prime \prime} \times .032$ "
( $4.75 \times .81 \mathrm{~mm}$ ) and $.187^{\prime \prime} \times .020^{\prime \prime}(4.75 \times .51 \mathrm{~mm})$.
Frequency: $50 / 60 \mathrm{~Hz}$.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Weight: $\quad 60 \mathrm{VA}-35.2 \mathrm{oz}$. 997 g ); 75VA - $38.4 \mathrm{oz} .(1087 \mathrm{~g})$.
Partial Listing of Custom Models

| Primary V | Secondary V | 60VA | 75VA |
| :---: | :---: | :---: | :---: |
| 120 | 24 | 4000-01L15BB* | 4000-01J 15BB* |
| 240 | 24 | 4000-02L15BB* | 4000-02J 15BB* |
| 277 | 24 | 4000-03L15BB* | 4000-03J 15BB* |
| 480 | 24 | 4000-04L15BB* | 4000-04J 15BB* |
| 120/208/240 | 24 | 4000-05L15BB* | 4000-05J 15BB* |
| 208/240 | 24 | 4000-09L15BB* | 4000-09J 15BB* |
| 208/240/480 | 24 | - | 4000-13J 15BB* |
| 380/415 | 24 | - | 4000-51J 15BB* |
| 575 | 24 | - | 4000-78J 15BB* |

* A three digit customer ID suffix will be assigned by the factory.

For Type AE Laydown Termination, replace BB in above part numbers with AE.

Outline Dimensions

Type BB Same Side Termination

Type AE
Laydown
Termination -
Internally Fused

Type AE
Laydown
Termination -
Integral
Circuit
Breaker



## Features

- Type K Foot Mount - features wire leads and a steel bracket welded to the bottom of the laminations for easy mounting.
- Type BB Same Side Termination - features quick connect terminals with
line and load terminations on the same side of transformer.
- Multiple voltage combinations are available. Consult factory for availability.


## Standard "999" Models Available

| Primary V | Secondary V | 60VA | 100VA |
| :---: | :---: | :---: | :---: |
| 120 | 24 | $4700-81$ L15K999 | - |
| $120 / 208 / 240 / 480$ | 24 | - | $4700-08$ K18K999 |

For more details about standard models see Part Numbering System table at beginning of transformer section in this catalog .

## 4700 series

## UL 506 Transformer 60VA - 150VA Non-Fused Wire Leads or Quick Connects

${ }^{\text {ch }}{ }_{\text {us }} \quad$ File E102980


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application


## Specifications

Wire Size: All leads are 18 AWG stranded $2 / 64^{\prime \prime}(.794 \mathrm{~mm})$ insulation thickness. Standard parts have $12^{\prime \prime}(305 \mathrm{~mm})$ total length with $1 / 2^{\prime \prime}(12.7 \mathrm{~mm})$ strip.
Terminals: Standard male quick connects are $.250^{\prime \prime} \times .032^{\prime \prime}(6.35 \times .81$ mm ). Other available quick connects include $.187^{\prime \prime} \times .032^{\prime \prime}$ $\left(4.75 \times .81 \mathrm{~mm}\right.$ ) and $.187^{\prime \prime} \times .020^{\prime \prime}(4.75 \times .51 \mathrm{~mm})$.
Frequency: $50 / 60 \mathrm{~Hz}$.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Weight: 60VA - 36.8 oz . ( 1042 g ); 100VA - 80 oz . ( 2270 g ); 150VA - 83.2 oz. ( 2356 g ).

Partial Listing of Custom Models

| Primary V | Secondary V | 100VA | 150VA |
| :---: | :---: | :---: | :---: |
| 120 | 24 | 4700-01K18K* | 4700-01Z18K* |
| 277 | 24 | 4700-03K18K* | 4700-03Z18K* |
| 480 | 24 | 4700-04K18K* | 4700-04Z18K* |
| 120/208/240/480 | 24 | 4700-08K18K* | - |
| 208/240 | 24 | 4700-09K18K* | 4700-09718K* |
| 208/230/460 | 24 | 4700-12K18K* | - |
| 208/240/480 | 24 | 4700-13K18K* | - |
| 400 | 24 | 4700-48K18K* | 4700-48Z18K* |
| 575 | 24 | 4700-78K18K* | 4700-78Z18K* |
| 460/575 | 24 | 4700-130K18K* | 4700-130Z18K* |

## Outline Dimensions

Type K
Foot Mount 60VA

Type K Foot Mount 100VA


|  | Primary Leads |  |  |  |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Voltage | COM | 120 | 208 | 240 | 277 | 480 | 575 | 24 |
| Color | Black | White | Red | Orange | Brown | Black/Red | Gray | Blue |
| Length [inches (mm)] | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ | $12(305)$ |
| Strip Length [inches (mm)] | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ | $0.5(12.7)$ |



## Features

- Cover mounts on conventional 4" square box.
- All leads terminate in the box.
- Leads are $8^{\prime \prime}$ ( 203.2 mm ) long with $1 / 2^{\prime \prime}$ ( 12.7 mm ) stripped)
- Standard transformer is 40VA Class II Energy Limited. Other transformers are available.
- Five secondary terminations (two are hot) for thermostat connection and \#6-32 screw termination is standard. Quick connects are optional.
- Assembled with choice of 9100 or 9400 series relays.
- Custom-built to meet customer requirements.


## 57 series

## Transformer Relay for HVAC Applications

## c ${ }^{\text {Tus }}$ File E113772


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Relay Data @ $25^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO) through 2 Form C (DPDT), depending upon relay selected
Rating: 9100 Series Relay: 12 FLA, 60 LRA, 15A resistive @ 125VAC; 6 FLA, 36 LRA, 15A resistive @ 240VAC;
3/4 HP @ 125/250VAC.
9400 Series Relay: 12 FLA, 60 LRA, 18A resistive @ 125VAC;
8 FLA, 48 LRA, 18A resistive @ 240VAC.

## Specifications

Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Duty Cycle: Continuous.
Weight: 32 oz. ( 909 g ) approximately

## Ordering Information

57 series products are custom-built. Your Tyco Electronics sales engineer will need to consult with the factory to develop a model meeting your needs.
Standard part numbers listed below are more likely to be available from stock.
Custom parts only.

## Outline Dimensions



## Alphanumeric Index

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[^11]
## High Performance Relays

If you need a low signal relay capable of switching up to 6Ghz or enduring challenging environments such as extreme shock, vibration, or temperature, you should consider our CII high performance relays. There is an overview of our high performance relay product line in section 14 of this databook.

## Low Signal ( $<3 A$ ), PC Board Relay Question Tree

This guide helps the user select one or more relay series which may be appropriate for a given application. The user should then refer to detailed specifications elsewhere in this catalog to determine the actual part number to be specified. Of course, the user must assume ultimate responsibility for determining the suitability of a relay for a particular application.



## Features

- J WD has dual in-line package (DIP) configuration. (14-pin DIP)
- J WS has single in-line package (SIP) configuration.
- Low cost, dry reed reliability with various contact arrangements.
- Wave solderable and immersion cleanable.
- Optional coil suppression diode.


## Contact Data @ 25 ${ }^{\circ}$ C

Arrangements: 1 Form A (SPST - NO) on J WD \& WSS. 1 Form B (SPST - NC), 1 Form C (SPDT) and 2 Form A (DPST-NO) on J WD only.
Material: Ruthenium.
Expected Mechanical Life: 100 million operations.
Expected Electrical Life:

|  | Resistive Load | End of Life Criteria | No. of Operations |
| :--- | :---: | :---: | :---: |
| Forms A \& B | 20VDC, 500mA | 500 mV Loss | $1 \times 10^{6}$ |
|  | 20VDC, 250mA | 500 mV Loss | $20 \times 10^{6}$ |
|  | Low Level (5VDC, 1mA) | 50 Ohms | $100 \times 10^{6}$ |
| Form C | 12VDC, 500mA | 500 mV Loss | $1 \times 10^{6}$ |
|  | 10VDC, 10mA | 50 Ohms | $25 \times 10^{6}$ |
|  | Low Level (5VDC, 1mA) | 50 Ohms | $100 \times 10^{6}$ |

## Contact Ratings:

Maximum Switched Voltage: 100VDC for Forms A \& B; 28VDC for Form C.
Maximum Switched Current: 500 mA for all models.
Maximum Switched Power:10W for Forms A \& B; 3W for Form C. Initial Contact Resistance: 200 milliohms, max. at 10mA, 6VDC.

## Initial Dielectric Strength

Between Open Contacts: 250VDC for Forms A \& B; 175VDC for Form C. Between Contacts and Coil: 500VDC.

Initial Insulation resistance
Between Mutually Insulated Conductors: 1010 ohms at 100VDC.
Coil Data @ $25^{\circ} \mathrm{C}$
See Ordering Information table.
Operate Data @ $25^{\circ} \mathrm{C}$
Operate Time (Including Bounce)t: 1.5 ms , max.
Release Time (Including Bounce)t: 0.5 ms , max., for Forms A \& B; 3.0 ms , max., for Form C.
$\dagger$ At or from Nominal Coil Voltage.

## Environmental Data

Temperature Range: $-35^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Shock: 100 g , max., in three planes for $8 \mathrm{~ms}, 1 / 2$ wave pulse.
Vibration: 20 g , max., between 10 and $2,000 \mathrm{~Hz}$.

## Mechanical Data

Termination: Printed circuit terminals on 0.100 " ( 2.54 mm ) grid centers. Enclosure Type: Black molded epoxy package.
Weight: 0.08 oz . $(2.3 \mathrm{~g}$ ) approximately.

## Wiring Diagrams (Top Views)

## Dia. 1

Dia. 2
Dia. 3
Dia. 4



Dia. 5
Dia. 6


Dia. 7


Note: Terminal numbers are for reference only and do not appear on relays.
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## JWD/J WS series

## Dual In-Line Package \& <br> Single In-Line Package <br> Dry Reed Relays

気 File E29244 (18) File LR81479
Ordering Information - Boldface items are more likely to be stocked.

| Relay <br> Part <br> No. | Diode | Nom. <br> Volt- <br> age <br> (VDC) | Resis- <br> tance <br> (10\% <br> (Ohms) | Must <br> Operate <br> Voltage <br> (VDC) | Must <br> Release <br> Voltage <br> (VDC) | Max. <br> Volt- <br> age <br> (VDC) | Nom. <br> Coil <br> Power <br> (mW) | Wir- <br> ing <br> Dia. <br> No. |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| JWD (DIP units) with 1 Form A (SPST-NO) contacts rated 10W max. |  |  |  |  |  |  |  |  |
| JWD-107-1 | No | $5 / 6$ | 500 | 3.8 | 0.5 | 19 | $50 / 72$ | 1 |
| JWD-107-5 | Yes | $5 / 6$ | 500 | 3.8 | 0.5 | 19 | $50 / 72$ | 1 |
| JWD-107-3 | No | 12 | 1,200 | 9.6 | 1.0 | 19 | 120 | 1 |
| JWD-107-7 | Yes | 12 | 1,200 | 9.6 | 1.0 | 19 | 120 | 1 |
| JWDD-171-5 | No | 24 | 2,150 | 19.2 | 2.0 | 40 | 268 | 2 |
| JWD-171-10 | Yes | 24 | 2,150 | 19.2 | 2.0 | 40 | 268 | 2 |

JWD (DIP units) with 2 Form A (DPST-NO) contacts rated 10W max.

| JWD-171-21 | No | $5 / 6$ | 200 | 3.8 | 0.5 | 14 | $125 / 180$ | 3 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| JWD-171-25 | Yes | $5 / 6$ | 200 | 3.8 | 0.5 | 14 | $125 / 180$ | 3 |
| JWD-171-23 | No | 12 | 500 | 9.6 | 1.0 | 19 | 288 | 3 |
| JWD-171-27 | Yes | 12 | 500 | 9.6 | 1.0 | 19 | 288 | 3 |
| JWD-171-24 | No | 24 | 2,200 | 19.2 | 2.0 | 40 | 262 | 3 |
| JWD-171-28 | Yes | 24 | 2,200 | 19.2 | 2.0 | 40 | 262 | 3 |

JWD (DIP units) with 1 Form B (SPST-NC) contacts rated 10W max.

| JWD-171-12 | No | $5 / 6$ | 500 | 3.8 | 0.5 | 7 | $50 / 72$ | 4 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| JWD-171-17 | Yes | $5 / 6$ | 500 | 3.8 | 0.5 | 7 | $50 / 72$ | 4 |
| JWD-171-14 | No | 12 | 1,200 | 9.6 | 1.0 | 16 | 120 | 4 |
| JWD-171-19 | Yes | 12 | 1,200 | 9.6 | 1.0 | 16 | 120 | 4 |
| JWD-171-15 | No | 24 | 2,200 | 19.2 | 2.0 | 40 | 262 | 4 |
| JWD-171-20 | Yes | 24 | 2,200 | 19.2 | 2.0 | 40 | 262 | 4 |

JWD (DIP units) with 1 Form C (SPDT) contacts rated 3W max.

| JWD-172-1 | No | 5/6 | 200 | 3.8 | 0.5 | 12 | 125/180 | 5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| JWD-172-5 | Yes | 5/6 | 200 | 3.8 | 0.5 | 12 | 125/180 | 5 |
| JWD-172-3 | No | 12 | 500 | 9.6 | 1.0 | 19 | 288 | 5 |
| JWD-172-7 | Yes | 12 | 500 | 9.6 | 1.0 | 19 | 288 | 5 |
| JWD-172-4 | No | 24 | 2,200 | 19.2 | 2.0 | 38 | 262 | 5 |
| JWD-172-8 | Yes | 24 | 2,200 | 19.2 | 2.0 | 38 | 262 | 5 |
| J WD-172-155 | No | 5/6 | 200 | 3.8 | 0.5 | 12 | 125/180 | 6 |
| J WD-172-159 | Yes | 5/6 | 200 | 3.8 | 0.5 | 12 | 125/180 | 6 |
| J WD-172-157 | No | 12 | 1,000 | 9.6 | 1.0 | 19 | 144 | 6 |
| J WD-172-161 | Yes | 12 | 1,000 | 9.6 | 1.0 | 19 | 144 | 6 |
| J WD-172-158 | No | 24 | 2,150 | 19.2 | 2.0 | 38 | 268 | 6 |
| JWD-172-162 | Yes | 24 | 2,150 | 19.2 | 2.0 | 38 | 268 | 6 |

JWS (SIP units) with 1 Form A (SPST-NO) contacts rated 10W max.

| JWS-117-1 | No | 5 | 500 | 3.8 | 0.5 | 16 | 50 | 7 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| J WS-117-6 | Yes | 5 | 500 | 3.8 | 0.5 | 16 | 50 | 7 |
| JWS-117-3 | No | 12 | 530 | 9.6 | 1.0 | 19 | 272 | 7 |
| J WS-117-8 | Yes | 12 | 530 | 9.6 | 1.0 | 19 | 272 | 7 |
| J WS-117-13 | No | 12 | 1,850 | 9.6 | 1.0 | 30 | 78 | 7 |
| J WS-117-18 | Yes | 12 | 1,850 | 9.6 | 1.0 | 30 | 78 | 7 |
| J WS-117-5 | No | 24 | 2,150 | 19.2 | 2.0 | 36 | 268 | 7 |
| J WS-117-10 | Yes | 24 | 2,150 | 19.2 | 2.0 | 36 | 268 | 7 |

## Outline Dimensions



Note: Magnetic shielding may be required between relays when they are placed in very close proximity to one another.


## 0 L series <br> Dry Reed Relay

## Telecommunications, Office Machines.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Low cost, small package dry reed relay.
- 1 Form A and 2 Form A contact arrangements.
- Immersion cleanable, sealed version available. Consult factory.


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO), 2 Form A (DPST-NO).
Material: Rh, Ru.
Max. Switching Rate: $300 \mathrm{ops} . / \mathrm{min}$. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 100 million operations (no load).
Expected Electrical Life: 1,000,000 operations (rated load).
Minimum Load: 1mA @ 1VDC.
Initial Contact Resistance: 150 milliohms @ 100mA, 6VDC.

## Contact Ratings

Ratings:
$100 \mu \mathrm{~A}$ @ 5VDC, 100,000,000 operations.
1mA @ 5VDC, 50,000,000 operations.
5mA @ 5VDC, 50,000,000 operations.
5mA @ 12VDC, 50,000,000 operations.
10mA @ 12VDC, 50,000,000 operations.
100mA @ 12VDC, 10,000,000 operations.
100mA @ 24VDC, 7,000,000 operations.
200mA @ 24VDC, 7,000,000 operations.
400mA @ 24VDC, 5,000,000 operations.

Max. Switched Voltage: AC: 120V.
DC: 60 V .
Max. Switched Current: 0.5A.
Max. Switched Power: 10VA, 10W.

## Initial Dielectric Strength

Between Open Contacts: 200VDC. (1 second).
Between Coil and Contacts: 3,000VDC. (1 second).
Surge Voltage Between Coil and Contacts: 3,000V (10/160 s ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 100VDCM.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings): Snap-on dust cover.
Weight: 0.07 oz (2g) approximately.

## Ordering Information



Our authorized distributors are more likely to stock the following items for immediate delivery. None at present.

## Outline Dimensions



Wiring Diagrams (Bottom View)


1 Form A
2 Form A

## PC Board Layouts (Bottom View)



1 Form A
2 Form A


## Features

- Low cost, small package dry reed relay.
- 1 Form A contact and 2 Form A arrangements.


## Contact Data @ 20 ${ }^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO), 2 Form A (DPST-NO).
Material: Rh, Ru.
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 100 million operations (no load).
Expected Electrical Life: 1,000,000 operations (rated load).
Minimum Load: 1mA @ 1VDC.
Initial Contact Resistance: 150 milliohms @ 100mA, 6VDC.

## Contact Ratings

## Ratings:

$100 \mu \mathrm{~A} @ 5 \mathrm{VDC}, 100,000,000$ operations.
1mA @ 5VDC, 50,000,000 operations.
5mA @ 5VDC, 50,000,000 operations.
5mA @ 12VDC, 50,000,000 operations.
10mA @ 12VDC, 50,000,000 operations.
100mA @ 12VDC, 10,000,000 operations.
100mA @ 24VDC, 7,000,000 operations.
200mA @ 24VDC, 7,000,000 operations.
400mA @ 24VDC, 5,000,000 operations.
Max. Switched Voltage: AC: 120V.
DC: 60V.
Max. Switched Current: 0.5A
Max. Switched Power: 10VA, 10W.

## Initial Dielectric Strength

Between Open Contacts: 200VDC. (1 second).
Between Coil and Contacts: 3,000VDC. (1 second).
Surge Voltage Between Coil and Contacts: 3,000V (10 / 160 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 100VDCM.

## OM R series

## Dry Reed Relay

## Telecommunications, Office Machines.

미 File No. E82292


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Coil Data

Voltage: 6 to 24VDC
Nominal Power: 100 mW to 280mW.
Coil Temperature Rise: $30^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 160\% of nominal.
Duty Cycle: Continuous.

Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| OMR |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| $5 / 6$ | 24.0 | 250 | 3.50 | 0.50 |
| 9 | 12.9 | 700 | 6.30 | 0.90 |
| 12 | 11.4 | 1,050 | 8.40 | 1.20 |
| 24 | 11.5 | 2,080 | 16.80 | 2.40 |

## Operate Data

Must Operate Voltage: 70\% of nominal voltage or less.
Must Release Voltage: 10\% of nominal voltage or more.
Operate Time: 1.0 ms max.
Release Time: 0.5 ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to 55 Hz ., 1.5 mm double amplitude
Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ ( 100 G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing)

[^12]| Ordering Information | Typical Part Number ${ }^{\text {P }}$ | OMR | -C | -1 | 12 | H | ,000, |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |
| 1. Basic Series: OMR = Dry Reed Relay. |  |  |  |  |  |  |  |
| 2. Enclosure: Blank = Open, no cover. $\mathrm{C}=$ Snap-on dust cover. |  |  |  |  |  |  |  |
| 3. Termination: 1 = 1 pole | $2=2$ pole |  |  |  |  |  |  |
| 4. Coil Voltage: $\begin{aligned} & 06=6 \mathrm{VDC} \\ & 09=9 \mathrm{VDC} \end{aligned}$ | $\begin{aligned} & 12=12 \mathrm{VDC} \\ & 24=24 \mathrm{VDC} \end{aligned}$ |  |  |  |  |  |  |
| 5. Contact Rating: $\mathrm{H}=0.5 \mathrm{~A} @ 120 \mathrm{VAC}$ |  |  |  |  |  |  |  |
| 6. Suffix: <br> ,000 = Standard model | Other Suffix = Custom model |  |  |  |  |  |  |

Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions

## Open Type, 1 Form A



Snap-on Dust Cover Type,
1 Form A


Wiring Diagrams (Bottom View)

1 Form A


2 Form A


Open Type, 2 Form A


Snap-on Dust Cover type,
2 Form A


## PC Board Layout (Bottom View)

1 Form A


2 Form A


# 159/160 series 

## Mercury-Wetted Reed Relays

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## General Information

The mercury-wetted contact relay represents one of the more sophisticated types of relays made today. The early pioneer work in mercury-wetted contact switching dates back to the 1950's, as telephone laboratory scientists sought out the "perfect contact". Mercurywetted contacts represent the nearest thing to the perfect contact yet developed, being characterized by such parameters as: bounce-free operation; very low and stable contact resistance; hermetic protection; fast operating speeds; Form C or Form D contact, action contact life measured in billions of operations. The only major weakness of a mercurywetted contact relay is the necessity to mount the relay within $30^{\circ}$ of a vertical position, due to its position sensitivity.
While there are several variations of the mercury-wetted contact relay on the market, the basic contact element has essential concepts in common. The mercury-wetted contact element consists of a glass-encapsulated nickel-iron reed with its base immersed in a pool of mercury. The free reed cantilever projects upward between sets of stationary contact electrodes, which have been glass-sealed in proper juxtaposition at the top of the glass chamber. The mercury is induced to flow up the cantilever by capillary action, wetting mercury on both the cantilever contact tip as well as the stationary contacts. Thus a mercury-to-mercury contact is maintained on both the normally-closed and normally-open contacts, and the system is self-replenishing. The 2-ampere mercury-wetted capsule is shown far left.

Along with the inherent fast actuation of the capsule and excellent load-handling capacity, the mercury-wetted contacts exhibit extremely long life, as the mercury films reestablish at each closure and contact erosion is eliminated. Contact interface resistance is very low and stable, and as the mercury films are elastic, contact bounce is eliminated. A dynamic sequence of the mercury-wetted contact action is shown below.
While the below sequence portrays a Form D (make-before-break) contact action, a true Form C (break-before-make) contact can be provided by proper control of the mercury film dynamics and the contact electrode spacing.
The mercury-wetted contact capsules generally are mounted within a coil assembly, and with appropriately mounted bias magnets, mounting base and magnetic shielded enclosures. The more popular assemblies contain one or two capsules in a convenient printed circuit mounting module.
Mercury-wetted relays can be adjusted to operate with very low levels of input power, in the order of 10-20 milliwatts. Thus, power gain switching of as great as 10,000 can be realized. For all but very light contact loads, contact protection is required to limit the current or voltage rise time across the contacts.

## Form D Mercury-Wetted Contact Action As Seen In High-Speed Sequence


(1) Mercury (shown in black) covers armature and contact points; (2) and (3) as armature moves from open to closed position, mercury filament joins both contacts momentarily; (4) ruptured mercury surfaces accelerate away from each other, providing rapid breaking action; (5) as contact surfaces join, mercury wetting dampens rebound, eliminates electrical chatter, and provides contact reliability.

## SPDT (Form C or Form D) Contact Specifications

| Material | Rating (Switched Load) | (Carry Load) | Bridging and Transfer Time | Contact Resistance | Life Expectancy |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Mercury-wetted <br> platinum contacts <br> hermetically | 2 amperes | 5 amperes | When operated by a single | 14 milliohms typical; |  |
| sealed in an <br> inert atmosphere | maximum | maximum | DC pulse, the bridging or | 20 milliohms maximum |  |
| operations |  |  |  |  |  |
| 100 volts maximum | Not switched | transfer time will be greater | Stable within |  |  |
| than 50 microseconds, but | $\pm 2$ milliohms |  |  |  |  |
| at rated load |  |  |  |  |  |

## Mercury-Wetted Relays Contact Protection

The essentially infinite life of mercury-wetted contact relays may only be realized if the requirements for suitable contact protection are observed
In that the goal is control of the rate of rise of voltage across the contacts when the circuit is opened (rather than peak transient limiting), the only suitable protection recognized is an RC network. Values of $R$ and $C$ may be calculated using the formula shown, or may be obtained from the direct reading nomograph.


## Nomograph Explanation

$1=$ Steady state current at time of circuit opening $\mathrm{E}=$ Open circuit voltage
Find I on the ordinate scale. Read C on the scale adjacent to I . R is found at the intersection of $I$ and $E$

To reduce voltage transient amplitudes, C may be increased up to 10 times calculated values. (R must be calculated value.)

For $1=0.5 \mathrm{amps}$ or less
and
$\mathrm{E}=50$ volts or less
R may be omitted
C must be calculated value

## Resistor Tolerances

| E | R |
| :---: | :---: |
| Less than 70 V | R up to 2 R |
| 70 V to 100 V | $\pm 50 \%$ |
| 100 V to 150 V | $\pm 10 \%$ |
| Greater than 150V | $\pm 5 \%$ |





## 159 series

## Mercury-Wetted Reed Relays

## Outline Dimensions



Note: Relay must be mounted within $30^{\circ}$ of vertical and suitable contact protection must be used

Part Numbering System

| Relay Series | Enclosure And Terminals | Contacts And Adjustment | Coils | Standard Or Special |
| :---: | :---: | :---: | :---: | :---: |
| 160 | $\begin{aligned} & 1-.625 \mathrm{Ht} ., . .125 \mathrm{Lg} . \\ & 2-.625 \mathrm{Ht} ., 156 \mathrm{Lg} . \\ & 3-.625 \mathrm{Ht} ., 187 \mathrm{Lg} . \\ & 4-.625 \mathrm{Ht} ., .250 \mathrm{Lg} . \end{aligned}$ <br> 0-Special | $\begin{aligned} & \text { 1-1D Single-Side-Stable } \\ & \text { 2-1D Bistable } \\ & \text { 5-1C Single-Side-Stable } \\ & \text { 6-1C Bistable } \\ & \text { 7-1C Dynamic (1\%) } \\ & \text { Balanced Bistable } \\ & \text { 0-Special } \end{aligned}$ | 1A-1Z-Single Coil 2K-2V-Double Coil 7A-7T-Single Coil 8A-8Z-Bifilar Coil 9A-9Z-Double Coil (Concentric) 1S and 2S-Special | 00-Standard <br> A1-Z9-Special <br> Customer Requirement |

Example: 159-151NOO is a 159 series relay, enclosure height of 625 in., pin length of .125 in., Form $C$ contact, single-side-stable adjustment, single coil 1 N , of completely standard construction.

## Coil Characteristics and Part Numbers

One Winding Single-Side-Stable 40 Milliwatts

| Coils | Coil Resistance (Ohms) | Must Operate Current (MA-DC) | Must Operate Voltage (VDC) | Must Release Voltage (VDC) | Maximum Voltage (VDC) | Part Number |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | Form C | Form D |
| 1A | 2.2 | 116 | . 28 | . 06 | 2.1 | 159-151A00 | 159-111A00 |
| 1B | 3.9 | 86 | . 37 | . 07 | 2.8 | 159-151800 | 159-111B00 |
| 1 C | 6.4 | 67 | . 47 | . 09 | 3.6 | 159-151C00 | 159-111C00 |
| 1 D | 9.0 | 60 | . 60 | . 12 | 4.3 | 159-151D00 | 159-111D00 |
| 1E | 14 | 47 | . 72 | . 15 | 5.3 | 159-151E00 | 159-111E00 |
| 1F | 24 | 35 | 93 | . 19 | 6.9 | 159-151FO0 | 159-111FOO |
| 1G | 34 | 32 | 1.2 | . 24 | 8.2 | 159-151G00 | 159-111G00 |
| 1 H | 56 | 24 | 1.5 | . 30 | 11 | 159-151H00 | 159-111HOO |
| 1 J | 86 | 20 | 1.9 | . 39 | 13 | 159-151J00 | 159-111J00 |
| 1K | 140 | 15 | 2.3 | . 46 | 17 | 159-151K00 | 159-111K00 |
| 1 L | 225 | 12 | 2.9 | . 59 | 21 | 159-151L00 | 159-111LOO |
| 1M | 385 | 9.0 | 3.8 | . 73 | 28 | 159-151M00 | 159-111MOO |
| 1N | 620 | 7.0 | 4.8 | . 95 | 35 | 159-151NOO | 159-111NOO |
| 1 P | 940 | 5.8 | 6.0 | 1.2 | 43 | 159-151P00 | 159-111P00 |
| 10 | 1,450 | 4.8 | 7.7 | 1.6 | 54 | 159-151000 | 159-111000 |
| 1R | 2,430 | 3.6 | 9.7 | 2.0 | 70 | 159-151R00 | 159-111R00 |
| 1 T | 3,620 | 2.9 | 12 | 2.3 | 85 | 159-151T00 | 159-111T00 |
| 1 U | 5,500 | 2.5 | 15 | 3.0 | 105 | 159-151U00 | 159-111U00 |
| 1 V | 8,600 | 2.0 | 19 | 3.8 | 130 | 159-151V00 | 159-111V00 |
| Dimensions are shown for reference purposes only. |  | Dimensions are in inches over (millimeters) unless otherwise specified. |  |  | Specifications and availability subject to change. |  | www.tycoelectronics.com <br> Technical support: <br> Refer to inside back cover. |

159 Series (continued) - Coil Characteristics and Part Numbers

Two Windings Single-Side-Stable 80 Milliwatts Per Winding

| Coils | Coil Resistance (Ohms) | Must Operate Current (MA-DC) (Either Winding) | Must Operate Voltage (VDC) (Either Winding) | Must Release Voltage (VDC) (Either Winding) | Maximum Voltage (VDC) (Either Winding) | Dielectric Stand Off Between Coils (VDC) | Part Number |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  | Form C | Form D |
| 2K | 70/70 | 30 | 2.3 | . 47 | 12 | 500 | 159-152K00 | 159-112K00 |
| 2L | 115/115 | 23 | 3.0 | 60 | 15 | 500 | 159-152LOO | 159-112LOO |
| 2M | 190/190 | 18 | 3.8 | . 79 | 19 | 400 | 159-152M00 | 159-112M00 |
| 2 N | 325/325 | 14 | 5.0 | 1.0 | 26 | 400 | 159-152NOO | 159-112NOO |
| 2 P | 490/490 | 12 | 6.2 | 1.3 | 31 | 400 | 159-152PO0 | 159-112PO0 |
| 20 | 730/730 | 9.6 | 7.7 | 1.6 | 38 | 400 | 159-152000 | 159-112000 |
| 2R | 1250/1250 | 7.2 | 10 | 2.0 | 50 | 400 | 159-152ROO | 159-112R00 |
| 2 T | 1860/1860 | 5.8 | 12 | 2.5 | 61 | 200 | 159-152T00 | 159-112TOO |
| 2 U | 2760/2760 | 5.0 | 15 | 3.0 | 74 | 200 | 159-152U00 | 159-112U00 |
| 2 V | 4275/4275 | 3.9 | 18 | 3.8 | 92 | 200 | 159-152V00 | 159-112V00 |

Two Windings Single-Side-Stable 40 Milliwatts Per Winding

| 2K | 70/70 | 15 | . 30 | 1.2 | 12 | 500 | 159-162K00 | 159-122K00 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2L | 115/115 | 12 | . 37 | 1.5 | 15 | 500 | 159-162LOO | 159-122LOO |
| 2M | 190/190 | 9.0 | . 47 | 1.9 | 19 | 400 | 159-162M00 | 159-122M00 |
| 2 N | 325/325 | 7.0 | . 62 | 2.5 | 26 | 400 | 159-162NOO | 159-122NOO |
| 2 P | 490/490 | 5.8 | . 77 | 3.1 | 31 | 400 | 159-162P00 | 159-122P00 |
| 20 | 730/730 | 4.8 | . 97 | 3.9 | 38 | 400 | 159-162000 | 159-122000 |
| 2R | 1250/1250 | 3.6 | 1.2 | 5.0 | 50 | 400 | 159-162R00 | 159-122R00 |
| 2T | 1860/1860 | 3.0 | 1.5 | 6.0 | 61 | 200 | 159-162T00 | 159-122TOO |
| 2 U | 2760/2760 | 2.5 | 1.8 | 7.5 | 74 | 200 | 159-162U00 | 159-122U00 |
| 2 V | 4275/4275 | 2.0 | 2.3 | 9.2 | 92 | 200 | 159-162V00 | 159-122V00 |

Two Windings Bifilar Windings Bistable 40 Milliwatts Per Winding

| 8A | 135/135 | 16 | . 48 | 2.4 | 16.4 | 500 | 159-168A00 | 159-128A00 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 8B | 170/170 | 15.5 | . 58 | 2.9 | 18.5 | 400 | 159-168B00 | 159-128B00 |
| 8C | 200/200 | 13.3 | . 58 | 2.9 | 20.0 | 400 | 159-168C00 | 159-128COO |
| 8D | 310/310 | 11.9 | . 82 | 4.1 | 24.9 | 400 | 159-168D00 | 159-128D00 |
| 8E | 460/460 | 7.8 | . 80 | 4.0 | 30.3 | 400 | 159-168E00 | 159-128E00 |
| 8F | 675/675 | 6.5 | . 96 | 4.8 | 36.7 | 400 | 159-168F00 | 159-128F00 |
| 8G | 810/810 | 6.85 | 1.2 | 6.1 | 40.2 | 400 | 159-168G00 | 159-128G00 |
| 8H | 1000/1000 | 6.75 | 1.5 | 7.4 | 44.7 | 400 | 159-168HOO | 159-128HOO |
| 8J | 1240/1240 | 5.6 | 1.4 | 7.0 | 49.8 | 400 | 159-168J00 | 159-128J00 |
| 8K | 2300/2300 | 3.82 | 1.9 | 9.7 | 67.8 | 200 | 159-168K00 | 159-128K00 |

Note: All values at $25^{\circ} \mathrm{C}$. Resistances specified are $\pm 10 \%$. Maximum voltages based on 2 watts continuous dissipation.

| Winding | Single-Side- | table 115 | vatts | Bistable | illiwatts |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Nominal Resistance (Ohms) | Single-Side-Stable |  |  |  |  |  | Bistable |  |  |  |  |
|  | Must Operate Current (MA-DC) | Must Operate Voltage (VDC) | Must <br> Release <br> Voltage <br> (VDC) | Maximum Voltage (VDC) | Part Number |  | Must Operate Current (MA-DC) | Must Operate Voltage (VDC) | Must <br> Release Voltage (VDC) | Part Number |  |
|  |  |  |  |  | Form C | Form D |  |  |  | Form C | Form D |
| 18 | 66.6 | 1.3 | . 18 | 6.0 | 159-157A00 | 159-117A00 | 31.2 | . 12 | . 62 | 159-167A00 | 159-127A00 |
| 65 | 37.4 | 2.7 | . 36 | 11.4 | 159-157B00 | 159-117B00 | 17.8 | . 26 | 1.3 | 159-167B00 | 159-127B00 |
| 85 | 33.3 | 3.1 | . 42 | 13.0 | 159-157C00 | 159-117C00 | 15.6 | . 30 | 1.5 | 159-167C00 | 159-127C00 |
| 90 | 37.7 | 3.8 | . 51 | 13.4 | 159-157000 | 159-117D00 | 17.6 | . 36 | 1.8 | 159-167D00 | 159-127D00 |
| 115 | 30.0 | 3.8 | . 51 | 15.1 | 159-157E00 | 159-117E00 | 14.0 | . 36 | 1.8 | 159-167E00 | 159-127E00 |
| 275 | 17.0 | 5.2 | . 77 | 23.4 | 159-157F00 | 159-117F00 | 8.0 | . 50 | 2.5 | 159-167F00 | 159-127F00 |
| 450 | 12.9 | 6.4 | . 85 | 30.0 | 159-157G00 | 159-117G00 | 6.0 | . 60 | 3.0 | 159-167G00 | 159-127G00 |
| 675 | 11.6 | 8.6 | 1.1 | 36.7 | 159-157H00 | 159-117H00 | 5.4 | . 80 | 4.0 | 159-167H00 | 159-127H00 |
| 940 | 10.1 | 10.5 | 1.4 | 43.3 | 159-157J00 | 159-117J00 | 4.7 | . 98 | 4.9 | 159-167J00 | 159-127J00 |
| 950 | 12.1 | 12.7 | 1.7 | 43.6 | 159-157K00 | 159-117K00 | 5.7 | 1.2 | 6.0 | 159-167K00 | 159-127K00 |
| 1250 | 9.4 | 12.9 | 1.8 | 50.0 | 159-157L00 | 159-117L00 | 4.4 | 1.2 | 6.1 | 159-167L00 | 159-127L00 |
| 1425 | 8.3 | 13 | 1.8 | 53.4 | 159-157M00 | 159-117M00 | 3.9 | 1.2 | 6.2 | 159-167M00 | 159-127M00 |
| 1800 | 9.4 | 18.6 | 2.6 | 60.0 | 159-157N00 | 159-117N00 | 4.4 | 1.7 | 8.8 | 159-167N00 | 159-127N00 |
| 1950 | 7.5 | 17.6 | 2.1 | 62.4 | 159-157P00 | 159-117P00 | 3.5 | 1.5 | 7.5 | 159-167P00 | 159-127P00 |
| 2400 | 7.35 | 20.6 | 2.6 | 69.2 | 159-157000 | 159-117000 | 3.4 | 1.8 | 9.0 | 159-167000 | 159-127000 |
| 4000 | 5.55 | 24.4 | 3.3 | 89.5 | 159-157R00 | 159-117R00 | 2.6 | 2.3 |  | 159-167R00 | 159-127R00 |
| 4000 |  | 17.6 | 2.4 | 89.5 | 159-157T00 | 159-117T00 | 1.9 | 1.6 | 8.3 | 159-167T00 | 159-127T00 |



## 160 series

## Mercury-Wetted <br> Reed Relays

9

## Features

160 series relays are available in a single Form C or Form D two ampere contact arrangement, single or dual coil and printed circuit board terminals.
The part numbers shown on the adjacent page are for relays with $0.093^{\prime \prime}$ terminal spacing. The part number designator for the $0.100^{\prime \prime}$ grid is a 160$3 X X X X X$ for a pin of $0.09^{\prime \prime}$ length, and $160-4 X X X X X$ for a pin of $0.125^{\prime \prime}$ length.
Positive potential applied to the start of the winding indicated by the symbol will close the contacts shown open on the electrical schematics. For reset of bistable relays, reversed polarity must be applied. Weight 0.5 ounces. UL File E55708
Note: Relay must be mounted within $30^{\circ}$ of vertical and suitable contact protection must be used.

## Wiring Diagrams



Single Coil Double Coil

## Outline Dimensions



## Part Numbering System

| Relay Series | Enclosures And Terminals | Contacts and Adjustments | Coil | Standard or Special |
| :---: | :---: | :---: | :---: | :---: |
| 160 | $\begin{aligned} & \text { 1-.. } 090 \text { Lg.,. } 093 \text { Grid } \\ & \text { 2-. } 125 \text { Lg.,. } 093 \text { Grid } \\ & \text { 3-. } 090 \text { Lg.,. } 100 \text { Grid } \\ & \text { 4-. } 125 \text { Lg.,. } 100 \text { Grid } \\ & \text { 0-Special } \end{aligned}$ | $\begin{aligned} & \text { 1-1D Single-Side-Stable } \\ & 2-1 \text { D Bistable } \\ & \text { 5-1C Single-Side-Stable } \\ & \text { 6-1C Bistable } \\ & \text { 7-1C Dynamic ( } 1 \% \text { ) } \\ & \text { Balanced Bistable } \\ & 0-\text { Special } \end{aligned}$ | 1A-1Z-Single Coil 2A-2Z-Double Coil 1S-Special Single Coil 2S-Special Double Coil | 00-Standard <br> A1-Z9-Special <br> Customer Requirement |

Example: $160-151 \mathrm{KOO}$ is a 160 series relay, enclosure height of 400 in ., pin length of .090 in ., Form C contact, single-side-stable adjustment, single coil 1 K , of completely standard construction.

Coil Characteristics and Part Numbers
Two Windings Bistable 20 Milliwatts Per Winding

| Coil | Coil Resistance (Ohms) | Must Operate <br> Current (MA-DC) <br> (Either Winding) | Must Not Operate Voltage (VDC) (Either Winding) | Must Operate Voltage (VDC) (Either Winding) | MaximumVoltage (VDC)(One Winding Only) | Dielectric Standoff Between Coils (VDC) | Part Number |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  | Form C | Form D |
| 2K | 60/60 | 17 | . 29 | 1.1 | 10 | 500 | 160-162K00 | 160-122K00 |
| 2L | 90/90 | 15 | . 38 | 1.5 | 13 | 400 | 160-162LOO | 160-122L00 |
| 2 M | 155/155 | 11 | . 49 | 1.9 | 16 | 400 | 160-162MOO | 160-122M00 |
| 2 N | 205/205 | 10 | . 61 | 2.3 | 19 | 400 | 160-162NOO | 160-122NOO |
| 2 P | 340/340 | 7.5 | . 73 | 2.8 | 24 | 400 | 160-162P00 | 160-122PO0 |
| 20 | 560/560 | 6.0 | . 98 | 3.6 | 31 | 400 | 160-162000 | 160-122000 |
| 2R | 870/870 | 4.7 | 1.2 | 4.5 | 39 | 200 | 160-162R00 | 160-122R00 |
| 2 T | 1320/1320 | 3.8 | 1.4 | 5.5 | 48 | 200 | 160-162T00 | 160-122T00 |
| 2 U | 1980/1980 | 3.2 | 1.8 | 7.0 | 59 | 200 | 160-162U00 | 160-122U00 |
| 2 V | 3000/3000 | 2.7 | 2.3 | 9.0 | 73 | 200 | 160-162VOO | 160-122V00 |
| 2W | 4500/4500 | 2.1 | 2.8 | 11.0 | 89 | 200 | 160-162WOO | 160-122W00 |

Note: All values at $25^{\circ} \mathrm{C}$. Resistances specified are $\pm 10 \%$. Maximum voltages based on 1.75 watts continuous dissipation.

160 Series (continued) - Coil Characteristics and Part Numbers

One Winding Single-Side-Stable 40 Milliwatts

| Coil Resistance (Ohms) | Must Operate Current (MA-DC) | Must Operate Voltage (VDC) | Must Release <br> Voltage (VDC) | Maximum Voltage (VDC) | Part Number |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Form C | Form D |
| 2.2 | 113 | . 27 | . 05 | 2.0 | 160-151A00 | 160-111A00 |
| 3.1 | 103 | . 35 | . 07 | 2.3 | 160-151B00 | 160-111B00 |
| 4.4 | 90 | . 43 | . 08 | 2.8 | 160-151C00 | 160-111C00 |
| 5.9 | 80 | . 52 | . 10 | 3.2 | 160-151D00 | 160-111D00 |
| 13.0 | 49 | . 71 | . 14 | 4.8 | 160-151E00 | 160-111E00 |
| 18.7 | 43 | . 87 | . 18 | 5.7 | 160-151F00 | 160-111FO0 |
| 27.7 | 36 | 1.1 | . 22 | 7.0 | 160-151G00 | 160-111G00 |
| 50 | 25 | 1.4 | . 28 | 9.4 | 160-151H00 | 160-111H00 |
| 70 | 23 | 1.8 | . 35 | 11 | 160-151J00 | 160-111J00 |
| 125 | 16 | 2.3 | . 46 | 15 | 160-151K00 | 160-111K00 |
| 185 | 14 | 2.9 | . 60 | 18 | 160-151L00 | 160-111LOO |
| 325 | 11 | 3.8 | . 77 | 24 | 160-151M00 | 160-111M00 |
| 435 | 10 | 4.6 | . 94 | 28 | 160-151N00 | 160-111NOO |
| 680 | 7.5 | 5.7 | 1.1 | 35 | 160-151P00 | 160-111P00 |
| 1.120 | 5.9 | 7.2 | 1.4 | 44 | 160-151000 | 160-111000 |
| 1.750 | 4.6 | 8.8 | 1.7 | 55 | 160-151R00 | 160-111R00 |
| 2,650 | 3.8 | 11 | 2.2 | 68 | 160-151T00 | 160-111TO0 |
| 3,900 | 3.2 | 14 | 2.7 | 83 | 160-151U00 | 160-111U00 |
| 6,100 | 2.6 | 17 | 3.5 | 103 | 160-151V00 | 160-111V00 |
| 9,000 | 2.1 | 21 | 4.2 | 125 | 160-151W00 | 160-111WOO |

Two Windings Single-Side-Stable 80 Milliwatts Per Winding

| Coil Resistance (Ohms) | Must Operate Current (MA-DC) (Either Winding) | Must Not Operate Voltage (VDC) (Either Winding) | Must Operate Voltage (VDC) (Either Winding) | Maximum Voltage (VDC) (One Winding Only) | Dielectric Standoff Between Coils (VDC) | Part Number |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | Form C | Form D |
| 60/60 | 33 | 2.2 | . 44 | 10 | 500 | 160-152K00 | 160-112K00 |
| 90/90 | 29 | 2.9 | . 58 | 13 | 400 | 160-152LOO | 160-112LOO |
| 155/155 | 22 | 3.7 | . 74 | 16 | 400 | 160-152M00 | 160-112MOO |
| 205/205 | 20 | 4.5 | . 92 | 19 | 400 | 160-152NOO | 160-112NOO |
| 340/340 | 15 | 5.6 | 1.1 | 24 | 400 | 160-152P00 | 160-112POO |
| 560/560 | 10.8 | 7.9 | 1.3 | 31 | 400 | 160-152000 | 160-112000 |
| 870/870 | 9.3 | 9.0 | 1.8 | 39 | 200 | 160-152R00 | 160-112ROO |
| 1,320/1,320 | 7.5 | 11.0 | 2.2 | 48 | 200 | 160-152T00 | 160-112T00 |
| 1,980/1,980 | 6.4 | 14.0 | 2.8 | 59 | 200 | 160-152U00 | 160-112U00 |
| 3,000/3,000 | 5.3 | 18.0 | 3.5 | 73 | 200 | 160-152V00 | 160-112V00 |
| 4,500/4,500 | 4.2 | 21.0 | 4.2 | 89 | 200 | 160-152W00 | 160-112W00 |



## Features

- Surface and through-hole mounting types.
- 1 Form C contact arrangement.
- Latching or non-latching versions available.
- Switches loads from dry circuit to 1 amp.
- Washable - meets IEC protection class IP67.
- Low coil power requirement for IC compatibility.
- Terminals arranged on 0.1" grid.
- Designed for compact, high density mounting, $106.6 \mathrm{~mm}^{2}$ surface area.
- Ideal for data and communication systems.


## Contact Data @ 23 ${ }^{\circ} \mathrm{C}$

Arrangements: 1 Form C (SPDT) bifurcated contacts.
Material \& Style:Palladium-Nickel with Gold-Rhodium overlay.
Expected Mechanical Life: 1 billion operations.
Expected Electrical Life: 50 million ops. at 10mA, 12VDC;
10 million ops. at $100 \mathrm{~mA}, 6 \mathrm{VDC}$;
100,000 ops. at 1A, 30VDC.
Contact Ratings:
Maximum Switched Voltage: 125VDC, 150VAC.
Maximum Switched Current: 1A.
Maximum Carrying Current: 1A.
Maximum Switched Power: 30W (DC), 60VA (AC).
Minimum Switched Capability: $100 \mu \mathrm{~V}$.
UL/CSA Contact Ratings: 1A @ 30VDC;
460mA @ 65VDC;
460mA @ 150VAC.
Initial Contact Resistance: 50 milliohms max. @ $10 \mathrm{~mA}, 20 \mathrm{mV}$.

## High Frequency Data

Capacitance: Between Open Contacts: 5pF, max.
Between Coil and Contacts: 6 pF , max.
RF Characteristics: Isolation at $100 / 900 \mathrm{MHz}:-30.9 \mathrm{db} /-18.0 \mathrm{db}$. Insertion loss at 100 / $900 \mathrm{MHz}:-0.12 \mathrm{db} /-1.9 \mathrm{db}$. V. S. W. R. at 100 / $900 \mathrm{MHz}: 1.06 \mathrm{db} / 1.75 \mathrm{db}$.

## Initial Dielectric Strength

Between Open Contacts: 500V rms for 1 minute.
Between Contacts and Coil: $1,500 \mathrm{~V}$ rms for 1 minute.
Surge Voltage Resistance per Bellcore TR-NWT-001089 (2/10 $\mu \mathrm{s}$ ):
Between Open Contacts: $2,000 \mathrm{~V}$ on request. Between Coil and Contacts: $2,500 \mathrm{~V}$.
Surge Voltage Resistance per FCC 68 ( $10 / 160 \mu \mathrm{~s}$ ): Between Open Contacts: $1,500 \mathrm{~V}$ on request. Between Coil and Contacts: $1,500 \mathrm{~V}$.

Note: Consult factory regarding availability of models meeting high surge resistance requirements between open contacts.

## Initial Insulation Resistance

Between Mutually Insulated Conductors: $10^{9}$ ohms @ 500VDC.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Voltage: 1.5 to 24VDC.
Thermal Resistance at Continuous Thermal Load: $130^{\circ} \mathrm{K}$ per Watt.
Maximum Coil Temperature: $85^{\circ} \mathrm{C}$.
Duty Cycle: Continuous.

## V23026 (P1) series

## Miniature, Sealed PC Board Relay

T File E48393
(18) File LR45064-5

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Coil Data @ $23^{\circ} \mathrm{C}$

| Nominal Voltage (VDC) | Maximum Operating Voltage (VDC) | Nominal Power (mW) | $\begin{aligned} & \text { Resistance } \\ & \text { (Ohms) } \\ & \pm 10 \% \end{aligned}$ | Coil Number Order Designation (Step 4 in Ordering Information chart) |
| :---: | :---: | :---: | :---: | :---: |
| Non-Latching - Through-Hole versions (A1) |  |  |  |  |
| 1.5 | 4.5 | 63 | 36 | 7 |
| 3 | 8.8 | 66 | 137 | 6 |
| 5 | 14.5 | 67 | 370 | 1 |
| 9 | 25.5 | 69 | 1,165 | 5 |
| 12 | 35 | 64 | 2,250 | 2 |
| 15 | 42 | 72 | 3,100 | 3 |
| 24 | 50 | 128 | 4,500 | 4 |
| Non-Latching - Surface-Mount versions (D1) |  |  |  |  |
| 1.5 | 4 | 80 | 28 | 7 |
| 3 | 8 | 80 | 113 | 6 |
| 5 | 13.3 | 80 | 313 | 1 |
| 9 | 24 | 80 | 1,013 | 5 |
| 12 | 32 | 80 | 1,800 | 2 |
| 15 | 40 | 80 | 2,813 | 3 |
| 24 | 50 | 128 | 4,500 | 4 |
| $\begin{array}{\|l} \hline \text { Bistable, Dual Coils - Through-Hole and Surface-Mount versions (B1,E1) } \\ \text { (values are the same for each coil)(1) } \end{array}$ |  |  |  |  |
| 1.5 | 4.25 | 70 | 32 | 7 |
| 3 | 8.55 | 69 | 130 | 6 |
| 5 | 14.75 | 64 | 390 | 1 |
| 9 | 14.75 | 68 | 1,200 | 5 |
| 12 | 29 | 96 | 1,500 | 2 |
| 15 | 29 | 150 | 1,500 | 3 |
| Bistable, Single Coil - Through-Hole and Surface-Mount versions (C1,F1) |  |  |  |  |
| 1.5 | 6 | 37 | 61 | 5 |
| 3 | 13 | 30 | 300 | 6 |
| 5 | 20 | 34 | 740 | 1 |
| 9 | 35 | 38 | 2,160 | 7 |
| 12 | 50 | 32 | 4,500 | 2 |
| 15 | 50 | 50 | 4,500 | 3 |
| 24 | 50 | 128 | 4,500 | 4 |

(1) The specified voltages apply with only one coil energized.

## Operate Data @ $23^{\circ} \mathrm{C}$

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 10\% of nominal voltage or less.
Max. Continuous Thermal Load : 500mW.
Operate Time (Excluding Bounce) t : 1 ms , typ.
Operate Bounce Timet: 1 ms , typ.
Release Time (Excluding Bounce)t: 0.4 ms , typ.
Set Time (Latching)t: 1 ms , typ.
Reset Time (Latching) t : 1 ms , typ.
Maximum Switching Rate: 200 operations/second.
$\dagger$ At or from Nominal Coil Voltage

## Environmental Data

Temperature Range: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration, Operational: $40 \mathrm{~g}, 10-200 \mathrm{~Hz} ; 20 \mathrm{~g}, 200-2000 \mathrm{~Hz}$.
Shock, Operational: 50 g at $11 \mathrm{~ms} 1 / 2$ sinusoidal impulse.
Resistance to Soldering Heat: $260^{\circ} \mathrm{C}$ for 10 s . Internal relay temperature should not exceed $210^{\circ} \mathrm{C}$.
Needle Flame Test: Application time 20s, burning time $<15$ s.

## Mechanical Data

Termination: Through-hole or surface mount printed circuit terminals.
Enclosure Type: Immersion cleanable, plastic sealed case.
Weight: 0.063 oz. ( 1.8 g ) approximately.

|  | Typical Part Number $\downarrow$ | V23026 |
| :--- | :--- | :--- |

1. Basic Series:

V23026 = P1 M iniature, printed circuit board relay.
2. Termination:

|  | Non-Latching | Dual Coil Latching | Single Coil Latching |
| :--- | :---: | :---: | :---: |
| Through-Hole | A1 | B1 | C1 |
| Surface Mount | D1 | E1 | F1 |

3. Function Type:
$00=$ Single Coil Non-Latching, Through-Hole terminals $02=$ Single Coil Non-Latching, Surface-M ount terminals
$05=$ Single Coil Latching
$10=$ Dual Coil Latching
4. Coil Voltage:
$7=1.5 \mathrm{VDC}(1) \quad 6=3 \mathrm{VDC} \quad 1=5 \mathrm{VDC} \quad 5=9 \mathrm{VDC}(1) \quad 2=12 \mathrm{VDC} \quad 3=15 \mathrm{VDC} \quad 4=24 \mathrm{VDC}(2)$
(1) For single coil latching versions only (C1, F1), $5=1.5 \mathrm{VDC}$ and $7=9 \mathrm{VDC} \quad$ (2) 24 V coil not available on dual coil version
5. Contact Type:

B201 = Bifurcated, 1 Form C (SPDT).
*Consult factory for tape and reel packaging.

Our authorized distributors are more likely to stock the following items for immediate delivery.
$\begin{array}{ll}\text { V23026A1001B201 } & \text { V23026D1021B201 } \\ \text { V23026A1002B201 } & \text { V23026D1022B201 }\end{array}$
V23026A1004B201 V23026D1024B201

## Outline Dimensions

Through-Hole


## Surface Mount



Wiring Diagrams (Bottom Views)
Single Coil Non-Latching \& Single Coil Latching


For non-latching versions, coil polarity must be observed.
For single coil latching versions, polarity shown results in "set" condition. Reverse polarity results in "reset" condition.
Diagram indicates de-energized position for non-latching and "reset" position for single coil latching.

## Dual Coil Latching



Diagram indicates relay in the "reset" position, with "reset" coil most recently energized as shown. Energizing "set" coil as shown will transfer the contacts.

PC Board Layouts (Bottom Views)

## Through-Hole



## Surface Mount



## TSC series



## Miniature, Sealed PC Board Relay

## Telecommunications, Appliances, Office Machines

균 UL File No. E82292
(18) CSA File No. LR48471

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| TSC-L Sensitive |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | Coil Resistance (ohms) $\pm$ 10\% | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 30.0 | 166 | 3.75 | 0.25 |
| 6 | 25.0 | 240 | 4.50 | 0.30 |
| 9 | 16.7 | 540 | 6.75 | 0.45 |
| 12 | 12.5 | 960 | 9.00 | 0.60 |
| 24 | 6.3 | 3,840 | 18.00 | 1.20 |
| TSC-D Standard |  |  |  |  |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | Coil Resistance (ohms) $\pm 10 \%$ | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 60.0 | 83 | 3.75 | 0.25 |
| 6 | 50.0 | 120 | 4.50 | 0.30 |
| 9 | 33.4 | 270 | 6.75 | 0.45 |
| 12 | 25.0 | 480 | 9.00 | 0.60 |
| 24 | 12.5 | 1,920 | 18.00 | 1.20 |

## Contact Ratings

Ratings: 1A @ 24VDC resistive.
1A @ 120VAC resistive.

Max. Switched Voltage: AC: 120V.
DC: 30V.
Max. Switched Current: 1A.
Max. Switched Power: 120VA, 24W.

## Initial Dielectric Strength

Between Open Contacts: 400VAC, $50 / 60 \mathrm{~Hz}$. (1 min.).
Between Contacts and Coil: 1,000VAC, $50 / 60 \mathrm{~Hz}$. (1 min.).
Note: Consult factory for higher dielectric version: $1,500 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$.
(1 min.).
Surge Voltage Between Coil and Contacts: 1,500V FCC Part 68 (10/160 $\mathrm{\mu s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Conductors: 1,000M ohm @ 500VDCM.

## Coil Data

Voltage: 5 to 24VDC.
Duty Cycle: Continuous.
Nominal Power: TSC-L: 150 mW .
TSC-D: 300 mW .
Max. Coil Power: TSC-L: $140 \%$ of nominal at $70^{\circ} \mathrm{C}$.
TSC-D: $115 \%$ of nominal at $70^{\circ} \mathrm{C}$.

| Ordering Information | Typical Part Number | TSC | -1 | 05 | L | 3 | H | ,000 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: TSC = M iniature relay |  |  |  |  |  |  |  |  |
| 2. Termination: 1 = 1 pole |  |  |  |  |  |  |  |  |
| 3. Coil Voltage: $\begin{array}{ll} 05=5 \mathrm{VDC} & 09=9 \mathrm{VDC} \\ 06=6 \mathrm{VDC} & 12=12 \mathrm{VDC} \end{array}$ | $24=24 \mathrm{VDC}$ |  |  |  |  |  |  |  |
| 4. Coil Input: <br> $\mathrm{L}=$ Sensitive $\quad \mathrm{D}=$ Standard |  |  |  |  |  |  |  |  |
| 5. Contact Material: 3 = Silver Nickel |  |  |  |  |  |  |  |  |
| 6. Enclosure: <br> Blank = Vented (Flux-tight) cover | $\mathrm{H}=$ Sealed plastic case |  |  |  |  |  |  |  |
| 7. Suffix: ,000 = Standard model | Other Suffix = Custom model |  |  |  |  |  |  |  |

Our authorized distributors are more likely to stock the following items for immediate delivery.

## TSC-105L3H,000 TSC-124L3H,000 TSC-112D3H,000

TSC-112L3H,000 TSC-105D3H,000 TSC-124D3H,000

## Outline Dimensions



## Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)


## Reference Data

## Coil Temperature Rise



## Ambient Temp. \& Operate Voltage



Load Limit Curve



## Features

- Gold clad contacts in a 1 Form C contact arrangement.
- Standard $0.1^{\prime \prime} \times 0.3^{\prime \prime}$ grid spacing in a DIP configuration.
- Standard or sensitive DC coils through 24 volts.
- High dielectric strength.
- Well suited for audio communications circuits, logic and process control, vending machines, thermostats and office automation applications.
- Immersion cleanable, plastic sealed case.
- Quiet operation for security applications.

Contact Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$
Arrangements: 1 Form C (SPDT).
Material: Gold overlay silver-palladium alloy.
Ratings: $1 \mathrm{amp} @ 24 \mathrm{VDC}$, resistive; $0.5 \mathrm{amp} @ 120 \mathrm{VAC}$, resistive.
Max. Switching Current: 2A
Max. Switching Power: 60VA/24W.
Max. Switching Voltage: 120VAC/60VDC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 150,000 ops. @ 1A, 24VDC, resistive.
100,000 ops. @1A, 120VAC, resistive.
Initial Contact Resistance: 50 milliohms, max., @ 100mA, 6VDC.
Surge Voltage:
Between Coil and Contacts ( $10 \times 160 \mu \mathrm{~s}$ ): 1,500V: (FCC Part 68).

## Initial Dielectric Strength

Between Open Contacts: 500 V ms, $50 / 60 \mathrm{~Hz}$., for 1 minute.
Contact to Coil: $1,000 \mathrm{~V}$ rms, $50 / 60 \mathrm{~Hz}$., for 1 minute.

## Initial Insulation Resistance

Between Mutually Insulated Conductors: $10^{8}$ ohms @ $500 \mathrm{VDC}, 20^{\circ} \mathrm{C}$ and 65\% relative humidity.

## Coil Data @ $20^{\circ} \mathrm{C}$

Voltage: 3 through 24VDC.
Nom. Power (Approx.): Std. Coil: 450 mW; Sensitive Coil: 200 mW.
Maximum Power: Std. Coil: 800 mW .;Sensitive Coil: 640 mW .
Temperature Rise: Std. Coil: $105^{\circ} \mathrm{C}$ per watt, typ.
Sensitive Coil: $125^{\circ} \mathrm{C}$ per watt, typ.
Maximum Coil Temperature: $105^{\circ} \mathrm{C}$.
Duty Cycle: Continuous.

## T81N/T81H series

## Ultraminiature, High Density PC Board Relay <br> 吹 File E29244 <br> (18 File LR48471

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| Standard Coils |  | Sensitive Coils |  |
| :---: | :---: | :---: | :---: |
| Nominal <br> Voltage <br> (VDC) | Resistance <br> $\pm \mathbf{1 0 \%}$ <br> (Ohms) | Nominal <br> Voltage <br> (VDC) | Resistance <br> $\pm \mathbf{1 0 \%}$ <br> (Ohms) |
| 3 | 20 | 3 | 45 |
| 5 | 55 | 5 | 125 |
| 6 | 80 | 6 | 180 |
| 9 | 180 | 9 | 400 |
| 12 | 320 | 12 | 700 |
| 24 | 1,280 | 24 | 2,800 |

## Operate Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

Must Operate Voltage: 70\% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time (Excluding Bounce)t: Standard Coil : 5 ms , approx. Sensitive Coil : 5 ms , approx.
Release Time (Excluding Bounce)t: All Models: 2 ms , approx.
† At or from Nominal Coil Voltage.

## Environmental Data

Temperature Range: Standard Coil: $-40^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.
Sensitive Coil: $-40^{\circ} \mathrm{C}$ to $+75^{\circ} \mathrm{C}$.
Vibration: 0.059" (1.5mm) max. excursions for $10-40 \mathrm{~Hz}$.
Shock: Standard Coil: 10 g for 11 ms .
Sensitive Coil: 6 g for 11 ms .

## Mechanical Data

Termination: Printed circuit terminals on 0.1 " ( 2.54 mm ) centers.
Enclosure: Sealed PBT plastic case.
Weight: 0.14 oz . ( 4 g ) approximately.


Our authorized distributors are more likely to stock these items.

| T81H5D312-05 | T81H5D312-12 | T81N5D312-05 | T81N5D312-24 |
| :--- | :--- | :--- | :--- |
| T81H5D312-06 | T81H5D312-24 | T81N5D312-12 |  | T81H5D

T81N5D312-12

Outline Dimensions


## Wiring Diagram (Bottom View)



Terminals - \#1 \& 2 $.023(0.6) \times .018$ (0.45)
Terminals - \#11 \& 12
.023 (0.6) X . 016 (0.40)
Terminal - \#7 .008 (0.20) X . 023 (0.6)

PC Board Layout (Bottom View)



## Features

- Gold overlay silver palladium alloy contact suitable for low loads.
- High density available on PC board due to small size.
- 2.54 mm terminal pitch same as I.C. socket terminal pitch.
- Sensitive and standard coils available.
- Immersion cleanable, sealed version available.


## Contact Data @ 20응

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Gold overlay silver palladium.
Max. Switching Rate: $300 \mathrm{ops} . / \mathrm{min}$. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 1mA @1VDC.
Initial Contact Resistance: 50 milliohms @ 100mA,6VDC.

## Contact Ratings

Ratings: 1A @ 24VDC resistive, 1A @ 120VAC resistive.
Max. Switched Voltage: AC: 120V.
DC: 60V.
Max. Switched Current: 1A.
Max. Switched Power: 120VA, 30W.

## Initial Dielectric Strength

Between Open Contacts: $500 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. ( 1 minute).
Between Coil and Contacts: $1,000 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 1,500V FCC Part 68
( $10 / 160 \mu \mathrm{~s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDCM.

## Coil Data

Voltage: 5 to 24VDC.
Nominal Power: OUAZ-D: 450 mW .
OUAZ-L: 200 mW .
Coil Temperature Rise: OUAZ-D: $60^{\circ} \mathrm{C}$ max., at rated coil voltage. OUAZ-L: $25^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

## OUAZ series

## Miniature, Sealed PC Board Relay

Telecommunications, Appliances, Office Machines, Audio Equipment.

吹 UL File No. E82292
(18) CSA File No. LR48471

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Coil Data @ $20^{\circ} \mathrm{C}$

| OUAZ-D Standard |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | Coil Resistance (ohms) $\pm 10 \%$ | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 90.9 | 55 | 3.50 | 0.25 |
| 6 | 75.0 | 80 | 4.20 | 0.30 |
| 9 | 50.0 | 180 | 6.30 | 0.45 |
| 12 | 37.5 | 320 | 8.40 | 0.60 |
| 24 | 18.8 | 1,280 | 16.80 | 1.20 |
| OUAZ-L Sensitive |  |  |  |  |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | Coil Resistance (ohms) $\pm$ 10\% | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 40.0 | 125 | 3.75 | 0.50 |
| 6 | 33.3 | 180 | 4.50 | 0.60 |
| 9 | 22.5 | 400 | 6.75 | 0.90 |
| 12 | 17.0 | 700 | 9.00 | 1.20 |
| 24 | 8.6 | 2,800 | 18.00 | 2.40 |

## Operate Data

Must Operate Voltage: OUAZ-D: 70\% of nominal voltage or less.
OUAZ-L: 75\% of nominal voltage or less.
Must Release Voltage: OUAZ-D: 5\% of nominal voltage or more.
OUAZ-L: 10\% of nominal voltage or more.
Operate Time: OUAZ-D: 5 ms max.
OUAZ-L: 10 ms max.
Release Time: 7 ms max.

## Environmental Data

Temperature Range:
Operating: OUAZ-D: $-30^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$
OUAZ-L: $-30^{\circ} \mathrm{C}$ to $+75^{\circ} \mathrm{C}$.
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $500 \mathrm{~m} / \mathrm{s}^{2}$ (50G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing)

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
OUAZ-SS: Vented (Flux-tight), plastic cover.
OUAZ-SH: Sealed, plastic case.
Weight: 0.12 oz. ( 3.5 g ) approximately.

## Ordering Information

| Typical Part Number | OUAZ | -SS | -1 | 12 | L | M | ,900 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: OUAZ = M iniature, sealed PC board relay. |  |  |  |  |  |  |  |
| 2. Enclosure: <br> SS = Vented (Flux-tight)*, plastic cover. <br> SH = Sealed, plastic case. |  |  |  |  |  |  |  |
| 3. Termination: 1 = 1 pole |  |  |  |  |  |  |  |
| 4. Coil Voltage: $\begin{array}{lll} 03=3 \mathrm{VDC} & 06=6 \mathrm{VDC} & 12=12 \mathrm{VDC} \\ 05=5 \mathrm{VDC} & 09=9 \mathrm{VDC} & 24=24 \mathrm{VDC} \end{array}$ |  |  |  |  |  |  |  |
| 5. Coil Input: <br> $\mathrm{L}=$ Sensitive $\quad \mathrm{D}=$ Standard |  |  |  |  |  |  |  |
| 6. Contact Arrangement: <br> Blank = 1 Form C, SPDT $\text { M = } 1 \text { Form A, SPST-NO }$ |  |  |  |  |  |  |  |
| 7. Suffix: ,900 = Standard model <br> Other Suffix = Custom model |  |  |  |  |  |  |  |

* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

Outline Dimensions


## Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)


## Reference Data

## Coil Temperature Rise



## Operate Time



## Life Expectancy




## Features

- Through hole or surface mount terminals.
- Meets Bellcore GR 1089, FCC Part 68 and ITU-T K20.
- For applications in telecommunications, office automation, consumer electronics, medical equipment, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- 100 mW coil for latching models, 140 mW coil for non-latching.
- Ultrasonic cleaning not recommended.


## Contact Data @ $23^{\circ} \mathbf{C}$ (except as noted)

Arrangement: 2 Form C (DPDT) bifurcated contacts.
Material: Stationary: Palladium-Ruthenium, gold covered.
Ratings: Max. Switched Current: 2A.
Max. Carry Current: 2A (at max ambient temperature.
Max. Switched Voltage: 220VDC, 250VAC.
Max. Switched Power: 60W DC or 62.5VA AC.
ULCSA Ratings: 250 mA @ $250 \mathrm{VAC} ; 2 \mathrm{~A} @ 30 \mathrm{VDC} ;$ 500 mA @ $120 \mathrm{VDC} ; 270 \mathrm{~mA}$ @ 220 VDC.
Initial Contact Resistance: $<70$ milliohms @ $10 \mathrm{~mA} / 20 \mathrm{mV}$.
Expected Mechanical Life: 100 million operations.
Expected Electrical Life: 2.5 million operations @ $10 \mathrm{~mA} / 30 \mathrm{mVDC}$.
2 million operations @ cable load open end.
500,000 operations @ 240mA / 125VDC, res.
500,000 operations @ 1A / 30VDC, res.
100,000 operations @ 270 mA / 220VDC, res.
100,000 operations @ 2A / 30VDC, res.
100,000 operations @ 250mA / 250VDC, res.
Thermoelectric potential: $<10 \mu \mathrm{~V}$.

## High Frequency Data

Capacitance: Between Open Contacts: 1pF, max.
Between Coil and Contacts: 2 pF , max.
Between Poles: 2pF, max.
RF Characteristics: Isolation at 100 / $900 \mathrm{MHz}:-37.0 \mathrm{db} /-18.8 \mathrm{db}$. Insertion loss at $100 / 900 \mathrm{MHz}:-0.03 \mathrm{db} /-0.33 \mathrm{db}$. V. S. W. R. at 100 / 900 MHz : $1.06 \mathrm{db} / 1.49 \mathrm{db}$.

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms for 1 minute.
Between Coil and Contacts: $1,800 \mathrm{~V}$ rms for 1 minute.
Between Poles: $1,000 \mathrm{Vrms}$ for 1 minute.
Surge Voltage Resistance per Bellcore 1089 ( $2 / 10 \mu \mathrm{~s}$ ),
FCC 68 ( $10 / 160 \mu \mathrm{~s}$ ) and IEC ( $10 / 700 \mu \mathrm{~s}$ ):
Between Open Contacts: 1,500V.
Between Coil and Contacts: $2,500 \mathrm{~V}$.
Between Poles: 1,500V.

## Initial Insulation Resistance

Between Contact and Coil: $10^{9}$ ohms or more @ 500VDC.

## $\mid M$ series

## DPDT Slimline and Low Profile Telecom/Signal PC Board Relays

吹 File E111441
(18) File 169679-1079886

16501-003
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Voltage: 1.5 to 24VDC.
Nominal Power: 100mW for 1.5-12VDC latching models; 140mW for 1.5-12VDC non-latching models; 200 mW for all 24VDC models.
Duty Cycle: Continuous.

Coil Data @ $23^{\circ} \mathrm{C}$

| Nominal Voltage (VDC) | Operate/Set Range |  | Minimum <br> Release/ Reset <br> Voltage <br> (VDC) | $\begin{gathered} \text { Resistance } \\ \pm 10 \% \\ \text { (Ohms) } \end{gathered}$ | Part Number |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Minimum Voltage (VDC) | $\begin{aligned} & \text { Maximum } \\ & \text { Voltage } \\ & \text { (VDC) } \\ & \hline \end{aligned}$ |  |  |  |
| Non-latching 1 coil versions |  |  |  |  |  |
| 1.5 | 1.13 | 3.4 | 0.15 | 16 | IMOO |
| 3 | 2.1 | 6.8 | 0.3 | 64 | IM01 |
| 4.5 | 3.15 | 10.3 | 0.45 | 145 | IM02 |
| 5 | 3.5 | 11.4 | 0.5 | 178 | IM03 |
| 6 | 4.2 | 13.7 | 0.6 | 257 | IM04 |
| 9 | 6.3 | 20.4 | 0.9 | 574 | IM05 |
| 12 | 8.4 | 27.3 | 1.2 | 1,028 | IM06 |
| 24 | 16.8 | 45.6 | 2.4 | 2,880 | IM07 |
| Latching 1 coil versions |  |  |  |  |  |
| 1.5 | 1.13 | 4.1 | -1.13 | 23 | IM40 |
| 3 | 2.25 | 8.1 | -2.25 | 90 | IM 41 |
| 4.5 | 3.38 | 12.1 | -3.38 | 203 | IM 42 |
| 5 | 3.75 | 13.5 | -3.75 | 250 | IM43 |
| 6 | 4.5 | 16.2 | -4.5 | 360 | IM44 |
| 9 | 6.75 | 24.2 | -6.75 | 810 | IM 45 |
| 12 | 9.0 | 32.3 | -9.0 | 1,440 | IM46 |
| 24 | 18.0 | 41.9 | -18.0 | 2,880 | IM47 |

## Operate Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Operate and Release Voltage: See values in chart above.
Operate Time (at nominal voltage): 1 ms , typ.; 3 ms , max.
Reset Time [latching](at nominal voltage): 1 ms , typ.; 3 ms , max.
Release Time [non-latching](without diode in parallel): 1 ms , typ.; 3 ms ,
max.
Release Time [non-latching](with diode in parallel): 3 ms , typ.; 5 ms , max.
Bounce Time (at contact close): 1 ms , typ.; 5 ms , max.
Maximum Switching Rate (no load): 50 operations/s.

## Environmental Data

Temperature Range: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Maximum Allowable Coil Temperature: $125^{\circ} \mathrm{C}$.
Thermal Resistance: <150KW.
Shock, half sinus, 11 ms : Functional: 50 g .
Shock, half sinus, 0.5 ms : Destructive: 500 g .
Vibration, $\mathbf{1 0 - 1 0 0 0} \mathrm{Hz}$.: Functional: 20 g .
Needle Flame Test: Application Time 20s.
Resistance to Soldering: $260^{\circ} \mathrm{C}$ for 10 s .

## Mechanical Data

Termination: Through-hole printed circuit terminals or gull-wing or J -leg surface mount printed circuit terminals.

## Mounting Position: Any.

Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: $0.03 \mathrm{oz} .(75 \mathrm{~g})$ approximately.
$U_{1}=\quad$ Minimum voltage at $23^{\circ} \mathrm{C}$ after pre-energizing with nominal voltage without contact current
$U_{\mathrm{II}}=\quad$ Maximum continous voltage at $23^{\circ}$

The operating voltage limits $U_{1}$ and $U_{\| 1}$ depend on
the temperature according to the formula:
$U_{1 \text { tamb }}=K_{1} \cdot U_{123^{\circ} \mathrm{C}}$
and
$U_{11 \text { tamb }}=K_{11} \cdot U_{\| 23^{\circ} \mathrm{C}}$
$t_{\mathrm{amb}} \quad=$ Ambient temperature
$U_{\text {Itamb }} \quad=$ Minimum voltage at ambient temperature, $\mathrm{t}_{\text {amb }}$
$U_{11}$ tamb $\quad=$ Maximum voltage at ambient temperature, $t_{\text {amb }}$
$k_{1}, k_{\|} \quad=$ Factors (dependent on temperature), see diagram


## Packaging Information

THT IM series relays are shipped in tubes of 50 . There are 1,000 relays in a full carton. SMT IM series relays are shipped in reels of 1,000 . There are 1,000 or 5,000 relays in a full carton.

## Ordering Information

See "Part Number" column in Coil Data chart on previous page for available base part numbers in the IM series.
For THT versions, add the suffix "TS" to the base part number.
For gull-wing SMT versions, add the suffix "GR" to the base part number.
For J -leg SMT versions, add the suffix 'J R" to the base part number.

## Our authorized distributors are more likely to stock the following items for immediate delivery.

None at present.

## Outline Dimensions

## THT Version



## SMT Version w/ Gull Wings



SMT Version w/ J Legs


## $\overline{\text { PC Board Layout (Bottom View) }}$

Solder Pad Layout (Bottom Views)
Wiring Diagram SMT Version w/ Gull Wings

SMT Version w/ J Legs


Recommended Soldering Conditions (according to CECC 00802)

Vapor Phase Soldering: Temperature/Time Profile
(Lead Temperature)


Infrared Soldering: Temperature/Time Profile (Lead Temperature)



## Features

- Through hole PC board terminals.
- Meets FCC Part 68 and ITU-T K20.
- For applications in telecommunications, office automation, consumer electronics, medical equipment, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- 80 mW coil for high sensitivity models, 140 mW coil for sensitive types.
- Ultrasonic cleaning not recommended.


## Contact Data @ $\mathbf{2 3}^{\circ} \mathbf{C}$ (except as noted)

Arrangement: 2 Form C (DPDT) bifurcated contacts.
Material: Stationary: Silver-nickel, gold covered.
Ratings: Max. Switched Current: 2A.
Max. Carry Current: 2A (at max ambient temperature.
Max. Switched Voltage: 125VDC, 250VAC.
Max. Switched Power: 30W DC or 62.5VA AC.
ULCSA Ratings: 500mA @ 50VDC; 1.25A @ 30VDC; 500mA @ 50VAC.
Initial Contact Resistance: $<70$ milliohms @ $10 \mathrm{~mA} / 20 \mathrm{mV}$.
Expected Mechanical Life: 100 million operations.
Expected Electrical Life: 2.5 million operations @ 10mA / 30mVDC.
2 million operations @ cable load open end.
100,000 operations @ 240mA / 125VDC.
100,000 operations @ 250mA / 250VDC.
100,000 operations @ 1.25A / 24VDC.
Thermoelectric potential: $<10 \mu \mathrm{~V}$.

## High Frequency Data

Capacitance: Between Open Contacts: 1pF, max. Between Coil and Contacts: 4 pF , max. Between Poles: 1pF, max.
RF Characteristics: Isolation at $\mathbf{1 0 0} / \mathbf{9 0 0} \mathbf{~ M H z : ~}-40.2 \mathrm{db} /-22.3 \mathrm{db}$. Insertion loss at 100 / $900 \mathbf{~ M H z : ~}-0.03 \mathrm{db} /-0.25 \mathrm{db}$. V. S. W. R. at 100 / $900 \mathrm{MHz}: 1.01 \mathrm{db} / 1.07 \mathrm{db}$.

## Initial Dielectric Strength

Between Open Contacts: 700Vrms for 1 minute.
Between Coil and Contacts: $1,000 \mathrm{Vrms}$ for 1 minute.
Between Poles: 1,000Vrms for 1 minute.
Surge Voltage Resistance per FCC 68 ( $10 / 160 \mu \mathrm{~s}$ ) and
IEC ( $10 / 700 \mu \mathrm{~s}$ ):
Between Open Contacts: 1,500V.
Between Coil and Contacts: $1,500 \mathrm{~V}$.
Between Poles: 1,500V.

## Initial Insulation Resistance

Between Contact and Coil: $10^{9}$ ohms or more @ 500VDC.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Voltage: 3 to 48VDC.
Nominal Power: $80-300 \mathrm{~mW}$ depending on models. See coil data tables. Duty Cycle: Continuous.

## FP2 series

## DPDT Low Profile <br> Telecom/Signal PC Board Relays

吹 File E111441
(18) File 169679-1079886

16501-003
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $23^{\circ} \mathrm{C}$

| Nom. Voltage (VDC) | Operate/Set Range |  | Minimum Release/Reset Voltage (VDC) | Nom. Power (mW) | Resistance $\pm 10 \%$ (Ohms) | Part Number |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Max. Voltage (VDC) |  |  |  |  |
| Non-latching 1 coil versions |  |  |  |  |  |  |
| 3 | 2.1 | 6.8 | 0.3 | 140 | 64 | D3006 |
| 4.5 | 3.15 | 10.3 | 0.45 | 140 | 145 | D3004 |
| 5 | 3.5 | 11.4 | 0.5 | 140 | 178 | D3009 |
| 6 | 4.2 | 13.7 | 0.6 | 140 | 257 | D3005 |
| 9 | 6.3 | 20.4 | 0.9 | 140 | 574 | D3010 |
| 12 | 8.4 | 27.3 | 1.2 | 140 | 1,028 | D3002 |
| 24 | 16.8 | 45.7 | 2.4 | 200 | 2,880 | D3012 |
| 48 | 33.6 | 67.5 | 4.8 | 300 | 7,680 | D3013 |
| Non-latching, sensitive 1 coil versions |  |  |  |  |  |  |
| 3 | 2.25 | 9.0 | 0.3 | 80 | 113 | D3021 |
| 4.5 | 3.38 | 13.5 | 0.45 | 80 | 253 | D3022 |
| 5 | 3.75 | 15.0 | 0.5 | 80 | 313 | D3023 |
| 6 | 4.5 | 18.0 | 0.6 | 80 | 450 | D3024 |
| 9 | 6.75 | 27.1 | 0.9 | 80 | 1,013 | D3025 |
| 12 | 9.0 | 36.1 | 1.2 | 80 | 1,800 | D3026 |
| 24 | 18.0 | 54.7 | 2.4 | 140 | 4,114 | D3027 |
| 48 | 36.0 | 72.5 | 4.8 | 260 | 8,882 | D3028 |
| Latching 1 coil versions |  |  |  |  |  |  |
| 3 | 2.25 | 8.1 | -2.25 | 100 | 90 | D3041 |
| 4.5 | 3.375 | 12.1 | -3.375 | 100 | 203 | D3042 |
| 5 | 3.75 | 13.5 | -3.75 | 100 | 250 | D3043 |
| 6 | 4.5 | 16.2 | -4.5 | 100 | 360 | D3044 |
| 9 | 6.75 | 24.2 | -6.75 | 100 | 810 | D3045 |
| 12 | 9.0 | 29.0 | -9.0 | 100 | 1,440 | D3046 |
| 24 | 18.0 | 47.5 | -18.0 | 150 | 3,840 | D3047 |
| Latching 2 coil versions |  |  |  |  |  |  |
| 3 | 2.1 | 5.7 | 2.1 | 200 | 45 | D3061 |
| 4.5 | 3.15 | 8.6 | 3.15 | 200 | 101 | D3062 |
| 5 | 3.5 | 9.5 | 3.5 | 200 | 125 | D3063 |
| 6 | 4.2 | 11.4 | 4.2 | 200 | 180 | D3064 |
| 9 | 6.3 | 17.1 | 6.3 | 200 | 405 | D3065 |
| 12 | 8.4 | 22.6 | 8.4 | 200 | 720 | D3066 |
| 24 | 16.8 | 33.7 | 16.8 | 200 | 1,920 | D3067 |

## Operate Data @ 23${ }^{\circ} \mathrm{C}$

Operate and Release Voltage: See values in chart above.
Operate Time (at nominal voltage): 3 ms , typ.; 4 ms , max.
Reset Time [latching](at nominal voltage): 3 ms , typ.; 4 ms , max.
Release Time [non-latching](w/o diode in parallel): 1 ms , typ.; 3 ms , max.
Release Time [non-latching](with diode in parallel): 3 ms , typ.; 4 ms , max.
Bounce Time (at contact close): 1 ms , typ.; 5 ms , max.
Maximum Switching Rate (no load): 50 operations/s.

## Environmental Data

Temperature Range: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Maximum Allowable Coil Temperature: $110^{\circ} \mathrm{C}$.
Thermal Resistance: <185K/W.
Shock, half sinus, 11 ms : Functional: 50g.
Shock, half sinus, 11 ms : Destructive: 1,500g.
Vibration, 10-500 Hz.: Functional: 20 g .
Needle Flame Test: Application Time 20s.
Resistance to Soldering: $260^{\circ} \mathrm{C}$ for 10 s .

## Mechanical Data

Termination: Through-hole printed circuit terminals.

## Mounting Position: Any.

Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.08 oz . ( 2 g ) approximately.
$U_{1}=\quad$ Minimum voltage at $23^{\circ} \mathrm{C}$ after pre-energizing with nominal voltage without contact current
$U_{\mathrm{II}}=\quad$ Maximum continous voltage at $23^{\circ}$

The operating voltage limits $U_{1}$ and $U_{\| \mid}$depend on the temperature according to the formula:

| $U_{1 \text { tamb }}=$ <br> and | $\mathrm{K}_{1} \cdot \mathrm{U}_{123^{\circ} \mathrm{C}}$ |
| :---: | :---: |
| $U_{\text {II tamb }}=$ | $\mathrm{K}_{11} \cdot \mathrm{U}_{1123^{\circ} \mathrm{C}}$ |
| $t_{\text {amb }}$ | = Ambient temperature |
| $U_{\text {I tamb }}$ | $=\mathrm{M}$ inimum voltage at ambient temperature, $\mathrm{t}_{\text {amb }}$ |
| $U_{\text {II tamb }}$ | $=$ Maximum voltage at ambient temperature, $\mathrm{t}_{\text {amb }}$ |
| $k_{1}, k_{\text {l\| }}$ | = Factors (dependent on temperature), see diagram |

## Ordering Information

See "Part Number" column in Coil Data chart on previous page for available part numbers in the FP2 series.


## Packaging Information

FP2 series relays are shipped in tubes of 50 . There are 1,000 relays in a full carton.

## Our authorized distributors are more likely to stock the following items for immediate delivery.

None at present.

## Outline Dimensions



## Wiring Diagrams (Bottom Views)

Non-Latching and Latching, 1 Coil
Release or Reset Condition


Latching, 2 Coil Reset Condition

$\overline{\text { PC Board Layout (Bottom View) }}$


V23079 (P2) series


## Features

- Surface and through hole mounting types.
- Breakdown voltage between contacts and coil: $1,500 \mathrm{Vrms}$.
- Surge withstand between contacts and coil: 2,500V (Bellcore).
- High capacity contact: 2A @ 30VDC.
- 2 Form C contact arrangement.
- Board space saving, vertical mount ( $14.6 \times 7.2 \mathrm{~mm}$ surface area).
- Immersion cleanable, plastic sealed case.
- Single and dual coil latching versions available.
- Basic insulation (coil-to-contact) according to EN 60950 / UL 1950.
- Ultrasonic cleaning is not recommended.


## Contact Data @ $23^{\circ} \mathrm{C}$

Arrangement: 2 Form C (DPDT) bifurcated contacts.
Material: Gold overlay on silver nickel.
Rating:
Max. Switching Voltage: 250VAC, 220VDC.
Max. Switching Current: 5A.
Max Carrying Current: 2A.
Max Switching Power: 60W, DC; 62.5VA, AC.
Min. Permissible Load: $100 \mu \mathrm{~V}$.
UL/CSA Rating: 1A @ 30VDC; 300mA @ 110VDC; 500 mA @ $120 \mathrm{VAC} ; 250 \mathrm{~mA}$ @ 240 VAC.
Expected Mechanical Life: Approx. 100 million ops.
Expected Electrical Life: 50 million ops. @ $10 \mathrm{~mA}, 12 \mathrm{~V}$, 10 million ops. @ $100 \mathrm{~mA}, 6 \mathrm{~V}$. 1 million ops. @1A, 30V, 500,000 ops. @ $500 \mathrm{~mA}, 60 \mathrm{~V}$. 200,000 ops. @ 2A, 30V.
Initial Contact Resistance: 50 milliohms @ $10 \mathrm{~mA}, 20 \mathrm{mV}$.
Thermoelectric potential: $<10 \mu \mathrm{~V}$.

## High Frequency Data

Capacitance: Between Open Contacts: 2pF, max.
Between Coil and Contacts: 1.5pF, max. Between Poles: 1pF, max.
RF Characteristics: Isolation at 100 / $900 \mathrm{MHz}:-39.0 \mathrm{db} /-20.7 \mathrm{db}$.
Insertion loss at $100 / 900 \mathrm{MHz}:-0.02 \mathrm{db} /-0.27 \mathrm{db}$.
V. S. W. R. at 100 / 900 MHz: $1.04 \mathrm{db} / 1.40 \mathrm{db}$.

## Initial Dielectric Strength

Between Open Contacts: $1,000 \mathrm{Vrms}$ for 1 minute. ( $1,500 \mathrm{Vms}$ on request, consult factory for availability).
Between Coil and Contacts: $1,500 \mathrm{Vrms}$ for 1 minute. (single coil relay).
Between Poles: $1,000 \mathrm{Vrms}$ for 1 minute.
Surge Voltage Resistance per Bellcore TR-NWT-001089 ( $2 / 10 \mu \mathrm{~s}$ ):
Between Open Contacts: $2,000 \mathrm{~V}$.
Between Coil and Contacts: $2,500 \mathrm{~V}$ (single coil relay). Between Poles: 2,500V.
Surge Voltage Resistance per FCC 68 ( $10 / 160 \mu \mathrm{~s}$ ):
Between Open Contacts: 1,500V.
Between Coil and Contacts: 1,500V (single coil relay).
Between Poles: 1,500V.

## Initial Insulation Resistance

Between Mutually Insulated Conductors: $10^{9}$ ohms @ 500VDC.

## 5 Amp Switching, High Dielectric DPDT Polarized <br> FCC Part 68 <br> PC Board Relay

楊 File E48393
(518 File LR45064
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Voltage: 3-24V.
Nominal Power: $70 \mathrm{~mW}-140 \mathrm{~mW}$, dependent on model. See chart below.

| Nominal Voltage (VDC) | Operating Range @ $23^{\circ} \mathrm{C}$ |  | @ $85{ }^{\circ} \mathrm{C}$ | Coil <br> Resistance <br> @ $23^{\circ} \mathrm{C}$ |
| :---: | :---: | :---: | :---: | :---: |
|  | Must Operate Voltage (VDC) | Max. Voltage (VDC) | Max. Voltage (VDC) |  |
| Non-Latching, 140mW Nominal Power |  |  |  |  |
| 3 | 2.25 | 6.5 | 3.4 | $64.3 \pm 6$ |
| 4.5 | 3.375 | 9.8 | 5.1 | $145 \pm 15$ |
| 5 | 3.75 | 10.9 | 5.7 | $178 \pm 18$ |
| 6 | 4.50 | 13.0 | 6.8 | $257 \pm 26$ |
| 9 | 6.75 | 19.6 | 10.3 | $578 \pm 58$ |
| 12 | 9.0 | 26.1 | 13.8 | 1,029 $\pm 103$ |
| 24 | 18.0 | 52.3 | 27.7 | $4,114 \pm 411$ |
| Single Coil Latching, 70mW Nominal Power |  |  |  |  |
| 3 | 2.25 | 9.2 | 4.8 | $128 \pm 13$ |
| 4.5 | 3.375 | 13.8 | 7.3 | $289 \pm 29$ |
| 5 | 3.75 | 15.3 | 8.1 | $357 \pm 36$ |
| 6 | 4.5 | 18.5 | 9.8 | $514 \pm 51$ |
| 9 | 6.75 | 27.7 | 14.6 | 1,157 $\pm 116$ |
| 12 | 9.0 | 37.0 | 19.6 | 2,057 $\pm 206$ |
| 24 | 18.0 | 74.0 | 39.2 | $8,228 \pm 823$ |
| Dual Coil Latching, 140mW Nominal Power |  |  |  |  |
| 3 | 2.25 | 6.5 | - | $64.3 \pm 6$ |
| 4.5 | 3.375 | 9.8 | - | $145 \pm 15$ |
| 5 | 3.75 | 10.9 | - | $178 \pm 18$ |
| 6 | 4.5 | 13.0 | - | $257 \pm 26$ |
| 9 | 6.75 | 19.6 | - | $578 \pm 58$ |
| 12 | 9.0 | 26.1 | - | 1,029 $\pm 103$ |
| 24 | 18.0 | 52.3 | - | $4,114 \pm 411$ |

## Operate Data @ $23^{\circ} \mathrm{C}$

Must Operate Voltage: $75 \%$ of nominal or less.
Must Release Voltage: $10 \%$ of nominal or more.
Operate Time (at nominal voltage): 3 ms , typ.; 5 ms , max.
Reset Time (at nominal voltage): 3 ms , typ.; 5 ms , max.
Release Time (non-latching w/o diode in parallel): 2 ms , typ.; 4 ms , max.
Release Time (non-latching with diode in parallel): 4 ms , typ.; 6 ms , max.
Bounce Time (at contact close): 1 ms , typ.; 3 ms , max.
Maximum Switching Rate (no load): 50 operations/s.

## Environmental Data

Temperature Range: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Maximum Allowable Coil Temperature: $110^{\circ} \mathrm{C}$.
Thermal Resistance: <165KW.
Shock, half sinus, 11 ms: Functional: 50 g .
Shock, half sinus, 11 ms : Destructive: 150 g .
Vibration, $10-1, \mathbf{0 0 0} \mathrm{~Hz}$.: Functional: 35 g .
Needle Flame Test: Application time 20s, buming time <15s.
Resistance to Soldering Heat: $260^{\circ} \mathrm{C}$ for 10 s .

## Mechanical Data

Termination: Through hole or surface mount printed circuit terminals. Mounting Position: Any.
Enclosure: Immersion cleanable (IP67) plastic case.
Weight: . 084 oz ( $(2.5 \mathrm{~g}$ ) approximately.

| Ordering Information |  | Typical Part Number $\downarrow$ | V23079 | A10 | 01 | B301 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: V23079 = P2 M iniature, pr | inted circuit board relay. |  |  |  |  |  |
| 2. Termination: |  |  |  |  |  |  |
|  | Non-Latching Normal Ht. | Non-Latching Reduced Ht. | Dual Coil Latching | Single Coil Latching |  |  |
| Through-Hole | A10 | A20 ${ }^{(1)}$ | B12 | C11 |  |  |
| SMT Extended Terminal | D10 | D20 ${ }^{(1)}$ | E12 | F11 |  |  |
| SMT Short Terminal | G10 | G20 ${ }^{(1)}$ | H12 | J11 |  |  |
| 3. Coil Voltage: $08=3 \mathrm{VDC} \quad 11=4.5 \mathrm{VDC}$ | $01=5 \mathrm{VDC} \quad 02=6 \mathrm{VD}$ | C $06=9 \mathrm{VDC} \quad 03=12 \mathrm{~V}$ | VDC $05=24 \mathrm{VDC}{ }^{(2)}$ |  |  |  |
| 4. Contact Type: <br> B301 = Bifurcated, 2 Form | C (DPDT), Silver Nickel. |  |  |  |  |  |

(1) Reduced mounting height of 10.0 mm , as opposed to 10.4 mm (SMT) or 9.6 mm as opposed to 9.9 (through-hole). Non-latching only, not available with 24 V coil.
(2) Not available with Termination A20, D20 or G20.

Our authorized distributors are more likely to stock the following items for immediate delivery.

| V23079A1001B301 | V23079A1011B301 | V23079A2011B301 | V23079D1005B301 | V23079D2003B301 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| V23079A1003B301 | V23079A2001B301 | V23079D1001B301 | V23079D1011B301 | V23079D2011B301 |
| V23079A1005B301 | V23079A2003B301 | V23079D1003B301 | V23079D2001B301 |  |

## Outline Dimensions

THT


Note: Mounting height varies dependent upon Termination type selected in step 2 of Ordering Information

## Coil Limits

$U_{1}=\quad$ Minimum voltage at $23^{\circ} \mathrm{C}$ after pre-energizing
$U_{\text {II }}=\quad$ Maximum continous voltage at $23^{\circ}$
The operating voltage limits $U_{1}$ and $U_{11}$ depend on the temperature according to the formula:
$U_{1 \text { tamb }}=K_{1} \cdot U_{123^{\circ} \mathrm{C}}$
and
$U_{11 \text { tamb }}=K_{11} \cdot U_{1123^{\circ} \mathrm{C}}$
$t_{\text {amb }}=$ Ambient temperature
$U_{\text {Itamb }}=$ Minimum voltage at ambient temperature, $\mathrm{t}_{\text {amb }}$
$U_{\text {It tamb }}=$ Maximum voltage at ambient temperature, $t_{\text {amb }}$
$k_{1}, k_{11}=$ Factors (dependent on temperature), see diagram


## Packaging Information

THT P2 relays are shipped in tubes of 50 . There are 2,000 relays in a carton. SMT P2 relays with long terminals are shipped in reels of 400, with 2,000 relays in a carton. SMT P2 relays with short terminals are shipped in reels of 500 . There are 2,500 relays in a full carton.

Wiring Diagrams (Bottom Views)
Single Coil Latching* and Single Coil Non-latching**


Dual Coil Latching***


Note: All diagrams shown in de-energized or reset position. *Note: For non-latching versions, coil polarity must be observed.
**Note: For single coil latching versions, polarity shown results in "set" condition. Reverse polarity results in "reset"condition.
***Note: The contact position illustrated shows the reset condition. If a positve potential is applied to terminal 1 or 7 , the relay adopts the set position.

## PC Board Layout (Bottom View)



Recommended Soldering Conditions (according to CECC 00802)

Vapor Phase Soldering: Temperature/Time Profile (Lead Temperature)


Infrared Soldering: Temperature/Time Profile (Lead Temperature)



## Features

- Through hole PC board terminals.
- High-dielectric ( $>5,000 \mathrm{~V}$ contact-to-coil surge) version available.
- Meets Bellcore GR 1089 and FCC Part 68 and ITU-T K20.
- For applications in telecommunications, office automation, consumer electronics, medical equipment, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- Standard or sensitive coils for 3-48 VDC.
- Ultrasonic cleaning not recommended.


## Contact Data @ $23^{\circ} \mathbf{C}$ (except as noted)

Arrangement: 2 Form C (DPDT) bifurcated contacts.
Material: Stationary: Silver-nickel, gold-covered or palladium-ruthenium, gold-covered.
Contact Ratings: Silver-nickel Palladium-ruthenium
Max. Switched Current: 2A
1.25A 2A.
Max. Carry Current: (at max ambient temp.)
Max. Switched Voltage: 125VDC, 250VAC 220VDC, 250VAC.
Max. Switched Power: 30W DC, 62.5VA AC 60W DC, 62.5VA AC.
ULCSA Contact Ratings: 1.25A @ 125VDC; 1.25A @ 125VAC.
Initial Contact Resistance: $<70$ milliohms @ $10 \mathrm{~mA} / 20 \mathrm{mV}$.
Expected Mechanical Life: 100 million operations.
Expected Electrical Life: 2.5 million operations @ 10mA / 12VDC.
2 million operations @ cable load open end.
100,000 operations @ 250mA / 125VDC, res.
100,000 operations @ 250mA / 250VDC, res. 100,000 operations @ 1.25A / 24VDC, res.
Thermoelectric potential: $<10 \mu \mathrm{~V}$.

## High Frequency Data

Capacitance: Between Open Contacts: 1pF, max.
Between Coil and Contacts: 4 pF , max.
Between Poles: 1pF, max.
RF Characteristics: Isolation at 100 / $\mathbf{9 0 0} \mathbf{~ M H z : ~}-30.6 \mathrm{db} /-13.7 \mathrm{db}$. Insertion loss at $100 / 900 \mathrm{MHz}:-0.02 \mathrm{db} /-0.50 \mathrm{db}$. V. S. W. R. at 100 / $900 \mathrm{MHz}: 1.02 \mathrm{db} / 1.27 \mathrm{db}$.

## Initial Dielectric Strength

## Standard Model

Between Open Contacts: 1,500Vrms for 1 minute.
Between Coil and Contacts: $1,500 \mathrm{Vrms}$ for 1 minute.
Between Poles: 1,500Vrms for 1 minute.
Surge Voltage Resistance per Bellcore TR-NWT-001089 (2/10 $\mu \mathrm{s}$ ) and FCC 68 ( $10 / 160 \mu \mathrm{~s}$ ):

Between Open Contacts: 2,500V.
Between Coil and Contacts: $1,500 \mathrm{~V}$.
Between Poles: 1,500V.
High-Dielectric Model
Between Open Contacts: 3,500Vrms for 1 minute.
Between Coil and Contacts: $1,800 \mathrm{Vrms}$ for 1 minute.
Between Poles: 1,800Vrms for 1 minute.
Surge Voltage Resistance per Bellcore TR-NWT-001089 (2 / $10 \mu \mathrm{~s}$ ) and FCC 68 ( $10 / 160 \mu \mathrm{~s}$ ):

Between Open Contacts: 5,000V.
Between Coil and Contacts: $2,500 \mathrm{~V}$.
Between Poles: 2,500V.

## Initial Insulation Resistance

Between Contact and Coil: $10^{9}$ ohms or more @ 500VDC.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathbf{C}$

Voltage: 3 to 48VDC.
Nominal Power: 200-300mW, depending on model. See coil data tables. Duty Cycle: Continuous.

## FT2/FU2 series <br> DPDT Slim Package Telecom/Signal PC Board Relays

吹 File E111441
(81) File 176679-1079886

16504-002
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $23^{\circ} \mathrm{C}$

| Nom. Voltage (VDC) | Operate/ Set Range |  | Minimum Release Voltage (VDC) | Nom. Power (mW) | Resistance $\pm 10 \%$ <br> (Ohms) | Coil \&SensitivityCode |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Min. Voltage (VDC) | Max. Voltage (VDC) |  |  |  |  |
| Sensitive versions |  |  |  |  |  |  |
| 3 | 2.25 | 4.2 | 0.3 | 200 | 45 | 21 |
| 4 | 3.0 | 5.7 | 0.4 | 200 | 114 | 29 |
| 4.5 | 3.38 | 6.4 | 0.45 | 200 | 101 | 22 |
| 5 | 3.75 | 7.1 | 0.5 | 200 | 125 | 23 |
| 6 | 4.5 | 8.5 | 0.6 | 200 | 180 | 24 |
| 9 | 6.75 | 12.7 | 0.9 | 200 | 405 | 25 |
| 12 | 9.0 | 17.0 | 1.2 | 200 | 720 | 26 |
| 24 | 18.0 | 33.9 | 2.4 | 240 | 2,400 | 27 |
| 48 | 36.0 | 67.9 | 4.8 | 240 | 9,600 | 28 |
| Standard versions |  |  |  |  |  |  |
| 3 | 2.25 | 5.2 | 0.3 | 300 | 30 | 01 |
| 4.5 | 3.38 | 7.8 | 0.45 | 300 | 68 | 02 |
| 5 | 3.75 | 8.7 | 0.5 | 300 | 83 | 03 |
| 6 | 4.5 | 10.4 | 0.6 | 300 | 120 | 04 |
| 9 | 6.75 | 15.6 | 0.9 | 300 | 270 | 05 |
| 12 | 9.0 | 20.8 | 1.2 | 300 | 480 | 06 |
| 24 | 18.0 | 40.8 | 2.4 | 300 | 1,920 | 07 |
| 48 | 36.0 | 81.6 | 4.8 | 300 | 768 | 08 |
| High dielectric versions |  |  |  |  |  |  |
| 3 | 2.25 | 4.2 | 0.3 | 200 | 45 | 91 |
| 5 | 3.75 | 7.1 | 0.5 | 200 | 125 | 93 |
| 12 | 9.0 | 17.0 | 1.2 | 200 | 720 | 96 |
| 24 | 18.0 | 33.9 | 2.4 | 240 | 2,400 | 97 |

Part Number Structure
D3


## Operate Data @ $23^{\circ} \mathrm{C}$

Operate and Release Voltage: See values in chart above.
Operate Time (at nominal voltage): 3 ms , typ.; 5 ms , max.
Release Time ( $\mathrm{w} / \mathrm{o}$ diode in parallel): 2 ms , typ.; 5 ms , max.
Release Time (with diode in parallel): 4 ms , typ.; 5 ms , max.
Bounce Time (at contact close): 1 ms , typ.; 5 ms , max.
Maximum Switching Rate (no load): 50 operations/s.

## Environmental Data

Temperature Range: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Maximum Allowable Coil Temperature: $125^{\circ} \mathrm{C}$.
Thermal Resistance: <165K/W.
Shock, half sinus, 11 ms : Functional: 15 g .
Shock, half sinus, 11 ms : Destructive: 500 g .
Vibration, $10-500 \mathrm{~Hz}$.: Functional: 10 g .
Needie Flame Test: Application Time 20s.
Resistance to Soldering: $260^{\circ} \mathrm{C}$ for 10 s .
Mechanical Data
Termination: Through-hole printed circuit terminals.

## Mounting Position: Any.

Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.12 oz . ( 3 g ) approximately.
$U_{1}=\quad$ Minimum voltage at $23^{\circ} \mathrm{C}$ after pre-energizing with nominal voltage without contact current
$U_{\mathrm{II}}=\quad$ Maximum continous voltage at $23^{\circ}$

The operating voltage limits $U_{1}$ and $U_{\| \mid}$depend on
the temperature according to the formula:
$U_{1 \text { tamb }}=K_{1} \cdot U_{123^{\circ} \mathrm{C}}$
and
$U_{\text {II tamb }}=K_{1 \mid} \cdot U_{\| 123^{\circ} \mathrm{C}}$
$t_{\mathrm{amb}} \quad=$ Ambient temperature
$U_{\text {Itamb }} \quad=$ Minimum voltage at ambient temperature, $\mathrm{t}_{\mathrm{amb}}$
$U_{\text {II tamb }} \quad=$ Maximum voltage at ambient temperature, $\mathrm{t}_{\mathrm{amb}}$
$k_{1}, k_{\|} \quad=$ Factors (dependent on temperature), see diagram

## Ordering Information

See "Part Number Structure" chart on previous page for available part numbers in the FT2/FU2 series.


Packaging Information
FT2 relays are shipped in tubes of 50 . There are 1,000 relays in a carton. FU2 relays with long terminals are shipped in reels of 400, with 2,000 relays in a carton. FU2 relays with short terminals are shipped in reels of 500 . There are 2,500 relays in a full carton.

Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions

## THT Version



PC Board Layout (Bottom View) THT Version


SMT Version w/ Long Terminala


SMT Version w/ Short Terminals


Solder Pad Layout (Bottom Views)
SMT Version w/ Long Terminals


SMT Version w/ Short Terminals

Wiring Diagram (Bottom View)


Recommended Soldering Conditions (according to CECC 00802)

Vapor Phase Soldering: Temperature/Time Profile (Lead Temperature)


## Infrared Soldering: Temperature/Time Profile (Lead Temperature)




## Features

- Through hole PC board terminals.
- Meets Bellcore GR 1089 and FCC Part 68.
- For applications in telecommunications, office automation, consumer electronics, medical equipment, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- 80 mW coil for high sensitivity models, 140 mW coil for sensitive types.
- Ultrasonic cleaning not recommended.


## Contact Data @ $\mathbf{2 3}^{\circ} \mathbf{C}$ (except as noted)

Arrangement: 2 Form C (DPDT) bifurcated contacts.
Material: Stationary: Palladium-ruthenium.
Ratings: Max. Switched Current: 2A.
Max. Carry Current: 2A (at max ambient temperature.)
Max. Switched Voltage: 220VDC, 250VAC.
Max. Switched Power: 60W DC or 62.5VA AC.
ULCSA Ratings: 300 mA @ 110VDC; 1A @ 30VDC; 500mA @ 120VAC; 250mA @ 240VAC.
Initial Contact Resistance: $<70$ milliohms @ $10 \mathrm{~mA} / 20 \mathrm{mV}$.
Expected Mechanical Life: 100 million operations.
Expected Electrical Life: 2.5 million operations @ 10mA / 30mVDC.
2 million operations @ cable load open end.
500,000 operations @ 250mA / 125VDC.
500,000 operations @ 1.25A / 24VDC.
500,000 operations @ 2A / 30VDC.
Thermoelectric potential: $<10 \mu \mathrm{~V}$.

## High Frequency Data

Capacitance: Between Open Contacts: $2 p \mathrm{~F}$, max.
Between Coil and Contacts: 4 pF , max.
Between Poles: 2pF, max.
RF Characteristics: Isolation at 100 / $\mathbf{9 0 0} \mathbf{~ M H z : ~}-34.0 \mathrm{db} /-15.1 \mathrm{db}$.
Insertion loss at 100 / $900 \mathbf{~ M H z : ~}-0.03 \mathrm{db} /-0.60 \mathrm{db}$.
V. S. W. R. at 100 / $900 \mathrm{MHz}: 1.07 \mathrm{db} / 1.45 \mathrm{db}$.

## Initial Dielectric Strength

Between Open Contacts: $1,800 \mathrm{Vrms}$ for 1 minute.
Between Coil and Contacts: $1,800 \mathrm{Vrms}$ for 1 minute.
Between Poles: 1,800Vrms for 1 minute.
Surge Voltage Resistance per Bellcore GR1089 (2/10 $\mu \mathrm{s}$ ) and FCC 68 ( $10 / 160 \mu \mathrm{~s}$ ):

Between Open Contacts: 2,500V.
Between Coil and Contacts: $3,500 \mathrm{~V}$.
Between Poles: 2,500V.

## Initial Insulation Resistance

Between Contact and Coil: $10^{9}$ ohms or more @ 500VDC.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Voltage: 3 to 48VDC.
Nominal Power: $80-300 \mathrm{~mW}$, depending on model. See coil data tables. Duty Cycle: Continuous.

## FX2 series

## DPDT Slim Package Telecom/Signal PC Board Relays

吹 File E111441
(18) File 176679-1079886

16504-002
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $23^{\circ} \mathrm{C}$

| Nom. <br> Voltage <br> (VDC) | Operate/Set Range <br> Min. <br> Voltage <br> (VDC) | Max. <br> Voltage <br> (VDC) | Minimum <br> Release/ Reset <br> Voltage <br> (VDC) | Nom. <br> Power <br> (mW) | Resis- <br> tance <br> $\pm 10 \%$ <br> (Ohms) | Part <br> Number |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |


| Non-latching 1 coil versions |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 3 | 2.1 | 6.8 | 0.3 | 140 | 64 | D3206 |
| 4 | 2.8 | 7.6 | 0.4 | 140 | 114 | D3207 |
| 4.5 | 3.15 | 10.3 | 0.45 | 140 | 145 | D3204 |
| 5 | 3.5 | 11.4 | 0.5 | 140 | 178 | D3209 |
| 6 | 4.2 | 13.7 | 0.6 | 140 | 257 | D3205 |
| 9 | 6.3 | 20.4 | 0.9 | 140 | 574 | D3210 |
| 12 | 8.4 | 27.3 | 1.2 | 140 | 1,028 | D3202 |
| 24 | 16.8 | 45.7 | 2.4 | 200 | 2,880 | D3212 |
| 48 | 33.6 | 67.5 | 4.8 | 300 | 7,680 | D3213 |
| Non-latching, sensitive 1 coil versions |  |  |  |  |  |  |
| 3 | 2.25 | 9.0 | 0.3 | 80 | 113 | D3221 |
| 4.5 | 3.38 | 13.5 | 0.45 | 80 | 253 | D3222 |
| 5 | 3.75 | 15.0 | 0.5 | 80 | 313 | D3223 |
| 6 | 4.5 | 18.0 | 0.6 | 80 | 450 | D3224 |
| 9 | 6.75 | 27.1 | 0.9 | 80 | 1,013 | D3225 |
| 12 | 9.0 | 36.1 | 1.2 | 80 | 1,800 | D3226 |
| 24 | 18.0 | 54.7 | 2.4 | 140 | 4,114 | D3227 |
| 48 | 36.0 | 72.5 | 4.8 | 260 | 8,882 | D3228 |
| Latching 1 coil versions |  |  |  |  |  |  |
| 3 | 2.25 | 8.1 | -2.25 | 100 | 90 | D3241 |
| 4.5 | 3.375 | 12.1 | -3.375 | 100 | 203 | D3242 |
| 5 | 3.75 | 13.5 | -3.75 | 100 | 250 | D3243 |
| 6 | 4.5 | 16.2 | -4.5 | 100 | 360 | D3244 |
| 9 | 6.75 | 24.2 | -6.75 | 100 | 810 | D3245 |
| 12 | 9.0 | 29.0 | -9.0 | 100 | 1,440 | D3246 |
| 24 | 18.0 | 47.5 | -18.0 | 150 | 3,840 | D3247 |

## Operate Data @ $23^{\circ} \mathrm{C}$

Operate and Release Voltage: See values in chart above.
Operate Time (at nominal voltage): 3 ms , typ.; 4 ms , max.
Reset Time [latching](at nominal voltage): 3 ms , typ.; 4 ms , max.
Release Time [non-latching](w/o diode in parallel): 1 ms , typ.; 3 ms , max.
Release Time [non-latching](with diode in parallel): 3 ms , typ.; 4 ms , max.
Bounce Time (at contact close): 1 ms , typ.; 5 ms , max
Maximum Switching Rate (no load): 50 operations/s.

## Environmental Data

Temperature Range: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Maximum Allowable Coil Temperature: $110^{\circ} \mathrm{C}$.
Thermal Resistance: < 185K/W.
Shock, half sinus, 11 ms: Functional: 50g.
Shock, half sinus, 11 ms : Destructive: 1,500g.
Vibration, 10-500 Hz.: Functional: 20g.
Needle Flame Test: Application Time 20s.
Resistance to Soldering: $260^{\circ} \mathrm{C}$ for 10 s .

## Mechanical Data

Termination: Through-hole printed circuit terminals.
Mounting Position: Any.
Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.10 oz . $(2.5 \mathrm{~g}$ ) approximately.
$U_{1}=\quad$ Minimum voltage at $23^{\circ} \mathrm{C}$ after pre-energizing with nominal voltage without contact current
$U_{\text {II }}=\quad$ Maximum continous voltage at $23^{\circ}$
The operating voltage limits $U_{1}$ and $U_{\| 1}$ depend on the temperature according to the formula:

| $U_{\text {Itamb }}=$ | $K_{1} \cdot U_{123^{\circ} \mathrm{C}}$ |
| :--- | :--- |
| and |  |
| $U_{\text {It tamb }}=$ | $\mathrm{K}_{11} \cdot U_{\text {II23 }} \mathrm{C}$ |
| $t_{\text {amb }}$ | $=$ Ambient temperature |
| $U_{\text {Itamb }}$ | $=$ Minimum voltage at ambient temperature, $\mathrm{t}_{\text {amb }}$ |
| $U_{\text {IIt tamb }}$ | $=$ Maximum voltage at ambient temperature, $\mathrm{t}_{\text {amb }}$ |
| $K_{1} K_{11}$ | $=$ Factors (dependent on temperature), see diagram |

## Ordering Information

See "Part Number" column in Coil Data chart on previous page for available part numbers in the FX2 series.


Packaging Information
FX2 series relays are shipped in tubes of 50 . There are 1,000 relays in a full carton.

## Our authorized distributors are more likely to stock the following items for immediate delivery.

None at present.

## Outline Dimensions



## Wiring Diagram (Bottom View)

## Non-Latching and Latching, Release or Reset Condition

$\overline{\text { PC Board Layout (Bottom View) }}$



## Features

- Standard DIP configuration mates with 16-pin socket.
- Meets FCC Part 68 (10/160 $\mu \mathrm{s}$ ).
- For applications in telecommunications, office automation, security
devices, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- Standard, high and ultra-sensitive coils.
- Ultrasonic cleaning not recommended.


## Contact Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Arrangement: Bifurcated 2 Form C (DPDT) contacts.
Material: Stationary: Silver, gold clad.
Ratings: Max. Switched Current: 2A.
Max. Cary Current: 2A.
Max. Switched Voltage (at nom. voltage): 125VDC, 125VAC.
Max. Switched Power: 60W DC or 62.5VA AC.
Min. Switching Load: 10 AA, 10mVDC.
Rated Load: 500mA at 125VAC.
Initial Contact Resistance: 50 milliohms.
Expected Mechanical Life: 15,000,000 ops at 36,000 ops/hr.

## Initial Dielectric Strength

Between Open Contacts: 750VAC 50/60 Hz. for 1 minute.
Between Coil and Contacts: 1,000VAC $50 / 60 \mathrm{~Hz}$. for 1 minute.
Between Poles: 1,000VAC $50 / 60 \mathrm{~Hz}$. for 1 minute.
Surge Voltage Resistance per FCC 68 ( $10 / 160 \mu \mathrm{~s}$ ):
Between Open Contacts: 1,500V.
Between Coil and Contacts: 1,500V.
Between Poles: 1,500V.

## Initial Insulation Resistance

Between Contact and Coil: $10^{9}$ ohms or more @ 500VDC.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

## Voltage: 3 to 48VDC.

Nominal Power: 150 mW to 580 mW . See Coil Data table for details. Duty Cycle: Continuous.

## 190 series

## 2 Amp, DPDT, High Sensitivity, DIP PC Board Relay

## 문 File E55708

(18) File LR73303

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Coil Data @ $23^{\circ} \mathrm{C}$

| Nominal Voltage (VDC) | $\begin{aligned} & \text { Current } \\ & \pm 10 \% \\ & \text { (mA) } \end{aligned}$ | Maximum Voltage (VDC) | $\begin{gathered} \text { Resistance } \\ \pm 10 \% \\ \text { (Ohms) } \end{gathered}$ | Approx. Power (mW) |
| :---: | :---: | :---: | :---: | :---: |
| Standard sensitivity (Max. Voltage stated @ 65 ${ }^{\circ} \mathrm{C}$, except 48 V @ $60^{\circ} \mathrm{C}$ ) |  |  |  |  |
| 3 | 166.7 | 3.6 | 18 | 500 |
| 5 | 100.0 | 6.0 | 50 | 500 |
| 6 | 83.3 | 7.2 | 72 | 500 |
| 9 | 55.6 | 10.8 | 162 | 500 |
| 12 | 41.7 | 14.4 | 288 | 500 |
| 24 | 20.8 | 28.8 | 1,152 | 500 |
| 48 | 12.0 | 52.8 | 4,000 | 580 |
| High sensitivity (Max. Voltage stated @ $70^{\circ} \mathrm{C}$ ) |  |  |  |  |
| 3 | 120.7 | 3.6 | 25 | 360 |
| 5 | 72.0 | 6.0 | 70 | 360 |
| 6 | 60.0 | 7.2 | 100 | 360 |
| 9 | 40.0 | 10.8 | 225 | 360 |
| 12 | 30.0 | 14.4 | 400 | 360 |
| 24 | 15.0 | 28.8 | 1,600 | 360 |
| 48 | 7.5 | 52.8 | 6,400 | 360 |
| Ultra high sensitivity (Max. Voltage stated @ $70^{\circ} \mathrm{C}$ ) |  |  |  |  |
| 3 | 50.0 | 4.5 | 60 | 150 |
| 5 | 30.0 | 7.5 | 167 | 150 |
| 6 | 25.0 | 9.0 | 240 | 150 |
| 9 | 16.7 | 13.5 | 540 | 150 |
| 12 | 12.5 | 18.0 | 960 | 150 |
| 24 | 8.3 | 36.0 | 2,880 | 200 |
| 48 | 6.25 | 72.0 | 7,680 | 300Ap |

## Operate Data @ 23${ }^{\circ} \mathrm{C}$

Operate Voltage: $75 \%$ of nominal voltage.
Release Voltage: 5\% of nominal voltage.
Operate Time: 7 ms , max. ( 3.5 ms , mean).
Release Time: 3 ms , max. ( 0.8 ms , mean).
Bounce Time: Operate: 0.5 ms , approx. Release: 3.5 ms , approx.
Operating Frequency: Mechanical: $36,000 \mathrm{ops} / \mathrm{hr}$.
Electrical: $1,800 \mathrm{ops} / \mathrm{hr}$ at rated load.

## Environmental Data

Temperature Range: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Relative Humidity Range: $35 \%$ to $85 \%$.
Shock: Functional: $200 \mathrm{~m} / \mathrm{s}^{2}$ (approx. 10 g ). Destructive: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ (approx. 100 g ).
Vibration: $10-55 \mathrm{~Hz} ., .059$ in ( 1.5 mm ) double amplitude.

## Mechanical Data

Termination: DIP compatible, printed circuit terminals.
Enclosure Type: Immersion cleanable plastic case.
Weight: 0.21 oz . ( 6 g ) approximately.

| Dimensions are shown for | Dimensions are in inches over | Specifications and availability <br> (millimeters) unless otherwise <br> seference purposes only. |
| :--- | :--- | :--- |

## Operational Performance Curves



Ordering Information


Our authorized distributors are more likely to stock the following items for immediate delivery.
190-22B2UO
190-22C2UO
190-22E2UO

## Outline Dimensions



Wiring Diagram (Bottom View)


## PC Board Layout (Bottom View)




## Features

- Standard DIP configuration mates with 16-pin socket.
- Meets FCC Part 68 (10/160 1 s ).
- For applications in telecommunications, office automation, security devices, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- $150 \mathrm{~mW}, 200 \mathrm{~mW}, 400 \mathrm{~mW}$ or 500 mW coil.
- Ultrasonic cleaning not recommended.


## Contact Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Arrangement: 2 Form C (DPDT) single contacts.
Material: Stationary: Silver-nickel, gold overlaid.
Ratings: Max. Switched Current: 3A.
Max. Carry Current: 3A.
Max. Switched Voltage (at nom. voltage): 220VDC, 250VAC.
Max. Switched Power: 60W DC or 125VA AC.
Min. Switching Load: 10mVDC.
UL/CSA Ratings: 1A / 30VDC; 300mA / 100VDC;
1A / 125VAC ( $400 \& 500 \mathrm{~mW}$ coils only);
500mA / 125VAC ( 150 \& 200mW coils only).
Initial Contact Resistance: 100 milliohms @ $10 \mathrm{~mA} / 20 \mathrm{mV}$.
Expected Mechanical Life: 15,000,000 ops.
Expected Electrical Life: 2 million operations @ 100mA / 6VDC.
500,000 operations @ 1.0A / 30VDC.
100,000 operations @ 2.0A / 30VDC for 400 mW and 500 mW versions only. 300,000 operations @ 500mA / 230VAC.
Thermoelectric potential: $<15 \mu \mathrm{~V}$.

## High Frequency Data

Capacitance: Between Open Contacts: $1 p F$, max. Between Coil and Contacts: 2pF, max. Between Poles: 1.5pF, max..
RF Characteristics: Isolation at $\mathbf{1 0 0 / 9 0 0 ~ M H z : ~}-39.0 \mathrm{db} /-20.7 \mathrm{db}$.
Insertion loss at 100 / $900 \mathrm{MHz}:-0.02 \mathrm{db} /-0.27 \mathrm{db}$. V. S. W. R. at 100 / $900 \mathrm{MHz}: 1.04 \mathrm{db} / 1.40 \mathrm{db}$.

## Initial Dielectric Strength

Between Open Contacts: 750Vrms for 1 minute.
Between Coil and Contacts: $1,000 \mathrm{Vrms}$ for 1 minute.
Between Poles: 750Vrms for 1 minute.
Surge Voltage Resistance per FCC 68 ( $10 / 160 \mu \mathrm{~s}$ ):
Between Open Contacts: 1,500V.
Between Coil and Contacts: 1,500V.
Between Poles: 1,500V.

## Initial Insulation Resistance

Between Contact and Coil: $10^{9}$ ohms or more @ 500VDC.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Voltage: 3 to 48VDC.
Nominal Power: See Coil Data table.
Duty Cycle: Continuous.

## V23105 series <br> 3 Amp, DPDT, High Sensitivity, DIP PC Board Relay

## 贮 File E48393

(51) File LR45064-27

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Coil Data @ $23^{\circ} \mathrm{C}$

| Nominal Voltage (VDC) | Minimum Voltage (VDC) | Maximum Voltage (VDC) | $\begin{gathered} \text { Resistance } \\ \pm 10 \% \\ \text { (Ohms) } \end{gathered}$ | Coil <br> Version Voltage Code |
| :---: | :---: | :---: | :---: | :---: |
| 150mW versions |  |  |  |  |
| 5 | 4.0 | 13.0 | 167 | 001 |
| 6 | 4.8 | 15.6 | 240 | 002 |
| 9 | 7.2 | 23.4 | 540 | 006 |
| 12 | 9.6 | 31.2 | 960 | 003 |
| 24 | 19.2 | 59.5 | 3,480 | 005 |
| 200mW versions |  |  |  |  |
| 3 | 2.1 | 6.7 | 45 | 308 |
| 5 | 3.5 | 11.2 | 125 | 301 |
| 6 | 4.2 | 13.5 | 180 | 302 |
| 9 | 6.3 | 20.3 | 405 | 306 |
| 12 | 8.4 | 27.0 | 720 | 303 |
| 24 | 16.8 | 54.1 | 2,880 | 305 |
| 48 | 33.6 | 108.3 | 11,520 | 307 |
| 400 mW versions |  |  |  |  |
| 5 | 3.5 | 7.9 | 62 | 401 |
| 6 | 4.2 | 9.5 | 90 | 402 |
| 9 | 6.3 | 14.3 | 203 | 406 |
| 12 | 8.4 | 19.1 | 360 | 403 |
| 24 | 16.8 | 37.9 | 1,440 | 405 |
| 48 | 33.6 | 75.8 | 5,760 | 407 |
| 500mW versions |  |  |  |  |
| 5 | 3.5 | 6.3 | 36 | 501 |
| 6 | 4.2 | 8.9 | 70 | 502 |
| 9 | 6.3 | 12.5 | 140 | 506 |
| 10 | 7.0 | 15.0 | 200 | 504 |
| 12 | 8.4 | 18.0 | 280 | 503 |
| 24 | 16.8 | 36.0 | 1,050 | 505 |
| 48 | 33.6 | 72.0 | 4,000 | 507 |

## Operate Data @ $23^{\circ} \mathrm{C}$

Operate Voltage: 70\% of nominal voltage ( $80 \%$ for 150 mW coil).
Release Voltage: 5\% of nominal voltage.
Operate Time (Including Bounce): $<10 \mathrm{~ms}$.
Release Time (Including Bounce): <10 ms.

## Environmental Data

Temperature Range: $\begin{array}{cl}150 / 200 \mathrm{~mW} \text { coil: } & -25^{\circ} \mathrm{C} \text { to }+85^{\circ} \mathrm{C} . \\ 400 \mathrm{~mW} \text { coil: } & -25^{\circ} \mathrm{C} \text { to }+75^{\circ} \mathrm{C} .\end{array}$

| 400 mW coil: | $-25^{\circ} \mathrm{C}$ to $+75^{\circ} \mathrm{C}$. |
| :--- | :--- |
| 500 mW coil: | $-25^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$. |

Maximum Allowable Coil Temperature: $105^{\circ} \mathrm{C}$.
Thermal Resistance: < 100K/W.
Shock: Functional: 10g. Destructive: 40 g .
Vibration, $10-55 \mathrm{~Hz}$.: Functional: 10 g .
Needle Flame Test: Application time 20s, burning time $<15$ s.
Resistance to Soldering Heat: $260^{\circ} \mathrm{C}$ for 10 S .

## Mechanical Data

Termination: DIP compatible, printed circuit terminals.
Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.21 oz . 6 g ) approximately.

Ordering Information

| Typical Part Number $\downarrow$ |  | V23105-A5 | 4 | 01 | A201 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: V23105-A5 = M iniature PC board relay. |  |  |  |  |  |
| 2. Version: <br> $0=150 \mathrm{~mW}$ coil. <br> $3=200 \mathrm{~mW}$ coil. <br> $4=400 \mathrm{~mW}$ coil. <br> $5=500 \mathrm{~mW}$ coil. |  |  |  |  |  |
| 3. Coil Voltage: $\begin{aligned} & 08=3 \mathrm{VDC}(150 \mathrm{~mW} \text { and } 200 \mathrm{~mW} \text { coils only }) \\ & 01=5 \mathrm{VDC} \\ & 02=6 \mathrm{VDC} \end{aligned}$ | $\begin{aligned} & 06=9 \text { VDC } \\ & 04=10 \mathrm{VDC}(500 \mathrm{~mW} \text { coil only }) \\ & 03=12 \mathrm{VDC} \end{aligned}$ | $\begin{aligned} & 05= \\ & 07= \end{aligned}$ |  | OmW coil) |  |
| 4. Contact Type and Material: A201 = DPDT, silver-nickel, gold overlaid. |  |  |  |  |  |

Our authorized distributors are more likely to stock the following items for immediate delivery.

V23105A5001A201
V23105A5003A201
V23105A5005A201

V23105A5401A201 V23105A5403A201 V23105A5405A201 V23105A5407A201

## Outline Dimensions



## $\overline{\text { Wiring Diagram (Bottom View) }}$



## PC Board Layout (Bottom View)



## MT2 series <br> DPDT Telecom/Signal PC Board Relays

믹 File E111441
(®1) File 176679-1079886
16502-001
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

| Nominal Voltage (VDC) | Minimum Voltage (VDC) | Maximum Voltage (VDC) | Minimum Release Voltage (VDC) | $\begin{gathered} \text { Resistance } \\ \pm 10 \% \\ \text { (Ohms) } \end{gathered}$ | Part Number |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 150 mW versions |  |  |  |  |  |
| 4.5 | 3.2 | 10.1 | 0.45 | 136 | C 93406 |
| 5 | 3.6 | 11.3 | 0.50 | 168 | C 93401 |
| 6 | 4.3 | 13.4 | 0.60 | 240 | C 93427 |
| 9 | 6.4 | 20.3 | 0.90 | 544 | C 93405 |
| 12 | 8.6 | 27.1 | 1.2 | 968 | C 93402 |
| 24 | 174.1 | 54.1 | 2.4 | 3,872 | C 93404 |
| 48 | 33.1 | 108.3 | 4.8 | 15,468 | C 93404 |
| 200 mW versions |  |  |  |  |  |
| 4.5 | 2.9 | 8.7 | 0.45 | 101 | C 93415 |
| 5 | 3.3 | 9.7 | 0.5 | 125 | C 93416 |
| 6 | 3.9 | 11.6 | 0.6 | 180 | C 93428 |
| 9 | 5.9 | 17.5 | 0.9 | 405 | C 93417 |
| 12 | 7.8 | 23.3 | 1.2 | 720 | C 93418 |
| 24 | 15.6 | 46.7 | 2.4 | 2,880 | C 93419 |
| 48 | 31.2 | 93.4 | 4.8 | 11,520 | C 93420 |
| 300 mW versions |  |  |  |  |  |
| 4.5 | 3.1 | 7.4 | 0.45 | 73 | C 93433 |
| 5 | 3.4 | 8.2 | 0.5 | 90 | C 93434 |
| 12 | 8.25 | 19.7 | 1.2 | 515 | C 93412 |
| 24 | 16.5 | 39.5 | 2.4 | 2,060 | C 93435 |
| 48 | 32.5 | 79.0 | 4.8 | 8,240 | C 93436 |
| 400 mW versions |  |  |  |  |  |
| 4.5 | 2.9 | 6.1 | 0.45 | 50 | C 93421 |
| 5 | 3.3 | 6.9 | 0.5 | 63 | C 93422 |
| 6 | 3.9 | 8.2 | 0.6 | 90 | C 93429 |
| 9 | 5.9 | 12.4 | 0.9 | 203 | C 93423 |
| 12 | 7.8 | 16.5 | 1.2 | 360 | C 93424 |
| 24 | 15.6 | 33.0 | 2.4 | 1,440 | C 93425 |
| 48 | 31.2 | 66.0 | 4.8 | 5,760 | C 93426 |
| 550 mW versions |  |  |  |  |  |
| 4.5 | 2.9 | 6.0 | 0.45 | 36 | C 93438 |
| 5 | 3.3 | 6.8 | 0.5 | 45 | C 93450 |
| 6 | 3.9 | 8.1 | 0.6 | 66 | C 93437 |
| 12 | 7.8 | 16.7 | 1.2 | 280 | C 93432 |
| 24 | 15.6 | 32.4 | 2.4 | 1,050 | C 93431 |
| 48 | 31.2 | 64.1 | 4.8 | 4,100 | C 93430 |

## Operate Data @ 23${ }^{\circ}$ C

Operate and Release Voltage: See values in chart above.
Operate Time (at nominal voltage): 4 ms , typ.; 5 ms , max.
Release Time (without diode in parallel): 1 ms , typ.; 3 ms , max.
Release Time (with diode in parallel): 4 ms , typ.; 6 ms , max.
Bounce Time (at contact close): 1 ms , typ.; 5 ms , max.
Maximum Switching Rate (no load): 50 operations/s.

## Environmental Data

Temperature Range: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Maximum Allowable Coil Temperature: $125^{\circ} \mathrm{C}$.
Thermal Resistance: < 125K/W.
Shock, half sinus, 11 ms: Functional: 50g.

## Initial Insulation Resistance

Between Contact and Coil: $10^{9}$ ohms or more @ 500VDC.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathbf{C}$

Voltage: 4.5 to 48VDC.
Nominal Power: See Coil Data table.
Duty Cycle: Continuous.

Destructive: 100 g .
unctional: 10 g .
Vibration, 10-500 Hz.: Functional: 10 g .
Needle Flame Test: Application Time 10 s.
Resistance to Soldering: $260^{\circ} \mathrm{C}$ for 10 s .

## Mechanical Data

Termination: DIP compatible, printed circuit terminals.
Mounting Position: Any.
Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.18 oz ( 5 g ) approximately.
$U_{1}=\quad$ Minimum voltage at $23^{\circ} \mathrm{C}$ after pre-energizing
$U_{\text {II }}=\quad$ Maximum continous voltage at $23^{\circ}$

The operating voltage limits $U_{1}$ and $U_{1 \mid}$ depend on the temperature according to the formula:
$U_{1 \text { tamb }}=K_{1} \cdot U_{123^{\circ} \mathrm{C}}$
and
$U_{\| l \text { tamb }}=\quad K_{\| l} \cdot U_{\| 23^{\circ} \mathrm{C}}$
$t_{\text {amb }} \quad=$ Ambient temperature
$U_{\text {Itamb }} \quad=$ Minimum voltage at ambient temperature, $\mathrm{t}_{\mathrm{amb}}$
$U_{\text {II tamb }} \quad=$ Maximum voltage at ambient temperature, $\mathrm{t}_{\mathrm{amb}}$
$k_{1}, k_{\mathrm{l}} \quad=$ Factors (dependent on temperature), see diagram

## Ordering Information

See "Part Number" column in Coil Data chart on previous page for available part numbers in the MT2 series.


## Packaging Information

MT2 series relays are shipped in tubes of 25 . There are 500 relays in a full carton.

Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions



Wiring Diagram (Bottom View)


## PC Board Layout (Bottom View)




## Features

- Through hole type terminals.
- Meets Bellcore GR 1089, FCC Part 68 and ITU-T K20
- For applications in telecommunications, office automation, consumer electronics, medical equipment, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- 300 mW coil.
- Ultrasonic cleaning not recommended.


## Contact Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$ (except as noted)

Arrangement: 4 Form C (DPDT) bifurcatedcontacts.
Material: Stationary: Silver-nickel, gold covered.
Ratings: Max. Switched Current: 1.25A.
Max. Carry Current: 1.25A (at max ambient temperature.
Max. Switched Voltage: 150VDC, 150VAC.
Max. Switched Power: 30W DC or 62.5VA AC.
UL/CSA Ratings: 400 mA @ 125VAC; 1.25A @24VDC.
Initial Contact Resistance: $<70$ milliohms @ $10 \mathrm{~mA} / 20 \mathrm{mV}$.
Expected Mechanical Life: 100,000,000 ops.
Expected Electrical Life: 10 million operations @ $10 \mathrm{~mA} / 30 \mathrm{mVDC}$.
5 million operations @ cable load open end.
200,000 operations @ 1.25A / 24VDC, res. 200,000 operations @ 200mA / 150VDC, res.
Thermoelectric potential: $<10 \mu \mathrm{~V}$.

## High Frequency Data

Capacitance: Between Open Contacts: 2pF, max. Between Coil and Contacts: 4 pF , max. Between Poles: 2pF, max.
RF Characteristics: Isolation at 100 / $\mathbf{9 0 0} \mathbf{~ M H z : ~}-31.2 \mathrm{db} /-17.2 \mathrm{db}$. Insertion loss at 100 / $900 \mathrm{MHz}:-0.05 \mathrm{db} /-0.91 \mathrm{db}$. V. S. W. R. at $100 / 900 \mathrm{MHz}: 1.03 \mathrm{db} / 1.31 \mathrm{db}$.

## Initial Dielectric Strength

Between Open Contacts: 700Vrms for 1 minute.
Between Coil and Contacts: $1,800 \mathrm{Vrms}$ for 1 minute.
Between Poles: 700Vrms for 1 minute.
Surge Voltage Resistance per Bellcore TR-NWT-001089 (2/10 $\mu \mathrm{s}$ ),
FCC $68(10 / 160 \mu \mathrm{~s})$ and IEC ( $10 / 700 \mu \mathrm{~s}$ ):
Between Open Contacts: 1,500V.
Between Coil and Contacts: $2,500 \mathrm{~V}$.
Between Poles: 1,500V.

## Initial Insulation Resistance

Between Contact and Coil: $10^{9}$ ohms or more @ 500VDC.

## MT4 series

## 4PDT Telecom/Signal PC Board Relays

믹 File E111441
(18) File 176679-1079886

E 16501-001
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Voltage: 4.5 to 48VDC.
Nominal Power: See Coil Data table.
Duty Cycle: Continuous.

Coil Data @ $23^{\circ} \mathrm{C}$

| Nominal <br> Voltage <br> (VDC) | Minimum <br> Voltage <br> (VDC) | Maximum <br> Voltage <br> (VDC) | Minimum <br> Release <br> Voltage <br> (VDC) | Resistance <br> $\mathbf{\pm 1 0 \%}$ <br> (Ohms) | Part <br> Number |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 300 mW versions |  |  |  |  |  |
| 4 |  | 3.2 | 7.8 | 0.45 | 67 |
| 5 | 3.6 | 8.65 | 0.5 | 83 | C 93807 |
| 9 | 6.4 | 15.6 | 0.9 | 270 | C 93801 |
| 12 | 8.6 | 20.8 | 1.2 | 480 | C 93802 |
| 24 | 17.1 | 41.6 | 2.4 | 1,920 | C 93803 |
| 48 | 34.1 | 83.2 | 4.8 | 7,680 | C 93804 |

## Operate Data @ $23^{\circ} \mathrm{C}$

Operate and Release Voltage: See values in chart above.
Operate Time (at nominal voltage): 4 ms , typ.; 6 ms , max.
Release Time (without diode in parallel): 1 ms , typ.; 3 ms , max.
Release Time (with diode in parallel): 4 ms , typ.; 6 ms , max.
Bounce Time (at contact close): 1 ms , typ.; 5 ms , max.
Maximum Switching Rate (no load): 50 operations/s.

## Environmental Data

Temperature Range: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Maximum Allowable Coil Temperature: $100^{\circ} \mathrm{C}$.
Thermal Resistance: <105K/W.
Shock, half sinus, 11 ms: Functional: 10 g.
Destructive: 100 g.
Vibration, $\mathbf{1 0 - 5 0 0} \mathrm{Hz}$.: Functional: 10 g .
Needle Flame Test: Application Time 10s.
Resistance to Soldering: $260^{\circ} \mathrm{C}$ for 10 s .

## Mechanical Data

Termination: DIP compatible, printed circuit terminals.
Mounting Position: Any.
Enclosure Type: Immersion cleanable (IP67) plastic case.
Weight: 0.25 oz . ( 7 g ) approximately.

| Dimensions are shown for | Dimensions are in inches over <br> (millimeters) unless otherw ise <br> seference purposes only. | Specifications and availability <br> specified. |
| :--- | :--- | :--- |

$U_{1}=\quad$ Minimum voltage at $23^{\circ} \mathrm{C}$ after pre-energizing
with nominal voltage without contact current
$U_{\|}=\quad$ Maximum continous voltage at $23^{\circ}$

The operating voltage limits $U_{1}$ and $U_{\| 1}$ depend on the temperature according to the formula:
$U_{\text {Itamb }}=\quad \mathrm{K}_{1} \cdot U_{123^{\circ} \mathrm{C}}$
and
$U_{\| l \text { tamb }}=\quad K_{\| l} \cdot U_{\| 23^{\circ} \mathrm{C}}$
$t_{\text {amb }} \quad=$ Ambient temperature
$U_{\text {t tamb }} \quad=$ Minimum voltage at ambient temperature, $\mathrm{t}_{\mathrm{amb}}$
$U_{\text {II tamb }} \quad=$ M aximum voltage at ambient temperature, $\mathrm{t}_{\mathrm{amb}}$
$k_{1}, k_{\mathrm{l}} \quad=$ Factors (dependent on temperature), see diagram

## Ordering Information

See "Part Number" column in Coil Data chart on previous page for available part numbers in the MT4 series.


## Packaging Information

MT4 series relays are shipped in tubes of 25 . There are 500 relays in a full carton.

Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions



Wiring Diagram (Bottom View)


## PC Board Layout (Bottom View)



## Alphanumeric Index

| Series | Type | Page |
| :---: | :---: | :---: |
| 0409 ( | 10A, One-pole Relay. | 488 |
| 0410 | 16A, One-pole Relay. | 491 |
| 0429 ( | 10A, One-pole Relay | 457 |
| 0430 | 10-16A, One- or Two-pole Relay | 495 |
| 600 | . 3-15A, One-pole Relay | 497 |
| Card E | 8A, One-pole Relay | 480 |
| IF (V2307 | 16A, One-pole Relay | 489 |
| OJ/OJ E | 3-10A, One-pole Relay | 422 |
| OMI/O | 16A, One-pole Relay. | 458 |
| OMI 2 | 5A, Two-pole Relay. | 460 |
| OMIF | 20A, One-pole Relay. | 466 |
| OMIT | 10A, One-pole Relay. | 464 |
| ORWH | 10A, One-pole Relay. | 438 |
| OSA | 3-5A, Two-pole Relay. | 470 |
| OSZ | .16A, One-pole Relay | 472 |
| OUDH | 10A, One-pole Relay | 432 |
| OZ/OZF | .16A, One-pole Relay. | 462 |
| PB ... | 10A, One-pole Relay. | 426 |
| PCD/PC | 15A, One-pole Relay. | 424 |
| PCE | 10A, One-pole Relay. | 436 |
| PCG | . 5A, Two-pole Relay. | 493 |
| PCH | 5-10A, One-pole Relay. | 418 |
| PCI. | 3A, Two-pole Relay. | 468 |
| PCJ | 5A, One-pole Relay .. | 416 |
| PCK | 16A, One-pole Relay. | 478 |
| PCN | .3A, One-pole Relay | 407 |
| PE | 5A, One-pole Relay | 403 |
| RE | 6A, One-pole Relay | 405 |
| RP II/1 | 8-16A, One-pole Relay. | 484 |
| RP II/2 | . 8A, Two-pole Relay. | 482 |
| RP3SL | 16A, One-pole Relay. | 486 |
| RT-AC | . 8-16A, One- or two-pole Relay | 448 |
| RT- DC | . 8-16A, One- or two-pole Relay | 446 |
| RT-S | 10A, One-pole Relay. | 451 |
| RT- Hi | 16A, One-pole Relay. | 455 |
| RT - Hi | 10-16A, One-pole Relay | 453 |
| RY II.. | ... 8A, One-pole Relay . | 412 |
| SDT | .10A, One-pole Relay. | 474 |
| SDT-R | 5-10A, One-pole Relay. | 476 |
| SNR (V | ... 6A, One-pole Relay .. | 409 |
| SRUDH | . 12A, One-pole Relay. | 442 |
| SRUUH | 15A, One-pole Relay. | 444 |
| T7C. | . 5-12A, One-pole Relay. | 440 |
| T7N.. | . 10A, One-pole Relay. | 434 |
| T73 | .10A, One-pole Relay. | 430 |
| T75 | . 8-14A, One-pole Relay. | 414 |
| T77 . | . 3-10A, One-pole Relay. | 420 |
| U/UB | ... 7A, One-pole Relay . | 428 |
| V23057 | ... 8A, One-pole Relay .. | 480 |
| V23077 | ... 16A, One-pole Relay.. | 489 |
| V23092 | ... 6A, One-pole Relay .. | 409 |
| V23148 | ... 7A, One-pole Relay . | 428 |

NOTE: A question tree that may help you in selecting an appropriate relay for your application can be found on the next page.

## Mid-Range PC Board Relays.... 401-498

## NOTE: In addition to the products listed in this section of the

 databook, 3-20A relays described in other sections are available with printed circuit board terminals. Following is a list:Relays with Forcibly Guided Contacts
SR4 D/M ................................................................ 606
SR6 D/M ................................................................... 607
SR6S ..................................................................... 611
V23047 (SR2M ) ........................................................ 603
V23050 (SR6) ......................................................... 609
Plug-in/Panel Mount Relays
K10 ....................................................................... 720
KH ......................................................................... 709
KU ........................................................................... 723
PCL/PCLH ............................................................... 713
PT ........................................................................... 717
R10 .......................................................................... 703
RM ........................................................................ 733
Power Relays \& Contactors
KUHP ..................................................................... 803
Latching, Impulse, Rotary \&
Special Application Relays
KUL ......................................................................... 908
PCKWK.................................................................... 904
PE - Latching ............................................................ 902
RT - Latching .......................................................... 906
Solid State Relays \& I/O Modules
OAC/ODC ............................................................ 1110
OACM/ODCM ...................................................... 1118
Products in our line of high performance relays (see overview in section 14 of this databook) are also offered with PC terminals.

## Mid Range (3-20A) PC Board Relay Question Tree

This guide helps the user select one or more relay series which may be appropriate for a given application. The user should then refer to detailed specifications elsewhere in this catalog to determine the actual part number to be specified. Of course, the user must assume ultimate responsibility for determining the suitability of a relay for a particular application

Several relay product families are quite broad (i.e., RT), and only the basic family designator, not the actual product series designator (RT Sensitive) is listed in this guide


* Typical loads at 28VDC or 120VAC, resistive, for comparison purposes. See catalog pages for a given series for detailed rating specifications.


## PE series

## 5 Amp Miniature <br> Printed Circuit Board Relay




Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Contact Life



Max. DC Load Breaking Capacity


## Coil Operating Range



| Ordering Information |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Typical Part Number $\downarrow$ | PE | 0 | 1 | 4 | 024 |
| 1. Basic Series: <br> $\mathrm{PE}=\mathrm{M}$ iniature printed circuit board relay. |  |  |  |  |  |  |  |
| 2. Enclosure*: 0 = Flux-tight. |  |  |  |  |  |  |  |  |
| 3. Contact Arra 1 = 1 Form C | ment: <br> T) |  |  |  |  |  |  |
| 4. Contact Mat 4 = Silver-nick |  |  |  |  |  |  |  |
| 5. Coil Voltage: $005=5$ VDC $006=6 \mathrm{VDC}$ | $\begin{aligned} & 012=12 \mathrm{VDC} \\ & 024=24 \mathrm{VDC} \end{aligned}$ | $048=48 \mathrm{VDC}$ |  |  |  |  |  |

* Sealed version available on request.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
PE014005 PE014024
PE014012

## Outline Dimensions



## Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)



## Features

- 1 Form A (SPST-NO).
- 6 amp rated current.
- Sensitive coil 200 mW .
- 10.6 mm height.
- Fully sealed with vent hole.
- Supplied in tubes.


## Contact Data @ 70으․

Arrangements: 1 Form A (SPST-NO).
Material: Silver-cadmium oxide.
Silver-nickel 0.15 with gold plating.
Expected Mechanical Life: 30 million operations minimum.
Ratings:
6 amp 30 VDC resistive load 500,000 ops.
$0.3 \mathrm{amp} 50 \mathrm{VDC} \mathrm{L} / \mathrm{R}=40 \mathrm{~ms} 3,000,000 \mathrm{ops}$.
UL/CSA AgCdO @ $\mathbf{2 5}^{\circ} \mathrm{C}$
6 amp 250 VAC general purpose $30,000 \mathrm{ops}$.
10 amp 120VAC general purpose $\left(+70^{\circ} \mathrm{C}\right) 6,000$ ops.
1/4 HP 240VAC 30,000 ops.
1/6 HP 277VAC 30,000 ops.
1/8 HP 120VAC 30,000 ops.
B300 6,000 ops.
ULCSA AgNi 0.15 @ $70^{\circ} \mathrm{C}$
6 amp 250VAC general purpose 6,000 ops.
VDE 0435 @ $70^{\circ} \mathrm{C}$
6 amp 250VAC general purpose 100,000 ops.
10mA 5VDC 5,000,000 ops.
VDE 0660 AC 11 @ $35^{\circ} \mathrm{C}$
2 amp 400VAC 200,000 ops.

Initial Dielectric Strength
Between Open Contacts: 1,000VAC.
Between Coil and Contacts: 4,000VAC.
Creepage/Clearance Coil-Contact: $4 / 4 \mathrm{~mm}$.

Coil Data DC @ $20^{\circ} \mathrm{C}$
Nominal Coil Power: 200mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: |
| 05 | $125 \pm 10 \%$ | 3.5 | 0.5 | 40 |
| 06 | $180 \pm 10 \%$ | 4.2 | 0.6 | 33.3 |
| 12 | $720 \pm 10 \%$ | 8.4 | 12 | 16.7 |
| 24 | $2,880 \pm 15 \%$ | 16.8 | 2.4 | 8.3 |
| 48 | $11,520 \pm 15 \%$ | 33.3 | 4.8 | 4.2 |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time : 5 ms typical, at nom. voltage.
Release Time : 1 ms typical, at nom. voltage.
Bounce Time: 1 ms typical, at nom. voltage.
Switching Rate: 360 ops./hr. max. at rated load.

$$
12,000
$$

## Environmental Data

Temperature Range:
Operating: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C} .\left(+85^{\circ} \mathrm{C} @ 4 \mathrm{amp}\right)$.
Vibration: 10 to 150 Hz . at 10 g N/O 20 g N/C.
Shock (destructive): $>100 \mathrm{~g}$.

## $R E$ series <br> 6 Amp Miniature <br> Printed Circuit Board Relay

c © $_{\text {us }}$ File E214025
$\bigcirc$ NR 10071
(60) NR 8841-014-02
(t) NR 10308.ZA1A

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94 V-0 rated): Sealed (RTIII) plastic case.
Weight: 0.18 oz . ( 5 g ) approximately.


Max. DC Load Breaking Capacity


Coil Operating Range


## Ordering Information

|  |  | Typical Part Number $>$ | RE | 0 | 3 | 0 | 006 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> RE $=$ Miniature printed circuit board relay. |  |  |  |  |  |  |  |
| 2. Enclosure: $0=$ Sealed |  |  |  |  |  |  |  |  |
| 3. Contact Arra 3 = 1 Form A | nent: <br> T-NO) |  |  |  |  |  |  |
| 4. Contact Mat 0 = Silver-cad 2 = Silver-nic | oxide. 15 with gold pla |  |  |  |  |  |  |
| 5. Coil Voltage: $\begin{aligned} & 005=5 \mathrm{VDC} \\ & 006=6 \mathrm{VDC} \end{aligned}$ | $\begin{aligned} & 012=12 \mathrm{VDC} \\ & 024=24 \mathrm{VDC} \end{aligned}$ | $048=48 \mathrm{VDC}$ |  |  |  |  |  |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. RE030005 RE030024
RE030012

## Outline Dimensions



In case of full load on contacts and under
extreme operating conditions (switching rate,
ambient temperature) it is recommended to
open the sealed (washable) relays, by opening
the vent hole* provided for this purpose, after completion of the cleaning process.

PC Board Layout (Bottom View)


## PCN series

Slim, 3 Amp
PC Board Relay


Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Only 5 mm wide, permitting high density spacing.
- 1 Form A contact arrangement.
- Sensitive coil requires only 120 mW coil power.
- Well suited for HVAC controls, I/O panels, PLCs.


## Contact Data @ 20 ${ }^{\circ} \mathrm{C}$

Arrangements: 1 Form A.
Type: Bifurcated.
Material: AgNi
Max. Switching Rate: 12,000 ops./min. (no load).
100 ops./min. (rated load).
Expected Mechanical Life: 20 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 1mA @ 5VDC.

## Contact Ratings

Ratings: 3A @ 250VAC resistive.
3A @30VDC resistive.
Max. Switched Voltage: AC: 277V; DC: 125 V .
Rated Switched Voltage: AC: 250V.
Max. Switched Current: 3A.
Max. Switched Power: AC: 1250VA; DC: 150W.
Initial Contact Resistance: 50 milliohms @100mA, 6VDC (reference).

NOTE: A 5A rated version ot the PCN series is now in development. Consult factory regarding its availability.

## Insulation Data

Insulation to IEC 664/VDE 0110
Voltage Rating: 277VAC.
Pollution Degree: 2.
Overvoltage Category: II.
Tracking Resistance of Relay Base: PTI 600.

## Coil Data

Voltage: 5 to 24VDC.
Nominal Power: 120 mW .
Operate Power: 58.8 mW .
Coil Temperature Rise: $35^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Voltage: 130\% of nominal.
Duty Cycle: Continuous.

Coil Data @ $20^{\circ} \mathrm{C}$

| PCN |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |  |
| 5 | 24.0 | 208 | 3.5 | 0.5 |  |
| 6 | 20.0 | 300 | 4.2 | 0.6 |  |
| 9 | 13.3 | 675 | 6.3 | 0.9 |  |
| 12 | 10.0 | 1,200 | 8.4 | 1.2 |  |
| 24 | 5.0 | 4,800 | 16.8 | 2.4 |  |

## Operate Data

Must Operate Voltage: 70\% of nominal voltage or less.
Must Release Voltage: 10\% of nominal voltage or more.
Operate Time: 5 ms typ.
Release Time: 2 ms typ.
Bounce Time: <1 ms typ.

## Environmental Data

Temperature Range:
Operating: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude
Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ ( 100 G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 10 to $90 \%$ RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings): Sealed (RT III / wash-tight) plastic case.
Weight: $0.1 \mathrm{oz}(3 \mathrm{~g})$ approximately.

## Initial Dielectric Strength

Between Open Contacts: 750 V ms .
Between Coil and Contacts: $3,000 \mathrm{~V}$ ms .
Surge Voltage Between Coil and Contacts: 5,080V ( 1.2 / 50 $\mu \mathrm{s}$ ).


Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions



## Wiring Diagram



PC Board Layout (Bottom View)


## Reference Data




## Features

- 1 Form A (SPST-NO) and 1 Form C (SPDT).
- 6 A rated current.
- Slim package : 5mm width.
- Sensitive coil 170 mW .
- 4kV coil-to-contact insulation.
- Applications: PLCs, timers, temperature controllers, I/O modules.


## Contact Data @ 20 ${ }^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Silver tin oxide, silver tin oxide with gold plating; and silver nickel 90/10.
Max. Switching Rate: 12,000 ops./min. (no load).

## 60 ops./min. (rated load).

Initial Contact Resistance:
AgSnO or AgNi 90/10: 100 milliohms @ 1A, 12VDC.
AgSnO, Au plated: 50 milliohms @ 100mA, 6VDC.
Max. Switched Voltage: AC: 400V; DC: 300V.
Rated Voltage: AC: 250V; DC: 24V.
Max. Switched Current: 6A.
Max. Switched Power: 1,500VA. (See curve for DC Power).
Minimum Load: AgSnO or AgNi 90/10: >500mA, 12VAC/NDC.
AgSnO, Au plated: $>10 \mathrm{~mA}$, 5VAC/VDC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: See curve.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC, (1 minute).
Between Contacts and Coil: 4,000VAC, (1 minute).
Surge Voltage Between Coil and Contacts: $6,000 \mathrm{~V}(1.2 / 50 \mu \mathrm{~s})$.
Creepage/Clearance Coil-to-Contact: Min. 6/8mm. Consult factory
regarding availability of 1 Form A model with $8 / 8 \mathrm{~mm}$.

## Initial Insulation Resistance

Between Mutually Insulated Conductors: 100,000Mohm @ 500VDC.

Coil Data @ $20^{\circ} \mathrm{C}$
Voltage: 5 to 48VDC.
Nominal Power: 170 mW .

| V23092 |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| 5 | 34.0 | 119 | 3.50 | 0.25 |
| 12 | 14.2 | 848 | 8.40 | 0.6 |
| 24 | 7.1 | 3,390 | 16.80 | 1.20 |
| 48 | 4.5 | $10,600^{*}$ | 33.60 | 2.40 |
|  |  |  |  |  |
|  |  |  |  |  |

## Operate Data @ 20 ${ }^{\circ} \mathrm{C}$

Must Operate Voltage: 70\% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: 5 ms max. at nominal voltage.
Release Time: 2.5 ms max. at nominal voltage.
Bounce Time: $1.5 \mathrm{~ms}(\mathrm{~N} / \mathrm{O})$ typical at nominal voltage.
$5 \mathrm{~ms}(\mathrm{~N} / \mathrm{C})$ typical at nominal voltage.

## V23092 (SNR) series

## 6 Amp Slim Miniature, PC Board Relay

cT us File E48393
( Were File 0631 / 0160 / 0435
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Environmental Data

Temperature Range:
Operating: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating Humidity: 20 to $85 \%$ RH.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings): Plastic sealed case (RT III wash tight).
Weight: $0.2 \mathrm{oz} .(6 \mathrm{~g})$ approximately.

## Contact Life



Max. DC Load Breaking Capacity


## Coil Operating Range



## Ordering Information



Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
V23092A1012A301
V23092A1024A301

## Outline Dimensions

Vertical Version


Wiring Diagrams (Bottom Views)

1 Form C


1 Form A


## Flat Pack Version



## PC Board Layout (Bottom View)




## DIN Rail Interface Module and Accessories for V23092 Series (SNR) Relay PC Board Relay

[^13]
## Features

- Module width is 0.2 in ( 5.08 mm ).
- Narrow width permits high density packing of modules on a DIN rail.
- Jumper bars available.
- Available as a set or as individual components.


## Technical Information

Rated Current / Rated Voltage: 6A / 250VAC.
Dielectric Strength, Coil-to-Contact: $>4,000 \mathrm{Vrms}$.
Insulation Category (VDR 0110b): C / 250.
Operating Ambient Temperature: $-20^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.
Protection Category: IP 20.
Protection Against Accidental Contact Meeting: VBG 4.
Wire Cross Section with/without Bootlace Crimp: 0.22 - $2.5 \mathrm{~mm}^{2}$
Terminal Torque (Nominal / Maximum): . 295 / . $442 \mathrm{ft} \mathrm{lb}(0.4 / 0.6 \mathrm{Nm}$ ).

## Component Parts

| ST 1F 000 | Socket without LED |
| :--- | :--- |
| ST 1F L24 | Socket with LED for 12-24VDC. |
| ST 16 016 | Mounting frame for relay, without marking |
| ST 17002 | J umper bar, 2 pole |
| ST 17 005 | J umper bar, 5 pole |
| ST 17 010 | J umper bar, 10 pole |
| ST 16 040 | Marking plate, consiting of 100 marking tags |

Sets - Relay in frame, mounted in socket

| ST 1P3 024 | 24VDC, AgSnO $_{2}$ contacts |
| :--- | :--- |
| ST 1P3 L12 | 12VDC, with LED, AgSnO $_{2}$ contacts |
| ST 1P3 L24 | 24VDC, with LED, $\mathrm{AgSnO}_{2}$ contacts |
| ST 1P3 L48 | 48VDC, with LED, AgSnO contacts $^{\text {24VDC, with LED, Au plated AgSnO }}$ 2 contacts |
| ST 1P2 L24 | 24VC, |



## Features

- 1 Form A (SPST-NO) and1 Form C (SPDT).
- 8 amp rated current.
- Sensitive coil 220 mW .
- 12.3 mm height.
- 8 mm coil to contact spacing.
- Flux-tight and washable (sealed) versions.


## Contact Data @ 70º

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT), single contact.
Material: Silver-cadmium oxide; Silver-tin oxide; and Silver-nickel 0.15 with or without gold plating.
Expected Mechanical Life: 30 million operations minimum.
Ratings:
Current: 8A
Voltage: 250VAC.
Power (breaking): 2,000 VA.
Voltage (breaking): 440VAC.
Current (making, max. 4s at 10\% duty cycle): 30A.
UL508 @ 70${ }^{\circ} \mathrm{C}$ (RY610 type)
8 amp 28VDC 30,000 ops.
280mA 250VDC 30,000 ops.
1/2 HP 240VAC.
1/4 HP 277VAC.
B300 120 or 240VAC
VDE 0631 @ $85^{\circ} \mathrm{C}$ (RY531 type) 6 (4) amp, 250VAC 100,000 ops.

Initial Dielectric Strength
Between Open Contacts: 1,000Vrms.
Between Coil and Contacts: $5,000 \mathrm{Vrms}$.
Creepage/Clearance: $8 / 8 \mathrm{~mm}$.

Coil Data DC @ $20^{\circ} \mathrm{C}$
Nominal Coil Power: 220mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 5 | 113 | 3.5 | 0.5 | 118 | 44.0 |
| 6 | 164 | 4.2 | 0.6 | 14.1 | 36.7 |
| 12 | 620 | 8.4 | 12 | 28.2 | 19.3 |
| 24 | 2,350 | 16.8 | 2.4 | 56.4 | 10.2 |
| 48 | 9,600 | 33.6 | 4.8 | 112.8 | 5.0 |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time : 7 ms , at nom. voltage.
Release Time: 3 ms , at nom. voltage.
Bounce Time (N/O contact) : 1 ms , at nom. voltage.
Switching Rate: 3,600 ops./hr. max. at rated load.

## Environmental Data

## Temperature Range:

Operating: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$
Vibration: (10 to 500 Hz.$) 5 \mathrm{~g}$.
Shock (destructive): $>100 \mathrm{~g}$.

## RY II series <br> 8 Amp Miniature <br> Printed Circuit Board Relay

c90s ${ }_{\text {us }}$ File E214025
$\bigcirc$ NR 10071
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Mechanical Data

Termination: Printed circuit terminals. Sockets available.
Enclosure (94 V-0 rated): Flux-tight (RT II) or sealed (RTIII) plastic case. Weight: 0.28 oz. $(8 \mathrm{~g})$ approximately.

## Contact Life



Max. DC Load Breaking Capacity


Coil Operating Range


## Ordering Information

| Typical Part Number $\downarrow$ RY | 6 | 1 | 0 | 012 |
| :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> RY = RY II miniature printed circuit board relay. |  |  |  |  |
| 2. Version: <br> 2 = Flux-tight, pins on 3.2 mm spacing. Only available with contact arrangement 1 <br> $5=$ Flux-tight, pins on 5 mm spacing. Only available with contact arrangement 3. <br> $6=$ Sealed, pins on 3.2 mm spacing. Only available with contact arrangement 1 <br> A $=$ Sealed, pins on 5 mm spacing. Only available with contact arrangement 3. |  |  |  |  |
| 3. Contact Arrangement: <br> 1 = 1 Form C (SPDT) Only available with 3.2 mm pin spacing. <br> 3 = 1 Form A (SPST-NO) Only available with 5 mm pin spacing. |  |  |  |  |
| 4. Contact Material: <br> $0=$ Silver-cadmium oxide. <br> 1 = Silver-nickel 0.15 <br> $2=$ Silver-nickel 0.15 with gold plating <br> 3 = Silver-tin oxide. |  |  |  |  |
| 5. Coil Voltage: |  |  |  |  |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions



1 Form C, 3.2mm pin spacing
1 Form $A, 5 m m$ pin spacing

## PC Board Layouts \& Wiring Diagrams (Bottom Views)



1 Form C, 3.2mm pin spacing
1 Form A, 5mm pin spacing

Sensitive, Low Profile, Hi-Current
Relay Designed to Meet
International Standards


## Features

- High sensitivity - nominal coil power requirement is as low as 212 mW .
- Low profile, .591 in . ( 15 mm ) tall case uses only $.465 \mathrm{in}^{2}\left(3 \mathrm{~cm}^{2}\right)$ of area on the printed circuit board, permitting high density circuit design.
- Power switching capability - contacts rated 14 amps in 1 Form A (SPSTNO) or 1 Form C (SPDT) arrangements.
- Designed to meet UL, CSA, VDE, SEMKO and SEV requirements.
- Designed to meet VDE 8mm spacing, 4kV dielectric, coil to contacts.
- Designed to meet 3 mm creepage between contacts.
- Conforms to: VDE 0110 - Insulation Group C (250V)

VDE 435 Part 201 - High current applications
VDE 0804 - Telecommunications equipment
VDE 0631 - Temperature controllers and limiters
VDE 0700 - Household appliances
VDE 0805/5.90 - Office machines

- Immersion cleanable§, ultrasonically sealed case.
- Well suited for a broad range of applications e.g. HVAC, appliances, security and industrial control.
§ For more details, refer to application note 13C265, "Mounting, Termination and Cleaning of PC Board Relays."


## Contact Ratings @ $25^{\circ} \mathrm{C}$ with relay properly vented.

Remove vent nib after soldering and cleaning.
Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Silver-cadmium oxide.
Expected Mechanical Life: 20 million operations.
Expected Electrical Life:
100,000 operations at $8 \mathrm{mps}, 240 \mathrm{VAC}$.
50,000 operations at 14 amps NO $/ 5 \mathrm{amps}$ NC, 120VAC Res.
30,000 operations at 7.2 FLA, 45 LRA, 120VAC.
10,000 operations at 5 FLA, 30 LRA, 240VAC.
30,000 operations at B300 pilot duty ( $360 \mathrm{VA}, 240 \mathrm{VAC}$;
$470 \mathrm{VA}, 120 \mathrm{VAC})$.
Contact Ratings (See Figure 1):
Maximum Switched Voltage: 380VAC.
Maximum Switched Current: 14/5 (N.O./N.C.) amps, AC
resistive; 8 amps DC (see Fig. 1)
Maximum Switched Power: 200W, DC; $2,000 \mathrm{VA}, \mathrm{AC}$.
Minimum Required Contact Load: 12V, 100 mA .
VDE Contact Ratings: 8 amps , 250 VAC .
UL/CSA Contact Ratings: 10 amps, 240VAC; 8 amps 24VDC;
1/3 HP, 120VAC; 1/2 HP, 240VAC.
Figure 1 - DC Switching Load Limit Curve


## T75 series

## 14 Amp, PC Board Miniature Relay

汀 File E29244
(18) File LR45064
$\bigcirc$ File No. 3919
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Initial Dielectric Strength

Between Open Contacts: $1,000 \mathrm{~V}$ rms.
Between Contacts and Coil: $4,000 \mathrm{~V}$ rms, 8 mm .

## Coil Data

Voltage: 3 to 60VDC.
Maximum Power @ $\mathbf{2 5}^{\circ} \mathrm{C}$ : 1W.
Nominal Power @ $25^{\circ} \mathrm{C}$ : 230 mW , typ.
Temperature Rise: $85 \mathrm{C}^{\circ}$ per Watt.
Duty Cycle: Continuous.

## Coil Data

|  | Nominal <br> Voltage | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: |
|  | 3 | 40 | 2.1 | 75.0 |
| DC | 5 | 118 | 3.6 | 42.4 |
| Coils | 6 | 165 | 4.3 | 36.4 |
|  | 9 | 365 | 6.4 | 24.7 |
|  | 12 | 650 | 8.5 | 18.5 |
|  | 18 | 1,455 | 12.8 | 12.4 |
|  | 34 | 2,270 | 17.2 | 10.6 |
|  | 48 | 5,460 | 25.4 | 6.4 |
|  | 60 | 8,790 | 34.5 | 5.5 |
|  |  | 15,265 | 42.8 | 3.9 |

## Operate Data @ $25^{\circ} \mathrm{C}$

Must Operate Voltage: 72\% of nom. voltage or less.
Must Release Voltage: 10\% of nom. voltage or more.
Operate Time (Excluding Bounce): 6 ms , typ., at nom. voltage.
Release Time (Excluding Bounce): 2.5 ms , typ., at nom. voltage.
Maximum Switching Rate: 20 operations/second.
Maximum Continuous Operating Voltage: 225\% of nom. voltage.

## Temperature Range

Storage: $-40^{\circ} \mathrm{C}$ to $+130^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosures: Immersion cleanable, plastic sealed case.
Weight: 0.65 oz . ( 18.5 g ) approximately.

| Typical Part Number |  |  |  |  | T75 | S | 5 | D | 1 | 1 | 2 | -12 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> T75 = Low profile, printed circuit board relay. |  |  |  |  |  |  |  |  |  |  |  |  |
| 2. Enclosure: S = Immersion cleanable, plastic sealed case. |  |  |  |  |  |  |  |  |  |  |  |  |
| 3. Contact Arrangement: $1=1$ Form A (SPST-NO) 5 = 1 Form C (SPDT) |  |  |  |  |  |  |  |  |  |  |  |  |
| 4. Coil Input: $D=D C$ voltage |  |  |  |  |  |  |  |  |  |  |  |  |
| 5. Coil Configuration: <br> 1 = Single coil, non-latching (monostable) |  |  |  |  |  |  |  |  |  |  |  |  |
| 6. | Mounting and Terminals: 1 = Printed circuit terminals |  |  |  |  |  |  |  |  |  |  |  |
| 7. Contact Material: <br> 2 = Silver-cadmium oxide (AgCdO) |  |  |  |  |  |  |  |  |  |  |  |  |
| 8. | Coil Voltage: $03=3 \mathrm{VDC}$ $05=5 \mathrm{VDC}$ | $\begin{aligned} & 06=6 \mathrm{VDC} \\ & 09=9 \mathrm{VDC} \end{aligned}$ | $\begin{aligned} & 12=12 \mathrm{VDC} \\ & 18=18 \mathrm{VDC} \end{aligned}$ | $\begin{aligned} & 24=24 V \\ & 36=36 V \end{aligned}$ |  | $\begin{aligned} & 48=4 \\ & 60= \end{aligned}$ |  |  |  |  |  |  |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
T75S5D112-05
T75S5D112-12
T75S5D112-24

## Outline Dimensions



CONTACT TERMINALS: $.023 \times .040(.58 \times 1.02)$ REF.
COIL TERMINALS: . 024 (.61) DIA. REF.

Wiring Diagram (Bottom View)


* on single throw models, ONLY NECESSARY TERMINALS ARE PRESENT.


## PC Board Layouts (Bottom Views)

## 1 Form C



1 Form A


| Dimensions are in inches over | Specifications and availability | ww w.tycoelectronics.com |
| :--- | :--- | :--- |
| (millimeters) unless otherwise | subject to change. | Technical support: |
| specified. |  | Refer to inside back cover. |



## PCJ series

## Slim 5 Amp <br> Miniature Power PC Board Relay

Air Conditioners, Refrigerators, Microwave Ovens
민 UL File No. E82292
(\$18) CSA File No. 1031444
VOE VDE File No. 122301
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Slim outline, L20.4 x W7 x H15 (mm).
- 1 Form A (SPST-NO) contact arrangement.
- High dielectric capacity of 4 kV .
- UL, CSA, VDE approvals.
- Immersion cleanable, sealed version available.
- Cadmium-free contacts.


## Contact Data @ 20응

Arrangements: 1 Form A (SPST-NO).
Material: Ag Alloy.
Max. Switching Rate: 300 ops./ min. (no load).
20 ops./ min. (rated load).
Expected Mechanical Life: 5 million ops (no load).
Expected Electrical Life: 100,000 ops (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100M ohms @ 1A, 6VDC.

## Contact Ratings

Ratings: 5A @ 250VAC resistive.
Max. Switched Voltage: AC: 275V.

> DC: 30V.

Max. Switched Current: 5A.
Max. Switched Power: 1,250VA, 150W.

## Initial Dielectric Strength

Between Open Contacts: 750VAC, 50/60 Hz. (1 min.).
Between Contacts and Coil: $4,, 000 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. (1 min.).
Surge Voltage Between Coil and Contacts: 7,000V (1.2/50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Conductors: 1,000M ohm @ 500VDCM.

## Coil Data

Voltage: 5 to 24VDC.
Duty Cycle: Continuous.
Nominal Power: 200mW.
Max. Coil Power: 130\% of nominal.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| PCJ |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| 5 | 40.0 | 125 | 3.75 | 0.25 |
| 6 | 33.3 | 180 | 4.50 | 0.30 |
| 9 | 22.5 | 405 | 6.75 | 0.45 |
| 12 | 16.7 | 720 | 9.00 | 0.60 |
| 18 | 11.1 | 1,620 | 13.50 | 0.90 |
| 24 | 8.6 | 2,880 | 18.00 | 1.20 |

## Operate Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: 10ms max.
Release Time: 4ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration, Mechanical: 10 to 55 Hz ., 1.5 mm double amplitude.
Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}(100 \mathrm{G}$ approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Weight: $0.14 \mathrm{oz} .(4 \mathrm{~g})$ approximately.

## Ordering Information

| dering information | Typical Part Number | PCJ | -1 | 05 | D | 3 | M | H | ,000 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> PCJ = Miniature 1 Form A relay |  |  |  |  |  |  |  |  |  |
| 2. Termination: 1 = 1 pole |  |  |  |  |  |  |  |  |  |
| 3. Coil Voltage: $\begin{array}{ll} 05=5 \mathrm{VDC} & 09=9 \mathrm{VDC} \\ 06=6 \mathrm{VDC} & 12=12 \mathrm{VDC} \end{array}$ | $\begin{aligned} & 18=18 \mathrm{VDC} \\ & 24=24 \mathrm{VDC} \end{aligned}$ |  |  |  |  |  |  |  |  |
| 4. Coil Input: D = Standard 200mW |  |  |  |  |  |  |  |  |  |
| 5. Contact Material: $3=\mathrm{AgNi}$ |  |  |  |  |  |  |  |  |  |
| 6. Contact Arrangement: $\mathrm{M}=1$ Form A (NO) |  |  |  |  |  |  |  |  |  |
| 7. Enclosure: <br> Blank = Vented (Flux-tight) cover | $\mathrm{H}=$ Sealed plastic case |  |  |  |  |  |  |  |  |
| 8. Suffix: <br> ,000 = Standard model Othe | ffix $=$ Custom model |  |  |  |  |  |  |  |  |

## Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

PCJ -105D3M, 000
PCJ -112D3MH,000
PCJ -124D3MH,000

## Outline Dimensions



## Wiring Diagram (Bottom View)



## PC Board Layout (Bottom View)



## Reference Data




## Features

- 1 Form A (SPST-NO) or 1 Form C (SPDT) contact arrangements.
- 5 or 10A ratings.
- Compact size 20L x 10W x 15.2H (mm).
- High surge voltage of 8000 V .
- Cadmium-free contacts.
- Sensitive ( 200 mW ) coil available on 1 Form A types.
- UL, CSA, VDE approval.


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: AgSnO.
Max. Switching Rate: 300ops./ min. (no load).
20ops./ min. (rated load).
Expected Mechanical Life: 5 million ops (no load).
Expected Electrical Life: 100,000ops (rated load).
Minimum Load: 100mA @5VDC.
Initial Contact Resistance: 100 milliohms @1A, 6VDC.

## Contact Ratings

Ratings: Models with 1 Form C Contacts, 400 mW Coil
5A (NO) /3A (NC) @ 30VDC resistive.
5A (NO) /3A (NC) @ 277VAC resistive.
10A (NO) @ 125VAC resistive. TV-3 (NO).
Models with 1 Form A Contacts, 400mW Coil
5A @ 277VAC/30VDC resistive.
10A @ 125VAC resistive. TV-3.
Models with 1 Form A Contacts, 200mW Coil 5A @ 277VAC/30VDC resistive. 10A @ 125VAC resistive.
Max. Switched Voltage: AC: 277V.
DC: 30V.

Max. Switched Current: 10A (NO) / 3A(NC).
Max. Switched Power: 1400VA, 150W (NO); 850VA, 90W (NC).

## Initial Dielectric Strength

Between Open Contacts: 750VAC, 50/60 Hz. (1 min.).
Between Contacts and Coil: $4,000 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. (1 min.).
Surge Voltage Between Coil and Contacts: 8,000V (1.2/50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Conductors: 1000M ohm @ 500VDCM.

## Coil Data

Voltage: 5 to 48VDC.
Duty Cycle: Continuous.
Nominal Power: 200 mW or 400 mW .
Max. Coil Power: 130\% of nominal.

## PCH series

## 5-10 Amp Miniature 1 Form A or C Power PC Board Relay

Air Conditioners, Refrigerators, Microwave Ovens

긴UL File No. E82292
(18) CSA File No. LR48471

VOE VDE File No. 119568
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ 20응

| 200mW Coils (Only available with 1 Form A contact arrangements) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| 5 | 40.0 | 125 | 3.75 | 0.25 |
| 6 | 30.0 | 180 | 4.50 | 0.30 |
| 9 | 22.5 | 400 | 6.75 | 0.45 |
| 12 | 16.7 | 720 | 9.00 | 0.60 |
| 24 | 8.6 | 2,800 | 18.00 | 1.20 |


| 400mW Coils |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |  |
|  | 80.0 | 62.5 | 3.75 | 0.25 |  |
| 5 | 66.7 | 90.0 | 4.50 | 0.30 |  |
| 6 | 44.4 | 202.5 | 6.75 | 0.45 |  |
| 9 | 33.3 | 360.0 | 9.00 | 0.60 |  |
| 12 | 22.2 | 810.0 | 13.50 | 0.90 |  |
| 18 | 11.1 | $1,440.0$ | 18.00 | 1.20 |  |
| 24 | 5.6 | $5,760.0$ | 36.00 | 2.40 |  |
| 48 |  |  |  |  |  |

## Operate Data @ 20 ${ }^{\circ} \mathrm{C}$

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: 10 ms max.
Release Time: 5ms max.

## Environmental Data

Temperature Range:
Operating: Models with Class F insulation: $-30^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Vibration, Mechanical: 10 to 55 Hz ., 1.5 mm double amplitude.
Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: 1,000m/s² (100G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Weight: $0.25 \mathrm{oz}(7 \mathrm{~g})$ approximately.


Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
PCH-105D2H,001 PCH-124D2H,001
PCH-112D2H,001

## Outline Dimensions



## Wiring Diagram (Bottom View)



NOTE: Only necessary terminals are present on 1 Form A models.

## PC Board Layout (Bottom View)



NOTE: Only necessary terminals are present on 1 Form A models.

Reference Data (Typical Values)
(Only applicable for 1 Form C, 400 mW coil model with 277VAC load on NO)




| Dimensions are in inches over | Specifications and availability | www.tycoelectronics.com |
| :--- | :--- | :--- |
| (millimeters) unless otherw ise | subject to change. | Technical support: |
| specified. |  | Refer to inside back cover. |

## T77 series

## 10 Amp Miniature PC Board Relay

兄 File E29244
(18A File LR48471

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $20^{\circ} \mathrm{C}$

Voltage: 3 to 24VDC.
Nominal Coil Power: Contact rating $3=200 \mathrm{~mW}$.
Contact rating $10=450 \mathrm{~mW}$
Coil Temperature Rise: Contact rating $3=35^{\circ} \mathrm{C}$ max. Contact rating $10=40^{\circ} \mathrm{C}$ max.
Max. Coil Power: 120\% of nominal.
Duty Cycle: Continuous.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| Rated Coil Voltage (VDC) | Coil Resistance (Ohms) $\pm 10 \%$ |  | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| :---: | :---: | :---: | :---: | :---: |
|  | Contact Rating 3 | Contact Rating 10 |  |  |
| 3 | 45 | 20 | 2.25 | 0.15 |
| 5 | 125 | 55 | 3.75 | 0.25 |
| 12 | 720 | 320 | 9.00 | 0.60 |
| 24 | 2,800 | 1,280 | 18.00 | 1.20 |

## Operate Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

Operate Time: 10 ms , max. (excluding bounce).
Release Time: 4 ms , max. (excluding bounce).

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+130^{\circ} \mathrm{C}$.
Operating: $-30^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.
Contact Rating 3: $-40^{\circ} \mathrm{C}$ to $+80^{\circ} \mathrm{C}$.
Contact Rating 10: $-40^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.
Vibration: Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude.
Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock: Mechanical: 100 g min.
Operational: 10 g min .
Operating Humidity: 45 to $85 \%$ RH.

## Mechanical Data

Termination: Printed circuit board
Enclosures ( $94 \mathrm{~V}-0$ Flammability Ratings):
T77S: Immersion cleanable.
T77V: Vented, flux-tight, plastic cover.
Weight: $0.36 \mathrm{oz} .(9 \mathrm{~g})$.

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{8}$ ohms, min. @ 500VDC.

## Initial Dielectric Strength

Between Open Contacts: 750VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: $4,000 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. (1 minute).

| Dimensions are shown for | Dimensions are in inches over | Specifications and availability |
| :--- | :--- | :--- |



Operate Time



Note: Graphical data should not be used as a substitute for specific application verification. To be used for estimates only.

| Ordering Information |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Typical Part Number | T77 | V | 1 | D | 10 | -24 |
| 1. Basic Series: T77 = Miniature PCB relay. |  |  |  |  |  |  |  |
| 2. Enclosure: <br> $\mathrm{V}=$ Vented (Flux-tight)* <br> $\mathrm{S}=$ Immersion cleanable case |  |  |  |  |  |  |  |  |
| 3. Contact Arrangement: 1 = (SPST-NO) |  |  |  |  |  |  |  |
| 4. Coil Input: D = DC Voltage |  |  |  |  |  |  |  |
| 5. Contact Rating: $3=3 \mathrm{~A} \quad 10=10 \mathrm{~A}$ |  |  |  |  |  |  |  |
| 6. Coil Voltage: $03=3 \mathrm{VDC} \quad 05=5 \mathrm{VDC} \quad 12=12 \mathrm{VDC}$ |  |  |  |  |  |  |  |

*Not suitable for immersion cleaning processes

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| T77V1D3-12 | T77V1D10-12 | T77S1D3-12 | T77S1D10-12 |
| :--- | :--- | :--- | :--- |
| T77V1D3-24 | T77V1D10-24 | T77S1D3-24 | T77S1D10-24 |

Outline Dimensions


Wiring Diagram (Bottom View)
1 Form A


## Suggested PC Board Layout (Bottom View)




## Features

- Miniature size $18.2 \times 10.2 \times 14.7 \mathrm{~h}$.
- 1 Form A (SPST-NO) contact arrangement.
- Designed to meet UL, CSA, VDE, TUV requirements.
- Designed to meet 4kV dielectric between coil and contacts ( OJ ).
- Sensitive and standard coils available.
- Immersion cleanable, sealed version available.


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO).
Material: Ag, Ag Alloy.
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @5VDC.
Initial Contact Resistance: 100 milliohms @ 1A,6VDC.

## Contact Ratings

Ratings: OJ/OJE-LM: 3A @ 250VAC resistive,
3A @ 28VDC resistive.
OJ/OJE-LMH: 8A @ 250VAC resistive, 8A @ 28VDC resistive.
OJ/OJE-DM: 5A @ 250VAC resistive, 5A @ 28VDC resistive.
OJ/OJE-HM: 10A @ 250VAC resistive, 10A @ 28VDC resistive.
Max. Switched Voltage: AC: 265V.
DC: 30V.
Max. Switched Power:
OJ/OJE-LM: 720VA, 90W
OJ/OJE-LMH: 1,800VA, 200W
OJ/OJE-DM: 1,200VA, 150W
OJ/OJE-HM: 2,500VA, 280W
Note: Consult factory regarding TV-5 rated models.

## Initial Dielectric Strength

## Between Open Contacts:

OJ: $\quad 750 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. (1 minute).
OJE: 750VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts:
OJ: $\quad 4,000 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. (1 minute).
OJE: 3,000VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts:
OJ: $10,000 \mathrm{~V}(1.2 / 50 \mu \mathrm{~s})$.
OJE: 5,000V (1.2/50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDCM.

## Coil Data

Voltage: 5 to 48VDC.
Nominal Power: OJ/OJE-LM and LMH: 200 mW . OJ/OJE-DMand HM: 450 mW .
Coil Temperature Rise:
OJ/OJE-LM and LMH : $30^{\circ} \mathrm{C}$ max., at rated coil voltage.
OJ/OJE-DM and HM: $40^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

OJ /OJ $E$ series

## 3-10 Amp Miniature, PC Board Relay

## Appliances, HVAC, Industrial Control.

군 UL File No. E82292
(18) CSA File No. LR48471
(VOEE VDE File No. 10080
$\triangle$ TUV File No. R75081

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| OJ/OJE-L Sensitive |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | Coil Resistance (ohms) $\pm$ 10\% | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 40.0 | 125 | 3.75 | 0.25 |
| 6 | 33.3 | 180 | 4.50 | 0.30 |
| 9 | 22.5 | 400 | 6.75 | 0.45 |
| 12 | 16.7 | 720 | 9.00 | 0.60 |
| 24 | 8.6 | 2,800 | 18.00 | 1.20 |
| OJ/OJE-D and -H Standard |  |  |  |  |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | Coil <br> Resistance (ohms) $\pm$ 10\% | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 91.0 | 55 | 3.50 | 0.25 |
| 6 | 75.0 | 80 | 4.20 | 0.30 |
| 9 | 50.0 | 180 | 6.30 | 0.45 |
| 12 | 37.5 | 320 | 8.40 | 0.60 |
| 24 | 18.8 | 1,280 | 16.80 | 1.20 |
| 48 | 9.4 | 5,100 | 33.60 | 2.40 |

## Operate Data

Must Operate Voltage:
OJ/OJE -L: 75\% of nominal voltage or less.
OJ/OJE -D and -H: 70\% of nominal voltage or less.
Must Release Voltage:
OJ/OJE -L: 5\% of nominal voltage or more.
OJ/OJE -D and -H: $5 \%$ of nominal voltage or more.
Operate Time: OJ/OJE -L: 15 ms max.
OJ/OJE -D and -H: 10 ms max.
Release Time: 4 ms max.

## Environmental Data

Temperature Range:
Operating: OJ/OJE-L: $-30^{\circ} \mathrm{C}$ to $+80^{\circ} \mathrm{C}$
OJ/OJE-D and $-\mathrm{H}:-30^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude
Operational: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude.
Shock, Mechanical: 1,000m/s² (100G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
OJ/OJE-SS: Vented (Flux-tight), plastic cover.
OJ/OJE-SH: Sealed, plastic case.
Weight: $0.32 \mathrm{oz}(9 \mathrm{~g})$ approximately.

## Ordering Information



* Not suitable for immersion cleaning processes.
** For higher contact rating with sensitve coil, add suffix " H " to the end of the part number as indicated in step 7 of Ordering Information.

Our authorized distributors are more likely to stock the following items for immediate delivery.
OJ -SH-105HM ,095
OJ E-SH-105DM,095
OJ E-SH-112HM,095
OJ E-SH-124LMH,095
OJ -SH-112LMH,095
OJ E-SH-112DM,095
OJ E-SH-105LMH,095
OJ -SH-124LMH,095
OJ E-SH-124DM,095
OJ E-SH-112LMH,095

## Outline Dimensions



## Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)



## Reference Data

Coil Temperature Rise


## Operate Time



Life Expectancy


| Dimensions are in inches over | Specifications and availability |
| :--- | :--- |
| (millimeters) unless otherw ise | subject to change. |
| specified. |  |



## PCD/PCDF series

## 15 Amp Low Profile Power PC Board Relay

## Appliances, HVAC, Office Machines

T UL File No. E82292
(18) CSA File No. LR48471

- TUV File No. R9751117

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Low profile (10mm), 15 Amp switching capacity.
- 1 Form A contact arrangement.
- Sensitive 200 mW coil ( 250 mW on 48 VDC coil).
- Immersion cleanable, sealed version available.
- Quick connect terminals available (PCDF).


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO).
Material: AgSnO.
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: 15A @ 125VAC resistive (PCDF only, load must be carried through QC terminals to achieve this rating),
10A @ 250VAC resistive,
10A @ 24VDC resistive.
5A @ 125VAC inductive ( $\cos \varnothing=0.4, L / R=7 \mathrm{msec}$ ),
$5 \mathrm{~A} @ 24 \mathrm{VDC}$ inductive ( $\cos \varnothing=0.4, \mathrm{~L} / \mathrm{R}=7 \mathrm{msec}$ ).
Max. Switched Voltage: AC: 250V.

$$
\text { DC: } 24 \mathrm{~V} \text {. }
$$

Max. Switched Current: 15A.
Max. Switched Power: 1,800VA, 240W.

## Initial Dielectric Strength

Between Open Contacts: 750VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: 2,500VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 5,000V (1.2 / 50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDCM.

## Coil Data

Voltage: 5 to 48VDC.
Nominal Power: 200 mW except 48VDC coil ( 250 mW ).
Coil Temperature Rise: $20^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| PCD \&PCDF |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |  |
| 5 | 40.0 | 125 | 3.75 | 0.50 |  |
| 6 | 33.3 | 180 | 4.50 | 0.60 |  |
| 9 | 22.5 | 400 | 6.75 | 0.90 |  |
| 12 | 17.0 | 720 | 9.00 | 1.20 |  |
| 24 | 8.6 | 2,880 | 18.00 | 2.40 |  |
| 48 | 5.2 | 9,200 | 36.00 | 4.80 |  |

## Operate Data

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 10\% of nominal voltage or more.
Operate Time: 15 ms max.
Release Time: 8 ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude
Operational: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude.
Shock, Mechanical: 1,000m/s² (100G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: PCD: Printed circuit terminals.
PCDF: Printed circuit terminals and quick connect terminals.
Enclosure (94V-0 Flammability Ratings): Sealed plastic case.
Weight: PCD: $0.31 \mathrm{oz}(9 \mathrm{~g})$ approximately.
PCDF: 0.35 oz ( 10 g ) approximately.


Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
None at present.


PC Board Layouts (Bottom View)


## Reference Data



Ambient Temp. $\left({ }^{\circ} \mathrm{C}\right)$


Life Expectancy


Note: This data is based on the max. allowabl
temperature for E type insulation coil $\left(115^{\circ} \mathrm{C}\right)$.


## Features

- Small size for high density PC board mounting.
- 1 Form A and 1 Form C contact arrangements.
- Creepage/clearance to VDE 0435 and VDE 0700.
$\cdot 2,500 \mathrm{Vms}$ dielectric strength between contact and coil.
- UL Class F approved insulation system.
- Low-complexity design for enhanced reliability.
- High-temperature version available.


## Contact Data

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Silver nickel 90/10.
Max. Switching Rate: 6,000 ops./min. (minimum load). 600 ops./min. (rated load).
Expected Mechanical Life: 5 million operations.
Expected Electrical Life :
PB1 \&PB3 @85C: 100,000 operations @ 6A, 240VAC (NO). 25,000 operations @ 10A, 240VAC (NO). 25,000 operations @ 10A/3A, 240VAC (NO/NC). 1,000 operations @ 10A/10A, 240VAC (NO/NC)
PBH @ $105^{\circ} \mathrm{C}$ : 250,000 operations @ 2A, 240VAC (NO). 150,000 operations @ 5A, 240VAC (NO). 100,000 operations @ 6A/6A, 240VAC (NO/NC).
Maximum Contact Rating: PB1 \&PB3: NO (Make) 10A / NC (Break) 3A.
PBH: 6A (mtg. space 3mm); 4A (dense pack).
Maximum Switching Voltage: PB1 \&PB3: 250VAC, 100 VDC.
PBH: 250VAC
Maximum Make Current (AII): 15A (max. 4 sec at 10\% duty cycle.) Maximum Breaking Capacity:
PB1 \&PB3: 750VA (NC contact)/2,500VA (NO contact).
PBH: 1,500VA.

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms.
Between Coil and Contacts: $2,500 \mathrm{Vrms}$.
Surge Voltage Resistance Between Coil and Contacts: 4,000Vrms.
Clearance / Creeepage Distance: $3 \mathrm{~mm} / 4 \mathrm{~mm}$.

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{8}$ ohms.
Tracking Resistance of Relay Base: PB1: CTI 250
PB3: CTI 300
Insulation to VDE 0110b (2/79): Category C / Reference Voltage 250.

## Coil Data @ 20 ${ }^{\circ} \mathrm{C}$

Voltage: 5, 6, 9, 12, 24 and 36VDC.
Nominal Coil Power: 360 mW .
Operate Coil Power: 200 mW .

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| Rated <br> Coil <br> Voltage <br> (VDC) | Coil <br> Resistance <br> $\pm \mathbf{1 0 \%}$ <br> (ohms) | Must <br> Operate <br> Voltage <br> (VDC) | Must <br> Release <br> Voltage <br> (VDC) | Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: |
| 5 | 70 | 3.75 | 0.5 | 72.0 |
| 6 | 100 | 4.5 | 0.6 | 60.0 |
| 9 | 225 | 6.75 | 0.9 | 40.0 |
| 12 | 400 | 9.0 | 1.2 | 30.0 |
| 24 | 1,600 | 18.0 | 2.4 | 15.0 |
| 36 | 3,600 | 27.0 | 3.6 | 60.0 |

Operate Data @ 20 ${ }^{\circ} \mathrm{C}$
Operate/Release Time: 20 ms , max. (excluding bounce).
Bounce Time: 15 ms , max.
Operate Coil Power: 200 mW .

## PB series

## 10 Amp, PC Board Miniature Relay

## c Ts $_{\text {us }}$ File E214025

(WOE File 4570-4940-0042
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Environmental Data

Temperature Range (Operating): PB1 or PB3: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.

## PBH: $-20^{\circ} \mathrm{C}$ to $+105^{\circ} \mathrm{C}$.

Vibration: 30 to $400 \mathrm{~Hz} ., 4 \mathrm{~g}$ 's, min.
Shock: Mechanical (Destruction): 30g min.
Protection Category: IP 54

## Mechanical Data

Termination: Printed circuit board
Enclosure: Splash-resistant (unsealed) plastic case (UL Flammability
Class V-0).
Weight: 0.2 oz . (5.4g).
Contact Life (PB1 \& PB3)


Max. DC Load Breaking Capacity (PB1 \& PB3)


## Coil Operating Range (PB1 \& PB3)



Ordering Information

1. Basic Series:
$\mathrm{PB}=\mathrm{M}$ iniature, 10A PC board relay.
2. Version:

1 = Standard version, CTI $250 \quad 3$ = High CTI version, CTI $300 \quad H=$ High Temerature $\left(105^{\circ} \mathrm{C}\right)$ version, CTI 250
3. Contact Arrangement:
$1=1$ Form C (SPDT) $\quad 3=1$ Form A (SPST-NO)
4. Contact Material:
$4=A g N i$ 90/10

| 4. Coil Input: |
| :--- |
| $005=5 \mathrm{VDC}$ | $006=6 \mathrm{VDC} \quad 009=9 \mathrm{VDC} \quad 012=12 \mathrm{VDC} \quad 024=24 \mathrm{VDC} \quad 036=36 \mathrm{VDC} \quad$ (Other voltages available as special order)

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

## Outline Dimensions



## Wiring Diagram (Bottom View)



## Suggested PC Board Layout (Bottom View)




## Features

- 1 Form A (SPST-NO), 1 Form B (SPST-NC) and1 Form C (SPDT).
- 8 amp rated current.
- Standard (non-latching) or latching types.
- Sensitive model requires 180 mW to pull-in.
- 2,000Vrms and 4,000Vrms contact-to-coil dielectric versions.
- Washable (sealed) plastic case.


## Contact Data @ 70․

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT), single contact.
Material: Silvernickel 0.15 .
Expected Mechanical Life: 20 million operations.
Ratings:
Current: 7A, standard and latching types; 5A, sensitive type.
Voltage: 250VAC.
Power (breaking): 1,750 VA standard and latching; 1,250 VA, sensitive.
Voltage (breaking): 250VAC.
Current (making, max. 4s at 10\% duty cycle): 12A.
Standard Type
7 amp resistive, 24 VDC or $250 \mathrm{VAC}, 50,000$ ops
5 amp resistive, 250VAC, 150,000 ops.
Latching Type
7 amp resistive, 24 VDC or $250 \mathrm{VAC}, 50,000$ ops.
5 amp resistive, 250VAC, 100,000 ops.
Sensitive Type
5 amp resistive, 250VAC, 100,000 ops.
5 amp resistive, 24VDC, 30,000 ops.

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms.
Between Coil and Contacts: $2,000 \mathrm{Vrms}$ for standard dielectric version. $4,000 \mathrm{Vrms}$ for high dielectric version.
Creepage/Clearance: $2.5 / 2.5 \mathrm{~mm}$ for standard dielectric version. $3.5 / 3.5 \mathrm{~mm}$ for high dielectric version.
Surge Resistance Between Coil and Contacts: 5,000Vrms.

## Coil Data DC @ $\mathbf{2 0}^{\circ} \mathrm{C}$

Nominal Coil Power: 330-800mW, dependent upon model.

| Nominal Voltage VDC | DC Resistance in Ohms $\pm 10 \%$ | Must Operate Voltage VDC | Drop-out Voltage VDC | Maximum Voltage VDC | Nominal Coil Current (mA) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Standard, non-latching models |  |  |  |  |  |
| 6 | 80 | 4.2 | 0.6 | 10.5 | 75.0 |
| 12 | 320 | 8.4 | 12 | 211 | 37.5 |
| 24 | 1,280 | 16.8 | 2.4 | 42.2 | 18.8 |
| 48 | 3,800 | 33.6 | 4.8 | 72.4 | 5.0 |
| Sensitive, non-latching models |  |  |  |  |  |
| 6 | 110 | 4.4 | 0.6 | 12.6 | 54.6 |
| 12 | 440 | 8.8 | 12 | 25.3 | 27.3 |
| 24 | 1,780 | 17.5 | 2.4 | 50.6 | 13.5 |
| 48 | 4,000 | 35.0 | 4.8 | 76.3 | 12.0 |
| Nominal Voltage VDC | DC Resistance in Ohms $\pm 10 \%$ | Must Operate Voltage VDC | Reset Voltage VDC | Maximum Voltage VDC | Nominal Coil Current (mA) |
| Latching models |  |  |  |  |  |
| 6 | 33 | 4.7 | 15 | 6.2 | 1818 |
| 12 | 119 | 9.4 | 3.0 | 12.4 | 100.8 |
| 24 | 475 | 18.7 | 6.0 | 24.7 | 50.5 |
| 48 | 1,750 | 37.4 | 12.0 | 49.4 | 27.4 |

## V23148 (U/UB) series <br> 7 Amp, Latching or Non-latching, Miniature Printed Circuit Board Relay

c90s File E214025
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time: 6 ms , standard model; 7 ms , sensitive model; 5 ms , latching model.
Release (Reset) Time: 3 ms .
Bounce Time (N/O contact / N/C contact) : $2 \mathrm{~ms} / 10 \mathrm{~ms}$.
Switching Rate: 180,000 ops./hr. max. at rated load.

## Environmental Data

Temperature Range:
Operating: $-25^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration: (10 to 55 Hz. ) 10g.
Shock (functional): 10 g at 11 ms , half-sine.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94 V-0 rated): Sealed (RTIII) plastic case.
Weight: $0.34 \mathrm{oz} .(9.5 \mathrm{~g})$ approximately.

Max. DC Load Breaking Capacity


## Coil Operating Range



## Ordering Information

| Typical Part Number $\downarrow$ V23148 | -A | 0 | 0 | 03 | -C | 101 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> V23148 = U/UB miniature printed circuit board relay. |  |  |  |  |  |  |
| 2. Version <br> A = Non-latching. B = Latching. |  |  |  |  |  |  |
| 3. Dielectric Strength, Coil-to-Contacts: $0=2,000 \mathrm{Vms}$. $1=4,000 \mathrm{Vrms}$ |  |  |  |  |  |  |
| 4. Coil Sensitivity: <br> $0=$ Standard. |  |  |  |  |  |  |
| $\begin{aligned} & \text { 5. Coil Voltage: } \\ & 03=6 \mathrm{VDC}\end{aligned} \quad 05=12 \mathrm{VDC} \quad 07=24 \mathrm{VDC} \quad 08=48 \mathrm{VDC}$ |  |  |  |  |  |  |
| 6. Contact Arrangement: $A=1$ Form C (SPDT) |  |  |  |  |  |  |
| 7. Contact Material: 101 = Silver-nickel 0.15 |  |  |  |  |  |  |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
None at present.

## Outline Dimensions




PC Board Layout (Bottom View)


## Wiring Diagrams (Bottom Views)

1 Form C


1 Form A


1 Form B


## T73 series



## Features

- 10 amp switching capacity.
- UL Class F $\left(155^{\circ} \mathrm{C}\right)$ coil insulation system standard.
- 1 Form A and 1 Form C contact arrangements.
- Ideal for domestic appliances, HVAC and security.
- Resists high temperature and various chemical solutions.
- Immersion cleanable, plastic sealed case available.


## Contact Data @ 20응

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Silver-cadmium oxide.
Max. Switching Rate: 240 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations.
Minimum Load: 10mA @ 5VDC
Initial Contact Resistance: 100 milliohms max. @ 100mA, 6VDC.
Contact Ratings @ $20^{\circ} \mathrm{C}$ with relay properly vented. Remove vent nib after soldering and cleaning.

| Contact <br> Arrang. | Typical Ratings | Type | Operations |
| :---: | :---: | :---: | :---: |
| $1 \& 5$ | $1 / 3 \mathrm{HP}$ NO @ 240VAC | Motor | 30,000 |
|  | 10A NO @ 120VAC | Resistive | 100,000 |
|  | 6A NO @ 120VAC | Resistive | 100,000 |
|  | 6A NO @ 24VDC | Resistive | 100,000 |
|  | 10A/5A @ 120VAC | Resistive | 100,000 |
|  | 1/4HP NO @ 120VAC | Motor |  |

Consult factory for other ratings.

## Initial Dielectric Strength

Between Open Contacts: 750VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: $2,000 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. (1 minute).

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{8}$ ohms min. @ 500VDC. Ag contact rating.

## Low Profile, 10 Amp <br> Printed Circuit Board Relay

## 미J File E29244

File LR48471
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

Voltage: 3 to 48VDC.
Nominal Power: 450 milliwatts.
660 milliwatts for 48VDC coil.
Coil Temperature Rise: 35C max, at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.
Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| Rated Coil <br> Voltage <br> (VDC) | Coil <br> Resistance <br> (Ohms) $+\mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| :---: | :---: | :---: | :---: |
| 3 | 20 | 1.95 | 0.15 |
| 5 | 56 | 3.25 | 0.25 |
| 6 | 80 | 3.90 | 0.30 |
| 9 | 180 | 5.85 | 0.45 |
| 12 | 320 | 7.80 | 0.60 |
| 18 | 720 | 11.7 | 0.90 |
| 24 | 1,150 | 15.6 | 1.20 |
| 48 | 3,500 | 31.2 | 2.40 |

## Operate Data @ 20 ${ }^{\circ} \mathrm{C}$

Operate Time: 10 ms (excluding bounce).
Release Time: 5 ms (excluding bounce).

## Environmental Data

Temperature Range:
Storage: $-40^{\circ} \mathrm{C}$ to $+130^{\circ} \mathrm{C}$.
Operating: $-30^{\circ} \mathrm{C}$ to $+80^{\circ} \mathrm{C}$.
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude Operational: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude.
Shock, Mechanical: 100 g min.
Operational: 10 g min .
Operating Humidity: 45 to $85 \%$ RH.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure ( $94 \mathrm{~V}-0$ Flammability Ratings):
Weight: 0.42 oz . (12g).

Figure 1 - Coil Temperature Rise


Operate Time


Life Expectancy


Note: Graphical data should not be used as a substitute for specific application verification. To be used for estimates only.

## Ordering Information



* Not suitable for immersion cleaning process.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

## T73S5D15-05

T73S5D15-12
T73S5D15-24

## Outline Dimensions



Wiring Diagrams (Bottom Views)
1 Form A


Suggested PC Board Layouts (Bottom Views) 1 Form A


1 Form C



## Features

- Low profile miniature power relay
- High density available on PC board due to small size.
- 450 mW coil available.
- Meets 2 kV dielectric between coil and contacts.
- Meets 5 kV surge voltage.
- Immersion cleanable, sealed version available.


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO), 1 Form C (SPDT).
Material: Ag Alloy.
Max. Switching Rate: 300 ops./min. (no load).
$30 \mathrm{ops} . / \mathrm{min}$. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: $100 \mathrm{~mA} @ 5 \mathrm{VDC}$.
Initial Contact Resistance: 100 milliohms @1A, 6VDC.

## Contact Ratings

Ratings: 10A @ 120VAC resistive,
10A @ 28 VDC resistive,
1/4 HP @ 120VAC.
3A @120VAC inductive ( $\cos \varnothing=0.4$ ),
3A @ 28VDC inductive ( $\mathrm{L} / \mathrm{R}=7 \mathrm{msec}$ ).
Max. Switched Voltage: AC: 240V.
DC: 110 V .
Max. Switched Current: 10A.
Max. Switched Power: 1,200VA, 300W.

## Initial Dielectric Strength

Between Open Contacts: $750 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. ( 1 minute).
Between Coil and Contacts: $2,000 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. ( 1 minute).
Surge Voltage Between Coil and Contacts: $5,000 \mathrm{~V}$ ( $1.2 / 50 \mu \mathrm{H}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDCM.

## Coil Data

Voltage: 5 to 48VDC.
Nominal Power: 450 mW except 48 VDC coil ( 660 mW )
Coil Temperature Rise: $60^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

## OUDH series

## 10 Amp Miniature, Sealed PC Board Relay

## Appliances, HVAC, Office Machines.

## 긴 UL File No. E58304

(\$18 CSA File No. LR48471


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Coil Data @ $20^{\circ} \mathrm{C}$

| OUDH |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| 5 | 89.6 | 56 | 3.75 | 0.50 |
| 6 | 75.0 | 80 | 4.50 | 0.60 |
| 9 | 50.0 | 180 | 6.75 | 0.90 |
| 12 | 37.5 | 320 | 9.00 | 1.20 |
| 24 | 20.9 | 1,280 | 18.00 | 2.40 |
| 48 | 13.7 | 3,500 | 36.00 | 4.80 |

## Operate Data

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: $10 \%$ of nominal voltage or more.
Operate Time: 10 ms max.
Release Time: 5 ms max.

## Environmental Data

## Temperature Range:

Operating: $-30^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to 55 Hz ., 1.5 mm double amplitude
Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ ( 100 G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure ( $94 \mathrm{~V}-0$ Flammability Ratings):
OUDH-SS: Vented (Flux-tight), plastic cover.
OUDH-SH: Sealed, plastic case.
Weight: $0.35 \mathrm{oz}(10 \mathrm{~g})$ approximately.

## Ordering Information

| Typical Part Number | OUDH | -SH | -1 | 12 | D | N | ,000 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: OUDH $=$ Miniature, sealed PC board relay. |  |  |  |  |  |  |  |
| 2. Enclosure: <br> SS = Vented (Flux-tight)* plastic cover. <br> SH = Sealed, plastic case. |  |  |  |  |  |  |  |
| 3. Termination: 1 = 1 pole |  |  |  |  |  |  |  |
| 4. Coil Voltage: $\begin{aligned} & 05=5 \mathrm{VDC} \\ & 06=6 \mathrm{VDC} \end{aligned} \quad 12=12 \mathrm{VDC} \quad 09=9 \mathrm{VDC} \quad 48=48 \mathrm{VDC} \quad 24=24 \mathrm{VDC}$ |  |  |  |  |  |  |  |
| 5. Coil Input: D = Standard |  |  |  |  |  |  |  |
| 6. Contact Arrangement: <br> Blank $=1$ Form C, SPDT <br> $\mathrm{M}=1$ Form $\mathrm{A}, \mathrm{SPST}-\mathrm{NO}$ |  |  |  |  |  |  |  |
| 7. Suffix: <br> ,000 = Standard model Other Suffix = Custom model |  |  |  |  |  |  |  |

* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
None at present.

## Outline Dimensions



Wiring Diagram (Bottom View)


PC Board Layout (Bottom View)


## Reference Data




## Features

- Low cost, reduced height, 10A relay.
- 1 Form A and 1 Form C contact arrangement.
- Plastic materials employ UL 94V-0 flammability.
- UL class F $\left(155^{\circ} \mathrm{C}\right)$ coil standard.
- Immersion cleanable, sealed package.
- Applications include appliance, HVAC, security system, garage opener light, emergency lighting.
- European "white goods" version available by special order.


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Silver-cadmium oxide.
Max. Switching Rate: Mechanical: 300 operations/min.
Electrical: 30 operations $/ \mathrm{min}$.
Expected Mechanical Life: 10 million operations min. (no load).
Expected Electrical Life: 100,000 operations min. (at rated coil voltage).
Minimum Contact Load: 10mA @ 5VDC.
Initial Contact Resistance: 100 milliohms, max. @ 1A, 6VDC.

UL Contact Ratings @ $\mathbf{2 0}^{\circ} \mathrm{C}$ with relay properly vented. Remove vent nib after soldering and cleaning.

| Contact <br> Arrang. | UL/CSA Ratings | Type | Operations |
| :---: | :---: | :---: | :---: |
| $1 \& 5$ | $1 / 4 \mathrm{HP}$ @ 240VAC | Motor | $1,000^{*}$ |
|  | 1/3HP @ 120VAC | Motor | 6,000 |
|  | $1 / 3 \mathrm{HP}$ NO @ 120VAC | Motor | 6,000 |
|  | $1 / 3 \mathrm{HP}$ NO @ 240VAC | Motor | $6,000^{* *}$ |
|  | 5A/5A @ 240VAC | Resistive | $6,000^{*}$ |
|  | 10A NO @ 240VAC | Resistive | 6,000 |
|  | 10A/5A @ 240VAC | Gen. Purpose | 6,000 |
|  | 1A NC @ 240VAC | Resistive | 6,000 |
|  | $1 / 6 \mathrm{HP}$ NC @ 240VAC | Motor | $6,000^{* *}$ |
|  | $1 / 4 \mathrm{HP}$ NO @ 240VAC | Motor | $6,000^{* *}$ |
|  | 1/10HP NO @ 120VAC | Motor | $6,000^{* *}$ |
|  | 10A/5A @ 240VAC | Resistive | $6,000^{* *}$ |
|  | TV-3 NO @ 120VAC | Tungsten | 25,000 |
|  | 6A NC @ 240VAC | Resistive | $25,000^{* *}$ |
|  | 10A/5A @ 240VAC | Resistive | 30,000 |
|  | 10A/5A @ 28VDC | Resistive | 30,000 |
|  | 10A NO @ 240VAC | Resistive | $30,000^{* *}$ |
|  | 10A NO @ 240VAC | Gen. Purpose | $30,000^{* *}$ |
|  | 34.8LRA/6FLA NO @ 120VAC | Motor | 100,000 |
|  | 10A/5A @ 120VAC | Resistive | 100,000 |
|  | 5A/5A @ 240VAC | Resistive | 100,000 |
|  | 10A/5A @ 28VDC | Resistive | 100,000 |

*Denotes test at $70^{\circ} \mathrm{C}$ ambient temperature.
${ }^{* *}$ Denotes test at $85^{\circ} \mathrm{C}$ ambient temperature.

## Initial Dielectric Strength

Between Open Contacts: 750VAC, $50 / 60 \mathrm{~Hz}$. ( 1 min .)
Between Coil and Contacts: $2,000 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. (1 min.)

## T7N series

## 10 Amp Miniature PC Board Relay

뮥 File E22575
(18) File LR48471

0

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{8}$ ohms, min. @ 500VDC.

## Coil Data

Voltage: 3 through 48VDC.
Nom. Power: 360 mW .
Coil Temp. Rise: See Figure 1.
Max. Coil Power: 150\% of nominal.
Duty Cycle: Continuous.

Coil Data @ $20^{\circ} \mathrm{C}$

| Rated Coil <br> Voltage <br> (VDC) | Coil <br> Resistance <br> $\mathbf{1 0 \%}$ (Ohms) | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| :---: | :---: | :---: | :---: |
| 3 | 25 | 2.1 | .15 |
| 5 | 70 | 3.5 | .25 |
| 6 | 100 | 4.2 | .30 |
| 9 | 225 | 6.3 | .45 |
| 12 | 400 | 8.4 | .60 |
| 18 | 900 | 12.6 | .90 |
| 24 | 1,600 | 16.8 | 1.20 |
| 36 | 3,600 | 25.2 | 1.80 |
| 48 | 6,400 | 33.6 | 2.40 |

Operate Data @ 20 ${ }^{\circ} \mathrm{C}$
Operate Time: 10 ms , max. (excluding bounce).
Release Time: 5 ms , max. (excluding bounce).

## Environmental Data

## Temperature Range:

Storage: $-40^{\circ} \mathrm{C}$ to $+130^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$. (no water condensation and no water drop).
Vibration: $10-55 \mathrm{~Hz} ., .063 "$ ( 1.6 mm ) double amplitude;
$10-55 \mathrm{~Hz} ., .079^{\prime \prime}(2.0 \mathrm{~mm})$ double amplitude.
Shock: Mechanical: 100 g minimum.
Operational: 10 g minimum.
Operating Humidity: 45 to $85 \%$ RH.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (UL 94V-O Flammability Ratings):
T7NS: Immersion cleanable case with knock-off nib for ventilation.
T7NV: Vented, flux-tight plastic cover.
Weight: 0.38 oz . (11g) approximately.

Figure 1 - Coil Temperature Rise


Operate Time


## Life Expectancy



Note: Graphical data should not be used as a substitute for specific application verification. To be used for estimates only.

Ordering Information


* Not suitable for immersion cleaning.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
T7NS1D1-12 T7NS5D1-05 T7NS5D1-24
T7NS1D1-24 T7NS5D1-12 T7NS5D1-48

## Outline Dimensions

Tolerance (unless otherwise noted): 3 decimal: $\pm .010$ ( $\pm .254$ ); 2 decimal: $\pm .015$ ( $\pm .381$ ).


Wiring Diagram (Bottom View)


## Suggested PC Board Layout (Bottom View)



## Socket

27E1064 socket is rated 10A @ 300VAC. UL Recognized for US and Canada. Designed to fit same suggested board layout as relay.


# PCE series 



## Features

- Small, low profile package, 10 Amp switching capacity.
- 1 Form A and 1 Form C contact arrangements.
- UL Class F $\left(155^{\circ} \mathrm{C}\right)$ insulation system standard
- Immersion cleanable, sealed version available.
- Applications include appliance, HVAC, security system, garage opener control, emergency lighting.


## Contact Data @ 20

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Ag Alloy, AgSnO.
Max. Switching Rate: $300 \mathrm{ops} . / \mathrm{min}$. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: 10A @ 250VAC resistive, 10A @ 120VAC resistive, 10A @ 28VDC resistive.
$3 \mathrm{~A} @ 250 \mathrm{VAC}$ inductive $(\cos \varnothing=0.4)$,
3A @ 120VAC inductive ( $\cos \varnothing=0.4$ ),
3A @ 28VDC inductive ( $\mathrm{L} / \mathrm{R}=7 \mathrm{msec}$ ).
Max. Switched Voltage: AC: 250V.
DC: 28 V .
Max. Switched Current: 10A.
Max. Switched Power: 2,500VA, 280W.

## Initial Dielectric Strength

Between Open Contacts: 750VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: 2,000VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 4,000V (1.2 / 50 1 s).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDCM.

## 10 Amp Miniature <br> Power PC Board Relay

## Appliances, HVAC, Office Machines

只 UL File No. E82292
(6A CSA File No. LR48471
VOE VDE File No. 6175
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data

Voltage: 6 to 48VDC.
Nominal Power: 360 mW
Coil Temperature Rise: $35^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.
Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| PCE |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
|  |  |  |  |  |
| 6 | 60 | 100 | 4.50 | 0.30 |
| 9 | 40 | 225 | 6.75 | 0.45 |
| 12 | 30 | 400 | 9.00 | 0.60 |
| 24 | 15 | 1,600 | 18.00 | 1.20 |
| 48 | 7 | 6,400 | 36.00 | 2.40 |

Operate Data
Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: 10 ms max.
Release Time: 5 ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ (100G approximately). Operational: 100m/s² (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
PCE: Sealed plastic case with knock-off nib for ventilation
Weight: $0.32 \mathrm{oz}(11 \mathrm{~g})$ approximately.

## Reference Data

## Coil Temperature Rise




Life Expectancy


Note: This data is based on the max. allowable
temperature for E type insulation coil $\left(115^{\circ} \mathrm{C}\right)$.


## Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

```
PCE-112D1MH,000
PCE-124D1MH,000
\[
\begin{aligned}
& \text { PCE-112D1H,000 } \\
& \text { PCE-124D1H,000 }
\end{aligned}
\]
```


## Outline Dimensions



## Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)


## Socket

27E1064 socket is rated 10A @ 300VAC. UL Recognized for US and Canada. Designed to fit same suggested board layout as relay.



## Features

- Compact relay with 1 Form A and 1 Form C contact arrangements.
- 10 Amp switching capacity.
- Flux-tight or sealed version available.
- Applications include appliance, HVAC, security system, garage opener control, emergency lighting.


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: AgCdO.
Max. Switching Rate: 300 ops./min. (no load).
20 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations at 10A @ 250VAC res. (NO). Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: 10A/6A @ 250VAC resistive (NO/NC), 10A/6A @ 28VDC resistive (NO/NC),
15A @ 120VAC resistive (NO),
15A @ 28VDC resistive (NO),
10A @ 277VAC resistive (NO).
Max. Switched Voltage: AC: 277V.
DC: 30V.
Max. Switched Current: 15A.
Max. Switched Power: $2,770 \mathrm{VA}, 360 \mathrm{~W}$.

## Initial Dielectric Strength

Between Open Contacts: 750VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: $1,500 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 3,000V (1.2 / 50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDC.

## Coil Data @ $20^{\circ} \mathrm{C}$

## Voltage: 3 to 48VDC.

Nominal Power: 360 mW
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

## ORWH series

## 10 Amp Miniature Power PC Board Relay

${ }_{c}$ Nins $_{\text {us }}$ File No. E82292

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| ORWH |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| 3 | 120.0 | 25 | 2.1 | 0.3 |
| 5 | 71.4 | 70 | 3.5 | 0.5 |
| 6 | 60.0 | 100 | 4.2 | 0.6 |
| 9 | 44.4 | 225 | 6.3 | 0.9 |
| 12 | 40.0 | 400 | 8.4 | 1.2 |
| 24 | 15.0 | 1,600 | 16.8 | 2.4 |
| 48 | 7.5 | 6,400 | 33.6 | 4.8 |

## Operate Data

Must Operate Voltage: 70\% of nominal voltage or less.
Must Release Voltage: 10\% of nominal voltage or more.
Operate Time: 10 ms max.
Release Time: 5 ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude
Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ (100G approximately). Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
ORWH-SS: Vented (flux-tight) cover.
ORWH-SH: Sealed plastic case. Note: Vent nib should be removed after soldering and cleaning.
Weight: $0.33 \mathrm{oz}(9.5 \mathrm{~g})$ approximately.

## Ordering Information



* Not suitable for immersion cleaning

Ourauthorized distributors aremorelikelyto maintainthefollowingitems instockforimmediatedelivery.

| ORWH-SH-112DM,N000 | ORWH-SH-109D,N000 | ORWH-SS-112DM,N000 | ORWH-SS-106D,N000 | ORWH-SS-148D,N000 |
| :--- | :--- | :--- | :--- | :--- |
| ORWH-SH-124DM,N000 | ORWH-SH-112D,N000 | ORWH-SS-124DM,N000 | ORWH-SS-109D,N000 |  |
| ORWH-SH-105D,N000 | ORWH-SH-124D,N000 | ORWH-SS-148DM,N000 | ORWH-SS-112D,N000 |  |
| ORWH-SH-106D,N000 | ORWH-SH-148D,N000 | ORWH-SS-105D,N000 | ORWH-SS-124D,N000 |  |

## Outline Dimensions



TERMINAL DIMENSIONS:
COIL: 0.024 (0.6) DIA.
LOAD: $0.12 \times 0.35(0.3 \times 0.9)$

Note: Only necessary terminals are present on 1 Form A models.

## Socket

27E1064 socket is rated 10A @ 300VAC. UL Recognized for US and Canada. Designed to fit same suggested board layout as relay.


## Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)



# T7C series 



## Features

- Up to 12 amp switching capacity.
- UL Class F $\left(155^{\circ} \mathrm{C}\right)$ coil insulation system.
- 1 Form A and 1 Form C contact arrangements.
- Ideal for domestic appliances, HVAC and security.
- Resists high temperature and various chemical solutions.

Contact Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$
Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Silver-cadmium oxide or silver.
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations.
Minimum Load: 10mA @ 5VDC
Initial Contact Resistance: Ag: 100 milliohms max. @ 100mA, 6VDC. AgCdO: 100 milliohms max. @ 1A, 6VDC.

Silver Cadmium Oxide Contact Ratings @ $20^{\circ} \mathrm{C}$ with relay properly vented. Remove vent nib after soldering and cleaning.

| Contact <br> Arrang. | UL/CSA Ratings | Type | Operations |
| :---: | :---: | :---: | :---: |
| $1 \& 5$ | 1/3HP NO @ 120VAC | Motor | $6,000^{* *}$ |
|  | TV-2 NO @ 120VAC | Tungsten | $25,000^{* *}$ |
|  | 5.4LRA/O.9FLA NO @ 240VAC | M otor | $30,000^{* * *}$ |
|  | 10LRA/1.5FLA @ 120VAC | Motor | $30,000^{* * *}$ |
|  | 12A NO @ 120VAC | Resistive/GP | $100,000^{*}$ |
|  | $34.8 L R A / 6 F L A ~ N O ~ @ ~ 120 V A C ~$ | Motor | $100,000^{* *}$ |
|  | 10A/5A @ 240VAC | Resistive/GP | $100,000^{* *}$ |
|  | 10A/5A @ 28VDC | Resistive | $100,000^{* *}$ |
|  | 240VA, 240VAC | Pilot Duty | $100,000^{* *}$ |
|  | 4LRA/4FLA NO @ 120VAC | Motor | $100,000^{* * * *}$ |
|  | 4LRA/2FLA NC @ 120VAC | Motor | $100,000^{* * * *}$ |
|  | 6LRA/6FLA NO @ 120VAC | Motor | $100,000^{* * *}$ |
|  | 7A @ 277VAC | Resistive/GP | 100,000 |
|  | 10LRA/2.5FLA NO @ 277VAC | Motor | 100,000 |

Consult factory for other ratings.
*Denotes test at $60^{\circ} \mathrm{C}$ ambient temperature
${ }^{* *}$ Denotes test at $70^{\circ} \mathrm{C}$ ambient temperature.
***Denotes test at $85^{\circ} \mathrm{C}$ ambient temperature.
****Denotes test at $105^{\circ} \mathrm{C}$ ambient temperature.

Silver Contact Ratings @ $20^{\circ} \mathrm{C}$ with relay properly vented.
Remove vent nib after soldering and cleaning.

| Contact <br> Arrang. | Ratings | Type | Operations |
| :---: | :---: | :---: | :---: |
| 1\& 5 | 5A @ 120VAC | Resistive | 6,000 |
|  | 5A @ 28VDC | Resistive | 6,000 |

## 5-12 Amp Miniature Power PC Board Relay

## 听 File E22575

## (6B) File LR48471

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Initial Dielectric Strength
Between Open Contacts: 750VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: 1,500VAC $50 / 60 \mathrm{~Hz}$. (1 minute)

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{8}$ ohms min. @ 500VDC.
Coil Data @ 20응
Voltage: 3 to 48VDC.
Nominal Power: 360 milliwatts. 510 milliwatts for 48VDC coil.
Coil Temperature Rise: 35C max, at rated coil voltage.
Max. Coil Voltage: 130\% of nominal.
Duty Cycle: Continuous.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| Rated Coil <br> Voltage <br> (VDC) | Coil Resistance <br> (Ohms) +10\% | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| :---: | :---: | :---: | :---: |
| 3 | 25 | 2.25 | 0.15 |
| 5 | 70 | 3.50 | 0.25 |
| 6 | 100 | 4.50 | 0.30 |
| 9 | 225 | 6.75 | 0.45 |
| 12 | 400 | 9.00 | 0.60 |
| 24 | 1,600 | 18.00 | 1.20 |
| 48 | 4,500 | 36.00 | 2.40 |

## Operate Data @ $20^{\circ} \mathrm{C}$

Operate Time: 10 ms (excluding bounce).
Release Time: 5 ms (excluding bounce).

## Environmental Data

Temperature Range:
Storage: $-40^{\circ} \mathrm{C}$ to $+130^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude
Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: 100 g min.
Operational: 10 g min .
Operating Humidity: 45 to $85 \%$ RH.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
T7CS: Immersion cleanable with knock-off nib.
T7CV: Vented, flux-tight, plastic cover with knock-off nib.
Weight: 0.42 oz . (12g).

Figure 1 - Coil Temperature Rise


Operate Time


Life Expectancy


Note: Graphical data should not be used as a substitute for specific application verification. To be used for estimates only. Graphical data applicable to model with silver cadmium oxide contacts.

## Ordering Information



* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| T7CV5D-05 | T7CV5D-12 | T7CS5D-05 | T7CS5D-12 |
| :--- | :--- | :--- | :--- |
| T7CV5D-06 | T7CV5D-24 | T7CS5D-06 | T7CS5D-24 |

## Outline Dimensions



## Wiring Diagrams (Bottom Views)

## 1 Form A



## 1 Form C



## Socket

27E1064 socket is rated 10A @ 300VAC. UL Recognized for US and Canada. Designed to fit same suggested board layout as relay.


## Suggested PC Board Layouts (Bottom Views)

1 Form A


1 Form C


## Hold-Down Spring

$\mathbf{2 0 C 4 3 0}$ spring is designed to secure T7C relay in 27E1064 socket.



| Dimensions are show $n$ for reference purposes only. | Dimensions are in inches over (millimeters) unless otherw ise specified. | Specifications and availability subject to change. | www.tycoelectronics.com Technical support: <br> Refer to inside back cover |
| :---: | :---: | :---: | :---: |



## Features

- Small package, 12 Amp switching capcity.
- 1 Form A and 1 Form C contact arrangements.
- Immersion cleanable, sealed version available.
- Applications include appliance, HVAC, security system, garage opener control, emergency lighting.


## Contact Data @ 20ㅇ

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Ag Alloy.
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100 mA @ 5 VDC .
Initial Contact Resistance: 100 milliohms @1A, 6VDC.

## Contact Ratings

Ratings: 12A @120VAC resistive, 10A @ 240 VAC resistive, 10A @ 28VDC resistive.

4A @120VAC inductive $(\cos \varnothing=0.4)$,
4A @ 28VDC inductive ( $\mathrm{L} / \mathrm{R}=7 \mathrm{msec}$ )
Max. Switched Voltage: AC: 240V.
DC: 28 V .
Max. Switched Current: 12A.
Max. Switched Power: 2,400VA, 300W.

## Initial Dielectric Strength

Between Open Contacts: $750 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. ( 1 minute).
Between Coil and Contacts: $1,500 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 3,000V (1.2 / 50 $\mathrm{\mu s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDCM.

## SRUDH series

## 12 Amp Miniature <br> Power PC Board Relay

## Appliances, HVAC, Office Machines

只 UL File No. E82292
(818 CSA File No. LR48471
$\triangle$ TUV File No. R60271
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data

Voltage: 6 to 48VDC.
Nominal Power: 360 mW except 48VDC coil ( 510 mW )
Coil Temperature Rise: $35^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: $130 \%$ of nominal.
Duty Cycle: Continuous.
Coil Data @ $20^{\circ} \mathrm{C}$

| SRUDH |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm$ 10\% | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |  |
|  | 60 | 100 | 4.50 | 0.60 |  |
| 6 | 40 | 225 | 6.75 | 0.90 |  |
| 9 | 30 | 400 | 9.00 | 1.20 |  |
| 12 | 15 | 1,600 | 18.00 | 2.40 |  |
| 24 | 10 | 4,500 | 36.00 | 4.80 |  |
| 48 |  |  |  |  |  |

## Operate Data

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: $10 \%$ of nominal voltage or more.
Operate Time: 15 ms max.
Release Time: 5 ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude Operational: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ ( 100 G approximately). Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure ( $94 \mathrm{~V}-0$ Flammability Ratings):
SRUDH-SS: Vented (Flux-tight) plastic cover
SRUDH-SH: Sealed plastic case
Weight: $0.42 \mathrm{oz}(12 \mathrm{~g})$ approximately.

## Reference Data




Note: Rise data is based on the max. allowable temp. for E type insulation coil $\left(115^{\circ} \mathrm{C}\right)$.

## Ordering Information

| Typical Part Number ${ }^{\text {l }}$ | SRUDH | -SS | -1 | 12 | D | M | 1 | ,000 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> SRUDH = M iniature Power PC board relay. |  |  |  |  |  |  |  |  |
| 2. Enclosure: <br> SS = Vent (Flux-tight)* plastic cover. <br> SH = Sealed, plastic case. |  |  |  |  |  |  |  |  |
| 3. Termination: 1 = 1 pole |  |  |  |  |  |  |  |  |
| 4. Coil Voltage: $\begin{array}{lll}06=6 \mathrm{VDC} & 12=12 \mathrm{VDC} & 48=48 \mathrm{VDC} \\ 09=9 \mathrm{VDC} & 24=24 \mathrm{VDC} & \end{array}$ |  |  |  |  |  |  |  |  |
| 5. Coil Input: D = Standard |  |  |  |  |  |  |  |  |
| 6. Contact Arrangement: <br> Blank = 1 Form C, SPDT <br> M $=1$ Form A, SPST-NO |  |  |  |  |  |  |  |  |
| 7. Contact Material: 1 = AgCdO |  |  |  |  |  |  |  |  |
| 8. Suffix: , $000=$ Standard model $\quad$ Other Suffix = Custom model |  |  |  |  |  |  |  |  |

* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
SRUDH-SH-112D1,000 SRUDH-SH-112DM 1,000

SRUDH-SH-124D1,000 SRUDH-SH-124DM 1,000

## Outline Dimensions



## Socket

27E1064 socket is rated 10A @ 300VAC. UL Recognized for US and Canada. Designed to fit same suggested board layout as relay.


Wiring Diagram (Bottom View)


PC Board Layout (Bottom View)


## Hold-Down Spring

$\mathbf{2 0 C 4 3 0}$ spring is designed to secure SRUDH relay in 27E1064 socket.

$\square$


## SRUUH series

## 15 Amp Miniature Power PC Board Relay

## cTs us UL File No. E82292 <br> - TUV File No. R60271

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- 15 Amp switching capacity.
- 1 Form A and 1 Form C contact arrangements.
- Immersion cleanable, sealed version available.
- Applications include appliance, HVAC, security system, garage opener control, emergency lighting.


## Contact Data @ 20응

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Silver cadmium oxide.
Max. Switching Rate: 300 ops./min. (no load).
20 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load, relay vented).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: 15A @120VAC resistive, 10A @ 240VAC resistive, 10A @ 28VDC resistive.
Max. Switched Voltage: AC: 240V.
DC: 28V.

Max. Switched Current: 15A.
Max. Switched Power: 2,400VA, 300W.
Note: Sealed relays should be vented after soldering and cleaning in order to achieve listed ratings.

## Initial Dielectric Strength

Between Open Contacts: 750VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: $1,500 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 3,000V (1.2 / 50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 100M ohms min. @ 500VDC.

## Coil Data

Voltage: 3 to 48VDC.
Nominal Power: 360 mW except 48VDC coil (510mW).
Coil Temperature Rise: $60^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| SRUUH |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |  |
| 3 | 120 | 25 | 2.25 | 0.30 |  |
| 6 | 60 | 100 | 4.50 | 0.60 |  |
| 9 | 40 | 225 | 6.75 | 0.90 |  |
| 12 | 30 | 400 | 9.00 | 1.20 |  |
| 24 | 15 | 1,600 | 18.00 | 2.40 |  |
| 48 | 10 | 4,500 | 36.00 | 4.80 |  |

## Operate Data

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 10\% of nominal voltage or more.
Operate Time: 15 ms max.
Release Time: 5 ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude
Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ (100G approximately).
Operational: 100m/s² (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit temminals.
Enclosure (94V-0 Flammability Ratings):
SRUUH-SS: Vented (Flux-tight) plastic cover
SRUUH-SH: Sealed plastic case
Weight: $0.42 \mathrm{oz}(12 \mathrm{~g})$ approximately.


* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

## Outline Dimensions



## Socket

27E1064 socket is rated 10A @ 300VAC. UL Recognized for US and Canada. Designed to fit same suggested board layout as relay.


Wiring Diagram (Bottom View)


PC Board Layout (Bottom View)


Note: Only necessary terminals are present on 1 Form A (SPST-NO) models.

## Hold-Down Spring

$\mathbf{2 0 C 4 3 0}$ spring is designed to secure SRUUH relay in 27E1064 socket.




## Features

- SPST through DPDT contact arrangements.
- Immersion cleanable and flux tight versions available.
- VDE 10mm spacing, 5 kV dielectric, coil to contacts.
- UL Class $\mathrm{F}\left(155^{\circ} \mathrm{C}\right)$ coil insulation system.
- Conforms to UL 508, 1873, 353 and 1950.
- Low profile; 15.7 mm height.
- Sensitive coil; 400 mW .
- Withstand surge voltage of $10,000 \mathrm{~V}$.
- Potter \& Brumfield or Schrack brand.


## Contact Data

Arrangements: 1 Form A (SPST-NO) Wiring Diagram Code 1, 2,3.
2 Form A (DPST-NO) Wiring Diagram Code 5.
1 Form C (SPDT) Wiring Diagram Code 1, 2, 3. 2 Form C (DPDT) Wiring Diagram Code 5.
Material: Silver-nickel 90/10.
Minimum Load: 12V/100mA.
Expected Mechanical Life: 10 million operations.
Initial Contact Resistance: 100 milliohms max @ 1A 12VDC.
Designed to meet UL/CSA/VDE ratings with relay properly vented. Remove vent nib after soldering and cleaning.

UL/CSA/VDE Ratings @ $\mathbf{2 5}^{\circ} \mathrm{C}$

| Code | NO/NC Load | Type | Operations |
| :---: | :---: | :---: | :---: |
| 1 | 10A/10A @ 277VAC | Resistive/GP | 100K |
|  | 10A/10A @ 30VDC | Resistive | 100K |
|  | 12A/12A @ 250VAC | Resistive/GP | 30K |
|  | 12A/12A @ 30VDC | Resistive | 30K |
|  | 3/4 HP @ 480VAC* | M otor | 6K |
|  | 1/2 HP @ 240VAC* | M otor | 6K |
|  | 1/3 HP @ 120VAC* | M otor | 6K |
|  | 48 LRA/10 FLA @ 240VAC* | M otor | 30K |
|  | TV-3 @ 120VAC* | Tungsten | 25K |
|  | A300, 720VA @ 240VAC* | Pilot Duty | 30K |
| 3 | 16A/16A @ 250VAC | Resistive/GP | 50K |
|  | 20A/20A @ 277VAC | Resistive/GP | 30K |
|  | 20A/20A @ 24VDC | Resistive | 30K |
|  | 16A/16A @ 30VDC | Resistive | 30K |
|  | 1 HP @ 480VAC* | M otor | 6K |
|  | 1 HP @ 240VAC* | M otor | 6K |
|  | 1/2 HP @ 120VAC* | M otor | 6K |
|  | 60 LRA/10 FLA @ 250VAC* | M otor | 30K |
|  | TV-5 @ 120VAC* | Tungsten | 25K |
|  | A300, 720VA @ 240VAC* | Pilot Duty | 30K |
|  | B300, 360VA @ 240VAC** | Pilot Duty | 30K |
| 5 | 8A/8A @ 277VAC | Resistive/GP | 100K |
|  | 8A/8A @ 30VDC | Resistive | 100K |
|  | 10A/10A @ 250VAC | Resistive/GP | 30K |
|  | 10A/10A @ 30VDC | Resistive | 30K |
|  | 1/2 HP @ 240VAC* | M otor | 6K |
|  | 1/4 HP @ 120VAC* | M otor | 6K |
|  | 34.8 LRA/6 FLA @ 120VAC* | M otor | 30K |
|  | 17.4 LRA/5 FLA @ 240VAC* | Motor | 30K |
|  | B300, 360VA @ 240VAC* | Pilot Duty | 30K |
|  | TV-3 @120VAC* | Tungsten | 25K |

* Form A only
** Form B only


## Initial Dielectric Strength

Between Open Contacts: $>1,000 \mathrm{VAC}$ (1 minute).
Between Poles (code 5): >2,500VAC (1 minute).
Between Coil and Contacts: $>5,000$ VAC ( 1 minute).
Surge Voltage (DC): $>10,000 \mathrm{VAC} \times(12 \times 50 \mu \mathrm{sec})$.

## RT series (DC Coil) <br> 16 Amp PC Board <br> Miniature Relay

${ }^{\text {c }} \mathbf{N H}_{\text {us }}$ File E22575
(18) File LR15734

ㄴor NR 6106
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: 5 to 110 VDC .
Nominal Power @ $25^{\circ} \mathrm{C}$ : 400 mW .
Duty Cycle: Continuous.
Initial Insulation Resistance: 10,000 megohms, min., at $25^{\circ} \mathrm{C}, 500 \mathrm{VDC}$ and $50 \%$ rel. humidity.
Coil Construction: UL Class F $\left(155^{\circ} \mathrm{C}\right)$.
Coil Data @ $25^{\circ} \mathrm{C}$

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) $-\mathbf{5 0 / 6 0 H z}$ |
| :---: | :---: | :---: | :---: |
| 005 | 62 | 3.5 | 80 |
| 006 | 90 | 4.2 | 66.7 |
| 009 | 202 | 6.3 | 44.4 |
| 012 | 360 | 8.4 | 33.3 |
| 018 | 810 | 12.6 | 22.2 |
| 024 | 1,440 | 16.8 | 16.7 |
| 048 | 5,760 | 33.6 | 8.3 |
| 060 | 9,000 | 42.0 | 8.0 |
| 110 | 30,250 | 77.0 | 4.3 |

Max. Ambient Temp. vs. Coil Voltage


A: Coil temperature $=$ Ambient temperature .
B: $110 \%$ of nominal coil voltage at rated contact load.

## Operate Data @ $25^{\circ} \mathrm{C}$

Must Operate Voltage(DC): 70\% of nominal.
Must Release Voltage(DC): 10\% of nominal.
Operate Time (Excluding Bounce):
7 ms , typ., 15ms max. at nom. voltage.
Release Time (Excluding Bounce):
3 ms , typ., 6 ms max. at nom. voltage.

## Environmental Data

Temperature Range:
Storage: $-40^{\circ} \mathrm{C}$ to $+105^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$ at rated current.
Vibration, Operational
N.O.:0.065" (165mm) max. excursions from $10-55 \mathrm{~Hz}$ :
N.C.:0.032" (0.82mm) max. excursions from $10-55 \mathrm{~Hz}:$ with no contact opening $>10 \mu \mathrm{~s}$.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosures: RT 1, 2, 3, 4: Flux-tight, top vented, plastic case.
RT B, C, D, E: Immersion cleanable, plastic case.
Weight: 0.35 oz . ( 10 g ) approximately.

## Ordering Information (DC Coil Models)



| Our authorized distributors are more likely to stock the following items for immediate delivery. |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| RT114012F | RTB14012F | RTB34024F | RTD14005F | RTD34012F | RTE24005F | RTE44012F |
| RT114024F | RTB14024F | RT314012F | RTD14012F | RT424012F | RTE24012F | RTE44024F |
| RTB14005F | RTB34012F | RT314024F | RTD14024F | RT424024F | RTE24024F |  |

## Outline Dimensions



## PC Board Layouts (Bottom View)



Code 1


Code 2

Code 3 \& 5
Notes: 1 On single throw models, only necessary terminals are present.
2. With the recommended PCB hole sizes, a grid with a pattem from 0.0984 to 0.1 in (2.5-2.54 mm ) can be used.

## Wiring Diagrams (Bottom View)

1 Pole 12A
1 Pole 16A
2 Pole 8A


Codes 1 \& 2


Code 3


Code 5

Note: On single throw models, only necessary terminals are present.

Breaking Capacity


A: 16A Version.
B: 12A Version.


A: 1 Contact.
B: 2 Contacts in series.

Contact Life for Resistive AC Load (Typical)


Note: Data from 250 VAC @ $70^{\circ} \mathrm{C}$.


# $R T$ series (AC Coil) <br> 16 Amp Miniature <br> Printed Circuit Board Relay 

${ }^{\text {c }} \mathbf{N u s}_{\text {us }}$ File E214025
$\therefore$ NR 6106

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- SPST through DPDT contact arrangements.
- Immersion cleanable and flux tight versions available.
- M eets VDE 10 mm spacing, 5 kV dielectric, coil to contacts.
- Conforms to UL 508, 1873 and 353.
- UL Class F $\left(155^{\circ} \mathrm{C}\right)$ coil construction
- Schrack brand


## Contact Data

Arrangements: 1 Form A (SPST-NO) Wiring Diagram Code 1, 2, 3.
2 Form A (DPST-NO) Wiring Diagram Code 5.
1 Form C (SPDT) Wiring Diagram Code 1, 2, 3.
2 Form C (DPDT) Wiring Diagram Code 5.
Material: Silver-nickel 90/10.
Minimum Load: 12V/100mA.
Expected Mechanical Life: 10 million operations.
Designed to meet UL/CSA/VDE ratings with relay properly vented. Remove vent nib after soldering and cleaning.

UL/CSA Ratings @ $\mathbf{2 5}^{\circ} \mathrm{C}$ :

| Code | NO/NC Load | Type | Operations |
| :---: | :---: | :---: | :---: |
| 1 | 12A NO @ 240VAC | GP | 30 K |
|  | 10A/5A @ 240VAC | Resistive/GP | 100 K |
|  | 8A @ 28VDC | Resistive | 30 K |
|  | 1 HP @ 240VAC* | Motor | 6 K |
|  | 1/2 HP @ 120VAC* | Motor | 6 K |
|  | 8A @ 28VDC* | Resistive | 30 K |
|  | B300 | Pilot Duty | 6 K |
| 3 | 16A/8A @ 240VAC | GP | 6 K |
|  | 8A @ 28VDC | Resistive | 30 K |
|  | $1 / 2$ HP @ 120VAC* | Motor | 6 K |
|  | 1HP @ 240VAC* | Motor | 6 K |
|  | 48 LRA, 8 FLA @ 240VAC | Motor | 30 K |
|  | B300 | Pilot Duty | 6 K |
| 5 | 8A @ 240VAC | Resistive | 30 K |
|  | 8A @ 28VDC | Resistive/GP | 30 K |
|  | 1/2 HP @ 240VAC | Motor | $6 K$ |
|  | $1 / 4$ HP @ 120VAC | Motor | 6 K |
|  | B300 | Pilot Duty | 6 K |
|  |  |  |  |
|  |  |  |  |

* Form A only

VDE Ratings @ $25^{\circ} \mathrm{C}$ :

| Code | NO/NC Load | Type | Operations |
| :---: | :---: | :---: | :---: |
| 1 | 12A @ 250VAC | Resistive | 30K |
|  | 12A @ 250VAC | Resistive | 100K |
| 3 | 16A @ 250VAC | Resistive | 10 K |
|  | 16A @ 250VAC | Resistive | 50K |
| 5 | 8A @ 250VAC | Resistive | 30 K |
|  | 8A @ 250VAC | Resistive | 50 K |

## Initial Dielectric Strength

Between Open Contacts: $>1,000 \mathrm{VAC}$ ( 1 minute).
Between Poles (code 5): >2,500VAC (1 minute).
Between Coil and Contacts: $>5,000 \mathrm{VAC}$ ( 1 minute).
Creepage/Clearance, Coil to Contact: $10 / 10 \mathrm{~mm}$.

## Coil Data @ $20^{\circ} \mathrm{C}$

Voltage: 24, 115, 230VAC (consult factory for availability of other voltages).
Nominal Power @ $25^{\circ} \mathrm{C}$ : .75VA.
Duty Cycle: Continuous.
Initial Insulation Resistance: 10,000 megohms, min., at $20^{\circ} \mathrm{C}, 500 \mathrm{VDC}$ and $50 \%$ rel. humidity.
Coil Construction: UL Class F $\left(155^{\circ} \mathrm{C}\right)$.

## Coil Data

| Nominal <br> Voltage <br> VAC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VAC | Drop-out <br> Voltage <br> VAC | Nominal <br> Coil <br> Current <br> $(\mathbf{m A )}-\mathbf{5 0 H z}$. | Nominal <br> Coil <br> Current <br> $(\mathbf{m A )}-\mathbf{6 0 H z}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 24 | 350 | 18.0 | 3.6 | 316 | 24.3 |
| 115 | 8,100 | 86.3 | 17.3 | 6.6 | 5.1 |
| 230 | 32,500 | 172.5 | 34.5 | 3.3 | 2.3 |

## Max. Ambient Temp. vs. Coil Voltage



A: Coil temperature = Ambient temperature.
B: 110\% of nominal coil voltage at rated contact load.

## Operate Data

Must Operate Voltage: See coil data.
Operate Time (Excluding Bounce): 8 ms , typ., at nom. voltage.
Release Time (Excluding Bounce): 11 ms , typ., at nom. voltage.

## Environmental Data

Temperature Range:
Storage: $-40^{\circ} \mathrm{C}$ to $+105^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$ at rated current.
Vibration: 30-150 Hz: at 20 g with no contact opening $>10 \mu \mathrm{~s}$ on the N.O. contact; at 5 g with no contact opening $>10 \mu \mathrm{~s}$ on the N.C. contact.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosures: RT 1, 2, 3, 4: Flux-tight, top vented, plastic case.
RT B, C, D, E: Immersion cleanable, plastic case.
Weight: 0.42 oz. (12g) approximately.

|  | 14 | 524 |
| :---: | :---: | :---: |
| 1. Basic Series: <br> RT $=$ Miniature, printed circuit board relay. |  |  |
| 2. Enclosure: $\begin{array}{ll} 1=1 \text { pole } 12 \mathrm{~A}, \text { Pinning } 3.5 \mathrm{~mm} \text {, flux-tight (Code } 1 \text { ). } & \mathrm{B}=1 \text { pole } 12 \mathrm{~A} \text {, Pinning } 3.5 \mathrm{~mm} \text {, sealed (Code } 1 \text { ). } \\ 2=1 \text { pole } 12 \mathrm{~A}, \text { Pinning } 5 \mathrm{~mm} \text {, flux-tight (Code } 2) . & \mathrm{C}=1 \text { pole } 12 \mathrm{~A} \text {, Pinning } 5 \mathrm{~mm} \text {, sealed (Code 2). } \\ 3=1 \text { pole } 16 \mathrm{~A} \text {, Pinning } 5 \mathrm{~mm} \text {, flux-tight (Code } 3 \text { ). } & \mathrm{D}=1 \text { pole } 16 \mathrm{~A} \text {, Pinning } 5 \mathrm{~mm} \text {, sealed (Code } 3 \text { ). } \\ 4=2 \text { pole } 8 \mathrm{~A} \text {, Pinning } 5 \mathrm{~mm} \text {, flux-tight (Code } 5) . & E=2 \text { pole } 8 \mathrm{~A} \text {, Pinning } 5 \mathrm{~mm} \text {, sealed (Code } 5) . \\ \hline \end{array}$ |  |  |
| 3. Contact Arrangement: <br> $1=1$ Form C (SPDT) (Requires wiring diagram codes 1, 2 or 3.) <br> $2=2$ Form C (DPDT) (Requires wiring diagram code 5.) <br> 3 = 1 Form A (SPST-NO) (Requires wiring diagram codes 1, 2 or 3.) <br> $4=2$ Form A (DPST-NO) (Requires wiring diagram code 5.) |  |  |
| 4. Contact Material: 4 = Silver-nickel 90/10. |  |  |
| 5. Coil Voltage: $524=24 \mathrm{VAC} \quad 615=115 \mathrm{VAC} \quad 730=230 \mathrm{VAC}$ |  |  |

Note: All AC coil model RT part numbers are Schrack brand, are orange in color and have UL Class $\mathrm{F}\left(155^{\circ} \mathrm{C}\right)$ coil construction.
Our authorized distributors are more likely to stock the following items for immediate delivery.

| RTB14524 | RTD14524 | RTE24524 |
| :--- | :--- | :--- |
| RTB14615 | RTD14615 | RTE24615 |
| RTB14730 | RTD14730 | RTE24730 |

## Outline Dimensions



Notes: 1 On single throw models, only necessary terminals are present.

1. On single throw models, only necessary terminals are present.
2. With the recommended PCB hole sizes, a grid with a pattem from 0.0984 to 0.1
in $(2.5-2.54 \mathrm{~mm})$ can be used. in ( $2.5-2.54 \mathrm{~mm}$ ) can be used.

## Wiring Diagrams (Bottom View)

Code 3 \& 5
are present.
Breaking Capacity
1 Pole


A: 16A Version.
B: 12A Version.

Contact Life for Resistive AC Load (Typical)



A: 1 Contact.
B: 2 Contacts in series.

Note: Data from $250 \mathrm{VAC} @ 70^{\circ} \mathrm{C}$.


Codes 1 \& 2


Code 3


Code 5

Note: On single throw models, only necessary terminals are present.


## RT series

Sockets and Accessories
이 File E135149
(61 File LR14385
(NR 5318

RT78625 ${ }^{1,2}$
1 Pole 10A, 250VAC
2 Pole 2x 10A, 250VAC
5mm Pinning


Hold-Down Spring RT16016

RP78601 ${ }^{1}$
10A, 250VAC
3.5mm Pinning


Hold-Down Spring RP16041


Hold-Down Spring RT16016

RT78626 ${ }^{1,2}$
1 Pole 12A, 300VAC
2 Pole $2 x$ 12A, 300VAC
5mm Pinning


Ejector/Hold-Down Spring RT16016 ${ }^{3}$

## Socket and Accessory Selection Table

Stock items are boldfaced.

| Socket | Socket Termination | Hold-Down Spring |
| :--- | :--- | :--- |
| RT78624 $^{1,2}$ | DIN Screw Terminal Socket | RT16016 |
| RT78625 $^{1,2}$ | DIN Screw Terminal Socket | RT16016 |
| RT78626 $^{1}$ | DIN Screw Terminal Socket | RT16016 |
| RP78601 $^{1}$ | PCB Terminal Socket | RY16041 |
| RP78602 $^{1}$ | PCB Terminal Socket | RY16041 |
| RPMT00A0 $^{\text {RPM }}$ | Protection Diode Module 1N40074 | - |
| RPMU0548 | RC Network M odule 24-48VAC | - |
| RPMU0730 | RC Network Module 110-230VAC | - |
| RPML0024 | LED Module 12-24VDC | - |
| RPML0524 | LED Module 12-48VACNDC | - |
| RPML0110 | LED Module 110VDC | - |
| RPML0730 | LED Module 110-230VAC | - |

RP78602 ${ }^{1}$
1 Pole 10A, 250VAC
2 Pole 2x 10A, 250VAC
5mm Pinning


Hold-Down Spring RP16041

## * Note

1. Not suitable for bistable relay with two coils.
2. For a 16A 1 pole relay the following jumpers have to be connected; 11 to 21,12 to 22 and 14 to 24 .
3. Insertion of the relay.

First the ejector (and eventually the module) has to be mounted onto the socket. Then the relay has to be set in the correct position and pressed into the socket until the ejector snaps over the top of the relay.
4. Standard polarity: A1:+, A2:-


## Features

- Sensitive coil requires only 250 mW .
- 10A contacts in 1 Form A (SPST-NO) or 1 Form C (SPDT) arrangement.
- UL Class F coil construction.
- $5 \mathrm{kV} / 10 \mathrm{~mm}$ contact-to-coil.


## Contact Data

Arrangements: 1 Form A (SPST-NO) or 1 Form C (SPDT), single contact.

## Material: Silver-nickel 90/10.

Expected Mechanical Life: 30 million operations.
Ratings:
Current: 10A.
Voltage: 250VAC.
Power (breaking): 2,500 VA.
Voltage (breaking): 440VAC.
Current (making, max. 4s at 10\% duty cycle): 15A.
Load/Life
8A, 250VAC; 430,000 ops.
370W, 230VAC, compressor, NO contact; >330,000 ops.
$550 \mathrm{~W}, 250 \mathrm{VAC}$, incandescent, NO contact; 190,000 ops.
$0.8 \mathrm{~A}_{\text {peak }} / 0.08 \mathrm{~A}, 230 \mathrm{VAC}, \cos \varphi=0.23$,
contactor 190 / 90 VA, NO contact; >8.8 million ops.

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms
Between Coil and Contacts: $5,000 \mathrm{Vrms}$.
Creepage/Clearance: $10 / 10 \mathrm{~mm}$.

Coil Data DC @ $20^{\circ} \mathrm{C}$
Nominal Coil Power: 250mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in <br> Ohms | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | ---: | :---: | :---: | :---: | :---: |
| 5 | $100 \pm 10 \%$ | 3.7 | 0.5 | 15.0 | 50.0 |
| 6 | $144 \pm 10 \%$ | 4.5 | 0.6 | 18.0 | 417 |
| 12 | $576 \pm 10 \%$ | 9.0 | 12 | 36.0 | 20.8 |
| 24 | $2,304 \pm 10 \%$ | 18.0 | 2.4 | 72.0 | 10.4 |
| 48 | $9,216 \pm 10 \%$ | 36.0 | 4.8 | 144.0 | 5.4 |
| 60 | $12,857 \pm 12 \%$ | 45.0 | 6.0 | 180.0 | 4.7 |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time (typical): 7 ms .
Release Time (typical): 3 ms .
Bounce Time (typical): NO: 2 ms ; NC: 4 ms .
Switching Rate: 3,600 ops./hr. max. at rated load.

## Environmental Data

Temperature Range:
Operating: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Vibration (30-150 Hz.): 5g.
Shock (destructive): 100g.

## RT series (Sensitive)

## 10 Amp, 1 Pole PC Board Relay with 250mW Coil

c91 ${ }_{\text {us File E2 }}$ E214025
$\Leftrightarrow$ (5)
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94 V-0 Rated): Flux-tight (RT II) or sealed (RT III) plastic case. Weight: . $49 \mathrm{oz} .(14 \mathrm{~g})$ approximately.

## Contact Life



## Max. DC Load Breaking Capacity



## Coil Operating Range



Ordering Information

|  |  |  | Typical Part Number | 7 | 4 | 012 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> RT = Printed circuit board relay. |  |  |  |  |  |  |
| 2. Version: $1=10 \mathrm{~A}, 3.5 \mathrm{~m}$ | in spacing, flux |  | $B=10 \mathrm{~A}, 3.5 \mathrm{~mm}$ pin spacin |  |  |  |
| 3. Contact Conf 7 = 1 Form C | ation: <br> DT) | 1 For | SPST-NO) |  |  |  |
| 4. Contact Mate K = Silver-nick |  |  |  |  |  |  |
| 5. Coil Voltage: $005=5 \mathrm{VDC}$ $006=6 \mathrm{VDC}$ | $\begin{aligned} & 012=12 \mathrm{VDC} \\ & 024=24 \mathrm{VDC} \end{aligned}$ | 048 060 | VDC |  |  |  |

## Stock Items - Authorized distributors are more likely to stock the following items.

None at present.

## Outline Dimensions



Wiring Diagrams (Bottom Views)


1 Form C


1 Form A

PC Board Layouts (Bottom Views)


1 Form C

* With the recommended hole size, a grid pattern from . $0984-.1$ in ( $2.5-2.54 \mathrm{~mm}$ ) can be used.


1 Form A

* With the recommended hole size, a grid
pattern from . 0984-. 1 in (2.5-2.54 mm) can be used.



## Features

- Sensitive ( 250 mW ) version with 10A, 1 Form A (SPST-NO) contacts.
- 16A version with 1 Form A (SPST-NO) or 1 Form C (SPDT) contacts.
- UL Class F coil construction.
- $5 \mathrm{kV} / 10 \mathrm{~mm}$ contact-to-coil.
- DC coil.


## Contact Data

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT). 1 Form C not available with sensitive coil.
Material: Silver-nickel 90/10.
Expected Mechanical Life: 10 million operations.
Ratings:
Current: Standard Coil: 16A; Sensitive Coil: 10A.
Voltage: 250VAC.
Power (breaking): Standard Coil: 4,000 VA; Sensitive Coil: 2,500VA
Voltage (breaking): 440VAC.
Current (making, max. 4s at 10\% duty cycle): Standard Coil: 30A; Sensitive Coil: 15A.
Load/Life - Standard Coil - Standard 1 Form A Contact $10 \mathrm{amp}, 250 \mathrm{VAC}, 105^{\circ} \mathrm{C}$; 150,000 ops. $16 \mathrm{amp}, 250 \mathrm{VAC}, 105^{\circ} \mathrm{C} ; 20,000$ ops.
Load/Life - Standard Coil - High Performance 1 Form A Contact $10 \mathrm{amp}, 250 \mathrm{VAC}, 105^{\circ} \mathrm{C} ; 300,000$ ops. 16 amp ON / 8 amp OFF, $250 \mathrm{VAC}, 105^{\circ} \mathrm{C} ; 250,000$ ops.
Load/Life - Sensitive Coil - 1 Form A Contact $12 \mathrm{amp}, 250 \mathrm{VAC}, 105^{\circ} \mathrm{C}$, dry switching; $>500,000$ ops. $10 \mathrm{amp}, 250 \mathrm{VAC}$, cyclical heat $105 / 40^{\circ} \mathrm{C} ; 200,000$ ops. $10 \mathrm{amp}, 250 \mathrm{VAC}, 105^{\circ} \mathrm{C} ; 150,000$ ops.

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms
Between Coil and Contacts: 5,000Vrms.
Creepage/Clearance: $10 / 10 \mathrm{~mm}$.

## Coil Data DC @ $20^{\circ} \mathrm{C}$

Nominal Coil Power: Sensitive Coil: 250 mW .; Standard Coil: $400 \mathrm{~mW} \dagger$
$\dagger$ Standard coil continuous thermal load $>10 \mathrm{~A}$ at $105^{\circ} \mathrm{C}$ requires reduction of coil power to $64 \%$ of nominal after 100 ms .

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Sensitive Coils (10A max. rating, 1 Form A only) |  |  |  |  |  |  |
| 12 | 576 | 9.0 | 12 | 36.0 | 20.8 |  |
| 24 | 2,304 | 18.0 | 2.4 | 72.0 | 10.4 |  |
| Standard Coils (16A max. rating, 1 Form A or 1 Form C) |  |  |  |  |  |  |
| 9 | 203 | 6.3 | 0.9 | 22.9 | 44.3 |  |
| 12 | 360 | 8.4 | 12 | 30.6 | 33.3 |  |
| 24 | 1,440 | 16.8 | 2.4 | 612 | 16.7 |  |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time (typical): Standard Coil: 7 ms .
Sensitive Coil: 8 ms .
Release Time (typical): Standard or Sensitive Coil: 3 ms .
Bounce Time (typical): Standard Coil NO / NC: $1 / 3 \mathrm{~ms}$.
Sensitive Coil: 2 ms .
Switching Rate: 3,600 ops./hr. max. at rated load.

## RTH series

## 10-16 Amp, 1 Pole

PC Board Relay for Operation to $105^{\circ} \mathrm{C}$
${ }^{\text {ch }}{ }_{\text {us }}$ File E214025
요

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Environmental Data

Temperature Range:
Operating: $-40^{\circ} \mathrm{C}$ to $+105^{\circ} \mathrm{C}$
Vibration (30-150 Hz.): Standard Coil NO / NC: $20 / 5 \mathrm{~g}$.
Sensitive Coil: 5 g .
Shock (destructive): 100g.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94 V-0 Rated): Flux-tight (RT II) plastic case.
Weight: . $49 \mathrm{oz} .(14 \mathrm{~g})$ approximately.


Max. DC Load Breaking Capacity


Models with Standard Coil


Models with Sensitive Coil

## Coil Operating Range



Models with Standard Coil


Models with Sensitive Coil

## Ordering Information

|  | Typical Part N | r | RTH | 4 | 012 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: RTH = Printed circuit board relay for high temperature $\left(105^{\circ} \mathrm{C}\right)$ applications. |  |  |  |  |  |
| 2. Coil Type and Contacts: <br> 1 = Standard coil, standard 1 Form C (S <br> 3 = Standard coil, standard 1 Form A (SP <br> H = Standard coil, "high performance" <br> 8 = Sensitive coil, standard 1 Form A (SP | cts, 16A rating ntacts, 16A rati PST-NO) contac ntacts, 10A rati | A rating |  |  |  |
| 3. Contact Material: 4 = Silver-nickel 90/10. |  |  |  |  |  |
| 4. Coil Voltage: 009 = 9VDC (standard version coil only) | $012=12 \mathrm{VDC}$ | $024=$ |  |  |  |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions



Wiring Diagrams (Bottom Views)


1 Form C, Standard Coil Only


1 Form A, Standard or Sensitive Coil

## PC Board Layouts (Bottom Views)



1 Form C, Standard Coil Only

* With the recommended hole size, a grid pattern from . $0984-.1$ in (2.5-2.54 mm) can be used.


1 Form A, Standard or Sensitive Coil
$*$ With the recommended hole size, a grid
pattern from $.0984-.1$ in $(2.5-2.54 \mathrm{~mm})$ can be used.


## Features

- Capable of handling 80A inrush currents.
- 16A, 1 Form A (SPST-NO) contacts.
- UL Class F coil construction.
- $5 \mathrm{kV} / 10 \mathrm{~mm}$ contact-to-coil.
- 400mW DC coil.


## Contact Data

Arrangements: 1 Form A (SPST-NO), single contact.
Material: Silver-nickel 90/10 or Silver-tin oxide.
Expected Mechanical Life: 30 million operations.
Ratings:
Current: 16A.
Voltage: 250VAC.
Power (breaking): 4,000 VA.
Voltage (breaking): 440VAC
Current (making, max. 4s at 10\% duty cycle): 30A.
Peak Inrush Current (20ms): 80A.
Load/Life - Silver-nickel contacts
1000W, 250VAC, incandescent lamps; 90,000 ops.
Load/Life - Silver-tin oxide contacts
$1000 \mathrm{~W}, 250 \mathrm{VAC}$, incandescent lamps; 80,000 ops.
Compressor, $230 \mathrm{VAC}, \mathrm{I}_{\text {in }} \leq 21 \mathrm{~A}_{\text {peak }}, \mathrm{I}_{\text {off }}=3.5 \mathrm{~A}, \cos \varphi=0.5 ; 230,000 \mathrm{ops}$.

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms
Between Coil and Contacts: $5,000 \mathrm{Vrms}$.
Creepage/Clearance: 10/10mm.

## Coil Data DC @ $20^{\circ} \mathrm{C}$

Nominal Coil Power: 400mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in <br> Ohms | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 12 | $360 \pm 10 \%$ | 8.4 | 12 | 30.6 | 33.3 |
| 24 | $1,440 \pm 10 \%$ | 16.8 | 2.4 | 612 | 16.7 |
| 48 | $5,520 \pm 10 \%$ | 33.6 | 4.8 | 122.4 | 8.7 |
| 60 | $7,340 \pm 12 \%$ | 42.0 | 6.0 | 153.0 | 8.1 |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time (typical): 8 ms .
Release Time (typical): 3 ms
Bounce Time (typical): 2 ms .
Switching Rate: 3,600 ops./hr. max. at rated load.

## Environmental Data

## Temperature Range:

Operating: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Vibration (30-500 Hz.): 20 g .
Shock (destructive): 100g.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94 V-0 Rated): Flux-tight (RT II) plastic case.
Weight: . 49 oz. ( 14 g ) approximately.

## RT series (High Inrush) <br> 16 Amp, 1 Pole PC Board Relay for Inrush Currents to 80A <br> c94 ${ }_{\text {us }}$ File E214025 <br> $\stackrel{1}{\infty}$

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Contact Life



## Max. DC Load Breaking Capacity



## Coil Operating Range



Ordering Information


Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions



Wiring Diagram (Bottom View)


## PC Board Layout (Bottom View)


*With the recommended hole size, a grid pattern from . 0984-. 1 in (2.5-2.54 mm) can be used.


## Features

- 1 Form A (SPST-NO).
- Tungsten prerun contact and silver-tin oxide contact.
- 10 amp rated current, $80 \mathrm{~A} / 20 \mathrm{~ms}$ inrush current.
- 4kV/8mm contact-to-coil, insulation to VDE 0631 and 0700.
- Sensitive coil ( 480 mW ).
- Low-profile (. 59 in [ 15 mm ]) flux-tight case.
- Well suited for lighting systems, motors, lamp loads.


## Contact Data

Arrangements: 1 Form A (SPST-NO), single contact.
Material: Tungsten prerun contact and silver-tin oxide contact.
Expected Mechanical Life: 5 million operations.
Ratings:
Current: 10A.
Current (making, max. 4s at 10\% duty cycle): 16A.
Current (peak inrush 20ms): 80A.
Voltage: 250VAC.
Voltage (breaking): 400VAC.
Load/Life
10 amp resistive, $250 \mathrm{VAC}, 50,000 \mathrm{ops}$.
2,500W, incandescent lamps, 30,000 ops.
1,300W, fluorescent lamps (140 FF ), 30,000 ops. 1,000W, Dulux lamps ( $140 \mu \mathrm{~F}$ ), 30,000 ops.

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms.
Between Coil and Contacts: $4,000 \mathrm{Vrms}$.
Creepage/Clearance: $8 / 8 \mathrm{~mm}$.
Coil Data DC @ $20^{\circ} \mathrm{C}$
Nominal Coil Power: 480mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> $(\mathbf{m A})$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 6 | 80 | 4.2 | 0.4 | 12.0 | 75.0 |
| 12 | 300 | 8.4 | 0.9 | 24.0 | 40.0 |
| 24 | 1,200 | 16.8 | 18 | 48.0 | 20.0 |
| 48 | 4,825 | 33.6 | 3.6 | 96.0 | 10.0 |
| 60 | 7,500 | 42.0 | 4.5 | 120.0 | 8.0 |

## 0429 series

## High Inrush (80A/20ms), Miniature Printed Circuit Board Relay

## 吹 File E214025

(0)

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time (typical): 6 ms .
Release Time (typical): 4 ms .
Bounce Time (typical): 3 ms .
Switching Rate: 6,000 ops./hr. max. at rated load.

## Environmental Data

Temperature Range:
Operating: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
Shock (destructive): 100g

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure ( 94 V-0 rated): Flux-tight (RTII) plastic case.
Weight: 0.35 oz . $(10 \mathrm{~g})$ approximately.

## Coil Operating Range



Ordering Information


Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions



PC Board Layout (Bottom View)


Wiring Diagram (Bottom View)



# OM I/OM IH series 

## 16A Miniature <br> Power PC Board Relay

Appliances, HVAC, Office Machines.
? UL File No. E58304
(18A CSA File No. LR48471
(VOE) VDE File No. 6678
(S) SEMKO File No. 9517235 (OMI)

$$
9143112 \text { (OMIH) }
$$

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Meet UL 508, VDE0435 and SEMKO requirements.
- 1 Form A and 1 Form C contact arrangements.
- Immersion cleanable, sealed version available.
- Meet 5,000V dielectric voltage between coil and contacts.
- Meet $10,000 \mathrm{~V}$ surge voltage between coil and contacts ( $1.2 / 50 \mu \mathrm{~s}$ ).


## Contact Data @ 20 ${ }^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Ag Alloy (OMI), AgSnO (OMIH).
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: OMI: 10A @ 240VAC resistive,
10A @ 30VDC resistive,
3A @ 240VAC inductive ( $\cos \varnothing=0.4$ ),
3A @ 30VDC inductive ( $\mathrm{L} / \mathrm{R}=7 \mathrm{msec}$ ).
OMIH:16A @ 240VAC resistive,
16A @ 30VDC resistive,
4A @ 240VAC inductive ( $\cos \varnothing=0.4$ ),
4A @ 24VDC inductive (L/R=7msec).
Max. Switched Voltage: AC: 250V.
DC: 30V.
Max. Switched Current: 10A (OMI), 16A (OMIH).
Max. Switched Power: OMI: 2,400VA, 300W.
OMIH: $3,800 \mathrm{VA}, 480 \mathrm{~W}$.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC 50/60 Hz. (1 minute).
Between Coil and Contacts: 5,000VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 10,000V (1.2 / 50 ss ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDC.

## Coil Data

Voltage: 5 to 48VDC.
Nominal Power: 720 mW (OMI-D), 540mW (OMI-L).
Coil Temperature Rise: $45^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

| OMI/OMIH-L Sensitive |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | $\begin{gathered} \text { Coil } \\ \text { Resistance } \\ (\text { ohms }) \pm \mathbf{1 0 \%} \end{gathered}$ | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 106.4 | 47 | 3.75 | 0.50 |
| 6 | 88.0 | 68 | 4.50 | 0.60 |
| 9 | 58.0 | 155 | 6.75 | 0.90 |
| 12 | 44.4 | 270 | 9.00 | 1.20 |
| 24 | 21.8 | 1,100 | 18.00 | 2.40 |
| 48 | 10.9 | 4,400 | 36.00 | 4.80 |
| OMI/OMIH-D Standard |  |  |  |  |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | Coil Resistance (ohms) $\pm 10 \%$ | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 138.9 | 36 | 3.50 | 0.50 |
| 6 | 120.0 | 50 | 4.20 | 0.60 |
| 9 | 78.3 | 115 | 6.30 | 0.90 |
| 12 | 60.0 | 200 | 8.40 | 1.20 |
| 24 | 29.3 | 820 | 16.80 | 2.40 |
| 48 | 14.5 | 3,300 | 33.60 | 4.80 |

## Operate Data

Must Operate Voltage:
OMI/OMIH-D: 70\% of nominal voltage or less.
OMI/OMIH-L: 75\% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: OMI/OMIH-D: 15 ms max.
OMI/OMIH-L: 20 ms max.
Release Time: 8 ms max.

## Environmental Data

Temperature Range:
Operating: OMI/OMIH-D:
$-30^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$
OMI/OMIH-L: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ ( 100 G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
OMI/OMIH-SS: Vented (Flux-tight) plastic cover.
OMI/OMIH-SH: Sealed plastic case.
Weight: $0.46 \mathrm{oz}(13 \mathrm{~g})$ approximately.


Our authorized distributors are more likely to stock the following items for immediate delivery.

| OMIH-SH-105D,394 | OMIH-SH-105L,394 |
| :--- | :--- |
| OMIH-SH-112D,394 | OMIH-SH-112L,394 |
| OMIH-SH-124D,394 | OMIH-SH-124L,394 |

## Outline Dimensions



Wiring Diagram (Bottom View)


PC Board Layout (Bottom View)


## Reference Data

Coil Temperature Rise




| Dimensions are in inches over | Specifications and availability |
| :--- | :--- |
| (millimeters) unless otherw ise | subject to change. |
| specified. |  |



# OM I 2 Pole series 

## 2 Pole Miniature Power PC Board Relay

## Appliances, HVAC, Office Machines.

呵 UL File No. E58304
(18) CSA File No. LR48471

VDE File No. 6678
(S) SEMKO File No. 9517235

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Meet UL 508, VDE0435 and SEMKO requirements.
- 2 Form A and 2 Form C contact arrangements.
- Immersion cleanable, sealed version available.
- Meet 5,000V dielectric voltage between coil and contacts.
- Meet $10,000 \mathrm{~V}$ surge voltage between coil and contacts ( $1.2 / 50 \mu \mathrm{~s}$ ).


## Contact Data @ 20 ${ }^{\circ} \mathrm{C}$

Arrangements: 2 Form A (DPST-NO) and 2 Form C (DPDT).
Material: Ag Alloy.
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @1A, 6VDC.

## Contact Ratings

Ratings: 5A @ 240VAC resistive,
5A @ 120VAC resistive,
5A @ 30VDC resistive,
1/8 HP @ 250VAC.
$1.5 \mathrm{~A} @ 240 \mathrm{VAC}$ inductive ( $\cos \varnothing=0.4$ ),
$1.5 \mathrm{~A} @ 120 \mathrm{VAC}$ inductive ( $\cos \varnothing=0.4$ ),
$1.5 \mathrm{~A} @ 24 \mathrm{VDC}$ inductive ( $\mathrm{L} / \mathrm{R}=7 \mathrm{msec}$ ).
Max. Switched Voltage: AC: 240V.

> DC: 30V.

Max. Switched Current: 5A.
Max. Switched Power: OMI: 1,200VA, 150W.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: 5,000VAC 50/60 Hz. (1 minute)
Surge Voltage Between Coil and Contacts: 10,000V (1.2 / 50 s s).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDCM.

## Coil Data

Voltage: 5 to 48VDC.
Nominal Power: 720 mW (OMI-D), 540 mW (OMI-L).
Coil Temperature Rise: $45^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

| OMI-L Sensitive |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | Coil Resistance (ohms) $\pm 10 \%$ | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 106.4 | 47 | 4.00 | 0.50 |
| 6 | 88.0 | 68 | 4.80 | 0.60 |
| 9 | 58.0 | 155 | 7.20 | 0.90 |
| 12 | 44.4 | 270 | 9.60 | 1.20 |
| 24 | 21.8 | 1,100 | 19.20 | 2.40 |
| 48 | 10.9 | 4,400 | 38.40 | 4.80 |
| OMI-D Standard |  |  |  |  |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | Coil Resistance (ohms) $\pm$ 10\% | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 138.9 | 36 | 3.75 | 0.50 |
| 6 | 120.0 | 50 | 4.50 | 0.60 |
| 9 | 78.3 | 115 | 6.75 | 0.90 |
| 12 | 60.0 | 200 | 9.00 | 1.20 |
| 24 | 29.3 | 820 | 18.00 | 2.40 |
| 48 | 14.5 | 3,300 | 36.00 | 4.80 |

## Operate Data

Must Operate Voltage:
OMI-D: 75\% of nominal voltage or less.
OMI-L: 80 \% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: OMI-D: 15 ms max.
OMI-L: 20 ms max.
Release Time: 8 ms max.

## Environmental Data

Temperature Range:
Operating: OMI-D:
$-30^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$
OMI-L:

$$
-30^{\circ} \mathrm{C} \text { to }+70^{\circ} \mathrm{C}
$$

Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: 1,000m/s² (100G approximately).
Operational: 100m/s² (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
OMI-SS: Vented (Flux-tight) plastic cover.
OMI-SH: Sealed plastic case.
Weight: $0.46 \mathrm{oz}(13 \mathrm{~g})$ approximately.


|  | Typical Part Number | OMI | -SS | -2 | 12 | L | M | ,594 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: OMI = 2 Pole Miniature Power PC Board |  |  |  |  |  |  |  |  |
| 2. Enclosure: $\begin{aligned} & \text { SS }=\text { Vent (Flux-tight)* plastic cover. } \\ & \text { SH }=\text { Sealed, plastic case. } \end{aligned}$ |  |  |  |  |  |  |  |  |
| 3. Termination: 2 = 2 pole |  |  |  |  |  |  |  |  |
| 4. Coil Voltage: $\begin{array}{ll} 05=5 \mathrm{VDC} & 09=9 \mathrm{VDC} \\ 06=6 \mathrm{VDC} & 12=12 \mathrm{VDC} \end{array}$ |  |  |  |  |  |  |  |  |
| 5. Coil Input: D = Standard ( 720 mW ) $\quad \mathrm{L}=$ Sensitive |  |  |  |  |  |  |  |  |
| 6. Contact Arrangement: <br> Blank $=2$ Form C, DPDT $\quad \mathrm{M}=2$ Form | -NO |  |  |  |  |  |  |  |
| 7. Suffix: <br> ,500 = Standard model for 'SS" enclosure | ,594 = Standard model for 'S | closure | O | Suff | Cust | mod |  |  |

* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to stock the following items for immediate delivery.
OMI-SH-205D,594 OMI-SH-205L,594
OMI-SH-212D,594 OMI-SH-212L,594
OMI-SH-224D,594 OMI-SH-224L,594

## Outline Dimensions



## Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)


## Reference Data

## Coil Temperature Rise



## Operate Time



Life Expectancy


| Dimensions are in inches over | Specifications and availability <br> (millimeters) unless otherw ise <br> specified. |
| :--- | :--- |



## OZ/OZF series

## 16A Miniature <br> Power PC Board Relay

## Appliances, HVAC, Office Machines.

근 UL File No. E82292
(18 CSA File No. LR48471
$\triangle$ TUV File No. R85447

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Meet UL 508, CSA and TUV requirements.
- 1 Form A and 1 Form C contact arrangements.
- Immersion cleanable, sealed version available.
- Meet 5,000V dielectric voltage between coil and contacts.
- Meet $10,000 \mathrm{~V}$ surge voltage between coil and contacts ( $1.2 / 50 \mu \mathrm{~s}$ ).
- Quick Connect Terminal type available (OZF).
- UL TV-8 rating available (OZT).


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Ag Alloy (1 Form C) and AgSnO (1 Form A).
Max. Switching Rate: 300 ops./min. (no load).

$$
30 \text { ops./min. (rated load). }
$$

Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: OZ/OZF: 20A @ 120VAC resistive,
16A @ 240VAC resistive,
5A @ 120VAC inductive ( $\cos \varnothing=0.4$ ),
5A @ 24VDC inductive ( $\mathrm{L} / \mathrm{R}=7 \mathrm{msec}$ ).
OZT: 8A @ 240VAC resistive,
TV-8 @ 120VAC tungsten, 25,000ops.
Max. Switched Voltage: AC: 240V.
DC: 110V.
Max. Switched Current: 16A (OZ/OZF), 8A (OZT)
Max. Switched Power: 3,850VA, 600W.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC 50/60 Hz. (1 minute).
Between Coil and Contacts: 5,000VAC 50/60 Hz. (1 minute).
Surge Voltage Between Coil and Contacts: 10,000V (1.2 / 50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDC.

## Coil Data

Voltage: 5 to 48VDC.
Nominal Power: 720 mW (OZ-D), 540mW (OZ-L).
Coil Temperature Rise: $45^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| OZ-L Sensitive |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | Coil Resistance (ohms) $\pm 10 \%$ | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 106.4 | 47 | 3.75 | 0.25 |
| 6 | 88.0 | 68 | 4.50 | 0.30 |
| 9 | 58.0 | 155 | 6.75 | 0.45 |
| 12 | 44.4 | 270 | 9.00 | 0.60 |
| 24 | 21.8 | 1,100 | 18.00 | 1.20 |
| 48 | 10.9 | 4,400 | 36.00 | 2.40 |
| OZ-D Standard |  |  |  |  |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | $\begin{gathered} \text { Coil } \\ \text { Resistance } \\ (\text { ohms }) \pm \mathbf{1 0 \%} \\ \hline \end{gathered}$ | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 138.9 | 36 | 3.50 | 0.25 |
| 6 | 120.0 | 50 | 4.20 | 0.30 |
| 9 | 78.3 | 115 | 6.30 | 0.45 |
| 12 | 60.0 | 200 | 8.40 | 0.90 |
| 24 | 29.3 | 820 | 16.80 | 1.20 |
| 48 | 14.5 | 3,300 | 33.60 | 2.40 |

## Operate Data

## Must Operate Voltage:

OZ-D: 70\% of nominal voltage or less.
OZ-L: 75\% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: OZ-D: 15 ms max.
OZ-L: 20 ms max.
Release Time: 8 ms max.

## Environmental Data

Temperature Range:
Operating: OZ-D: $-30^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$
OZ-L: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: 1,000m/s² (100G approximately). Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
OZ-S: Vented (Flux-tight) plastic cover.
OZF-SS: Vented (Flux-tight) plastic cover.
OZ-SH: Sealed plastic case.
Weight: $0.46 \mathrm{oz}(13 \mathrm{~g})$ approximately.

## Ordering Information


OZ $=16$ A PC Board Terminals $\quad$ OZF $=$ Quick Connect Teminals
$\mathrm{OZT}=$ TV-8 Rating PC Board Terminals
2. Enclosure:
$\mathrm{S}=$ Vent (Flux-tight)* plastic cover (only available with OZF)
SS = Vent (Flux-tight)* plastic cover.
SH = Sealed, plastic case.
3. Termination:
1 = 1 pole
6. Contact Arrangement:
Blank = 1 Form C, SPDT $\quad \mathrm{M}=1$ Form A, SPST-NO
7. Contact Material:
Blank = AgCdO (1 Form C) $1=A g S n O$ (1 Form A, only available with OZ....LM 1 or DM 1)
. Mounting and Termination:
9. Suffix:
,200 = Standard model for 'SS" enclosure on OZ and OZT $\quad, 000=$ Standard model for coil input "D" on OZF $\quad$ Other Suffix = Custom model
,294 = Standard model for "SH" enclosure on OZ and OZT ,300 = Standard model for coil input "L" on OZF
* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| OZ-SH-105D,294 <br> OZ-SH-112D,294 | OZ-SH-124D,294 | OZ-SH-105LM1,294 | OZ-SH-112LM1,294 | OZ-SH-105L,294 |
| :--- | :--- | :--- | :--- | :--- |$\quad$ OZ-SH-124L,294



PC Board Layouts (Bottom View)
OZ


## Wiring Diagrams



* No electrical connection, for board attachment only.



[^14]temperature for E type insulation coil $\left(115^{\circ} \mathrm{C}\right)$.

| Dimensions are shown for reference purposes only. | Dimensions are in inches over (millimeters) unless otherwise specified. | Specifications and availability subject to change. | www.tycoelectronics.com Technical support: Refer to inside back cover. |
| :---: | :---: | :---: | :---: |



## OM IT series

## 10A Miniature Power PC Board Relay

Appliances, HVAC, Office Machines.
只 UL File No. E58304
(818) CSA File No. LR48471
(VOE) VDE File No. 6678
(S) SEMKO File No. 8713114
( $\stackrel{+}{\text { s }})$ SEV File No. 97550375

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Meet UL 508, VDE0435, SEMKO and SEV requirements.
- 1 Form A contact arrangements.
- UL TV-5 rating available.
- Immersion cleanable, sealed version available.
- Meet $5,000 \mathrm{~V}$ dielectric voltage between coil and contacts.
- Meet $10,000 \mathrm{~V}$ surge voltage between coil and contacts (1.2 / 50 s ).


## Contact Data @ 20 ${ }^{\circ} \mathrm{C}$

Arrangements: 1 Form A.
Material: AgSnO
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: 10A @ 240VAC resistive,
TV-5 @ 120VAC tungsten 25,000ops.
Max. Switched Voltage: AC: 240V.
DC: 30 V .
Max. Switched Current: 10A.
Max. Switched Power: 2,400VA, 300W.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: $5,000 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 10,000V (1.2 / 50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDC.

## Coil Data

Voltage: 5 to 48VDC.
Nominal Power: 720 mW (OMI-D), 540 mW (OMI-L).
Coil Temperature Rise: $45^{\circ} \mathrm{C}$ max., at rated coil voltage (OMI-D).
$35^{\circ} \mathrm{C}$ max., at rated coil voltage (OMI-L).
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

| Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$ |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| OMIT-L Sensitive |  |  |  |  |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | CoilResistance <br> $($ ohms $) \pm 10 \%$ | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 106.4 | 47 | 3.75 | 0.25 |
| 6 | 88.0 | 68 | 4.50 | 0.30 |
| 9 | 58.0 | 155 | 6.75 | 0.45 |
| 12 | 44.4 | 270 | 9.00 | 0.90 |
| 24 | 21.8 | 1,100 | 18.00 | 1.20 |
| 48 | 10.9 | 4,400 | 36.00 | 2.40 |
| OMIT-D Standard |  |  |  |  |
| Rated Coil Voltage (VDC) | Nominal Current (mA) | Coil Resistance $($ ohms $) \pm 10 \%$ | Must Operate Voltage (VDC) | Must Release Voltage (VDC) |
| 5 | 138.9 | 36 | 3.50 | 0.25 |
| 6 | 120.0 | 50 | 4.20 | 0.30 |
| 9 | 78.3 | 115 | 6.30 | 0.45 |
| 12 | 60.0 | 200 | 8.40 | 0.90 |
| 24 | 29.3 | 820 | 16.80 | 1.20 |
| 48 | 14.5 | 3,300 | 33.60 | 2.40 |

## Operate Data

Must Operate Voltage:
OMIT-D: 70\% of nominal voltage or less.
OMIT-L: $75 \%$ of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: OMIT-D: 15 ms max.
OMIT-L: 20 ms max.
Release Time: 8 ms max.

## Environmental Data

Temperature Range:
Operating: OMT-D:
$-30^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$
OMT-L:

$$
-30^{\circ} \mathrm{C} \text { to }+70^{\circ} \mathrm{C}
$$

Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude
Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ ( 100 G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
OMIT-SS: Vented (Flux-tight) plastic cover.
OMIT-SH: Sealed plastic case.
Weight: $0.46 \mathrm{oz}(13 \mathrm{~g})$ approximately.

| Ordering Information |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Typical Part Number $\rightarrow$ OMIT |  | -SS | -1 | 12 | $L$ | M | ,300 |
| 1. Basic Series: OMIT = Miniature Sealed PC Board Relay |  |  |  |  |  |  |  |  |
| 2. Enclosure: <br> SS = Vent (Flux-tight)* plastic cover. <br> SH = Sealed, plastic case. |  |  |  |  |  |  |  |  |
| 3. Termination: 1 = 1 pole |  |  |  |  |  |  |  |  |
| 4. Coil Voltage: $\begin{array}{ll} 05=5 \mathrm{VDC} & 09=9 \mathrm{VDC} \\ 06=6 \mathrm{VDC} & 12=12 \mathrm{VDC} \\ \hline \end{array}$ |  |  |  |  |  |  |  |  |
| 5. Coil Input: <br> D = Standard (720mW) L = Sensitive |  |  |  |  |  |  |  |  |
| 6. Contact Arrangement: <br> Blank = 1 Form C, SPDT $\quad \mathrm{M}=1$ Form | T-NO |  |  |  |  |  |  |  |
| 7. Suffix: <br> ,300 = Standard model for "SS" enclosure | ,394 = Standard model for "SH" enclosure |  |  | Other Suffix = Custom model |  |  |  |  |

[^15]Our authorized distributors are more likely to maintain the following items in stock for imnmediate delivery. None at present.

## Outline Dimensions



## Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)


## Reference Data




OM IF series
20A Miniature
Power PC Board Relay
Appliances, HVAC, Office Machines.
吹 UL File No. E82292
(18) CSA File No. LR48471
(VoE) VDE File No. 6031
TUV File No. R85447

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data

Voltage: 12 to 24VDC.
Nominal Power: 540mW.
Coil Temperature Rise: $35^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| OMIF |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| 12 | 44.4 | 270 | 9.00 | 0.60 |
| 18 | 30.0 | 600 | 13.50 | 0.90 |
| 24 | 21.8 | 1,100 | 18.00 | 1.20 |

## Operate Data

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: 20 ms max
Release Time: 10 ms max.

## Environmental Data

Temperature Range:
Operating: $\quad-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: 1,000m/s² (100G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to $85 \%$ RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals with quick connect terminals.
Enclosure (94V-0 Flammability Ratings):
OMIF-S: Vented (Flux-tight) plastic cover.

Weight: $0.53 \mathrm{oz}(15 \mathrm{~g})$ approximately.

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDC.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC 50/60 Hz. (1 minute).
Between Coil and Contacts: 5,000VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 10,000V (1.2 / 50 s s).

## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A.
Material: AgSnO
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: 20A @125VAC resistive.
16A @ 250VAC resistive,
16A @ 24VDC resistive.
Max. Switched Voltage: AC: 250V.

## DC: 24 V .

Max. Switched Current: 20A.
Max. Switched Power: 4,000VA, 385W.

| Dimensions are shown for | Dimensions are in inches over | Specifications and availability |
| :--- | :--- | :--- |


| Ordering Information |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Typical Part Number | OMIF | -S | -1 | 24 | L | M | ,300 |
| 1. Basic Series: <br> OMIF $=20 \mathrm{~A}$ PC Board Terminals |  |  |  |  |  |  |  |  |
| 2. Enclosure: <br> S = Vented (Flux-tight)* plastic cover |  |  |  |  |  |  |  |  |
| 3. Termination: 1 = 1 pole |  |  |  |  |  |  |  |  |
| 4. Coil Voltage: $12=12 \mathrm{VDC} \quad 18=18 \mathrm{VDC}$ | $24=24 \mathrm{VDC}$ |  |  |  |  |  |  |  |
| 5. Coil Input: <br> L = Sensitive ( 540 mW ) |  |  |  |  |  |  |  |  |
| 6. Contact Arrangement: M $=1$ Form A, SPST-NO |  |  |  |  |  |  |  |  |
| 7. Suffix: <br> , $300=$ Standard model | Other Suffix = Custom model |  |  |  |  |  |  |  |

* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.


Wiring Diagram

(Top View)

PC Board Layout (Bottom View)


## Reference Data

## Operating Voltage



Operate Time


## Life Expectancy



Note: This data is based on the max. allowable temperature for E type insulation coil $\left(115^{\circ} \mathrm{C}\right)$.

| Dimensions are shown for reference purposes only. | Dimensions are in inches over (millimeters) unless otherwise specified. | Specifications and availability subject to change. | w w w.tycoelectronics.com Technical support: <br> Refer to inside back cover |
| :---: | :---: | :---: | :---: |



## Features

- Slim and simple architecture.
- 2 Form A (DPST-NO) contact arrangement.
- Cadmium-free contacts.
- UL, CSA, approvals.
- Immersion cleanable, sealed version available.
- Magnetic blow-out available for DC loads.


## Contact Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

Arrangements: 2 Form A (DPST-NO).
Material: Ag-GS Alloy.
Max. Switching Rate: 300ops./ min. (no load).
30ops./ min. (rated load).
Expected Mechanical Life: 1 million ops (no load).
Expected Electrical Life: 100,000 ops (rated load).
Minimum Load: 1mA @1VDC.
Initial Contact Resistance: 50 milliohms @ 1mA, 6VDC.

## Contact Ratings

Ratings: $3 \mathrm{~A} @ 24 \mathrm{VDC}$ resistive.
3A @ 120VAC resistive.
Max. Switched Voltage: AC: 240V.
DC: 50V.

DC: 50 V .
Max. Switched Current: 5A.
Max. Switched Power: 300VA, 90W.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC, $50 / 60 \mathrm{~Hz}$. ( 1 min.).
Between Adjacent Contacts: 2,000VAC, $50 / 60 \mathrm{~Hz}(1 \mathrm{~min})$.
Between Contacts and Coil: $4,000 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. (1 min.).
Surge Voltage Between Coil and Contacts: 7,000V (1.2/50 s ).

Initial Insulation Resistance
Between Mutually Insulated Conductors: 1,000M ohm @ 500VDCM.

## Coil Data

Voltage: 5 to 48VDC.
Duty Cycle: Continuous.
Nominal Power: 350mW.
Max. Coil Power: $130 \%$ of nominal at $20^{\circ} \mathrm{C}$.

## PCl series

## Slim 2 Form A

Miniature PC Board Relay

## Appliances, Audio Equipment, Office Machines

听 UL File No. E82292
(18A CSA File No. LR48471
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $20^{\circ} \mathrm{C}$

| PCI |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm$ 10\% | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |  |
|  | 69.4 | 72 | 3.50 | 0.50 |  |
| 5 | 58.8 | 102 | 4.20 | 0.60 |  |
| 6 | 39.1 | 230 | 6.30 | 0.90 |  |
| 9 | 29.1 | 413 | 8.40 | 1.20 |  |
| 12 | 14.5 | 1,650 | 16.80 | 2.40 |  |
| 24 |  |  |  |  |  |

Operate Data @ $20^{\circ} \mathrm{C}$
Must Operate Voltage: 70\% of nominal voltage or less.
Must Release Voltage: 10\% of nominal voltage or more.
Operate Time : 15ms max.
Release Time : 5ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude. Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ (100G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure: Plastic sealed case with enclosure option " H ".
Otherwise, vented (flux-tight) cover.
Weight: $0.41 \mathrm{oz}(10.5 \mathrm{~g})$ approximately.

| Typical Part Number $\downarrow$ | PCI | -2 | 05 | D | M | ,000 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: $\mathrm{PCI}=$ Miniature relay |  |  |  |  |  |  |
| 2. Termination: 2 = 2 pole |  |  |  |  |  |  |
| 3. Coil Voltage: |  |  |  |  |  |  |
| 4. Coil Input: D = Standard |  |  |  |  |  |  |
| 5. Contact Arrangement: $M=2$ Form $A$ |  |  |  |  |  |  |
| 6. Enclosure: <br> Blank $=$ Vented (Flux-tight) cover $\quad \mathrm{H}=$ Sealed plastic case |  |  |  |  |  |  |
| 7. Optional: <br> Blank = Standard <br> $\mathrm{M}=$ with magnetic blow-out |  |  |  |  |  |  |
| 8. Suffix: <br> ,000 = Standard model <br> Other Suffix = Custom model |  |  |  |  |  |  |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Wiring Diagram (Bottom View)




## PC Board Layout (Bottom View)





Note: This data is based on the max. allowable temperature for E type insulation coil $\left(115^{\circ} \mathrm{C}\right)$.

| Dimensions are shown for reference purposes only. | Dimensions are in inches over (millimeters) unless otherw ise specified. | Specifications and availability subject to change. | www.tycoelectronics.com Technical support: <br> Refer to inside back cover. |
| :---: | :---: | :---: | :---: |



## OSA series <br> 2 Pole Miniature Power PC Board Relay

## Appliances, Audio Equipment, Office Machines

믄 UL File No. E82292
(18) CSA File No. LR48471
(S) SEMKO File No. 9452086 (available for DM5) TUV File No. R9551879 (available for DM5)

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| OSA |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
|  | 106.4 | 47 | 3.75 | 0.50 |
| 5 | 88.0 | 68 | 4.50 | 0.60 |
| 6 | 58.0 | 155 | 6.75 | 0.90 |
| 9 | 44.4 | 270 | 9.00 | 1.20 |
| 12 | 21.8 | 1,100 | 18.00 | 2.40 |
| 24 | 11.0 | 4,400 | 36.00 | 4.80 |
| 48 |  |  |  |  |

## Operate Data

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 10\% of nominal voltage or more.
Operate Time: 20 ms max.
Release Time: 10 ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude
Operational: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ (100G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure ( $94 \mathrm{~V}-0$ Flammability Ratings):
OSA-SS: Vented (Flux-tight) plastic cover.
OSA-SH: Sealed plastic case.
Weight: $0.46 \mathrm{oz}(13 \mathrm{~g})$ approximately.


* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
None at present.

## Outline Dimensions



Wiring Diagram (Bottom View)


PC Board Layout (Bottom View)


## Reference Data



Operate Time



| Dimensions are in inches over | Specifications and availability |
| :--- | :--- |
| (millimeters) unless otherw ise | subject to change. |
| specified. |  |



## OSZ series

## 1 Pole Miniature <br> Power PC Board Relay

## Appliances, HVAC, Office Machines

## 只 UL File No. E58304

(14) CSA File No. LR48471

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Meet UL Tungsten TV-8 rating.
- 1 Form A contact arrangements.
- Immersion cleanable, sealed version available.
- Meet $4,000 \mathrm{~V}$ dielectric voltage between coil and contacts.
- Meet 7,000V surge voltage between coil and contacts (1.2 / 50 $\mu$ s).


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO).
Material: AgSnO.
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: 16A @ 240VAC resistive,
16A @ 24VDC resistive,
TV-8 @ 120VAC Tungsten, 25,000ops.
Max. Switched Voltage: AC: 240V.
DC: 24 V .
Max. Switched Current: 16A.
Max. Switched Power: 2,400VA, 380W.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: $4,000 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 7,000V (1.2 / 50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDC.

## Coil Data

Voltage: 5 to 48VDC.
Nominal Power: 540 mW
Coil Temperature Rise: $55^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| OSZ |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| 5 | 106.4 | 47 | 3.75 | 0.25 |
| 6 | 88.0 | 68 | 4.50 | 0.30 |
| 9 | 58.0 | 155 | 6.75 | 0.45 |
| 12 | 44.4 | 270 | 9.00 | 0.60 |
| 24 | 21.8 | 1,100 | 18.00 | 1.20 |
| 48 | 11.0 | 4,400 | 36.00 | 2.40 |

## Operate Data

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: 20 ms max.
Release Time: 10 ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude
Operational: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude.
Shock, Mechanical: 1,000m/s² (100G approximately).
Operational: 100m/s² (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
OSZ-SS: Vented (Flux-tight) plastic cover.
OSZ-SH: Sealed plastic case.
Weight: 0.45 ( 13 g ) approximately.


* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions



## Wiring Diagram (Bottom View)



## PC Board Layout (Bottom View)



## Reference Data



Operate Time


Life Expectancy


Note: This data is based on the max. allowable temperature for E type insulation coil $\left(115^{\circ} \mathrm{C}\right)$.

| Dimensions are shown for | Dimensions are in inches over | Specifications and availability |
| :--- | :--- | :--- |
| reference purposes only. | (millimeters) unless otherw ise <br> specified. | www.tycoelectronics.com <br> subject to change. |
| Technical support: |  |  |



## Features

- UL TV-5 rating relay.
- 1 Form A contact arrangement.
- Immersion cleanable, sealed version available.
- Applications include appliance, HVAC, CTV, monitor, emergency lighting.


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO)
Material: AgSnO.
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: 5A Tungsten @ 120VAC (TV-5) 25,000ops.
10A @ 250VAC resistive,
10A @ 120VAC resistive,
10A @ 30VDC resistive.
$3 A @ 250 V A C$ inductive ( $\cos \varnothing=0.4$ ),
3A @ 30VDC inductive ( $\mathrm{L} / \mathrm{R}=7 \mathrm{msec}$ ).
Max. Switched Voltage: AC: 250V.

$$
\text { DC: } 30 \mathrm{~V} \text {. }
$$

Max. Switched Current: 10A.
Max. Switched Power: 2,500VA, 300W.

## Initial Dielectric Strength

Between Open Contacts: 900VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: 4,000VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 10,000V (1.2 / 50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDCM.

## Coil Data

Voltage: 5 to 48VDC.
Nominal Power: 540 mW
Coil Temperature Rise: $40^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

## SDT series

## 10 Amp Miniature <br> Power PC Board Relay

Appliances, HVAC, CTV, Monitor Display
T UL File No. E82292
(18. CSA File No. LR48471
(S) SEM KO File No. 9308008
© TUV File No. R9551731
( ${ }^{+}$) SEV File No. 97550375

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| SDT |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |  |
|  | 106.4 | 47 | 3.75 | 0.50 |  |
| 5 | 88.0 | 68 | 4.50 | 0.60 |  |
| 6 | 58.0 | 155 | 6.75 | 0.90 |  |
| 9 | 44.4 | 270 | 9.00 | 1.20 |  |
| 12 | 21.8 | 1,100 | 18.00 | 2.40 |  |
| 24 | 10.9 | 4,400 | 36.00 | 4.80 |  |
| 48 |  |  |  |  |  |

## Operate Data

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 10\% of nominal voltage or more.
Operate Time: 15 ms max.
Release Time: 8 ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ (100G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
SDT-SS: Vented (Flux-tight) plastic cover
SDT-SH: Sealed plastic case
Weight: 0.39 oz (11g) approximately.

| Ordering Information |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Typical Part Number | SDT | -SS | -1 | 12 | D | M | ,000 |
| 1. Basic Series: SDT = M iniature Power PC board relay. |  |  |  |  |  |  |  |
| 2. Enclosure: <br> SS = Vented (Flux-tight) * plastic cover. <br> SH = Sealed, plastic case. |  |  |  |  |  |  |  |
| 3. Termination: 1 = 1 pole |  |  |  |  |  |  |  |
| 4. Coil Voltage: |  |  |  |  |  |  |  |
| 5. Coil Input: D = Standard |  |  |  |  |  |  |  |
| 6. Contact Arrangement: M = 1 Form A, SPST-NO |  |  |  |  |  |  |  |
| 7. Suffix: <br> ,000 = Standard model Other Suffix = Custom model |  |  |  |  |  |  |  |

* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions



## Wiring Diagram (Bottom View)



PC Board Layout (Bottom View)


## Reference Data



Note: This data is based on the max. allowable
temperature for E type insulation coil $\left(115^{\circ} \mathrm{C}\right)$.

## Operate Time



Life Expectancy


## SDT-R series



## Features

- UL TV-5 and TV-8 rating relay.
- 1 Form A contact arrangement.
- Sensitive and standard coils available.
- Applications include appliance, HVAC, CTV, M onitor, emergency lighting.


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO)
Material: AgSnO
Max. Switching Rate: 300 ops./min. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

## Ratings:

SDT-LMR: 5A Tungsten @ 120VAC (TV-5) 25,000ops.
5A @ 250VAC resistive,
5A @ 30VDC resistive.
SDT-DMR: 8A Tungsten @ 120VAC (TV-8) 25,000ops.
10A @ 250VAC resistive,
10A @ 30VDC resistive.
Max. Switched Voltage: AC: 250V.
DC: 30V.
Max. Switched Current: 5A (SDT-LMR), 10A (SDT-DMR)
Max. Switched Power: 1,250VA, 150W (SDT-LMR),
2,500VA, 300W (SDT-DMR).

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: $4,000 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 10,000V (1.2 / 50 s s).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDCM.

## Coil Data

Voltage: 5 to 48VDC.
Nominal Power:

$$
\begin{aligned}
\text { SDT-LMR } & : 250 \mathrm{~mW} \\
\text { SDT-DMR } & : 540 \mathrm{~mW}
\end{aligned}
$$

Coil Temperature Rise: $40^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

## 10 Amp Miniature

 Power PC Board RelayAppliances, HVAC, CTV, Monitor Display.
미 UL File No. E58304
(181 CSA File No. LR48471
(s) SEMKO FileNo. 9722134,9803052
$\triangle$ TUV File No. R9750487

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| SDT-LMR (250mW) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm$ 10\% | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |  |
| 5 | 50.0 | 100 | 3.75 | 0.50 |  |
| 6 | 41.7 | 144 | 4.50 | 0.60 |  |
| 9 | 27.7 | 325 | 6.75 | 0.90 |  |
| 12 | 20.7 | 580 | 9.00 | 1.20 |  |
| 24 | 10.5 | 2,300 | 18.00 | 2.40 |  |
| SDT-DMR (400mW) |  |  |  |  |  |
| Rated Coil | Nominal | Coil | Must Operate | Must Release |  |
| Voltage | Current | Resistance | Voltage | Voltage |  |
| (VDC) | (mA) | (ohms) $\pm \mathbf{1 0 \%}$ | (VDC) | (VDC) |  |
| 5 | 106.4 | 47 | 3.75 | 0.50 |  |
| 6 | 88.0 | 68 | 4.50 | 0.60 |  |
| 9 | 58.0 | 155 | 6.75 | 0.90 |  |
| 12 | 44.4 | 270 | 9.00 | 1.20 |  |
| 24 | 21.8 | 1,100 | 18.00 | 2.40 |  |
| 48 | 10.9 | 4,400 | 36.00 | 4.80 |  |

## Operate Data

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 10\% of nominal voltage or more.
Operate Time: 15 ms max.
Release Time: 5 ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude Operational: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ ( 100 G approximately). Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings): SDT-S: Snap-on dust cover (Flux-tight).
Weight: 0.38 oz . ( 11 g ) approximately.


* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions



## Wiring Diagram (Bottom View)



## PC Board Layout (Bottom View)



## Reference Data

## Operating Voltage (SDT-LMR)



## Operate Time



Life Expectancy


Note: This data is based on the max. allowable
temperature for E type insulation coil $\left(115^{\circ} \mathrm{C}\right)$.

## PCK series



## Slim 16 Amp <br> Miniature Power PC Board Relay

## Appliances, HVAC, Office Machines.

T기 UL File No. E82292
(18) CSA File No. LR48471

## Features

- Slim outline to save board space.
- 1 Form A contact arrangement.
- Quick connect terminal type.
- Meet 5,000V dielectric voltage between coil and contacts.
- Meet 10,000V surge voltage between coil and contacts.


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO) .
Material: AgSnO.
Max. Switching Rate: 300ops./ min. (no load).
20ops./ min. (rated load).
Expected Mechanical Life: 2 million ops (no load).
Expected Electrical Life: 100,000 ops (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @1A, 6VDC.

## Contact Ratings

Ratings: 16A @ 250VAC resistive.
16A @ 24VDC resistive.
Max. Switched Voltage: AC: 277V.
DC: 24 V .
Max. Switched Current: 16A.
Max. Switched Power: 4,000VA, 385W.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC, $50 / 60 \mathrm{~Hz}$. (1 min.).
Between Contacts and Coil: 5,000VAC, $50 / 60 \mathrm{~Hz}$. (1 min.).
Surge Voltage Between Coil and Contacts: 10,000V (1.2/50 1 s).

## Initial Insulation Resistance

Between Mutually Insulated Conductors: 1,000M ohm @ 500VDC.

## Coil Data

Voltage: 5 to 24VDC.
Duty Cycle: Continuous.
Nominal Power: 500 mW .
Max. Coil Power: $130 \%$ of nominal at $20^{\circ} \mathrm{C}$.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 0}{ }^{\circ} \mathrm{C}$

| PCK |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| 5 | 100.0 | 50.0 | 3.75 | 0.25 |
| 6 | 83.3 | 72.0 | 4.50 | 0.30 |
| 9 | 55.6 | 162.0 | 6.75 | 0.45 |
| 12 | 41.7 | 288.0 | 9.00 | 0.60 |
| 18 | 27.8 | 648.0 | 13.50 | 0.90 |
| 24 | 20.9 | $1,150.0$ | 18.00 | 1.20 |

## Operate Data @ 20 ${ }^{\circ} \mathrm{C}$

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: 20 ms max.
Release Time: 10ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration, Mechanical: 10 to 55 Hz ., 1.5 mm double amplitude.
Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1000 \mathrm{~m} / \mathrm{s}^{2}$ (100G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals with quick connect terminals.
Enclosure: Vented (Flux-tight) plastic cover.
Weight: $0.46 \mathrm{oz}(13 \mathrm{~g})$ approximately.

## Ordering Information

|  | Typical Part Number | PCK | -1 | 12 | D | 2 | M | ,000 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> PCK $=16 \mathrm{~A}$ PC board terminals |  |  |  |  |  |  |  |  |
| 2. Termination: 1 = 1 pole |  |  |  |  |  |  |  |  |
| 3. Coil Voltage: $\begin{array}{ll} 05=5 \mathrm{VDC} & 09=9 \mathrm{VDC} \\ 06=06 \mathrm{VDC} & 12=12 \mathrm{VDC} \end{array}$ | $\begin{aligned} & 18=18 \mathrm{VDC} \\ & 24=24 \mathrm{VDC} \end{aligned}$ |  |  |  |  |  |  |  |
| 4. Coil Input: D = Standard |  |  |  |  |  |  |  |  |
| 5. Contact Material: $2=\mathrm{AgSnO}$ |  |  |  |  |  |  |  |  |
| 6. Contact Arrangement: $\mathrm{M}=1$ Form A (SPST-NO) |  |  |  |  |  |  |  |  |
| 7. Suffix: <br> ,000 = Standard model | Other Suffix = Custom model |  |  |  |  |  |  |  |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions



Wiring Diagram (Bottom View)


PC Board Layout (Bottom View)


## Reference Data




## Features

- 1 Form A (SPST-NO) and 1 Form C (SPDT).
- 8 amp rated current.
- Vertical or horizontal version.
- Single or bifurcated contacts.
- 4,000Vrms contact-to-coil dielectric.
- Washable (sealed) plastic case.


## Contact Data

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT), single or bifurcated contact.
Material: Silver-nickel 0.15 , silver-nickel 20 or silver-cadmium oxide.
Expected Mechanical Life: 20 million operations.
Ratings:
Current: 8A; 5A with silver-nickel 0.15 contacts.
Voltage: 250VAC.
Power (breaking): 2,000 VA.
Voltage (breaking): 440VAC.
Current (making, max. 4s at 10\% duty cycle): 15A.
Silver-nickel 0.15
4 amp resistive, 30VDC, 2 million ops
1 amp inductive L/R $=40 \mathrm{~ms}, 24 \mathrm{VDC}, 200,000 \mathrm{ops}$.
Silver-cadmium oxide
$1 \mathrm{amp} \operatorname{cosj}=0.4,230 \mathrm{VAC}, 500,000 \mathrm{ops}$.

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms.
Between Coil and Contacts: $4,000 \mathrm{Vrms}$.
Creepage/Clearance: 4/4mm.

## Coil Data DC @ $20^{\circ} \mathrm{C}$

Nominal Coil Power: 450-500mW, dependent upon model.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in <br> Ohms | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 6 | $80 \pm+10 \%$ | 4.0 | 0.6 | 10.6 | 75.0 |
| 12 | $330 \pm 10 \%$ | 8.0 | 12 | 215 | 36.4 |
| 24 | $1,200 \pm+15 \%$ | 16.0 | 2.4 | 40.0 | 20.0 |
| 48 | $4,700 \pm+15 \%$ | 32.0 | 4.8 | 79.0 | 10.2 |
| 60 | $7,200 \pm+15 \%$ | 40.0 | 6.0 | 98.0 | 8.3 |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time: 7 ms .
Release Time: 3 ms .
Bounce Time (N/O contact / N/C contact) : $0.5 \mathrm{~ms} / 3 \mathrm{~ms}$.
Switching Rate: 3,600 ops./hr. max. at rated load.

## Environmental Data

Temperature Range:
Operating: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.

## V23057 (Card E) series

## 8 Amp, Miniature

Printed Circuit Board Relay
c ${ }^{\text {P4 }}{ }_{\text {us }}$ File E214025
$\stackrel{1}{6}$
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94 V-0 rated): Sealed (RTIII) plastic case.
Weight: 0.28 oz . $(8 \mathrm{~g})$ approximately.

## Contact Life



Max. DC Load Breaking Capacity


## Coil Operating Range



## Ordering Information



Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions



Vertical Version


## PC Board Layouts (Bottom Views)



Vertical Version


Horizontal Version


## Features

- 2 Form A (DPST-NO) or 2 Form C (DPDT).
- 8 amp rating with terminals on 5 mm pin spacing.
- $4 \mathrm{kV} / 8 \mathrm{~mm}$ contact-to-coil.
- Sockets available.


## Contact Data

Arrangements: 2 Form A (DPST-NO) and 2 Form C (DPDT), single contact.
Material: Silver-cadmium oxide or silver-nickel 0.15 .

## Expected Mechanical Life: 20 million operations.

Ratings:
Current: 8A (UL: 10A)
Voltage: 250VAC
Power (breaking): 2,000VA
Voltage (breaking): 440VAC
Make Current (max. 4s at 10\% duty cycle): 14A
Load/Life

| Type | Load | Life (Ops.) |
| :--- | :--- | :--- |
| RP440 | 64A ON, 2A OFF, 250VAC | 10,000 |
| RP421 | 2A, 50VDC, resistive | 2 million |
| RP421 | $1 / 10$ HP, 240VAC, per contact | UL 508 |
| RP421 | $3 A, 380 V A C$, AC11 | 30,000 |
| RP421 | $0.18 A, 110 V D C$, DC11 | 100,000 |
| RP420 | $0.6 A, 220 \mathrm{VAC}, \cos \varphi=0.8$, single phase motor | 13 million |

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms
Between Coil and Contacts: 4,000Vrms.
Between Contact Sets: $2,500 \mathrm{Vrms}$.
Creepage/Clearance: $8 / 8 \mathrm{~mm}$.

## Coil Data DC @ $\mathbf{2 0}^{\circ} \mathrm{C}$

Nominal Coil Power: 500mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in <br> Ohms | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 5 | $54 \pm 10 \%$ | 3.5 | 0.5 | 9.0 | 92.6 |
| 6 | $68 \pm 10 \%$ | 4.2 | 0.6 | 10.8 | 88.2 |
| 12 | $270 \pm 10 \%$ | 8.4 | 12 | 216 | 44.4 |
| 24 | $1,100 \pm 15 \%$ | 16.8 | 2.4 | 43.2 | 218 |
| 48 | $4,400 \pm 15 \%$ | 33.6 | 4.8 | 86.4 | 10.9 |
| 60 | $6,540 \pm 15 \%$ | 42.0 | 6.0 | 108.0 | 9.2 |
| 110 | $23,100 \pm 15 \%$ | 77.0 | 110 | 198.0 | 4.8 |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time (typical): 9 ms .
Release Time (typical): 3 ms .
Bounce Time (typical): N/O: 2 ms ; N/C: 3 ms .
Switching Rate: 6.000 ops./hr. max. at rated load

## RP II/2 series

## 8 Amp, 2 Pole <br> PC Board Relay

c ${ }^{2} \mathbf{N}_{\text {us File }}$ E214025
$\bigcirc$ (5) K터에
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Environmental Data

Temperature Range:
Operating: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration (30-150 Hz.): N/O: 11g; N/C: 15 g .
Shock (destructive): 100g.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure: Flux-tight (RT II) plastic case or sealed (RT III) cover.
Weight: . $63 \mathrm{oz} .(18 \mathrm{~g})$ approximately.

## Contact Life



Max. DC Load Breaking Capacity


## Coil Operating Range



## Ordering Information

| Typical Part Number $>$ |  |  | RP | 4 | 1 | 0 | 012 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> RP = Printed circuit board relay. |  |  |  |  |  |  |  |
| 2. Version: <br> $4=8 A$, flux-tight. $\quad 8=8 A$, sealed. |  |  |  |  |  |  |  |
| 3. Contact Arrangement: <br> 2 = 2 Form C (DPDT). $4=2 \text { Form } A$ | DPST-NO). |  |  |  |  |  |  |
| 4. Contact Material and Pin Spacing: $0=$ Silver-cadmium oxide, 5 mm pin spacing. 1 = Silver-nickel $0.15,5 \mathrm{~mm}$ pin spacing. |  |  |  |  |  |  |  |
| 5. Coil Voltage: $\begin{array}{ll} 005=5 \mathrm{VDC} & 012=12 \mathrm{VDC} \\ 006=6 \mathrm{VDC} & 024=24 \mathrm{VDC} \end{array}$ | $\begin{aligned} & 048=48 \mathrm{VDC} \\ & 060=60 \mathrm{VDC} \end{aligned}$ | $110=110 \mathrm{VDC}$ |  |  |  |  |  |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions



## PC Board Layout (Bottom View)



Wiring Diagrams (Bottom Views)


2 Form C

2 Form A


## Features

- 1 Form A (SPST-NO) or 1 Form C (SPDT).
- 8 and 12 amp models available with 3.5 or 5 mm pin spacing.
- 16 amp models available with 5 mm pin spacing.
- $4 \mathrm{kV} / 8 \mathrm{~mm}$ contact-to-coil.
- Sockets available.


## Contact Data

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT), single contact.
Material: Silver-cadmium oxide or silver-nickel 0.15 .
Expected Mechanical Life: 30 million operations.

| Ratings: |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Curren |  | 8A | 12A | 16A |
| Voltage |  | 250VAC | 250VAC | 250VAC |
| Power | breaking): | 2,000VA | 3,000VA | 4,000VA |
| Voltage | (breaking): | 400VAC | 400VAC | 400VAC |
| Make C | urrent: | 16A | 20A | 25A |
| Materia |  | AgNi 0.15 | AgCdO | AgCdO |
| Load/Life |  |  |  |  |
| Type | Load |  |  | Life (Ops.) |
| RP410 | 12A, 250VAC | $\cos \varphi=1,12$ | 40\% duty cycle | 110,000 |
| RP410 | 9.1A, 220VA | $\cos \varphi=1,36$ | 15\% duty cycle | 200,000 |
| RP418 | 3.4A ON, 0.4 | A OFF, 220V | S $\varphi=0.6$ | $>11$ million |
| RP411 | 8A, 250VAC, | OS $\varphi=1,50 \%$ | cycle | 100,000 |
| RP412 | 8A, 250VAC, | $\operatorname{Sos} \varphi=1,50 \%$ | cycle | 100,000 |
| RP330 | 18.2A, 250V | , $\cos \varphi=1$, | 15\% duty cycle | 110,000 |
| RP330 | 96A ON, 16A | OFF, 250VAC | = 0.6, 450/h | >30,000 |

## Initial Dielectric Strength

Between Open Contacts: $1,000 \mathrm{~V}$ ms
Between Coil and Contacts: $4,000 \mathrm{Vrms}$.
Creepage/Clearance: $8 / 8 \mathrm{~mm}$.

## Coil Data DC @ $20^{\circ} \mathrm{C}$

Nominal Coil Power: 500mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in <br> Ohms | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 5 | $54 \pm 10 \%$ | 3.5 | 0.5 | 9.0 | 92.6 |
| 6 | $68 \pm 10 \%$ | 4.2 | 0.6 | 10.8 | 88.2 |
| 12 | $270 \pm 10 \%$ | 8.4 | 12 | 216 | 44.4 |
| 24 | $1,100 \pm 15 \%$ | 16.8 | 2.4 | 43.2 | 218 |
| 48 | $4,400 \pm 15 \%$ | 33.6 | 4.8 | 86.4 | 10.9 |
| 60 | $6,540 \pm 15 \%$ | 42.0 | 6.0 | 108.0 | 9.2 |
| 110 | $23,100 \pm 15 \%$ | 77.0 | 110 | 198.0 | 4.8 |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time (typical): 8 ms .
Release Time (typical): 2 ms .
Bounce Time (typical): N/O: 2 ms ; N/C: 4 ms .
Switching Rate: 6.000 ops./hr. max. at rated load

## RP II/1 series

## 8-16 Amp, 1 Pole PC Board Relay

© ${ }_{\text {us File E }}$ E214025

$\Leftrightarrow$ (t)
Kㄸㅓㅄㅄㅇ 12 A Version Only
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Environmental Data

Temperature Range:
Operating: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration (30-300 Hz.): N/O: >10g; N/C: 2 g .
Shock (destructive): 100g.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure: Flux-tight (RT II) plastic case or sealed (RT III) cover.
Weight: . $63 \mathrm{oz} .(18 \mathrm{~g})$ approximately.


Max. DC Load Breaking Capacity


## Coil Operating Range



## Ordering Information



Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions



## PC Board Layouts (Bottom Views)



8/12A, 3.5 mm Pin Spacing


8/12A, 5 mm Pin Spacing


16A, 5 mm Pin Spacing


1 Form C, 16A, 5 mm


1 Form A, 16A, 5 mm


## Features

- 1 Form A (SPST-NO).
- 16 amp models handles up to 120A peak inrush current.
- $4 \mathrm{kV} / 8 \mathrm{~mm}$ contact-to-coil
- Latching and non-latching types.


## Contact Data

Arrangements: 1 Form A (SPST-NO), single contact.
Material: Silver-tim oxide.
Expected Mechanical Life: 30 million operations.
Ratings:
Current: 16A
Voltage: 250VAC
Power (breaking): 4,000VA
Voltage (breaking): 440VAC
Make Current (max 4s at 10\% duty cycle): 25A
Peak Inrush Current: 120A
Load/Life
12A, 250VAC, $\cos \varphi=1 ; 300,000 \mathrm{ops}$.
TV8; 25,000 ops.
2,500W, 230VAC, Halogen lamps; > 10,000 ops.
1,000W, 250VAC, Incandescent lamps; 230,000 ops.
3,000W, 250VAC, Incandescent lamps; 36,000 ops.
1,500VA, Fluorescent lamps, 163 F ; 10,000 ops.

## Initial Dielectric Strength

Between Open Contacts: 2,000Vrms
Between Coil and Contacts: $4,000 \mathrm{Vms}$.
Creepage/Clearance: $8 / 8 \mathrm{~mm}$.
Coil Data DC @ $\mathbf{2 0}^{\circ} \mathrm{C}$
Nominal Coil Power: Non-latching: 500mW.
Single-coil latching: 12-14W.
Dual-coil latching: 12-15W.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in <br> Ohms | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Non-Latching Models |  |  |  |  |  |
| 12 | $270 \pm 10 \%$ | 9.0 | 12 | 216 | 44.4 |
| 24 | $1,100 \pm 15 \%$ | 18.0 | 2.4 | 43.2 | 218 |
| 48 | $4,400 \pm 15 \%$ | 36.0 | 4.8 | 86.4 | 10.9 |
| 60 | $6,540 \pm 15 \%$ | 45.0 | 6.0 | 108.0 | 9.2 |
| Nominal | DC <br> Resistance <br> in | Must <br> Operate <br> Voltage <br> Voltage <br> VDC | Reset <br> Voltage <br> Ohms | Reset <br> R1 <br> Ohms /W | Nominal <br> Coil <br> Current <br> (mA) |

Single-coil Latching Models - Reset Voltage 70-110\% of Nom.

| 5 | $21 \pm 10 \%$ | 3.7 | 3.6 | $39 / 0.5$ | 238.1 |
| ---: | ---: | ---: | ---: | ---: | ---: |
| 12 | $115 \pm 10 \%$ | 9.0 | 8.7 | $220 / 0.5$ | 104.3 |
| 24 | $460 \pm 10 \%$ | 18.0 | 16.7 | $820 / 0.5$ | 52.2 |


| Dual-coil Latching Models - Reset Voltage 75-120\% of Nom. |  |  |  |  |  |
| :---: | ---: | ---: | ---: | ---: | ---: |
| 12 | $105 \pm 15 \%$ | 9.0 | 9.0 | - | 114.3 |
| 24 | $460 \pm 15 \%$ | 18.0 | 18.0 | - | 52.2 |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate / Release Time (Non-latching, typical): $8 \mathrm{~ms} / 2 \mathrm{~ms}$.
Operate / Reset Time (Latching, typical): $6 \mathrm{~ms} / 2 \mathrm{~ms}$.
Bounce Time (typical): 2 ms .
Switching Rate: 6.000 ops./hr. max. at rated load.

## RP 3 SL series

## 16 Amp, 1 Pole <br> PC Board Relay for High Inrush Loads <br> ${ }^{\text {cTN }}$ us File E214025 <br> $\Leftrightarrow$ K터엥

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Environmental Data

Temperature Range:
Operating: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration (30-300 Hz.): 20 g .
Shock (destructive): 100g.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure: Flux-tight (RT II) plastic case or sealed (RT III) cover.
Weight: . $63 \mathrm{oz} .(18 \mathrm{~g})$ approximately.

## Contact Life



Max. DC Load Breaking Capacity


Coil Operating Range


Non-Latching Models


Latching Models


Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. TBD

## Outline Dimensions



## PC Board Layout (Bottom View)



## Wiring Diagram (Bottom View)



Terminal b) only present on two-coil latching models

Latching Versions:
Contact position shown results during or after Coil energization with reset voltage.

Two-Coil Versions:
Operate: A2, A3
Reset A1, A3

## Circuit Diagram for Single-Coil Latching Model




## Features

- 1 Form A (SPST-NO).
- Tungsten prerun contact and silver-cadmium oxide contact.
- 10 amp rated current, $500 \mathrm{~A} / 10 \mu \mathrm{sin}$ inush current.
- 4kV/8mm contact-to-coil, insulation to VDE 0631 and 0700.
- Non-latching and latching types.
- Well suited for lighting systems, motors, lamp loads.


## Contact Data

Arrangements: 1 Form A (SPST-NO), single contact.
Material: Tungsten prenun contact and silver-cadmium oxide contact.
Expected Mechanical Life: 30 million operations.
Ratings:
Current: 10A.
Current (making, max. 4s at 10\% duty cycle): 16A.
Current (peak inrush 10 $\mu$ s): 500A.
Voltage: 250VAC.
Voltage (breaking): 400VAC.
Load/Life
10 amp resistive, 250VAC; 250,000 ops.
2,500W, incandescent lamps; 30,000 ops.
1,300W, fluorescent lamps (140 $\mu \mathrm{F}$ ); 30,000 ops.
1,000W, Dulux lamps ( $140 \mu \mathrm{~F}$ ); 30,000 ops.

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms.
Between Coil and Contacts: $4,000 \mathrm{Vrms}$.
Creepage/Clearance: $8 / 8 \mathrm{~mm}$.

## Non-Latching Coil Data DC @ $20^{\circ} \mathrm{C}$

Nominal Coil Power: Non-latching: 820mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> $(\mathbf{m A )}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 6 | 80 | 4.2 | 0.4 | 12.0 | 75.0 |
| 12 | 300 | 8.4 | 0.9 | 24.0 | 40.0 |
| 24 | 1,200 | 16.8 | 18 | 48.0 | 20.0 |
| 48 | 4,825 | 33.6 | 3.6 | 96.0 | 10.0 |
| 60 | 7,500 | 42.0 | 4.5 | 120.0 | 8.0 |

## 0409 series

## High Inrush (500A/10us) <br> Printed Circuit Board Relay

## 吹 File E214025

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Latching Coil Data DC @ $\mathbf{2 0}^{\circ} \mathrm{C}$
Nominal Coil Power: Latching: 0.8-1W.
Minimum Energization Time: 20 ms .

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\pm 10 \%$ | Must <br> Operate <br> Voltage <br> VDC | Min. <br> Reset <br> Voltage <br> VDC | Max. <br> Reset <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> $(\mathbf{m A )}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 12 | 118 | 8.9 | 0.7 | 2.5 | 40.0 |
| 24 | 457 | 18.0 | 13 | 5.0 | 20.0 |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time /Release Time (typical): $10 \mathrm{~ms} / 3 \mathrm{~ms}$.
Bounce Time (typical): 3 ms
Switching Rate: 9,000 ops./hr. max. at rated load.

## Environmental Data

Temperature Range: Operating: $-20^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration (30-300 Hz.): 20g.
Shock (destructive): 100g.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure ( 94 V-0 rated): Flux-tight (RTII) plastic case.
Weight: 0.35 oz . $(10 \mathrm{~g})$ approximately.
Coil Operating Range


Ordering Information

| Typical Part Number |  |  |  | 0409 | 47 | 031 | 001 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: $0409=$ Miniature printed circuit board relay for high inrush currents. |  |  |  |  |  |  |  |
| 2. Type: 47 = Non-latching | 67 | hing |  |  |  |  |  |
| 3. Coil Voltage: Non latching Coil: Latching Coil: | $\begin{aligned} & 031=12 \mathrm{VDC} \\ & 032=12 \mathrm{VDC} \end{aligned}$ | $\begin{aligned} & 027=24 \mathrm{VDC} \\ & 029=24 \mathrm{VDC} \end{aligned}$ | 024 = 48VDC | $023=60 \mathrm{VDC}$ |  |  |  |

4. Contact Configuration:
$001=1$ Form A (SPST-NO)
Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions



PC Board Layout (Bottom View)


Wiring Diagram (Bottom View)



## Features

- 1 Form A (SPST-NO) and 1 Form B (SPST-NC).
- 16 amp rated current.
- Quick connect terminals for load.
- Ambient temperature up tp $125^{\circ} \mathrm{C}$.
- 4kV/8mm contact-to-coil, insulation to VDE 0631 and 0700.
- Flux-tight plastic case.


## Contact Data

Arrangements: 1 Form A (SPST-NO) and 1 Form B (SPST-NC), single contact.
Material: Silver-cadmium oxide.
Expected Mechanical Life: 30 million operations.

## Ratings:

Current: 16A.
Voltage: 250VAC.
Power (breaking): 4,000 VA.
Voltage (breaking): 440VAC.
Current (making, max. 4s at 10\% duty cycle): 25A.
1 Form A Contacts
10 amp resistive, $400 \mathrm{VAC}, 125^{\circ} \mathrm{C}, 200,000$ ops.
16 amp resistive, $250 \mathrm{VAC}, 125^{\circ} \mathrm{C}, 100,000$ ops.

## 1 Form B Contacts

10 amp resistive, $400 \mathrm{VAC}, 125^{\circ} \mathrm{C}, 50,000$ ops.
16 amp resistive, $250 \mathrm{VAC}, 125^{\circ} \mathrm{C}, 50,000$ ops.

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms.
Between Coil and Contacts: $4,000 \mathrm{Vrms}$.
Creepage/Clearance: $8 / 8 \mathrm{~mm}$.

## Coil Data DC @ $20^{\circ} \mathrm{C}$

Nominal Coil Power: 360mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 6 | 100 | 3.8 | 0.6 | 16.9 | 60.0 |
| 12 | 400 | 7.5 | 12 | 33.8 | 30.0 |
| 24 | 1,600 | 14.9 | 2.4 | 67.7 | 15.0 |
| 48 | 6,400 | 30.0 | 4.8 | 135.3 | 7.5 |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time: 10 ms .
Release Time: 2 ms .
Bounce Time (N/O contact / N/C contact) : $1 \mathrm{~ms} / 2 \mathrm{~ms}$.
Switching Rate: 3,600 ops./hr. max. at rated load.

## Environmental Data

Temperature Range:
Operating: $-40^{\circ} \mathrm{C}$ to $+125^{\circ} \mathrm{C}$.

## V23077 (IF) series <br> 16 Amp, Miniature <br> Printed Circuit Board Relay

${ }^{\text {cTN }}$ us File E214025
© 0
Users should thoroughly review the technical data before selecting a product Users should thoroughly review the technical data before selecting a prod
part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Mechanical Data

Termination: Printed circuit terminals, plus quick connects for load.
Enclosure ( 94 V-0 rated): Flux-tight (RTII) plastic case.
Weight: 0.92 oz . $(26 \mathrm{~g})$ approximately.

## Contact Life



## Max. DC Load Breaking Capacity



## Coil Operating Range



## Ordering Information

| Typical Part Number $\downarrow$ V23077 | -A | 1 | 005 | -A | 4 | 03 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> V23077 $=$ IF $125^{\circ} \mathrm{C}$ miniature printed circuit board relay.. |  |  |  |  |  |  |
| 2. Termination: <br> A = PC temminals for coil, $.25^{\prime \prime}$ ( 6.35 mm ) quick connects for load. |  |  |  |  |  |  |
| 3. Version: <br> 1 = Standard. |  |  |  |  |  |  |
| $\begin{aligned} & \text { 4. Coil Voltage: } \\ & 003=6 \mathrm{VDC}\end{aligned} \quad 005=12 \mathrm{VDC} \quad 007=24 \mathrm{VDC} ~ 009=48 \mathrm{VDC}$ |  |  |  |  |  |  |
| 5. Contact Type: A = Single contact. |  |  |  |  |  |  |
| 6. Contact Material: 4 = Silver-cadmium oxide. |  |  |  |  |  |  |
| 7. Contact Arrangement: $02=1$ Form A (SPST-NO) $. \quad 03=1$ Form B (SPST-NC). |  |  |  |  |  |  |

Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions



## Wiring Diagrams (Bottom Views)



1 Form A

1 Form C

## PC Board Layout (Bottom View)




## Features

- 1 Form A (SPST-NO), 1 Form B (SPST-NC) and 1 Form X (SPST-NO-DM).
- 16 amp rated current.
- Quick connect terminals for load.
- 41063 types operate in ambient temperature up to $125^{\circ} \mathrm{C}$.
- 4kV/8mm contact-to-coil, insulation to VDE 0631 and 0700.
- 41083 version provides 3 mm contact gap.
- Flux-tight plastic case.


## Contact Data

Arrangements:
410 63: 1 Form A (SPST-NO) and 1 Form B (SPST-NC), single contact.
410 83: 1 Form X (SPST-NO-DM).
Material: 410 63: Silver-cadmium oxide.; 410 83: Silver-nickel.
Expected Mechanical Life: 10 million operations.
Ratings:
Current: 16A.
Voltage: 250VAC.
Power (breaking): 4,000 VA.
Voltage (breaking): 440VAC.
Current (making, max. 4s at 10\% duty cycle): 410 63: 25A.; 410 83: 20A.
41063-1 Form A Contacts
16 amp resistive, $250 \mathrm{VAC}, 125^{\circ} \mathrm{C}, 100,000$ ops. 12 amp resistive, $250 \mathrm{VAC}, 70^{\circ} \mathrm{C}, 450,000$ ops. 10 amp resistive, $400 \mathrm{VAC}, 125^{\circ} \mathrm{C}, 50,000$ ops. $12 \mathrm{amp} \cos \varphi=0.6,250 \mathrm{VAC}, 125^{\circ} \mathrm{C}, 50,000$ ops
41063 - 1 Form B Contacts 16 amp resistive, $250 \mathrm{VAC}, 125^{\circ} \mathrm{C}, 150,000$ ops.
41083 - 1 Form X Contacts 16 amp resistive, $250 \mathrm{VAC}, 85^{\circ} \mathrm{C}, 30,000 \mathrm{ops}$. 10 amp resistive, $250 \mathrm{VAC}, 85^{\circ} \mathrm{C}, 100,000$ ops 10 amp resistive, $400 \mathrm{VAC}, 85^{\circ} \mathrm{C}, 10,000$ ops.

## Initial Dielectric Strength

Between Open Contacts: 410 63: 1,000Vrms.; 410 83: 2,000Vms.
Between Coil and Contacts: $4,000 \mathrm{Vrms}$.
Creepage/Clearance: $8 / 8 \mathrm{~mm}$.

## Coil Data DC @ $20^{\circ} \mathrm{C}$

Nominal Coil Power: 360mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{4 1 0 6 3}$ models (1 Form A or 1 Form B) |  |  |  |  |  |
| 6 | 100 | 3.8 | 0.6 | 16.9 | 60.0 |
| 12 | 400 | 7.5 | 12 | 33.8 | 30.0 |
| 24 | 1,600 | 14.9 | 2.4 | 67.7 | 15.0 |
| 48 | 6,400 | 30.0 | 4.8 | 135.3 | 7.5 |
| $\mathbf{4 1 0 8 3}$ models (1 Form X with 3 mm contact gap) |  |  |  |  |  |
| 6 | 100 | 3.6 | 0.45 | 16.9 | 60.0 |
| 12 | 400 | 7.3 | 0.9 | 33.8 | 30.0 |
| 24 | 1,600 | 14.6 | 18 | 67.7 | 15.0 |
| 48 | 6,400 | 29.2 | 3.6 | 135.3 | 7.5 |
| 60 | 10,000 | 36.5 | 4.5 | 135.3 | 6.0 |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time (typical): 410 63: 10ms.; 410 83: 14 ms.
Release Time (typical): 5 ms .
Bounce Time (typical): 3 ms
Switching Rate: 6,000 ops./hr. max. at rated load.

## 0410 series

## 16 Amp, Miniature Printed Circuit Board Relay

## 믹 File E214025

(18) 요 (5)

NOTE: 041083 version is VDE only, not UL, CSA or SEMCO.
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Environmental Data

Temperature Range:
Operating: $41063:-20^{\circ} \mathrm{C}$ to $+125^{\circ} \mathrm{C} ; 41083:-20^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Vibration: ( 10 to 500 Hz .) 10 g [410 83].
Shock (functional): 100g [410 83].

## Mechanical Data

Termination: Printed circuit terminals, plus quick connects for load.
Enclosure ( $94 \mathrm{~V}-0$ rated): Flux-tight (RTII) plastic case.
Weight: $0.85 \mathrm{oz} .(24 \mathrm{~g})$ approximately.

## Contact Life




## Max. DC Load Breaking Capacity



Coil Operating Range


41063 Type
1 Form A or 1 Form C


## 41083 Type

1 Form X, 3 mm Contact Gap

## Ordering Information

| Typical Part Number $>$ | 0410 | 83 | 046 | 001 |
| :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> $0410=$ Miniature printed circuit board relay with quick connect terminals for load. |  |  |  |  |
| 2. Version: <br> $63=$ M odel for ambient temperature up to $125^{\circ} \mathrm{C}$. <br> 83 = M odel with 3 mm contact gap, for ambient temperature up to $85^{\circ} \mathrm{C}$ |  |  |  |  |
| 3. Coil Voltage: <br> $054=6 \mathrm{VDC} \quad 050=12 \mathrm{VDC} \quad 046=24 \mathrm{VDC} \quad 043=48 \mathrm{VDC}$ <br> (Note: 60VDC coil is not available with version 63) | $042=60 \mathrm{VDC}$ |  |  |  |
| 4. Contact Arrangement: <br> $01=1$ Form A (SPST-NO) on version 63; 1 Form X (SPST-NO-DM) on version 83. $02=1$ Form B (SPST-NC), not available on version 83. |  |  |  |  |

Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions



Wiring Diagrams (Bottom Views)


410 63, 1 Form A


410 83, 1 Form X

## PC Board Layout (Bottom View)



## PCG series



## Features

- Meet UL Tungsten TV-5 rating.
- 2 Form A contact arrangements.
- Meet UL, CSA, SEMKO and SEV requirements.
- Meet $4,000 \mathrm{~V}$ dielectric voltage between coil and contacts.
- Meet $10,000 \mathrm{~V}$ surge voltage between coil and contacts ( 1.2 / $50 \mu \mathrm{~s}$ ).


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 2 Form A (DPST-NO).
Material: AgSnO.
Max. Switching Rate: $300 \mathrm{ops} . / \mathrm{min}$. (no load).
$30 \mathrm{ops} . / \mathrm{min}$. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: 5A @ 250VAC resistive, 100,000ops.
8A @250VDC resistive, 50,000ops.
TV-5 @120VAC Tungsten, 25,000ops.
Max. Switched Voltage: AC: 277V.

## DC: 30V.

Max. Switched Current: 10A
Max. Switched Power: 1,250VA, 380W.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: 4,000VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 10,000V (1.2 / 50 $\mu \mathrm{s}$ ).
Surge Voltage Between Contact and other Pole: 6,000V (1.2 / 50 s s).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDCM.

## Coil Data

Voltage: 5 to 48VDC.
Nominal Power: 540 mW
Coil Temperature Rise: $50^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

## 2 Pole Miniature

## Power PC Board Relay

## Appliances, Audio Equipment, Office Machines

PI UL File No. E82292
(18) CSA File No. LR48471
(S) SEMKO File No. 8744066
( $\left.{ }_{\mathbf{S}}^{\mathbf{S}}\right)$ SEV File No. 98110096

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| PCG |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm$ 10\% | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
| 5 | 106.4 | 47 | 4.00 | 0.25 |
| 6 | 88.0 | 68 | 4.80 | 0.30 |
| 9 | 58.0 | 155 | 7.20 | 0.45 |
| 12 | 44.4 | 270 | 9.60 | 0.60 |
| 24 | 21.8 | 1,100 | 19.20 | 1.20 |
| 48 | 11.0 | 4,400 | 38.40 | 2.40 |

## Operate Data

Must Operate Voltage: 80\% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: 15 ms max.
Release Time: 5 ms max.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: $1,000 \mathrm{~m} / \mathrm{s}^{2}$ (100G approximately).
Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.

## Enclosure ( $94 \mathrm{~V}-0$ Flammability Ratings):

PCG-N: Vented (Flux-tight) snap-on cover.
Weight: $0.63 \mathrm{oz}(18 \mathrm{~g})$ approximately.

| Dimensions are shown for | Dimensions are in inches over | Specifications and availability |
| :--- | :--- | :--- |
| reference purposes only. | (millimeters) unless otherwise <br> specified. | www.tycoelectronics.com <br> subject to change. |
| Technical support: |  |  |

Ordering Information


* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

Outline Dimensions


Wiring Diagram (Bottom View)


PC Board Layout (Bottom View)


## Reference Data




## Features

- 1 Form A (SPST-NO) through 2 Form C (DPDT).
- 16 amp rated current (1 pole) or 10 amp (2 pole).
- Printed circuit or quick connect terminals.
- $4 \mathrm{kV} / 8 \mathrm{~mm}$ contact-to-coil.
- 3 mm contact gap version available.
- Optional magnetic blowout on 3mm contact gap version.
- PC board, bracket or panel mount.


## Contact Data

Arrangements: 1 Form A (SPST-NO), 1 Form B (SPST-NC), 1 Form C (SPDT), 2 Form A (DPST-NO), 2 Form B (DPST-NC), 2 Form C (DPDT).
Material: Silver-cadmium oxide or silver-copper 3.
Expected Mechanical Life: 250,000 operations
Ratings:
Current: One pole: 16A; Two pole: 10A.
Voltage: 250VAC.
Power (breaking): One pole: 4,000 VA; Two pole: $2,500 \mathrm{VA}$.
Voltage (breaking): 400VAC.
Current (making, max. 4s at 10\% duty cycle): One pole: 25A; Two pole: 15A.
Load/Life - One Pole - Model with Standard Contact Gap 16 amp resistive, 250VAC, 250,000 ops.
Load/Life - One Pole - Model with 3mm Contact Gap
16 amp resistive, $250 \mathrm{VAC}, 70^{\circ} \mathrm{C}, 150,000$ ops.
10 amp resistive, $250 \mathrm{VAC}, 105^{\circ} \mathrm{C}, 150,000$ ops.
Load/Life - Two Pole
10 amp resistive, 250VAC, 250,000 ops.

## Initial Dielectric Strength

Between Open Contacts: Standard Contact Gap: 1,000Vrms 3mm Contact Gap: $2,000 \mathrm{Vms}$.
Between Coil and Contacts: 4,000Vrms.
Creepage/Clearance: $8 / 8 \mathrm{~mm}$.

Coil Data DC @ $20^{\circ} \mathrm{C}$
Nominal Coil Power: DC Coil : 1W.; AC Coil: 18VA

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC Coils | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 12 | 145 | 7.8 | 0.6 | 15.6 | 83.0 |
| 24 | 580 | 15.6 | 12 | 312 | 410 |
| 48 | 2,200 | 312 | 2.4 | 62.4 | 22.0 |
| 110 | 13,000 | 715 | 5.5 | 143.0 | 9.0 |
| AC Coils - Models with Standard Contact Gap <br> 24 <br> 60$\quad 200$ |  |  |  |  |  |
| 110 | 1,250 | 45.0 | 3.6 | 27.0 | 75.0 |
| 230 | 17,500 | 83.0 | 9.0 | 69.0 | 30.0 |
| AC Coils - Models with 3mm Contact Gap | 16.0 | 127.0 | 16.0 |  |  |
| 24 | 145 | 18.0 | 3.6 | 27.0 | 75.0 |
| 60 | 950 | 45.0 | 9.0 | 69.0 | 30.0 |
| 110 | 3,100 | 83.0 | 16.0 | 127.0 | 16.0 |
| 230 | 11,400 | 170.0 | 35.0 | 253.0 | 9.0 |

## 0430 series

## 10-16 Amp, 1 or 2 Pole PC Board or Panel Relay

TVile E214025

(vos)
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time (typical): Standard Contact Gap: 18 ms . 3mm Contact Gap: 15 ms .
Release Time (typical): Standard Contact Gap: 3 ms . 3mm Contact Gap: 8 ms .
Bounce Time (typical): Standard Contact Gap: 3 ms . 3mm Contact Gap: 4 ms .
Switching Rate: 9,000 ops./hr. max. at rated load.

## Environmental Data

Temperature Range:
Operating: $41063:-20^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Shock (destructive): 100g.

## Mechanical Data

Termination: Printed circuit or quick connect terminals.
Enclosure: Plastic dust cover.
Weight: 113 oz . ( 32 g ) approximately.

## Contact Life



Models with Std. Contact Gap


Models with 3mm Contact Gap

Max. DC Load Breaking Capacity


Models with Std. Contact Gap


Models with 3mm Contact Gap

## Ordering Information



Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions




PC Board Version, Std. Gap.


Wiring Diagrams (Bottom Views)

1 Form A, Standard Contact Gap

1 Form A, 3mm Contact Gap

2 Form A, Standard Contact Gap
 subject to change.

## PC Board Layouts (Bottom Views)



1 Form A, 3mm Contact Gap
1 Form A, Standard Contact Gap


## Features

- Low power sensitive coil.
- 1 Form A, 1 Form B and 1 Form C contact arrangements.
- Various contact materials and types for ratings to 15 amps.
- Coil assembly rated $130^{\circ} \mathrm{C}, 94 \mathrm{~V}-\mathrm{O}$.
- Applications include sensor and timer controls, emergency lighting, instrmentation, alarm systems, smoke and fire detectors, business equipment and vending machines.


## Contact Data

Arrangements: 1 Form A (SPST-NO), 1 Form B (SPST-NC) and 1 Form C (SPDT).
Material and Type: Gold-silver crossbar, silver-cadmium crossbar, palladium crossbar, gold-flashed silver cadmium, silver sadmium oxide, find silver, gold-flashed coin silver.
Expected Mechanical Life: 10 million operations, minimum.
Expected Electrical Life: 100,000 operations, minimum, at rated load.
ULCSA Ratings @ $25^{\circ} \mathrm{C}$

| Code | Contact Material | Rating |
| :---: | :---: | :---: |
| B | Au Flashed AgCd | 75VA@24VAC Pilot Duty§ |
|  |  | 1A@120VAC General Purpose |
|  |  | 1.5A@50VDC Resistive |
|  |  | 600w@277VAC Gen'l. Purpose SPST-NO Only |
|  |  | 240W@277VAC Gen'l. Purpose SPST-NC Only |
|  |  | 480VA277VAC Pilot Duty SPDT Only |
|  |  | 480VA@@allast SPDT Only |
|  |  | $1 / 10$ HP@120VAC |

§ Only when Code Y Electrical Spacing is specified.

## 600 series <br> 15 Amp Sensitive PC Board Relay

吹 File E39006 and E42149
(18) File LR48569

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application

## Initial Dielectric Strength

Between Open Contacts: 500VAC, 60 Hz ., 2 seconds.
Between Coil and Contacts: 1,000VAC, $60 \mathrm{~Hz} ., 2$ seconds.

## Coil Data @ $25^{\circ} \mathrm{C}$

Rated Voltage: 3 to 48VDC.
Maximum Voltage @ $85^{\circ} \mathrm{C}$ : $120 \%$ of Rated Voltage.
Nominal Power @ $25^{\circ} \mathrm{C}$ : 110mW for 3A and 5A rated models;
240 mW for 15 A rated models.
Maximum Power @ $\mathbf{2 5}^{\circ} \mathrm{C}$ : 1W.
Duty Cycle: Continuous.
Initial Insulation Resistance: 10,000 megohms, min., at $25^{\circ} \mathrm{C}, 500 \mathrm{VDC}$ and $50 \%$ rel. humidity.

Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

| Nominal <br> Voltage <br> VDC | DC Resistance in Ohms <br> $\mathbf{\pm 1 0 \%}$ |  | Must <br> Operate <br> Voltage <br> VDC | Must <br> Release <br> Voltage <br> VDC |
| :---: | :---: | :---: | :---: | :---: |
|  | 3 A \& 5A Types | 15A Types | 2.25 | 0.3 |
| 006 | 82 | 38 | 4.5 | 0.6 |
| 009 | 327 | 150 | 6.75 | 0.9 |
| 012 | 736 | 338 | 9.0 | 12 |
| 018 | 1,309 | 600 | 13.5 | 18 |
| 024 | 2,945 | 1,350 | 18.0 | 2.4 |
| 028 | 5,236 | 2,400 | 210 | 2.8 |
| 048 | 7,127 | 3,267 | 36.0 | 4.8 |

## Operate Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Must Operate Voltage: 75\% of nominal.
Must Release Voltage: 10\% of nominal.
Operate Time: 10 ms , typ.
Release Time: 10 ms , typ.

## Environmental Data

Temperature Range:
Storage: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosures: Unsealed dust cover or sealed plastic case.
Weight: 16 oz . ( 45 g ) approximately.


Our authorized distributors are more likely to stock the following items for immediate delivery. None at present.

## Outline Dimensions



## PC Board Layout (Bottom View)



Wiring Diagrams (Bottom Views)
1 Form A 1 Form B 1 Form C
(SPST-NO) (SPST-NC) (SPDT)


Note: On single throw models, only necessary terminals are present.

## Alphanumeric Index

| Series Type | Page |
| :--- | :--- |
| 491 ................ 20A AC Coil PCB or Panel Mt. Relay ............. 509 |  |
| PCF ................ 25A DC Coil PCB Relay ................................ 502 |  |
| T9A .............. 30A DC Coil PCB or Panel Mt. Relay ............... 506 |  |
| T90 .............. 30A DC Coil PCB Relay ............................. 504 |  |
| T92 ............... 30A AC or DC Coil PCB or Panel Mt. Relay ... 511 |  |

NOTE: Some of the relay series described in the Power Relays and Contactors section are also available with printed circuit board terminals as an option.
$\qquad$ 501-512

## Power (20-30A) PC Board Relay Question Tree

This guide helps the user select one or more relay series which may be appropriate for a given application. The user should then refer to detailed specifications elsewhere in this catalog to determine the actual part number to be specified. Of course, the user must assume ultimate responsibility for determining the suitability of a relay for a particular application.



## PCF series

## 25A Miniature <br> Power PC Board Relay

## Appliances, HVAC, Office Machines.

TJ UL File No. E58304
(18) CSA File No. LR48471
$\triangle$ TUV File No. R9551880

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Meet UL 508, CSA, TUV requirements.
- 1 Form A contact arrangements.
- Quick connect terminal type and PC board type.
- Meet 5,000V dielectric voltage between coil and contacts.
- Meet $10,000 \mathrm{~V}$ surge voltage between coil and contacts ( $1.2 / 50 \mu \mathrm{~s}$ ).


## Contact Data @ 20응

## Arrangements: 1 Form A.

Material: AgSnO
Max. Switching Rate: $300 \mathrm{ops} . / \mathrm{min}$. (no load).
30 ops./min. (rated load).
Expected Mechanical Life: 10 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: 25A @ 250VAC resistive.
23A @ 277VAC resistive.
20A @ 250VAC inductive ( $\cos \varnothing=0.4$ ).
Max. Switched Voltage: AC: 250V.
Max. Switched Current: 25A.
Max. Switched Power: 6,370VA.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC $50 / 60 \mathrm{~Hz}$. (1 minute).
Between Coil and Contacts: $5,000 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. (1 minute).
Surge Voltage Between Coil and Contacts: 8,000V (1.2 / 50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Elements: 1,000M ohms min. @ 500VDC.

## Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$

| PCF / PCFN |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | Nominal <br> Current <br> (mA) | Coil <br> Resistance <br> (ohms) $\pm$ 10\% | Must Operate <br> Voltage <br> (VDC) | Must Release <br> Voltage <br> (VDC) |
|  |  | 40 | 4.50 | 0.30 |
| 06 | 150.0 | 90 | 6.75 | 0.45 |
| 09 | 100.0 | 160 | 9.00 | 0.60 |
| 12 | 75.0 | 640 | 18.00 | 1.20 |
| 24 | 37.5 |  |  |  |

## Operate Data

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 5\% of nominal voltage or more.
Operate Time: 20 ms max.
Release Time: 10 ms max.

## Environmental Data

Temperature Range:
Operating: $\quad-30^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$
Vibration, Mechanical: 10 to $55 \mathrm{~Hz} ., 1.5 \mathrm{~mm}$ double amplitude Operational: 10 to 55 Hz ., 1.5 mm double amplitude.
Shock, Mechanical: 1,000m/s² (100G approximately).
Operational: 100m/s² (10G approximately).
Operating Humidity: 20 to 85\% RH. (Non-condensing).

## Mechanical Data

Termination PCF: Printed circuit terminals with quick connect terminals.
PCFN : Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings):
PCF / PCFN: Vented (Flux-tight) plastic cover.
Weight: $0.99 \mathrm{oz}(28 \mathrm{~g})$ approximately.

## Coil Data

Voltage: 6 to 24VDC.
Nominal Power: 900 mW .
Coil Temperature Rise: $55^{\circ} \mathrm{C}$ max., at rated coil voltage.
Max. Coil Power: 130\% of nominal.
Duty Cycle: Continuous.

Ordering Information


* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
None at present.



## Features

- Up to 30A switching in SPST and 20A switching in SPDT arrangements.
- Silver cadmium oxide contacts.
- Available as an open-frame relay, with a snap-on dust cover or with an immersion cleanable( ${ }^{(6)}$, plastic sealed case.
- Meets UL 508 \& UL 873 spacing - 1/8" through air, 1/8" over surface. (1/4" over surface with terminal code 4)
- UL class F insulation standard.
- Well suited for various industrial, commercial and residential applications, as well as many others.


## Contact Ratings @ $25^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Silver-cadmium oxide.
Mechanical Life: 10 million operations, typical.
Contact Ratings @ $\mathbf{2 5}^{\circ} \mathrm{C}$ with relay properly vented. Remove vent nib after soldering and cleaning.
Typical Electrical Load \& Life (Open Style Relay)

| Form \& Contact Material | Contact Load | Type of Load | Ops |
| :---: | :---: | :---: | :---: |
| (1) Silver-cadmium <br> oxide | 30A @ 240VAC | UL General Purpose | 100,000 |
|  | 20A @ 240VAC | Resistive Heater | 100,000 |
| (5) Silver-cadmium | 20A/10A @ 240VAC | UL General Purpose | 100,000 |
| oxide | 20A/10A @ 28VDC | Resistive | 100,000 |

Minimum Contact Load:
Silver Contacts: 500mA @ 5VDC or 12VAC.
Silver Cadmium Oxide Contacts: 1A @ 5VDC or 12VAC.
Initial Contact Resistance: $75 \mathrm{~m} \Omega$, max., @ min. rated current (switched).

## Initial Dielectric Strength

Between Open Contacts: $1,500 \mathrm{~V}$ rms.
Between Contacts and Coil: $1,500 \mathrm{~V}$ rms ( terminal code 1 ).
$2,500 \mathrm{Vms}$ (UL 873 version terminal code 4).

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{9}$ ohms, min., @ 500VDC, $25^{\circ} \mathrm{C}$ and $50 \%$ R.H.

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: 5 to 110VDC.
Maximum Coil Power: 2.8 Watt
Maximum Coil Temperature ${ }^{(5)}$ : Class F: $155^{\circ} \mathrm{C}$.
Duty Cycle: Continuous.

## Coil Data

| Nominal Voltage <br> (VDC) | Resistance <br> $\mathbf{\pm 1 0 \%}$ (Ohms) | Nominal Power <br> $(\mathbf{m W})$ | Nominal Current <br> $(\mathbf{m A})$ |
| :---: | :---: | :---: | :---: |
| 5 | 27 | 930 | 185 |
| 6 | 40 | 900 | 150 |
| 9 | 97 | 840 | 93 |
| 12 | 155 | 930 | 77 |
| 15 | 256 | 880 | 59 |
| 18 | 380 | 850 | 47 |
| 24 | 660 | 870 | 36 |
| 48 | 2,560 | 900 | 19 |
| 110 | 13,450 | 900 | 8 |

## Operate Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 10\% of nominal voltage or more.
Operate Time (Including Bounce)t: 15 ms , max.
Release Time (Including Bounce) $\dagger$ : 15 ms , max.
$\dagger$ At or From Nominal Coil Voltage

## T90 series

## 30 Amp Printed Circuit Board Relay <br> 只 File E22575 <br> (18) File LR15734® ${ }^{\text {® }}$ Patented

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Typical Coil Temperature Rise

Data below are average values and should be verified in application. Tests were conducted within a $2^{\prime}(.6 \mathrm{~m})$ cube (still air) with relay mounted to a 30A, single side P.C. board (6); at nominal coil power @ $25^{\circ} \mathrm{C}$; with normally open contact loaded; and with 4' ( 1.22 m ) long, \#10 AWG load wires.



## Environmental Data

Storage Temperature Range: $-40^{\circ} \mathrm{C}$ to $130^{\circ} \mathrm{C}$.
Operating Temperature Range: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}(1)$.
Vibration, Operational: $0.065^{\prime \prime}(1.65 \mathrm{~mm})$ max. excursions from $10-55 \mathrm{~Hz}$. with no contact opening $>100 \mu \mathrm{~s}$.
Shock, Operational: 10 g for 11 ms with no contact opening $>100 \mu \mathrm{~s}$.
Shock, Mechanical: 100g.

## Mechanical Data

Termination: Printed circuit terminals(4).
Enclosures (all have 94V-0 flammability rating, Class F temp. rating): Optional dust cover: Snap-on plastic dust cover is available for use on open style T90N.
Sealed case (T90S): Immersion cleanable, sealed plastic case ${ }^{(2)}$.
Weight: Open Model T90N: 0.7 oz . $(20 \mathrm{~g}$ ) approximately.
Sealed Model T90S: 0.9 oz. $(26 \mathrm{~g})$ approximately.

## Notes

(1) Operating ambient temperature must consider " Must Operate Voltage Change Over Temperature," Contact Temperature Rise, Coil Temperature Rise (If coil is not allowed to cool) and Maximum Coil Temperature. Specification ambient considers nominal coil voltage, 20A load with coil cooled to ambient.
(2) Sealed relay terminals should not be bent.
(3) Knock-off nib should be removed after cleaning process for optimum life of sealed relays.
(4) Maximum soldering temperature is $500^{\circ} \mathrm{F}$ for 4 seconds.
(5) Class F coils are UL systems approved for maximum coil temperature of $155^{\circ} \mathrm{C}$ by change of resistance method.
(6) See application note 13C265 for proper relay mounting, termination, cleaning and PC board conductor width. Coil rise test performed with 30A PC board to maintain $20^{\circ} \mathrm{C}$ maximum rise @ 30 A .

1. Basic Series:

T90 = Printed circuit board power relay.
2. Enclosure:
$\mathrm{N}=$ Open, no cover (snap-on dust cover available as an option).
$\mathrm{S}=$ Immersion cleanable, sealed plastic case with knock-off nib for ventilation.
3. Contact Arrangement:
$1=1$ Form A (SPST-NO). $5=1$ Form C (SPDT).
4. Coil Input:
$\mathrm{D}=\mathrm{DC}$ Voltage.
5. Terminals:
$1=$ Printed circuit terminals.
4 = Printed circuit terminals, no common terminal between coil terminals (see wiring diagram).
Note: Terminal code 4 recommended for UL 873 applications. Consult factory for use of terminal code 1 for UL 873 applications.
6. Contact Material:

2 =Silver-cadmium oxide.

| 7. $\begin{array}{l}\text { Coil Voltage: } \\ 5=5 \mathrm{~V} \mathrm{DC}\end{array} 6=6 \mathrm{VDC} \quad 9=9 \mathrm{VDC} \quad 12=12 \mathrm{VDC} \quad 15=15 \mathrm{VDC} \quad 18=18 \mathrm{VDC} \quad 24=24 \mathrm{VDC} \quad 48=48 \mathrm{~V}$ DC $\quad 110=110 \mathrm{VDC}$ |
| :--- |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| T90N1D12-12 | T90N1D42-24 | T90N5D42-24 | T90S1D42-24 | T90S5D42-24 |
| :--- | :--- | :--- | :--- | :--- |
| T90N1D12-18 | T90N5D12-12 | T90S1D12-12 | T90S5D12-12 |  |
| T90N1D12-24 | T90N5D12-24 | T90S1D12-24 | T90S5D12-24 |  |
|  |  |  |  |  |

## Outline Dimensions

T90N


T90S



## Wiring Diagram \& PC Board Layout (Bottom Views)

1 Form C


UL \& CSA Contact Ratings

| Voltage | Load Type | N.O. Contact | N. C. Contact |
| :---: | :---: | :---: | :---: |
|  |  |  |  |
| Silver Contacts |  |  |  |
| 240VAC | General Purpose | 10 A | 5 A |
| 240VAC | Resistive | 10 A | 5 A |
| 28VDC | Resistive | 10 A | 5 A |
| Silver-Cadmium Oxide Contacts |  |  |  |
| 240VAC | General Purposet | 30 A | 15 A |
| 240VAC | UL Resistivet | 20 A | 15 A |
| 120VAC | Motor | 1 HP | $1 / 4 \mathrm{HP}$ |
| 240VAC | Motor | 2 HP | $1 / 2 \mathrm{HP}$ |
| 240VAC | LRA/FLAt | $8 / 30$ | $30 / 10$ |
| 240VAC | Tungsten | TV5 | TV3 |
| 277VAC | Ballast | 6 A | 3 A |
| 28VDC | Resistive | 20 A | 10 A |

$\dagger$ For Form C application, derate current to $67 \%$.


## Features

- Up to 30 amp switching in SPST and 20 amp in SPDT arrangements.
- Immersion cleanable(6), plastic sealed case available.
- Meets UL 873 and UL 508 spacing - 1/8" through air, 1/4" over surface.
- Load connections made via 1/4" Q. C. terminals and safety wells accept insulated female Q. C. terminals (mounting codes $2 \& 5$ ).
- UL Class F insulation system standard.
- Well suited for various industrial, commercial and residential applications.


## Contact Ratings @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO), and 1 Form C (SPDT).
Material: Silver-cadmium oxide.
Mechanical Life: 10 million operations, typical.
Minimum Contact Load: 1A @ 5VDC or 12VAC.
Initial Contact Resistance: 75 milliohms, max., @ min. rated current (switched).
Contact Ratings @ $25^{\circ} \mathrm{C}$ (unless otherwise noted) with relay properly vented. Remove vent nib after soldering and cleaning.
Typical Electrical Load \& Life - 1 Watt Coil

| Contact <br> Arrangement | Contact Load | Type of Load | Operations |
| :---: | :---: | :---: | :---: |
| 1 | 30A @ 240VAC | UL General Purpose | 100,000 |
|  | 25A @ 240VAC | Resistive Heater | 100,000 |
| 5 | 20A/10A @ 240VAC | UL General Purpose | 100,000 |
|  | 20A/10A @ 240VAC | UL Resistive | 100,000 |
|  | 20A/10A @28VDC | Resistive | 100,000 |

UL 508/873 \& CSA Contact Ratings - 900mW Coil

| Voltage | Load Type | N.O. Contact | N.C. Contact | Operations |
| :---: | :---: | :---: | :---: | :---: |
| 240 VAC | General Purpose | 30 A | - | 100,000 |
| 240 VAC | Resistive | 18 A | - | $100,000 @ 105^{\circ} \mathrm{C}$ |
| 240 VAC | Resistive | - | 15 A | 6,000 |
| 240 VAC | LRA/FLA | $30 \mathrm{~A} / 15 \mathrm{~A}$ | - | 100,000 |
| 120VAC | LRA/FLA | $50 \mathrm{~A} / 16 \mathrm{~A}$ | - | 100,000 |
| 120VAC | LRA/FLA | $30 \mathrm{~A} / 11 \mathrm{~A}$ | - | 200,000 |

Note: Consult factory for other 900 mW version contact ratings.
UL 508/873 \& CSA Contact Ratings - 1 Watt Coil

| Voltage | Load Type | N.O. Contact | N.C. Contact |
| :---: | :---: | :---: | :---: |
| 277 VAC | Tungsten $*$ | 5.4 A | - |
| 277 VAC | Ballast | 10 A | 3 A |
| 240 VAC | Motor | 2 HP | $1 / 2 \mathrm{HP}$ |
| 240 VAC | Resistive $* \dagger$ | 25 A | 20 A |
| 240 VAC | General Purpose $\dagger$ | 30 A | 15 A |
| 240 VAC | LRA/FLA $* * \dagger \dagger$ | $80 \mathrm{~A} / 30 \mathrm{~A}$ | $30 \mathrm{~A} / 12 \mathrm{~A}$ |
| 240 VAC | Pilot Duty* | 470 VA | 275 VA |
| 125 VAC | Motor | 1 HP | $1 / 4 \mathrm{HP}$ |
| 120 VAC | LRA/FLA | $98 \mathrm{~A} / 22 \mathrm{~A}$ | - |
| 120 VAC | Tungsten $*$ | 8.3 A | - |
| 120 VAC | Pilot Duty | 470 VA | - |
| 28 VDC | Resistive | 20 A | 10 A |

## * Rated 6,000 operations.

** Higher UL \& CSA ratings available.
$\dagger$ For Form C application, derate current to 20A (N.O.), 10A (N.C.).
†† For Form C application, derate current to 67\%.

## T9A series

## DC Coil 30 Amp PC Board or Panel Mount Relay

只 File E22575<br>(18) File LR15734®

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Initial Dielectric Strength

Between Open Contacts: $1,500 \mathrm{~V}$ rms.
Between Contacts and Coil: $2,500 \mathrm{~V}$ ms.
6 kV surge using $1.2 \mu \mathrm{~s} / 50 \mu \mathrm{~s}$ Impulse Wave or $.5 \mu \mathrm{~s}-100 \mathrm{kHz}$ Ring Wave

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{9}$ ohms, min., @ 500VDC, $25^{\circ} \mathrm{C}$ and $50 \%$ R.H.

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: 5 to 110VDC.
Nominal Coil Power: 1.0W, (approx.) and 900mW (approx.) versions.
Maximum Coil Power: 2.8 Watt.
Maximum Coil Temperature ${ }^{(5)}$ : Class $\mathrm{F}: 155^{\circ} \mathrm{C}$.
Duty Cycle: Continuous.

## Coil Data - 1 Watt

| Nominal <br> Voltage | DC Resistance <br> $\pm \mathbf{1 0 \%}$ (Ohms) | Nominal <br> Current (mA) |
| :---: | :---: | :---: |
| 5 | 25 | 200 |
| 9 | 81 | 111 |
| 12 | 144 | 83 |
| 18 | 324 | 56 |
| 24 | 576 | 42 |
| 48 | 2,304 | 21 |
| 110 | 12,100 | 9 |

## Coil Data - 900mW

| Nominal <br> Voltage | DC Resistance <br> $\pm \mathbf{1 0 \%}$ (Ohms) | Nominal <br> Current (mA) |
| :---: | :---: | :---: |
| 5 | 27 | 185 |
| 9 | 97 | 93 |
| 12 | 155 | 77 |
| 18 | 380 | 47 |
| 24 | 660 | 36 |
| 48 | 2,560 | 19 |
| 110 | 13,450 | 8 |

## Operate Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Must Operate Voltage: 75\% of nominal voltage or less.
Must Release Voltage: 10\% of nominal voltage or more.
Operate Time (Including Bounce)§: 15 ms , max.
Release Time (Including Bounce)§: 15 ms , max.
§ At or From Nominal Coil Voltage

Note: Consult factory for other 900 mW version contact ratings.

## Ambient Temperature vs. Coil Voltage - 1 Watt Coil

Data below are average values and should be verified in application. Tests were conducted within a $2^{\prime}(.6 \mathrm{~m})$ cube (still air); at nominal coil power @ $25^{\circ} \mathrm{C}$; with normally open contact loaded; and with $4^{\prime}(1.22 \mathrm{~m})$ long, \#10 AWG load wires. P.C. board relays were mounted to a 30A, single side P.C. board (6).




## Environmental Data

Storage Temperature Range: $-55^{\circ} \mathrm{C}$ to $130^{\circ} \mathrm{C}$.
Operating Temperature Range ${ }^{(1)}:-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Vibration, Operational: $0.065^{\prime \prime}(1.65 \mathrm{~mm})$ max. excursions from $10-55 \mathrm{~Hz}$. with no contact opening $>100 \mu \mathrm{~s}$.
Shock, Operational: 10 g for 11 ms with no contact opening $>100 \mu \mathrm{~s}$.
Shock, Mechanical: 100g.

## Mechanical Data

Termination: Printed circuit and quick connect terminals (4).
Enclosures (all have 94V-0 flammability rating):
T9AP: Unsealed, plastic dust cover.
T9AS: Immersion cleanable, sealed plastic case ( $2 \& 3$ ).
T9AV: Vented, flux-tight, plastic cover.
Weight: Q.C. version: 1.2 oz. (33g) approx. (mounting code $2 \& 5$ ).
Sealed Model T9AS: 0.9 oz . ( 26 g ) approx. (mounting code 1).

## Notes

(1) Operating ambient temperature must consider " M ust Operate Voltage Change OverTemperature," Contact Temperature Rise, Coil Temperature Rise (If coil is not allowed to cool) and Maximum Coil Temperature. Specification ambient considers 20A load with coil cooled to ambient.
(2) Sealed relay terminals should not be bent.
(3) Remove knock-off nib after cleaning process for optimum life of sealed relays.
(4) M aximum soldering temperature is $500^{\circ} \mathrm{F}$ for 4 seconds.
(5) Class F coils are UL systems approved for maximum coil temperature of $140^{\circ} \mathrm{C}$, by change of resistance method.
(6) See application note 13C265 for proper relay mounting, termination, cleaning and PC board conductor width. Coil rise test performed with 30A PC board to maintain $20^{\circ} \mathrm{C}$ maximum rise @ 30A.

## Ordering Information



Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| T9AP1D52-9 | T9AS1D12-24 | T9AS5D22-12 |  |  |
| :---: | :---: | :---: | :---: | :---: |
| T9AP1D52-12 | T9AS1D12-48 | T9AS5D22-24 |  |  |
| T9AP5D52-12 | T9AS1D22-12 | T9AV1L22-24 |  |  |
| T9AP5D52-24 | T9AS1D22-24 |  |  |  |
| T9AS1D12-12 | T9AS5D12-12 |  |  |  |
| T9AS1D12-18 | T9AS5D12-24 |  |  |  |
| Dimensions are sho reference purposes |  | Dimensions are in inches over (millimeters) unless otherw ise specified. | Specifications and availability subject to change. | www.tycoelectronics.com Technical support: <br> Refer to inside back cover. |

## Outline Dimensions

T9AS - Mounting \& Termination Code 2


T9AP - Mounting \& Termination Code 5


Note: Recommended mounting screw torque is 4.0-5.0 lbs.in when \# 6 screw is used.

T9ASN - Mounting \& Termination Code 1


PC Board Layouts (Bottom Views)
T9AP/S - Mounting \& Termination Code 2


T9AS/V - Mounting \& Termination Code 1



## Features

- Up to 20 amp switching in SPST-NO and 13.3 amp in SPDT arrangements.
- Washable, plastic sealed case available.
- Meets UL 873 and UL 508 spacing - 1/8" through air, 1/4" over surface.
- Load connections made via $1 / 4$ " Q. C. terminals.
- Choice of UL Class B or F insulation system.
- Well suited for various industrial, commercial and residential applications.

Contact Ratings @ $23^{\circ} \mathrm{C}$
Arrangements: 1 Form A (SPST-NO), 1 Form B (SPST-NC) and 1 Form C (SPDT).
Material: Silver-cadmium oxide.
Mechanical Life: 10 million operations, at 300 ops/minute.
Electrical Life: 100,000 operations at factory rated load, $6 \mathrm{ops} /$ minute. Minimum Contact Load: 1A @ 5VDC or 12VAC.
Initial Contact Resistance: 50 milliohms @ 100mA, 6VDC).

Contact Ratings @ $\mathbf{2 3}^{\circ} \mathrm{C}$ with relay properly vented. Remove tape from vent hole after soldering and cleaning.

Factory Contact Ratings

| Voltage | 1 Form A | 1 Form B | 1 Form C |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | (NO) | (NC) |
| 240 VAC | 20 A | 10 A | 13.3 A | 6.7 A |
| 28 VDC | 20 A | 6.7 A | 13.3 A | 6.7 A |

## UL/CSA Contact Ratings

| Voltage | Load Type | 1 Form A | Form B | 1 Form C |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | (NO) | (NC) |
| 240VAC | General Purpose | 30 A | 15 A | 20 A | 10 A |
| 240VAC | Resistive $*$ | 30 A | 15 A | 20 A | 10 A |
| 240 VAC | Motor | 2 HP | $1 / 2 \mathrm{HP}$ | 2 HP | $1 / 2 \mathrm{HP}$ |
| 120VAC | Motor | 1 HP | $1 / 4 \mathrm{HP}$ | 1 HP | $1 / 4 \mathrm{HP}$ |
| 240 VAC | LRA/FLA $* *$ | $80 / 30$ | $30 / 10$ | $50 / 20$ | $20 / 7$ |
| 120VAC | LRA/FLA | $98 / 22$ | - | - | - |
| 120VAC | Tungsten $*$ | TV5 | TV3 | TV5 | TV3 |
| 277 VAC | Ballast | 10 A | 3 A | 10 A | 3 A |
| 28 VDC | Resistive | 20 A | 10 A | 20 A | 10 A |

## Initial Dielectric Strength

Between Open Contacts: $1,500 \mathrm{~V}$ ms, 1 minute.
Between Contacts and Coil: $1,500 \mathrm{~V}$ rms, 1 minute.

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{9}$ ohms, min., @ 500VDC, $23^{\circ} \mathrm{C}$ and $50 \%$ R.H.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Voltage: 12 to 220VAC.
Nominal Coil Power: 2.0VA, (approx.).
Maximum Coil Temperature ${ }^{(4)}$ : Class B: $130^{\circ} \mathrm{C}$.

$$
\text { Class F: } 155^{\circ} \mathrm{C}
$$

Duty Cycle: Continuous.

## 491 series

## AC Coil 20 Amp PC Board or Panel Mount Relay

귝 File E38802
(18) File LR75282

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Coil Data

| Nominal <br> Voltage | DC Resistance <br> $\mathbf{1 0 \%}$ (Ohms) | Must Operate <br> Voltage (Max.) | Must Release <br> Voltage (Min.) |
| :---: | :---: | :---: | :---: |
| 12 | 26 | 10.2 | 1.8 |
| 24 | 106 | 20.4 | 3.6 |
| 110 | 2,750 | 93.5 | 16 |
| 220 | 11,000 | 187 | 33 |

## Operate Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Must Operate Voltage: 85\% of nominal voltage or less.
Must Release Voltage: 15\% of nominal voltage or more.
Operate Time (Including Bounce)§: 20 ms , max.
Release Time (Including Bounce)§: 15 ms , max.
§ At or From Nominal Coil Voltage

## Environmental Data

Storage Temperature Range: $-40^{\circ} \mathrm{C}$ to $130^{\circ} \mathrm{C}$.
Operating Temperature Range ${ }^{(1)}:-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Vibration, Operational: $0.065^{\prime \prime}(1.5 \mathrm{~mm})$ max. excursions from $10-55 \mathrm{~Hz}$.
Shock, Operational: 10 g for 11 ms .
Shock, Mechanical: 100g.

## Mechanical Data

Termination: Printed circuit and quick connect terminals (4).
Enclosures (all have 94V-0 flammability rating):
Open, unsealed dust cover or sealed case.
Weight: 1.2 oz. (33g) approx.

## Coil Temperature Rise



## Notes

(1) Operating ambient temperature must consider must operate voltage change over temperature, contact temperature rise, coil temperature rise (If coil is not allowed to cool) and maximum coil temperature.
(2) Sealed relay terminals should not be bent.
(3) Remove tape after cleaning process for optimum life of sealed relays.
(4) Class B coils are UL systems approved for maximum coil temperature of $130^{\circ} \mathrm{C}$, by change of resistance method. Class F coils are UL systems approved formaximum coil temperature of $155^{\circ} \mathrm{C}$, by change of resistance method.

1. Basic Series:

491 =AC coil, printed circuit board/panel power relay.
2. Enclosure \& Terminals:
$1=$ Dust Cover, PC terminal. $7=$ Sealed Case, Panel Mount, .187 Coil Terminal.
$2=$ Sealed Case, PC terminal. 8 = Open Unit
$6=$ Sealed Case, Panel Mount, . 110 Coil Terminal.
3. Contact Arrangement:
$1=1$ Form C (SPDT) $\quad 4=1$ Form B (SPST-NC) $\quad 5=1$ Form A (SPST-NO)
4. Coil Input:

$$
P=12 \mathrm{VAC} \quad \mathrm{Q}=24 \mathrm{VAC} \quad \mathrm{~T}=120 \mathrm{VAC} \quad \mathrm{U}=220 \mathrm{VAC}
$$

5. Contacts:

2 = Silver-cadmium oxide
6. Coil Insulation and Special Features:
$00=$ Standard, UL Class B Coil Insulation System $\quad$ M0 $=$ Magnetic Blowout (with enclosure 1 or 2 only, not UL or CSA)
F0 $=$ Special, UL Class F Coil Insulation System A1 - E9 = Special - Customer Specific Features

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| 491-21T200 | 491-24T200 | 491-61T200 | 491-64T200 |
| :--- | :--- | :--- | :--- |
| 491-21Q200 | 491-24Q200 | 491-61Q200 | 491-64Q200 |

Outline Dimensions
Open Style


Sealed Case for PC Board Mounting


## PC Board Layout (Bottom View)



Sealed Case for Panel Mounting


## Wiring Diagrams (Bottom Views)

1 Form A 1 Form B 1 Form C



## Features

- 30A DPST-NO and DPDT switching capabilities.
- Designed to control compressor loads to 3.5 tons, 25.3 FLA, 110 LRA
- Extended life $->300,000$ operations at 30A, 240VAC (DC coil). $>100,000$ operations at 30A, 240VAC (AC coil).
- Meets requirements of UL873 and UL508 spacings.
- .315" (8mm) through air, .375" (9.5mm) over surface.
- Meets requirements of VDE 8 mm spacing, 4 kV dielectric coil-to-contacts.
- Meets requirements of UL Class F construction.
- UL approved for 600VAC switching (1.5HP).
- Conforms to VDE 0435, 0631, and 0700.
- New screw terminal version (consult factory for availability, ratings).

Contact Ratings @ $25^{\circ} \mathbf{C}$ with relay properly vented.
Remove tape over vent hole after soldering and cleaning.
Arrangements: 2 Form A (DPST-NO) and 2 Form C (DPDT).
Materials: Silver cadmium oxide.
Max. Load Rating:
Normally Open Contacts:
30A @ 120/277VAC, resistive;
10A @600VAC, resistive;
1 HP @ 120VAC, 2.5 HP @ 240VAC;1.5 HP @ 480VAC, 1.5 HP @ 600VAC
110 LRA, 25.3 FLA, @ 240 VAC with DC coil(1);
60 LRA, 14 FLA @ 240 VAC with AC coil-
3A @ 240VAC pilot duty;
20A @ 28VDC;
TV10 @ 120VAC.
VDE Rating (Flange Mount): 25A @ 400VAC, 100K Ops. (30K Ops. for Form C Models).
VDE Rating (PC Mount): 30A @ 400VAC, 100K Ops. (30K Ops. for Form C Models).
Normally Closed Contacts:
3A @ 28VDC or 277VAC, 2A @ 480VAC, 1A @600VAC.
VDE Rating (Flange or PC Mount): 3A @ 400VAC, 30K Ops.
Min. Load Rating:
Normally Open Contacts: 500mA @ 12VACNDC.
Normally Closed Contacts: 100mA @ 6VACNDC.
Expected Mechanical Life: 5 million operations.
Expected Electrical Life: 100,000 operations at rated load.
ARI 780-86 Endurance Test (section 6.6):
HVAC Definite Purpose Contactor Standard
Normally Open Contacts
Single Phase/Two Pole (Both poles together switching a single load)
110 LRA, 25.3 FLA, 200K operations (DC Coil).


Single Phase Per Pole (Single load per pole) 110 LRA, 18 FLA, 200K operations (DC Coil). 60 LRA, 14 FLA, 200K operations (AC Coil).

Notes: Vent hole tape must be removed to achieve all listed ratings. Consult factory regarding ratings for screw terminal versions.

## Initial Dielectric Strength

Between Contacts and Coil: $4,000 \mathrm{~V}$ rms, $50 / 60 \mathrm{~Hz}$.
Between Open Contacts: $1,500 \mathrm{~V} \mathrm{rms}, 50 / 60 \mathrm{~Hz}$.
Between Poles: $2,000 \mathrm{~V}$ rms, $50 / 60 \mathrm{~Hz}$.

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{9}$ ohms, min. @ 500VDC.

## Coil Data

Voltage: 12 through 110VDC and 12 through 277VAC.
Resistance: See Coil Data table.
Nom. Power: AC Coil: 4.0VA; DC Coil: 1.7W.
Coil Temp. Rise: $35^{\circ} \mathrm{C} / \mathrm{W}$.
Max. Coil Temp.: $155^{\circ} \mathrm{C}$.
Duty Cycle: Continuous.

## T92 series

## Two-Pole, 30 Amp

PC Board or Panel Mount Relay
믹 File E22575
(4L) File E22575 (type 2,3,4,5)
(18 File LR15734 『®

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.
Coil Data (@ $\mathbf{2 5}^{\circ} \mathrm{C}$ Coil Temperature)

| DC Coils (1.7W) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Nom. Voltage (VDC) | $\begin{gathered} \text { DC Resist. } \\ \pm 10 \% \text { (Ohms) } \end{gathered}$ |  | Nom. Voltage (VDC) | DC Resist. $\pm 10 \%$ (Ohms) |  |
| 12 |  | 86 | 48 |  | 1,390 |
| 24 |  | 350 | 110 |  | 7,255 |
| AC Coils (4.0VA) |  |  |  |  |  |
| Nom. Voltage (VAC) | Freq. | $\begin{gathered} \text { DC Resist. } \\ \pm 10 \% \text { (Ohms) } \\ \hline \end{gathered}$ | Nom. Voltage (VAC) | Freq. | $\begin{array}{c\|} \hline \text { DC Resist. } \\ \pm 10 \% \text { (Ohms) } \end{array}$ |
| 12 | 60 | 9.1 | 110/120 | 50/60 | 950 |
| 24 | 60 | 36.6 | 220/240 | 50/60 | 3800 |
|  |  |  | 250/277 | 50/60 | 5485 |

Ambient Temperature vs. Coil Voltage


## Assumptions:

1. Thermal resistance $=35^{\circ} \mathrm{C}$ per Watt (DC only.)
2. Still air.
3. Nominal coil resistance.
4. Max. mean coil temperature $=155^{\circ} \mathrm{C}$ (change of resistance method).
5. Coil temperature rise due to load $=6.3^{\circ} \mathrm{C} @ 30 \mathrm{amps}$.
6. Curves are based on 1.7 W at $25^{\circ} \mathrm{C}$ (DC only.)

## Operate Data

Must Operate Voltage: AC Coil: 80\% of nominal voltage or less.
DC Coil: 75\% of nominal voltage or less.
Must Release Voltage: $10 \%$ of nominal voltage or more.
Initial Operate Time ${ }^{(2)}$ : 15 ms typical, ( 25 ms max. w/bounce).
Initial Release Time ${ }^{(2): ~} 10 \mathrm{~ms}$ typical, ( 25 ms max. w/bounce).
Max Operating Frequency: 14 operations per minute.

## Environmental Data

Temperature Range: Storage: $-55^{\circ} \mathrm{C}$ to $+155^{\circ} \mathrm{C}$.
Operating: AC Coil: $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$. DC Coil: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Vibration: $0.065^{\prime \prime}$ ( 1.65 mm ) double amplitude for $10-55 \mathrm{~Hz}$., functional.
Shock, Operational: 10 g for $11 \mathrm{~ms}, 1 / 2$ sine wave pulse with no contact opening $>100 \mu \mathrm{~s}$.
Shock, Mechanical: 100 g for $11 \mathrm{~ms}, 1 / 2$ sine wave pulse.
Flammability: UL 94V-0.

## Mechanical Data

Termination: Printed circuit terminals; .250" (6.35mm) quick connects for coil and contacts; . 187 " ( 4.75 mm ) quick connects for coil and .250 " ( 6.35 mm ) quick connects for contacts; or M4 screws with captive pressure plates for coil and contacts.
Enclosure: Unsealed, plastic dust cover or immersion cleanable, tape sealed plastic cover.
Weight: 3 oz. (86g) approximately.

## Conditions

All parametric, environmental and life tests are performed according to EIA Standard RS-407-A at standard test conditions ( $25^{\circ} \mathrm{C}$ ambient, 20-50\% RH, $29.5 \pm 1$ " Hg.) unless otherwise noted.

## Notes

(1) FLA, LRA ratings are compatible with 3.5 ton compressor applications.
(2) Nominal voltage, no coil suppression, excluding bounce.

$\ddagger$ New option. Consult factory for detailed ratings, specifications and availability.

| Stock Items - We recommend that our authorized distributors stock the following items for immediate delivery. |  |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| T92P7A22-24 T92P7A22-240 T92P7D12-24 T92P7D22-24 T92P11A22-120 T92P11D22-12 T92S7D12-12 T92S11D22-12 |  |  |  |  |  |  |  |
| T92P7A22-120 | T92P7D12-12 | T92P7D22-12 | T92P11A22-24 | T92P11A22-240 | T92P11D22-24 | T92S7D12-24 | T92S11D22-24 |

## Outline Dimensions

Mounting \& Termination Type 1


## Mounting \& Termination Type 5



Mounting \& Termination Types 2, 3 \& 4


## Suggested PC Board Layout (Bottom View)



Note: An altemate PC board layout utilizes $.076 \pm$ .003 ( $1.93 \pm .076$ ) diameter holes on the same center-to-center spacing shown above. Use of the rectangular holes is recommended for improved solderability.

## Alphanumeric Index

| Series | Type | Page |
| :---: | :---: | :---: |
| SR2M (V23047). | 2 Pole Relay | 603 |
| SR4 D/M ........ | 4 Pole Relay. | 606 |
| SR6 (V23050) | 6 Pole Relay .. | 609 |
| SR6 D/M ......... | 4 Pole Relay. | 607 |
| SR6S | Sensitive 6 Pole Relay | 611 |
| SR6Z.............. | .. 6 Pole Relay Module... | 613 |
| V23047 (SR2M) . | . 2 Pole Relay . | 603 |
| V23050 (SR6) .... | 6 Pole Relay . | 609 |

# Definitions - Relays with forcibly guided contacts ("safety relays") 

## General Information

Relays with forced guidance contacts play a decisive role in avoiding accidents on machines and in systems. Safety control circuits enable to switch into the fail safe state. Forcibly guided contacts monitor the function of the safety control circuits.
For this safety function, all the assumed faults that can occur must already have been taken into consideration and their effects examined. Standard EN 50205 "Relays with forcibly guided contacts" contains current internationally-defined design requirements. Relays with forcibly guided contacts that comply with EN 50205 are also referred as "safety" relays.

## Function

Power relays with forcibly guided (linked) contacts:
Power relays with at least one break contact and at least one make contact designed that by mechanical means make and break contacts can never be simultaneously in the closed position.
Contact gaps shall never be less than 0.5 mm over the operating life, not only under normal operating conditions, but also when a fault occurs.
This requirement allows the respective exclusive-or contact to detect the fault of a contact to open. For example, the welding of a make contact is indicated by the non-closing of the break contact when the energization is switched off.

To fulfill the specifications of the standard, the assumed faults must be considered:

| Assumed fault | Effect |
| :---: | :--- |
| Failure of the contact to open <br> due to welding | The failure of any make contact to open has the effect that none of the <br> break contacts close even when the relay is not energized. <br> The failure of any break contact to open has the effect that none of the make <br> contacts close when the relay is energized. |
| Failure of the contact to open | The drive has no effect on the forcibly guided contact operation. |
| due to failure of the drive | Simultaneous closing of the break and make contacts is not possible even as a <br> result of breakage. Completely insulated contact chambers (SR2, SR4, SR6) or <br> barriers (SR2M) guarantee a contact gap of 0.5 mm. |
| Breakage of the contact spring |  |


| Dimensions are shown for | Dimensions are in inches over | Specifications and availability | w w w.tycoelectronics.com |
| :---: | :---: | :---: | :---: |
| reference purposes only. | (millimeters) unless otherwise | subject to change. | Technical support: |
|  | specified. |  | Refer to inside back cover |

## Application Example - Relays with forcibly guided contacts ("safety relays")

The configuration of safety control circuits is basically only possible with specified fault conditions. Safety relays have the characteristic that make and break contacts can never both be closed at the same time.

The following circuit diagram shows an emergency stop control circuit consisting of three 4-pole safety relays.

Operation

- Closing the "ON" switch causes the K1 relay to be pulled in
- The K2 and K3 relays are energized via the make contacts K 1-1 and K 1-2 and hold themselves via K2-2 or K3-2
- The break contacts K2-1 and K3-1 cause the drop-out of K1 where the load circuit is released via the break contacts of K1-3 or K1-4.

The first fault to occur

- does not cause the safety function to fail because more components are used than required for the circuit to function (redundancy).
prevents an restart and can be detected as a result (self monitoring)


Fault analysis (examples):

| Type of fault | Is there any danger arising from the fault? | Is a restart possible? |
| :---: | :--- | :--- |
| Failure of contact | No, K3-3 opens when the emergency | No, K2-1 and K2-3 cannot be closed at the |
| K2-3 to open | stop switch is actuated | same time (fault excluded by forcibly guidance). |
|  |  | "ON" button does not cause K1 to close |
| Failure of contact | No, K2-3 and K3-3 open when the | No, K1-1 and K1-2 cannot close due to |
| K1-3 to open | emergency stop switch is actuated | closed K1-3. K2 and K3 are not energized |

V23047 series
SR2M "Safety Relay" - PCB, neutral, monostable relay with two forcibly guided contacts.
${ }^{\text {chen }}$ us File E214024
(10e8) No. 116064
( ( TUV-Rheinland, No. 945/EZ 116/99
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{6}$ ohms.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Voltage: 5 to 110VDC.
Nominal Power: 700mW.
Max. Coil Temperature: $105^{\circ} \mathrm{C}$.
Duty Cycle: Continuous.

## Coil Data @ $23^{\circ} \mathrm{C}$

| Rated Coil <br> Voltage <br> (VDC) | Coil <br> Resistance <br> (Ohms) | Must Operate <br> Voltage <br> (VDC) | Nominal <br> Coil Current <br> (mA) |
| :---: | :---: | :---: | :---: |
| 5 | $35.7 \pm 3.6$ | 3.75 | 140 |
| 6 | $51 \pm 5.1$ | 4.5 | 118 |
| 9 | $116 \pm 11.6$ | 6.8 | 78 |
| 12 | $206 \pm 20.6$ | 9 | 60 |
| 21 | $630 \pm 63.0$ | 15.8 | 34 |
| 24 | $823 \pm 82.3$ | 18 | 30 |
| 36 | $1,851 \pm 185$ | 27 | 19.5 |
| 48 | $3,291 \pm 494$ | 36 | 14.6 |
| 60 | $5,142 \pm 617$ | 45 | 11.7 |
| 80 | $9,143 \pm 1,097$ | 60 | 8.8 |
| 110 | $17,285 \pm 2,074$ | 83 | 6.4 |

## Operate Data @ $23^{\circ} \mathrm{C}$

Operate Time: 10 ms (excluding bounce).
Release Time (w/o parallel diode, typ.): 4 ms (excluding bounce).
Bounce Time: 10 ms .
Must Release Voltage: 10\% of nominal voltage.
Max. Allowed Ambient Temp. vs. Applied Coil Voltage


## Operating

Curve 1 - Must operate voltage when the coil is not pre-energized.
Curve 2 - Operate voltage raises due to a pre-energizing with $1.1 \times$ Vnom.
Curve 3 - Maximum allowable voltage.
Release
The must release voltage may fall to $\geq 5 \%$ of Vnom during operation life of the relay.
$\square$ Denotes recommended operation area.

Max. Allowable Ambient Temperature ( ${ }^{\circ} \mathrm{C}$ )

## Environmental Data

Temperature Range: $-25^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Solder Bath Temp./Max. Duration: $260^{\circ} \mathrm{C} / 5 \mathrm{~s}$.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings): Sealed plastic case.
Weight: 0.6 oz . ( 18 g ).

## Initial Dielectric Strength

Between Open Contacts: $1,000 \mathrm{~V}$ rms.
Between Adjacent Contacts: $4,000 \mathrm{~V}$ rms.
Between Coil and Contacts: $4,000 \mathrm{~V}$ rms.

| Specifications and availability | w ww.tycoelectronics.com |
| :--- | :--- |
| subject to change. | Technical support: |
|  | Refer to inside back cover |

Ordering Information


Our authorized distributors are more likely to stock the following items for immediate delivery.
V23047A1012A501 V23047A1012A511

## Outline Dimensions



Wiring Diagrams (Bottom Views)
1 NO and 1 NC


## 2 Form C



## Suggested PC Board Layouts (Bottom Views)




## 2 Form C



RP78602
Socket with PCB Terminals


RT78625
DIN Rail Mount Socket with Screw-Type Terminals


RP16104 Plastic Retaining Clip

RT78626
DIN Rail Mount Socket with Screw-Type Terminals


RP16104 Plastic Retaining Clip

## RT16040 Marking Tags



- White
- Marking area . 610 (15.5) x . 236 (6.0).
- Snaps on socket in up to 4 positions.


## Function and Protection Modules



- Easy insertion of module into the socket.
- Wiring in parallel to the coil.

| Ordering Code | Type |
| :---: | :---: |
| RT16040 | Marking Tags |
| RPMT00A0 | Protection Diode 1N4007* |
| RPML0024 | LED 12-24VDC* |
| RPML0524 | LED 12-48VDC |
| RPML0110 | LED 110VDC* |

* Standard Polarity: A1:+, A2:-

| Dimensions are shown for | Dimensions are in inches over | Specifications and availability | Ww w.tycoelectronics.com |
| :---: | :---: | :---: | :---: |
| reference purposes only. | (millimeters) unless otherwise | subject to change. | Technical support: |
|  | specified. |  | Refer to inside back cover. |



## Features

- $2 \mathrm{NO}+2 \mathrm{NC}$ or $3 \mathrm{NO}+1 \mathrm{NC}$ contacts.
- $4 \mathrm{kV} / 10 \mathrm{~mm}$ contact-to-coil.
- Compact package.
- Well suited for emergency shut-off, machine control, elevator and escalator control, light barrier control.


## Contact Data

Type: Single button contact, forcibly guided.
Arrangements: $2 \mathrm{NO}+2 \mathrm{NC}$ or $3 \mathrm{NO}+1 \mathrm{NC}$.
Material: Silver-tin oxide.
Expected Mechanical Life: 10 million operations.
Ratings:
Current: 8A.
Voltage: 250VAC.
Voltage (breaking): 440VAC
Power (breaking): 2,000VA.
Minimum Contact Load: $>50 \mathrm{~mW}$.
Initial Contact Resistance: $\leq 100$ millohms/1A/24VDC;
$\leq 20$ millohms/10mA/5VDC.

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms.
Between Coil and Contacts: $4,000 \mathrm{Vrms}$.
Between Contact Sets: $2,500 \mathrm{Vrms}$.
Creepage/Clearance: Contact-to-coil: 10/10mm.

$$
\text { Between Contact Sets: } 3 / 3.5 \mathrm{~mm} \text {. }
$$

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{6}$ ohms.

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time /Release Time (typical): $12 \mathrm{~ms} / 20 \mathrm{~ms}$.
Switching Rate: 3,600 ops./hr. max. at rated load.

## SR4 D/M series

## "Safety Relay" with four forcibly guided contacts.

c ${ }^{\text {Mis }}$ File E214024
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Coil Data DC @ $20^{\circ} \mathrm{C}$
Nominal Coil Power: 800 mW .

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in <br> Ohms | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: |
| 5 | $31 \pm 10 \%$ | 3.8 | 0.5 | 1613 |
| 6 | $45 \pm 10 \%$ | 4.5 | 0.6 | 133.3 |
| 9 | $101 \pm 10 \%$ | 6.8 | 0.9 | 89.1 |
| 12 | $180 \pm 10 \%$ | 9.0 | 12 | 66.7 |
| 15 | $281 \pm 10 \%$ | 113 | 15 | 53.4 |
| 18 | $405 \pm 10 \%$ | 13.5 | 18 | 44.4 |
| 21 | $551 \pm 10 \%$ | 15.8 | 2.1 | 38.1 |
| 24 | $720 \pm 10 \%$ | 18.0 | 2.4 | 33.3 |
| 36 | $1,620 \pm 10 \%$ | 27.0 | 3.6 | 22.2 |
| 40 | $2,000 \pm 10 \%$ | 30.0 | 4.0 | 20.0 |
| 48 | $2,880 \pm 10 \%$ | 25.0 | 4.8 | 16.7 |
| 60 | $4,500 \pm 10 \%$ | 45.0 | 6.0 | 13.3 |
| 85 | $9,031 \pm 10 \%$ | 64.0 | 8.5 | 9.4 |
| 110 | $15125 \pm 10 \%$ | 82.5 | 110 | 7.3 |

All values are given for coil without preenergization, at $20^{\circ} \mathrm{C}$ ambient. At $70^{\circ} \mathrm{C}$ after preenergization with $11 \times$ nominal voltage, the maximum operating voltage is $85 \%$ of nominal.
At $70^{\circ} \mathrm{C}$ maximum coil voltage is $11 \times$ nominal.

## Environmental Data

Temperature Range: Operating: $-20^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration (10-200 Hz.): NO: 8g; NC: 2.5 g .

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure: Sealed (RTIII) plastic case.
Weight: 0.56 oz. ( 16 g ) approximately.

## Ordering Information



Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

Outline Dimensions


PC Board Layout (Bottom View)


Wiring Diagrams (Bottom Views)



## Features

- $2 \mathrm{NO}+2 \mathrm{NC}$ or $3 \mathrm{NO}+1 \mathrm{NC}$ contacts.
- Large spacings for improved isolation.
- Well suited for emergency shut-off, machine control, elevator and escalator control, light barrier control


## Contact Data

Type: Single button contact, forcibly guided.
Arrangements: $2 \mathrm{NO}+2 \mathrm{NC}$ or $3 \mathrm{NO}+1 \mathrm{NC}$.
Material: Silver-tin oxide.
Expected Mechanical Life: 10 million operations.

## Ratings:

Current: 8A.
Voltage: 250VAC.
Voltage (breaking): 440VAC.
Power (breaking): 2,000VA.
Minimum Contact Load: $>50 \mathrm{~mW}$.
Initial Contact Resistance: $\leq 100$ millohms/1A/24VDC;
$\leq 20$ millohms/10mA/5VDC.

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms.
Between Coil and Contacts: $3,000 \mathrm{Vrms}$.
Between Contact Sets: $3,000 \mathrm{Vrms} ; 4,000 \mathrm{Vrms}$, in longitudinal direction. Creepage/Clearance: Contact-to-coil: $5.5 / 5.5 \mathrm{~mm}$.

Between Contact Sets: $5.5 / 5.5 \mathrm{~mm}$; $12 / 12 \mathrm{~mm}$, in longitudinal direction.

Coil Data DC @ $20^{\circ} \mathrm{C}$
Nominal Coil Power: 800mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in <br> Ohms | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: |
| 5 | $21 \pm 10 \%$ | 3.8 | 0.5 | 238.1 |
| 6 | $30 \pm 10 \%$ | 4.5 | 0.6 | 200.0 |
| 9 | $68 \pm 10 \%$ | 6.8 | 0.9 | 132.4 |
| 12 | $120 \pm 10 \%$ | 9.0 | 12 | 100.0 |
| 18 | $270 \pm 10 \%$ | 13.5 | 18 | 66.7 |
| 21 | $368 \pm 10 \%$ | 15.8 | 2.1 | 57.1 |
| 24 | $480 \pm 10 \%$ | 18.0 | 2.4 | 50.0 |
| 36 | $1,080 \pm 10 \%$ | 27.0 | 3.6 | 33.3 |
| 40 | $1,333 \pm 10 \%$ | 30.0 | 4.0 | 30.0 |
| 48 | $1,920 \pm 10 \%$ | 25.0 | 4.8 | 25.0 |
| 60 | $3,000 \pm 12 \%$ | 45.0 | 6.0 | 20.0 |
| 85 | $6,021 \pm 12 \%$ | 64.0 | 8.5 | 14.1 |
| 110 | $10,080 \pm 12 \%$ | 82.5 | 110 | 10.9 |

All values are given for coil without preenergization, at $20^{\circ} \mathrm{C}$ ambient. At $70^{\circ} \mathrm{C}$ after preenergization with $11 \times$ nominal voltage, the maximum operating voltage is $85 \%$ of nominal.
At $70^{\circ} \mathrm{C}$ maximum coil voltage is $11 \times$ nominal.

## SR6 D/M series

## "Safety Relay" with four forcibly guided contacts and large spacings, improved isolation

c ${ }^{\text {ch }}$ us File E214024
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Initial Insulation Resistance
Between Mutually Insulated Elements: $10^{6}$ ohms.

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time /Release Time (typical): $11 \mathrm{~ms} / 3 \mathrm{~ms}$.
Switching Rate: 3,600 ops./hr. max. at rated load.

## Environmental Data

Temperature Range: Operating: $-20^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration (10-200 Hz.): NO: 8g; NC: 5g.
Shock (functional) 16ms, half-sine: NO: 8g; NC: 6 g .

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure ( 94 V-0 rated): Sealed (RTIII) plastic case.
Weight: $106 \mathrm{oz} .(30 \mathrm{~g})$ approximately.

Max. DC Load Breaking Capacity


Coil Operating Range


## Ordering Information

## Typical Part Number $-\quad$ SR6

1. Basic Series:

SR6 $=4$ pole printed circuit board relay with forcibly guided contacts, increased spacing.
2. Contact Configuration:
$\mathrm{D}=2 \mathrm{NO}+2 \mathrm{NC}$ contacts $\quad \mathrm{M}=3 \mathrm{NO}+1 \mathrm{NC}$ contacts
3. Contact Material:

4 = Silver-tin oxide.
4. Coil Voltage:

| $005=5 \mathrm{VDC}$ | $009=9 \mathrm{VDC}$ | $018=18 \mathrm{VDC}$ | $024=24 \mathrm{VDC}$ | $040=40 \mathrm{VDC}$ | $060=60 \mathrm{VDC}$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| $006=6 \mathrm{VDC}$ | $012=12 \mathrm{VDC}$ | $021=21 \mathrm{VDC}$ | $036=36 \mathrm{VDC}$ | $048=48 \mathrm{VDC}$ | $085=85 \mathrm{VDC}$ |

Our authorized distributors are more likely to stock the following items for immediate delivery .
None at present.

## Outline Dimensions



## PC Board Layouts (Bottom Views)



Wiring Diagrams (Bottom Views)


3 NO + 1 NC


## Features

- 4 NO and 2 NC or 3 NO and 3 NC or 5 NO and 1 NC contacts.
- Extremely compact.
- High insulation spacing for the safe separation of the contact circuits.
- Sealed case.
- Ideal for emergency shut-off, machine control, elevator and escalator control, light barrier control.


## Contact Data @ $23^{\circ} \mathrm{C}$

Type: Single button contacts, forcibly guided.
Arrangements: 3 NO and 3 NC, 4 NO and 2 NC or 5 NO and 1 NC .
Material: Silver nickel alloy.
Max. Continuous Current at Max. Amb. Temp.: 8A, 1 contact loaded.
Max. Switched Voltage: 400VAC/VDC.
Max. Switched Power: 2,000VA.
Max. Switching Rate: 6 operations $/ \mathrm{min}$. at rated load. 600 operations $/ \mathrm{min}$. at minimum load.
Minimum Load: 50mW.
Initial Contact Resistance: $100 \mathrm{~m} \Omega-1 \mathrm{~A} / 24 \mathrm{VDC}$.
Expected Mechanical Life: $10^{7}$ operations.
Electrical Life: 250VAC, $70^{\circ} \mathrm{C}$ ambient, 1 NO loaded with 8 A and 1 NC loaded with 5A: 75,000 operations.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC rms.
Between Adjacent Contacts: 3,000VAC rms.
Between Coil and Contacts: 3,000VAC ms.

## Coil Data @ $\mathbf{2 3}^{\circ} \mathrm{C}$

Voltage: 5 to 110VDC.
Nominal Power: 1.2W.
Max. Coil Temperature: $130^{\circ} \mathrm{C}$.
Duty Cycle: Continuous.

## Coil Data @ $23^{\circ} \mathrm{C}$

| Rated Coil <br> Voltage <br> (VDC) | Coil <br> Resistance <br> (Ohms) | Must Operate <br> Voltage <br> (VDC) | Nominal <br> Coil Current <br> (mA) |
| :---: | :---: | :---: | :---: |
| 5 | $21 \pm 2$ | 3.75 | 240 |
| 6 | $30 \pm 3$ | 4.5 | 200 |
| 9 | $68 \pm 7$ | 6.8 | 130 |
| 12 | $120 \pm 12$ | 9.0 | 100 |
| 18 | $270 \pm 27$ | 13.5 | 70 |
| 21 | $370 \pm 40$ | 15.8 | 60 |
| 24 | $480 \pm 50$ | 180 | 50 |
| 40 | $1,330 \pm 130$ | 30.0 | 30 |
| 60 | $3,000 \pm 300$ | 45.0 | 20 |
| 85 | $6,020 \pm 600$ | 64.0 | 14 |
| 110 | $10,000 \pm 1,000$ | 82.5 | 11 |

## V23050 series

SR6 "Safety Relay" - PCB, neutral, monostable relay with six forcibly guided contacts.
${ }^{\text {ch }}{ }_{\text {us }}$ File E214024
VOEB No. 116064
(s) TUV-Rheinland, No. 945/EZ 116/99

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Operate Data @ $23^{\circ} \mathrm{C}$

Minimum Release Voltage: 10\% of nominal voltage.
Minimum Operating Voltage @ $70^{\circ} \mathrm{C}$ : $85 \%$ of nominal voltage.

## Environmental Data

Temperature Range: $-25^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Solder Bath Temp./Max. Duration: $260^{\circ} \mathrm{C} / 5 \mathrm{~s}$.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure (UL94V-2 Flammability Ratings): Sealed (RTIII) plastic case. Weight: 1.01 oz. (30g).

## Max. DC Load Breaking Capacity



## Coil Operating Range



Ordering Information

|  | Typical Part Number |  | V23050 | A1 | 012 | A | 5 | 33 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: V23050 = SR6 safety relay. |  |  |  |  |  |  |  |  |
| 2. Enclosure: A1 = Sealed. |  |  |  |  |  |  |  |  |
| 3. Coil Voltage: $\begin{array}{ll} 005=5 \mathrm{VDC} & 006=6 \mathrm{VDC} \\ 024=24 \mathrm{VDC} & 040=40 \mathrm{VDC} \end{array}$ | $\begin{aligned} & 009=9 \mathrm{VDC} \\ & 060=60 \mathrm{VDC} \end{aligned}$ | $\begin{aligned} & 012=12 \mathrm{VDC} \\ & 085=85 \mathrm{VDC} \end{aligned}$ | $\begin{aligned} & 021=21 \mathrm{VDC} \\ & 110=110 \mathrm{VDC} \end{aligned}$ |  |  |  |  |  |
| 4. Contact Type: A = Single contact. |  |  |  |  |  |  |  |  |
| 5. Contact Material: 5 = Silver nickel. |  |  |  |  |  |  |  |  |
| 6. Contact Arrangement: $33=3 \mathrm{NO}$ and 3 NC . $42=4 \mathrm{NO}$ and 2 NC . $51=5 \mathrm{NO}$ and 1 NC . |  |  |  |  |  |  |  |  |

Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions



## Suggested PC Board Layouts (Bottom Views)

## 3 NO and 3 NC, 4 NO and 2 NC



5 NO and 1 NC



## Features

- $4 \mathrm{NO}+2 \mathrm{NC}, 3 \mathrm{NO}+3 \mathrm{NC}$ or $5 \mathrm{NO}+1 \mathrm{NC}$ contacts.
- Polarized, 800 mW coil.
- 6 kV surge resistance between poles.
- Well suited for emergency shut-off, machine control, elevator and escalator control, light barrier control


## Contact Data

Type: Single button contact, forcibly guided.
Arrangements: $4 \mathrm{NO}+2 \mathrm{NC}, 3 \mathrm{NO}+3 \mathrm{NC}$ or $5 \mathrm{NO}+1 \mathrm{NC}$.
Material: Silver-tin oxide.
Expected Mechanical Life: 10 million operations.
Ratings:
Current: 8A.
Voltage: 250VAC.
Voltage (breaking): 440VAC.
Power (breaking): 2,000VA.
Minimum Contact Load: $>50 \mathrm{~mW}$.
Initial Contact Resistance: $\leq 100$ millohms/1A/24VDC;

$$
\leq 20 \text { millohms } / 10 \mathrm{~mA} / 5 \mathrm{VDC} \text {. }
$$

## Initial Dielectric Strength

Between Open Contacts: 1,000Vrms.
Between Coil and Contacts: $3,000 \mathrm{Vrms}$.
Between Contact Sets: 3,000Vrms.
Creepage/Clearance: Contact-to-coil: $5.5 / 5.5 \mathrm{~mm}$.
Between Contact Sets: $5.5 / 5.5 \mathrm{~mm}$.

Coil Data DC @ $20^{\circ} \mathrm{C}$
Nominal Coil Power: 800mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in <br> Ohms | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: |
| 5 | $31 \pm 10 \%$ | 3.8 | 0.5 | 1613 |
| 6 | $45 \pm 10 \%$ | 4.5 | 0.6 | 133.3 |
| 9 | $101 \pm 10 \%$ | 6.8 | 0.9 | 89.1 |
| 12 | $180 \pm 10 \%$ | 9.0 | 12 | 66.7 |
| 15 | $281 \pm 10 \%$ | 113 | 15 | 53.4 |
| 18 | $405 \pm 10 \%$ | 13.5 | 18 | 44.4 |
| 21 | $551 \pm 10 \%$ | 15.8 | 2.1 | 38.1 |
| 24 | $720 \pm 10 \%$ | 18.0 | 2.4 | 33.3 |
| 36 | $1,620 \pm 10 \%$ | 27.0 | 3.6 | 22.2 |
| 40 | $2,000 \pm 10 \%$ | 30.0 | 4.0 | 20.0 |
| 48 | $2,880 \pm 10 \%$ | 25.0 | 4.8 | 16.7 |

[^16]
## SR6 Sensitive series <br> Sensitive "Safety Relay" with six forcibly guided contacts.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{6}$ ohms.

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time /Release Time (typical): $11 \mathrm{~ms} / 3 \mathrm{~ms}$.
Switching Rate: 3,600 ops./hr. max. at rated load.

## Environmental Data

Temperature Range: Operating: $-20^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration (10-200 Hz.): NO: 8g; NC: 5g.
Shock (functional) 16ms, half-sine: NO: 8g; NC: 6 g .

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure ( 94 V-0 rated): Sealed (RTIII) plastic case.
Weight: $106 \mathrm{oz} .(30 \mathrm{~g})$ approximately.

Max. DC Load Breaking Capacity


## Ordering Information



Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions



PC Board Layouts (Bottom Views)

$3 \mathrm{NO}+3 \mathrm{NC}$
and
$4 \mathrm{NO}+2 \mathrm{NC}$
$5 \mathrm{NO}+1 \mathrm{NC}$

## Wiring Diagrams (Bottom Views)






## Features

- 6-pole SR6 relay mounted to PC board on DIN-rail module.
- AC/DC input.
- Spring connectors.
- Module is 181 in ( 46 mm ) wide.
- Well suited for emergency shut-off, machine control, elevator and escalator control, light barrier control


## Contact Data

Type: Single button contact, forcibly guided.
Arrangements: $4 \mathrm{NO}+2 \mathrm{NC}, 3 \mathrm{NO}+3 \mathrm{NC}$ or $5 \mathrm{NO}+1 \mathrm{NC}$.
Material: Silver-tin oxide.
Expected Mechanical Life: 10 million operations.

## Ratings:

Current: 8A.
Voltage: 250VAC.
Voltage (breaking): 440VAC.
Power (breaking): 2,000VA.
Minimum Contact Load: $>50 \mathrm{~mW}$.
Initial Contact Resistance: $\leq 100$ millohms/1A/24VDC;
$\leq 20$ millohms/10mA/5VDC.

## Initial Dielectric Strength

Between Open Contacts: $1,000 \mathrm{Vrms}$.
Between Coil and Contacts: $3,000 \mathrm{Vrms}$.
Between Contact Sets: 2,000Vrms.
Creepage/Clearance: Contact-to-coil: $5.5 / 5.5 \mathrm{~mm}$.
Between Contact Sets: 3/3mm.

## Outline Dimensions



Module width: 1.81 in ( 46 mm ). Module length: 3.42 in ( 87 mm ). Mounted height: 2.12-2.28 in. (54-58 mm) depending upon DIN rail.

Module fits mounting rails per DIN EN 50022 or DIN EN 50035.

## SR6 $Z$ series <br> 6-pole "Safety Relay" on DIN-rail module.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data DC @ $\mathbf{2 0}^{\circ} \mathrm{C}$

Nominal DC Voltage: 24VDC
Nominal AC/DC Voltage: 24, 115VACNDC.
Nominal AC Voltage: 230VAC.
Minimum Operating Voltage: 90\% of nominal
Minimum Release Voltage: $\leq 10 \%$ of nominal.
Maximum Operating Voltage: 110\% of nominal. Input Circuit: Bridge rectifier, series resistor.

## Operate Data

Switching Rate: 3,600 ops./hr. max. at rated load.

## Environmental Data

Temperature Range: Operating: $-20^{\circ} \mathrm{C}$ to $+50^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: Spring clamp connections.
Acceptable Wire Sizes: 14-18 AWG.
Weight: $3.17 \mathrm{oz} .(90 \mathrm{~g})$ approximately.
Ordering Information


SR6Z

SR6Z $=6$ pole relay with forcibly guided
contacts on DIN-rail module.
2. Contact Configuration:
$\mathrm{A}=3 \mathrm{NO}+3 \mathrm{NC}$ contacts
$\mathrm{B}=4 \mathrm{NO}+2 \mathrm{NC}$ contacts
$\mathrm{C}=5 \mathrm{NO}+1 \mathrm{NC}$ contacts
5. Coil Voltage:
$\begin{array}{ll}024=24 \mathrm{VDC} & 524=24 \mathrm{VACNDC} \\ 615=115 \mathrm{VACNDC} & 730=230 \mathrm{VAC}\end{array}$
$615=115 \mathrm{VACNDC} \quad 730=230 \mathrm{VAC}$

Distributors are more likely to stock the following items.
None at present.

Wiring Diagrams (Bottom Views)


DC Module, 3 NO + 3 NC


DC Module, 5 NO + 1 NC


AC/DC Module, 4 NO + 2 NC


AC/DC Module, 3 NO + 3 NC


AC/DC Module, 5 NO + 1 NC

## Engineering Notes

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## Mature Products

Some mature product series are no longer described in the technical databook, as they no longer represent the most effective solution for many new design requirements. However, certain models within these series are currently available, in varying quantities, for retrofit applications. Some of these products are scheduled for obsolescence or discontinuance in the nearfuture. Contact technical support(see inside back cover)for suggestions regarding alternate products which may be appropriate for your application.

NOTE: A question tree that may help you in selecting an appropriate relay for your application can be found on the next page. also available with printed circuit board terminals as an option.
NOTE: Many of the relay products described in this section are

| Dimensions are shown for | Dimensions are in inches over | Specifications and availability <br> reference purposes only. | www.tycoelectronics.com <br> (millimeters) unless otherwise |
| :--- | :--- | :--- | :--- |
| specified. |  |  |  |

## Plug-in / Panel M ount General Purpose ( $\leq 20 \mathrm{~A}$ ) Relay Question Tree

This guide helps the user select one or more relay series which may be appropriate for a given application. The user should then refer to detailed specifications elsewhere in this catalog to determine the actual part number to be specified. Of course, the user must assume ultimate responsibility for determining the suitability of a relay for a particular application.

Several relay product families are quite broad (i.e., R10, KU), and only the basic family designator, not the actual product series designator (i.e., R10S, KUIP) is listed in this guide.


[^17]

## Features

- Broad range of coil options provide sensitivity ranging from 25 to 750 mW .
- Various contacts switch from dry circuit to 7.5 amps.
- Many mounting and termination options.


## Contact Data @ 25 ${ }^{\circ}$ C

Arrangements: 1 Form C (SPDT) through 8 Form C (8PDT) See Ordering Information tables for more details regarding availability.

Contact Materials, Styles \& Ratings @ +25 ${ }^{\circ} \mathrm{C}$

| Contact Code | Contact Material | Contact Style | Coil Codes Available | Contact Ratings |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Min. | Typ. | Max. |
| W | Silver-Cadmium Oxide | Single Button | V, Q, S, J | 500 mA | - | 7.5A $\ddagger$ |
| X | Silver-Cadmium Oxide | Single Button | V, Q, S, J | 500 mA | - | 5A§ |
| Y | Fine Silver | Single Button | All | 100 mA | 2A | 3A |
| Z | Fine Silver | Bifurcated | All | 1 mA | 100 mA | 2A |
| P | Gold overlay on Silver | Bifurcated Crossbar | All | Dry Circuit | 1 mA | 3A |

Ratings are at 28VDC or 155VAC unless otherwise specified. Total load must not exceed 30A per relay.
$\ddagger$ Use ungrounded frame for AC loads of 5A or greater. Max.ratings are 7.5A at 115VAC and 4A at 28VDC for coil codes S and J
§ Use ungrounded frame for AC loads of 5A or greater. Max.ratings are 5A at 115VAC and 3A at 28 VDC for coil codes S and J.

UL Horsepower Contact Ratings (Coil Code V Only)

| Contact Code | No. of Poles | At 110-120VAC | At 220-240VAC |
| :---: | :---: | :---: | :---: |
| $W$ | $1,2,4$ | $1 / 8 \mathrm{HP}(3.8 \mathrm{~A})$ | $1 / 6 \mathrm{HP}(2.2 \mathrm{~A})$ |
| X | $1,2,4,6$ | $1 / 20 \mathrm{HP}(1.5 \mathrm{~A})$ | $1 / 10 \mathrm{HP}(1.5 \mathrm{~A})$ |

Expected Mechanical Life: 100 million operations, typical. (Except contact Code W: 1,000,000 operations, typical.)

Typical Expected Life For Resistive Loads @ $25^{\circ} \mathrm{C}$

| Type | Current | Voltage | Contact Style | Coil Code | Operationst† |
| :---: | :---: | :---: | :---: | :---: | :---: |
| R10 | 7.5A | 120VAC, 60 Hz . | W | V,S,J | $7.5 \cdot 10^{4}$ |
| R10 | 7.5A | 28VDC | W | V | $7.5 \cdot 10^{4}$ |
| R10 | 5.0A | 120VAC, 60 Hz . | X | V,S,J | $5 \cdot 10^{4}$ |
| R10 | 5.0A | 28VDC | X | V | $5 \cdot 10^{4}$ |
| R10 | 4.0A | 28VDC | W | S, J | $2 \cdot 10^{4}$ |
| R10 | 3.0A | 28VDC | X | S, J | $2 \cdot 104$ |
| R10 | 3.0A | 28 VDC or 120VAC | $P$ | V,S,J | $3 \cdot 10^{4}$ |
| R10 | 2.0A | 28VDC | $P, Y, Z$ | V | $1.5 \cdot 10^{6}$ |
| R10 | 2.0A | 28VDC | P, Y, Z | S,J | $6 \cdot 10^{5}$ |
| R10S | 2.0A | 28VDC | P, Y, Z | J | $5 \cdot 10^{5}$ |
| R10 | 1.0A | 28VDC | P, Y, Z | V,S,J | $12 \cdot 10^{6}$ |
| R10 | 1.0A | 28VDC | P, Y, Z | SS,J J | $5 \cdot 10^{5}$ |
| R10S | 1.0A | 28VDC | P, Y, Z | J | $1 \cdot 10^{6}$ |
| R10 | 500mA | 28VDC | P, Y, Z | SS, J J | $5 \cdot 10^{6}$ |
| R10 | 100mA | 28 VDC or 120VAC | P,Y,Z | V,S,J | $1 \cdot 10^{8}$ |
| R10 | 100 mA | 48VDC | P, Z | SS, J J | $5 \cdot 10^{6}$ |
| R10 | 100 mA | 6VDC | P | SS,J J | $5 \cdot 10^{7}$ |
| R10S | 100 mA | 28 VDC or 120VAC | P, Y, Z | J | $1 \cdot 10^{6}$ |
| R10 | 50 mA | 6VDC | P, Z | V,S,J | $5 \cdot 10^{7}$ |
| R10S | 30 mA | 6VDC | P, Z | J | $5 \cdot 10^{6}$ |
| R10 | 1 mA | 6VDC | P | SS,J J | $5 \cdot 10^{7}$ |

$\dagger \dagger$ Relay operated at rated coil voltage or $133 \%$ of pick-up current or higher.

## Initial Dielectric Strength

Between Open Contacts: 500 V rms, for contact codes $P$ and $Z$. $1,000 \mathrm{~V}$ ms for contact codes $\mathrm{W}, \mathrm{X}$ and Y with coil code V.
Between All Other Conductors: $1,000 \mathrm{~V}$ rms.

## R10 series

## General Purpose

## Dry Circuit to 7.5 Amp Multicontact AC or DC Relay

- R10-E - Clear Dust Cover Version
- R10-R - Sealed, Immersion Cleanable Type
- R10S - Super Sensitive, Logic Compatible

문 File E29244
File LR15734
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Capacitance

Between Contacts: 2 pf, typ.
Between Contacts and Coil: 2 pf, typ.
Between Coil and Frame: 30 pf, typ.

## Initial Insulation Resistance

Between Mutually Insulated Elements: $10^{10}$ ohms @ $25^{\circ} \mathrm{C}, 50 \%$ RH. Consult factory for optional acetal resin material rated $10^{12}$ ohms.
Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$ (also see Coil Data tables)
Voltage: 3 to 115 VDC and 6 to 115 VAC .
Maximum Coil Power: 2.2 Watts.
Coil Temperature Rise: $30^{\circ} \mathrm{C}$ per Watt.
Maximum Coil Temperature: $105^{\circ} \mathrm{C}$.
Operate Data @ $25^{\circ} \mathrm{C}$
R10 Relays (DC Only) Typical Ranges of Operations
(Curves for reference only. If specific


R10 Ultra-Sensitive "SS" and "JJ" Typical Ranges of Operation (Curves for reference only. If specific


> Multiple of Max. Pull-In Voltage or Current

## Environmental Data

Storage Temperature Range: $-55^{\circ} \mathrm{C}$ to $+105^{\circ} \mathrm{C}$.
Operating Temperature Range: $-55^{\circ} \mathrm{C}$ to $+75^{\circ} \mathrm{C}$.

## Mechanical Data

Terminal Finish: Tin plating standard.
Weight: 0.8 to 1.4 oz . ( 23 to 40 g ) approximately.

## Coil Data Tables @ $\mathbf{2 5}^{\circ} \mathrm{C}$

One of the boldface resistance or voltage values from a table below is to be inserted in step 6 of the ordering chart on the next page.

| Standard DC Voltage Adjustment |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 2.2 Watts Maximum Continuous Coil Dissipation @ $\mathbf{2 5}^{\circ} \mathrm{C}$ |  |  |  |  |
| VDC at $25^{\circ} \mathrm{C}$ |  | Coil Resistance at $25^{\circ} \mathrm{C} \pm \mathbf{1 0 \%}$ (ohms) |  |  |
| Nominal | Pick-up (Max.) | 1, 2 \& 4 Form A, B, C or D Pick-up 500 mW | $\begin{aligned} & \hline 6 \text { Form A, } \\ & \text { B or C } \\ & \text { Pick-up } \\ & 850 \mathrm{~mW} \end{aligned}$ | $\begin{aligned} & \hline 8 \text { Form A, } \\ & \text { B or C } \\ & \text { Pick-up } \\ & 1000 \mathrm{~mW} \end{aligned}$ |
| 3.0 | 2.25 | 10 | 6 | 5 |
| 5.0 | 3.75 | 28 | 16 | 14 |
| 6.0 | 4.5 | 52 | 25 | 20 |
| 12.0 | 9.0 | 185 | 90 | 72 |
| 24.0 | 18.0 | 700 | 430 | 350 |
| 48.0 | 36.0 | 2.5 K | 1.5K | 1.25K |
| 72.0 | 54.0 | 5.8K | 3.5K | 2.8K |
| 115.0 | 86.0 | 15.0K | 9.0K | 8.0K |


| 0 Special DC Voltage Adjustment |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 \& 2 Form A, B, C or D |  |  | 3 \& 4 Form A, B, C or D |  |  |  |
| $\begin{gathered} \text { Coil Res. } \\ \text { @ } 25^{\circ} \mathrm{C} \\ \pm 10 \% \\ \text { (ohms) } \end{gathered}$ | Pick-up <br> (Max.) <br> @ $25^{\circ} \mathrm{C}$ <br> (VDC) | Pick-up @ $25^{\circ} \mathrm{C}$ (mW) | $\begin{gathered} \text { Coil Res. } \\ @ 25^{\circ} \mathrm{C} \\ \pm 10 \% \\ \text { (ohms) } \end{gathered}$ | Pick-Up (Max.) <br> @ $25^{\circ} \mathrm{C}$ <br> (VDC) | Pick-Up @ $25^{\circ} \mathrm{C}$ (mW) | Nominal Voltage @ $25^{\circ} \mathrm{C}$ (VDC) |
| 52 | 3.1 | 180 | 32 | 3.8 | 450 | 5 |
| 110 | 4.5 | 185 | 52 | 4.2 | 340 | 6 |
| 450 | 9.2 | 190 | 185 | 8.4 | 380 | 12 |
| 1.8K | 17.4 | 170 | 1.0K | 17.2 | 295 | 24 |
| 7.5K | 36.2 | 175 | 3.2K | 31.1 | 300 | 48 |
| 15.0K | 49.5 | 165 | 7.5K | 49.3 | 325 | 72 |
| 30.0K | 67.5 | 160 | 15.0K | 67.5 | 300 | 115 |


| S Sensitive DC Voltage Adjustment |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 2.2 Watts Maximum Continuous Coil Dissipation @ $25^{\circ} \mathrm{C}$ |  |  |  |  |  |
| VDC at $25^{\circ} \mathrm{C}$ |  | Coil Resistance at $25^{\circ} \mathrm{C} \pm \mathbf{1 0 \%}$ (ohms) |  |  |  |
| Nominal | Pick-up <br> (Max.) | 1 \& 2 Form A, B, C or D Pick-up 100 mW | 3 \& 4 Form A, B, C or D Pick-up 175mW | $\begin{aligned} & 6 \text { Form A, } \\ & \text { B or C } \\ & \text { Pick-up } \\ & 250 \mathrm{~mW} \end{aligned}$ | 8 Form A, B or C Pick-up 400mW |
| 3.0 | 2.25 | 50 | 30 | 20 | 12 |
| 5.0 | 3.75 | 140 | 80 | 56 | 35 |
| 6.0 | 4.5 | 200 | 110 | 80 | 52 |
| 12.0 | 9.0 | 800 | 450 | 320 | 200 |
| 24.0 | 18.0 | 3.2K | 1.8K | 1.2 K | 800 |
| 48.0 | 36.0 | 13.0K | 7.5K | 5.2K | 3.2 K |
| 72.0 | 54.0 | 28.0K | 16.0 | 13.0K | 7.5K |
| 115.0 | 86.0 | 50.0K | 40.0K | 30.0K | 16.0K |


| J Sensitive DC Current Adjustment |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Must Operate Current (mA) |  |  |  |  |  |
| All Applicable Types Except R10S |  |  |  |  |  |
| Coil <br> Resistance <br> $\pm 10 \%$ <br> (ohms) | 2 Form A, B, C or D Pick-up 85mW | 4 Form A, B, C or D Pick-up 175 mW | 6 Form A, B, C or D Pick-up 250mW | $\begin{aligned} & 8 \text { Form A, } \\ & \text { B or C } \\ & \text { Pick-up } \\ & 400 \mathrm{~mW} \end{aligned}$ | Max. Coil Current (mA) |
| 1.0K | 8.5 | 13.0 | 16.0 | 20.0 | 45.0 |
| 2.5K | 5.8 | 8.4 | 10.0 | 13.0 | 28.0 |
| 5.0K | 4.1 | 6.2 | 7.2 | 9.0 | 20.0 |
| 10.0K | 3.1 | 4.5 | 5.0 | 6.4 | 14.0 |
| 15.0K | 2.6 | 3.5 | 4.2 | 5.3 | 11.5 |
| 30.0K | 1.7 | 2.5 | 2.9 | 3.7 | 8.3 |
| R10S Types Only |  |  |  |  |  |
| Coil Resistance $\pm 10 \%$ (ohms) |  | $\stackrel{1}{\text { Form } \mathrm{C}}$ Pick-up 10 mW | $\begin{gathered} 2 \\ \text { Form C } \\ \text { Pick-up } \\ 20 \mathrm{~mW} \end{gathered}$ |  | $\stackrel{4}{4}$ Pick-up 40 mW |
| 500 |  | 4.5 (A) | 6.3 (A) |  | 9.0 |
| 1.0K |  | 3.2 (A) | 4.5 |  | 6.5 |
| 2.5K |  | 2.0 | 2.9 (B) |  | 4.1 (B) |
| 5.0K |  | 1.4 (B) | 2.0 |  | 2.9 (C) |
| 10.0K |  | 1.0 | 1.4 (C) |  | 2.0 |
| 16.0K |  | 0.8 | 1.2 |  | 1.4 |
| 30.0K |  | 0.6 (C) | 0.8 |  | 1.2 |

(A) Suggested for 5VDC operation.
(B) Suggested for 12VDC operation.
(C) Suggested for 24VDC operation.

| JJ | Ultra-Sensitive Current Adjustment (1-4 Pole Only) |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Maximum Pick-Up Current (mA) |  |  |  |
| Coil Resistance at $25^{\circ} \mathrm{C}$ $\pm 10 \%$ | 1 Form C Pick-Up Power 20 mW | 2 Form C Pick-Up Power 40 mW | $\begin{gathered} \hline \text { \& } 4 \text { Form C } \\ \text { Pick-Up } \\ \text { Power } \\ \text { 80mW } \end{gathered}$ | Maximum Continuous Coil Current (mA) |
| 1.0K | 4.5 | 6.5 | 9.0 | 45.0 |
| 2.5 K | 2.9 | 4.1 | 5.8 | 28.0 |
| 5.0K | 2.1 | 2.9 | 4.1 | 20.0 |
| 10.0K | 1.5 | 2.0 | 3.0 | 14.0 |
| 15.0K | 1.2 | 1.7 | 2.4 | 11.5 |
| 30.0K | 0.85 | 1.2 | 1.7 | 8.3 |


| Standard AC Operated Relays |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Coil Resistance <br> @ $\mathbf{2 5}{ }^{\circ} \mathrm{C} \pm \mathbf{2 0 \%}$ (ohms) |  | Volts AC @ $25^{\circ} \mathrm{C}$ |  |  |
| 2 \& 4 Form C | 6 \& 8 Form C | Pick-Up (max.) | Nominal | Maximum Continuous |
| 25 | 15 | 5.0 | 6 | 7.2 |
| 120 | 90 | 9.0 | 12 | 14.5 |
| 500 | 350 | 18.0 | 24 | 30.0 |
| 2.0K | 1.4 K | 36.0 | 48 | 60.0 |
| 9.0K | 7.5K | 86.0 | 115 | 130.0 |

Note: Dual coil diode rectified construction.

Typical Coil Inductance



Our authorized distributors are more likely to stock the following items for immediate delivery.

| R10-E1P2-115V | R10-E1X2-24V | R10-E1Y2-J 1.0K | R10-E1Y4-V700 | R10-E2P4-V185 |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
| R10-E1P2-V700 | R10-E1X2-S800 | R10-E1Y2-J 2.5K | R10-E1Y6-V1.5K | R10-E2P4-V700 | R10-E2Y4-V185 |
| R10-E1P4-115V | R10-E1X2-V185 | R10-E1Y2-V15.0K | R10-E1Z2-V185 | R10-E2W2-V185 |  |
| R10-E1P4-V700 | R10-E1X2-V700 | R10-E1Y2-V185 | R10-E1Z2-V700 | R10S-E1Y2-J 5.0K |  |
| R10-E1W2-V185 | R10-E1X4--115V | R10-E1Y2-V2.5K | R10-E1Z4-V185 | R10S-E2Y1-J 1.0K |  |
| R10-E1W2-V700 | R10-E1X4-V185 | R10-E1Y2-V700 | R10-E1Z4-V2.5K | R10-E2X2-V700 |  |
| R10-E1W4-V185 | R10-E1X4-V2.5K | R10-E1Y4-J 10.0K | R10-E1Z4-V700 | R10-E2X4-V700 |  |
| R10-E1W4-V700 | R10-E1X4-V700 | R10-E1Y4-V2.5K | R10-E1Z6-V1.5K | R10-E2Y2-V185 |  |
| R10-E1X2-115V | R10-E1X6-V430 | R10-E1Y4-V52 | R10-E1Z6-V430 | R10-E2Y2-V700 |  |

## Outline Dimensions



## Solder Terminal Dimensions



PC Terminal Dimensions

|  | A | B | C | D | Arrang. |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Type 2 | .131 | .050 | .064 | 1.251 | Inline |
| Type 7 | .131 | .040 | .013 | 1.20 | Inline |
| Type 9 | .170 | .040 | .000 | 1.187 | Staggered |
| Thickness | .012 | 012 | .012 | .013 | --- |



## Wiring Diagrams (Bottom Views)

R10 Wiring Diagrams


R10-AC Wiring Diagram


## Suggested PC Board Layouts (Component Side of Boards) Terminal Types E2 \& R2 Terminal Types E9 \& R9



## Suggested Panel Cutout For Relay or Socket

$.543 \pm .020$
$(8.71 \pm .51)$
4 POLE - $562 \pm .020$
6 POLE - $781 \pm .020$
$(19.84 \pm .51)$
$1000 \pm .020$
(25.40 $\pm .51$ )

Mounting Hole Layout For Terminal \& Mounting Style 6



## Socket Specifications

Contact Material:
Spring brass, tin-plated.
Body Material: 2 and 4 pole: polyester.
6 and 8 pole: phenolic.
Voltage Drop: 30mV max. @10A.
Dielectric Strength: $1,000 \mathrm{~V} \mathrm{~ms}$.
Insulation Resistance: $10^{9}$ megohms.
Max. Current: 10A.

## Solder or PC Terminal Sockets

Rugged, molded socket body retains floating terminals of either solder or printed circuit pin configuration. PC terminal sockets are offered with pins in either $0.1^{\prime \prime}(2.54 \mathrm{~mm})$ grid or in-line arrangement.

## Grounding Provisions

Pre-installed on sockets
Not for use at 5A AC and above.
Grounding Strip: Mounting stud of relay contacts grounding strip. Grounding strip is grounded with screw or rivet through round hole in socket.
Grounding Terminal (PC sockets only):
Mounting stud of relay contacts ground terminal through square hole in socket.

Strip
Terminal

| III |  |
| :--- | :--- |
| III |  |
| III | 트 |
| II |  |



Caution:
Printed circuit sockets are manufactured with "floating" (loose) terminals. This permits them to align with holes in the circuit board and with the relay terminals. During the mounting and soldering of the socket, vertical float should be eliminated and the terminals seated on the board. (This may be accomplished by inserting a dummy relay in the socket.) Failure to eliminate float may cause fracture of the solder joint or separation of the copper conductor from the printed circuit board when a relay is inserted in the socket after soldering.

Ordering Data - Stock items are boldfaced.

| Socket <br> Part No. | No. of Poles | Type of Terminal | Grounding Provision | All tolerances $\pm .010$ ( $\pm .25$ ) unless otherwise noted. |
| :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { 27E125 } \\ & \text { 27E126 } \\ & \text { 27E127 } \\ & \text { 27E162 } \\ & \text { 27E163 } \\ & \text { 27E164 } \end{aligned}$ | $\begin{aligned} & 2 \\ & 4 \\ & 6 \\ & 2 \\ & 4 \\ & 6 \end{aligned}$ | Solder | Strip <br> Strip <br> Strip <br> None <br> None <br> None |  |
| $\begin{aligned} & \text { 27E128 } \\ & \text { 27E129 } \\ & \text { 27E130 } \\ & \text { 27E254 } \\ & \text { 27E212 } \\ & \text { 27E213 } \\ & \text { 27E271 } \\ & \text { 27E258 } \\ & \text { 27E193 } \\ & \text { 27E194 } \\ & \hline 27 E 636 \\ & 27 E 637 \end{aligned}$ | $\begin{aligned} & 2 \\ & 4 \\ & 6 \\ & 8 \\ & 2 \\ & 4 \\ & 6 \\ & 8 \\ & 2 \\ & 4 \\ & \hline 2 \\ & 4 \end{aligned}$ | PC Stag. .180" long <br> ( 4.57 mm ) <br> PC Stag. <br> .210" long <br> ( 5.33 mm ) | Strip <br> Strip <br> Strip <br> Strip <br> None <br> None <br> None <br> None <br> Terminal <br> Terminal <br> Strip <br> Strip | Suggested Board Layout (Component Side) |
| $\begin{aligned} & 27 \mathrm{E} 631 \\ & 27 \mathrm{E} 632 \\ & 27 \mathrm{E} 340 \\ & 27 \mathrm{E} 42 \\ & 27 \mathrm{E} 29 \\ & 27 \mathrm{E} 630 \\ & 27 \mathrm{E} 338 \\ & \hline 27 \mathrm{E} 633 \\ & 27 \mathrm{E} 334 \\ & 27 \mathrm{E} 635 \end{aligned}$ | $\begin{aligned} & 2 \\ & 4 \\ & 6 \\ & 2 \\ & 4 \\ & 6 \\ & 4 \\ & \hline 2 \\ & 4 \\ & 6 \end{aligned}$ | PC In-line .180" long <br> ( 4.57 mm ) <br> PC In-line <br> .210" long <br> ( 5.33 mm ) | Strip <br> Strip <br> Strip <br> None <br> None <br> None <br> Terminal <br> Strip <br> Strip <br> Strip | Suggested Board Layout (Component Side) |
| Hold Downs For Use With R10 Sockets |  |  |  |  |
| Part No. | No. of Poles | Description |  |  |
| $20 C 249$ $20 C 250$ $20 C 251$ $20 C 266$ $20 C 259$ $20 C 300$ $20 C 301$ | 2 <br> 4 <br> 6 <br> 8 <br> All <br> 2 (R10S) <br> 4 (R10S) | Wire Hold Down Spring Wire Hold Down Spring Wire Hold Down Spring Wire Hold Down Spring Wire Hold Down Strap (PC only) Hold Down Spring Hold Down Spring |  |  |

See following page for additional sockets \& accessories.

Solder \& PC Terminal Socket Outline Dimensions


37D645 - Mounting Strip
Strip of .060 " ( 1.52 mm ) aluminum contains ten pre-punched, breakaway mounting plates. Each plate accomodates a 2, 4, 6 or 8 pole solder terminal R10 relay or socket to facilitate chassis- or rack mounting.


R10 Socket \& Accessory Information (Continued)


Bracket Mount Socket Allows solder terminal relay to mount flat on a chassis.

Ordering Data - Stock items are boldfaced.


4 Pole
Terminal Wiring Code


6 Pole
Terminal Wiring Code


## Suggested Track Mounting



Suggested Chassis Mounting


SUGGESTED STANDOFF
(CUSTOMER SUPPLIED)
OR INSULATOR (40G432)
.375 (9.53) DIA. MIN; . 625 (15.88) DIA.


Track Mount Socket
Provides front wiring, screw terminal connections for R10 family relays. No grounding provision.


KHS


## Features

- Miniature size from 2 pole to 4 pole.
- KHAU is produced on an automated line, while KHU is produced manually. Form, fit and function of the two versions are identical.
- KHS hermetically sealed version UL Approved for Class 1 Division 2 hazardous locations.
- Various applications include process control, photocopier, and data processing.
- Push-to-test and indicator options available.
- Various contact materials available for specific load requirements.


## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT), 4 Form C (4PDT).
Expected Life: 10 million operations, mechanical; 100,000 operations min. at rated loads. Ratings are based on tests of relays with ungrounded frames.
Initial Breakdown Voltage: 500 V rms, 60 Hz ., between open contacts. 1240 V rms, 60 Hz ., between all other elements.

## Contact Ratings

| Contact Code | Material | Resistive Rating |  |
| :---: | :---: | :---: | :---: |
|  |  | Minimum | Maximum |
| 1 | Silver | $\begin{gathered} \text { 100mA @ } \\ \text { 12VAC/12VDC } \end{gathered}$ | $\begin{gathered} 3 A @ \\ \text { 120VAC/28VDC } \end{gathered}$ |
| 2* | Silver-cadmium oxide | $\begin{gathered} 500 \mathrm{~mA} @ \\ 12 \mathrm{VAC} / 12 \mathrm{VDC} \end{gathered}$ | 5A @ 120VAC/28VDC |
| 3 | Gold-silver-nickel | 10mA @ 12VAC/12VDC | 2A @ 120VAC/28VDC |
| 6 | Bifurcated cross bar, gold overlay silver | Dry circuit | 1A @ 120VAC/28VDC |
| 8 | Gold diffused silver | 50mA @ 12VAC/12VDC | 3A @ 120VAC/28VDC |

Note: Relays should only carry a maximum of 15 amps continuously for all poles combined.

## KHS Contact Ratings

Class I Division II Hazardous Location:
5A@28VDC/120VAC
UL 508 (Industrial Control):
3A@28VDC/120VAC; 1/10 HP @ 120VAC.

## KHA series

## General Purpose

 Dry Circuit to 5A Multicontact AC or DC Relay
## ㄱํ File E22575

(81) File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: From 6 to 120VDC, and 6 to 240VAC, $50 / 60 \mathrm{~Hz}$.
Nom. Power: DC coils - 0.9 watt; 0.5 watt minimum operate @ $25^{\circ} \mathrm{C}$.
AC coils - 1.2 VA; 0.55 VA minimum operate @ $25^{\circ} \mathrm{C}$.
Max. Power: DC coils -2.0 watts @ $25^{\circ} \mathrm{C}$.
Duty Cycle: Continuous.
Initial Breakdown Voltage: 500V rms, 60 Hz .

## Coil Data

| DC Coils |  |  |  | AC Coils |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Nominal <br> Voltage | Resistance <br> in Ohms <br> $\mathbf{1 0 \%}$ @ <br> $\mathbf{2 5}{ }^{\circ} \mathbf{C}$ | Nominal <br> Inductance <br> in Henrys | Resistance <br> in Ohms <br> $\pm \mathbf{1 5 \%}$ | Nominal <br> AC Current <br> in mA |  |
| 5 | 32 | .072 | - | - |  |
| 6 | 40 | .08 | 10.5 | 200 |  |
| 12 | 160 | .28 | 43 | 100 |  |
| 24 | 650 | 1.0 | 160 | 52 |  |
| 48 | 2,600 | 4.5 | 668 | 25 |  |
| $110^{*}$ | 11,000 | 17.0 | - | - |  |
| $120^{*}$ | - | - | 3,900 | 11.0 |  |
| 240 | - | - | 12,000 | 6.0 |  |

*Note: For 220 and 240VDC, use series dropping 5 W resistor of $11,000 \Omega$.

## Operate Data @ $25^{\circ} \mathrm{C}$

Must-Operate Voltage: DC: 75\% of nominal voltage.
AC: $85 \%$ of nominal voltage.
Operate Time: 13 milliseconds typical @ nominal voltage (excluding bounce).
Release Time: 6 milliseconds typical @ nominal voltage (excluding bounce).

## Environmental Data

Temperature Range: $-45^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$ operate.

$$
-60^{\circ} \mathrm{C} \text { to }+130^{\circ} \mathrm{C} \text { storage. }
$$

## Mechanical Data

Mountings: \#3-48 stud, sockets with printed circuit or solder terminals, or bracket plate with \#6-32 threaded stud.
Termination: Printed circuit or solder/socket terminals. Printed circuit terminals are available for KHS on a special order basis.
Enclosures: See Ordering Information table.
Weight: 1.6 oz. approx. (45g).

## Ordering Information


8. Coil Voltage:
$6,12,24,48,120,240^{* *}$ VAC
$6,12,24,48,110 \mathrm{VDC} \quad * * 240 \mathrm{VAC}$ coil is not available on KHS type relays.

Note 1: Some KHA models available in KH construction. Specify KH instead of KHA.

## Stock Items - Our authorized distributors are likely to stock the following items.

KHAE-17D12-24
KHAU-11A11-120
KHAU-11D11-24
KHAU-17A11-12
KHAU-17A11-24
KHAU-17A11-120
KHAU-17A11N-120
KHAU-17A12-120
KHAU-17A13-120
KHAU-17A16-24
KHAU-17A16-120
KHAU-17A18-120
KHAU-17D11-6
KHAU-17D11-12

KHAU-17D11-24
KHAU-17D11-48
KHAU-17D11-110
KHAU-17D12-12
KHAU-17D12-24
KHAU-17D12-48
KHAU-17D12-110
KHAU-17D16-12
KHAU-17D16-24
KHS-17A11-24
KHS-17A11-120
KHS-17A12-120
KHS-17D11-12
KHS-17D11-24

KHS-17D11-48
KHS-17D11-110
KHS-17D12-12
KHS-17D12-24

## Outline Dimensions

Mounting Code 1 - KHAU only.


PC terminal models have rivet, not stud. Max. seated height in 27E006 socket is 1.37 " ( 34.8 mm ).

Mounting Code 1 - KHS only.
2 \& 4 Pole


Class 1 Div. 2 Group A, B, C \& D Hazards

## Mounting Code 1 - Neon Indicator, Push-To-Test.



## Printed Circuit

 Terminals

Printed circuit terminal thickness .022 (.558)

## Wiring Diagrams (Bottom Views)

2 Pole

$+=$ Polarity for LED indicator.

## PC Board Layout (Bottom View)



For KHAE Relays
with PC terminals
and sockets with
PC terminals

Boldface sockets are normally maintained in stock for immediate delivery.
For KHAU, KHAX, KHS, KHU Relays.
Relays with solder terminals are required for use with sockets.

## Socket Description

| Industrial Part No. | No. of Poles | Terminal and Length | Grounding Provision | Socket Material |
| :---: | :---: | :---: | :---: | :---: |
| 27E006* | 4 | $\begin{aligned} & \text { Solder .375" } \\ & (9.53 \mathrm{~mm}) \end{aligned}$ | Yes | Nylon |
| 27E007* | 4 | $\begin{aligned} & \text { P.C. .218" } \\ & (5.54 \mathrm{~mm}) \end{aligned}$ | Yes | Nylon |
| $\begin{aligned} & \text { 27E023* } \\ & \text { 27E220* } \end{aligned}$ | $\begin{aligned} & 4 \\ & 2 \end{aligned}$ | $\begin{aligned} & \text { P.C. .218" } \\ & \text { (5.54mm) } \end{aligned}$ | No | Nylon |
| 27E166** | 4 | Screw | Yes | Glass-filled Polyester |
| 27E894** | 4 | Screw | No | Glass-filled Polyester |
| 20 C 217 |  | Relay Hold Down Spring <br> Relay Hold Down Spring - use with 27E166 <br> Relay Hold Down Spring - use with 27E894 |  |  |
| 20 C 297 |  |  |  |  |
| $20 C 426$ |  |  |  |  |

** UL Recognized, file E59244

## Pierced Solder Terminals



Mounting Strip 37D633


37D633 will mount eight solder terminal sockets
in one length of aluminum strip measuring $10.97^{\prime \prime} \times 2.25^{\prime \prime} \times .062$
$(278.6 \times 57.15 \times 1.57)$

Screw Terminal DIN Rail,
Snap-Mount Socket 27E894
(Use with mounting track 24A110)


## 4-Pole Socket



Recommended Chassis Cutouts For Mounting Sockets


Printed Circuit Terminals With Grounding Lug


Without Grounding Lug


Caution: Printed circuit sockets are manufactured with "floating" (Loose) terminals. This permits them to align with holes in the circuit board and with the relay terminals. During the mounting and soldering of the socket, vertical During the mounting and soldering of the socket, vertical
float should be eliminated and the terminals seated on the float should be eliminated and the terminals seated on the board. (This may be accomplished by inserting a dummy
relay in the socket.) Failure to eliminate float may cause relay in the socket.) Failure to eliminate float may caus
fracture of the solder joint or separation of the copper fracture of the solder joint or separation of the copper inserted in the socket after soldering.

Hold Down
Spring 20C217



## Features

- Small size, 3A, 5A, 10A and 15A switching capacity.
- Meets UL and CSA requirements.
- 1 pole, 2 poles and 4 poles contact arrangements.
- AC and DC coils with UL Class F $\left(155^{\circ} \mathrm{C}\right)$ coil insulation system standard.
- Optional flange mount case.
- Plug-in terminals or PCB terminals.


## Contact Data @ 20 ${ }^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO), 1 Form C (SPDT),
2 Form A (DPST-NO), 2 Form C (DPDT),
4 Form A (4PST-NO), 4 Form C (4PDT).
Material: Ag, Ag Alloy.
Max.Switching Rate: 300ops./min.(Mechanical). 30ops./min.(Electrical).
Expected Mechanical Life: 100 million operations (no load).
Expected Electrical Life: 100,000 operations (rated load).
Minimum Load: 100mA @5VDC.
Initial Contact Resistance: 50milliohms @ DC6V,1A.

## Contact Ratings

Ratings: PCL-4 3A @AC250V/DC24V resistive.
PCL-2 5A @AC250V/DC24V resistive.
PCLH-2 15A @AC120V resistive.
10A @ AC250V/DC24V resistive.
PCLH-1 15A @AC250V/DC24V resistive.
Max. Switched Current: PCL-4 3A.

| PCL-2 | $5 A$. |
| :--- | :--- |
| PCLH-2 | $15 A$. |
| PCLH-1 | $15 A$. |

Max. Switched Power: PCL-4 660VA, 72W.
PCL-2 1,100VA, 120W.
PCLH-2 3,168VA, 240W.
PCLH-1 3,300VA, 360W.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC 1minute.
Between Adjacent Contact Terminals: 1,500VAC 1minute.
Between Contacts and Coil: $2,000 \mathrm{VAC} 1$ minute.
Surge Voltage (Coil-Contact): 3,000V(1.2/50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Open Contacts: 1,000Mohms @ 500VDC.
Between Adjacent Contact Terminals: 1,000M ohms @ 500VDC.
Between Contacts and Coil: 1,000Mohms @ 500VDC.

## Coil Data

Voltage: AC 6-240V.
DC 6-110V.
Nominal Power: AC abt. 1.4VA/1.2VA ( $50 \mathrm{~Hz} / 60 \mathrm{~Hz}$ ). DC abt. 0.9 W .
Coil Temperature Rise: AC $60^{\circ} \mathrm{C}$ max.
$D C 50^{\circ} \mathrm{C}$ max.
Max. Coil Power: 110\% of nominal voltage.

## PCL/PCLH series <br> 3A, 5A, 10A, 15A General Purpose Miniature Relay

Factory Automation, Process Controls, Electrical Panels, etc.

TJ UL File No. E58304
(18) CSA File No. LR48471

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Coil Data@ $20^{\circ} \mathrm{C}$

| PCL AC Coil |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Rated Coil Voltage (VAC) | Coil Resistance (ohms) $\pm 10 \%$ | Must Operate Voltage (VAC) | Must Release Voltage (VAC) | Nominal Coil Power (VA) |
| 6 | 10 |  |  |  |
| 12 | 40 |  |  |  |
| 24 | 160 |  |  |  |
| 48 | 600 | 80\% max. | 30\% min. | abt. 1.4 |
| 100 | 2,800 |  |  |  |
| 110/120 | 3,400 |  |  |  |
| 200 | 11,000 |  |  |  |
| 220/240 | 13,600 |  |  |  |
| PCL DC Coil |  |  |  |  |
| Rated Coil Voltage (VDC) | Coil Resistance (ohms) $\pm 10 \%$ | Must Operate Voltage (VDC) | Must Release Voltage (VDC) | Nominal Coil Power (W) |
| 6 | 40 |  |  |  |
| 12 | 160 |  |  | abt. 0.9 |
| 24 | 650 | 80\% max. | 10\% min. |  |
| 48 | 2,600 |  |  |  |
| 100/110 | 11,000 |  |  | abt. 1.1 |

## Operate Data @ 20 ${ }^{\circ} \mathrm{C}$

Must Operate Voltage: AC $80 \%$ of nominal voltage or less. DC $80 \%$ of nominal voltage or less.
Must Release Voltage: AC $30 \%$ of nominal voltage or more.
DC 10\% of nominal voltage or more.
Operate Time: AC 20 ms max.
DC 15ms max.
Release Time: AC 20 ms max. DC 8ms max.

## Environmental Data

Temperature Range:
Operating: $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.
Humidity: 45 to $85 \%$. (Non-condensing).
Vibration, Operational: 10 to 55 Hz 1.0mm double amplitude.
Mechanical: 10 to 55 Hz 1.0 mm double amplitude.
Shock, Operational: $100 \mathrm{~m} / \mathrm{s}^{2}$ (abt. 10G).
Mechanical: $\quad 1,000 \mathrm{~m} / \mathrm{s}^{2}$ (abt. 100G).

## Mechanical Data

Termination: Plug-in, PCB.
Enclosure: Snap-on cover.
Weight: 1.26 oz (32g) approximately.


Our authorized distributors are more likely to stock the following items for immediate delivery.
PCLH-202A1S,000
PCLH-203A1S,000
PCLH-206A1S,000
PCLH-208A1S,000
PCLH-202D1S,000
PCLH-203D1S,000
PCLH-204D1S,000
PCLH-205D1S,000
PCLH-206A1SP,000
PCLH-202D1SP,000
PCLH-203D1SP,000
PCLH-205D1SP,000

## Outline Dimsisions

PCL 2c, 2a type (PCB Terminal)


PCL 2c, 2a type (Plug-in Terminal)


## Outline Dimensions (continued)



PCLH type (Flange Mount Case)


## Wiring Diagrams (Bottom Views)

PCL 4c type


PCL 4a type


PCL 2c type


PCLH 2c type


PCLH 2a type


PCLH 1c type


PCLH 1a type


PC Board Layouts (Bottom Views)


## Reference Data



## Sockets

For PCL socket information refer to KH series sockets (page 712).
For PCLH socket information refer to K10 series sockets (page 722).


## Features

- Low profile height of 29 mm .
- DPDT, 3PDT or 4PDT contact arrangements.
- Greater switching performance - up to 3,000VA.
- AC and DC coils.
- Mechanical indicator.
- Manual test tab with locking option available.


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT), 3 Form C (3PDT) and 4 Form C (4PDT).
Material: Silver-nickel $90 / 10$ with optional gold plating.
Minimum Load: Silver-nickel 90/10: 10mA @ 12V.
Silver-nickel $90 / 10$ with gold plating: $1 \mathrm{~mA} @ 20 \mathrm{mV}$.
Expected Mechanical Life: DC coil 30 million operations minimum.
AC coil 20 million operations minimum.
Ratings:

| Arrangement | 2 Form C | 3 Form C | 4 Form C |
| :--- | :---: | :---: | :---: |
| Rated Current | 12 A | 10 A | 6 A |
| Rated Voltage | 250 VAC | 250 VAC | 250 VAC |
| Maximum Switching Voltage | 440 VAC | 440 VAC | 440 VAC |
| Rated Breaking Capacity | $3,000 \mathrm{VA}$ | $2,500 \mathrm{VA}$ | $1,500 \mathrm{VA}$ |
| Maximum Make Current | 24 A | 20 A | 12 A |

## Initial Dielectric Strength

Between Open Contacts: 1,500VAC.
Between Coil and Contacts: 2,500VAC; 5,000V surge ( $12 / 50 \mu \mathrm{~s}$ ).
Between Poles: 2 and 3 Pole:2,500VAC, 4 Pole: 2,000VAC.

DC Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$
Nominal Coil Power: 750mW

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: |
| 06 | 48 | 4.5 | 0.6 | 125.0 |
| 12 | 192 | 9.0 | 12 | 62.5 |
| 24 | 777 | 18.0 | 2.4 | 30.8 |
| 48 | 3,072 | 36.0 | 4.8 | 15.6 |
| 60 | 4,845 | 45.0 | 6.0 | 12.4 |
| 110 | 16,133 | 82.5 | 110 | 6.8 |
| 220 | 64,533 | 165.0 | 22.0 | 3.4 |

AC Coil Data @ $\mathbf{2 0}^{\circ} \mathrm{C}$
Nominal Coil Power: 10VA @ $50 \mathrm{~Hz} . / 0.86 \mathrm{VA} @ 60 \mathrm{~Hz}$.

| Nominal <br> Voltage <br> VAC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage (VAC) <br> $\mathbf{5 0 ~ H z ~ / ~ 6 0 ~ H z ~}$ | Drop-out <br> Voltage <br> VAC | Nominal <br> Coil <br> Current (mA) <br> $\mathbf{5 0 ~ H z . ~ / ~ 6 0 ~ H z . ~}$ |
| :---: | :---: | :---: | :---: | :---: |
| 06 | 11 | $4.8 / 5.4$ | 18 | $166.5 / 141$ |
| 12 | 48 | $9.6 / 10.8$ | 3.6 | $83.3 / 70.5$ |
| 24 | 192 | $19.2 / 216$ | 7.2 | $416 / 33.0$ |
| 48 | 777 | $38.4 / 43.2$ | 14.4 | $213 / 18.2$ |
| 60 | 1,306 | $48.0 / 54.0$ | 18.0 | $16.7 / 14.5$ |
| 115 | 4,845 | $92.0 / 103.5$ | 34.5 | $8.8 / 7.5$ |
| 230 | 19,465 | $184.0 / 207.0$ | 69.0 | $4.3 / 3.9$ |

## PT series

## 6 to 12 Amp Miniature Relay 2, 3 or 4 Pole, PCB or Plug-in <br> c $\mathbf{T N}_{\text {us }}$ UL File E79990 <br> ( - 아


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time : 15 ms typical, at nom. voltage.
Release Time : 10 ms typical, at nom. voltage.
Bounce Time: 5 ms typical, at nom. voltage.
Switching Rate: 6 ops./minute max. at rated load.

## Environmental Data

Temperature Range:

$$
\text { Storage: }-45^{\circ} \mathrm{C} \text { to }+80^{\circ} \mathrm{C} \text {. }
$$

Operating: $-45^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration: 55 to 150 Hz . at $7 \mathrm{~g} \mathrm{~N} / \mathrm{O}, 4 \mathrm{~g} \mathrm{~N} / \mathrm{C}$.
Operational Shock: $20 \mathrm{~g} \mathrm{~N} / \mathrm{O}, 5 \mathrm{~g} \mathrm{~N} / \mathrm{C}$.
Mechanical Shock: 50g.

## Electrical Life



Max. DC Load Breaking Capacity (resistive Ioad)


## Coil Operating Range





Our authorized distributors are more likely to stock the following items for immediate delivery.

| PT220024 | PT221024 | PT270024 | PT320024 | PT321024 | PT370024 | PT520024 | PT521024 | PT570024 | PT580024 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| PT220524 | PT221524 | PT270524 | PT320524 | PT321524 | PT370524 | PT520524 | PT521524 | PT570524 | PT580524 |
| PT220615 | PT221615 | PT270615 | PT320615 | PT321615 | PT370615 | PT520615 | PT521615 | PT570615 | PT580615 |

## Outline Dimensions

## Socket Mount, Solder Terminals



Printed Circuit Board Terminals


## Wiring Diagrams (Bottom Views)



PC Board Layout (Bottom Views)


27E894
DIN Rail Socket with Screw Terminals, 4 pole


PT78702, PT78703, PT78704 (2, 3 and 4 Pole) DIN Rail Socket with Screw Terminals


## 27E006

4 Pole Socket with Solder Terminals


## Socket Selection Table

Stock items are boldfaced.

| Socket <br> Part No. | Socket Termination | Mounting <br> Style | No. of <br> Poles | Accepts <br> Modules? |
| :--- | :--- | :---: | :---: | :---: |
| 27E894 | Screw Terminals | DIN-rail | 4 | No |
| PT78702 | Screw Terminals | DIN-rail | 2 | Yes |
| PT78703 | Screw Terminals | DIN-rail | 3 | Yes |
| PT78704 | Screw Terminals | DIN-rail | 4 | Yes |
| 27E006 | .375 (9.53) SolderTerminals | Panel Cutout | 4 | No |
| 27E220 | .218 (5.54) SolderTerminals | PC Board | 2 | No |
| 27E023 | .218 (5.54) PCB Terminals | PC Board | 4 | No |

27E023
4 Pole Socket with PCB Terminals


27E220
2 Pole Socket with PCB Terminals


LED and Protection Module Selection Table
Stock items are boldfaced.

| Module <br> Part No. | Type |
| :--- | :--- |
| RPM T0 0A0 | Protection diode 1N4007 (Note 1) |
| RPM U0 548 | RC network 24-48VAC |
| RPM U0 730 | RC network 110-230VAC |
| RPM L0 024 | LED 12-24VDC (Note 1) |
| RPM L0 524 | LED 12-48VACNDC |
| RPM L0 110 | LED 110VDC (Note 1) |
| RPM L0 730 | LED 110-230VAC |

Note 1: Standard polarity: A1: +, A2: -


## Features

- K10 - DPDT contact arrangement standard.
- AC and DC coils.
- Mounting options include socket, PCB , top flange.
- UL Class B coil insulation system.


## Contact Data @ $25^{\circ} \mathrm{C}$

Materials: Silver-cadmium oxide.
Expected Life: 10 million operations, mechanical; 100,000 operations minimum at rated loads.

## Contact Ratings

| Contact Code | Material | ULCSA Ratings | Type |
| :---: | :---: | :---: | :---: |
| $\mathbf{5}$ | Silver-cadmium | 15 A @ 30VDC | Resistive |
|  | oxide | 15 A @ 120VAC | Resistive |
|  |  | 10 A @ 277VAC | Resistive |
|  |  | $1 / 3 \mathrm{HP}$ @ 120VAC |  |
|  |  | $1 / 2 \mathrm{HP}$ @ 250VAC |  |

## Initial Dielectric Strength

Between Open Contacts: 1,000V rms.
Between Adjacent Contacts: $1,500 \mathrm{~V}$ rms.
Between Contacts and Coil: $1,500 \mathrm{~V}$ rms.

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

## Nominal Power:

DC Coils: . 9 Watts.
AC Coils: 12VA.
Maximum Power: 2.0 Watts.
Duty Cycle: Continuous.
Insulation: Class B: $\left(130^{\circ} \mathrm{C}\right)$.

## K10 series

## 15 Amp General Purpose Miniature Relay

미 File E22575
(18) File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data

|  | DC Coils |  | AC Coils |  |
| :---: | :---: | :---: | :---: | :---: |
| Nominal <br> Voltage | Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Nominal <br> Current in <br> Milliamps | Resistance <br> in Ohms <br> $\mathbf{\pm 1 5 \%}$ | Nominal <br> Current in <br> Milliamps |
| 6 | 40 | 150 | 10.5 | 200 |
| 12 | 160 | 75 | 43 | 100 |
| 24 | 650 | 37 | 160 | 52 |
| 48 | 2,600 | 18.5 | 668 | 26 |
| 110 | 11,000 | 10 | $3, \overline{900}$ | -11 |
| $120^{*}$ | - | - | 12,000 | 6 |
| $240^{*}$ | - | - |  |  |

*For 220/240VDC operation, use 11,000 Ohm, 5 Watt dropping resistor in series with the 110VDC coil.

## Operate Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Must Operate Voltage:
DC Coils: $75 \%$ of nominal voltage.
AC Coils: $85 \%$ of nominal voltage.
Operate Time (Excluding Bounce): 13 milliseconds, typical, at nominal voltage.
Release Time (Excluding Bounce): 6 milliseconds, typical, at nominal voltage.

## Environmental Data

Temperature Range:
Storage: $-60^{\circ} \mathrm{C}$ to $+105^{\circ} \mathrm{C}$.
Operating: $-45^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Socket mount, printed circuit board, top flange.
Termination: 187 " ( 4.75 mm ) quick connect/solder terminals, or printed circuit terminals.
Enclosure: Smoke-color polycarbonate dust cover.
Weight: 18 oz . (51g) approximately.

## Ordering Information



Our authorized distributors are more likely to stock the following items for immediate delivery.

| K10P-11A15-6 | K10P-11D15-6 | K10P-11D55-24 |
| :--- | :--- | :--- |
| K10P-11A15-12 | K10P-11D15-12 | K10P-11D55-110 |
| K10P-11A15-24 | K10P-11D15-24 | K10P-11DT5-12 |
| K10P-11A15-120 | K10P-11D15-110 | K10P-11DT5-24 |
| K10P-11AT5-120 | K10P-11D55-12 |  |

## Outline Dimensions

Mounting Code 1
Socket Mount


Mounting Code 5 Printed Circuit Terminals


Mounting Code T


PC Board Layout


Wiring Diagram


## Sockets and Accessories for K10 Relays

Sockets for K10 series relays are rated 10 amps, and are UL recongnized, File E59244, and CSA certified, File LR15734.

27E488
Pierced Solder Terminals

$20 C 217$
Hold Down
Spring For
27E488 \& 27E489


## Chassis Cutout For 37D633 <br> Mounting 27E488 Mounting Strip <br> Socket



Recommended chassis thickness $.039^{\prime \prime}(.99 \mathrm{~mm})$ to 079" (2.01mm).

Socket punch
Greenlee part
5015115.0, Type 731R
available from
Greenlee Tool Co.,
Rockford, Illinois.

Caution: Printed circuit sockets are manufactured with "floating" (loose) terminals. This permits them to align with holes in the circuit board and with the relay terminals. During the mounting and soldering of the socket, vertical float should be eliminated and the terminals seated on the board. (This may be accomplished by inserting a dummy relay in the socket.) Failure to eliminate float may cause fracture of the solder joint or separation of the copper conductor from the printed circuit board when a relay is inserted in the socket after soldering.

37D633 will mount eight 27E488 sockets in one length of aluminum strip measuring 10.97" $\times 2.25$ " x .062".
$(278.64 \times 57.15 \times 157)$


## 27E895

Screw Terminals, DIN Rail Snap-Mount (Use with mounting track 24A110)


27E487
Screw Terminals

## $20 C 426$

Hold Down Spring For 27E487 \& 27E895

Note: P.C. terminal socket will also fit P.C. board layout for relay. However, in order to accomplish this, terminals must be formed accordingly.

27E489
Printed Circuit Terminals

P.C. Board Layout For Socket



## Features

- AC coils: 6-240VAC, 50/60 Hz. DC: 6-110VDC.
- Contact arrangement up to 4PDT.
- Wide selection of termination and mounting styles.
- PC terminals available.
- Push to test button and indicator lamps.
- KUEP incorporates a blow out magnet for high voltage DC switching.
- KUIP/KUGP are VDE approved.
- Complete line of sockets and DIN rail.
- Class B coil insulation.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: See respective ordering information table.
Materials: Fine silver ( 5 amp ) silver-cadmium oxide (10 amp).
Gold flash available as standard.
Gold diffused and gold alloy on special order.
Expected Mechanical Life:
Contact Ratings

| Material | Arrangement | ULCSA Ratings | Expected Life |
| :---: | :---: | :---: | :---: |
| Fine Silver | All | 5 amps @ 28VDC or 240VAC 80\% PF, 2.5 amp tungsten @120VAC, 1/2 amp @120VDC. | 100,000 |
|  |  | 1/6 HP @120VAC, 1/3 HP @ 240VAC, 5 FLA, 15 LRA @ 250VAC (FLA covered by 30,000 operations). |  |
| SilverCadmium Oxide | 1-2 Pole KUP KUIP KUGP KUEP All KUMP | 10 amps @ 28 VDC or 240VAC, 80\% PF, 5 amp tungsten @ 120VAC, 3A 600VAC, $1 / 2 \mathrm{amp}$ @ 120VDC. | 100,000 |
|  |  | 1/3 HP @ 120VAC, 1/2 HP @ 240, 480, and 600VAC, 10 FLA 30 LRA @ 120VAC, 5 FLA, 15 LRA @ 250VAC.(FLA ratings covered by 30,000 operations) |  |
|  | KUMP | 15 amp @ 277VAC, 80\% PF KUM KUMP | 100,000 |
|  | 3 Pole KUP KUIP | $10 \mathrm{amp} @ 28 \mathrm{VDC}$ or 120VAC, 80\% PF, 6 2/3 amp @ 240VAC, 80\% PF | 100,000 |
|  | 4 Pole | 10 amp per pole not to exceed 30 amp total @ 28VDC, 120VAC, 80\% PF, 6 2/3 amp @ 240VAC, 80\% PF | 100,000 |
|  | KUEP <br> SPST-NO <br> KUEP <br> 2PST-NO <br> KUEP <br> 2PDT | 10 amp @ 150VDC <br> 5 amp @ 150VDC <br> 3 amp @ 150VDC | 100,000 |

(All other AC ratings apply KUEP.)

## Initial Dielectric Strength

Between Open Contacts: 1,200V rms; KUGP, 3,500V rms.
Between Adjacent Contacts: 2,200V rms.
Between Contacts and Coil: $2,200 \mathrm{~V}$ ms; KUGP, KUIP, $3,750 \mathrm{~V}$ ms.

KU series

## KUP Enclosed Relay

KUIP VDE 8mm Coil to Contacts
KUGP VDE 8mm 3mm Gap Coil to Contacts
KUEP 10 Amp 150VDC Load Switching
KUMP 15 Amp 277VAC
听 File E22575
(18) File LR15734

방 0435 Registration 1792 (KUGP)
License 8112102.01
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: 6 to 110VDC and 6 to 240VAC.
Nominal Coil Power:
DC Coils: 12 Watts - KUP, KUIP, KUMP, 1 - 3 pole; KUEP, 1 pole.
DC Coils: 18 Watts - KUP, 4 pole; KUEP, 2 pole; KUGP.
AC Coils: 2.0VA - KUP, KUIP, 1 - 2 pole; KUEP, 1 pole.
AC Coils: 2.7 VA - KUP, KUIP, 3 pole; KUEP, 2 pole; KUGP, KUMP.

Coil Data

| DC Volts | 1.2 Watt |  | 1.8 Watt |  |
| :---: | :---: | :---: | :---: | :---: |
|  | DC Ohms $\pm \mathbf{1 0 \%}$ | Nom. I ma | DC Ohms $\pm \mathbf{1 0} \%$ | Nom. I ma |
| 5 | 21 | 238 | 14 | 360 |
| 6 | 32.1 | 187 | 20 | 300 |
| 12 | 120 | 100 | 80 | 150 |
| 24 | 472 | 51 | 320 | 75 |
| 48 | 1,800 | 26.7 | 1,260 | 38 |
| 110 | 10,000 | 11 | 6,720 | 16 |
| AC Volts | 2VA |  | 2.7VA |  |
| Nominal | DC Ohms $\pm \mathbf{1 5} \%$ | Nom. I ma | DC Ohms $\mathbf{1 5} \%$ | Nom. I ma |
| 6 | 6 | 335 | 4.2 | 460 |
| 12 | 24 | 168 | 18 | 230 |
| 24 | 85 | 84 | 72 | 115 |
| 120 | 2,250 | 17.5 | 1,700 | 24 |
| 240 | 9,110 | 8.75 | 7,200 | 12 |

Operate Data @ $25^{\circ} \mathrm{C}$
Must Operate Voltage:
DC Coils: 75\% of nominal voltage or less.
AC Coils: 85\% of nominal voltage or less.
Operating Time (Excluding Bounce):
15 milliseconds, typical, at nominal voltage.
Release Time (Excluding Bounce):
10 milliseconds, typical, at nominal voltage.

## Environmental Data

Temperature Range:
Operating: Enclosed Relays: $-45^{\circ} \mathrm{C}$ to maximum listed in table below.
Open Relays: Add $15^{\circ} \mathrm{C}$ to maximum listed.

| Max $\mathrm{C}^{\circ}$ | $+45^{\circ} \mathrm{C}$ | +50 ${ }^{\circ} \mathrm{C}$ | $+55^{\circ} \mathrm{C}$ | +70 ${ }^{\circ} \mathrm{C}$ | $+75^{\circ} \mathrm{C}$ | $+80^{\circ} \mathrm{C}$ | +95 ${ }^{\circ} \mathrm{C}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| KUP | $\begin{gathered} \hline A C \\ 3-4 \text { pole } \\ \hline \end{gathered}$ | $\begin{gathered} \hline \text { DC } \\ 4 \text { pole } \\ \hline \end{gathered}$ | $\begin{array}{\|c\|} \hline \text { AC } \\ 1-2 \text { pole } \\ \hline \end{array}$ | $\begin{array}{\|c\|} \hline \text { DC } \\ 1-3 \text { pole } \\ \hline \end{array}$ |  |  |  |
| KUIP |  |  |  | $\begin{gathered} \text { AC } \\ 3 \text { pole } \end{gathered}$ |  | $\begin{gathered} \text { AC } \\ 1-2 \text { pole } \\ \hline \end{gathered}$ | $\begin{gathered} \text { DC } \\ 1-3 \text { pole } \\ \hline \end{gathered}$ |
| KUGP |  |  |  | $\begin{gathered} \text { AC } \\ 2 \text { pole } \end{gathered}$ | $\begin{gathered} \text { DC } \\ 2 \text { pole } \\ \hline \end{gathered}$ |  |  |
| KUEP | $\begin{gathered} \text { AC } \\ 2 \text { pole } \\ \hline \end{gathered}$ | $\begin{gathered} \mathrm{DC} \\ 2 \text { pole } \\ \hline \end{gathered}$ | $\begin{gathered} \text { AC } \\ 1 \text { pole } \\ \hline \end{gathered}$ | $\begin{gathered} \hline \mathrm{DC} \\ 1 \text { pole } \\ \hline \end{gathered}$ |  |  |  |
| KUMP | $\begin{gathered} \text { AC } \\ 3 \text { pole } \end{gathered}$ |  | $\begin{gathered} \text { AC } \\ 1-2 \text { pole } \end{gathered}$ | $\begin{gathered} \text { DC } \\ \text { 1-3 pole } \end{gathered}$ |  |  |  |

## Environmental Data (Continued)

Maximum Allowable Ambient Temperature vs. Voltage (KUP enclosed)



## Mechanical Data

Termination: Quick connect, solder and PC board.
Enclosure: Clear polycarbonate dust cover.
Weight: 3.0 oz. ( 85 g ) approximately.

## Ordering Information



Our authorized distributors are more likely to stock

| KUP-5A15-24 | KUP-11A15-12 | KUP-11D15-5 | KUP-11D55-110 | KUP-14A55-24 | KUP-14D25-24 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| KUP-5A15-120 | KUP-11A15-24 | KUP-11D15-12 | KUP-14A11-120 | KUP-14A55-120 | KUP-14D35-24 |
| KUP-5A15-240 | KUP-11A15-120 | KUP-11D15-24 | KUP-14A15-12 | KUP-14A55-240 | KUP-14D55-12 |
| KUP-5A55-120 | KUP-11A15-240 | KUP-11D15-110 | KUP-14A15-24 | KUP-14D11-24 | KUP-14D55-24 |
| KUP-5D15-12 | KUP-11A35-120 | KUP-11D35-24 | KUP-14A15-120 | KUP-14D15-6 | KUP-17A19-120 |
| KUP-5D15-24 | KUP-11A55-24 | KUP-11D55-6 | KUP-14A15-240 | KUP-14D15-12 | KUP-17A55-24 |
| KUP-5D55-12 | KUP-11A55-120 | KUP-11D55-12 | KUP-14A25-120 | KUP-14D15-24 | KUP-17D19-24 |
| KUP-5D55-24 | KUP-11AT5-120 | KUP-11D55-24 | KUP-14A35-120 | KUP-14D15-48 | KUP-17D55-24 |
| KUP-11A11-120 | KUP-11D11-24 | KUP-11D55-48 | KUP-14A45-120 | KUP-14D15-110 |  |

Ordering Information

6. Coil Voltage:

To $240 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. or 110VDC. (For 277VAC, consult factory.)*
See coil data tables.

* Options included in VDE file.

Our authorized distributors are more likely to stock the following items for immediate delivery.

## KUGP-7D55-24

KUIP-5A55-120
KUIP-11D55-12
KUIP-11D55-24

KUIP-14A15-120
KUIP-14D15-12
KUIP-14D15-24

Ordering Information


Our authorized distributors are more likely to stock the following items for immediate delivery.

| KUEP-3A15-120 | KUEP-3D15-110 | KUEP-11D15-12 |
| :--- | :--- | :--- |
| KUEP-3D15-12 | KUEP-7D15-24 | KUEP-11D15-24 |
| KUEP-3D15-24 | KUEP-11A15-120 |  |

## Ordering Information


5. Terminal \& Contact Material:

| Type | $\mathbf{1} \& \mathbf{2}$ Pole Models | $\mathbf{3}$ Pole Models |
| :---: | :---: | :---: |
| Codes <br> Available | $6,8,9, \mathrm{G}$ | $6,8,9$ |

$6=.205$ " ( 5.21 mm ) quick connect/solder; silver-cadmium-oxide.
$8=.187^{\prime \prime}(4.75 \mathrm{~mm})$ quick connect/solder; silver-cadmium-oxide.
$9=.0477^{\prime \prime}(119 \mathrm{~mm})$ printed circuit; silver-cadmium-oxide.
$\mathrm{G}=.250$ " $(6.35 \mathrm{~mm})$ quick connect; silver-cadmium-oxide. (Not available on 3 pole models.)
6. Coil Voltage:

To $240 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. or 110VDC (For 277VAC, consult factory.)

| Our authorized distributors are more likely to stock the following items for immediate delivery. |  |  |  |
| :--- | :--- | :--- | :--- |
| KUMP-11A18-24 KUMP-11D18-12 KUMP-14A18-24 |  |  |  |
| KUMP-11A18-120 KUMP-11D18-24 KUMP-14A18-120 |  |  |  |
| KUMP-11A18-240 | KUMP-11D18-110 | KUMP-14D18-12 |  |

## Outline Dimensions

## Open Relays

Bracket Type


Enclosed Relays
Plain Case


Top Flange Case


## Bracket Mount Case



## Seated Heights For Open Relays

1391" (35.33mm) for \#6-32 stud with .218 " ( 5.54 mm ) locating tab.

152" ( 38.6 mm ) for bracket
with 2-\#6 32 tapped holes.
1282" (32.56mm) for \#6-32 tapped core with $.125^{\prime \prime}(3.18 \mathrm{~mm})$ or $.218^{\prime \prime}$ ( 5.54 mm ) locating tab.
2.046 " (5197mm) for relay
with printed circuit terminals

STUD TYPE also available with $.125^{\prime \prime}$ ( 3.18 mm ) tab, as well as without stud and locating tab.
Models without stud have core tapped \#6-32
THREAD, $.25^{\prime \prime}(6.4 \mathrm{~mm})$ minimum depth.
*Dimensions with .250 " $(6.35 \mathrm{~mm})$ terminals.
**Dimensions with $.110^{\prime \prime}(2.79 \mathrm{~mm})$ or
.205"(5.21mm) terminals.
***Dimensions with .187 " ( 4.75 mm ) terminals.

## Core and Stud Mount Cases


$\dagger$ Dimensions with $.250^{\prime \prime}$ ( 6.35 mm ) terminals.
$\ddagger$ Dimensions with .110 " ( 2.79 mm ), .187"
( 4.75 mm and $.205^{\prime \prime} 5.21 \mathrm{~mm}$ ) terminals.
*Dimensions with .250 " $(6.35 \mathrm{~mm})$ terminals.
**Dimensions with .110 " ( 2.79 mm ) or .205" ( 5.21 mm ) terminals
***Dimensions with .187" (4.75mm) terminals

Stud on End Case


## Outline Dimensions (Continued)

## Relay Front Diagrams

## 1-3 Pole Relays



## Relays With

.250" (6.35mm) Terminals


4 Pole Relays


## Terminal Dimensions

.110" (2.79mm)
Quick ConnectQuick Connect

205" ( 5.21 mm ) Quick Connect

.187" (4.75mm)
Quick Connect



Note: All drawings shown oversize.

Wiring Diagrams

| *1 Form X | 1 Form C | *2 Form A | *2 Form C | 3 Form C | 4 Form C |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $4 \square$ | $7^{\stackrel{2}{4}}$ | $\xrightarrow[-7]{+\stackrel{4}{7}} \xrightarrow{+} \xrightarrow{+\frac{6}{9}}$ | $\begin{array}{ll} -\frac{1}{6} \\ -\frac{4}{7} \\ +\frac{7}{2} \end{array} \quad \begin{aligned} & -\frac{3}{6} \\ & -\frac{6}{4} \end{aligned}$ |  |  |
| A $\sim^{\text {B }}$ | A $\sim^{\text {B }}$ | $A \sim B$ | $\mathrm{A}-\underbrace{\text { B }}$ | A | $\mathrm{A}-\mathrm{C}^{\text {B }}$ |

*Recommended Load Polarity for Optimum Arc Suppression.

## PC Board Layouts (Bottom Views)

## 1 Form X



3 Pole Models


4 Pole Models


## Sockets For KU Series Relays Through 3 Poles

## Socket Selection Table

Stock items are boldfaced
For KUP, KUEP, KUGP, KUIP, and KUMP relays, through 3 poles, with .187 " ( 4.75 mm ) quick connect termination.

| Socket | Socket Termination | Hold-Down Spring |
| :---: | :---: | :---: |
| 27E043 | Solder eyelet | 20C228 or 20C254* |
| 27E046 | PC board, .144" (3.66mm) terminals | 20 C 228 or 20C254 |
| 27E067 | .187" (4.75mm) quick connect | 20 C 228 or 20C254 |
| 27E121 | Screw terminals | 20C314 (2 per socket required) |
| 27E305 | PC board, .184" (4.67mm) terminals | 20 C 228 or 20C254 |
| 27E396 | .187" (4.75mm) quick connect* | 20C254 |
| 27E893 | Screw terminals $\dagger$ | $20 C 318$ |
| * 20C228 held <br> ** Snap-in mou <br> $\dagger$ DIN rail mou | by socket hold-down screw where as 20C2 | onto socket. |

## Hard Mount Sockets For Relays Through 3 Poles

Nylon sockets with $.187^{\prime \prime}(4.75 \mathrm{~mm})$ quick connect, solder or printed circuit terminals are available for KUEP, KUGP, KUIP, KUMP, and KUP relays, through 3 poles, with .187" $(4.75 \mathrm{~mm})$ quick connect terminals. All are rated 15 amps and UL recognized, File E59244 and CSA certified File LR15734
27E043-with solder eyelet terminals. 27E067-with .187" ( 4.75 mm ) quick connect terminals.


The 27E043 and 27E067 use chassis cutout shown on this page.

Suggested Socket PC Board Layout


Recommended Chassis Cutout For Hard Mount Sockets


Recommeded Chassis Cutout For Snap-In Sockets


Recommended chassis thickness 031" (.79mm) to .062" (157mm).

## Sockets For KU Series Relays Through 3 Poles (continued)

## 27E121

## Screw Terminal Socket

The 27E121 socket offers screw termination for KUEP, KUGP, KUIP, KUL, KUMP and KUP relays, through 3 poles, with .187" (4.75mm) quick connect terminals. This socket stacks on 1700" (43.18mm) centers. When surface mounting, two \#6-32 screws of suitable length are required. When track mounting, two 24A071 retainer clips (not shown) are required. The 27E121 is rated 15 amps and is UL recognized, File E59244, CSA certified, File LR15734.

## 27E893

Screw Terminal, Din Rail Snap-Mount Socket
(use with mounting track 24A110)
The 27E893 DIN rail, snap-mount socket offers screw termination for KUEP, KUGP, KUIP, KUL, KUMP and KUP relays, through 3 poles, with 187 " ( 4.75 mm ) quick connect terminals. This socket is constructed with a spring-loaded latch which allows it to be quickly snapped onto or removed from a "top hat" style mounting track. No special tools or extra hardware is required for installation. The 27E893 is UL rated 15 amps, 94V-0, File E59244 and CSA rated 10 amps , File LR15734.


## Sockets For KU Series 4 Pole Relays

## Socket Selection Table

Stock items are boldfaced.
For 4 pole KUP relays with . $110^{\prime \prime}$ ( 2.79 mm ) quick connect termination.

| Socket | Socket Termianation | Hold-Down Spring |
| :--- | :--- | :--- |
| $27 E 415$ | .187" (4.75mm) quick connect | 20 C 228 or 20C254 |
| 27E419 | PC board | 20 C 228 or 20C254 |
| 27E867* | Screw terminals | 20C254 |

* Use 40G432 insulator pad or customer supplied altemative.


## Hard Mount Sockets For 4 Pole Relays

27E415-with . 187 " ( 4.75 mm ) quick connect/solder terminals. 27E419-with printed circuit terminals. See PC board layout at right.
Note: Only 4 pole KUP relays with . 110 " ( 2.79 mm ) quick connect terminals can be used with 4 pole hard mount sockets.


## Suggested Socket

 PC Board Layout

27E415 uses same chassis cutout as 27E043.



## Features

- AC coils 24, 120 \& 240V 50/60 Hz.; DC 12 \& 24VDC.
- Contact arrangement to 3PDT.
- Sockets available for all models.
- Accepted pin pattern for HVAC industry.
- Primarily designed for the HVAC industry.


## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Material: Fine silver or silver-cadmium oxide.

## Contact Ratings

| Material | ULCSA Ratings | Life <br> Expected |
| :--- | :--- | :---: |
| Fine silver | 5A @ 28VDC or 240VAC, 80\% PF, <br> 1/10 HP @ 120VAC, 1/4 HP @ 240VAC | 100,000 |
| Silver <br> cadmium <br> oxide | 10A @ 28VDC or 240VAC, 80\% PF, <br> 1/4 HP @ 120VAC,1/3 HP @ 240VAC <br> 10 FLA, 30 LRA @ 120VAC, <br> 5 FLA,15 LRA @ 240VAC | 100,000 |

## Initial Dielectric Strength

Between Open Contacts: 500V rms.
Between Adjacent Contacts: $1,500 \mathrm{~V}$ ms .
Between Contacts and Coil: 1,500V rms.

## KUP93 series

## General Purpose <br> 3 to 10 Amp, Multicontact AC or DC Relay

行 File E22575
(18) File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data

|  | Nominal <br> Voltage | DC <br> Resistance <br> in Ohms <br> $\pm \mathbf{1 0 \% *}$ | Must <br> Operate <br> Voltage | Nominal <br> Coil <br> Current <br> $(\mathbf{m A )}$ |
| :---: | :---: | :---: | ---: | :---: |
| DC | 12 | 120 | 9.0 | 100 |
| Coils | 24 | 472 | 18.0 | 51 |
| AC | 24 | 72 | 20.4 | 115 |
| Coils | 120 | 1,700 | 102.0 | 24 |
|  | 240 | 7,200 | 204.0 | 12 |

*AC coils, $\pm 15 \%$

## Operate Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Must Operate Voltage:
DC Coils: $75 \%$ of nominal voltage or less.
AC Coils: $85 \%$ of nominal voltage or less.
Operate Time (Excluding Bounce): 15 milliseconds, typical, at nominal voltage.
Release Time (Excluding Bounce):
DC Coils: 10 milliseconds, typical, at nominal voltage.
AC Coils: 10 milliseconds, typical, at nominal voltage.

## Environmental Data

Temperature Range:

## Storage:

All Coils: $-45^{\circ} \mathrm{C}$ to $+105^{\circ} \mathrm{C}$.
Operating:
DC Coils: $-45^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
AC Coils: $-45^{\circ} \mathrm{C}$ to $+45^{\circ} \mathrm{C}$.

## Coil Data @ $25^{\circ} \mathrm{C}$

Nominal Power:
DC Coils: 12 Watts.
AC Coils: 2.7VA
Initial Insulation Resistance: 100 megohms, min., at $25^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: .187"x .020 " quick connect.
Enclosures: Clear polycarbonate dust cover.
Weight: 3.0 oz . ( 86 g ) approximately.

| Typical Part No. ${ }^{\text {P }}$ | KUP93 | 11 | A | 2 | 1 | $-24$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Type: <br> KUP93 = Enclosed general purpose relay. |  |  |  |  |  |  |
| 2. Contact Arrangement: 14 = 3 Form C (3PDT) |  |  |  |  |  |  |
| 3. Coil Input: $A=A C$ $D=D C$ |  |  |  |  |  |  |
| 4. Mounting: $1 \text { = PLAIN CASE; }$ |  |  |  |  |  |  |
| 5. Terminals, Contact Material \& Rating: $1=.187$ " ( 4.75 mm ) quick connect, silver, 5 amps . $3=.187$ " $(4.75 \mathrm{~mm})$ quick connect, silver-cadmium oxide, 10 amps . |  |  |  |  |  |  |
| 6. Coil Voltage: To $240 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. or 110 VDC . |  |  |  |  |  |  |

Our authorized distributors are more likely to stock the following items for immediate delivery. No items in this series typically are stocked.

## Outline Dimensions



## KUP93 Sockets



## Wiring Diagrams

3 Form C


Socket PC Board Layout (Component Side of Board)


## KUP93 Socket Number

| Socket <br> Color | P C Socket With <br> Terminals |
| :---: | :---: |
| Natural Nylon | $27 E 168^{* *}$ |

**UL Recognized, file E22575
Socket: Rated 10 amperes. Will accept .187" (4.75mm) quick-connect terminals of all KUP93 relays.


## Features

- Contact arrangements to 3PDT.
- Plug-in or PC terminals.
- Push to test button and mechanical indicator.
- RM 5/6 VDE approved with 3mm contact gap.


## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

## Arrangements:

RM 2/3/7: 2 Form C (DPDT) and 3 Form C (3PDT).
RM 5/6: 2 Form A (DPST-NO) and 3 Form A (3PST-NO).
RM 8: 2 Form C (DPDT).
Material: Silver-cadmium oxide.
Expected Mechanical Life: 20 million operations minimum.
Contact Ratings:
ULCSA @ $25^{\circ} \mathrm{C}$
RM 2/5: 16A, 250VAC G.P., 30,000 Ops.
16A, 28VDC G.P., 30,000 Ops.
1 HP, 120VAC G.P., 30,000 Ops.
1HP, 240VAC G.P., 30,000 Ops.
RM 3/6: 10A, 250VAC G.P., 30,000 Ops.
10A, 28VDC G.P., 30,000 Ops.
RM 3/6/7: $\quad 1$ HP, 120VAC, 30,000 Ops.
1/2 HP, 240VAC, 480VAC, 600VAC, 30,000 Ops.
1.5 HP, 240VAC, 3 Phase, 30,000 Ops.

RM 7: 16A, 250VAC G.P., 30,000 Ops.
16A, 10VDC G.P., 30,000 Ops.
RM 8: 25A,. 240VAC, G.P., 30,000 Ops.
1.5 HP, 120VAC, G.P., 30,000 Ops.

2 HP, 240, G.P., 30,000 Ops.
VDE @ $35^{\circ} \mathrm{C}$
RM 2: 16A, 400VAC, 100,000 Ops.
RM 3/6: 10A, 400VAC, 100,000 Ops.
RM 5/7: 16A, 400VAC, 100,000 Ops.
RM 8: $\quad 25 \mathrm{~A}, 250 \mathrm{VAC}, 10,000$ Ops.

## Initial Dielectric Strength

Between Open Contacts: 1,500VAC (RM 5/6 2,500VAC).
Between Coil and Contacts: $2,500 \mathrm{VAC}$.
Creepage/Clearance coil-contact: $6 / 3.5 \mathrm{~mm}$ (RM $84 / 2.8$ ).

## DC Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

| Nominal Voltage VDC | Operate Voltage VDC | Drop-out Voltage VDC | DC <br> Resistance <br> in Ohms <br> $\pm 10 \%$ <br> RM 2 <br> RM 3 <br> RM 8 | DC <br> Resistance in Ohms $\pm 10 \%$ RM 5 RM 6 RM 7 | Nominal <br> Coil <br> Current <br> (mA) <br> RM 2 <br> RM 3 <br> RM 8 | Nominal Coil Current (mA) RM 5 RM 6 RM 7 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 06 | 4.5 | 0.9 | 32 | 24 | 187.5 | 250.0 |
| 12 | 9.0 | 1.8 | 110 | 86 | 109.1 | 139.5 |
| 24 | 18.0 | 3.6 | 475 | 345 | 50.5 | 69.6 |
| 48 | 36 | 7.2 | 2,000 | 1,340 | 24.0 | 35.8 |
| 60 | 45 | 9.0 | 2,850 | 2,200 | 21.1 | 27.3 |
| 110 | 82.5 | 16.5 | 10,000 | 7,300 | 11.0 | 15.1 |
| 221 | 165 | 33 | 40,000 | 30,000 | 5.5 | 7.3 |

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

AC Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

| Nomina Voltage VAC | Operate <br> Voltage <br> VAC | Drop-out Voltage VAC | DC <br> Resistance in Ohms $\pm 10 \%$ RM 2 RM 3 | DC <br> Resistance in Ohms $\pm 10 \%$ RM 5 RM 6 RM 7 RM 8 | Nominal Coil Current (mA) RM 2 RM 3 | Nominal Coil <br> Current (mA) RM 5 RM 6 RM 7 RM 8 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 06 | 4.8 | 2.4 | 5.3 | 4.7 | 381.7 | 476.7 |
| 12 | 9.6 | 4.8 | 24.0 | 19.5 | 182.5 | 225.8 |
| 24 | 19.2 | 9.6 | 86.0 | 80.0 | 94.2 | 109.2 |
| 48 | 38.4 | 19.2 | 345.0 | 320.0 | 47.5 | 54.2 |
| 60 | 48.0 | 24.0 | 544.0 | 500.0 | 37.8 | 43.7 |
| 115 | 92.0 | 46.0 | 2,000.0 | 1,850.0 | 20.6 | 23.0 |
| 230 | 184.0 | 92.0 | 8,300.0 | 7,500.0 | 10.1 | 11.7 |
| 400 | 320.0 | 160.0 | 27,500.0 | 23,500.0 | 5.8 | 6.5 |

Operate Data
Must Operate Voltage: see coil data.
Operate Time : Approximate ms

|  | RM | RM | RM |
| :---: | :---: | :---: | :---: |
|  | $\mathbf{2 / 3 / 7}$ | $\mathbf{5 / 6}$ | $\mathbf{8}$ |
| Pull-in | 15 | 15 | 15 |
| Drop Out | 10 | 10 | 15 |
| Bounce | 3 | 4 | 3 |
| Switching Rate: | 1000 | ops/hr max. at rated load. |  |

## Environmental Data

Temperature Range:
Operating: $-45^{\circ} \mathrm{C}$ to maximum ${ }^{\circ} \mathrm{C}$ listed below.

|  | RM2 | RM3 | RM5 | RM6 | RM7 |
| :---: | :---: | :---: | :---: | :---: | ---: |
| DC | RM8 |  |  |  |  |
| DC | $+70^{\circ} \mathrm{C}$ | $+60^{\circ} \mathrm{C}$ | $+60^{\circ} \mathrm{C}$ | $+60^{\circ} \mathrm{C}$ | $+60^{\circ} \mathrm{C}$ |
| AC Coil | $+55^{\circ} \mathrm{C}$ | $+55^{\circ} \mathrm{C}$ |  |  |  |
| C | $+55^{\circ} \mathrm{C}$ | $+50^{\circ} \mathrm{C}$ | $+50^{\circ} \mathrm{C}$ | $+50^{\circ} \mathrm{C}$ | $+40^{\circ} \mathrm{C}$ |

Vibration:
RM2/3/7: 30 to 150 Hz at 5 g N/O, $2 \mathrm{~g} \mathrm{N/C}$
RM5/6: 30 to 150 Hz at 12 g N/O.
RM8: 30 to 150 Hz at $10 \mathrm{~g} \mathrm{~N} / \mathrm{O}, 5 \mathrm{~g} \mathrm{~N} / \mathrm{C}$

RM2/3/7
2/3 POLE 10/16A

## Contact Life



## DC Coil Operating Range



Max. DC Load Breaking Capacity


AC Coil Operating Range


RM5/6
2/3 POLE 10/16A
(Contact gap 3 mm )

## Max. DC Load Breaking Capacity

## Contact Life




## DC Coil Operating Range



AC Coil Operating Range


## Contact Life



## DC Coil Operating Range



Max. DC Load Breaking Capacity


Ordering Information


Our authorized distributors are more likely to stock the following items for immediate delivery.

| RM202012 | RM203012 | RM205024 | RM302024 | RM502524 | RM602615 | RM 702615 | RM 703615 | RM805615 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| RM202024 | RM203024 | RM205524 | RM302524 | RM502615 | RM 702012 | RM703012 | RM805012 |  |  |
| RM202524 | RM203524 | RM205615 | RM302615 | RM602024 | RM 702024 | RM703024 | RM 805024 |  |  |
| RM202615 | RM203615 | RM 302012 | RM502024 | RM602524 | RM 702524 | RM703524 | RM805524 |  |  |
| Dimensions are reference purpo | wn for only. |  | Dimensions are in inches over (millimeters) unless otherwise specified. |  | Specifications and availability subject to change. |  |  |  | www.tycoelectronics.com <br> Technical support: <br> Refer to inside back cover. |

## Outline Dimensions

RM . 187 quick connect terminals


## RM with PCB terminals



Wiring Diagrams (Bottom Views)


## RM3/7 3 Pole

## RM5 2 Pole



RM6 3 Pole


RM . 250 quick connect terminals, with brackets


RM with snap-on attachment


PC Board Layout (Bottom View)


RM78702
M78702


Hold-Down Spring RM28802
RM78705
16A, 250VAC, Socket with Screw Terminals



## Features

- Industry standard octal-type termination for quick installation.
- Contact arrangements from 1 Form C (SPDT) to 3 Form C (3PDT).
- Indicator lamp and push-to-test options available on certain models.
- The KRPA is the automated manufactured version of the KRP.
- Hermetically sealed option available with KR UL recognized for Class I Div. 2 Hazardous locations, Groups A, B, C, D.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: See Ordering Information Table.
Materials: Silver or silver-cadmium oxide, with or without gold flashing.
Expected Life: 10 million operations min., mechanical; 100,000 operations min. @ rated loads.

KA, KRP, KRPA
UL/CSA Contact Ratings @ $25^{\circ} \mathrm{C}$
(Except KR)

| Contact Code | Arrangement | Contact Rating |
| :---: | :---: | :---: |
| $Y$ <br> (Silver) | 1, 2, 3 Poles | $\begin{aligned} & \text { 5A @ 120VAC } \\ & 3 \mathrm{~A} @ 240 \mathrm{VAC} \\ & 1 / 10 \mathrm{HP} @ 120 \mathrm{VAC} \\ & 1 / 6 \mathrm{HP} \text { @ } 240 \mathrm{VAC} \end{aligned}$ |
| G\&N (Silver-Cad. Oxide) | 1, 2, 3 Poles | $\begin{aligned} & 10 \mathrm{~A} @ 240 \mathrm{VAC} \\ & 1 / 2 \mathrm{HP} @ 240 \mathrm{VAC} \\ & 1 / 3 \mathrm{HP} @ 120 \mathrm{VAC} \end{aligned}$ |
| KR-E (Herm. Sealed) | UL Contact Ratings @ $\mathbf{2 5}^{\circ} \mathrm{C}$ Class I, Div. 2, Hazardous Loc. |  |
| Contact Code | Arrangement | Contact Rating |
| $Y$ <br> (Silver) | 1, 2, 3 Poles | $\begin{aligned} & \text { 5A @ 120VAC } \\ & 3 \mathrm{~A} \text { @ 240VAC } \\ & \text { 1/10HP @ 120VAC } \\ & 1 / 6 \mathrm{HP} @ 240 \mathrm{VAC} \end{aligned}$ |
| G\&N (Silver-Cad. O | 1, 2, 3 Poles | $\begin{aligned} & \text { 10A @ 240VAC } \\ & 1 / 6 \mathrm{HP} @ 120 \mathrm{VAC} \end{aligned}$ |

KR-E (Herm. Sealed) UL Contact Ratings @ $25^{\circ} \mathrm{C}$
UL 508 Industrial Control

| Contact Code | Arrangement | Contact Rating |
| :--- | :--- | :--- |
| Y, G | $1,2,3$ Poles | 3 A @ 120VAC |
| (Silver) |  | 3 A @ 28VDC |
|  |  | $1 / 10 \mathrm{HP}$ @ 120VAC |

KRP, KRPA Factory Ratings

| Contact Code | Arrangement | Contact Rating |
| :---: | :---: | :---: |
| Y | $1,2,3$ Poles | 5A @ 28VDC, 120VAC, 80\% PF |
| G\&N | $1,2,3$ Poles | 10A @ 28VDC, 120VAC, 80\% PF |
|  |  | 6 A @ 250VAC |

## KA UL Contact Ratings

| Contact Code | Series | Contact Ratings |
| :---: | :--- | :--- |
| Y | $\mathrm{KA}^{1}$ | 5A @ 120VAC, 3A @ 240VAC, <br> $1 / 10 \mathrm{HP}$ @ 120VAC, 1/6 HP @ 240VAC |
| G | $\mathrm{KA}^{2}$ | 10 A @ 120VAC, 6A @ 240VAC <br> $1 / 6 \mathrm{HP}$ @ 120VAC, 1/3 HP @ 240VAC |

[^18]2Listed by C.S.A. for 10A @ 120VAC 80\% PF
Note: See KRPA, KRP, KA, KR-E Ordering Information table.

## KRPA, KRP, KA, KR series

## 5 to 10 Amp <br> General Purpose Relay

구 File E29244, E22575, E81558 (KR Hermetic)
(18) File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Initial Dielectric Strength
Between Open Contacts: 500 V rms.
Between All Elements: $1,500 \mathrm{~V}$ rms.

Coil Data @ $25^{\circ} \mathrm{C}$

|  |  | Nominal Power | Maximum Power |
| :--- | :---: | :---: | :--- |
| KRP <br> KRPA | AC | 2VA | Enclosed Models - 4VA |
|  | DC | 12W | Enclosed M odels - 3W |
|  | AC | 2VA | Open Models - 4VA |
|  | DC | 125mW per movable arm | Open Models - 4W |

Duty Cycle: Continuous.
Initial Insulation Resistance: KRP, KRPA - 1000 Megohms, min. KA - 100 M egohms, min.

Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

|  | Nominal <br> Voltage | DC Resistance ( $\Omega$ ) <br> $\mathbf{\pm 1 0 \%}$ | Nominal Coil <br> Current (mA) |
| :--- | :---: | :---: | :---: |
| DC | 6 | 32 | 188 |
|  | 12 | 120 | 100 |
|  | 24 | 472 | 51 |
|  | 48 | 1,800 | 26.6 |
|  | 220 | 10,000 | 115 |
|  | 6 | Use 110V relay with $10,000 \Omega$ 5W Resistor in series |  |
| AC | 12 | 6 | 335 |
| Coils | 24 | 24 | 168 |
|  | 120 | 85 | 84 |
|  | 240 | 2,250 | 17.5 |
|  |  | 9,110 | 8.75 |

## Operate Data @ $25^{\circ} \mathrm{C}$

## Must-Operate Voltage:

DC: 75\% or less of nominal voltage.
AC: $85 \%$ or less of nominal voltage.
Operate Time (Excluding Bounce):
15 milliseconds typical @ nominal voltage.
Release Time (Excluding Bounce):
10 milliseconds typical @ nominal voltage.

## Environmental Data

Temperature Range:
Open Models: AC: $-45^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
DC: $-45^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Enclosed Models: AC: $-45^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.
DC: $-45^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.

## Mechanical Data

Open Models: Solder terminals.
Enclosed Models: Octal-type plug.
Enclosures: Transparent polycarbonate (except KR).
Hermetically sealed metal case available with KR only.
Weight: KA: $17 \mathrm{oz} .(48.2 \mathrm{~g})$ approximately.
KRPA, KRP: 3.0 oz. ( 85 g ) approximately.

## Ordering Information

1. Series:
KRPA (Newer version, enclosed)
KRP (Older version, enclosed)
KR (Hermetically sealed option 'E'only)
KA (Open style) 2. Cypical Part No.
*Indicator Lamp not available on $25-90 \mathrm{~V}$ coils. Only $120-240 \mathrm{VAC}$ and 110 VDC models are UL recognized and CSA certified.

| Our authorized distributors are more likely to stock the following items for immediate delivery. |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| KA-5AG-120 | KR-11DGE-24 | KRP-14AN-120 | KRPA-11AN-24 | KRPA-14AG-120 |
| KA-5AY-120 | KR-14AGE-120 | KRP-14AY-120 | KRPA-11AN-120 | KRPA-14AG-240 |
| KA-5DG-6 | KR-14DGE-24 | KRP-14DG-12 | KRPA-11AN-240 | KRPA-14AN-24 |
| KA-5DG-12 | KRP-5AG-120 | KRP-14DG-24 | KRPA-11AY-6 | KRPA-14AN-120 |
| KA-5DG-110 | KRP-11AG-24 | KRP-14DG-110 | KRPA-11AY-12 | KRPA-14AN-240 |
| KA-11AG-120 | KRP-11AG-120 | KRP-14DN-24 | KRPA-11AY-24 | KRPA-14AY-24 |
| KA-11AY-6 | KRP-11AG-240 | KRPA-5AG-24 | KRPA-11AY-120 | KRPA-14AY-120 |
| KA-11AY-24 | KRP-11AN-24 | KRPA-5AG-120 | KRPA-11AY-240 | KRPA-14AY-240 |
| KA-11AY-120 | KRP-11AN-120 | KRPA-5AY-120 | KRPA-11DG-6 | KRPA-14DG-12 |
| KA-11DG-12 | KRP-11AY-120 | KRPA-5DG-6 | KRPA-11DG-12 | KRPA-14DG-24 |
| KA-11DG-24 | KRP-11DG-12 | KRPA-5DG-12 | KRPA-11DG-24 | KRPA-14DG-48 |
| KA-11DG-110 | KRP-11DG-24 | KRPA-5DG-24 | KRPA-11DG-48 | KRPA-14DG-110 |
| KA-14AG-120 | KRP-11DG-48 | KRPA-5DY-12 | KRPA-11DG-110 | KRPA-14DN-24 |
| KA-14AY-120 | KRP-11DG-110 | KRPA-5DY-24 | KRPA-11DN-12 | KRPA-14DY-24 |
| KA-14DG-24 | KRP-11DG-125 | KRPA-11AG-6 | KRPA-11DN-24 |  |
| KA-14DG-110 | KRP-11DN-12 | KRPA-11AGG-12 | KRPA-11DN-110 |  |
| KR-11AE-120 | KRP-11DN-24 | KRPA-11AG-24 | KRPA-11DY-12 |  |
| KR-11DE-24 | KRP-11DY-24 | KRPA-11AG-120 | KRPA-11DY-24 |  |
| KR-11DGE-12 | KRP-14AG-120 | KRPA-11AG-240 | KRPA-14AG-12 |  |



KRP-3-H

## Features

- 1 Form X (SPST - NO - DM) contact rating of 20A.
- Heavy copper alloy movable contact arms.
- Twin silver-cadmium oxide contacts.
- Many uses in automation controls and other applications requiring high current switching.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangement: 1 Form X (SPST - NO - DM).
Ratings: UL Rating: 20A @ 120VAC, 3/4 HP @ 120VAC. Factory Rating: 20A @ 120VAC, 80\% PF; 1 HP @ 120/240VAC.
Material: Twin, silver-cadmium oxide.
Expected Life: 2.5 million operations min., mechanical. 100,000 operations at rated contact load.

## Initial Dielectric Strength

Between Open Contacts: 500 V rms, 60 Hz . between all elements.

## KRP-3-H series

## 20 Amp <br> Small AC or DC Relays

岲 File E22575

## Coil Data @ $25^{\circ} \mathrm{C}$

See chart on page 105.
Nominal Power: DC Coils: 12W
AC Coils: 2.0VA
Initial Insulation Resistance: 1,000 megohms.

## Operate Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Must-Operate Voltage: DC: $75 \%$ of nominal voltage.
AC: $85 \%$ of nominal voltage.
Operate Time: 15 milliseconds approximate (Excluding Bounce).
Release Time: 10 milliseconds approximate (Excluding Bounce).

## Environmental Data

Temperature Range: Enclosed Models: $\mathbf{A C}:-45^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.
DC: $-45^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Socket mounting.
Termination: Octal-type plug.
Enclosure: Polycarbonate enclosure with octal-type mounting. Weight: 2 oz . ( 57 g ) approximately.

## Ordering Information

| Typical Part No. $-\quad$ KR | P | -3 | D | H | -12 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: KR |  |  |  |  |  |
| 2. Type: <br> P = Enclosed <br> ( 20 amp models available only with Contact Arrangement 3 and Material H.) |  |  |  |  |  |
| 3. Contact Arrangement: 3 = 1 Form X (SPST - NO - DM) |  |  |  |  |  |
| 4. $\begin{aligned} & \text { Coil Input: } \\ & A=A C \\ & D=D C \end{aligned}$ |  |  |  |  |  |
| 5. Contact Material \& Rating: <br> $\mathrm{H}=$ Silvercadmium oxide, $1 / 4$ " ( 6.35 mm ) dia., 20 amps . |  |  |  |  |  |
| 6. Coil Voltage: <br> To $240 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. or 110VDC. |  |  |  |  |  |

## Our authorized distributors are more likely to stock the following items for immediate delivery.

KRP-3AH-120
KRP-3DH-24
KRP-5AG-120

## Outline Dimensions

## KA Series



Tolerances on .XX Decimals $\pm .02( \pm .5)$ Unless Otherwise Specified
Tolerances on .XXX Decimals $\pm .005$ ( $\pm .13$ ) Unless Otherwise Specified

## KR Series Enclosures

Type "P" Clear Dust Cover


Hermetically Sealed Enclosure (KR only)


## Octal Plug



For KRP3-H


Hold-Down Spring
$20 C 176$ KRPA \& KRP 20 C 206 KAP and KRP3

Height: 2.125" (53.98mm) max.


## Sockets For KRP, KRPA Series Relays

The following sockets are normally maintained in stock for immediate delivery.
Screw Terminal, DIN Rail Snap-Mount Sockets (Use with mounting track 24A110)
 wires. Rated 10 amps @ 300VAC and meets UL $94 \mathrm{~V}-0$.

## Screw Terminal Sockets

27E122
10A, 300VAC
8-pin

Terminal Location


Sockets have M3.5 screw terminals which accept up to two \#12 AWG


27E892
10A, 300VAC
Terminal Location

Top View



## Features

- DPDT or 3PDT contact arrangements.
- 4 amp bifurcated contact available.
- AC and DC coils.
- Protection Diode available (DC coils).
- Mechanical indicator - all models.
- Electrical indicator available.
- Test actuator with front operated finger protected push to test button and integral locking test tab.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT).

$$
3 \text { Form C (3PDT. }
$$

Material: 10 amp ; Silver-nickel 90/10 with or without gold plating.
4 amp ; Silver-nickel $90 / 10$ with gold plating.
Expected Mechanical Life: 20 million operations minimum.
Ratings:
ULCSA NO/NC @ $25^{\circ} \mathrm{C}$ :
4 amp (Bifurcated) 250VAC Resistive 30,000 ops.
10 amp 240VAC Resistive 30,000 ops.
1/2 HP 240VAC 30,000 ops.
1/4 HP 120VAC 30,000 ops.
B300 Pilot duty 30,000 ops.
VDE @ $35^{\circ} \mathrm{C}$ :
10 amp 250VAC Resistive 100,000 ops., DC Coil, AC Coil N/O. 20,000 ops., AC Coil N/C.

## Initial Dielectric Strength

Between Open Contacts: 1,500VAC.
Between Coil and Contacts: $2,500 \mathrm{VAC}$.
Between Poles: $2,500 \mathrm{VAC}$.
Creepage/Clearance Coil-Contact: $4 / 2.8 \mathrm{~mm}$.

## Coil Data @ $25^{\circ} \mathrm{C}$

Nominal Coil Power: 1.2W, 2.3VA.
DC Data

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\pm \mathbf{1 0 \%}$ | Must <br> Operate <br> Voltage <br> VDC | Must <br> Release <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: |
| 06 | 32 | 4.5 | 0.6 | 187.5 |
| 12 | 110 | 9 | 1.2 | 109.1 |
| 24 | 475 | 18 | 2.4 | 50.5 |
| 48 | 2,000 | 36 | 4.8 | 24.0 |
| 60 | 2,850 | 45 | 6.0 | 21.1 |
| 110 | 10,000 | 82.5 | 11.5 | 11.0 |
| 220 | 40,000 | 165 | 22.0 | 5.5 |

AC Data

| Nominal <br> Voltage <br> VAC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VAC | Must <br> Release <br> Voltage <br> VAC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: |
| 06 | 5.3 | 4.8 | 2.4 | 381.7 |
| 12 | 24 | 9.6 | 4.8 | 182.5 |
| 24 | 86 | 19.2 | 9.6 | 94.2 |
| 48 | 345 | 38.4 | 19.2 | 47.5 |
| 60 | 544 | 48 | 24 | 37.8 |
| 115 | 2,000 | 92 | 46 | 20.6 |
| 230 | 8,300 | 184 | 92 | 10.1 |

MT series
10 Amp General Purpose Relay
c ${ }^{\text {ch }}$ us File E214025
$\Leftrightarrow$ NR 6182
C $\epsilon$
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time: 12 ms typical, at nom. voltage.
Release Time: 5 ms typical, at nom. voltage.
Bounce Time: 4 ms typical, at nom. voltage.
Switching Rate: 1,200 ops./hr. max. at rated load.

## Environmental Data

Temperature Range:
Operating: $-45^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$ DC coil. $-45^{\circ} \mathrm{C}$ to $+50^{\circ} \mathrm{C}$ AC coil.
Vibration: 30 to $1,500 \mathrm{~Hz}$. at $5 \mathrm{~g} \mathrm{~N} / \mathrm{O}, 2 \mathrm{~g} \mathrm{~N} / \mathrm{C}$.
Shock: 50 g N/O, 10 g N/C.

## Electrical Life



Max. DC Load Breaking Capacity


A: 1 contact.
B: 2 contacts in series.
C: 3 contacts in series.

Coil Operating Range


A: DC coil.
B: AC coil.


Our authorized distributors are more likely to stock the following items for immediate delivery.

| MT221012 | MT226024 | MT226230 | MT321024 | MT326115 |
| :--- | :--- | :--- | :--- | :--- |
| MT221024 | MT226115 | MT321012 | MT326024 | MT326230 |

## Outline Dimensions



Wiring Diagrams (Bottom Views)


## MT Sockets and Accessories

## MT78750

10A, 400VAC
11 Pin Socket

MT78755
10A, 400VAC 8 Pin Socket


## Hold-Down Spring MT28800



## Hold-Down Spring MT28800

## MT Sockets and Accessories (continued)

## Module-capable Sockets

MT78745
MT78740
10A, 400VAC
10A, 400VAC
8 Pin Socket
11 Pin Socket


## Socket Selection Table

Stock items are boldfaced.

| Socket | Socket Type and Termination | Hold-Down Spring |
| :--- | :--- | :--- |
| MT78750 | 11-pin, DIN Rail w/ Screw Terminals | MT28800 |
| MT78755 | 8-pin, DIN Rail w/ Screw Terminals | MT28800 |
| MT78740 | 11-pin, module-capable, DIN Rail w/ Screw Terminals | MT28800 |
| MT78745 | 8-pin, module-capable, DIN Rail w/ Screw Terminals | MT28800 |

## Timing Module Selection Table

Stock items are boldfaced.

| Module | Type |
| :--- | :--- |
| MTMZOW00 | Delay ON timing module |
| MTMFOW00 | Multifunction timing module |
|  |  |

## LED and Protection Module Selection Table

Stock items are boldfaced.

| Module | Type |
| :--- | :--- |
| MTM T00A0 | Protection diode 1N4007 |
| MTMU0524 | RC-network 24 - 115 VAC |
| MTMU0730 | RC-network 230 VAC |
| MTML0024 | LED 24 VAC / VDC |
| MTML0615 | LED 115 VAC |

## Timing Module Functional Data

## Nominal Voltage: 24 - 240 VAC / VDC

Frequency: $48-63 \mathrm{~Hz}$.
Precision of Time Setting: $\pm 0.5 \%$.
Readiness for Repetition: $\leq 0.5 \%$ or 5 ms .
Influence of Temperature: $\leq 0.1 \% /{ }^{\circ} \mathrm{C}$.
Time Range Switchable: $0.05 \mathrm{~s}-240 \mathrm{~h}$ in 8 ranges.
Ambient Temperature: $-25^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.

Timing Function Diagrams Delay ON

Delay OFF

Single shot leading edge

Single shot trailing edge

Single shot

Delay ON triggered by signal contact

Flasher starting with pause

Flasher starting with pulse



## Features

- 2 Form A (DPST-NO).
- 16 amp rated current.
- Compatible with RAST 5 connector.
- Contact gap exceeds 3 mm ; $4 \mathrm{kV} / 8 \mathrm{~mm}$ contact-to-coil spacing.
- Designed for European domestic appliances.
- Snap-in or screw mounting.
- Dust cover.


## Contact Data

Arrangements: 2 Form A (DPST-NO).
Material: Silver-cadmium oxide or silver-nickel.
Expected Mechanical Life: 2 million operations.

## Ratings:

Current: 16A.
Voltage: 250VAC.
Power (breaking): $4,000 \mathrm{VA}$.
Voltage (breaking): 400VAC.
Current (making, max. 4s at 10\% duty cycle): 25A.
AC Coil Models
16 amp resistive, $250 \mathrm{VAC}, 100,000$ ops.
12 amp resistive, 250VAC, 100,000 ops.
DC Coil Models
16 amp resistive, $250 \mathrm{VAC}, 250,000$ ops.
12 amp resistive, 250VAC, 250,000 ops.

## Initial Dielectric Strength

Between Open Contacts: $2,000 \mathrm{Vms}$.
Between Coil and Contacts: $4,000 \mathrm{Vrms}$.
Creepage/Clearance: $8 / 8 \mathrm{~mm}$.

## Coil Data DC @ $\mathbf{2 0}^{\circ} \mathrm{C}$

Nominal Coil Power: AC Coils: 2.0-2.5 VA; DC Coils: 13W.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | Maximum <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> $(\mathbf{m A )}$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| DC Coils |  |  |  |  |  |
| 12 | 118 | 7.7 | 0.9 | 19.5 | 102.0 |
| 24 | 470 | 15.5 | 18 | 39.0 | 510 |
| AC Coils $\mathbf{5 0} \mathbf{~ H z}$ ) |  |  |  |  |  |
| $110-120$ | 1,650 | 93.0 | 18.0 | 132.0 | 20.0 |
| $220-240$ | 6,600 | 187.0 | 36.0 | 264.0 | 10.0 |
| $380-400$ | 20,000 | 323.0 | 60.0 | 440.0 | 6.0 |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time (typical): 15 ms .
Release Time (typical): 15 ms .
Bounce Time (typical): 4 ms .
Switching Rate: $9,000 \mathrm{ops}$./hr. max. at rated load.

## 0419 series <br> 16 Amp <br> RAST 5 Relay

c ${ }^{\text {cNus }}$ File E214025
(1) (5) (D) (1) K뿐

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Environmental Data

## Temperature Range:

Operating: $-20^{\circ} \mathrm{C}$ to $+90^{\circ} \mathrm{C}$.
Vibration: ( 5 to 500 Hz .) 2g.
Shock (destruction): 80g.

## Mechanical Data

Termination: Rast 5.
Enclosure: Plastic dust cover.
Weight: 3.2 oz. $(90 \mathrm{~g})$ approximately.

## Contact Life



## Coil Operating Range



## Ordering Information



Our authorized distributors are more likely to stock the following items for immediate delivery.
None at present.

## Outline Dimensions and Wiring Diagrams



Snap Mount Version


Screw Mount Version


## DIN Rail Mount <br> Screw Terminal Socket Track Mounting System

只 File E59244
(18) File LR35144

## Features

- Sockets mount on standard 35mm DIN track \& P\&B "top hat" track.
- Spring loaded integral clip holds sockets securely to the track.
- Small screwdriver can be used to release sockets from track.
- Any available hold-down springs must be ordered separately. See Relay \& Socket Usage Chart beginning on page 747.
- End clips can be used to further stabilize sockets on track.

Location of Socket Dimensions

| Typical Relay | Base | Socket Part Number | Page |
| :---: | :---: | :---: | :---: |
| KRPA (DPDT) | 8-pin octal-type | $27 E 891$ | 741 |
| KRPA (3PDT) | 11-pin octal-type | $27 E 892$ | 741 |
| KUP | 11-blade square | $27 E 893$ | 730 |
| KH, PCL | 14-blade square | $27 E 894$ | 712 |
| K10, PCLH | 8-blade square | $27 E 895$ | 722 |
| RT (code 1) | 5-blade square | RT78624 | 452 |
| RT (codes 3 \& 5) | 8-blade square | RT87625 | 452 |
| MT (DPDT) | 8-pin octal-type | MT78755 | 743 |
| MT (3PDT) | 11-pin octal-type | MT78750 | 743 |
| RM | 11-blade square | RM 78705 | 736 |
| PT (DPDT) | 8-blade square | PT78702 | 719 |
| PT (3PDT) | 11-blade square | PT78703 | 719 |
| PT (4PDT) | 14-blade square | PT78704 | 719 |

## $24 A 110$ - DIN Rail Style Mounting Track

24A110 mounting track is designed to accept snap-mount sockets, as well as all other $\mathrm{P} \& B$ screw terminal sockets. Track is made of lightweight, sturdy extruded aluminum and is shipped in three-foot (914cm) lengths with mounting holes on six-inch ( 152 mm ) centers. Track can be cut to shorter lengths or used end-to-end.


## 24A071 \& 40G432 - End Clip

24A071 steel mounting clip with one \#6-32 screw 7/16" (11.1mm) long is used with a 40G432 insulator to prevent sockets from moving sideways or sliding off the end of the track.


Our authorized distributors are more like to stock the items listed below in boldface.

| Part Number | Description |  |
| :---: | :---: | :---: |
| 24A110 | DIN rail style extruded aluminum mounting track for DIN or standard sockets. |  |
| 24A071 | Steel mounting clip with one \#6-32 screw 7/16" (11.1mm) long. Use with 40G432 below to make end clip. |  |
| 40G432 | Plastic insulator. Use with 24A071 above to make end clip. |  |
| Dimensions are shown for reference purposes only. | Dimensions are in inches over Specifications and availability <br> (millimeters) unless otherw ise subject to change. <br> specified.  | www.tycoelectronics.com Technical support: Refer to inside back cover. |



## Conventional <br> Screw Terminal Socket Track Mounting Sytem

## Track \& Mounting Accessories

## Features

-P\&B DIN rail track accommodates a variety of sockets and relays. See
Relay \& Socket Usage Chart beginning on page 747.

- Various clips are available to secure components to track.


## Location of Socket Dimensions

| Typical Relay | Base | Socket Part Number | Page |
| :---: | :---: | :---: | :---: |
| K10 | 8-blade square | 27E487 | 722 |
| KH | 14-blade square | $27 E 166$ | 712 |
| KUP (3PDT) | 11-blade square | $27 E 121$ | 730 |
| KRPA (3PDT) | 11-pin octal-type | $27 E 123$ | 741 |
| KRPA (DPDT) | 8-pin octal-type | $27 E 122$ | 741 |
| R10 (DPDT) | 10-blade square | $27 E 460$ | 708 |
| R10 (4PDT) | 16-blade square | $27 E 461$ | 708 |
| R10 (6PDT) | 22-blade square | $27 E 462$ | 708 |
| KUP (4PDT) | 14-blade square | $27 E 867$ | 730 |

Our authorized distributors are more like to stock the items listed below in boldface.

| Part Number | Description |
| :---: | :--- |
| 24A110 | DIN rail style extruded aluminum mounting track 36" (914mm) long with holes on 6.0" (152.4mm) centers. Holes accept \#8 screws. |
| $\mathbf{2 4 A 0 7 1}$ | Steel mounting clip with one \#6-32 screw 7/16" (11.1mm) long. |
| $\mathbf{2 4 A 0 7 2}$ | Plastic twist mounting clip for 27E166, 27E122 and 27E123 sockets. Twist clip into track to hold socket in place, except when used on <br> end of track. Use 24A071 on ends of track to lock first and last socket in place. |
| $\mathbf{4 0 G 4 3 2}$ | Plastic insulator for track or surface mounting. Use with 27E460, 27E461, 27E462 and 27E867 sockets. |

Track Mounting System - Chart below lists typical applications. See Relay \& Socket Usage Chart on following pages for more detail.

| Socket | Typ. Relay | Component Hold Down Spring |  | 24A110 Track Mounting Hardware |  | Chassis Mounting |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 27E121 | KUP | 20C314 | Hooks into slots below mounting ears. Two hold downs required per socket. | 24A071 | 36" (914cm) strip will mount 19 sockets. | Two suitable screws on 1.7" ( 43.2 mm ) centers. |
| 27E122 | KRPA |  | See Socket Usage Chart. | $\begin{aligned} & \text { 24A071 } \\ & \text { 24A072 } \end{aligned}$ | 36 " (914cm) strip will mount 22 sockets. | Two suitable screws on 1.296" (32.92mm) centers. |
| 27E123 | KRPA |  | See Socket Usage Chart. | $\begin{aligned} & \text { 24A071 } \\ & \text { 24A072 } \end{aligned}$ | 36" (914cm) strip will mount 15 sockets. | Two suitable screw on 1.296 " (32.92mm) or 2.06" ( 52.3 mm ) centers. |
| 27E166 | KHAU | $20 C 297$ | Hooks into slots on side of socket body. One hold down required per socket. | 24A071 | 36 " ( 914 cm ) strip will mount 30 sockets. | Two suitable screws on .94" (23.9mm) centers. |
| 27E460 27E461 27E462 | R10 | $\begin{aligned} & 20 C 249 \\ & 20 \mathrm{C} 250 \\ & 20 \mathrm{C} 251 \end{aligned}$ | Hooks into slots on side of socket body. One hold down required per socket. | $\begin{aligned} & \text { 24A071 } \\ & \text { 40G432 } \end{aligned}$ | 36" (914cm) strip will mount 16 27E460, 12 27E461 or 9 27E462 sockets. | Two 40G432 insulators and two suitable screws on $1.8^{\prime \prime}(45.7 \mathrm{~mm}), 2.125^{\prime \prime}(53.98 \mathrm{~mm})$ or $2.812^{\prime \prime}$ ( 71.42 mm ) centers. |
| 27E487 | K10 | 20 C 297 | Hooks into slots on side of socket body. One hold down required per socket. | $\begin{aligned} & \text { 24A071 } \\ & \text { 24A072 } \end{aligned}$ | 36 " $(914 \mathrm{~cm})$ strip will mount 31 sockets. <br> 24A072 can be used on small ear only. | Two suitable screws on 1.143" (29.03mm) centers. |
| 27E867 | $\begin{aligned} & \hline \text { KUP } \\ & \text { (4PDT) } \end{aligned}$ | 20C254 | Hooks into slots on side of socket body. One hold down. | $\begin{aligned} & \text { 24A071 } \\ & \text { 40G432 } \end{aligned}$ | 36 " $(914 \mathrm{~cm})$ strip will mount 13 sockets. | Two 40G432 insulators and two suitable screws on 2.25 " $(57.15 \mathrm{~mm})$ centers. |

## Relay and Socket Usage Chart


Note 1:
Note 2:
Listed hold-down springs cannot be used for R10S.
Note 3:
Note 4:
On R10L series hold down spring fits to the side of light emitting diode.
Note 5:
Note 6:
Snap-mount relay sockets snap onto 24A110 mounting rail without extra hardware.
27E893 cannot be used with KUIP and KUGP series relays.

| Dimensions are shown for reference purposes only. | Dimensions are in inches over (millimeters) unless otherwise specified. | Specifications and availability subject to change. |
| :---: | :---: | :---: |

## Relay and Socket Usage Chart

| Relay | Socket | Terminal Type | Hold-Down Spring | Notes | Socket Page | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CU-41 \& CU-44 | 27E043 | Solder | 20C228 or 20C254 | - | 729 | 20C228 held in place by socket hold down screw whereas 20C254 |
|  | 27E046 | PC | 20C228 or 20C254 | - | 729 | snaps onto socket. <br> 20C228 held in place by socket hold down screw whereas 20C254 |
|  | 27E067 | QC \& Solder | 20C228 or 20C254 | - | 729 | snaps onto socket. <br> 20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket. |
|  | 27 E 396 | QC \& Solder | 20C254 | - | 729 |  |
|  | 27E400 | Solder | 20C254 | - | 729 |  |
|  | 27E121 | Screw | 20C314 | - | 730 | Use 2 pieces 20C314 per socket. |
|  | 27E893 | Screw | 20 C 318 | 5 | 730 |  |
| CU-51 | 27E043 | Solder | 20 C 247 | - | 729 | $20 C 247$ held in place by socket hold down screw. |
|  | 27E046 | PC | 20 C 247 | - | 729 | 20C247 held in place by socket hold down screw. |
|  | 27E067 | QC \& Solder | 20 C 247 | - | 729 | 20C247 held in place by socket hold down screw. |
|  | 27E121 | Screw | 20 C 314 | - | 730 | Use 2 pieces 20C314 per socket. |
|  | 27E396 | QC \& Solder |  | $\overline{5}$ | 729 |  |
|  | 27E893 | Screw | 20C318 | 5 | 730 |  |
| GP | CR0001 | Screw | CR0111 or CR0133 | - | 920 |  |
|  | CR0002 | Screw | CR0111 or CR0133 | - | 920 |  |
|  | CR0067 | Screw | CR0069 | - | 920 |  |
|  | CR0095 | Screw | CR0070 or CR0155 | - | 920 |  |
| IAC \& IDC | - | - | - | - | - | Refer to page 1114 for I/O modules mounting board details. |
| IACM \& IDCM | - | - | - | - | - | Refer to page 1122 for Slim Line I/O modules mounting board details. |
| K10 | 27E487 | Screw | 20 C 426 | - | 722 |  |
|  | 27E488 | Solder | $20 C 217$ | - | 722 |  |
|  | 27E489 | PC | $20 C 217$ | - | 722 |  |
|  | 27E895 | Screw | 20 C 426 | 5 | 722 |  |
| KBP | 27E123 | Screw | - | - | 741 |  |
| (11-pin octal) | 27E892 | Screw |  | 5 | 741 |  |
| KH \& KHA (type-P,S,U,X) | 27E006 | Solder | $20 C 217$ | - | 712 |  |
|  | 27 E 007 | PC | 20 C 217 | - | 712 |  |
|  | 27E023 | PC | 20 C 217 | - | 712 |  |
|  | 27E166 | Screw | $20 C 297$ | $\overline{5}$ | 712 |  |
|  | 27E894 | Screw | 20 C 426 | 5 | 712 |  |
| KR Sealed | 27E122 | Screw | - | - | 741 |  |
| (8-pin octal) | 27E891 | Screw | - | 5 | 741 |  |
| KR Sealed (11-pin octal) | 27E123 | Screw | - | - | 741 |  |
|  | 27E892 | Screw | - | 5 | 741 |  |
| KRP3-H <br> (8-pin octal) | 27E122 | Screw | - | - | 741 |  |
|  | 27E891 | Screw | - | 5 | 741 |  |
| KRP \& KRPA <br> (8-pin octal) | 27E122 | Screw | - | - | 741 |  |
|  | 27E891 | Screw | - | 5 | 741 |  |
| KRP \& KRPA (11-pin octal) | 27E123 | Screw | - | - | 741 |  |
|  | 27E892 | Screw | - | 5 | 741 |  |
| KUEP, <br> KUGP, KUIP, KUMP \& KUP [1-3 poles with .187" <br> $(4.75 \mathrm{~mm}) \mathrm{OC}]$ | 27 E 043 | Solder | 20C228 or 20C254 | - | 729 | $20 \mathrm{C228}$ held in place by socket hold down screw whereas 20C254 |
|  | 27E046 | PC | 20C228 or 20C254 | - | 729 | snaps onto socket. <br> 20C228 held in place by socket hold down screw whereas 20C254 |
|  |  |  | $20 C 228$ or 20 C254 | - | 72 | snaps onto socket. |
|  | 27 E 067 | QC \& Solder | 20C228 or 20C254 | - | 729 | 20C228 held in place by socket hold down screw whereas 20C254 |
|  | 27E121 | Screw | 20C314 | - | 730 | snaps onto socket. <br> Use 2 pieces 20C314 per socket. |
|  | 27 E 396 | QC \& Solder | 20C254 | - | 729 | Use 2 pieces 20 C314 per socket. |
|  | 27E400 | Solder | 20C254 | - | 729 |  |
|  | 27E893 | Screw | 20 C 318 | 5,6 | 730 |  |
| KUL with .187" <br> (4.75mm) QC] | 27E043 | Solder | $20 C 247$ | - | 729 | 20 C 247 held in place by socket hold down screw. |
|  | 27E046 | PC | 20 C 247 | - | 729 | 20C247 held in place by socket hold down screw. |
|  | 27E067 | QC \& Solder | 20 C 247 | - | 729 | 20C247 held in place by socket hold down screw. |
|  | 27E121 | Screw | 20 C 314 | - | 730 | Use 2 pieces 20C314 per socket. |
|  | $27 E 396$ | QC \& Solder |  | 5 | 729 |  |
|  | 27E893 | Screw | 20 C 318 | 5 | 730 |  |

[^19]
## Relay and Socket Usage Chart

| Relay | Socket | Terminal Type | Hold-Down Spring | Notes | Socket Page | Comments |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| KUP <br> [4 pole with .110" <br> ( 2.79 mm ) QC] | 27E415 | QC \& Solder | 20C228 or 20C254 | - | 101 | 20C228 held in place by socket hold down screw whereas 20C254 |
|  |  |  |  |  |  | snaps onto socket. |
|  | 27E419 | PC | 20C228 or 20C254 | - | 101 | 20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket. |
|  | 27E867 | Screw | 20C254 | 4 | 101 |  |
| MDO | 27E006 | Solder | - | - | 712 |  |
|  | 27E007 | PC | - | - | 712 |  |
|  | 27E023 | PC | - | - | 712 |  |
|  | 27E166 | Screw | - | - | 712 |  |
|  | 27E894 | Screw | - | 5 | 712 |  |
| MT | MT78750 | Screw | MT28800 | - | 743 | For relays with 11-pin bases. |
|  | MT78755 | Screw | MT28800 | - | 743 | For relays with 8-pin bases. |
|  | MT78740 | Screw | MT28800 | - | 744 | For relays with 11-pin bases. Will accommodate function modules. |
|  | MT78745 | Screw | MT28800 | - | 744 | For relays with 8-pin bases. Will accommodate function modules. |
| ML | CR0001 | Screw | CR0111 or CR0133 | - | 920 |  |
|  | CR0002 | Screw | CR0111 or CR0133 | - | 920 |  |
|  | CR0067 | Screw | CR0069 | - | 920 |  |
|  | CR0095 | Screw | CR0070 or CR0155 | - | 920 |  |
| OAC \& ODC | - | - | - | - | - | Refer to page 1114 for I/O module mounting board details. |
| OACM \& ODCM | - | - | - | - | - | Refer to page 1122 for Slim Line I/O modules mounting board details. |
| ORWH | 27E1064 | PC | - | - | 439 |  |
| PCE | 27E1064 | PC | - | - | 437 |  |
| PT | 27E006 | Solder | - | - | 719 | Will accommodate 2- or 4-pole models. |
|  | 27E220 | PC | - | - | 719 | For use with 2-pole models. |
|  | 27E023 | PC | - | - | 719 | For use with 4-pole models. |
|  | $27 E 894$ | Screw | - | 5 | 719 | Will accommodate 2- or 4-pole models. |
|  | PT78700 | Screw | - | 5 | 719 | Will accommodate 2- or 4-pole models. |
|  | PT78702 | Screw | - | 5 | 719 | For 2-pole relays. Will accommodate function modules. |
|  | PT78703 | Screw | - | 5 | 719 | For 3-pole relays. Will accommodate function modules. |
|  | PT78704 | Screw | - | 5 | 719 | For 4-pole relays. Will accommodate function modules. |
| R10, R10L \& R10S (2 pole) | 27E125 | Solder | 20 C 249 | 2, 3 | 707 | Tin plated terminals with grounding strip. |
|  | 27E162 | Solder | 20C249 | 2, 3 | 707 | Tin plated terminals no grounding provision. |
|  | 27 E 128 | PC Stag. | 20C249 or 20C259 | 2, 3 | 707 | Tin plated terminals with grounding strip. |
|  | 27E446 | Solder | 20C249 | 1, 2, 3 | 707 | Tin plated terminals with grounding strip. |
|  | 27E193 | PC Stag. | 20C249 or 20C259 | 2, 3 | 707 | Tin plated terminals with grounding terminals. |
|  | 27 E 212 | PC Stag. | 20C249 or 20C259 | 2, 3 | 707 | Tin plated terminals no grounding provision. |
|  | 27 E 342 | PC In-Line | 20C249 or 20C259 | 2, 3 | 707 | Tin plated terminals no grounding provision. |
|  | 27 E 317 | Solder/Bkt. Mt. | 20 C 249 | 2,3 | 708 | Tin plated terminals with grounding strip. |
|  | 27E460 | Screw | 20C249 or 20C259 | 2, 3, 4 | 708 | Tin plated terminals no grounding provision. |
| R10, R10L \& R10S (4 pole) | 27E126 | Solder | 20 C 250 | 2, 3 | 707 | Tin plated terminals with grounding strip. |
|  | 27E163 | Solder | 20 C 250 | 2, 3 | 707 | Tin plated terminals no grounding provision. |
|  | 27E129 | PC Stag. | 20 C 250 | 2, 3 | 707 | Tin plated terminals with grounding strip. |
|  | 27E194 | PC Stag. | 20C250 or 20C259 | 2, 3 | 707 | Tin plated terminals with grounding terminal. |
|  | 27 E 213 | PC Stag. | 20C250 or 20C259 | 2, 3 | 707 | Tin plated terminals no grounding provision. |
|  | 27E629 | PC In-Line | 20C250 or 20C259 | 2, 3 | 707 | Tin plated terminals no grounding provision. |
|  | 27E461 | Screw | 20C250 or 20C259 | 2, 3, 4 | 708 | Tin plated terminals no grounding provision. |
| R10 \& R10L ( 6 pole) | 27E127 | Solder | 20C251 | 3 | 707 | Tin plated terminals with grounding strip. |
|  | 27E130 | PC Stag. | 20C251 or 20C259 | 3 | 707 | Tin plated terminals with grounding strip. |
|  | 27E630 | PC In-Line | 20C251 or 20C259 | 3 | 707 | Tin plated terminals no ground provision. |
|  | 27E462 | Screw | 20C251 or 20C259 | 3,4 | 708 | Tin plated terminals no grounding provision. |
| RM | RM 78700 | QC | RM28802 | - | 736 |  |
|  | RM 78701 | Solder | RM28802 | - | 736 |  |
|  | RM 78702 | PC | RM28802 | - | 736 |  |
|  | RM78705 | Screw | - | 5 | 736 |  |
| RT | RP78601 | PC | RP16041 | - | 450 | Use with Code 1. |
|  | RP78602 | PC | RP16041 | - | 450 | Use with Codes 3\&5. |
|  | RT78624 | Screw | RT16016 | 5 | 450 | Use with Code 1. |
|  | RT78625 | Screw | RT16016 | 5 | 450 | Use with Codes 3 \& 5 . |
|  | RT78626 | Screw | RT16016 | 5 | 450 | Use with Codes 3 \& 5 . |


| Note 1: | Flange mount sockets pre-assembled on steel mounting plates. Grounding is not recommended for currents of 5 amps AC \& above. |  |  |
| :---: | :---: | :---: | :---: |
| Note 2: | Listed hold-down springs cannot be used for R10S. |  |  |
| Note 3: | On R10L series hold down spring fits to the side of light emitting diode. |  |  |
| Note 4: | Use 40G432 insulator or suitable insulator (2 per socket). |  |  |
| Note 5: | Snap-mount relay sockets snap onto 24A110 mounting rail without extra hardware. |  |  |
| Note 6: | 27 E 893 cannot be used with KUIP and KUGP series relays. | Relay and Socket Usage Chart continued on next page. |  |
| Dimension reference | are shown for purposes only. <br> Dimensions are in inches over (millimeters) unless otherwise specified. | Specifications and availability subject to change. | www.tycoelectronics.com Technical support: Refer to inside back cover |

## Relay and Socket Usage Chart

|  |  | Terminal |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Relay | Socket | Type | Sold-Down <br> Spring | Notes | Socket |
| Page |  |  |  |  |  |$\quad$ Comments

[^20]
## Alphanumeric Index

| Series | Type | Page |
| :---: | :---: | :---: |
|  | Power Relay | 818 |
| 9100 | Power Relay | 816 |
| 9400 | Power Relay | 814 |
| KUHP | . Power Relay | 803 |
| Model 2000. | . Definite Purpose Contactor | 828 |
| M odel 93-3100 | . Definite Purpose Contactor | 834 |
| M odel 96-3100 | . Definite Purpose Contactor | 830 |
| Model 96-3186. | . Definite Purpose Contactor | 838 |
| M odel 98-3100 . | . Definite Purpose Contactor | 832 |
| M odel A-3100. | . Definite Purpose Contactor | 840 |
| P25 ............... | . Definite Purpose Contactor | 820 |
| P30/P40. | . Definite Purpose Contactor | 823 |
| P31/P41 | . Definite Purpose Contactor | 826 |
| PM | . Power Relay | 809 |
| PRD .............. | .Power Relay | 811 |
| RM C/D ... | .Power Relay | 805 |
| S86R/S87R .... | . Power Relay | 807 |

## NOTE: In addition to the products described in this section of the databook, more power relays and contactors are

 also described in other sections. Following is a list.
## Power PC Board Relays

491 .......................................................................... 509
PCF ........................................................................ 502
T9A ....................................................................... 506
T90 .......................................................................... 504
T92 .......................................................................... 511

## Plug-in/Panel Mount Relays

KRP-3-H ................................................................... 739
RM8 ........................................................................ 733

|  |
| :--- |
| Special Application Relays |
| 136 ...................................................................... 916 |

136 .................................................................................................................... 916
Solid State Relays \& I/O Modules
SSR ........................................................................ 1104
SSRD ..................................................................... 1102
SSRQ .................................................................... 1108
SSRD ................................................................... 1106
Automotive Relays
T72M ..................................................................... 1005
V23086 ................................................................. 1002
V2R........................................................................ 1012
VF4 ........................................................................ 1017
VF7 ....................................................................... 1021
VFM ..................................................................... 1014
VKP ...................................................................... 1007
Power relays and contactors are also included in our line of high performance products (see overview of product line in section 14 of this databook).

NOTE: A question tree that may help you in selecting an appropriate power relay or definite purpose contactor for your application can be found on the next page.

## Power Relay \& Definite Purpose Contactor Question Tree

This guide helps the user select one or more product series which may be appropriate for a given application. The user should then refer to detailed specifications elsewhere in this catalog to determine the actual part number to be specified. Of course, the user must assume ultimate responsibility for determining the suitability of a product for a particular application.


[^21]

## Features

- AC coils 6-277VAC $50 / 60 \mathrm{~Hz} .$, DC 6-110VDC.
- Contact arrangement up to DPDT.
- .250" combination push-on/solder terminals or PC terminals.
- Side flange and top flange mounting.
- Designed to meet VDE space requirements.
- Class B coil insulation.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 1 Form C (SPDT) and 2 Form C (DPDT).
Material: Silver or silver-cadmium oxide.
Expected Mechanical Life: 10 million operations.

## Contact Ratings

| Contact Arrangement | ULCSA Ratings | Expected Life |
| :---: | :---: | :---: |
| 1 Form C Single Pole Double Throw | $\begin{aligned} & \text { 30A 120/240VAC } \\ & 1 \mathrm{HP} \text { @ 120VAC, } \\ & 11 / 2 \mathrm{HP} \text { @ } 240 \mathrm{VAC} \\ & 25 \mathrm{~A} @ 28 \mathrm{VDC} \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { 100,000 } \\ & \text { ops. } \end{aligned}$ |
| 2 Form C Double Pole Double Throw | $\begin{aligned} & \text { 20A @ 120/240VAC } \\ & \text { 3/4 HP @ 120VAC } \\ & 1 \text { 1/2 HP @ 240VAC } \\ & \text { 20A @ 28VDC } \\ & \text { 7A @120VAC (Tungsten)* } \end{aligned}$ | $\begin{aligned} & \text { 100,000 } \\ & \text { ops. } \end{aligned}$ |

*NO contacts only.

## Initial Dielectric Strength

Between Open Contacts: 1,200V rms.
Between Adjacent Contacts: $3,750 \mathrm{~V}$ ms .
Between Contacts and Coil: $3,750 \mathrm{~V} \mathrm{~ms}$.
Between Coil and Frame: $2,000 \mathrm{~V}$ ms.

## Coil Data @ $25^{\circ} \mathrm{C}$

Voltage: 6-110VDC and 6-277VAC.
Nominal Power:
DC Coils: 12 Watts.
AC Coils: 2.7VA.
Duty Cycle: Continuous.
Initial Insulation Resistance: 100 megohms, min.
Insulation: Class B, $130^{\circ} \mathrm{C}$.

## KUHP series

## 30 Amp Power Relays

## 呮 File E22575

## (11) File LR15734-123

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data

|  | Nominal <br> Voltage | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage | Nominal <br> Coil <br> Current <br> $(\mathbf{m A})$ |
| :---: | :---: | :---: | :---: | :---: |
| DC | 6 | 32.1 | 4.5 | 187 |
| Coils | 12 | 120 | 9.0 | 100 |
|  | 24 | 472 | 18.0 | 51 |
|  | 110 | 1,800 | 360 | 26.7 |
|  | 6 | 10,000 | 82.5 | 11 |
| AC | 12 | 4.2 | 5.1 | 460 |
| Coils | 24 | 18 | 10.2 | 230 |
|  | 120 | 1,72 | 20.4 | 115 |
|  | 240 | 7,200 | 102.0 | 24 |
|  | 277 | 10,250 | 2045.0 | 12 |

* $\pm 15 \%$ for AC coils.


## Operate Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Must Operate Voltage:
DC Coils: $75 \%$ of nominal.
AC Coils: $85 \%$ of nominal.
Operate Time (Excluding Bounce): 20 milliseconds, typical, at nominal voltage.
Release Time (Excluding Bounce): 20 milliseconds, typical, at nominal voltage.

## Environmental Data

Temperature Range: (Operating)
DC Coils: $-45^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
AC Coils: $-45^{\circ} \mathrm{C}$ to $+45^{\circ} \mathrm{C}$.
Shock: 15 g 's, 11 ms (non-operating).
Vibration: . 065 " double amplitude, $10-55 \mathrm{~Hz}$.

## Mechanical Data

Termination: .250" quick connect/solder; and PC board.
Enclosure: Polycarbonate dust cover.
Weight: 3.2 oz. (92g) approximately.

| Ordering Information |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Typical Part No. | KUHP- | 11 | A | 5 | 1 | -120 |
| 1. Basic Series and Type: <br> KUHP = Enclosed 20/30 amp relay. |  |  |  |  |  |  |  |
| 2. Contact Arrangement and Rating: <br> $5=1 \mathrm{C}$ (SPDT); 30 amps . <br> 11 = 2C (DPDT); 20 amps. |  |  |  |  |  |  |  |
| 3. Coil Input: $A=A C, 50 / 60 \mathrm{~Hz} . \quad D=D C$ |  |  |  |  |  |  |  |
| $\begin{aligned} & \text { 4. Mountings: } \\ & 1=\text { PLAIN CASE }\end{aligned} \quad 5=$ BRACKET MOUNT CASE | T = TOP FLANGE CASE |  |  |  |  |  |  |
| 5. Terminals and Contact Materials: $1=.250$ " ( 6.35 mm ) quick connect/solder; silver-cadmium oxide. <br> $7=.047^{\prime \prime}(119 \mathrm{~mm})$ printed circuit; silver-cadmium oxide. |  |  |  |  |  |  |  |
| 6. Coil Voltage: <br> AC coils to $277 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. <br> DC coils to 110 VDC . |  |  |  |  |  |  |  |

NOTE: No sockets are available for this relay.
Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| KUHP-5A51-24 | KUHP-5AT1-120 | KUHP-5D51-24 | KUHP-5DT1-24 | KUHP-11A51-120 | KUHP-11D51-12 | KUHP-11DT1-12 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| KUHP-5A51-120 | KUHP-5D51-12 | KUHP-5DT1-12 | KUHP-11A51-24 | KUHP-11AT1-120 | KUHP-11D51-24 | KUHP-11DT1-24 |

## Outline Dimensions

## Plain Case



Top Flange Enclosure


## Bracket Mount Case



Terminal Dimensions
.250" (6.35mm) Quick Printed Circuit Connect/Solder


Wiring Diagrams
1 Form C
1 Form A (Delete 2)
1 Form B (Delete 5)


## 2 Form C

2 Form A (Delete 1 \& 3)
2 Form B (Delete 4 \& 6)


PC Board Layouts (Bottom Views)


## 2 Pole Model




## Features

- SPST-NO-DM or SPDT-DB-DM arrangements.
- Flange-mount case.
- Optional push to test button.
- Available with LED indicator and protection diode.


## Contact Data @ $20^{\circ} \mathrm{C}$

Arrangements:1 Form X (SPST-NO-DM) and 1 Form Z (SPDT-DB-DM).
Material: Silver-cadmium oxide.
Expected Mechanical Life: 10 million operations minimum.
Rated Current: 30A.
Rated Voltage: 250VAC.
Maximum Breaking Capacity (AC): 7,500VA.
Maximum Make Current (max. 4s at 10\% duty cycle: 60A.

## Initial Dielectric Strength

Between Open Contacts: 1,500VAC (RM 5/6 2,500VAC).
Between Coil and Contacts: 2,500 VAC.
Creepage/Clearance: 2.8/4mm.

## Coil Data @ $20^{\circ} \mathrm{C}$

Voltage: 6-220VDC and 24-400VAC.
Nominal Power: DC Coils: 1.2W; AC Coils: 2.8VA.
Coil Data @ 20응

| Nominal <br> Voltage <br> VDC | Operate <br> Voltage <br> VDC | Drop-out <br> Voltage <br> VDC | DC <br> Resistance <br> in <br> Ohms | Nominal <br> Coil <br> Current <br> (mA) |  |
| :---: | ---: | ---: | ---: | ---: | :---: |
| DC Coils |  |  |  |  |  |
| 6 | 4.5 | 0.6 | $32 \pm 10 \%$ | 187.5 |  |
| 12 | 9.0 | 1.2 | $110 \pm 10 \%$ | 109.1 |  |
| 24 | 18.0 | 2.4 | $475 \pm 10 \%$ | 50.0 |  |
| 48 | 36.0 | 4.8 | $2,000 \pm 10 \%$ | 24.0 |  |
| 60 | 45.0 | 6.0 | $2,850 \pm 10 \%$ | 21.1 |  |
| 110 | 82.5 | 11.0 | $10,000 \pm 12 \%$ | 11.0 |  |
| 220 | 165.0 | 22.0 | $40,000 \pm 15 \%$ | 5.5 |  |
| AC Coils |  |  |  |  |  |
| 24 | 19.2 | 9.6 | $80 \pm 10 \%$ | 109.2 |  |
| 48 | 38.4 | 19.2 | $320 \pm 10 \%$ | 54.2 |  |
| 60 | 48.0 | 24.0 | $500 \pm 10 \%$ | 43.7 |  |
| 115 | 92.0 | 46.0 | $1,850 \pm 10 \%$ | 23.0 |  |
| 230 | 184.0 | 92.0 | $7,500 \pm 10 \%$ | 11.7 |  |
| 400 | 320.0 | 160.0 | $23,500 \pm 15 \%$ | 6.5 |  |

## Operate Data

Must Operate Voltage: See Coil Data table.
Operate Time /Release Time (typical): $17 \mathrm{~ms} / 18 \mathrm{~ms}$.
Bounce Time (typical): 4 ms .
Switching Rate: 9,600 ops./hr. max. at rated load.

## Environmental Data

Temperature Range (Operating):
DC Coil: $-45^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.
AC Coil: $-45^{\circ} \mathrm{C}$ to $+40^{\circ} \mathrm{C}$.
Vibration: 30 to 150 Hz at $10 \mathrm{~g} \mathrm{~N} / \mathrm{O}, 5 \mathrm{~g} \mathrm{~N} / \mathrm{C}$

# RM C/D series 

## 30 Amp Power Relays

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Mechanical Data

Termination: .250" quick connects.
Enclosure: Plastic dust cover.
Weight: 2.86 oz. ( 81 g ) approximately.

## Contact Life



## Maximum DC Load Breaking Capacity



DC Coil Operating Range


## Ordering Information



* For models with protection diode, standard polarity is: terminal A1 is positive, terminal A2 is negative.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions



## Wiring Diagrams (Bottom Views)





## S86R/S87R series

Low Cost
20 Amp
Industrial Relays
미 File E22575
(18) File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Low cost.
- Contact forms to 2 Form C.
- Applications include spa controls, vending machines, HVAC, and machine tool controls.
- Variety of mounting styles.


## Contact Data @ $25^{\circ} \mathrm{C}$

S86R and S87R: 20 amps @ 277VAC; 60 LRA, 12 FLA, 1 HP @ 125VAC;

48 LRA, 8 FLA @ 240VAC; 2 HP @ 250VAC; Pilot
Duty,
360VA @ 125/250VAC.
Materials: Silver and silver-cadmium oxide.
Expected Life: 1 million operations, mechanical; 50,000 operations at rated loads.

## Initial Dielectric Strength

Initial Breakdown Voltage: 1,560V mss, 60 Hz.

## Operate Data

Must Operate Voltage:
DC Coils: $75 \%$ of nominal voltage @ $+25^{\circ} \mathrm{C}$.
AC Coils: $85 \%$ of nominal voltage @ $+25^{\circ} \mathrm{C}$.
Operating Position: Relay is designed for operation with plunger either vertical or horizontal; however, the relay is not designed for operation in an upside-down position.

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

## Nominal Power:

S86R: 4.0VA for AC models
S87R: 2.9 Watts for single pole DC models.
4.5 Watts for double pole DC models. 4.0VA for AC models

Insulation: Class $\mathrm{B}\left(130^{\circ} \mathrm{C}\right)$.

## Environmental Data

Temperature Range: $-10^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.


| Our authorized distributors are more likely |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
| So maintain the following items in stock for immediate delivery. |  |  |  |  |
| S86R5A1B1D1-120 | S86R11D1B1D1-12 | S87R5A2B1D1-240 | S87R11A2B1D1-24 | S87R11A2B1D1240 |
| S86R11A1B1D1120 | S87R5A2B1D1-120 | S87R5D2B1D1-24 | S87R11A2B1D1120 | S87R11D2B1D1-110 |

Outline Dimensions

S86R (2 pole shown) Style 1



S87R (2 pole shown) Style 2


## Switch Terminal Configuration

Style 1



## PM series

## Heavy Duty 25 Amp Multicontact AC or DC Power Relay

(4) File E22575 (PM)

(18) File 15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Contact ratings to 25 amps .
- 8 -32 screw or .250 Q.C. termination.
- AC and DC coils available.
- 4PDT contact arrangement.
- Plastic and metal covers available.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 4 Form C (4PDT).
Ratings: PM \& PMT: 25 amps @ 277VAC, max.; 10 amps @ 28VDC; 1 HP @ 120/240VAC, Single Phase.
Minimum Ratings: $1 \mathrm{amp} @ 12$ VACNDC.
Material: Silver-cadmium oxide.
Expected Life: 10 million operations, mechanical; 100,000 operations at rated loads @ $25^{\circ} \mathrm{C}$.

## Initial Dielectric Strength

Initial Breakdown Voltage: $2,000 \mathrm{~V}$ ms minimum between all elements and ground.

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: From 6 to 125 VDC and 12 to 240VAC, $50 / 60 \mathrm{~Hz}$.
Nom. Power: DC: 4.4 Watts @ $25^{\circ} \mathrm{C}$.
AC: $14 \mathrm{VA} @ 25^{\circ} \mathrm{C}$.
Duty Cycle: Continuous.
Initial Insulation Resistance: 100 megohms, minimum.

| DC Coils |  |  | AC Coils ( $50 / 60 \mathrm{~Hz}$.) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Nominal Voltage | DC Resis. In Ohms $\pm 10 \%$ @ $+25^{\circ} \mathrm{C}$ | Nominal Current In Milliamps | Nominal Voltage | DC Resis. In Ohms $\pm 15 \%$ <br> @ $+\mathbf{2 5}^{\circ} \mathrm{C}$ | Nominal Current In Milliamps |
| 6 | 8.2 | 732 |  |  |  |
| 12 | 33 | 364 | 12 | 14 | 1070 |
| 24 | 132 | 182 | 24 | 5.0 | 540 |
| 48 | 526 | 91 | 120 | 120 | 128 |
| 110 | 2760 | 40 | 240 | 587 | 61 |
| 125 | 3570 | 35 |  |  |  |
| 220 | Use a 110 volt relay with 2700 to 3300 ohm 5 watt wire wound resistor in series. |  |  |  |  |

Operate Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$
Must-Operate Voltage: DC: $75 \%$ of nominal voltage $@+25^{\circ} \mathrm{C}$.
AC: $85 \%$ of nominal voltage @ $+25^{\circ} \mathrm{C}$.

## Environmental Data

Temperature Range: AC: $-55^{\circ} \mathrm{C}$ to $+45^{\circ} \mathrm{C}$ @ nominal coil power. DC: $-55^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C} @$ nominal coil power $\left(+75^{\circ} \mathrm{C}\right.$ available on special order).

## Mechanical Data

Mounting: Three holes; one front key-hole and two rear channel slots for \#8-32 screws.
Termination: PM: Heavy-duty screw type with \#8-32 BH screw. PMT: . 250 " ( 6.35 mm ) quick connect terminals.
Insulating Material: Molded polyester alkyd.
Enclosure: PM \& PMT: Plastic dust cover or metal enclosure available. Order separately. See following page.
Weight: 14 oz. (397g) approximately.

## Ordering Information



Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| PM-17AY-24 | PM-17DY-12 | PMT-17DY-24 |
| :--- | :--- | :--- |
| PM-17AY-120 | PM-17DY-24 |  |
| PM-17AY-240 | PM-17DY-110 |  |

Outline Dimensions


Tolerance: $\pm .010( \pm .25)$

PM Plastic Dust Cover 35D203


Overall Dimensions In Inches (mm)

| Part No. | Length | Width | Height |
| :---: | :---: | :---: | :---: |
| 35D203 | $3.394^{*}$ | $2.657^{*}$ | $2.719^{*}$ |
|  | $(86.21)$ | $(67.49)$ | $(69.06)$ |
| 35D227 | 5.313 | 3.813 | 3.813 |
|  | $(134.95)$ | $(96.85)$ | $(96.85)$ |

*When M ounted On Relay

PM Metal Cover 35D227


## PRD series

## 10 to 50 Amp Heavy Duty AC or DC Power Relay

## (4L) File E22575 (M odels With All Screw Terminals) ㄱT File E22575 (All Others)

(18) File 15734

Toet File 1949 (Q. C. Terminal models only)


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Auxiliary Snap-Action Switch

Arrangements: 1 Form C (SPDT).
Rating: 5 amps at $120 \mathrm{VAC}, 60 \mathrm{~Hz} . @ 25^{\circ} \mathrm{C}$.
Material: Silver.

## Initial Dielectric Strength

Initial Breakdown Voltage: $2,000 \mathrm{~V}$ ms minimum between all elements and ground. ( $2,200 \mathrm{~V}$ rms on 600 V ratings.)

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: From 6 to 220VDC, and 6 to 480VAC.
Resistance: See coil data table.
Nom. Power: DC coils: -2.0 watts @ $25^{\circ} \mathrm{C}$.
AC coils: - $9.8 \mathrm{VA} @ 25^{\circ} \mathrm{C}$.
Max Power: DC coils: -8.0 watts @ $25^{\circ} \mathrm{C}$.
Duty Cycle: Continuous.
Initial Insulation Resistance: 100 megohms, minimum.

## Coil Data

| "DY" and "DG" <br> DC Coils |  | "AY" and "AG" <br> AC Coils (50-60Hz.) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Nominal <br> Volts | Resistance <br> In Ohms <br> $\mathbf{\pm 1 0 \% @ ~ 2 5}{ }^{\circ} \mathbf{C}$ | Nominal DC <br> Current In <br> Milliamps | Nominal <br> Volts | DC Resis. <br> In Ohms <br> $\mathbf{\pm 1 5 \% @ ~ 2 5}{ }^{\circ} \mathbf{C}$ | Nominal AC <br> Current In <br> Milliamps |
| 6 | 18 | 333 | 6 | .86 | 1600 |
| 12 | 71 | 169 | 12 | 3.2 | 820 |
| 24 | 288 | 84 | 24 | 12.0 | 410 |
| 110 | 6050 | 18.2 | 120 | 290 | 85 |
| 220 | Use 110V relay with | 240 | 1200 | 43 |  |
|  | approx. 6,000 ohm | 480 | 4500 | 22 |  |
|  | 5W wire-wound |  |  |  |  |
|  | resistor in series. |  |  |  |  |

## Operate Data @ +25º

Must-Operate Voltage: DC: $75 \%$ of nominal voltage @ $25^{\circ} \mathrm{C}$.

$$
\text { AC: } 85 \% \text { of nominal voltage @ } 25^{\circ} \mathrm{C} \text {. }
$$

## Environmental Data

Temperature Range: $A C:-55^{\circ} \mathrm{C}$ to $+45^{\circ} \mathrm{C}$.
DC: $-55^{\circ} \mathrm{C}$ to $+80^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Two .187 " ( 4.75 mm ) diameter holes on 1875" ( 47.63 mm ) centers.
Termination: See ordering information tables for various options. Enclosure: Metal dust cover, 35D013, available. Order separately. Weight: 10 oz. (284g) approximately.

Ordering Information

1. Type:
PRD = Open relay.
PRDA = Open relay with aux. SPDT snap-action switch.

## Stock Items - The following items are normally maintained in stock for immediate delivery.

| PRD-3AG0-120 | PRD-5AY0-240 | PRD-7DG0-24 | PRD-11AY0-120 | PRD-11DJ 0-24 |
| :---: | :---: | :---: | :---: | :---: |
| PRD-3AJ 3-24 | PRD-5DY0-12 | PRD-7DY0-12 | PRD-11AY0-240 | PRD-11DY0-12 |
| PRD-3AY0-120 | PRD-5DY0-24 | PRD-7DY0-24 | PRD-11AY0-480 | PRD-11DY0-24 |
| PRD-3DY0-12 | PRD-7AGO-120 | PRD-11AG0-24 | PRD-11DG0-12 | PRD-11DY0-110 |
| PRD-3DY0-24 | PRD-7AY0-24 | PRD-11AG0-120 | PRD-11DG0-24 | PRDA-11AGA-120 |
| PRD-5AY0-24 | PRD-7AY0-120 | PRD-11AG0-240 | PRD-11DH0-12 | PRDA-11AYA-120 |
| PRD-5AY0-120 | PRD-7AY0-240 | PRD-11AHO-120 | PRD-11DH0-24 |  |
| PRD-5AY1-120 | PRD-7AY3-120 | PRD-11AY0-24 | PRD-11DH0-110 |  |

## Ordering Information



## 6. Coil Voltage:

12, 24, 48, 110, 125VDC
$24,120,240,277,480 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$.

## Stock Items - The following items are normally maintained in stock for immediate delivery.

No models in the PRD-3AP series are maintained in stock.

## Outline Dimensions

## PRD/PRDA Small Base - Top View



PRD/PRDA Large Base - Top View


50 Amp PRD



PRD Magnetic Blow-Out Drawings


PRD7 with Magnetic Blow-Out


PRD11 with Magnetic Blow-Out



## 9400 series

## Power Relay <br> 1-pole, 8-12 FLA <br> AC or DC Coil

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Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Single-pole relay used extensively in HVAC applications.
- Multi-positional mounting without affecting operation.
- Convenient 0.250 " ( 6.35 mm ) quick connect terminals.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 1 Form X (SPST-NO-DM), 1 Form Y (SPST-NC-DB), 1 Form Z (SPDT-DM-DB) \& 1 Form Z (SPDT-DM-DB) jumpered to wire as 1 Form C (SPDT).
Materials: Silver Alloy and Fine Silver
Maximum Ratings:
Silver Alloy (Power) Contacts
All Forms: 12 FLA, 60 LRA @ 125VAC;
18A @ 125VAC, resistive;
8 FLA, 48 LRA @ 240/277VAC
18A @ 240/277VAC, resistive.
1 Form X only: 25A @ 240/277VAC, resistive.
Fine Silver (Pilot) Contacts
All Forms: 3A, 277VAC;
125VA @ 125VAC;
250VA @ 250VAC;
277VA @ 277VAC;
Expected Life: 1 million ops., mechanical
250,000 ops., at rated resistive load. 100,000 ops., at rated inductive load.

## Initial Dielectric Strength

Initial Breakdown Voltage: 1,554 VAC between live parts and exposed non-current carying metal parts.

## Coil Data @ $25^{\circ} \mathrm{C}$

Voltage: 12 \& 24 VDC; 6-277 VAC, 50/60 Hz
Max. Sealed Power: 4 VA (AC coils.); 3 W (DC coils).
Nominal Inrush Power: 5 VA (AC coils.); 3 W (DC coils).
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Duty Cycle: Continuous.

Coil Temperature Rise Above Ambient


Operate Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$
Must Operate Voltage: Approximately 85\% of AC nominal coil voltage. Approximately $75 \%$ of DC nominal coil voltage.

## Environmental Data

Temperature Range: Storage and Operating: $-40^{\circ} \mathrm{C}-+65^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: $0.250^{\prime \prime}(6.35 \mathrm{~mm})$ quick connects, standard. Consult factory for availability of optional 0.187 " ( 4.75 mm ) quick connects.
Weight: 2.88 oz . ( 82 g ) approximately

Ordering Information


Standard part numbers listed below are more likely to be available from stock.
9400-03Q1999 9400-03T1999 9400-03U1999 9400-04Q1999 9400-04T1999 9400-04U1999

## Outline Dimensions



## Contact Configurations




## Features

- Single- or double-pole relay used extensively in HVAC applications.
- Multi-positional mounting without affecting operation.
- Convenient $0.250^{\prime \prime}(6.35 \mathrm{~mm})$ quick connect terminals.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 1 Form A (SPST-NO), 1 Form B (SPST-NC), 1 Form C (SPDT), 2 Form A (DPST-NO), 2 Form B (DPST-NC), 2 Form C (DPDT) or 1 Form A + 1 Form B (SPST-NO+SPST-NC).
Materials: Silver, Fine Silver and Gold Alloy.

## Maximum Ratings:

Silver (Power) Contacts
All Forms: $\quad 3 / 4 \mathrm{HP} @ 125 / 250 \mathrm{VAC}$;
12 FLA, 60 LRA, 15A resistive @ 125VAC;
6 FLA, 35 LRA, 15A resistive @ 250/277VAC;
3 FLA, 18 LRA, 12.5A resistive @ 480VAC;
3 FLA, 14 LRA @ 600VAC;
Form A only: 25A @ 277VAC, resistive.
Fine Silver and Gold Alloy (Pilot) Contacts
All Forms: $\quad 1 / 10 \mathrm{HP} @ 125 / 250 \mathrm{VAC}$;
3A @ 277VAC;
125VA @ 125VAC.
Expected Life: 1 million ops., mechanical.
250,000 ops., at rated resistive loads.
100,000 ops., at rated inductive loads.

## Initial Dielectric Strength

Initial Breakdown Voltage: 2,200 VAC @ 60 Hz. between live parts and exposed non-current carying metal parts.

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: 12 \& 24 VDC; 24-277 VAC, $50 / 60 \mathrm{~Hz}$.
Max. Sealed Power: 9.5 VA (AC coils.); 5.75 W (DC coils).
Nominal Inrush Power: 215 VA (AC coils.); 5.75 W (DC coils).
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Duty Cycle: Continuous.

## 9100 series

## Power Relay <br> 1- and 2-pole, 3-12 FLA <br> AC or DC Coil

cTus File E75492

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Temperature Rise Above Ambient



Operate Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$
Must Operate Voltage: Approximately 85\% of AC nominal coil voltage. Approximately $75 \%$ of DC nominal coil voltage.

## Environmental Data

Temperature Range: Storage and Operating: $-40^{\circ} \mathrm{C}-+65^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: $0.250^{\prime \prime}(6.35 \mathrm{~mm})$ quick connects. Dual terminals on the coil are standard.
Weight: 6.08 oz . $(173 \mathrm{~g})$ approximately

## Ordering Information



## Standard part numbers listed below are more likely to be available from stock.

9100-233Q999 9100-233T999 9100-233U999

Outline Dimensions



## Features

- Single-pole, normally closed relay used extensively in HVAC applications.
- Variety of mounting positions and brackets.
- Convenient 0.250 " ( 6.35 mm ) quick connect terminals.
- Custom-built to meet customer requirements.


## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: Normally-Closed.
Materials: Silver cadmium oxide.
Maximum Rating: 35A inductive @ 277VAC, 0.5 power factor (Break only.) Expected Life: 750,000 ops, mechanical.

250,000 ops., breaking rated load.

## Initial Dielectric Strength

Initial Breakdown Voltage: 1,554 VAC @ 60 Hz . between live parts and exposed non-current carrying metal parts.

## 38 series

## Potential Motor Starting Relay 1-pole, 35A, Normally Closed AC Coil

${ }^{\text {cT }}{ }_{\text {us }}$ File E83865

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $25^{\circ} \mathrm{C}$

Voltage: 130, 170, 214, 256, 336, 395, 420 and 495 VAC, 60 Hz .
Nominal Sealed Power: 5 VA).
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Duty Cycle: Continuous.

## Mechanical Data

Termination: $0.250^{\prime \prime}$ ( 6.35 mm ) quick connects (single or dual, model dependent). Terminals \#4 \& \#6 are dummies for customer convenience.
Mounting Position: Each model is calibrated for its specified mounting position. Pick-up voltage may vary if relay is mounted in positions other than specified.
Weight: 5.76 oz. ( 163.8 g ) approximately

Ordering Information


Standard part numbers listed below are more likely to be available from stock.
Custom parts only.

## Coil Rating \& Calibration Table

Select proper continuous coil voltage from top of appropriate column, select pick - up (PU) and drop-out (DO) voltages and insert relay calibration (RC) number in part number.

|  | $\begin{gathered} \text { COIL } \neq \\ 130 \mathrm{~V} 60 \\ 117 \mathrm{~V} 50 \end{gathered}$ | $0+10 \%$ |  | $\begin{aligned} & \text { COIL \# } \\ & 170 \text { V } 601 \\ & 151 \mathrm{~V} 50 \text { 1 } \end{aligned}$ | $\begin{aligned} & -\mathrm{Hz} \\ & 1 z^{*} \\ & 040 \pm 10 \% \end{aligned}$ |  | $\begin{gathered} \text { COIL \# } \\ 256 \mathrm{~V} 60 \\ 228 \mathrm{~V} 501 \\ \mathrm{a} \end{gathered}$ | $\begin{aligned} & \mathrm{Hz} \\ & \mathrm{~Hz} z^{*} \\ & 100 \pm 10 \% \end{aligned}$ |  | $\begin{gathered} \text { COIL \# } \\ 336 \mathrm{~V} 60 \\ 299 \mathrm{~V} 50 \end{gathered}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { RES.@ } \\ & 24^{\circ} \mathrm{C} \end{aligned}$ |  | $\underline{+10 \%}$ | $\begin{aligned} & \text { RES.@ } \\ & 24^{\circ} \mathrm{C} \end{aligned}$ |  | 20+10\% | $\begin{aligned} & \text { RES. } \\ & 24^{\circ} \mathrm{C} \end{aligned}$ | @ | 100+10\% | $\begin{aligned} & \text { RES. } \\ & 24^{\circ} \mathrm{C} \end{aligned}$ |  | $\text { 8000 } \pm 10 \%$ |
| RC\# | PU | DO | RC\# | PU | DO | RC\# | PU | DO | RC\# | PU | DO |
| 1 |  |  | 2 | 159-172 | 20-77 | 3 | 240-269 | 45-95 | 4 | 243-271 | 55-125 |
| 8 |  |  | 9 |  |  | 10 | 259-288 | 45-95 | 11 | 261-290 | 55-125 |
| 15 |  |  | 16 |  |  | 17 | 278-306 | 45-115 | 18 | 280-309 | 55-125 |
| 22 |  |  | 23 |  |  | 24 | 296-325 | 45-115 | 25 | 299-327 | 55-125 |
| 29 |  |  | 30 |  |  | 31 | 315-343 | 45-115 | 32 | 317-345 | 55-125 |
| 36 |  |  | 37 |  |  | 38 | 323-352 | 45-115 | 39 | 326-354 | 55-125 |
| 43 |  |  | 44 |  |  | 45 | 333-363 | 45-115 | 46 | 335-364 | 55-125 |
| 50 |  |  | 51 |  |  | 52 | 285-305 | MAX. 77 | 53 | 340-370 | 55-125 |
| 57 | 111-125 | 20-50 | 58 | 111-124 | 30-65 | 59 | 240-269 | 35-77 | 60 | 171-184 | 40-90 |
| 64 | 121-134 | 20-50 | 65 | 120-134 | 30-65 | 66 | 123-134 | 25-77 | 67 | 168-182 | MAX. 90 |
| 71 | 130-143 | 20-55 | 72 | 130-144 | 30-65 | 73 |  |  | 74 | 180-195 | 40-90 |
| 78 | 139-153 | 20-55 | 79 | 140-153 | 30-65 | 80 | 136-150 | 45-90 | 81 | 219-253 | 40-115 |
| 85 | 149-163 | 20-55 | 86 | 149-163 | 30-65 | 87 | 150-163 | 45-90 | 88 | 152-166 | 55-115 |
| 92 |  |  | 93 | 159-172 | 30-65 | 94 | 159-172 | 45-90 | 95 | 162-175 | 55-115 |
| 99 |  |  | 100 | 168-182 | 30-65 | 101 | 168-182 | 45-95 | 102 | 171-184 | 55-115 |
| 106 |  |  | 107 | 178-192 | 30-75 | 108 | 178-192 | 45-95 | 109 | 180-193 | 55-115 |
| 113 |  |  | 114 | 139-153 | MAX. 55 | 115 | 185-213 | 45-95 | 116 | 188-214 | 55-115 |
| 120 |  |  | 121 |  |  | 122 | 203-231 | 45-95 | 123 | 205-234 | 55-115 |
| 127 |  |  | 128 |  |  | 129 | 221-250 | 45-95 | 130 | 224-252 | 55-125 |
| 134 |  |  | 135 |  |  | 136 | 140-152 | 33-77 | 137 | 186-215 | 40-90 |
| 141 | 80-110 | 20-55 | 142 |  |  | 143 | 285-305 | 45-115 | 144 | 162-175 | 40-90 |
| 148 | 62-76 | 20-45 | 149 |  |  | 150 | 159-172 | 35-77 | 151 | 162-175 | 70-100 |
| 156 |  |  | 157 |  |  | 158 | 150-162 | MAX. 77 | 159 | 243-271 | 40-90 |
| 163 |  |  | 164 |  |  | 165 | 136-150 | MAX. 50 | 166 | 205-234 | 40-90 |
| 170 |  |  | 171 |  |  | 172 | 166-182 | 35-77 | 173 | 180-195 | MAX. 105 |
| 178 |  |  | 179 |  |  | 180 |  |  | 181 | 224-252 | 40-90 |
| 185 |  |  | 186 |  |  | 187 |  |  | 188 | 280-309 | 55-100 |
|  |  |  |  |  |  |  |  |  | 194 | 205-234 | 40-90 |
|  |  |  |  |  |  |  |  |  | 198 | 152-166 | 40-90 |


| RES.@ | $\begin{gathered} \text { COIL \#5 } \\ 395 \mathrm{~V} 60 \mathrm{~Hz} \\ 338 \mathrm{~V} 50 \mathrm{~Hz} \end{gathered}$ |  | $\begin{gathered} \text { COIL \#6 } \\ 420 \mathrm{~V} 60 \mathrm{~Hz} \\ 378 \mathrm{~V} 50 \mathrm{~Hz} \end{gathered}$ |  |  | $\begin{gathered} \text { COIL \#7 } \\ 495 \mathrm{~V} 60 \mathrm{~Hz} \\ 452 \mathrm{~V} 50 \mathrm{~Hz} \end{gathered}$ |  |  |  | $\begin{gathered} \text { COIL \# } \\ 214 \mathrm{~V} 60 \\ 193 \mathrm{~V} 50 \end{gathered}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $24^{\circ} \mathrm{C}$ | 9600 $\pm 10 \%$ |  | $\begin{aligned} & \text { RES. } \\ & 24^{\circ} \mathrm{C} \\ & \hline \end{aligned}$ | 12700 $\pm 10 \%$ |  | RES.@ $24^{\circ} \mathrm{C}$ | 15200 $\pm 10 \%$ |  | RES.@ |  |  |
| RC\# | PU | DO | RC\# | PU | DO | RC\# | PU | DO | RC\# | PU | DO |
| 5 | 245-275 | 60-140 | 6 | 242-272 | 75-150 | 7 | 239-268 | 75-170 | 193 | 158-171 | 25-57 |
| 12 | 262-290 | 60-140 | 13 | 262-290 | 75-150 | 14 | 258-287 | 75-170 | 196 | 120-134 | 25-56 |
| 19 | 280-310 | 60-140 | 20 | 280-310 | 75-160 | 21 | 277-305 | 75-170 | 197 | 129-142 | 25-57 |
| 26 | 305-335 | 60-140 | 27 | 300-328 | 75-160 | 28 | 295-324 | 75-170 |  |  |  |
| 33 | 187-208 | 60-130 | 34 | 318-347 | 75-160 | 35 | 314-342 | 75-180 |  |  |  |
| 40 | 326-354 | 60-140 | 41 | 328-356 | 75-150 | 42 | 323-352 | 75-180 |  |  |  |
| 47 | 335-365 | 60-140 | 48 | 337-366 | 75-160 | 49 | 332-361 | 75-180 |  |  |  |
| 54 | 340-370 | 60-140 | 55 | 340-370 | 75-160 | 56 | 258-287 | 60-135 |  |  |  |
| 61 | 180-195 | 40-105 | 62 | 300-328 | 75-121 | 63 |  |  |  |  |  |
| 68 | 215-225 | MAX. 120 | 69 | 300-328 | MAX. 125 | 70 | 323-352 | MAX. 135 |  |  |  |
| 75 | 334-363 | 50-110 | 76 | 212-232 | MAX. 121 | 77 | 277-305 | 75-150 |  |  |  |
| 82 | 298-326 | 50-110 | 83 | 195-224 | 60-121 | 84 | 295-324 | 60-135 |  |  |  |
| 89 | 189-205 | 60-130 | 90 | 204-233 | 60-121 | 91 | 325-345 | MAX. 135 |  |  |  |
| 96 | 162-175 | 50-100 | 97 | 260-290 | 60-121 | 98 |  |  |  |  |  |
| 103 | 180-195 | 50-100 | 104 | 242-272 | 60-121 | 105 |  |  |  |  |  |
| 110 | 180-195 | 60-130 | 111 | 180-195 | 60-121 | 112 | 239-268 | 60-135 |  |  |  |
| 117 | 190-215 | 60-130 | 118 | 190-215 | 60-121 | 119 | 325-345 | 75-170 |  |  |  |
| 124 | 208-239 | 60-130 | 125 | 204-233 | 75-150 | 126 | 277-305 | 60-135 |  |  |  |
| 131 | 223-254 | 60-140 | 132 | 223-252 | 75-150 | 133 |  |  |  |  |  |
| 138 | 245-275 | MAX. 120 | 139 | 195-224 | 75-150 | 140 |  |  |  |  |  |
| 145 | 208-239 | MAX. 120 | 146 | 320-340 | 60-121 | 147 |  |  |  |  |  |
| 152 | 260-275 | MAX. 120 | 153 | 295-315 | MAX. 195 | 154 |  |  |  |  |  |
| 160 | 260-275 | 60-140 | 161 | 218-243 | 60-121 | 162 |  |  |  |  |  |
| 167 | 215-225 | 60-130 | 168 | 205-234 | 40-90 | 169 |  |  |  |  |  |
| 174 | 239-270 | 50-110 | 175 | 223-252 | 60-121 | 176 |  |  |  |  |  |
| 182 | 208-239 | 50-110 | 183 | 295-315 | MAX. 125 | 184 |  |  |  |  |  |
| 189 | 224-252 | 60-121 | 190 | 280-310 | 60-121 | 191 |  |  |  |  |  |
| 195 | 190-215 | 40-105 | 192 | 180-195 | 40-105 |  |  |  |  |  |  |
| 200 | 279-308 | 50-110 |  |  |  |  |  |  |  |  |  |

*For 50 Hz , add 300 to RC\#- i.e. for 151 V 50 Hz , RC\#58 changes to 358 .


P25 with DC coil


P25 with AC coil

## Features

- AC and DC coils.
- For controlling motors, power supplies, heating elements and lighting.
- Dust cover available.
- Auxiliary switch available.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: Up to 3 Form X (3PST-NO-DM).
Ratings: See contact rating table.
Material: Silver-cadmium oxide.
Expected Life: 500,000 operations at full load.
AC coil: 2 million operations, mechanical.
DC coil: 5 million operations, mechanical.
Minimum Contact Load: 3A @120VAC.

## Main Contact Ratings @ +25 ${ }^{\circ} \mathrm{C}, \mathbf{6 0} \mathbf{~ H z}$.

| Type | Motor Rating in Amps, 3Ø3P or 1Ø2P |  |  |  | Resistive Rating (Electric Heat) @ 600V |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Full Load @ 600V | Locked Rotor |  |  |  |
|  |  | @ 240V | @ 480V | @ 600V |  |
| P25 | 25A | 150A | 125A | 100A | 30A |


| Motor Rating in Horsepower |  |  |  |
| :---: | :---: | :---: | :---: |
| Type | @ 120V | @ 240V | $@$ 440-600V |
| $1 \varnothing 2 \mathrm{P}$ | 15 HP | 3 HP | $-\overline{\mathrm{HP}}$ |
| $3 \varnothing 3 \mathrm{P}$ | 3 HP | 7.5 HP | 10 HP |

Notes: Models utilizing box lug terminals are restricted to the following ratings: 25 FLA, 150 LRA @ 250VAC; 30A @ 277VAC Resistive; Horsepower ratings shown in the table are valid up to 240VAC.
Tungsten Lamp Rating: 30A, 277VAC.
Electric Discharge Lamp Rating: 30A, 277VAC.
Heavy Duty Pilot Ratings @ 120V through 600V: 720VA max. (Box lug nut units limited to 277VAC.)

## Auxiliary Snap-Action Switch

Arrangements: Up to 2 Form C (DPDT).
Rating: 10 amps at $120 \mathrm{VAC}, 60 \mathrm{~Hz} . @ 25^{\circ} \mathrm{C}$.
Material: Silver.

## Initial Dielectric Strength

Initial Breakdown Voltage: 2,200V rms. minimum between all elements and between all elements and ground.

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: From 6 to 240VDC and 24 to 600VAC, $50 / 60 \mathrm{~Hz}$.
Power: DC, 4-8W; AC, 40VA inrush; 10VA, sealed.
Duty Cycle: Continuous.
Insulation Class: Class A, standard. Class B available
Initial Insulation Resistance: 100 megohms, minimum.

## P25 series

## Definite Purpose Magnetic Contactor <br> 25 Ampere Full Load 30 Ampere Resistive AC \& DC Coils

财 File E22575
(81) File LR15734
(A) No. R 97069

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data

| Nominal <br> VDC | Resistance <br> (Ohms $\mathbf{\pm 1 0 \%}$ <br> @ 25 | Must | Maximum <br> Operate* <br> Volts | Nominal Coil <br> Operating <br> Volts |
| :---: | :---: | :---: | :---: | :---: |
| 12 | 34 | 9 | 15 | Current (ma) @ <br> Nominal Voltage |
| 24 | 133 | 18 | 30 | 353 |


| AC Voltage <br> Rating | Nominal |  | Must Operate |  |
| :---: | :---: | :---: | :---: | :---: |
|  | $\mathbf{6 0 ~ H z}$. | $\mathbf{5 0} \mathbf{~ H z}$. | $\mathbf{6 0} \mathbf{~ H z}$. | $\mathbf{5 0} \mathbf{~ H z}$. |
| 24 | 24 | 24 | 20.4 | 20.4 |
| 120 | 120 | 110 | 102 | 94 |
| 240 | $208 / 240$ | $208 / 220$ | 177 | 177 |

Consult factory for other voltages
*Must operate is $75 \%$ of nominal voltage for any mounting position, applicable for vertical or
horizontal mounting, but not for upside-down mounting.
**Units requiring less power can be provided for some applications.
Consult factory for details.
Note: Coil suppression is recommended for all DC coil units, particularly 120 and 240VDC coils.

## Operate Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Must-Operate Voltage: See coil data tables.

## Environmental Data

Temperature Range: AC: $-55^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$
DC: $-55^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$
Contact sales representative for higher temperature ratings.

## Mechanical Data

Mounting: No. 10 screws on $2.125^{\prime \prime}$ ( 53.98 mm ) centers or universal mounting bracket.
Termination:
Contacts: $8-32$ screw for No. 16 to No. 8 wire, dual .250 " ( 6.35 mm ) quick connect, box lug or captive pressure plate.
Coil: Combination $8-32$ screw and .250 " ( 6.35 mm ) or . $187^{\prime \prime}$ ( 4.75 mm ) quick connect, combination captive pressure plate and .250 " ( 6.35 mm ) quick connect, or .250" ( 6.35 mm ) quick connect.
Aux. Switch: . 250 " $(6.35 \mathrm{~mm}$ ) quick connect, .187" ( 4.75 mm ) quick connect.
Weight: 14 oz. (397g).

## Ordering Information



[^22]
## Outline Dimensions

P25 With AC Coil
P25 With DC Coil


Mounting Plate Footprint


## Contact Terminal Options



## Replacement Parts and Accessories

## Contact Replacement Kit - 9P25X1

Contact replacement kit includes 3 contact pressure springs, 3 movable contact assemblies and 6 stationary contact assemblies. Contact replacement kits are for use only on those models with form X contact arrangements.

Mounting Plate Kit - 9P25X2
Mounting plate kit includes one mounting plate (37B918) and two mounting screws (15J 011).

Auxiliary Switch Kit for P25 AC Coil Units - 9P25X3
This auxiliary switch kit includes one plastic actuator and one auxiliary switch assembly. It contains no screw. One assembly screw must be removed from the P25 contactor and used to mount the auxiliary switch.

Auxiliary Switch Kit for P25 DC Coil Units - 9P25X4
This auxiliary switch kit includes one plastic actuator, one auxiliary switch assembly and one thread cutting screw.


## Features

- AC and DC coils
- Available with auxiliary switch.
- Variety of main contact terminals.
- For control of motors, power supplies, heating elements and lighting.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: Up to 4 Form X (4PST-NO-DM)
Ratings: See contact rating table.
Material: Silver-cadmium oxide.
Expected Life: 200,000 operations at full load.
AC coil: 2 million operations, mechanical.
DC coil: 10 million operations, mechanical.
Minimum Contact Data: 3A @ 120VAC.

## Main Contact Ratings

| Type | Motor Rating in Amps, 303P or 1Ø2P |  |  |  | Resistive Rating @ 600V | Tungsten Rating @277V |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Full Load @ 600V | Locked Rotor |  |  |  |  |
|  |  | @ 240V | @480V | @ 600V |  |  |
| P30 | 30A | 180A | 150A | 120A | 40A | 40A |
| P40 | 40A | 240A | 200A | 160A | 50A | 50A |

P30 Electrical Discharge Lamp Control: 40A @ 240V (Delta), 40A @ 600V (Wye). P40 Electrical Discharge Lamp Control: 50A @ 600V (Wye).

| Type | Motor Rating in Horsepower |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | @ 120V | @ 240V | @ 440-600V |
| P30 | $1 \varnothing 2 \mathrm{P}$ | 15 HP | 3 HP | - |
|  | $3 Ø 3 \mathrm{P}$ | 3 HP | 7.5 HP | 7.5 HP |
| P40 | $1 \varnothing 2 \mathrm{P}$ | 2 HP | 5 HP | - |
|  | $3 \varnothing 3 \mathrm{P}$ | 5 HP | 10 HP | 15 HP |

## Auxiliary Snap-Action Switch

Arrangements: Up to 2 Form C (DPDT).
Rating: 10 amps at $120-250 \mathrm{VAC} @ 25^{\circ} \mathrm{C}$.
Material: Silver.

## Initial Dielectric Strength

Initial Breakdown Voltage: $2,200 \mathrm{~V}$ ms minimum between all elements and between all elements to ground.

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: From 12 to 120 VDC , and 24 to $277 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$.
Power: DC, 7.5 W ; AC, 92VA, In rush; 12 VA Sealed.
Duty Cycle: Continuous.
Insulation Class: Class A, standard, Class B available. Initial Insulation Resistance: 100 megohms, minimum.

## P30/P40 series

## Definite Purpose Magnetic Contactor 30/40 Ampere Full Load 40/50 Ampere Resistive AC \& DC Coils

묵 File E22575
(81) File LR15734
P30 No. R 97070
P40 No. R 97071

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data

| Nominal <br> VDC | Resistance <br> (Ohms $\mathbf{\pm 1 0 \%}$ <br> $\mathbf{@ 2 5} \mathbf{~} \mathbf{~ C )}$ | Must <br> Operate* <br> Volts | Maximum <br> Operating <br> Volts | Nominal Coil <br> Current (ma) @ <br> Nominal Voltage |
| :---: | :---: | :---: | :---: | :---: |
| 12 | 20.8 | 9 | 15 | 577 |
| 24 | 84 | 18 | 30 | 286 |
| 48 | 334 | 36 | 57 | 144 |
| 120 | 2,110 | 90 | 144 | 57 |


| AC Voltage Rating | Nominal | Must Operate* |
| :---: | :---: | :---: |
|  | $50 / 60 \mathrm{~Hz}$. | $50 / 60 \mathrm{~Hz}$. |
| 24 | 24 | 20.4 |
| 120 | 110/120 | 94 |
| 240 | 208/240 | 177 |
| 277 | 277 | 236 |

*Applicable for vertical mounting, but not for upside-down mounting.
Note: Coil suppression is recommended for all DC coil units, particulary 120 and 240VDC coils.

## Operate Data

Must-Operate Voltage: See coil data tables.

## Environmental Data

Temperature Range: $-55^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Universal mounting bracket. See outline drawings.

## Termination

Contacts: Binder screw, box lug, captive pressure plate, combination screw and dual . 250 " ( 6.35 mm ) quick connect, or combination box lug and dual . 250 " ( 6.35 mm ) quick connect. See Main Contact Terminal Options photo.
Coil: Combination 8 -32 screw and .250" ( 6.35 mm ) quick connect.
Aux. Switch: . 250 " ( 6.35 mm ) quick connect, $.187^{\prime \prime}$ ( 4.75 mm ) quick connect.
Weight: 3 Pole Models: 25 oz. (709g) approximately.
4 Pole Models: 28 oz. (794g) approximately.

Ordering Information


Our authorized distritburos are more likely to maintain the following items in stock for immediate delivery.

| P30P42A12P1-120 | P40C42A12D1-120 |
| :--- | :--- |
| P30P42D12P1-24 | P40P42A12P1-24 |
| P30P47A12P1-120 | P40P42A12P1-120 |
| P30P47D12P1-24 | P40P42A12P1-240 |
|  | P40P42D12P1-24 |

## Outline Dimensions

3 Pole Models
AC Coil

DC Coil


4 Pole Models
AC Coil
DC Coil


## Contact Terminal Options



## Main Contact Ordering and Replacement Information

## Contact Replacement Kits

Contact replacement kits for 3 pole models include 3 contact pressure springs, 3 movable contact assemblies and 6 stationary contact assemblies. Kits for 4 pole models include 4 contact pressure springs, 4 movable contact assemblies and 8 stationary contact assemblies. Contact replacement kits are for use only on those models with form $X$ contact arrangements.

## Kits for P30 contactors:

3 Form X models - Kit No. 9P30X1
4 Form X models - Kit No. 9P30X2

## Kits for P40 contactors:

3 Form X models - Kit No. 9P40X1
4 Form X models - Kit No. 9P40X2

## To Replace Contacts:

1. Remove screws holding dust cover in place, and remove cover.
2. Compress and remove contact pressure springs.
3. Lift movable contacts and remove.
4. Remove screws holding stationary contact in place, and remove contacts.
5. Reverse the above procedure to install new stationary and movable contacts.

Caution: Do not overtighten the screws, as it is possible to strip the threads.


P31


P41

## Features

- 3 phase and single phase switching.
- Integral dual QC terminals.
- Class "B" coil insulation.
- Variety of main terminals.
- Applications include HVAC industrial control.
- Direct activated DC coils.


## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Main Contacts:
Arrangements: 3 Form X (3PST-NO-DM) and 4 Form X (4PST-NO-DM).
Ratings: See Main Contact Ratings Table.
Material: Silver-cadmium oxide.
Initial Breakdown Voltage: $2,200 \mathrm{Vms}$ minimum between all elements and between all elements to ground.
Expected Life: 200,000 operations at motor load.
500,000 operations, mechanical.
Minimum Contact Data: 3A @ 120VAC.

## Initial Dielectric Strength

Initial Breakdown Voltage: $2,200 \mathrm{~V}$ ms minimum between all elements and between all elements and ground.

Main Contact Ratings @ $\mathbf{2 5}^{\circ} \mathrm{C}, \mathbf{6 0} \mathrm{Hz}$. AC (Per Pole)

|  | $@$ 240VAC |  | @ 480VAC |  | $@$ 600VAC |  |  |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
|  | LRA | FLA | LRA | FLA | LRA | FLA | RES |
| P31C | 150 | 25 | 125 | 25 | 100 | 25 | 35 |
| P31E | 240 | 40 | 200 | 40 | 160 | 40 | 50 |
| P41B | 120 | 20 | 100 | 20 | 80 | 20 | 25 |
| P41C | 150 | 25 | 125 | 25 | 100 | 25 | 35 |

## P31/P41 series

## Definite Purpose

Magnetic Contactor
16 to 40 Amp Full Load
20 to 50 Amp Resistive
T File E25575
P31 No. R 9071107
File LR15734
P41 No. R 9071106

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: 12 and 24V DC. See Coil Data table.
Power: 8W.
Duty Cycle: Continuous.
Insulation: Class B.
Initial Insulation Resistance: 100 megohms minimum.
Coil Data @ + $\mathbf{2 5}^{\circ} \mathrm{C}$

| Code | Nominal <br> Voltage | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Must <br> Operate <br> Voltage | Nominal <br> Coil <br> Current <br> $(\mathbf{m A})$ |
| :---: | :---: | :---: | :---: | :---: |
| DFO | 12DC | 21 | 9 | 571 |
| DHO | 24DC | 84 | 18 | 286 |

*Applicable for vertical or horizontal mounting, but not for upside-down mounting Note: Coil suppression is recommended for all units.

## Operate Data @ $25^{\circ} \mathrm{C}$

Must-Operate Voltage: See Coil Data Table.

## Environmental Data

Temperature Range: $-55^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Universal mounting bracket. See Outline Drawings. Termination:

Contacts: Dual .250 " $(6.35 \mathrm{~mm})$ quick connect with or without binder head screw or box lug.
Coil: Dual .250 " ( 6.35 mm ) quick connect.
Weight: 18 oz ( 510 g ) approximately.

Ordering Information


## Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

None at present.

## Outline Dimensions



Top View


P41
Top View


## Contact Terminal Options




## Features

- Next-generation contactor is smaller and lighter than previous models.
- Enclosed case affords contact and coil protection while working in conjunction with plastic mounting base to reduce operational noise level and electrically isolate unit.
- Snap-together assembly and reduced part count help to hold down cost.
- Design permits direct access to holes in mounting base.


## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 1 Form X (SPST-NO-DM) with or without shunt and 2 Form X (DPST-NO-DM).
Maximum Ratings: See Contact Ratings Table.
Minimum Ratings: 96VA.
Material: Silver Cadmium Oxide.
Expected Life (application dependent): 200,000 ops., at rated load. 500,000 ops., mechanical.

## Contact Ratings

| Model | Maximum <br> Voltage <br> VAC | Full <br> Load <br> Amps | Locked <br> Rotor <br> Amps | Resistive <br> Load <br> Amps |
| :---: | :---: | :---: | :---: | :---: |
| 25 Amp Contactor | 277 | 25 | 150 | 30 |
| 30 Amp Contactor | 277 | 30 | 150 | 40 |

## Initial Dielectric Strength

Initial Breakdown Voltage:
Between Contacts and Coil: 1,600 VAC
Between Poles: 1,600 VAC
Between Open Contacts: 1,600 VAC

# Model 2000 series 

## Definite Purpose Contactor <br> 1- or 2-pole, 25-30 FLA <br> AC Coil

${ }^{\text {che }}$ us File E75492

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$
Voltage: 24, 100, 120, 200, 208-240 and 277 VAC, $50 / 60 \mathrm{~Hz}$.
Nominal Power: 6 VA ( 60 Hz .); 8 VA ( 50 Hz .).
Nominal Inrush Power: 25 VA ( 60 Hz .); 30 VA ( 50 Hz. ).
Coil Temperature Rise: $65^{\circ} \mathrm{C}$ Max.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Duty Cycle: Continuous.

## Operate Data @ $25^{\circ} \mathrm{C}$

Must Operate Voltage: 85\% of nominal coil voltage or less.
Must Release Voltage: $10 \%$ of nominal coil voltage or more. Initial Operate Time: 20 ms , typical.
Initial Release Time: 10 ms , typical.
Max. Bounce Time: 0-10 ms, typical.

## Environmental Data

Temperature Range: Storage and Operating: $-40^{\circ} \mathrm{C}-+65^{\circ} \mathrm{C}$.
Flammability: UL 94-HB housing.

## Mechanical Data <br> Contact Termination:

Type: \#10-32 Screw with quad 0.250 " ( 6.35 mm ) quick connects.
Wire Size: 16-8 AWG (Must use ring terminal for 8 AWG wire.)
Tightening Torque: 22 in.-lbs.
Coil Termination: Dual $0.250^{\prime \prime}(6.35 \mathrm{~mm}$ ) quick connects.
Weight: 4.93 oz ( 140 g ) approximately

## Ordering Information



Standard part numbers listed below are more likely to be available from stock.

| $2000-15 Q 1999$ | $2000-20 Q 5999$ | $2000-15 T 1999$ | $2000-20 T 5999$ | $2000-15 U 1999$ | $2000-20 U 5999$ |
| :--- | :--- | :--- | :--- | :--- | :--- |
| 2000-15Q2999 | $2000-20 Q 6999$ | $2000-15 T 2999$ | $2000-20 T 6999$ | $2000-15 U 2999$ | $2000-20 U 6999$ |

## Outline Dimensions



Model 2000-10 (one pole)
Model 2000-15 (one pole with shunt)


Model 2000-20 (two pole)

## Termination Options



SPECIAL
\#10-32 Sems Screw with Pressure Plate


[^23]

# Model 96-3100 series 

## Definite Purpose Contactor <br> 1- or 2-pole, 20-40 FLA <br> AC Coil

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IEC 947-4-1

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Environmental Data

Temperature Range: Storage and Operating: $-40^{\circ} \mathrm{C}-+65^{\circ} \mathrm{C}$.
Flammability: UL 94-HB housing.

## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 1 Form X (SPST-NO-DM) with or without shunt and 2 Form X (DPST-NO-DM).
Maximum Ratings: See Contact Ratings Table.
Material: Silver Cadmium Oxide.

Coil Data @ $25^{\circ} \mathrm{C}$
Voltage: 24-277 VAC, $50 / 60 \mathrm{~Hz}$. See Coil Data Table below.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Duty Cycle: Continuous.

## Features

- Robust 1- and 2-pole contactors.
- Shunt available on 1-pole models.
- Convenient mounting plate.


## Contact Ratings

| Full Load Amps | $\begin{gathered} \text { Number } \\ \text { of } \\ \text { Poles } \end{gathered}$ | $\begin{gathered} \text { Line } \\ \text { Voltage } \end{gathered}$ | Locked Rotor Amps | Resistive Amps Rating | Maximum Horsepower |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Voltage | Single <br> Phase |
| 20 | 2 | $\begin{gathered} \hline 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{gathered} \hline 120 \\ 100 \\ 80 \end{gathered}$ | $\begin{aligned} & 30 \\ & 30 \\ & 30 \end{aligned}$ | $\begin{aligned} & 120 \\ & 240 \end{aligned}$ | $\begin{aligned} & 2 \\ & 3 \end{aligned}$ |
| 25 | 1 | $\begin{gathered} 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{gathered} 150 \\ 50 \\ 40 \\ \hline \end{gathered}$ | $\begin{aligned} & 30 \\ & 30 \\ & 30 \end{aligned}$ | $\begin{aligned} & 120 \\ & 240 \end{aligned}$ | $\begin{aligned} & 1 \\ & 2 \end{aligned}$ |
| 25 | 2 | $\begin{gathered} 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{aligned} & 150 \\ & 125 \\ & 100 \end{aligned}$ | $\begin{aligned} & 35 \\ & 35 \\ & 35 \end{aligned}$ | $\begin{aligned} & 120 \\ & 240 \end{aligned}$ | $\begin{aligned} & 2 \\ & 3 \end{aligned}$ |
| 30 | 1 | $\begin{gathered} 240 / 277 \\ 480 \\ 600 \\ \hline \end{gathered}$ | $\begin{aligned} & 150 \\ & 75 \\ & 50 \\ & \hline \end{aligned}$ | $\begin{aligned} & 40 \\ & 40 \\ & 40 \\ & \hline \end{aligned}$ | $\begin{aligned} & 120 \\ & 240 \end{aligned}$ | $\begin{aligned} & 1 \\ & 2 \end{aligned}$ |
| 30 | 2 | $\begin{gathered} \hline 240 / 277 \\ 480 \\ 600 \\ \hline \end{gathered}$ | $\begin{aligned} & 150 \\ & 125 \\ & 100 \\ & \hline \end{aligned}$ | $\begin{aligned} & 40 \\ & 40 \\ & 40 \\ & \hline \end{aligned}$ | $\begin{aligned} & 120 \\ & 240 \end{aligned}$ | $\begin{aligned} & 2 \\ & 3 \end{aligned}$ |
| 40 | 1 | $\begin{gathered} 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{aligned} & 240 \\ & 200 \\ & 160 \end{aligned}$ | $\begin{aligned} & 50 \\ & 50 \\ & 50 \end{aligned}$ | $\begin{aligned} & 120 \\ & 240 \end{aligned}$ | $\begin{aligned} & 2 \\ & 3 \end{aligned}$ |
| 40 | 2 | $\begin{gathered} \hline 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{aligned} & 240 \\ & 200 \\ & 160 \end{aligned}$ | $\begin{aligned} & 50 \\ & 50 \\ & 50 \end{aligned}$ | $\begin{aligned} & 120 \\ & 240 \end{aligned}$ | $\begin{aligned} & 2 \\ & 3 \end{aligned}$ |

## Coil Data

|  | 1-Pole Models |  |  |  | 2-Pole Models |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Nominal Coil Voltage | 24 | 120 | 208/240 | 277 | 24 | 120 | 208/240 | 277 |
| M aximum Pickup Volts | 18 | 88 | 177 | 221 | 18 | 88 | 177 | 221 |
| Drop-Out Volts Range | 6-15 | 20-70 | 40-140 | 50-165 | 6-15 | 20-70 | 40-140 | 50-165 |
| Nominal Inrush VA @ 50 Hz | 22.5 | 22.5 | 22.5 | 22.5 | 37 | 37 | 37 | 37 |
| Nominal Inrush VA @ 60 Hz | 20 | 20 | 20 | 20 | 35 | 35 | 35 | 35 |
| Nominal Sealed VA @ 50 Hz | 7 | 7 | 7 | 7 | 8 | 8 | 8 | 8 |
| Nominal Sealed VA @ 60 Hz | 5.25 | 5.25 | 5.25 | 5.25 | 7 | 7 | 7 | 7 |
| Nominal DC Resistance - Ohms | 16.5 | 420 | 1850 | 2650 | 11 | 250 | 1000 | 1600 |

Ordering Information


\section*{Standard part numbers listed below are more likely to be available from stock. <br> | $3100-15 Q 2999$ | $3100-20 Q 6999$ | $3100-20 Q 18999 C L$ |
| :--- | :--- | :--- |
| $3100-15 T 2999$ | $3100-20 T 6999$ | $3100-20 T 18999 C L$ |
| $3100-15 U 2999$ | $3100-20 U 6999$ | $3100-20 U 18999 C L$ |}

## Outline Dimensions



## Termination Options



[^24]

## Model 98-3100 series

## Definite Purpose Contactor <br> 3-pole, 20-40 FLA <br> AC Coil

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#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Features

- 3-pole contactors.
- Industry-standard mounting plate.
- Optional interlock/auxiliary switches available.
- Manual test button is standard.
- Coil dust cover helps keep dust and dirt away from magnet and coil area.
- Double E magnet system provides optimal performance.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 3 Form X (3PST-NO-DM).
Maximum Ratings: See Contact Ratings Table.
Material: Silver Cadmium Oxide.

## Coil Data @ $25^{\circ} \mathrm{C}$

Voltage: 24-480 VAC, $50 / 60 \mathrm{~Hz}$. See Coil Data Table below.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Duty Cycle: Continuous.

## Environmental Data

Temperature Range: Storage and Operating: $-40^{\circ} \mathrm{C}-+65^{\circ} \mathrm{C}$
Flammability: UL 94-HB housing.

## Mechanical Data

Contact Termination:

## 20, 25, 30 FLA Models

Type: \#10-32 Screw with quad 0.250 " ( 6.35 mm ) quick connects. Wire Size: 16-8 AWG (Stranding must be split for 8 AWG wire.) Tightening Torque: 25 in.-lbs.
40 FLA Models
Type: Box Lug with dual $0.250^{\prime \prime}(6.35 \mathrm{~mm})$ quick connects.
Wire Size: 14-4 Cu/Al AWG
Tightening Torque: 40 in .-lbs.
Coil Termination: Dual $0.250^{\prime \prime}(6.35 \mathrm{~mm})$ quick connects, standard. A 0.250 " quick connect and a \# $\# 6$ - 32 screw, optional.
Arc Cover: Optional on 20-30 FLA models, standard on 40 FLA models. Weight: 16 oz . ( 455 g ) approximately

## Contact Ratings

| Full Load Amps | $\begin{aligned} & \text { Number } \\ & \text { of } \\ & \text { Poles } \end{aligned}$ | $\begin{gathered} \text { Line } \\ \text { Voltage } \end{gathered}$ | Locked Rotor Amps | Resistive Amps Rating | Maximum Horsepower |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Voltage | Single Phase | Three Phase |
| 20 | 3 | $\begin{gathered} \hline 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{gathered} 120 \\ 100 \\ 80 \end{gathered}$ | $\begin{aligned} & 30 \\ & 30 \\ & 30 \end{aligned}$ | $\begin{aligned} & 110 / 120 \\ & 200 / 240 \\ & 480 / 600 \end{aligned}$ | $\begin{gathered} 1.5 \\ 3 \\ - \end{gathered}$ | $\begin{gathered} - \\ 7.5 \\ 7.5 \end{gathered}$ |
| 25 | 3 | $\begin{gathered} 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{aligned} & 150 \\ & 125 \\ & 100 \end{aligned}$ | $\begin{aligned} & 35 \\ & 35 \\ & 35 \end{aligned}$ | $\begin{gathered} 110 / 120 \\ 200 / 208 \\ 240 / 277 \\ 480 \\ 600 \\ \hline \end{gathered}$ | $\begin{aligned} & 2 \\ & 5 \end{aligned}$ | $\begin{aligned} & 7.5 \\ & 10 \\ & 15 \\ & 70 \end{aligned}$ |
| 30 | 3 | $\begin{gathered} 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{aligned} & 180 \\ & 150 \\ & 120 \end{aligned}$ | $\begin{aligned} & 40 \\ & 40 \\ & 40 \end{aligned}$ | $\begin{gathered} 110 / 120 \\ 200 / 208 \\ 240 / 277 \\ 480 \\ 600 \\ \hline \end{gathered}$ | $2$ | $\begin{aligned} & - \\ & 10 \\ & 10 \\ & 15 \\ & 20 \\ & \hline \end{aligned}$ |
| 40 | 3 | $\begin{gathered} 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{aligned} & 240 \\ & 200 \\ & 160 \end{aligned}$ | $\begin{aligned} & 50 \\ & 50 \\ & 50 \end{aligned}$ | $\begin{gathered} 110 / 120 \\ 200 / 208 \\ 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{gathered} 3 \\ - \\ 7.5 \end{gathered}$ | $\begin{aligned} & - \\ & 10 \\ & 10 \\ & 20 \\ & 25 \end{aligned}$ |

## Coil Data

| Nominal Coil Voltage | 24 | 120 | 208/240 | 277 | 480 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Maximum Pickup Volts | 18 | 88 | 177 | 220 | 384 |
| Drop-Out Volts Range | 6-15 | 20-70 | 40-140 | 65-185 | 150-270 |
| Nominal Inrush VA @ 50 Hz | 60 | 60 | 60 | 60 | 65 |
| Nominal Inrush VA @ 60 Hz | 53 | 53 | 53 | 53 | 53 |
| Nominal Sealed VA @ 50 Hz | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| Nominal Sealed VA @ 60 Hz | 5 | 5 | 5 | 5 | 5 |
| Nominal DC Resistance - Ohms | 7 | 180 | 720 | 950 | 3100 |

## Ordering Information



## Standard part numbers listed below are more likely to be available from stock.

| $3100-30 \mathrm{Q} 999 \mathrm{CY}$ | $3100-30 U 9999 \mathrm{CY}$ | $3100-30 \mathrm{~T} 10999 \mathrm{CG}$ |
| :--- | :--- | :--- |
| $3100-30 \mathrm{~T} 9999 \mathrm{CY}$ | $3100-30 \mathrm{~L} 10999 \mathrm{CG}$ | $3100-30 \mathrm{U} 10999 \mathrm{CG}$ |

## Outline Dimensions



Termination Options


ORDERING NOTE: "Standard" terminals need not be specified in the "Ordering Information" chart above. "Special" terminals are offered on a special order basis. Special order items may be subject to extended leadtimes and significant minimum order quantities. Your Tyco Electronics sales engineer must consult with the factory before providing price and availability information regarding items with these options.

## Auxiliary Switches

Various interlock / auxiliary switches are available for the Model 98 contactor. All auxiliary switches for the Model 98 are snap-on design, no tools required.


Footnotes: Ratings of Auxiliary Interlocks / Switches (1) Contact Rating Single Circuit NO or NC and two circuit NO/NC:

|  | 120 V |  | 240 V | $\underline{480 \mathrm{~V}}$ | $\frac{600 \mathrm{~V}}{}$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Amperes - Break | 3.0 |  | 1.5 | 0.75 | 0.6 |
| Amperes -Make | 30 | 15 | 7.5 | 6 |  |
| Amperes - Continuous | 10 | 10 | 10 | 10 |  |

(2) Contact Rating SPDT (337):

10A, 1/3 HP, 125 or 250 VAC 1/2A, 125 VDC; 1/4A, $250 \mathrm{VDC}:$
4A 120 VAC on Lamp Load

## Equipped with 0.250 " (6.35) Quick Connect Terminals

| Description | dificat |  | Field Added Kits |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Contact Config. |  | Kit Catalog | Number of |
|  | NO | NC | Number | Kits Required |
| Single unit interlock | 1 | 0 | 98220-303 | 1 |
| configurations listed. | 0 | 1 | 98220-331 | 1 |
| Maximum of two. | 1 | 1 | 98220-332 | 1 |
| (One on each side.) | 2 | 0 | 98220-303 | 2 |
|  | 0 | 2 | 98220-331 | 2 |
| See footnote (1) for ratings. | 2 | 2 | 98220-332 | 2 |
| SPDT Circuit | 1 | 1 | 98220-337 | 1 |
| (Either one or two | 2 | 2 | 98220-338 | 1 |
| switches per side.) | 2 | 2 | 98220-337 | 2 |
| See footnote (2) for ratings. | 4 | 4 | 98220-338 | 2 |
| SPDT Dry Circuit | 1 | 1 | 98220-341 | 1 |
| 0.1 amp max. | 2 | 2 | 98220-340 | 1 |
| Gold Flashed Contacts | 4 | 4 | 98220-340 | 2 |

Equipped with \#6-32 Screw Terminals \& Saddle Clamps

| Description Factory M | difica |  | Field Added Kits |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Contact Config. |  | Kit Catalog | Number of |
|  | NO | NC | Number | Kits Required |
| Single unit interlock | 1 | 0 | 98220-303 | 1 |
| configurations listed. | 0 | 1 | 98220-331 | 1 |
| Maximum of two. | 1 | 1 | 98220-332 | 1 |
| (One on each side.) | 2 | 0 | 98220-303 | 2 |
|  | 0 | 2 | 98220-331 | 2 |
| See footnote (1) for ratings. | 2 | 2 | 98220-332 | 2 |



## Features

- 3-pole contactors.
- Convenient "universal" mounting plate.
- Optional interlock/auxiliary switches available.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 3 Form $X$ (3PST-NO-DM).
Maximum Ratings: See Contact Ratings Table.
Material: Silver Cadmium Oxide.

## Coil Data @ $25^{\circ} \mathrm{C}$

Voltage: 24-480 VAC, 50/60 Hz. See Coil Data Table below.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Duty Cycle: Continuous.

## Model 93-3100 series

## Definite Purpose Contactor <br> 3-pole, 50-60 FLA <br> AC Coil

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#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Environmental Data

Temperature Range: Storage and Operating: $-40^{\circ} \mathrm{C}-+65^{\circ} \mathrm{C}$.
Flammability: UL 94-HB housing.

## Mechanical Data

## Contact Termination:

Type: Box Lug with dual $0.250^{\prime \prime}(6.35 \mathrm{~mm}$ ) quick connects.
Wire Size: 14-2 Cu/Al AWG
Tightening Torque: 50 in .-lbs.
Coil Termination: Dual $0.250^{\prime \prime}(6.35 \mathrm{~mm}$ ) quick connects, standard. A 0.250 " quick connect and a \# $\#$ - 32 screw, optional.
Arc Cover: Standard.
Weight: 32 oz . $(910 \mathrm{~g}$ ) approximately

## Contact Ratings

| Full Load Amps | $\begin{gathered} \text { Number } \\ \text { of } \\ \text { Poles } \end{gathered}$ | $\begin{gathered} \text { Line } \\ \text { Voltage } \end{gathered}$ | Locked Rotor Amps | Resistive Amps Rating | Maximum Horsepower |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Voltage | Single Phase | Three Phase |
| 50 | 3 |  |  |  | 110/120 | 3 | - |
|  |  | 240 | 300 | 65 | 200/208 | 7.5 | 15 |
|  |  | 480 | 250 | 65 | 240/277 | 10 | 15 |
|  |  | 600 | 200 | 65 | 480 | - | 25 |
|  |  |  |  |  | 600 | - | 25 |
| 60 | 3 |  |  |  | 110/120 | 5 | - |
|  |  | 240 | 360 | 75 | 200/208 | 7.5 | 25 |
|  |  | 480 | 300 | 75 | 240/277 | 10 | 25 |
|  |  | 600 | 240 | 75 | 480 | - | 30 |
|  |  |  |  |  | 600 |  | 30 |

## Coil Data

| Nominal Coil Voltage | 24 | 120 | 208/240 | 277 | 480 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Maximum Pickup Volts | 182 | 93 | 177 | 235 | 374 |
| Drop-Out Volts Range | 6-15 | 20-70 | 40-135 | 50-180 | 120-286 |
| Nominal Inrush VA @ 50 Hz | 140 | 140 | 140 | 140 | 140 |
| Nominal Inrush VA @ 60 Hz | 132 | 132 | 132 | 132 | 132 |
| Nominal Sealed VA @ 50 Hz | 20 | 20 | 20 | 20 | 20 |
| Nominal Sealed VA @ 60 Hz | 14 | 14 | 14 | 14 | 14 |
| Nominal DC Resistance - Ohms | 2.4 | 45 | 180 | 280 | 852 |

## Ordering Information



Standard part numbers listed below are more likely to be available from stock.
None at present.

## Outline Dimensions



## Termination



Shown with Optional Auxiliary Switch

## Auxiliary Switches

Various interlock / auxiliary switches are available for the Model 93 contactor.


W/ \#6-32 SCREW \& SADDLE CLAMP -344 STYLE

## Equipped with $\mathbf{0 . 2 5 0 "}$ (6.35) Quick Connect Terminals

| Factory Modifications |  | Field Added Kits |  |  |
| :--- | :---: | :---: | :---: | :---: |
| Description | Contact Config. |  | Kit Catalog | $\begin{array}{c}\text { Number of } \\ \text { Number }\end{array}$ |
|  | Nits Required |  |  |  |$\left.| \begin{array}{lllll|}\text { NC }\end{array}\right)$

Equipped with \#6-32 Screw Terminals \& Saddle Clamps

| Factory M odifications |  | Field Added Kits |  |
| :---: | :---: | :---: | :---: |
| Description | Contact Config. NO NC | Kit Catalog Number | Number of Kits Required |
| Single unit interlock | 10 | 34300-342 | 1 |
| configurations listed. | $0 \quad 1$ | 34300-343 | 1 |
| Maximum of two. Must be same polarity. (note 1) | $1 \quad 1$ | 34300-344 | 1 |

Footnotes: Ratings of Auxiliary Interlocks / Switches

| Footnotes: Ratings of Auxiliary Interlocks / Switches |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (1) Contact Rating Single Circuit NO or NC and two circuit NO/NC: |  |  |  |  | (2) Contact Rating SPDT (337): |
|  |  |  |  |  | 10A, 1/3 HP, 125 or 250 VAC |
|  | 120 V | $\underline{240 V}$ | 480V | 600 V | 1/2A, $125 \mathrm{VDC} ; 1 / 4 \mathrm{~A}, 250 \mathrm{VDC}$ |
| Break | 3.0A | 1.5A | 0.75A | 0.6A | 4 A 120 VAC on Lamp Load |
| Make | 30A | 15A | 7.5A | 6A |  |
| Continuous | 10A | 10A | 10A | 10A |  |

(2) Contact Rating SPDT (337): $10 \mathrm{~A}, 1 / 3 \mathrm{HP}, 125$ or 250 VAC 1/2A, $125 \mathrm{VDC} ; 1 / 4 \mathrm{~A}, 250 \mathrm{VDC}$ : 4 A 120 VAC on Lamp Load


# Model 93-3100 series 

Definite Purpose Contactor
4-pole, 25-40 FLA
AC Coil
c7 ${ }_{\text {us }}$ File E75492
( $\Subset$ (5) File EN60947-4-1:1991
IEC 947-4-1

## Features

- 4-pole contactors.
- Convenient "universal" mounting plate.
- Optional interlock/auxiliary switches available.

> Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Environmental Data

Temperature Range: Storage and Operating: $-40^{\circ} \mathrm{C}-+65^{\circ} \mathrm{C}$.
Flammability: UL 94-HB housing.

## Mechanical Data

## Contact Termination

25, 30 FLA Models
Type: \#10-32 Screw with quad 0.250" ( 6.35 mm ) quick connects. Wire Size: 16-8 AWG (Stranding must be split for 8 AWG wire.) Tightening Torque: 25 in.-lbs.
40 FLA Models
Type: Box Lug with dual 0.250 " ( 6.35 mm ) quick connects.
Wire Size: 14-4 Cu/AI AWG
Tightening Torque: 40 in.-lbs.
Coil Termination: Dual 0.250 " ( 6.35 mm ) quick connects, standard. A 0.250 " quick connect and a \#6-32 screw, optional.
Arc Cover: Optional on 25-30 FLA models, standard on 40 FLA models.
Weight: 24 oz . 683 g ) approximately

Voltage: 24 - 480 VAC, $50 / 60 \mathrm{~Hz}$. See Coil Data Table below.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Duty Cycle: Continuous.

## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 4 Form X (4PST-NO-DM).
Maximum Ratings: See Contact Ratings Table.
Material: Silver Cadmium Oxide.

## Coil Data @ $25^{\circ} \mathrm{C}$

## Contact Ratings

| Full Load Amps | Number of Poles | $\begin{gathered} \text { Line } \\ \text { Voltage } \end{gathered}$ | Locked Rotor Amps | $\begin{gathered} \hline \text { Resistive } \\ \text { Amps } \\ \text { Rating } \\ \hline \end{gathered}$ | Maximum Horsepower |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Voltage | Single Phase | Three Phase |
| 25 | 3 | $\begin{gathered} 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{aligned} & 150 \\ & 125 \\ & 100 \end{aligned}$ | $\begin{aligned} & 35 \\ & 35 \\ & 35 \end{aligned}$ | $\begin{gathered} \hline 110 / 120 \\ 200 / 208 \\ 240 / 277 \\ 480 \\ \hline \end{gathered}$ | $2$ | $\begin{aligned} & 7.5 \\ & 10 \\ & 15 \\ & \hline \end{aligned}$ |
| 30 | 3 | $\begin{gathered} \hline 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{aligned} & 180 \\ & 150 \\ & 120 \end{aligned}$ | $\begin{aligned} & 40 \\ & 40 \\ & 40 \end{aligned}$ | $\begin{gathered} \hline 110 / 120 \\ 200 / 208 \\ 240 / 277 \\ 480 \\ \hline \end{gathered}$ | $\begin{aligned} & 2 \\ & 5 \\ & 5 \end{aligned}$ | $\begin{aligned} & 10 \\ & 10 \\ & 15 \end{aligned}$ |
| 40 | 3 | $\begin{gathered} \hline 240 / 277 \\ 480 \\ 600 \end{gathered}$ | $\begin{aligned} & 240 \\ & 200 \\ & 160 \end{aligned}$ | $\begin{aligned} & 50 \\ & 50 \\ & 50 \end{aligned}$ | $\begin{gathered} \hline 110 / 120 \\ 200 / 208 \\ 240 / 277 \\ 480 \end{gathered}$ | $\begin{gathered} 3 \\ - \\ 7.5 \end{gathered}$ | $\begin{gathered} - \\ 10 \\ 10 \\ 20 \end{gathered}$ |

## Coil Data

| Nominal Coil Voltage | 24 | 120 | 208/240 | 277 | 480 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| M aximum Pickup Volts | 19.2 | 93 | 177 | 220 | 384 |
| Drop-Out Volts Range | 6-15 | 20-70 | 40-140 | 50-185 | 150-270 |
| Nominal Inrush VA @ 50 Hz | 68 | 68 | 68 | 58 | 48 |
| Nominal Inrush VA @ 60 Hz | 60 | 60 | 60 | 52 | 52 |
| Nominal Sealed VA @ 50 Hz | 14 | 14 | 14 | 11 | 11 |
| Nominal Sealed VA @ 60 Hz | 9 | 9 | 9.5 | 9.5 | 9 |
| Nominal DC Resistance - Ohms | 5 | 148 | 520 | 750 | 2700 |

## Ordering Information



Standard part numbers listed below are more likely to be available from stock.
None at present.

## Outline Dimensions



Termination Options


ORDERING NOTE: "Standard" terminals need not be specified in the "Ordering Information" chart above. "Special" terminals are offered on a special order basis. Special order items may be subject to extended leadtimes and significant minimum order quantities. Your Tyco Electronics sales engineer must consult with the factory before providing price and availability information regarding items with these options.

Shown with Optional Auxiliary Switch

## Auxiliary Switches

Various interlock / auxiliary switches are available for the Model 93 contactor.


## Equipped with $0.250^{\prime \prime}$ (6.35) Quick Connect Terminals

| Factory Modifications |  | Field Added Kits |  |  |
| :--- | :---: | :---: | :---: | :---: |
| Description | Contact Config. |  | Kit Catalog <br> Number |  |
|  | Number of <br> Kits Required |  |  |  |
| Single unit interlock | 1 | 0 | $34220-303 \mathrm{~N}$ | 1 |
| configurations listed. | 0 | 1 | $34220-331 \mathrm{~N}$ | 1 |
| Maximum of two. Must | 1 | 1 | $34220-332 \mathrm{~N}$ | 1 |
| be same polarity. | 2 | 0 | $34220-303 \mathrm{~N}$ | 2 |
| See footnote (1) for ratings. | 0 | 2 | $34220-331 \mathrm{~N}$ | 2 |
|  | 2 | 2 | $34220-332 \mathrm{~N}$ | 2 |
| SPDT Circuit | 1 | 1 | $34220-337 \mathrm{~N}$ | 1 |
| See footnote (2) for ratings. | 2 | 2 | $34220-337 \mathrm{~N}$ | 2 |
| SPDT Dry Circuit, 0.1 amp max. | 1 | 1 | $34220-341 \mathrm{~N}$ | 1 |
| Gold Flashed Contacts | 2 | 2 | $34220-340 \mathrm{~N}$ | 1 |

Equipped with \#6-32 Screw Terminals \& Saddle Clamps

| Factory Modifications |  | Field Added Kits |  |  |
| :--- | :---: | :---: | :---: | :---: |
| Description | Contact Config. |  | Kit Catalog | Number of <br> Number |
|  | Kits Required |  |  |  |$|$| Single unit interlock | 1 | 0 | $34220-342 N$ | 1 |
| :--- | :---: | :---: | :---: | :---: |
| configurations listed. | 0 | 1 | $34220-343 N$ | 1 |
| Maximum of two. Must | 1 | 1 | $34220-344 N$ | 1 |
| be same polarity. (note 1) |  |  |  |  |

Footnotes: Ratings of Auxiliary Interlocks / Switches

| Footnotes: Ra | ins | Aux | ary | erio | / Switches |
| :---: | :---: | :---: | :---: | :---: | :---: |
| (1) Contact Ratin and two circu | g Sing <br> it $\mathrm{NO} /$ | Circu | O or |  | (2) Contact Rating SPDT (337): $10 \mathrm{~A}, 1 / 3 \mathrm{HP}, 125$ or 250 VAC |
|  | 120 V | 240 V | 480 V | 600 V | 1/2A, 125 VDC ; 1/4A, 250 VDC : |
| Break | 3.0A | 1.5A | 0.75A | 0.6A | 4 A 120 VAC on Lamp Load |
| Make | 30A | 15A | 7.5A | 6A |  |
| Continuous | 10A | 10A | 10A | 10A |  |

10A, 13HP 125 or 250 10A, 125 VDC 14A 250VDC 4A 120 VAC on Lamp Load


## Features

- 3-pole contactors.
- Convenient "universal" mounting plate.
- Optional interlock/auxiliary switches available.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 3 Form X (3PST-NO-DM).
Maximum Ratings: See Contact Ratings Table.
Material: Silver Cadmium Oxide.

Coil Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$
Voltage: 24-480 VAC, 50/60 Hz. See Coil Data Table below.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Duty Cycle: Continuous.

## Model 96-3186 series

## Definite Purpose Contactor <br> 3-pole, 75-90 FLA <br> AC Coil

c께 ${ }_{\text {us }}$ File E75492
( © (5) File EN60947-4-1:1991
IEC 947-4-1


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Environmental Data

Temperature Range: Storage and Operating: $-40^{\circ} \mathrm{C}-+65^{\circ} \mathrm{C}$.
Flammability: UL 94-HB housing.

## Mechanical Data

## Contact Termination:

Type: Box Lug with dual $0.250^{\prime \prime}(6.35 \mathrm{~mm})$ quick connects.
Wire Size: 14-1/0 Cu/Al AWG
Tightening Torque: 50 in.-lbs.
Coil Termination: 0.250 " quick connect and a \#6-32 screw.
Arc Cover: Standard.
Weight: 64 oz . ( 1820 g ) approximately

## Contact Ratings

| Full Load Amps | $\begin{gathered} \text { Number } \\ \text { of } \\ \text { Poles } \end{gathered}$ | $\begin{aligned} & \text { Line } \\ & \text { Voltage } \end{aligned}$ | Locked <br> Rotor <br> Amps | Resistive Amps Rating | Maximum Horsepower |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Voltage | Single | Three Phase |
| 75 | 3 |  |  |  | 110/120 | 5 | - |
|  |  | 240 | 450 | 93 | 200/208 | 10 | 20 |
|  |  | 480 | 375 | 93 | 240/277 | 15 | 25 |
|  |  | 600 | 399 | 93 | 480 | - | 40 |
|  |  |  |  |  | 600 | - | 25 |
| 90 | 3 |  |  |  | 110/120 | 7.5 | - |
|  |  | 240 | 540 | 120 | 200/208 | 15 | 25 |
|  |  | 480 | 450 | 120 | 240/277 | 20 | 30 |
|  |  | 600 | 360 | 120 | 480 | - | 50 |
|  |  |  |  |  | 600 | - | 50 |

## Coil Data

| Nominal Coil Voltage | 24 | 120 | 208/240 | 277 | 480 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Maximum Pickup Volts | 18 | 88 | 177 | 220 | 384 |
| Drop-Out Volts Range | 6-15 | 20-70 | 40-110 | 65-185 | 150-270 |
| Nominal Inrush VA @ 50 Hz | 285 | 285 | 285 | 285 | 285 |
| Nominal Inrush VA @ 60 Hz | 240 | 240 | 240 | 240 | 240 |
| Nominal Sealed VA @ 50 Hz | 42 | 42 | 42 | 42 | 42 |
| Nominal Sealed VA @ 60 Hz | 27 | 27 | 27 | 27 | 27 |
| Nominal DC Resistance - Ohms | . 63 | 15.6 | 63.5 | 84 | 255 |

## Ordering Information



## Standard part numbers listed below are more likely to be available from stock.

None at present.


Shown with Optional Auxiliary Switch

## Auxiliary Switches

Various interlock / auxiliary switches are available for the Model 96 contactor.
 -303 STYLE


NORMALLY OPEN \& CLOSED -332 STYLE


NORMALLY CLOSED -331 STYLE


SPDT -337 \& -341 STYLE

W/ \#6-32 SCREW \& SADDLE CLAMP -344 STYLE

-

Equipped with 0.250 " (6.35) Quick Connect Terminals

| Factory Modifications |  | Field Added Kits |  |  |
| :--- | :---: | :---: | :---: | :---: |
| Description | Contact Config. |  | Kit Catalog | Number of <br> Number |
| Kits Required |  |  |  |  |$|$

Equipped with \#6-32 Screw Terminals \& Saddle Clamps

| Factory M odifications |  | Field Added Kits |  |
| :---: | :---: | :---: | :---: |
| Description | $\begin{aligned} & \text { Contact Config. } \\ & \text { NO NC } \end{aligned}$ | Kit Catalog Number | Number of Kits Required |
| Single unit interlock | 10 | 34300-342 | 1 |
| configurations listed. | $0 \quad 1$ | 34300-343 | 1 |
| Maximum of two. Must be same polarity. (note 1) | 11 | 34300-344 | 1 |

Footnotes: Ratings of Auxiliary Interlocks / Switches
(1) Contact Rating Single Circuit NO or NC (2) Contact Rating SPDT (337):

| and two circuit NO/NC: |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
|  | 120 V | 240 V | 480 V |  |
|  | $\frac{600 \mathrm{~V}}{}$ |  |  |  |
| Break | 3.0 A | 1.5 A | 0.75 A | 0.6 A |
| Make | 30 A | 15 A | 7.5 A | 6 A |

Continuous 10A 10A 10A 10A

10A, 1/3 HP, 125 or 250 VAC 1/2A, 125 VDC; 1/4A, $250 \mathrm{VDC}:$ 4A 120 VAC on Lamp Load


## Features

- 3-pole contactors.
- Convenient "universal" mounting plate.
- Optional interlock/auxiliary switches available.


## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 3 Form $\times$ (3PST-NO-DM).
Maximum Ratings: See Contact Ratings Table.
Material: Silver Cadmium Oxide.

# Model A-3100 series 

## Definite Purpose Contactor 3-pole, 120 FLA <br> AC Coil

${ }^{c}{ }^{\text {PN }}$


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Environmental Data

Temperature Range: Storage and Operating: $-40^{\circ} \mathrm{C}-+65^{\circ} \mathrm{C}$.
Flammability: UL 94-HB housing.

## Mechanical Data

## Contact Termination:

Type: Box Lug with dual 0.250 " ( 6.35 mm ) quick connects.
Wire Size: 2 - 4-0 Cu/Al AWG
Tightening Torque: 100 in.-lbs.
Coil Termination: 0.250 " quick connect and a \#6-32 screw.
Arc Cover: Standard.
Weight: 128 oz. ( 3640 g ) approximately

Coil Data @ $25^{\circ} \mathrm{C}$
Voltage: 24-480 VAC, 50/60 Hz. See Coil Data Table below.
Insulation Class: UL Class B $\left(130^{\circ} \mathrm{C}\right)$.
Duty Cycle: Continuous.

Contact Ratings

| Full Load Amps | $\begin{gathered} \text { Number } \\ \text { of } \\ \text { Poles } \\ \hline \end{gathered}$ | $\begin{gathered} \text { Line } \\ \text { Voltage } \end{gathered}$ | Locked Rotor Amps | Resistive Amps Rating | Maximum Horsepower |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | Voltage | Single Phase | Three Phase |
| 120 | 3 |  |  |  | 110/120 | 10 | 30 |
|  |  | 240 | 720 | 150 | 200/208 | 20 | 30 |
|  |  | 480 | 600 | 150 | 240 | 25 | 40 |
|  |  | 600 | 480 | 150 | 480 | - | 75 |
|  |  |  |  |  | 600 | - | 75 |

## Coil Data

| Nominal Coil Voltage | 24 | 120 | 208/240 | 277 | 480 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| M aximum Pickup Volts | 20.4 | 93 | 176 | 235 | 374 |
| Drop-Out Volts Range | 6-15.6 | 20-70 | 40-135 | 65-180 | 150-270 |
| Nominal Inrush VA @ 50 Hz | 470 | 600 | 600 | 600 | - |
| Nominal Inrush VA @ 60 Hz | 400 | 510 | 510 | 510 | 510 |
| Nominal Sealed VA @ 50 Hz | 43 | 50 | 50 | 50 | - |
| Nominal Sealed VA @ 60 Hz | 40 | 48 | 48 | 40 | 48 |
| Nominal DC Resistance - Ohms | . 264 | 4.73 | 18.6 | 30.25 | 78 |

## Ordering Information



Standard part numbers listed below are more likely to be available from stock.
3100Y30Q120999CJ 3100Y30T120999CJ 3100Y30U120999CJ


## Auxiliary Switches

Various interlock / auxiliary switches are available for the Model A contactor.


W/ \#6-32 SCREW \& SADDLE CLAMP
-344 STYLE

Equipped with 0.250" (6.35) Quick Connect Terminals

| Factory M odifications |  | Field Added Kits |  |  |
| :--- | :---: | :---: | :---: | :---: |
| Description | Contact Config. |  | Kit Catalog | Number of <br> NO |
|  | NC | Number | Kits Required |  |$|$| Single unit interlock | 1 | 0 | $34300-303$ | 1 |
| :--- | :---: | :---: | :---: | :---: |
| configurations listed. | 0 | 1 | $34300-331$ | 1 |
| Maximum of two. Must | 1 | 1 | $34300-332$ | 1 |
| be same polarity. | 2 | 0 | $34300-303$ | 2 |
| See footnote (1) for ratings. | 0 | 2 | $34300-331$ | 2 |
|  | 2 | 2 | $34300-332$ | 2 |
| SPDT Circuit | 1 | 1 | $34300-337$ | 1 |
| See footnote (2) for ratings. | 2 | 2 | $34300-337$ | 2 |
| SPDT Dry Circuit, 0.1 amp max. | 1 | 1 | $34300-341$ | 1 |
| Gold Flashed Contacts | 2 | 2 | $34300-340$ | 1 |

Equipped with \#6-32 Screw Terminals \& Saddle Clamps

| Factory M odifications |  | Field Added Kits |  |
| :---: | :---: | :---: | :---: |
| Description | Contact Config. NO NC | Kit Catalog Number | Number of Kits Required |
| Single unit interlock | 10 | 34300-342 | 1 |
| configurations listed. | $0 \quad 1$ | 34300-343 | 1 |
| Maximum of two. Must be same polarity. (note 1) | 11 | 34300-344 | 1 |

Footnotes: Ratings of Auxiliary Interlocks / Switches
(1) Contact Rating Single Circuit NO or NC

| and two circuit NON |  |  |  |  |
| :--- | :--- | :--- | :--- | :---: |
|  | 120 V | 240 V | 480 V | 600 V |
| Break | 3.0 A | 1.5 A | 0.75 A | 0.6 A |
| Make | 30 A | 15 A | 7.5 A | 6 A |
| Continuous | 10 A | 10 A | 10 A | 10 A |

(2) Contact Rating SPDT (337): 10A, 1/3 HP, 125 or 250 VAC $1 / 2 \mathrm{~A}, 125 \mathrm{VDC} ; 1 / 4 \mathrm{~A}, 250 \mathrm{VDC}:$ 4A 120 VAC on Lamp Load

## Engineering Notes

## Alphanumeric Index

| Series Type | Page |
| :---: | :---: |
| 136 ..................... Traffic Light (Flash Transfer) Relay | 916 |
| GP ...................... Control Relay | 917 |
| KBP .................... Mechanical Latching Relay | 910 |
| KUL .................... Magnetic Latching Relay | 908 |
| M DR ................... Rotary Relay (High Shock Resistance) . | 914 |
| ML ...................... Magnetic Latching Control Rela | 917 |
| TR ....................... Timing Control Relay | 917 |
| PE (latching) ......... M agnetic Latching Relay. | 902 |
| PCKWK............... Magnetic Latching Relay. | 904 |
| RT (latching) ......... Magnetic Latching Relay . | 906 |
| S89R/S90R .......... Impulse Relay | 912 |



# PE Latching series 

## 5 Amp, Miniature, Single Coil Printed Circuit Board Relay

cTus ${ }_{\text {us }}$ File E38891
凹O
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- 1 Form C (SPDT).
- 5 amp rated current.
- 10mm height.
- Flux-tight for wave soldering.
- Supplied in tubes.
- DIP configuration.
- 4kV coil-to-contact insulation.


## Contact Data

Arrangement: 1 Form C (SPDT).
Material: Silver-nickel 90/10.
Expected Mechanical Life: 5 million operations.
Ratings: 5 amp 250VAC resistive 100,000 operations.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC.
Between Coil and Contacts: 4,000VAC.
Creepage/Clearance Coil-Contact: $>3.2 / 4 \mathrm{~mm}$.

## Coil Data @ $20^{\circ} \mathrm{C}$

Nominal Coil Power: 360mW.

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Pull-in <br> Voltage <br> VDC | Reset <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: |
| 03 | 25 | 2.25 | 2.25 | 120.0 |
| 05 | 69 | 3.75 | 3.75 | 72.0 |
| 06 | 100 | 4.5 | 0.6 | 60.0 |
| 12 | 400 | 9.0 | 12 | 30.0 |
| 24 | 1,600 | 18.0 | 2.4 | 15.0 |

## Operate Data

Minimum Energization Time: 20 ms , at nom. voltage. (Consult factory on information on reduced pulse duration at higher voltages.)
Maximum Energization Time: 1 min. at 10\% duty cycle.
Maximum Reset Voltage: 120\% of nominal voltage at $-40^{\circ} \mathrm{C}$.
Switching Rate: 360 ops./hr. max. at rated load.

## Coil Operation

| Version | A.. |  | C.. |  |
| :--- | :---: | :---: | :---: | :---: |
| Coil Terminals | A1 | A2 | A1 | A2 |
| Pull-In Polarity | + | - | - | + |
| Reset Polarity | - | + | + | - |

Note: Contact position not defined at delivery.

## Environmental Data

## Temperature Range:

Operating: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Shock (Destructive): $>100 \mathrm{~g}$.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure ( $94 \mathrm{~V}-0$ rated): Flux-tight plastic case.
Weight: 0.18 oz. ( 5 g ) approximately.

## Contact Life



Max. DC Load Breaking Capacity


Coil Operating Range


Ordering Information


* Sealed version available on request.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
None at present.

## Outline Dimensions



## Wiring Diagram (Bottom View)

12 A2



PC Board Layout (Bottom View)



## PCKW K series

Latching, Slim 16Amp<br>Miniature Power PC Board Relay<br>Appliances, HVAC, Office Machines.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Efficient, latching operation.
- Slim outline to save board space.
- 1 Form A contact arrangement.


## Contact Data @ 20응

Arrangements: 1 Form A (SPST-NO).
Material: Ag Alloy.
Max. Switching Rate: 300 ops./ min. (no load).
20 ops./ min. (rated load).
Expected Mechanical Life: 5 million ops (no load).
Expected Electrical Life: 100,000 ops (16A @ 250VAC).
Minimum Load: 100mA @ 5VDC.
Initial Contact Resistance: 100 milliohms @ 1A, 6VDC.

## Contact Ratings

Ratings: 16A @ 277VAC resistive.
Max. Switched Voltage: AC: 277V.
Max. Switched Current: 16A.
Max. Switched Power: 4,432VA.

## Initial Dielectric Strength

Between Open Contacts: 1,000VAC, $50 / 60 \mathrm{~Hz}$. ( 1 min .);

$$
1,200 \mathrm{VAC}, 50 / 60 \mathrm{~Hz} \text {. (1 sec.). }
$$

Between Contacts and Coil: $4,000 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. (1 min.); 4,800VAC, $50 / 60 \mathrm{~Hz}$ ( 1 sec. ).
Surge Voltage Between Coil and Contacts: 10,000V (1.2/50 $\mu \mathrm{s}$ ).

## Initial Insulation Resistance

Between Mutually Insulated Conductors: 1,000M ohm @ 500VDC.

## Coil Data

Voltage: 12VDC (Consult factory for other coil voltage).
Nominal Power: 1.8W (SET).
800mW (RESET).
Max. Coil Power: $130 \%$ of nominal at $20^{\circ} \mathrm{C}$.

Coil Data @ $20^{\circ} \mathrm{C}$

| PCKWK |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Rated Coil <br> Voltage <br> (VDC) | SET Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | RESET Coil <br> Resistance <br> (ohms) $\pm \mathbf{1 0 \%}$ | SET Coil <br> Voltage Range <br> (VDC) | RESET Coil <br> Voltage Range <br> (VDC) |  |
| 12 | 80 | 180 | $6.0-9.0$ | $2.0-7.0$ |  |

## Operate Data @ 20 ${ }^{\circ} \mathrm{C}$

SET Time: 10 ms max. (including bounce) at rated voltage.
8 ms max. (including bounce) at $130 \%$ rated voltage.
RESET Time: 10 ms max. at rated voltage.
8 ms max. at 130\% rated voltage.
The pulse to either the set or reset coil of the PCKWK relay should be no less than 30 milliseconds duration, and no more than 1 second duration.

Observe coil polarity.
Do not apply voltage to both SET and RESET coils simultaneously.
Extemal magnetic fields may affect the operation of the relay.

## Environmental Data

Temperature Range:
Operating: $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Vibration, Mechanical: 10 to 55 Hz ., 1.5 mm double amplitude for 2 hr .
Operational: 10 to 55 Hz ., 1.5 mm double amplitude for 5 min .

## Shock, Mechanical: $980 \mathrm{~m} / \mathrm{s}^{2}$.

Operational (when SET): $98 \mathrm{~m} / \mathrm{s}^{2}$.
Operational (when RESET): $980 \mathrm{~m} / \mathrm{s}^{2}$.
Operating Humidity: 20 to 65\% RH. (Non-condensing).

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure: Vented (Flux-tight) plastic cover.
Weight: $0.49 \mathrm{oz}(14 \mathrm{~g})$ approximately.

| Ordering Information |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Typical Part Number | PCKWK | -1 | 12 | D | 2 | M | ,000 |
| 1. Basic Series: <br> PCKW $=16$ A double coil relay |  |  |  |  |  |  |  |
| 2. Termination: 1 = 1 pole |  |  |  |  |  |  |  |
| 3. Coil Voltage: $12=12 \mathrm{VDC}$ Consult factory for other voltages. |  |  |  |  |  |  |  |
| 4. Coil Input: D = Standard |  |  |  |  |  |  |  |
| 5. Contact Material: 2 =AgSnO |  |  |  |  |  |  |  |
| 6. Contact Arrangement: M = 1 Form A (SPST-NO) |  |  |  |  |  |  |  |
| 7. Suffix: <br> ,000 = Standard model <br> Other Suffix $=$ Custom model |  |  |  |  |  |  |  |

* Not suitable for immersion cleaning processes.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions



## Wiring Diagram (Bottom View)



## PC Board Layout (Bottom View)




## Features

- Latching relay with 1 or 2 coils.
- SPDT (16A) and DPDT (8A) contact arrangements.
- Flux tight enclosure.
- Meets VDE 10 mm spacing, 5 kV dielectric, coil to contacts.
- Conforms to UL 508, 1873 and 353.
- UL Class F $\left(155^{\circ} \mathrm{C}\right)$ coil construction
- Schrack brand


## Contact Data

Arrangements: 1 Form C (SPDT) Wiring Diagram Code 3.
2 Form C (DPDT) Wiring Diagram Code 5.
Material: Silver-nickel 90/10.
Minimum Load: $12 \mathrm{~V} / 100 \mathrm{~mA}$.
Expected Mechanical Life: 5 million operations, 1 pole.

$$
2 \text { million operations, } 2 \text { pole. }
$$

Designed to meet UL/CSA/VDE ratings with relay properly vented. Remove vent nib after soldering and cleaning.

## ULCSA ratings @ $70^{\circ} \mathrm{C}$ :

| Code | NO/NC Load | Type | Operations |
| :---: | :---: | :---: | :---: |
| 3 | 16A/8A @ 240VAC | GP | 6 K |
|  | 8A @ 28VDC | Resistive | 30 K |
|  | $1 / 2$ HP @ 120VAC* | Motor | 6 K |
|  | 1HP @ 240VAC* | Motor | 6 K |
|  | 48 LRA, 8 FLA @ 240VAC | Motor | 30 K |
|  | B300 | Pilot Duty | 6 K |
| 5 | 8A @ 240VAC | Resistive | 30 K |
|  | 8A @ 28VDC | Resistive/GP | 30 K |
|  | $1 / 2$ HP @ 240VAC | M otor | 6 K |
|  | $1 / 4$ HP @ 120VAC | M otor | 6 K |
|  | B300 | Pilot Duty | 6 K |

* Form A only

VDE Ratings @ $70^{\circ} \mathrm{C}$ :

| Code | NO/NC Load | Type | Operations |
| :---: | :---: | :---: | :---: |
| 3 | 16A@ 250VAC | Resistive | 10 K |
|  | $8 \mathrm{~A} @ 250 \mathrm{VAC}$ | Resistive | 30 K |
| 5 | $8 \mathrm{~A} @ 250 \mathrm{VAC}$ | Resistive | 30 K |
|  | $8 \mathrm{~A} @ 250 \mathrm{VAC}$ | Resistive | 100 K |

## RT series (Latching) <br> 16 Amp Miniature <br> Printed Circuit Board Relay

${ }^{\text {cTus }}$. File E38891<br>$\therefore$ NR 6106

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Coil Data @ $20^{\circ} \mathrm{C}$
Voltage: 5 to 24VDC*, 1 coil.
3 to 24VDC*, 2 coil.
Nominal Power @ $\mathbf{2 5}^{\circ} \mathrm{C}$ : 400mW, 1 coil. $600 \mathrm{~mW}, 2$ coil.
Duty Cycle: Continuous.
Initial Insulation Resistance: 10,000 megohms, min., at $20^{\circ} \mathrm{C}, 500 \mathrm{VDC}$ and $50 \%$ rel. humidity.
Coil Construction: UL Class F $\left(155^{\circ} \mathrm{C}\right)$.

* Other coil voltages upon request.

1 Coil Data

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Set <br> Voltage <br> VDC | Reset <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: |
| 05 | 62 | $3.5-6.0$ | $2.75-6.0$ | 80.0 |
| 06 | 90 | $4.2-7.2$ | $3.30-7.2$ | 66.7 |
| 12 | 360 | $8.4-14.4$ | $6.60-14.4$ | 33.3 |
| 24 | 1,440 | $16.8-28.8$ | $13.20-28.8$ | 16.7 |

## 2 Coil Data

| Nominal <br> Voltage <br> VDC | DC <br> Resistance <br> in Ohms <br> $\mathbf{\pm 1 0 \%}$ | Set <br> Voltage <br> VDC | Reset <br> Voltage <br> VDC | Nominal <br> Coil <br> Current <br> (mA) |
| :---: | :---: | :---: | :---: | :---: |
| 05 | 42 | $3.5-7.5$ | $2.75-4.5$ | 120.0 |
| 06 | 55 | $4.2-9.0$ | $3.30-9.0$ | 108.0 |
| 12 | 240 | $8.4-18.0$ | $6.60-18.0$ | 50.0 |
| 24 | 886 | $16.8-36.0$ | $13.20-36.0$ | 27.0 |

## Operate Data @ $20^{\circ} \mathrm{C}$

Must Operate Voltage: See coil data.
Operate Time (Excluding Bounce): 5 ms , typ., at nom. voltage.
Release Time (Excluding Bounce): 4 ms , typ., at nom. voltage.
Max. Switching Rate: 360 ops. at rated load.

## Environmental Data

Temperature Range:
Storage: $-40^{\circ} \mathrm{C}$ to $+105^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$ at rated current.
Vibration: $30-500 \mathrm{~Hz}$ :
$N / C$ opens at $>3 \mathrm{~g}$ and changes from reset to set at $>5 \mathrm{~g}$;
Shock: $\mathrm{N} / \mathrm{C}$ opens at $>6 \mathrm{~g}$ and changes from reset to set at $>15 \mathrm{~g}$.;

## Mechanical Data

Termination: Printed circuit terminals.
Enclosures: RT 3, 4: Flux-tight, top vented, plastic case.
Weight: 0.46 oz . ( 13 g ) approximately.


Note: All latching model RT part numbers are Schrack brand, are orange in color and have UL Class $\mathrm{F}\left(155^{\circ} \mathrm{C}\right)$ coil construction.
Our authorized distributors are more likely to stock the following items for immediate delivery. None at present.

## Outline Dimensions


$\overline{\text { Wiring Diagrams (Bottom View) }}$


Code $3 \quad$ Code 5

|  | 1 Coil |  | 2 Coils |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Coil Terminals | A1 | A2 | A1 | A3 | A2 |
| Operate | + | - |  | + | - |
| Reset | - | + | - | + |  |

Contact position not defined at delivery.

## $\overline{\text { PC Board Layout (Bottom View) }}$



Code 3 \& 5

## Breaking Capacity

1 Pole


A: 16A Version.
B: 12A Version


A: 1 Contact.
B: 2 Contacts in series.


## Features

- Single or dual-wound DC coils or single-wound AC coils.
- Contact arrangements to 3PDT.
- Reset occurs by reversing polarity in a single coil relay or by energizing
the reset winding in dual coil relays.
- Uses same sockets as other KU relays.
- Well suited for applications such as alarm systems, machine tools, battery chargers and process controls.


## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements:
DC Single Coil: 1 Form C (SPDT), 2 Form C (DPDT) and 3 Form C (3PDT).
DC Dual Coil: 1 Form C (SPDT) and 2 Form C (DPDT).
AC Single Coil: 1 Form C (SPDT), 2 Form C (DPDT) and 3 Form C (3PDT).
Materials: Siver-cadmium oxide.

## Expected Life:

Mechanical: 10 million operations.
Electrical: 100,000 operations minimum at rated load.

## Contact Ratings

| Contact <br> Code | Arrangement | Ratings |
| :---: | :--- | :--- |
| $\mathbf{5}$ | $1,2,3$ poles | 10A @ 28VDC or 240VAC, 80\% <br>  |
|  |  | @F; 1/4 HP @ 120VAC, 1/3 HP |
|  |  |  |

## Initial Dielectric Strength

Between Open Contacts: 500V rms.
Between Adjacent Contacts: $1,500 \mathrm{~V}$ ms.
Between Contacts and Coil: $1,500 \mathrm{~V}$ rms.

## Coil Data @ $25^{\circ} \mathrm{C}$

Duty Cycle: Continuous. (Latch and reset not to be energized simultaneously).
Initial Insulation Resistance: 100 megohms, minimum.
Initial Breakdown Voltage: 1500 V ms, 60 Hz . between all elements.

Note: On single coil AC models one terminal is common. Latch/Reset function is accomplished by input in series with a diode to provide the correct polarity to the coil. To perform either function, the terminal not being used (Latch or Reset) must be open or isolated with no other path to common or ground.

## KUL series

## 10 Amp Magnetic Latching Relay

況 File E22575
(18) File 15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data

|  | Nominal Voltage | DC <br> Resistance in Ohms $\pm 10 \% \dagger$ |  | Must <br> Operate <br> Voltage | $\begin{aligned} & \text { 0.5 W } \\ & \text { Resistor } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| DC Coils | Single Coil |  |  |  |  |
|  | $\begin{aligned} & 12 \\ & 24 \\ & 48 \end{aligned}$ | 1,8 | 20 | $\begin{array}{r} 9.0 \\ 18.0 \\ 36.0 \end{array}$ | - |
|  | Dual Coil* |  |  |  |  |
|  | 12 24 48 |  | 90 | $\begin{array}{r} 9.0 \\ 18.0 \\ 36.0 \end{array}$ | - |
| $\begin{gathered} \text { AC } \\ \text { Coils } \\ 50 / 60 \mathrm{~Hz} . \end{gathered}$ | Single Coil with Diodes** |  |  |  |  |
|  | $\begin{array}{r} 24 \\ 120 \\ 240 \end{array}$ | 3,7 17,9 | 76 | $\begin{array}{r} 20.4 \\ 102.0 \\ 204.0 \end{array}$ | $\begin{array}{r} 680 \Omega \\ 15,000 \Omega \\ 68,000 \Omega \end{array}$ |
|  | Dual Coil |  |  |  |  |
|  |  | Latch | Reset |  |  |
|  | $\begin{array}{r} 24 \\ 120 \end{array}$ | $\begin{gathered} 100 \\ 2525 \end{gathered}$ | $\begin{gathered} 250 \\ 7800 \end{gathered}$ | $\begin{array}{r} 20.4 \\ 102.0 \end{array}$ | - |

* Dual coil available only with 1 or 2 Form C contacts. On standard dual coil relays, the latch and unlatch voltage must be the same. For unlike
voltages, please contact your sales representative.
** Diodes and resistors included inside relay with 1 and 2 Form C
contacts. For 3 Form C relays, the customer must furnish and wire
diodes and resistors extemally.
$\dagger \pm 15 \%$ for AC coils.


## Operate Data @ $25^{\circ} \mathrm{C}$

Must Operate Voltage
DC Coils: $75 \%$ of nominal voltage.
AC Coils: 85\% of nominal voltage.
Operate Time : 25 milliseconds maximum at nominal voltage.
Release or Reset Time: 25 milliseconds maximum at nominal voltage.

## Environmenal Data

Temperature Range:
Storage: $-45^{\circ} \mathrm{C}$ to $+105^{\circ} \mathrm{C}$.
Operating:
Single Coil AC \& DC: $-45^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Dual Coil DC: $-45^{\circ} \mathrm{C}$ to $+50^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: .187" (4.75mm) quick connect/solder terminals. Sockets are available.
Enclosure: Clear plastic polycarbonate heat and shock resistant case. Weight: $3.4 \mathrm{oz} .(96 \mathrm{~g})$ approximately.


Our authorized distributors are more likely to maintain the following items in stock for immediate delivery..

| KUL-5A15S-120 | KUL-11A15S-120 | KUL-11D15D-24 | KUL-11D15S-24 |
| :--- | :--- | :--- | :--- |
| KUL-11A15S-24 | KUL-11D15D-12 | KUL-11D15S-12 |  |

Outline Dimensions


See KU series drawings for bracket mount case.

## Terminal Dimensions

.187" (4.75mm) Standard


Wiring Diagrams (Bottom Views)


Note 1 Contact positions shown in diagrams is with the "RESET" input having been energized last.

Note 2 Do not connect any low impedance loads from terminal B to A.
Note 3 Resistor and diodes connected by customer. See Coil Data Chart on KUL Series engineering data page for resistor value. Recommended using 1N4007 diode.


## Features

- Dual coil latching relay accepts a momentary impulse to one coil to latch and a second impulse to the other coil to release.
- Enclosed in a clear polycarbonate dust cover.
- AC or DC coils.
- Contacts up to 5PDT.
- Mounts in 11 or 20-pin octal-type plugs.


## Contact Data @ +25 ${ }^{\circ} \mathrm{C}$

Arrangements: From 2 Form C (DPDT) to 5 Form C (5PDT), (3PDT each coil).
Ratings: 10 amps @ 120VAC.
Materials: 10 amp models: Silver-cadmium oxide.
Expected Life: 500,000 operations, mechanical; 50,000 operations minimum at rated loads.

## KBP series

## 10 Amp <br> Dual Coil <br> Latching Relay

기 File E29244
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data

|  | Nominal Voltage | Resistance in Ohms $\pm 10 \%$ @ $25^{\circ} \mathrm{C}$ | Nominal Current Milliamperes |
| :---: | :---: | :---: | :---: |
| DC Coils (to 5 pole) | $\begin{array}{r} 12 \\ 24 \\ 48 \\ 110 \end{array}$ | $\begin{gathered} 52.0 \\ 230 \\ 850 \\ 4560 \end{gathered}$ | $\begin{gathered} 230 \\ 104 \\ 56.5 \\ 24 \end{gathered}$ |
|  | 220 | Use 110 volt relay with 5000 Ohms, 5 watt resistor in series. |  |
|  | Nominal Voltage | Resistance in Ohms <br> $\pm 15 \%$ @ $25^{\circ} \mathrm{C}$ | Nominal Current Milliamperes |
| AC Coils | Up to 4 Pole Relays |  |  |
|  | $\begin{array}{r} 24 \\ 120 \\ 240 \end{array}$ | $\begin{array}{r} 42 \\ 1030 \\ 4100 \end{array}$ | $\begin{array}{r} 210 \\ 44 \\ 22 \end{array}$ |
|  | For 5 Pole Relays |  |  |
|  | $\begin{array}{r} 24 \\ 120 \end{array}$ | $\begin{array}{r} 27 \\ 700 \end{array}$ | $\begin{array}{r} 325 \\ 68 \end{array}$ |

## Operate Data @ +25 ${ }^{\circ} \mathrm{C}$

## Must-Operate Voltage:

DC: 75\% of nominal voltage.
AC: $85 \%$ of nominal voltage.
Operate Time: 25 milliseconds excluding bounce.

## Environmental Data

Temperature Range:
Storage: $105^{\circ} \mathrm{C}$.
Operating: $-45^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$

## Coil Data @ +25²

## Nominal Power:

DC Coils: 2.7 W .
AC Coils: 5.3 VA to 4 pole; 7.8 VA to 5 pole.
Maximum Power: DC coils -4.0 W .
Duty Cycle: Intermittent.
Initial Insulation Resistance: 100 megohms.

## Mechanical Data

Termination: See terminals table on next page.
Enclosures: Plastic dust cover standard. Hermetically sealed metal case available on special order.
Weight: 10.8 oz . ( 306 g ) approximately.

## Ordering Information

|  | Typical Part Number $>$ | KBP | -11 | A | G | $-24$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Type: KBP = Enclosed, dual coil latching relay. | $\mathrm{KB}=$ Open, dual coil latching relay. |  |  |  |  |  |
| 2. Contact Arrangement: $11=2$ Form C (DPDT) $17=4$ Form C (4PDT) $20=5$ Form C (5PDT) |  |  |  |  |  |  |
| 3. Coil Input: $\begin{aligned} & A=A C \\ & D=D C \end{aligned}$ |  |  |  |  |  |  |
| 4. Contact Rating: G = $10 \mathrm{amps} @ 120 \mathrm{VAC}, 80 \%$ PF. |  |  |  |  |  |  |
| 5. Coil Voltage: $\begin{array}{ll} 12,24,48,110 \mathrm{VDC} & \text { Specify } \\ 24,120,240 \mathrm{VAC} & \text { relays. } \end{array}$ | latch and release coil voltage for sta is available on special order. | d KBP |  |  |  |  |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| KB-17AG-120 | KBP-11AG-120 | KBP-11DG-110 |
| :--- | :--- | :--- |
| KB-17DG-12 | KBP-11DG-24 | KBP-20AG-120 |



## Wiring Diagrams (Bottom Views)



Note: Shown with reset coil energized last.

# S89R/S90R series 



S89R


S90R

# Bistable, Impulse Relay 15 and 20 Amp Industrial Rating Continuous Coil Rating 

미 File E22575
(18) File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Low cost, bistable impulse relay.
- Operates on 75 ms min. pulse.
- Used in garage door controls, motor reversing and lighting controls.
- S89R available with plastic cover and octal plug-in base.


## Contact Data @ $25^{\circ} \mathrm{C}$

Ratings: S89R: $15 \mathrm{amps}, 1 / 2 \mathrm{HP}, 125 / 250 \mathrm{VAC} ; 5 \mathrm{amps}, 125 \mathrm{VAC}$, tungsten filament lamp load; $1 / 2 \mathrm{amp}, 125 \mathrm{VDC} ; 1 / 4 \mathrm{amp}, 250 \mathrm{VDC}$.
Expected Life: 100,000 operations, mechanical; 50,000 operations at rated loads.
Ratings: S90R:

| Load | Minimum Life |
| :--- | ---: |
| 20A, 120VAC or 7.5A, 277VAC, Tungsten. | 10,000 Cycles |
| 15A, 125VAC or 7A, 277VAC, Fluorescent. | 10,000 Cycles |
| 20A, 277VAC, 75-80\% PF. | 50,000 Cycles |
| 1 HP, 125VAC, 50/60 Hz. | 50,000 Cycles |
| 2 HP, 250VAC, 50/60 Hz. | 50,000 Cycles |
| 12 FLA, 60 LRA, 120VAC. | 50,000 Cycles |
| 8 FLA, 48 LRA, 240VAC. | 50,000 Cycles |
| Pilot Duty, 360VA, 125/250VAC. | 50,000 Cycles |

Coil Data @ $25^{\circ} \mathrm{C}$

## Nominal Power:

DC Coils: 6.33 Watts @ $+25^{\circ} \mathrm{C}$.
AC Coils: 9VA @ $+25^{\circ} \mathrm{C}$.

Insulation: Class $\mathrm{B}\left(130^{\circ} \mathrm{C}\right)$.
Initial Breakdown Voltage: $1,500 \mathrm{~V}$ rms, 60 Hz .
Must-Operate Voltage:
DC Coils: $75 \%$ of nominal voltage @ $+25^{\circ} \mathrm{C}$.
AC Coils: $85 \%$ of nominal voltage @ $+25^{\circ} \mathrm{C}$.

## Coil Data

| Nominal <br> Voltage | Resistance <br> DC Ohms <br> $\mathbf{\pm 1 5 \% ~ @ ~} \mathbf{2 5}^{\circ} \mathbf{C}$ | Nominal <br> Current <br> $\mathbf{m A}$ |
| :---: | :---: | :---: |
| 24VAC | 8.7 | 375 |
| 120VAC | 260 | 75 |
| 240VAC | 1084 | 38 |
| 6VDC | 5.8 | 1035 |
| 12VDC | 22.5 | 533 |
| 24VDC | 92 | 260 |

## Environmental Data

Temperature Range: $-10^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.

## Mechanical Data

Weight: 7.75 oz. (241g) approximately.

Ordering Information

|  | Typical Part No. $\downarrow$ S89R | 5 | A | B | D | 1 | -24 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: $S 89 R=15 A$ $S 90 R=20 A$ $S 90 R=20 A$ |  |  |  |  |  |  |  |
| 2. Contact Arrangement: $5=\text { SPDT } \quad 11=\text { DPDT }$ | $17=4 \mathrm{PDT}$ |  |  |  |  |  |  |
| $\begin{aligned} & \text { 3. Coil Input: } \\ & \begin{array}{l} A=A C \\ D=D C \end{array} \end{aligned}$ |  |  |  |  |  |  |  |
| 4. Coil Terminal Style: $\begin{aligned} & A=.187^{\prime \prime}(4.75 \mathrm{~mm}) \text { Quick connect/solder. } \\ & B=.250^{\prime \prime}(6.35 \mathrm{~mm}) \text { Quick connect/solder. } \end{aligned}$ | $\mathrm{P}=$ Dust cover with octal plug-in base. (S89R only.) |  |  |  |  |  |  |
| 5. Switch Terminal Style: $\begin{aligned} & C=.187^{\prime \prime}(4.75 \mathrm{~mm}) \text { Quick connect.* } \\ & D=.250^{\prime \prime}(6.35 \mathrm{~mm}) \text { Quick connect. } \end{aligned}$ | P = Dust cover with octal plug-in base.* <br> * S89R only. |  |  |  |  |  |  |
| 6. Switch Terminal Configuration: 1 = Style 1 (See outline drawings.) |  |  |  |  |  |  |  |
| 7. Coil Voltage: 24, 120, 240VAC 6, 12, 24VDC |  |  |  |  |  |  |  |


| Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| S89R5ABD1-24 | S89R11AAC1-24 | S89R11ABD1-120 | S89R11DAC1-24 | S90R5ABD1-120 |
| S89R5ABD1-120 S89R11AAC1-120 S89R11APP1-120 S89R11DBD1-12 | S90R11ABD1-24 |  |  |  |
| S89R5DBD1-12 | S89R11ABD1-24 | S89R11DAC1-12 | S89R11DBD1-24 | S90R11ABD1-120 |

## Outline Dimensions

## Open Relays



## Enclosed Relays

S89 Series


Wiring Diagram


## Switch Terminal Configuration

## Style 1



## Switch Terminal Style

$\mathrm{C}=.187{ }^{2}(4.75 \mathrm{~mm})$ Quick-connect $D=.250$ " ( 6.35 mm ) Quick-connect

| $.187 "(4.75 \mathrm{~mm})$ | .250" (6.35mm) |
| :--- | :--- |
| Quick Connect | Quick Connect |
| S89R | S89R |
|  | S90R |




Small 4PDT


Medium 24PDT

## Features

- AC and DC coils, latching and non-latching.
- 4PDT through 24PDT contact arrangements.
- Contacts will not chatter when relays are subjected to high-impact shock blows of 2000 ft .-lbs.


## Contact Data

Arrangements: 4 Form C (4PDT) through 24 Form C (24PDT).

## Contact Ratings

| Single Contacts | Two Contacts in Series |
| :---: | :---: |
| $10 \mathrm{~A}, 115 \mathrm{VAC}$ | $3 \mathrm{~A}, 440 \mathrm{VAC}$ |
| $3 \mathrm{~A}, 28 \mathrm{VDC}$ | $15 \mathrm{~A}, 115 \mathrm{VAC}$ |
| $0.8 \mathrm{~A}, 125 \mathrm{VDC}$ | $1.5 \mathrm{~A}, 125 \mathrm{VDC}$ |

The above AC contact ratings are based on contact loads having a $50 \%$ power factor. The DC contact ratings are based on resistive loads.

## Contact Section



## M DR series

## 10 Amp Rotary Relay <br> For Demanding Shock \& Vibration Applications

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Operate Data @ $25^{\circ} \mathrm{C}$

| Type | Typ. Operate Time (ms) | Typ. Release Time (ms) |
| :---: | :---: | :---: |
| Small AC Non-Latching | 5 to 12 | 5 to 18 |
| Small DC Non-Latching | 15 to 30 | 5 to 15 |
| Small AC Latching | 6 to 12 | N/A |
| Small DC Latching | 10 to 16 | N/A |
| Medium AC Non-Latching | 6 to 12 | 6 to 20 |
| Medium DC Non-Latching | 65 to 90 | 10 to 30 |
| Medium AC Latching | 8 to 14 | N/A |
| Medium DC Latching | 30 to 80 | N/A |

Latching Two-Position Types: Except for the latching feature, MDR latching relays utilize the same general construction as non-latching types. They have two sets of coils and provide a latching two-position operation.

Contacts Shown With Coil 1-2 De-Energized and Coil 3-4 Energized.


Coils Must be Energized Alternately, Not Simultaneously

## Environmental Data

Temperature Range: Standard models: $0^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.
Special order models: $0^{\circ} \mathrm{C}$ to $+90^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: \#5-40 screw terminals supplied.
Weight (Approx.):
Small - 4 \& 8PDT: 32 oz. ( 0.914 kg ); 12PDT: $33 \mathrm{oz} .(0.943 \mathrm{~kg}$ )
Medium - 16PDT: 72 oz. ( 2.04 kg ); 24PDT: $74 \mathrm{oz} .(2.10 \mathrm{~kg}$ ).

Ordering Information and Coil Characteristics - No models in this series are maintained in stock.

| Type | Part Number | Contacts | Coil Voltage ( 60 Hz . for AC) | Coil Current (Amps) | DC Coil Resistance (Ohms) | Coil Power* (Watts) | Breakdown (Volts RMS) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Small | MDR-131-1 | 4PDT | 115VAC | 0.215 | 66 | 6.5 | 1,230 |
| Non- | M DR-131-2 | 4PDT | 440VAC | 0.045 | 1,256 | 5.1 | 1,880 |
| Latching | MDR-135-1 | 4PDT | 28VDC | 0.362 | 76 | 10.0 | 1,308 |
|  | MDR-137-8 | 4PDT | 125VDC | 0.082 | 1,520 | 10.3 | 2,375 |
|  | MDR-134-1 | 8PDT | 115VAC | 0.215 | 66 | 6.5 | 1,230 |
|  | MDR-134-2 | 8PDT | 440VAC | 0.045 | 1,256 | 5.1 | 1,880 |
|  | M DR-136-1 | 8PDT | 28VDC | 0.362 | 76 | 10.0 | 1,308 |
|  | MDR-138-8 | 8PDT | 125VDC | 0.082 | 1,520 | 10.3 | 2,375 |
|  | MDR-163-1 | 12PDT | 115VAC | 0.230 | 62 | 6.9 | 1,230 |
|  | MDR-163-2 | 12PDT | 440VAC | 0.055 | 940 | 6.3 | 1,880 |
| Medium | MDR-170-1 | 16PDT | 115 VAC | 0.620 | 8.4 | 17.0 | 1,230 |
| Non - | MDR-170-2 | 16PDT | 440VAC | 0.160 | 107 | 17.0 | 1,880 |
| Latching | MDR-172-1 | 16PDT | 28VDC | 0.667 | 42 | 18.7 | 1,308 |
|  | MDR-173-1 | 16PDT | 125VDC | 0.125 | 1,024 | 16.0 | 2,375 |
|  | MDR-141-1 | 24PDT | 115VAC | 0.620 | 8.4 | 17.0 | 1,230 |
|  | MDR-141-2 | 24PDT | 440VAC | 0.160 | 107 | 17.0 | 1,880 |
|  | MDR-167-1 | 24PDT | 28VDC | 0.667 | 42 | 18.7 | 1,308 |
| Small | MDR-67-2 | 4PDT | 115VAC | 0.150 | 210 | 5.5 | 1,230 |
| Latching | M DR-4091 | 4PDT | 440VAC | 0.020 | 4,500 | 3.0 | 1,880 |
|  | MDR-67-3 | 4PDT | 28VDC | 0.778 | 36 | 21.8 | 1,308 |
|  | MDR-5060 | 4PDT | 125VDC | 0.164 | 760 | 20.6 | 2,375 |
|  | M DR-4076 | 8PDT | 115VAC | 0.150 | 210 | 5.5 | 1,230 |
|  | MDR-4092 | 8PDT | 440VAC | 0.020 | 4,500 | 3.0 | 1,880 |
|  | MDR-5035 | 8PDT | 28VDC | 0.778 | 36 | 21.8 | 1,308 |
|  | MDR-5061 | 8PDT | 125VDC | 0.164 | 760 | 20.6 | 2,375 |
| Medium | MDR-6064 | 12PDT | 115VAC | 0.380 | 24 | 12.0 | 1,230 |
| Latching | MDR-7020 | 12PDT | 28VDC | 0.316 | 88.6 | 8.8 | 1,308 |
|  | MDR-66-4 | 16PDT | 115VAC | 0.380 | 24 | 12.0 | 1,230 |
|  | MDR-7036 | 16PDT | 125VDC | 0.083 | 1,500 | 10.4 | 2,375 |

* Actual Wattmeter readings


## Outline Dimensions

Tolerances: Decimals $\pm .010( \pm .25)$ Unless Otherwise Specified

## Small Models



Overall Height
4PDT 3.13" (79.5mm) Max.
8PDT 3.53" ( 89.7 mm ) Max.
12PDT 3.88 " ( 98.6 mm ) Max.
Coil and Contact Terminal Screws \#5-40 Supplied

## Medium Models



## Overall Height

12PDT 4.63" (117.6mm) Max.
16PDT 5.00" (127.0mm) Max. 24PDT 5.75" (146.1mm) Max.
Coil and Contact Terminal Screws \#5-40 Supplied


## Features

- The Type 136 is a small power relay that will switch a 20 amp tungsten load at 120VAC
- Mechanical life in excess of 5 million operations is obtained by the use of a wide friction-free knife-edge frame design and armature assembly.
- The dust cover enclosure is fitted with an 8-position J ones plug
- All ratings are at $25^{\circ} \mathrm{C}$ ambient.


## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Materials: Silver-palladium, . 375 (9.52) diameter.
Rating: 20 amps , tungsten @ 120VAC.
Expected Life: 5 million operations, mechanical; 250,000 operations at rated load.

## Initial Dielectric Strength

Between All Points: 1,500VAC.

## 136 series

## DPDT, 20 Amp

 Traffic Control (flash transfer) Relay
## CALTRANS approved <br> NEMA approved

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Coil Data @ $25^{\circ} \mathrm{C}$

Nominal Voltage: 120VAC.
Resistance ( $\mathbf{\pm 1 0 \%}$ ): 390 ohms.
Nominal Power: 10VA.
Duty Cycle: Continuous.
Temperature Rise: $45^{\circ} \mathrm{C}$.

Operate Data @ $25^{\circ} \mathrm{C}$
Must Operate Voltage: 85\% of nominal voltage.

## Mechanical Data

Mounting: Socket mount.
Termination: 8-position J ones Plug compatible with CINCH 2400 series socket.
Enclosure: Clear polycarbonate dust cover.
Weight: 11 oz. (312g) approximately.

## Ordering Information

| Part Number | Description |
| :---: | :--- |
| 136-62T3A1 | Traffic Control (Flash Transfer Function) Relay (120VAC coil; contacts rated 20A tungsten @ 120VAC) |

Our authorized distributors are likely to maintain the above-listed part number in stock for immediate delivery.

## Outline Dimensions




SERIES GP


SERIES TR

## GP/ML/TR Design Features

Among the advances AGASTAT control relays offer over existing designs is a unique contact operating mechanism. An articulated arm assembly amplifies the movement of the solenoid core, allowing the use of a short stroke coil to produce an extremely wide contact gap. The long support arms used in conventional relays are eliminated. Both current capacity and shock/vibration tolerance are greatly increased, as well as life expectancy.

## Design/Construction

AGASTAT control relays are operated by a moving core electromagnet whose main gap is at the center of the coil. A shoe is fitted to the core which overlaps the yoke and further increases the magnetic attraction.

The coil itself is in the form of an elongated cylinder, which provides a low mean tum length and also assists heat dissipation. Since the maximum travel of the electromagnet does not provide optimum contacts movement, an ingenious amplifying device has been designed.

This consists of a W-shaped mechanism, shown in figure 1. When the center of the W is moved vertically the lower extremities move closer to each other as can be seen in the illustration. The center of the W mechanism is connected to the moving core of the electromagnet and the two lower points are connected to the moving contacts.

Two of these mechanisms are placed side-by-side to actuate the four contacts sets of the relay. The outer arms of the W mechanisms are leaf springs, manufactured from a flat piece of non-ferrous metal. These outer arms act as return springs for their corresponding contacts. This provides each contact with its own separate return spring, making the contacts independent.

The mechanical amplification of the motion of the electromagnet permits a greater distance between the contacts, while the high efficiency of the electromagnet provides a nominal contact force in excess of 100 grams on the normally open contacts.

All the contacts are positioned well away from the cover and are well ventilated and separated from each other by insulating walls.

The absence of metal-to-metal friction, the symmetrical design of the contact arrangement and the lack of heavy impacts provides a mechanical life of $100,000,000$ operations.

For use in AC circuits, the relay is supplied with a built-in rectification circuit, thus retaining the high DC efficiency of the electromagnet. The current peak on energizing is also eliminated and consequently the relay can operate with a resistance in series (e.g. for high voltages or for dropout by shorting the coil). The use of the rectification circuit offers still other advantages. The same model can operated at frequencies ranging from 40 to 400 cycles. Operation of the relay is crisp; even with a low AC voltage, there is a complete absence of hum and vibration.

The plastic dust cover has two windows through which the iron yoke protrudes to facilitate cooling and also to allow direct mounting arrangement of the relay irrespective of the terminals.

Figure 1 - Illustration of Amplification


NOTE: Seismic \& radiation tested EGP, EML and ETR models are available. Consult factory for detailed information.

## GP/ML/TR series

## 10 Amp Control Relay Non-latching, Latching \& Timing Versions

## (LL) File E15631

File LR29186
Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Occupies very small panel space
- May be mounted singly, in continuous rows or in groups.
- Available with screw terminal molded socket.
- 4 SPDT contacts.
- Magnetic blowout device option increases DC current carrying ability approximately ten times for both N.O. and N.C. contacts. In both AC and DC operation, the addition of the device will normally double the contact life, due to reduced arcing.


## GP/ML Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 4 Form C (4PDT)
Material: Siver plated.
Ratings: See chart.
Expected Life: Mechanical: 100 million operations. Electrical: See chart and graph.

## Contact Ratings and Expected Life

| Voltage | Current <br> (Amps) | Power Factor <br> or <br> Time Constant | Number of <br> Electrical <br> Operations | Remarks |
| :--- | :---: | :---: | :---: | :---: |
| 540 VAC | 3 | COS $\varnothing=0.5$ | 15,000 | 2 contacts in series |
| 380 VAC | 15 | Resistive | 10,000 | 2 contacts in parallel |
| 380 VAC | 10 | Resistive | 200,000 |  |
| 380 VAC | $3 \times 3.3$ | COS $\varnothing=0.8$ | 200,000 | 3hp motor |
| 220 VAC | 20 | Resistive | 20,000 | 2 contacts in parallel |
| 220 VAC | 15 | COS $\varnothing=0.5$ | 20,000 | 2 contacts in parallel |
| 220 VAC | 10 | Resistive | 400,000 |  |
| 220 VAC | $3 \times 6$ | COS $\varnothing=0.8$ | 200,000 | 3hp motor |
| 220 VAC | 5 |  | $1,500,000$ | Filament lamps |
| 220 VAC | 5 | Resistive | $3,000,000$ |  |
| 220 VAC | 2.5 | COS $\varnothing=0.25$ | $2,000,000$ |  |
| 220 VAC | 2 | Resistive | $15,000,000$ |  |
| 220 VAC | 1.25 | Resistive | $30,000,000$ |  |
| 120 VDC | 1.5 | Resistive | $20,000,000$ | with blow-out device |
| 48 VDC | 10 | Resistive | $1,000,000$ |  |

## Load Life Curve



## Initial Dielectric Strength

Between non-connected terminals: $2,000 \mathrm{~V} \mathrm{rms}, 60 \mathrm{~Hz}$.
Between non-connected terminals \& relay yoke: $2,000 \mathrm{~V} \mathrm{rms}, 60 \mathrm{~Hz}$.

## Initial Insulation Resistance

Between non-connected terminals: $10^{9}$ ohms at 500VDC.
Between non-connected terminals \& relay yoke: $10^{9} \mathrm{ohms}$ at 500VDC.

## Coil Data

Voltage: 24, 120 \& 220VAC, 60 Hz . Add series resistor for 380-440VDC; 12, 24, 48, 125 \& 250VDC.

Duty Cycle: Continuous.
Nominal Coil Power: 6VA for AC coils; 6W for DC coils. There is no surge current during operation.
Coil Operating Voltage

|  | DC |  |  |  | AC, $\mathbf{5 0 / 6 0 H z}$ |  |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Nominal Coil Voltage | 12 | 24 | 48 | 125 | 250 | 24 | 120 | 220 |
| Minimum Pick-up <br> Voltage at 20C | 9 | 18 | 36 | 94 | 187 | 19 | 92 | 175 |
| Minimum Pick-up <br> Voltage at 40ㅇ | 9.5 | 19 | 38 | 100 | 200 | 20 | 102 | 188 |
| Maximum voltage for <br> continuous use | 13.5 | 27 | 53 | 143 | 275 | 27 | 137 | 245 |

For 380VAC - Use 6800 ohms 4 watt resistor in series with 220VAC relay. For 440VAC - Use 8200 ohms 6 watt resistor in series with 220VAC relay.

Drop-out voltage is between $10 \%$ and $40 \%$ of the nomninal voltages for both DC and AC (For example: in a 120 VAC unit, drop-out will occur between 12 and 48 volts.) DC relays will function with unfiltered $D C$ from a full-wave bridge rectifier.

Operate Data @ 20응
Operate Time at Rated Voltage: Between energizing and opening of normally closed contacts, less than 18 milliseconds on AC and less than 15 milliseconds on DC.
Release Time: Between energizing and closing of normally open contacts, less than 35 milliseconds on AC and less than 30 milliseconds on DC. Between de-energizing and opening of normally open contacts, less than 70 milliseconds on AC and less than 8 milliseconds on DC. Between de-energizing and closing of normally closed contacts, less than 85 milliseconds on $A C$ and less than 25 milliseconds on $D C$.

## Environmenal Data

Operating Temperature Range: $0^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.
Vibration: Single axis fragility curve data are available on request at frequencies from 5 Hz . to 33 Hz .
Shock: The relay, when kept energized by means of one of its own contact sets, will withstand 40 g shock load when operating on DC, and 150 g shock load on AC.

## Mechanical Data

Mounting Terminals: 16 flat base pins. Screw terminal sockets are available.
Wire Connection: The 16 flat pins are arranged in four symmetrical rows of four pins; the pitch in both directions being .394". Connection may be made to the relay by soldering. Sockets are available with screw terminals.

The internal wiring of the relay is also symmetrical as shown in the adjacent figure, allowing the relay to be inserted into the socket in either of two positions. Terminals B2 and B3 are provided as extra connections for special applications.
Weight: 10.9 oz ( 308 g ) approximately.


Our authorized distributors are more likely to maintain the following items in stock for immediate delivery..
GPD
GPDN

## Outline Dimensions



Wiring Diagrams (Bottom Views)


## TR series

## 10 Amp Control Relay - Timing Version

## TR Features

-8 timing ranges.

- 4 SPDT contacts.
- Magnetic blowout device option increases DC current carrying ability approximately ten times for both N.O. and N.C. contacts. In both AC and DC operation, the addition of the device will normally double the contact life, due to reduced arcing.


## TR Design/Construction

Couples an advanced electromechanical design with a field-proven solidstate timing network, an adaptation of the circuit used in the AGASTAT premium grade SSC Timer.

This unique circuit also eliminates the need for supplementary temperature-compensation components, affording unusual stability over a realistically broad operating temperature range. It also provides transient protection and protection against premature switching of the output contacts due to power interuption during timing.

## Timing Specifications

Operating Mode: On-Delay (Delay on energization).
Timing Adjustment: Internal fized or internal potentiometer. Timing Ranges:

$$
\begin{array}{ll}
.15 \text { to } 3 \mathrm{sec} . & 4 \text { to } 120 \mathrm{sec} . \\
.55 \text { to } 15 \mathrm{sec} . & 10 \text { to } 300 \mathrm{sec} . \\
1 \text { to } 30 \mathrm{sec} . & 1 \text { to } 30 \mathrm{~min} . \\
2 \text { to } 60 \mathrm{sec} . & 2 \text { to } 60 \mathrm{~min} .
\end{array}
$$

## Accuracy:

Repeat: $\pm 2 \%$ as fixed temerature and voltage.
Overall: $\pm 5 \%$ over combined rated extremes of temerature and voltage.
Reset Time: 75 ms .

## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 4 Form C (4PDT)
Nominal Rating: 10A @ 120VAC.
Contact Pressure:
Between movable and normally closed contacts: 30 g , typical.
Between movable and normally open contacts: 100 g , typical.
Expected Life: Mechanical: 100 million operations.
Electrical: See load/life graph.

## Initial Dielectric Strength

Between terminals and case and between mutually-isolated contacts: $2,000 \mathrm{VAC}$.

Load Life Curve


Initial Insulation Resistance
Between non-connected terminals: $10^{9}$ ohms at 500 VDC .
Between non-connected terminals \& relay yoke: $10^{9}$ ohms at 500VDC.

## Coil Data

Voltage: 120VAC, 50-60 Hz.; 24 \& 125VDC.

## Transient Protection

1,500 volt transient of less than 100 microseconds, or 1,000 volts or less.

## Environmenal Data

Operating Temperature Range: $0^{\circ} \mathrm{C}$ to $+50^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting Terminals: 16 flat base pins. Screw terminal sockets are available.
Weight: 11 oz. (311g) approximately.

| Ordering Information Typical Part No. |  | 1 | 4 | B | 1 | A | N |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: TR = Timing control relay |  |  |  |  |  |  |  |
| 2. Operation: 1 = On-delay |  |  |  |  |  |  |  |
| 3. Output: <br> 4 = 4PDT ( 4 form C) |  |  |  |  |  |  |  |
| 4. Operating Voltage: $B=24 \mathrm{VDC}$ | $\mathrm{D}=215 \mathrm{VDC}$ | $\mathrm{I}=120 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. |  |  |  |  |  |
| 5. Timing Adjustment: 1 = Internal fixed. | 3 = Intemal potentiometer. |  |  |  |  |  |  |
| 6. Timing Range: $\mathrm{A}=.15$ to 3 sec . $B=.55$ to 15 sec . | $\begin{aligned} & C=1 \text { to } 30 \mathrm{sec} . \\ & D=2 \text { to } 60 \mathrm{sec} . \end{aligned}$ | $\begin{aligned} & \mathrm{E}=4 \text { to } 120 \mathrm{sec} . \\ & \mathrm{G}=10 \text { to } 300 \mathrm{sec} . \end{aligned}$ |  |  | $\begin{aligned} & I=2 \text { to } 60 \mathrm{~min} . \\ & \mathrm{N}=1 \text { to } 30 \mathrm{~min} . \end{aligned}$ |  |  |
| 7. Options: $\mathrm{N}=\mathrm{M}$ agnetic blow-out | ut device. |  |  |  |  |  |  |



## Outline Dimensions

Same as GP/MR. See previous page.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery..
None at present.

## Accessories for GP/ML/TR series control relays

## Front connected sockets



Cat. No. CR0001
With captive clamp terminals
Cat. No. CR0002
With (\#6) binding head screws


Cat. No. CR0095 With (\#6) screw terminals


Cat. No. CR0067
With (\#6) screw terminals


## Hold down (locking) springs



Cat. No. CR0111
For sockets: CR0001\& CR0002


## Heavy-duty hold down (locking) straps


*Cat. No. CR0133 For socket: CR0001 \& CR0002

*Cat. No. CR0155
For socket: CR0095

* Catalog number includes strap, strap plate and necessary brackets.


## Magnetic blowout device



Cat. No. CR0190 Reduces arcing on the relay contacts when they make or break contact, either upon energizing or de-energizing, resulting in less contact degradation. Extends the life of the contact.

## Extracting handle



Cat. No. CR0179
Used to remove GP, ML and TR units from mounting bases.

## Alphanumeric Index

| Series | Type | Page |
| :---: | :---: | :---: |
| T72M | Single 20A Relay | 1005 |
| V23086 | Single or Dual 20A Relay | 1002 |
| V2R | 20A Motor Reversing Module | 1012 |
| VF4 | 40A Relay | 1017 |
| VF7 | 70A Relay | 1021 |
| VFM | 20A Relay ... | 1014 |
| VKP | 40A Relay ... | 1007 |
| VTF. | Flasher Module | 1024 |

## Automotive Relay Question Tree

This guide helps the user select one or more relay series which may be appropriate for a given application. The user should then refer to detailed specifications elsewhere in this catalog to determine the actual part number to be specified. Of course, the user must assume ultimate responsibility for determining the suitability of a relay for a particular application.


[^25]NOTE: The "automotive" relays described in this section are DC coil relays designed to switch 14 VDC loads in automobiles. They may also be suitable for non-automotive applications such as electric wheelchairs and other battery powered equipment. They are not UL recognized.

| Dimensions are shown for | Dimensions are in inches over | Specifications and availability | www.tycoelectronics.com <br> reference purposes only. |
| :--- | :--- | :--- | :--- |
|  | (millimeters) unless otherwise | specifiect to change. |  | | Technical support: |
| :--- |



## V23086 series

## 20 Amp Micro K (Single \& Dual) PC Board Relay for Automotive Applications

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Operate Data

Must Operate and Must Release Voltage: See Coil Data table.
Initial Operate Time: 3 milliseconds, typical, with rated coil voltage applied.
Initial Release Time: 15 milliseconds, typical, with zero volts applied (for unsuppressed relays after having been energized at rated coil voltage.)

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+155^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+105^{\circ} \mathrm{C}$.
Shock: 20 g , 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.)
$10-40 \mathrm{~Hz} ., 127 \mathrm{~mm}$ double amplitude.
$40-70 \mathrm{~Hz} ., 5 \mathrm{~g}$ 's constant.
$70-100 \mathrm{~Hz} ., 0.5 \mathrm{~mm}$ double amplitude.
$100-500 \mathrm{~Hz} ., 10 \mathrm{~g}$ 's constant.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure: Immersion cleanable, sealed plastic cover.
Weight: Sealed: 4 gm ( 0.14 oz .) approximately.

## Abnormal Operation

Overload Current: 50A, 5 sec.(2)
87.5A, 0.5 sec .

150A, 0.1 sec .
24V Jump Start: 24VDC for 5 minutes conducting rated contact current @ $23^{\circ} \mathrm{C}$.
Drop Test: Capable of meeting specifications after a 10 meter drop onto concrete in final enclosure.
Flammability: UL94-HB or better (meets FMVSS 302).

## Notes

(1) Allowable overdrive is rated at ambient temperature of $23^{\circ} \mathrm{C}$ and $105^{\circ} \mathrm{C}$ as stated with no load current flowing through the relay contacts and minimum coil resistance with power applied for 30 sec . max. ( $20 \%$ max. duty cycle.)
(2) Current and times are compatible with circuit protection by a typical 25A fuse. Relay will make, camy and break the specified current.

Coil Data (@ $\mathbf{2 3}^{\circ} \mathrm{C}$ Coil Temperature)

| Coil Designator | Rated Coil Voltage (VDC) | Coil <br> Resistance $\pm 10 \%$ (Ohms) | Must-Operate Voltage (VDC) | Must-Release Voltage (VDC) | Allowable (1) Overdrive (VDC) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | @ $\mathbf{2 3}^{\circ} \mathrm{C}$ | @ $105{ }^{\circ} \mathrm{C}$ |
| 001 | 12 | 254 | 6.9 | 15 | 27.2 | 16.5 |

## Figure 1 - Operating Voltage Range



## Ordering Information

| Part Number | Contact <br> Arrangement | Enclosure | Contact <br> Materials |
| :---: | :---: | :---: | :---: |
| V23086-C1001-A303 | 1 Form C | Sealed, Plastic Cover | $\mathrm{AgNi} \mathrm{0.15}$ |
| V23086-C1001-A402 | 1 Form A | Sealed, Plastic Cover | AgSnO |
| V23086-C1001-A403 | 1 Form C | Sealed, Plastic Cover | AgSnO |
| V23086-C2001-A303 | Dual Form C | Sealed, Plastic Cover | AgNi 0.15 |
| V23086-C2001-A403 | Dual Form C | Sealed, Plastic Cover | AgSnO |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

## Outline Dimensions - Single Relay




Suggested PC Board Layout - Single Relay (Bottom View)

$(11 \pm 0.05)$

## Outline Dimensions - Dual Relay



Wiring Diagrams - Dual Relay (Bottom Views)
1 Form A


1 Form C


## Suggested PC Board Mtg. Holes - Dual Relay (Bottom View)

See bottom view of relay (above) for hole-to-hole spacing


# T72M series 



## Features

- 20A, 16VDC switching rating.
- 60A inrush at 16VDC.
- 15A continuous contact rating @ $105^{\circ} \mathrm{C}$.
- Immersion cleanable plastic case with knock-off nib for ventilation.
- Low profile package has a seated height of only .67"' (17mm).
- 1 Form C arrangement.
- Choice of AgNi 0.15 or AgSnO contacts.


## Conditions

All parametric, environmental and life tests are performed according to EIA Standard RS-407-A at standard test conditions ( $23^{\circ} \mathrm{C}$ Ambient, 20-50\% RH, $29.5 \pm 10^{\prime \prime} \mathrm{Hg}$.) unless otherwise noted.

## Contact Data

Arrangements: 1 Form C (SPDT).
Material: AgNi 0.15 - Recommended for inductive loads.
AgSnO - Recommended for high inrush, lamp and capacitive loads and applications prone to contact material transfer.
Max. Switching Rate: 20 operations per second with no contact load. 6 operations per minute for rated life at rated load.
Max. Switching Voltage: 75VDC(1).
Max. Load Current (@ 14VDC Load Voltage):

| Load | Form C |  |
| :---: | :---: | :---: |
|  | NO | NC |
| Max. Continuous Current |  |  |
| Max. Break Current (1) | 20A | 10A |
| Max. Make Current (2) | 20A | 20A |
| AgNi 0.15 | 60A |  |
| AgSnO | 80A | 12A |

Max. Switching Power: 35-320 watts DC (voltage dependent)(1).
Min. Recommended Current: $0.5 \mathrm{amp} @ 12 \mathrm{VDC}$.
Initial Voltage Drop: 200 millivolts, maximum, for normally open contacts @ 10 amp contact load. 250 millivolts, maximum, for normally closed contacts @ 5 amp contact load.
Expected Life: 10 million operations, mechanical; 100,000 operations at 20 amps, 14VDC, resistive load on normally open contact.

## Initial Dielectric Strength

Between Contacts and Coil: 500 V rms.

## Coil Data

Voltage: 12 and 24VDC.
Resistance: See Coil Data table.
Nom. Power: 0.80 watts @ $23^{\circ} \mathrm{C}$ coil temp. and rated coil voltage.
Thermal Resistance: $50^{\circ} \mathrm{C}$ per actual coil watt in still air with no contact load current.

## 20 Amp Miniature PC Board Relay for Automotive Applications

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Operate Data

Must Operate and Must Release Voltage: See Coil Data table.
Initial Operate Time: 5 milliseconds, typical, with rated coil voltage applied.
Initial Release Time: 2 milliseconds, typical, with zero volts applied (for unsuppressed relays after having been energized at rated coil voltage.)

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+155^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+105^{\circ} \mathrm{C}$ (4).
Shock: 20 g , 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.)
$10-40 \mathrm{~Hz} ., 127 \mathrm{~mm}$ double amplitude.
40-70 Hz., 5g's constant.
$70-100 \mathrm{~Hz} ., 0.5 \mathrm{~mm}$ double amplitude.
$100-500 \mathrm{~Hz} ., 10 \mathrm{~g}$ 's constant.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure: Immersion cleanable, sealed plastic cover.
Weight: Sealed: 12 gm ( 0.4 oz .) approximately.
Audible Sound: 95dBA @ $10 \mathrm{~cm}, 14 \mathrm{VDC}$ coil voltage.
77dBA @1 M, 14VDC coil voltage.

## Abnormal Operation

Overload Current: 40A, 36 sec.(5)
80A, 10 sec .
150A, 2.5 sec .
24V Jump Start: 24VDC for 5 minutes conducting rated contact current @ $23^{\circ} \mathrm{C}$.
Drop Test: Capable of meeting specifications after a 10 meter drop onto concrete in final enclosure.
Flammability: UL94-HB or better (meets FMVSS 302).

## Notes

(1) See Figure 1
(2) Inrush current for lamp load.
(3) Allowable overdrive is rated at ambient temperature of $23^{\circ} \mathrm{C}$ and $105^{\circ} \mathrm{C}$ as stated with a 10A load current flowing through the relay contacts and minimum coil resistance with power applied for 30 sec . max. ( $20 \%$ max. duty cycle.) For continuous duty information, see Figure 2. (Ambient Termerature vs. Coil Voltage for Continuous Duty.)
(4) See Figure 2.
(5) Current and times are compatible with circuit protection by a typical 20A circuit breaker. Relay will make, carry and break the specified current.

## Coil Data (@23${ }^{\circ} \mathrm{C}$ Coil Temperature)

| Coil Designator | Rated Coil Voltage (VDC) | Coil <br> Resistance $\pm 10 \%$ (Ohms) | Coil Inductance (H) <br> (Ref.) | Must-Operate Voltage (VDC) | Must-Release Voltage (VDC) | Allowable (3) Overdrive (VDC) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | @ 23 ${ }^{\circ} \mathrm{C}$ | @ $105{ }^{\circ} \mathrm{C}$ |
| 12 | 12 | 180 | 0.9 | 6.3 | 12 | 24.6 | 14.3 |
| 24 | 24 | 720 | 3.2 | 12.6 | 2.4 | 49.3 | 28.7 |

## Figure 1 - Limiting Curve for Power Load



Figure 2 - Ambient Temperature vs. Coil Voltage for Continuous Duty

*Standard Coil Voltages: $12=12 \mathrm{VDC}$
$24=24 \mathrm{VDC}$ (Consult factory for availability).

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
None at present.

## Outline Dimensions

Tolerance (unless otherwise noted): 3 decimal: $\pm .010$ ( $\pm .254$ ); 2 decimal: $\pm .015$ ( $\pm .381$ ).


Wiring Diagram (Bottom View)

## Code 5

1 Form C


## Suggested PC Board Layout (Bottom View)



## VKP series

## Compact, 40 Amp, <br> Open or Sealed <br> PC Board Relay <br> For Automotive Applications

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Operate Data

Must Operate and Must Release Voltage: See Coil Data table. Initial Operate Time: 5 milliseconds, typical, with rated coil voltage applied. Initial Release Time: 3 milliseconds, typical, with zero volts applied (for unsuppressed relays after having been energized at rated coil voltage).

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+155^{\circ} \mathrm{C}$. Operating: $-40^{\circ} \mathrm{C}$ to $+125^{\circ} \mathrm{C}$ (4).
Shock: 20 g , 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.)
$10-40 \mathrm{~Hz} ., 127 \mathrm{~mm}$ double amplitude.
$40-70 \mathrm{~Hz} ., 5 \mathrm{~g}$ s constant.
$70-100 \mathrm{~Hz} ., 0.5 \mathrm{~mm}$ double amplitude.
$100-500 \mathrm{~Hz} ., 10 \mathrm{~g}$ 's constant.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure: Sealed relay is suitable for immersion cleaning of PCB assembly or conformal coating. Relay may be vented after cleaning by cutting the vent projection from the comer of the relay after processing using a razor knife or equivalent.
Weight: 20 g ( 0.7 oz .) approximately.

## Abnormal Operation

Overload Current: Consult factory.
24V Jump Start: 24VDC for 5 minutes conducting rated contact current @ $23^{\circ} \mathrm{C}$.
Drop Test: Capable of meeting specifications after a 10 meter drop onto concrete in final enclosure.
Flammability: UL94-HB or better, internal parts (meets FMVSS 302).

## Notes

(1) See Figure 1
(2) Inrush current for lamp load.
(3) Allowable overdrive is rated at ambient temperature for $23^{\circ} \mathrm{C}$ or $85^{\circ} \mathrm{C}$ as stated with no load current flowing through the relay contacts and minimum coil resistance. Also see Figure 2 for maximum ambient temperature versus applied coil voltage.
(4) See Figure 2.
(5) Current and times are compatible with circuit protection by a typical automotive circuit breaker. Relay will make, carry and break the specified current.

## Coil Data (@ $23^{\circ} \mathrm{C}$ Coil Temperature)

| Coil <br> Designator | Rated Coil <br> Voltage <br> (VDC) | Coil <br> Resistance <br> $\mathbf{\pm 1 0 \%}$ (Ohms) | Coil <br> Inductance <br> (H) (Ref.) | Must-Operate <br> Voltage <br> (VDC) | Must-Release <br> Voltage <br> (VDC) | Allowable(3) <br> Overdrive <br> (VDC) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| F |  |  |  |  |  |  |
| H | 12 | 90 | 0.6 | $65^{\circ} \mathbf{C}$ |  |  |

Figure 1 - Limiting Curve for Power Load


Safe breaking, arc extinguished (normally open contact) for resistive loads.

Figure 2 - Ambient Temperature vs. Coil Voltage for Continuous Duty


## Assumptions:

1. Thermal resistance $=40^{\circ} \mathrm{C}$ per watt.
2. Still air.
3. Nominal coil resistance.
4. M aximum mean coil temperature $=180^{\circ} \mathrm{C}$.
5. Coil temperature rise due to load.

$$
\begin{aligned}
& =3.5^{\circ} \mathrm{C} @ 8 \mathrm{amps} . \\
& =10^{\circ} \mathrm{C} @ 16 \mathrm{amps} . \\
& =20^{\circ} \mathrm{C} @ 24 \mathrm{amps} . \\
& =36^{\circ} \mathrm{C} @ 32 \mathrm{amps} . \\
& =55^{\circ} \mathrm{C} @ 40 \mathrm{amps} .
\end{aligned}
$$

6. Thermal resistance and power dissipation based on coil resistance at $180^{\circ} \mathrm{C}$.
7. Curves are based on 16 watts at $23^{\circ} \mathrm{C}$.
8. When full lifetime is at high ambient and high load current, subtract $25^{\circ} \mathrm{C}$ from maximum allowable ambient temperature.
9. Data is for open relays.
10. Subtract $10^{\circ} \mathrm{C}$ from the maximum allowable ambient temperature for sealed version.

## Ordering Information

| Part Number | Contact Arrangement | Contact <br> Material | Enclosure | Termination Footprint |
| :---: | :---: | :---: | :---: | :---: |
| VKP-11 ${ }^{*} 42$ | 1 Form A | AgNi 0.15 | Open | U.S.A. |
| VKP-15* 42 | 1 Form C | AgNi 0.15 | Open | U.S.A. |
| VKP-11 ${ }^{*} 52$ | 1 Form A | AgSnO | Open | U.S.A. |
| VKP-15* 52 | 1 Form C | AgSnO | Open | U.S.A. |
| VKP-31 ${ }_{*}^{*} 42$ | 1 Form A | AgNi 0.15 | Immersion Cleanable Case | U.S.A. |
| VKP-35 42 | 1 Form C | AgNi 0.15 | Immersion Cleanable Case | U.S.A. |
| VKP-31*52 | 1 Form A | AgSnO | Immersion Cleanable Case | U.S.A. |
| VKP-35 ${ }_{-} 52$ | 1 Form C | AgSnO | Immersion Cleanable Case | U.S.A. |

*Standard Coil Voltages: $\mathrm{F}=12 \mathrm{VDC}$
$\mathrm{H}=24 \mathrm{VDC}$ (Consult factory for availability)

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
None at present.

[^26]
## New Relay for <br> Flashing Lamp Applications

## Features

- 30A flashing lamp rating up to $85^{\circ} \mathrm{C}$.
- Long life for flashing lamp load applications.
- 1 Form A and 1 Form C arrangements.
- Available as open frame or sealed relay.
- Choice of standard or high current model.


## Conditions

All parametric, environmental and life tests are performed accourding to EIA Standard RS-407-A at standard test conditions ( $23^{\circ} \mathrm{C}$ Ambient, $20-50 \% \mathrm{RH}$, $29.5 \pm 10^{\prime \prime} \mathrm{Hg}$.) unless otherwise noted.

## Contact Data

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: PdCu/AgNi 0.15
Max. Switching Rate: 20 operations per second with no contact load. 90 operations per minute for rated life at rated load. 270 operations per minute for passenger car lamp outage indication.
Max. Switching Voltage: 28VDC.
Max. Load Current (@ 14VDC Load Voltage):

| Standard Current Types |  |  |  |  |
| :---: | :--- | :---: | :---: | :---: |
| Load |  | Form A | Form C |  |
|  |  | (NO) | NO | NC |
| Steady-State | Open Frame | 15A | 15A | 5A |
| Flashing(1) | Sealed Cover | 12A | 12A | 5A |
| Alternate | Open Frame | - | 4A | 4A |
| Flashing(2) | Sealed Cover | - | 4A | 4A |
| Max. Make Current(3) |  | 120A | 120A | 30A |
| Max. Break Current |  | 20A | 20A | 10A |


| High Current Types |  |  |  |  |
| :---: | :--- | :---: | :---: | :---: |
| Load |  | Form A | Form C |  |
|  |  | (NO) | NO | NC |
| Steady-State <br> Flashing | Open Frame | 30A | 30A | 10A |
|  | Sealed Cover | 25A | 25A | 10A |
| Alternate <br> Flashing | Open Frame | - | 8A | 8A |
|  | Sealed Cover | - | 8A | 8A |
| Max. Make Current(3) |  | 240A | 240A | 60A |
| Max. Break Current |  | 30A | 30A | 20A |

Min Recommended Current: 1 amp @ 12VDC.
Initial Voltage Drop: 100 millivolts, maximum, for normally open contacts @ 10A contact load.
200 millivolts, maximum, for normally closed contacts @ 10A contact load
Expected Life: Mechanical Life: 10 million operations.
Electrical Life: (See application information.)

## Electrical Isolation

Dielectric Strength (coil to contacts): 500 Vrms.

## VKP series

## PC Board Relay

## Coil Data

Voltage: 12 and 24VDC.
Resistance: See Coil Data table.
Nom. Power: 16 watts @ $23^{\circ} \mathrm{C}$ coil temp. and rated coil voltage.
Thermal Resistance: $45^{\circ} \mathrm{C}$ per actual coil watt in stil air with no contact load current.

## Operate Data

Must Operate and Must Release Voltage: See Coil Data table. Initial Operate Time: 5 milliseconds, typical, with rated coil voltage applied. Initial Release Time: 3 milliseconds, typical, with zero volts applied (for unsuppressed relays after having been energized at rated coil voltage).

## Environmental Data

Temperature Range: Storage:
Open Types: $-40^{\circ} \mathrm{C}$ to $+155^{\circ} \mathrm{C}$.
Sealed Types: $-40^{\circ} \mathrm{C}$ to $+125^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $125^{\circ} \mathrm{C}(4)$.
Shock: 20 g , 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.) $10-40 \mathrm{~Hz} ., 127 \mathrm{~mm}$ double amplitude. 40-70 Hz., 5g's constant. $70-100 \mathrm{~Hz} ., 0.5 \mathrm{~mm}$ double amplitude. $100-500 \mathrm{~Hz} ., 10 \mathrm{~g}$ 's constant.

## Mechancial Data

Termination: Printed circuit terminals. (U.S.A. footprint style only)
Enclosure: Sealed relay is suitable for immersion cleaning of PCB assembly or conformal coating. Relay may be vented cutting the vent projection from the comer of the relay after processing using razor knife or equivalent.
Weight: 20g (0.7 oz.) approximately.

## Abnormal Operation

Overload Current: Consult factory.
24V Jump Start: 24VDC for 5 minutes conducting rated contact current @ $23^{\circ} \mathrm{C}$.
Drop Test: Capable of meeting specifications after a 10 meter drop onto concrete in final enclosure.
Flammability: UL94-HB or better (meets FMVSS 302).

## Notes

(1) Continuous On-Off cycling of a single set of lamps at 60 to 90 cycles per minute and approximately a 50\% duty cycle.
(2) Continuous cycling between two sets of lamps with one set switched by the N.O. contacts and the other by the N.C. contacts, at 60 to 90 cycles per minute and aproximately a 50\% duty cycle.
(3) Inrush current for lamp load.
(4) Allowable overdrive is rated at ambient temperature for $23^{\circ} \mathrm{C}$ or $85^{\circ} \mathrm{C}$ as stated with no load current flowing through the relay contacts and minimum coil resistance. Also see Figure 2 for maximum ambient temperature versus applied coil voltage.
(5) Current and times are compatible with circuit protection by a typical automotive circuit breaker. Relay will make, carry and break the specified current.

## Coil Data (@ $23^{\circ} \mathrm{C}$ Coil Temperature)

| Coil Designator | Rated Coil Voltage (VDC) | Coil Resistance $\pm 10 \%$ (Ohms) | Coil Inductance (H) (Ref.) | Must-Operate Voltage (VDC) | Must-Release Voltage (VDC) | Allowable (4) Overdrive (VDC) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | @ $23^{\circ} \mathrm{C}$ | @ $85^{\circ} \mathrm{C}$ |
| $\begin{aligned} & \mathrm{F} \\ & \mathrm{H} \end{aligned}$ | $\begin{aligned} & 12 \\ & 24 \end{aligned}$ | $\begin{gathered} 90 \\ 362 \end{gathered}$ | $\begin{aligned} & 0.6 \\ & 2.3 \end{aligned}$ | $\begin{array}{r} 6.8 \\ 13.9 \end{array}$ | $\begin{aligned} & 12 \\ & 2.4 \end{aligned}$ | $\begin{aligned} & 19.6 \\ & 39.3 \end{aligned}$ | $\begin{aligned} & 14.3 \\ & 28.6 \end{aligned}$ |

## Application Information

Load Polarity: VKP series relays for flashing lamp applications are constructed with Palladium-Copper movable contacts and fine grain silver stationary contacts. This causes the relay to be sensitive to the polarity of the load voltage. This type of VKP relay must be mechanized in the circuit such that the more positive connection is made to the movable contact (identified as terminal 4 in the wiring diagrams). Failure to do so will nullify the benefit of the Palladium Copper and will result in contact welding.

Typical Applications: VKP series relays for flashing lamp applications are typically used for turn signal, hazard warning, emergency vehicle, and security system applications. They may also be used for high in-rush current capacitive loads such as audio amplifiers. Use on inductive loads or loads with high continuous load currents should be avoided. The relay should also not be used for applications which do not have a significant make current as high contact voltage drop may result.

Standard Current Relays: VKP series relays for flashing lamp applications which are indicated as "standard current" units are generally suitable for passenger car and light truck applications for turn signal, hazard warning, or combination flashers (with or without normal trailering requirements) for 2 or 3 bulb turn signal systems. They are also generally suitable for security system applications for lamp flashing and for most audio amplifier applications.

High Current Relays: VKP series relays for flashing lamp applications which are designated as "high current" have larger contacts, a larger shunt connecting the movable contacts to the output terminals, and other performance enhancing characteristics to provide longer life and provide higher current carrying capacity. This type relay should be used for truck applications which have greater load current and in applications such as emergency vehicle lighting and service vehicle hazard waming lights which have very high cycle life requirements. The high current versions are also recommended for most alternating flasher applications, as this version has much improved performance of the normally closed contact. However, optimum life can be obtained for alternating applications by using two normally open relays and powering the coils alternately.

## Electrical Life Test Information

Standard Current Relays: 3 bulb T/S (tum signal) system, combined turn signal and hazard waming with normal trailering (test requirements):

| 3 bulb | 18 million operations |
| :--- | :--- |
| 4 bulb | 130 K operations |
| 6 bulb | 194 K operations |
| 8 bulb | 248 K operations |
| TOTAL | 2.3 million operations |

This application represent about the limit of the performance capability of the "standard current" types and is generally the limit of the industry requirement for passenger car applications.
Note: Bulb as used here is a 27 watt turn signal bulb, trade \#1156. Testing includes operations at $-40^{\circ} \mathrm{C}, 23^{\circ} \mathrm{C}$, and $85^{\circ} \mathrm{C}$.

High Current Relays: 3 bulb T/S system, combined turn signal and hazard warning with special trailering (test requirements):

| 3 bulb | 2.1 million operations |
| :--- | :--- |
| 6 bulb | 194 K operations |
| 7 bulb | 259 K operations |
| 14 bulb | 497 K operations |
| TOTAL | 3.0 million operations |

This application represent about the limit of the performance capability of the "high current" types. It should be noted that the low current operations have very little affect on the total product life where as the 14 bulb (33 ampere) operations are extremely destructive. Units test on 14 bulb (only) loads can be expected to fail at less than 1 million operations.
Note: Bulb as used here is a 27 watt turn signal bulb, trade \#1156. Testing includes operations at $-40^{\circ} \mathrm{C}, 23^{\circ} \mathrm{C}$, and $85^{\circ} \mathrm{C}$.

Design Considerations: It should be noted that although the VKP series relays are capable of handling relatively high currents, when applying the product under high current and high ambient temperature conditions, providing adequate conductor volume is critical, as is the solder connection, particularly with respect to the normally open contact terminal. It may be necessary to use high temperature solder, a plated through hole PCB, or a copper lead frame type construction under these conditions to prevent failure of the solder joint.

Figure 2 - Ambient Temperature vs. Coil Voltage for Continuous Flashing at 50\% Duty Cycle (Steady Current, Open Style) Consult factory.

## Ordering Information

| Part Number | Contact Arrangement | Contact Material | Enclosure | Load Ratings |
| :---: | :---: | :---: | :---: | :---: |
| VKP-11 ${ }^{*} 32$ | 1 Form A | PdCu/AgNi 0.15 | Open | Standard Current |
| VKP-11 ${ }^{*} 62$ | 1 Form A | PdCu/AgNi 0.15 | Open | High Current |
| VKP-15* 62 | 1 Form C | PdCu/AgNi 0.15 | Open | High Current |
| VKP-31 ${ }_{\text { }} 32$ | 1 Form A | PdCu/AgNi 0.15 | Immersion Cleanable Case | Standard Current |
| VKP-31 ${ }^{*} 62$ | 1 Form A | PdCu/AgNi 0.15 | Immersion Cleanable Case | High Current |
| VKP-35* 62 | 1 Form C | PdCu/AgNi 0.15 | Immersion Cleanable Case | High Current |

[^27]Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
None at present.

| Dimensions are shown for | Dimensions are in inches over | Specifications and availability <br> (millimeters) unless otherwise <br> specified. |
| :--- | :--- | :--- | | wwww.tycoelectronics.com |
| :--- |
| reference purposes only. |

## Outline Dimensions

## Open Model



## Sealed Model



Wiring Diagrams (Bottom Views)


## Suggested PC Board Layouts (Bottom Views)

Open Model
Hole Size


## Center-To-Center



## Sealed Model

Hole Size


Center-To-Center



## Features

- 20A, 16VDC switching rating.
- 75A inrush at 16VDC.
- 20A continuous contact rating @ $85^{\circ} \mathrm{C}$.
- Operation to $105^{\circ} \mathrm{C}$ ambient.
- Immersion cleanable plastic case with knock-off nib for ventilation.
- Low profile package has a seated height of only .67" ( 17 mm ).
- H-Bridge motor reversing arrangement.


## Conditions

All parametric, environmental and life tests are performed according to EIA Standard RS-407-A at standard test conditions ( $23^{\circ} \mathrm{C}$ Ambient, 20-50\% RH, $29.5 \pm 10^{\prime \prime} \mathrm{Hg}$.) unless otherwise noted.

## Contact Data

Arrangements: $2 \times 1$ Form C (H-Bridge).
Material: AgNi 0.15 (consult factory for other contact materials).
Max. Switching Rate: 20 operations per second with no contact load.
6 operations per minute for rated life at rated load
Max. Switching Voltage: 24VDC.
Max. Load Current $23^{\circ} \mathrm{C}$ (@ 14VDC Load Voltage):
Continuous Carry: 20 Amperes
Intermittent Carry: 40 Amperes for 30 seconds.
Make: 75 Amperes
Break: 40 Amperes
Max. Switching Power: 320 watts DC (voltage dependent)(1)
Min. Recommended Current: $0.5 \mathrm{amp} @ 12 \mathrm{VDC}$.
Initial Voltage Drop: 400 millivolts, maximum (measured between load terminals) @ 10 amp contact load.
Nominal Circuit Resistance: 6 milliohms load terminal to load terminal @ 10 amp (this value is provided for circuit design purposes only and is not a specified parameter).
Expected Life:
Mechanical: 10 million operations
Electrical: 20A, 14VDC, 1mH > 100K operations.
$40 \mathrm{~A}, 14 \mathrm{VDC}, 0.5 \mathrm{mH}>10 \mathrm{~K}$ operations.

## Initial Insulation Resistance @ 500VDC

Between Contacts and Coil: 10 megaohms.
Between Open Contacts: 10 megaohms.

## Coil Data

Voltage: 12VDC.
Resistance: See Coil Data table.
Nom. Power: See Coil Data table.
Thermal Resistance: $55^{\circ} \mathrm{C}$ per actual coil watt in still air with no contact load current.

## V2R series

## 20 Amp DC Motor Reversing PC Board Relay for Automotive Applications

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Operate Data

Must Operate and Must Release Voltage: See Coil Data table.
Initial Operate Time: 5 milliseconds, typical, with rated coil voltage applied.
Initial Release Time: 2 milliseconds, typical, with zero volts applied (for unsuppressed relays after having been energized at rated coil voltage.)

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+155^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+105^{\circ} \mathrm{C}$. (2)
Shock: 20 g , 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.)
$10-40 \mathrm{~Hz} ., 127 \mathrm{~mm}$ double amplitude.
$40-70 \mathrm{~Hz} ., 5 \mathrm{~g}$ 's constant.
$70-100 \mathrm{~Hz} ., 0.5 \mathrm{~mm}$ double amplitude.
$100-500 \mathrm{~Hz} ., 10 \mathrm{~g}$ 's constant.

## Mechanical Data

Termination: Printed circuit terminals.
Enclosure: Immersion cleanable, sealed plastic cover.
Weight: Sealed: 25 gm ( 0.9 oz .) approximately.
Audible Sound: $95 \mathrm{dBA} @ 10 \mathrm{~cm}$, 14VDC coil voltage.
77dBA @ $1 \mathrm{M}, 14 \mathrm{VDC}$ coil voltage.

## Abnormal Operation

Overload Current: 40A, 36 sec . ${ }^{(3)}$
80A, 10 sec .
150A, 2.5 sec .
24V Jump Start: 24VDC for 5 minutes conducting rated contact current @ $23^{\circ} \mathrm{C}$.
Drop Test: Capable of meeting specifications after a 10 meter drop onto concrete in final enclosure.
Flammability: UL94V-0 (meets FMVSS 302).

## Notes

(1) See Figure 1
(2) See Figure 2.
(3) Current and times are compatable with circuit protection by a typical 20A circuit breaker. Relay will make, carry and break the specified current.
(4) Allowable overdrive is rated at ambient temperature of $23^{\circ} \mathrm{C}$ and $105^{\circ} \mathrm{C}$, as stated, with a 10 A load current flowing throuth the relay contacts and minimum coil resistance with power applied for 30 sec . max. (20\% max. duty cycle). For continuous duty information, see Figure 2 (AmbientTemperature vs. Coil Voltage for Continuous Duty.)

## Coil Data (@ $23^{\circ} \mathrm{C}$ Coil Temperature)

| Relay Part Number | Rated Coil Voltage (VDC) | Coil Resistance $\pm 10 \%$ (Ohms) | Coil Inductance (H) (Ref.) | Must-Operate Voltage (VDC) | Must-Release Voltage (VDC) | Nominal Power (Watts) | Allowable (4) Overdrive (VDC) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  | @ $\mathbf{2 3}^{\circ} \mathrm{C}$ | @ $105^{\circ} \mathrm{C}$ |
| V2R-1001 | 12 | 150 | 0.7 | 6.0 | 0.9 | 0.93 | 24V | 16 V |

Figure 1 - Limiting Curve for Power Load
At present, these data are still to be determined.

Figure 2 - Ambient Temperature vs. Coil Voltage for Continuous Duty


## Assumptions:

1. Thermal resistance $=55^{\circ} \mathrm{C}$ per watt
2. Still air
3. Nominal coil resistance ( $150 \Omega$ )
4. Maximum mean coil temperature $=180^{\circ} \mathrm{C}$
5. Coil temperature rise due to load $=3^{\circ} \mathrm{C} @ 4 \mathrm{amps}$

$$
=9^{\circ} \mathrm{C} @ 8 \mathrm{amps}
$$

$$
=19^{\circ} \mathrm{C} @ 12 \mathrm{amps}
$$

$$
=31^{\circ} \mathrm{C} @ 16 \mathrm{amps}
$$

$$
=51^{\circ} \mathrm{C} @ 20 \mathrm{amps}
$$

6. Thermal resistance and power dissipation based on coil resistance at $180^{\circ} \mathrm{C}$
7. Curves are based on 0.96 watts at $23^{\circ} \mathrm{C}$
8. When full lifetime is at high ambient and high load current, subtract $25^{\circ} \mathrm{C}$ from maximum allowable ambient temperature.

## Ordering Information

| Part <br> Number | Coil <br> Resistance |
| :---: | :---: |
| V2R-1001 | $150 \Omega$ |

## Typical Application Schematic



Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. None at present.

## Outline Dimensions

Tolerance (unless otherwise noted): 3 decimal: $\pm .010$ ( $\pm .254$ ); 2 decimal: $\pm .015$ ( $\pm .381$ ).


Wiring Diagram (Bottom View)
$2 \times 1$ Form C (H-Bridge)


Suggested PC Board Layout



## Features

- 20A continuous contact rating @ $85^{\circ} \mathrm{C}$.
- 1 Form A and 1 Form C arrangements.
- Plug-in terminals.
- Plastic enclosure.


## Conditions

All parametric, environmental and life tests are performed according to EIA Standard RS-407-A at standard test conditions ( $23^{\circ} \mathrm{C}$ Ambient, 20-50\% RH, $29.5 \pm 10^{\prime \prime} \mathrm{Hg}$.) unless otherwise noted.

## Contact Data

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: AgNi 0.15 and AgSnO (consult factory for other contact materials).
Max. Switching Rate: 20 operations per second with no contact load.
6 operations per minute for rated life at rated load.
Max. Switching Voltage: 75VDC(1).
Max. Load Current (@ 14VDC Load Voltage):

| Load | Form A | Form C |  |
| :---: | :---: | :---: | :---: |
|  |  | NO | NC |
| Max. Continuous Current | $20 A$ | $20 A$ | 10A |
| Max. Make Current | $120 A(2)$ | $120 A(2)$ | $40 A$ |
| Max. Break Current(1) | $30 A$ | $30 A$ | 15A |

Max. Switching Power: 35-250 watts DC (voltage dependent(1).
Min. Recommended Current: 10 amp @ 12VDC.
Initial Voltage Drop: 200 millivolts, maximum, for normally open contacts @ 15 amp contact load.
250 millivolts, maximum, for normally closed contacts @ 10 amp contact load.
Expected Life: 10 million operations, mechanical; 100,000 operations at 20 amps, 14VDC, resistive load on normally open contact.

## Initial Dielectric Strength

Between Contacts and Coil: 500V ms.

## Coil Data

Voltage: 12VDC.
Resistance: See Coil Data table.
Nom. Power: (@ $23^{\circ} \mathrm{C}$ coil temp. and rated coil voltage.):
16W, unsuppressed.
181W, with 680 ohm resistor.
Thermal Resistance: $50^{\circ} \mathrm{C}$ per actual coil watt in still air with no contact load current.

## VFM series

## 20 Amp Relay <br> With Quick Connect Terminals for Automotive Applications

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Operate Data

Must Operate and Must Release Voltage: See Coil Data table.
Initial Operate Time: 4 milliseconds, typical, with rated coil voltage applied.
Initial Release Time: 15 milliseconds, typical, with zero volts applied (for unsuppressed relays after having been energized at rated coil voltage).

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+155^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+125^{\circ}(4)$
Shock: $10 \mathrm{~g}, 11$ milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.)
$10-40 \mathrm{~Hz} ., 127 \mathrm{~mm}$ double amplitude.
40-70 Hz., 5g's constant.
$70-100 \mathrm{~Hz} ., 0.5 \mathrm{~mm}$ double amplitude
$100-500 \mathrm{~Hz} ., 10 \mathrm{~g}$ 's constant.

## Mechanical Data

Termination: Quick connect.
Enclosure: Plastic dust cover.
Weight: With QC terminals: 20g (0.7 oz.) approximately

## Abnormal Operation

Overload Current: 40A, 36 sec.(5)
80A, 10 sec .
200A, 2.5 sec .
24V Jump Start: 24VDC for 5 minutes conducting rated contact current @ $23^{\circ} \mathrm{C}$.
Drop Test: Capable of meeting specifications after a 3.28 foot (10 meter) drop onto concrete in final enclosure.
Flammability: UL94-HB or better (meets FMVSS 302).

## Notes

(1) See Figure 1
(2) Inrush current for lamp load.
(3) Allowable overdrive is rated at ambient temperature for $23^{\circ} \mathrm{C}$ or $85^{\circ} \mathrm{C}$ as stated with no load current flowing through the relay contacts and minimum coil resistance. Also see Figure 2 for maximum ambient temperature versus applied coil voltage.
(4) See Figure 2.
(5) Current and times are compatible with circuit protection by a typical 20A automotive circuit breaker. Relay will make, carry and break the specified current.

## Coil Data (@ $\mathbf{2 3}^{\circ} \mathrm{C}$ Coil Temperature)

| Coil Designator (VDC) | Rated Coil Voltage (VDC) | Coil Resistance $\pm 10 \%$ (Ohms) | Coil Inductance (H) (Ref.) | Must-Operate Voltage (VDC) | Must-Release Voltage (VDC) | Allowable (3) Overdrive |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | @ $23^{\circ} \mathrm{C}$ | @ $85^{\circ} \mathrm{C}$ |
| F | 12 | 90 | 0.5 | 7.2 | 12 | 20.4 | 14.9 |

Figure 1 - Limiting Curve for Power Load


Figure 2 - Ambient Temperature vs. Coil Voltage for Continuous Load


## Assumptions:

1 Thermal resistance $=50^{\circ} \mathrm{C}$ per watt
2. Still air
3. Nominal coil resistance
4. Maximum mean coil temperature $=180^{\circ} \mathrm{C}$
5. Coil temperature rise due to load
$=1^{\circ} \mathrm{C} @ 4 \mathrm{amps}$
$=4.5^{\circ} \mathrm{C} @ 8 \mathrm{amps}$
$=9.5^{\circ} \mathrm{C} @ 12 \mathrm{amps}$
$=18^{\circ} \mathrm{C} @ 16 \mathrm{amps}$
$=26.5^{\circ} \mathrm{C} @ 20 \mathrm{amps}$
6. Thermal resistance and power dissipation based on coil resistance at $180^{\circ} \mathrm{C}$
7. Curves are based on 15 watts at $23^{\circ} \mathrm{C}$
8. When full lifetime is at high ambient and high load current, subtract $25^{\circ} \mathrm{C}$ from maximum allowable ambient temperature.

## Ordering Information

| Part Number | Contact <br> Arrangement | Terminals | Contact <br> Material |
| :---: | :---: | :---: | :---: |
| VFM-11F21 | 1 Form A | Quick connect | AgNi 0.15 |
| VFM-11F41 | 1 Form A | Quick connect | AgSnO |
| VFM-15F21 | 1 Form C | Quick connect | AgNi 0.15 |
| VFM-15F41 | 1 Form C | Quick connect | AgSnO |

*Standard Coil Voltages: $\mathrm{F}=12 \mathrm{VDC}$
Optional Coil Suppression
Add suffix -S01 for 680 ohm resistor in parallel with 12VDC coil.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
None at present..

## Outline Dimensions



Wiring Diagrams (Bottom Views)

1 Form A


## Connector

Connectors For Use With VFM Relays

PC Board Socket
VCFM- 1000


Wire Harness Style, Bracket Mount Socket (Order Terminals Separately) VCFM-1002


## Connector/Terminal Usage Chart - Boldface items are stocked.

| Connector | Terminal P/N | Required Crimp Terminals (Order Separately) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Alternate P/N | Wire AWG | Oty. Required |  | Use in Cavities |  |
|  |  |  |  | Form A | Form C | Form A | Form C |
| VCFM-1000 | None | None | N/A | N/A | N/A | N/A | N/A |
| VCFM-1002 | 26A1349A | AMP 60249-1 AMP 42281-1 | $\begin{aligned} & 12-16 \\ & 14-18 \end{aligned}$ | 2 | 2 | $3 \& 5$ | $3 \& 5$ |
|  | $\begin{aligned} & \text { 26A1492A } \\ & \text { 26A1492B } \end{aligned}$ | G\&H K26313 G\&H K26312 | $\begin{aligned} & 15-20 \\ & 14-16 \end{aligned}$ | 2 | 3 | 1 \& 2 | 1, 2 \& 4 |



## Features

- 40A continuous contact rating @ $85^{\circ} \mathrm{C}$.
- 1 Form A and 1 Form C arrangements.
- Plug-in or PC board terminals.
- Optional mounting bracket.
- Various enclosure options.


## Conditions

All parametric, environmental and life tests are performed according to EIA Standard RS-407-A at standard test conditions ( $23^{\circ} \mathrm{C}$ Ambient, 20-50\% RH, $29.5 \pm 10$ " Hg .) unless otherwise noted.

## Contact Data

Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: AgNi 0.15 (consult factory for other contact materials).
Max. Switching Rate: 20 operations per second with no contact load. 6 operations per minute for rated life at rated load.
Max. Switching Voltage: 75VDC(1).
Max. Load Current (@14VDC Load Voltage):

| Load | Form A | Form C |  |
| :---: | :---: | :---: | :---: |
|  | (NO) | NO | NC |
| Max. Continuous Current | 60A | 60A | 40A |
| Max. Make Current(2) | 120A | 120A | 45A |
| Max. Break Current(1) | 60A | 60A | 40A |

Max. Switching Power: 50-500 watts DC (voltage dependent)(1)
Min. Recommended Current: $1 \mathrm{amp} @ 12 \mathrm{VDC}$.
Initial Voltage Drop: 200 millivolts, maximum, for normally open contacts @ 40 amp contact load.
250 millivolts, maximum, for normally closed contacts @ 30 amp contact load.
Expected Life: 10 million operations, mechanical; 100,000 operations at 40 amps, 14VDC, resistive load on normally open contact.

## Initial Dielectric Strength

Between Contacts and Coil: 500V rms.

## Coil Data

Voltage: 6, 12 and 24VDC
Resistance: See Coil Data table.
Nom. Power: (@ $23^{\circ} \mathrm{C}$ coil temp. and rated coil voltage.):
16W, unsuppressed.
181W, with 680 ohm resistor.
Thermal Resistance: $50^{\circ} \mathrm{C}$ per actual coil watt in still air with no contact load current.

## VF4 series

## 40 Amp Relay <br> With PC Board or <br> Quick Connect Terminals for Automotive Applications

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Operate Data

Must Operate and Must Release Voltage: See Coil Data table.
Initial Operate Time: 7 milliseconds, typical, with rated coil voltage applied.
Initial Release Time: 2 milliseconds, typical, with zero volts applied (for unsuppressed relays after having been energized at rated coil voltage.)

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+155^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+125^{\circ} \mathrm{C}$ (4).
Shock: 20 g , 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.)
$10-40 \mathrm{~Hz} ., 127 \mathrm{~mm}$ double amplitude.
$40-70 \mathrm{~Hz} ., 5 \mathrm{~g}$ 's constant.
$70-100 \mathrm{~Hz} ., 0.5 \mathrm{~mm}$ double amplitude.
$100-500 \mathrm{~Hz} ., 10 \mathrm{~g}$ 's constant.

## Mechanical Data

Termination: 0.250 " quick connect and printed circuit terminals.
Enclosures:
Dust Cover: Protects relay from dust. For use in passenger compartment or enclosures.
Shrouded Dust Cover: Protects relay and relay connector (order separately) from dust and splash.
Weatherproof Cover: Mates with a connector (order separately) to seal relay from salt spray etc. Recommended for under hood application.
Cover Retention: Dust cover will withstand a 33.7 pound (150 Newton) force (axially applied) without detachment. Ultrasonic cover: 50 pound (220 Newton).
Weight: 31g (11 oz.) approximately (dust cover model).

## Abnormal Operation

Overload Current: Consult factory.
24V Jump Start: 24VDC for 5 minutes conducting rated contact current @ $23^{\circ} \mathrm{C}$.
Drop Test: Capable of meeting specifications after a 3.28 foot ( 10 meter) drop onto concrete.
Flammability: UL94V-0 extemal; UL94-HB or better, internal parts (meets FMVSS 302).

## Notes

(1) See Figure 1
(2) Inrush current for lamp load.
(3) Allowable overdrive is rated at ambient temperature for $23^{\circ} \mathrm{C}$ or $85^{\circ} \mathrm{C}$ as stated with no load current flowing through the relay contacts and minimum coil resistance. Also see Figure 2 for maximum ambient temperature versus applied coil voltage.
(4) See Figure 2.
(5) Current and times are compatible with circuit protection by a typical automotive circuit breaker. Relay will make, carry and break the specified current.

## Coil Data

| Coil Designator | Rated Coil Voltage (VDC) | Coil Resistance $\pm 10 \%$ (Ohms) | Coil Inductance (H) (Ref.) | Must-Operate Voltage (VDC) | Must-Release Voltage (VDC) | Allowable (3) Overdrive (VDC) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | @ $\mathbf{2 3}^{\circ} \mathrm{C}$ | @ $85^{\circ} \mathrm{C}$ |
| D | 6 | 22.5 | 0.2 | 3.6 | 0.6 | 10.1 | 7.9 |
| F | 12 | 90 | 0.8 | 7.2 | 12 | 20.2 | 15.7 |
| H | 24 | 360 | 2.7 | 14.4 | 2.4 | 40.5 | 315 |

Figure 1 - Limiting Curve for Power Load


Safe breaking, arc extinguished (nomally open contact) for resistive loads.

Figure 2 - Ambient Temperature vs. Coil Voltage for Continuous Duty


## Assumptions:

1. Themal resistance $=50^{\circ} \mathrm{C}$ per watt
2. Still air
3. Nominal coil resistance
4. Maximum mean coil temperature $=180^{\circ} \mathrm{C}$
5. Coil temperature rise due to load

$$
\begin{aligned}
& =2^{\circ} \mathrm{C} @ 8 \mathrm{amps} \\
& =5^{\circ} \mathrm{C} @ 16 \mathrm{amps} \\
& =11^{\circ} \mathrm{C} @ 24 \mathrm{amps} \\
& =20^{\circ} \mathrm{C} @ 32 \mathrm{amps} \\
& =32^{\circ} \mathrm{C} @ 40 \mathrm{amps}
\end{aligned}
$$

6. Themmal resistance and power dissipation based on coil resistance at $180^{\circ} \mathrm{C}$
7. Curves are based on 16 watts at $23^{\circ} \mathrm{C}$
8. When full lifetime is at high ambient and high load current, subtract $25^{\circ} \mathrm{C}$ from maximum allowable ambient temperature.

## Ordering Information

| Part Number | Contact Arrangement | Contact <br> Material | Enclosure | Terminals |
| :---: | :---: | :---: | :---: | :---: |
| VF4-11* 11 | 1 Form A | AgNi0.15 | Dust cover | Quick connect |
| VF4-11* 13 | 1 Form A | AgNi0.15 | Dust cover | Printed circuit |
| VF4-15* 11 | 1 Form C | AgNio. 15 | Dust cover | Quick connect |
| VF4-15* 13 | 1 Form C | AgNi0.15 | Dust cover | Printed circuit |
| VF4-25* 11 | 1 Form C | AgNi0. 15 | Shrouded dust cover | Quick connect |
| VF435* 11 | 1 Form C | AgNio. 15 | Weatherproof cover | Quick connect |
| VF4-41* 11 | 1 Form A | AgNio. 15 | Dust cover with bracket | Quick connect |
| VF4-45* 11 | 1 Form C | AgNi0. 15 | Dust cover with bracket | Quick connect |
| VF4-45* 21 | 1 Form C | AgSnO | Dust cover with bracket | Quick connect |
| VF4-51* 11 | 1 Form A | AgNio. 15 | Shrouded dust cover with bracket | Quick connect |
| VF4-55* 11 | 1 Form C | AgNi0.15 | Shrouded dust cover with bracket | Quick connect |
| VF4-61* 11 | 1 Form A | AgNi0. 15 | Weatherproof cover with bracket | Quick connect |
| VF4-65* 11 | 1 Form C | AgNi0.15 | Weatherproof cover with bracket | Quick connect |
| VF4-81* 11 | 1 Form A | AgNi0.15 | Dust cover with molded bracket | Quick connect |
| VF4-85* 11 | 1 Form C | AgNio. 15 | Dust cover with molded bracket | Quick connect |

*Standard Coil Voltages: |  | $\mathrm{D}=6 \mathrm{VDC}$ (Consult factory for availability). |
| :--- | :--- |
|  | $\mathrm{F}=12 \mathrm{VDC}$ |
|  | $\mathrm{H}=24 \mathrm{VDC}$ (Consult factory for availability). |

## Optional Coil Suppression

Add suffix -S07 for 180 ohm resistor in parallel with 6VDC coil.
Add suffix -S01 for 680 ohm resistor in parallel with 12VDC coil. Add suffix -S08 for 2,700 ohm resistor in parallel with 24VDC coil.

Epoxy Sealed Construction
Add suffix -C01 for epoxy sealed unit.
Add suffix -C05 for epoxy sealed unit with resistor.

## Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| VF4-15F11 | VF4-15H11 |
| :--- | :--- |
| VF4-15F13 | VF4-15H13 |
| VF4-45F11 | VF4-65F11-S01 |

## Outline Dimensions

## Dust Cover With Quick Connect Terminals

VF4-1_ _ (Without Bracket) \& VF4-4_ _ (With Bracket)


Shrouded Dust Cover With Quick Connect Terminals VF4-2_ _ (Without Bracket) \& VF4-5_ _(With Bracket)


## Wiring Diagrams (Bottom Views)

## 1 Form A



## Plastic Bracket Cover With Quick Connect Terminals

VF4-8


Printed Circuit Board Terminals
Clinchable Power


## Single Pin



Weatherproof Cover With Quick Connect Terminals VF4-3_ _ (Without Bracket) \& VF4-6_ _(With Bracket)


Suggested PC Board Layouts (Bottom Views)
VF4-XXX13


## VF4-XXX12



## Connectors

Connectors For Use With Quick Connect Terminal VF4-1 $\qquad$ VF4-4 $\qquad$ And VF4-8 $\qquad$ Relays

PC Board Socket
VCF4-1000



Wiring Harness Style Connector (order terminals separately VCF4-1001


Wiring Harness Style, Bracket Mount Socket (order terminals separately) (Mount individually or can be interlocked)


Connector For Use With VF4-2
or VF4-5
Relays With Shrouded Dust Cover (order terminals separately) VCF4-1003


Connector For Use With VF4-3__ _ or VF4-6_ _ _ Relays With Weatherproof Cover
Connectors to mate with the weatherproof cover relays are available from Delphi Packard (1-800-PACKARD).
(Typical Delphi Packard part number: 12065685).

Connector/Terminal Usage Chart - Our authorized distributors are more likely to stock boldface items.

| Connector | Terminal P/N | Required Crimp Terminals (Order Separately) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Alternate P/N | Wire AWG | Qty. Required |  |
|  |  |  |  | Form A | Form C |
| VCF4-1000 | None | None | N/A | 0 | 0 |
| VCF4-1001 | 26A1349A | AMP 60249-1 | $12-16$ | 4 | 5 |
|  | 26A1349B | AMP 42281-1 | $14-18$ |  |  |
| VCF4-1002 | 26A1348A | Packard 12015864 | $18-20$ | 4 | 5 |
|  | 26A1348B | Packard 12015865 | $14-16$ |  |  |
|  | 26A1348C | Packard 12084588 | $10-12$ |  |  |



## Features

- 70 A continuous contact rating $@ 85^{\circ} \mathrm{C}$.
- 1 Form A arrangements.
- Plug-in or PC board terminals.
- Optional mounting bracket.


## Conditions

All parametric, environmental and life tests are performed according to EIA Standard RS-407-A at standard test conditions ( $23^{\circ} \mathrm{C}$ Ambient, 20$50 \%$ RH, $29.5 \pm 10$ " Hg .) unless otherwise noted.

## Contact Data

Arrangements: 1 Form A (SPST-NO).
Material: AgNi 0.15 (consult factory for other contact materials).
Max. Switching Rate: 20 operations per second with no contact load.
6 operations per minute for rated life at rated load.
Max. Switching Voltage: 75VDC(1).
Max. Load Current (@ 14VDC Load Voltage):
Max. Continuous Current: 70A.
Max. Make Current: 120A(2).
Max. Break Current ${ }^{(1)}$ : 70A.
Max. Switching Power: 60-800 watts DC (voltage dependent)(1).
Min. Recommended Current: 1 amp @ 12VDC.
Initial Voltage Drop: 200 millivolts, max., @ 70 amp contact load.
Expected Life: 10 million operations, mechanical; 100,000 operations at 70 amps, 14VDC, resistive load.

## Initial Dielectric Strength

Between Contacts and Coil: 500V rms.

## Coil Data

Voltage: 12 and 24VDC.
Resistance: See Coil Data table.
Nom. Power: (@ $23^{\circ} \mathrm{C}$ coil temp. and rated coil voltage):
2.0W, unsuppressed.
2.21W, with 680 ohm resistor.

Thermal Resistance: $50^{\circ} \mathrm{C}$ per actual coil watt in still air with no contact load current.

## VF7series

## 70 Amp Relay With PC Board or Quick Connect Terminals for Automotive Applications

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Operate Data

Must Operate and Must Release Voltage: See Coil Data table. Initial Operate Time: 7 milliseconds, typical, with rated coil voltage applied.
Initial Release Time: 2 milliseconds, typical, with zero volts applied (for unsuppressed relays after having been energized at rated coil voltage).

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+155^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+125^{\circ} \mathrm{C}(4)$.
Shock: 20 g , 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.) $10-40 \mathrm{~Hz} ., 127 \mathrm{~mm}$ double amplitude. $40-70 \mathrm{~Hz} ., 5 \mathrm{~g}$ 's constant. $70-100 \mathrm{~Hz} ., 0.5 \mathrm{~mm}$ double amplitude. $100-500 \mathrm{~Hz} ., 10 \mathrm{~g}$ 's constant.

## Mechanical Data

Termination: 0.250 " and $0.375^{\prime \prime}$ quick connect and printed circuit terminals. Enclosures: Plastic dust cover.
Cover Retention: Cover will withstand a 33.7 pound ( 150 Newton) force (axially applied) without detachment.
Weight: 31g (11 oz.) approximately.

## Abnormal Operation

Overload Current: 140A, 60 sec.(5)
245A, 2 sec.
420A, 0.15 sec .
24V Jump Start: 24VDC for 5 minutes conducting rated contact current @ $23^{\circ} \mathrm{C}$.
Drop Test: Capable of meeting specifications after a 10 meter drop onto concrete, (Sealed model only.)
Flammability: UL94-HB or better (meets FMVSS 302).

## Notes

(1) See Figure 1
(2) Inrush current for lamp load.
(3) Allowable overdrive is rated at ambient temperature for $23^{\circ} \mathrm{C}$ or $85^{\circ} \mathrm{C}$ as stated with no load current flowing through the relay contacts and minimum coil resistance. Also see Figure 2 for maximum ambient temperature versus applied coil voltage.
(4) See Figure 2.
(5) Current and times are compatible with circuit protection by a typical 70A automotive fuse. Relay will make, camy and break the specified current.

## Coil Data (@ 23º Coil Temperature)

| Coil Designator | Rated Coil Voltage (VDC) | Coil Resistance $\pm 10 \%$ (Ohms) | Coil Inductance (H) (Ref) | Must-Operate Voltage (VDC) | Must-Release Voltage (VDC) | Allowable (3) Overdrive (VDC) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | @ $23{ }^{\circ} \mathrm{C}$ | @ $85^{\circ} \mathrm{C}$ |
| F | 12 | 72 | 0.5 | 7.2 | 12 | 18.1 | 14.1 |
| H | 24 | 288 | 2.0 | 14.4 | 2.4 | 36.2 | 28.2 |

Figure 1 - Limiting Curve for Power Load


Safe breaking, arc extinguished (normally open contact) for resistive loads.

Figure 2 - Ambient Temperature vs. Coil Voltage for Continuous Duty


## Assumptions:

1. Thermal resistance $=50^{\circ} \mathrm{C}$ per watt
2. Still air
3. Nominal coil resistance
4. Maximum mean coil temperature $=180^{\circ} \mathrm{C}$
5. Coil temperature rise due to load
$=2^{\circ} \mathrm{C} @ 14 \mathrm{amps}$
$=4^{\circ} \mathrm{C} @ 28 \mathrm{amps}$
$=7^{\circ} \mathrm{C} @ 42 \mathrm{amps}$
$=12^{\circ} \mathrm{C} @ 56 \mathrm{amps}$
$=22^{\circ} \mathrm{C} @ 70 \mathrm{mps}$
6. Thermal resistance and power dissipation based on coil resistance at $180^{\circ} \mathrm{C}$
7. Curves are based on 2.0 watts at $23^{\circ} \mathrm{C}$
8. When full lifetime is at high ambient and high load current, subtract $25^{\circ} \mathrm{C}$ from maximum allowable ambient temperature.

Ordering Information

| Part Number | Contact <br> Arrangement | Enclosure | Terminals |
| :---: | :---: | :---: | :---: |
| VF7-11* 11 | 1 Form A | Dust cover | Quick connect |
| VF7-11* 12 | 1 Form A | Dust cover | Printed circuit (clinch) |
| VF7-41* 11 | 1 Form A | Dust cover with bracket | Quick connect |

[^28]Optional Coil Suppression
Add suffix -S01 for 680 ohm resistor in parallel with 12VDC coil.
Add suffix -S08 for 2700 ohm resistor
in parallel with 24VDC coil.
Epoxy Sealed Construction
Add suffix -C01 for epoxy sealed unit.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
VF7-11F11
VF7-11F12
VF7-41F11

## Outline Dimensions

## Dust Cover With Quick Connect Terminals



## Printed Circuit Board Terminals



Suggested PC Board Layout (Bottom View)


## Connector

Wiring Harness Style Connector For Use With Quick Connect VF7 Relays (order terminals separately)
VCF7-1000


## Connector/Terminal Usage Chart - Our authorized distributors are more likely to stock boldface items.

|  |  | Required Crimp Terminals (Order Separately) |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Connector | Terminal P/N | Alternate P/N | Wire AWG | Oty. Required |
| VCF7-1000 | 26A 1350A | AMP 280756-4 | $10-12$ | 2 (Contacts) |
|  | 26A 1350B | AMP 280755-4 | $6-10$ | 2 (Contacts) and |
|  | 26A 1349B | AMP 42281-1 | $14-18$ | 2 (Coil) |

Note: For information on crimping tools, please consult local representative or factory.


## VTF series

## Flasher Modules <br> for Automotive Applications

Safety Standards:
U.S.A.:

SAE J 590 (tum signal)
SAE J 945 (hazard waming)
SAE J 2068 (turn signal/hazard waming)
FMVSS 108 (all)
European:
Designed to meet ECO guideline 76/756 requirements.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Environmental Data

Operating Ambient Temperature Range: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Storage Ambient Temperature Range: $-40^{\circ} \mathrm{C}$ to $+125^{\circ} \mathrm{C}$.
Shock: $20 \mathrm{~g}, 10$ millisecond, half sine wave pulse.
Vibration: $10-40 \mathrm{~Hz}$., 127 mm double amplitude.
40-70 Hz., 5g's constant.
$70-100 \mathrm{~Hz} ., 0.5 \mathrm{~mm}$ double amplitude.
$100-500 \mathrm{~Hz} ., 10 \mathrm{~g}$ 's constant.

## Mechanical Data

Termination: 0.250 " $(6.35 \mathrm{~mm})$ quick connect.
Enclosures:
Dust Cover: Protects relay from dust.
Cover Retention: 50 pound (220 Newton) minimum.
Weight: 13 oz . ( 37 g ) approximately.

## Abnormal Operation

Drop Test: Capable of meeting specifications after a 3.28 foot (10 meter) drop onto concrete in final enclosure.
Flammability: UL94-HB or better (meets FMVSS 302).

## Notes

(1) Three lamp combination flashers with three terminals do not meet U.S. Federal motor vehicle safety requirements when lamp outage occurs during hazard mode operation. For more information consult factory.
(2) The actual sound pressure is highly dependent on mounting method used.

## Operate Data

Nominal Voltage: 12VDC system.
Operating Voltage Range: 9 -16VDC.
Device Voltage Drop: Less than 0.400 VDC at rated turn signal load. Less than 0.450 VDC at rated hazard signal load.
Inital Turn-on Time: Less than or equal to 50 msec .
Start Time: Less than 10 sec per FMVSS 108.
Sound Pressure Level : Min. 72 dbA at 10 meters.(2)

## Ordering Information

| Part Number | Meets the Safety <br> Standard of: | Flasher Type |  | Turn Signal Mode | Max. Number of <br> Lamps |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | U.S.A. | Turn | Turn/Hazard <br> Warning | 5 Lamp <br> System | Hazard |  |
|  | X | X | X | X | No |  |
| VTF-14F11 | X |  | X |  |  |  |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
None at present.

Figure 1 - Electrical Contact Life vs. Load Power


## Outline Dimensions



## Wiring Diagram (Bottom View)



## Connectors

Wiring Harness Style Connector (order terminals separately) VCF4-1001


## Sockets

PC Board Socket VCF4-1000


Wiring Harness Style, Bracket Mount Socket (order terminals separately)


Connector/Terminal Usage Chart - Our authorized distributors are more likely to stock boldface items.

| Connector | Required Crimp Terminals (Order Separately) |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Terminal P/N | Alternate P/N | Wire AWG | Oty. Required |
| VCF4-1000 | None | None | N/A | 0 |
| VCF4-1001 | 26A1349A | AMP 60249-1 | $12-16$ | 3 |
|  | 26A1349B | AMP 42281-1 | $14-18$ |  |
| VCF4-1002 | 26A1348A | Packard 12015864 | $18-20$ |  |
|  | 26A1348B | Packard 12015865 | $14-16$ | 3 |
|  | 26A1348C | Packard 12084588 | $10-12$ |  |

Engineering Notes


## Alphanumeric Index

| Series | Type | Page |
| :---: | :---: | :---: |
| 210 | M tg. Board for Standard I/O M odules .. | 1114 |
| 2IOM | Mtg. Board for Slim Line I/O M odules | 1122 |
|  | . Standard AC Input M odules | 1110 |
| IACM | . Slim Line AC Input M odules | 1118 |
| IDC | . Standard DC Input M odules | 1110 |
| IDCM | . Slim Line DC Input M odules | 1118 |
| OAC | . Standard AC Output M odule | 1110 |
| OACM | . Slim Line AC Output M odule | 1118 |
| ODC | Standard DC Output M odule | 1110 |
| ODCM | . Slim Line DC Output M odule | 1118 |
| SSR | . Solid State Relay, Paired SCR Output | 1104 |
| SSRD | . Dual Solid State Relay | 1106 |
| SSRQ. | . Quad Solid State Relay. | 1108 |
|  | . Solid State Relay, Triac Output | 1102 |

Additional solid state relays are included in our CII high performance relay product line. For an overview of the CII product line, see section 14 of this databook.


## SSRT series

## "Hockey Puck" <br> Solid State Relay With <br> Snubberless Triac Output


Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Standard "hockey puck" package.
- Enhanced noise immunity (designed to meet level 3 requirements of

European EMC Directive).

- LED indicator.
- Floating terminal design.
- Low cost snubberless triac outputs.
- 10A \& 25A rms versions.
- AC \& DC input versions.
- 4000 V rms isolation.


## Engineering Data

Form: 1 Form A (SPST-NO).
Duty: Continuous.
Isolation: 4000 V ms minimum, input - output.
Capacitance: 8.0 pf typical (input to output).
Temperature Range:
Storage: $-40^{\circ} \mathrm{C}$ to $+100^{\circ} \mathrm{C}$
Operating Temperature: $-20^{\circ} \mathrm{C}$ to $+80^{\circ} \mathrm{C}$
Case Material: Plastic, UL rated 94V-0.
Case and Mounting: Refer to outline dimension.
Termination: Refer to outline dimension.
Approximate Weight: 3.5 oz. (98g).

## Ordering Information

|  | Sample Part Number | SSRT | $-240$ | D | 10 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: SSRT = "hockey puck" triac output solid state relay |  |  |  |  |  |
| 2. Line Voltage: $240=24-280$ VAC |  |  |  |  |  |
| 3. Input Type \& Voltage: <br> $A=90-280$ VAC linear $D=3-32$ VDC constant current |  |  |  |  |  |
| 4. Maximum Switching Rating: $10=.1-10 \mathrm{~A}$ rms, mounted to heatsink $25=.1-25 A$ rms, mounted to heatsink |  |  |  |  |  |

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
SSRT-240A10 SSRT-240D10

SSRT-240A25 SSRT-240D25

## Input Specifications

| Parameter | AC Input/AC Output | DC Input/AC Output |
| :--- | :---: | :---: |
| Control Voltage Range $\mathrm{V}_{\mathrm{IN}}$ | $90-280 \mathrm{VAC}$ | $3-32 \mathrm{VDC}$ |
| Must Operate Voltage $\mathrm{V}_{\mathrm{IN(OP)}}(\mathrm{Max})$. | 90 VAC | 3 VDC |
| Must Release Voltage $\mathrm{V}_{\mathrm{IN(REL)}}(\mathrm{Min)}$. | 10 VAC | 1VDC |
| Input Current (Max.) | 8.5 mA | 14 mA |

Output Specification (@ $\mathbf{2 5}^{\circ} \mathrm{C}$, unless otherwise specified)

| Parameter | Conditions | Units | $\begin{aligned} & \text { SSRT-240A10 } \\ & \text { \& SSRT-240D10 } \end{aligned}$ | $\begin{aligned} & \text { SSRT-240A25 } \\ & \text { \& SSRT-240D25 } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: |
| Load Voltage Range V L |  | V rms | 24-280 |  |
| Repetitive Blocking Voltage (Min.) |  | $\checkmark$ peak | $\pm 600$ |  |
| Load Current Range $\mathrm{I}_{\text {L }}{ }^{*}$ | Resistive | A rms | . 1 -10 | .1-25 |
| Single Cycle Surge Current (Min.) |  | A peak | 100 | 250 |
| Leakage Current (Off-State) (Max.) | $\begin{gathered} \mathrm{f}=60 \mathrm{~Hz} . \mathrm{V}_{\mathrm{L}}=\mathrm{Nom} . \\ \text { (120 or } 240 \mathrm{~V} \mathrm{~ms} \text { ) } \end{gathered}$ | mA rms | . 1 |  |
| On-State Voltage Drop (Max.) | $\mathrm{I}_{\mathrm{L}}=$ Max. | $\checkmark$ peak | 1.5 | 1.3 |
| Static dv/dt (Off-State) (Min.) |  | V/us | 500 |  |
| Thermal Resistance, J unction to Case ( $\mathrm{R}_{\text {өj-c }}$ ) (Max.) |  | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ | 2.2 | 1.7 |
| Tum-On Time (Max.) | $\mathrm{f}=60 \mathrm{~Hz}$. | ms | 8.3 for DC input types, 20 for AC input types |  |
| Tum-Off Time (Max.) | $\mathrm{f}=60 \mathrm{~Hz}$. | ms | 8.3 for DC input types, 30 for AC input types |  |
| $I^{2}$ t Rating | $\mathrm{t}=8.3 \mathrm{~ms}$ | $\mathrm{A}^{2} \mathrm{Sec}$. | 41 | 240 |
| Load Power Factor Rating | $\mathrm{I}_{\mathrm{L}}=\mathrm{Max}$. |  | 0.5-1.0 |  |

*See Derating Curves

Electrical Characteristics (Thermal Derating Curves)

10A Units


25A Units


## Heatsink Recommendations

- We recommend that solid state relay modules be mounted to a heatsink sufficient to maintain the module's base temperature at less than $85^{\circ} \mathrm{C}$ under worst case ambient temperature and load conditions.
- The heatsink mounting surface should be a smooth (30-40 micro-inch finish), flat (30-40 micro-inch flatness across mating area), un-painted surface which is clean and free of oxidation.
- An even coating of thermal compound (Dow Coming DC340 or equivalent) should be applied to both the heatsink and module mounting surfaces and spread to a uniform depth of .002 " to eliminate all air pockets.
- The module should be mounted to the heatsink using two\#10 screws.


## Operating Diagrams



## Outline Dimensions



## SSR series



## "Hockey Puck" <br> Solid State Relay With Paired SCR Output

## c ${ }^{(\$ 1} \mathbf{N u s}_{\text {us }}$ File E81606

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Engineering Data

Form: 1 Form A (SPST-NO).
Duty: Continuous.
Isolation: $4,000 \mathrm{~V}$ rms minimum.
Capacitance: 8 pf typical (input to output).
Temperature Range:
Storage: $-40^{\circ} \mathrm{C}$ to $+100^{\circ} \mathrm{C}$
Operating: $-20^{\circ} \mathrm{C}$ to $+80^{\circ} \mathrm{C}$
Case Material: Plastic, UL rated 94V-0.
Case and Mounting: Refer to outline dimension.
Termination: Refer to outline dimension.
Approximate Weight: 3.5 oz. (98g).

## Ordering Information



Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| SSR-240A25 | SSR-240D25 | SSR-240D50 |
| :--- | :--- | :--- |
| SSR-240A50 | SSR-240D25R | SSR-480D125 |

## Input Specifications

| Parameter | AC Input | DC Input |
| :--- | :---: | :---: |
|  | Zero V Turn-on Units | Zero and Random V Turn-on Units |
| Control Voltage Range $\mathrm{V}_{\mathbb{I N}}$ | $90-280 \mathrm{VAC}$ | $3-32 \mathrm{VDC}$ |
| Must Operate Voltage $\mathrm{V}_{\operatorname{IN(OP)}}(\mathrm{Min)}$. | 90 VAC | 3VDC |
| Must Release Voltage $\mathrm{V}_{\text {IN(REL) }}(\mathrm{Min)}$. | 10 VAC | 1VDC |
| Input Current (Max.) | 15 mA | 15 mA |

Output Specifications (@ $\mathbf{2 5}^{\circ} \mathrm{C}$, unless otherwise specified)

| Parameter | Nom. Line Voltage | Conditions | Units | 25A Models | 50A Models | 125A Models |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Load Voltage Range $\mathrm{V}_{\mathrm{L}}$ | 120/240V M odel |  | $V \mathrm{mms}$ | 24-280 |  |  |
|  | 480V Model |  | V rms | 48-660 |  |  |
| Repetitive Blocking Voltage (Min.) | 120/240 Model |  | $\checkmark$ peak | $\pm 600$ |  |  |
|  | 480V Model |  | $\checkmark$ peak | $\pm 1200$ |  |  |
| Load Current Range $\mathrm{I}_{\text {L }}{ }^{*}$ | 120/240 \& 480V M odels | Resistive | A mis | . $05-25$ | .1-50 | . 1 -125 |
| Single Cycle Surge Current (Min.) | 120/240 \& 480V M odels |  | A peak | 250 | 750 | 1,700 |
| Leakage Current (Off-State) (Max.) | 120/240V Model | $\mathrm{f}=60 \mathrm{~Hz} . \mathrm{V}_{\mathrm{L}}=240 \mathrm{~V} \mathrm{~ms}$ | mA ms | . 1 |  |  |
|  | 480 V Model | $\mathrm{f}=60 \mathrm{~Hz} . \mathrm{V}_{\mathrm{L}}=480 \mathrm{~V} \mathrm{~ms}$ |  | . 25 |  |  |
| On-State Voltage Drop (Max.) | 120/240 \& 480V M odels | $\mathrm{I}_{\mathrm{L}}=$ Max. |  | 1.35 |  |  |
| Static dv/dt (Off-State) (Min.) | 120/240 \& 480V M odels |  | V/us | 500 |  |  |
| Thermal Resistance, J unction to Case ( $\mathrm{R}_{\theta \mathrm{J}-\mathrm{C}}$ ) (Max.) | 120/240 \& 480V M odels |  | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ | 0.4 | 0.25 | . 15 |
| Turn-On Time (Max.) | 120/240 \& 480V M odels | $\mathrm{f}=60 \mathrm{~Hz}$. | ms | 8.3 for Zero Voltage Turn-On DC input types, 20 for Zero Voltage Tum-On AC input types, 0.02 for Random Voltage Tum-On M odels |  |  |
| Turn-Off Time (Max.) | 120/240 \& 480V M odels | $\mathrm{f}=60 \mathrm{~Hz}$. | ms | 8.3 for DC input types, 30 for AC input types |  |  |
| $I^{2} \mathrm{~T}$ Rating | 120/240 \& 480V M odels | $\mathrm{t}=8.3 \mathrm{~ms}$ | $A^{2}$ Sec. | 937 | 2,458 | 12,000 |
| Load Power Factor Rating | 120/240 \& 480V M odels | $\mathrm{I}_{\mathrm{L}}=$ Max. |  | 0.5-1.0 |  |  |

*See Derating Curves

## Electrical Characteristics (Thermal Derating Curves)

25A Units



## Operating Diagrams



50A Units


## Heatsink Recommendations

- We recommend that solid state relay modules be mounted to a heatsink sufficient to maintain the module's base temperature at less than $85^{\circ} \mathrm{C}$ under worst case ambient temperature and load conditions.
- The heatsink mounting surface should be a smooth (30-40 micro-inch finish), flat ( $30-40$ micro-inch flatness across mating area), un-painted surface which is clean and free of oxidation.
- An even coating of thermal compound (Dow Corning DC340 or equivalent) should be applied to both the heatsink and module mounting surfaces and spread to a uniform depth of .002" to eliminate all air pockets.
- The module should be mounted to the heatsink using two \#10 screws.


## Outline Dimensions



## SSRD series



## Dual AC Output "Hockey Puck" <br> Solid State Relay With Paired SCR Outputs

## ${ }^{\mathbf{c N}} \mathrm{Nus}_{\text {sile }} \mathrm{E} 81606$

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Two independent AC output solid state relays in one standard package.
- Enhanced noise immunity (designed to meet level 3 requirements of European EMC Directive).
- Inverse parallel SCR outputs.
- 25A rms \& 40A rms versions available.
- 4-15 VDC input control.
- Zero voltage and random voltage turn-on versions.
- 4000 V ms optical isolation.
- Quick connect style terminals.


## Engineering Data

Form: 2 Form A (2 SPST-NO).
Duty: Continuous.
Isolation: 4000 V rms input-to-output;
2500 V rms input or output to ground.
Capacitance: 8.0 pf typical (input to output).
Temperature Range:
Storage: $-40^{\circ} \mathrm{C}$ to $+100^{\circ} \mathrm{C}$
Operating: $-40^{\circ} \mathrm{C}$ to $+80^{\circ} \mathrm{C}$
Case Material: Plastic, UL rated 94V-0.
Case and Mounting: Refer to outline dimension.
Termination: Refer to outline dimension.
Approximate Weight: 3.5 oz . (98g).

## Ordering Information

| Sample Part Number $>$ | SSRD | D | 25 |
| :---: | :---: | :---: | :---: |
| 1. Basic Series: SSRD = Dual output SSR - 2 SPST - NO |  |  |  |
| 2. Line Voltage: $240=24-280$ VAC |  |  |  |
| 3. Input Type \& Voltage: $\mathrm{D}=4-15 \mathrm{VDC}$ |  |  |  |
| 4. Maximum Switching Rating/Output: $25=.1-25 \mathrm{~A} \mathrm{rms} @ 25^{\circ} \mathrm{C}$, mounted to heatsink $40=.1-40 \mathrm{~A} \mathrm{~ms} @ 25^{\circ} \mathrm{C}$, mounted to heatsink |  |  |  |

5. Options: Blank = Zero voltage turn-on (both outputs)

R = Random voltage turn-on (both outputs)

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.
SSRD-240D25 SSRD-240D40

## Input Specifications

| Parameter | Units | Zero V Turn-on and Random V Turn-on Units |
| :--- | :---: | :---: |
| Control Voltage Range $\mathrm{V}_{\text {IN }}$ | VDC | $4-15$ |
| Must Operate Voltage $\mathrm{V}_{\text {IN(OP) }}$ (Min.) | VDC | 3.75 |
| Must Release Voltage $\mathrm{V}_{\text {IN(REL) }}($ Min.) | VDC | 1 |
| Input Current (Max.) | mA DC | 34 |
| Input Current (Min. for On-State) | mA DC | 7.5 |
| Input Resistance | Ohms | 500 |

## Output Specifications (@ $\mathbf{2 5}^{\circ} \mathbf{C}$, unless otherwise specified)

| Parameter | Conditions | Units | 25A Models | 40A Models |
| :---: | :---: | :---: | :---: | :---: |
| Load Voltage Range $\mathrm{V}_{\mathrm{L}}$ | $\mathrm{f}=47-63 \mathrm{~Hz}$. | $V$ ms | 24-280 |  |
| Peak Voltage (Min.) | $\mathrm{t}=1 \mathrm{Min}$. | $\checkmark$ peak | 550 |  |
| Load Current Range $\mathrm{IL}^{*}$ | Resistive | A rms | 0.1-25 | 0.1-40 |
| Single Cycle Surge Current (Max.) |  | A peak | 500 | 780 |
| One Second Surge Current (Max.) |  | A peak | 150 | 234 |
| Leakage Current (Off-State) (Max.) | $\mathrm{V}_{\mathrm{L}}=280 \mathrm{~V} \mathrm{~ms}$ | mA rms | 0.1 |  |
| On-State Voltage Drop (Max.) | $\mathrm{I}_{\mathrm{L}}=$ Max. | $\checkmark$ peak | 1.4 | 1.3 |
| Static dv/dt (Off-State) (Min.) |  | V/us | 500 |  |
| Thermal Resistance, J unction to Baseplate ( $\mathrm{R}_{\text {өJ-B }}$ ) (Max.) | Both Sections On | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ | 0.6 | 0.6 |
| Tum-On Time (Max.) | $\mathrm{f}=60 \mathrm{~Hz}$. | ms | 8.33 for Zero Voltage Tum-On M odels $<0.1$ for Random Voltage Turn-On M odels |  |
| Tum-Off Time (Max.) | $\mathrm{f}=60 \mathrm{~Hz}$. | ms | 8.33 |  |
| $\mathrm{I}^{2} \mathrm{t}$ Rating | $\mathrm{t}=8.3 \mathrm{~ms}$ | $A^{2}$ Sec. | 1,041 | 2,435 |
| Load Power Factor Rating | $\mathrm{I}_{\mathrm{L}}=\mathrm{Max}$. |  | 0.5-1.0 |  |

*See Derating Curves

## Electrical Characteristics (Thermal Derating Curves)



## Operating Diagram


$\dagger$ Random Turn-on Units have a Random Turn-on circuit instead of Zero Voltage Circuit


## Heatsink Recommendations

- We recommend that solid state relay modules be mounted to a heatsink sufficient to maintain the module's base temperature at less than $85^{\circ} \mathrm{C}$ under worst case ambient temperature and load conditions.
- The heatsink mounting surface should be a smooth (30-40 micro-inch finish), flat (30-40 micro-inch flatness across mating area), un-painted surface which is clean and free of oxidation
- An even coating of thermal compound (Dow Coming DC340 or equivalent) should be applied to both the heatsink and module mounting surfaces and spread to a uniform depth of .002" to eliminate all air pockets.
- The module should be mounted to the heatsink using two \#10 screws.


## Outline Dimensions



Input Terminal Connectors are available from several different manufacturers.

AMP P/N: 103976-3 or 640440-4
Methode P/N: 1300-004-422
Consult your local distributor for these or equivalent connectors

## SSRO series



## Quad AC Output "Hockey Puck" <br> Solid State Relay With <br> Triac Outputs

## c94is File E29244

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Features

- Four independent AC output solid state relays in one standard package.
- 20A ms triac outputs.
- 4-15 VDC input control.
- Zero voltage and random voltage turn-on versions.
- 2500V rms optical isolation.
- Quick connect style terminals.


## Engineering Data

Form: 4 Form A (4 SPST-NO).
Duty: Continuous.
Isolation: 2500 V rms input-to-output-to-ground.
Capacitance: 10.0 pf maximum (input to output).
Temperature Range:
Storage: $-40^{\circ} \mathrm{C}$ to $+125^{\circ} \mathrm{C}$
Operating: $-40^{\circ} \mathrm{C}$ to $+80^{\circ} \mathrm{C}$
Case Material: Plastic, UL rated 94V-0.
Case and Mounting: Refer to outline dimension.
Termination: Refer to outline dimension.
Approximate Weight: 3.5 oz . (98g).

## Ordering Information



Our authorized distributors are more likely to maintain the following items in stock for immediate delivery. SSRQ-240D20

## Input Specifications

| Parameter | Conditions | Units | Zero V or Random V Turn-on Units |
| :--- | :---: | :---: | :---: |
| Control Voltage Range $\mathrm{V}_{\mathrm{IN}}$ | $@ 25^{\circ} \mathrm{C}$ | VDC | $4-15$ |
| Must Operate Voltage $\mathrm{V}_{\operatorname{IN}(O P)}(\mathrm{Min})$. | $@ 25^{\circ} \mathrm{C}$ | VDC | 4 |
| Must Release Voltage $\mathrm{V}_{\operatorname{IN}(\mathrm{REL})(\mathrm{Min} .)}$ | $@ 25^{\circ} \mathrm{C}$ | VDC | 1 |
| Input Current (Typ.) | $@ 25^{\circ} \mathrm{C}$ | mA DC | 12 |
| Input Impedance (Nom.) | $@ 25^{\circ} \mathrm{C}$ | ohms | 330 |

Output Specifications (@ $\mathbf{2 5}^{\circ} \mathrm{C}$, unless otherwise specified)

| Parameter | Conditions | Units |  |
| :---: | :---: | :---: | :---: |
| Load Voltage Range $\mathrm{V}_{\mathrm{L}}$ |  | $V$ rms | 24-280 |
| Repetitive Blocking Voltage (Min.) |  | $\checkmark$ peak | $\pm 600$ |
| Load Current Range $\mathrm{I}_{\text {* }}{ }^{*}$ | Resistive | A rms | .15-20 |
| Single Cycle Surge Current (Min.) |  | A peak | 250 |
| Leakage Current (Off-State) (Max.) | $\mathrm{f}=60 \mathrm{~Hz} . V_{L}=280 \mathrm{Vrms}$ | mA rms | 10 |
| On-State Voltage Drop (Max.) | $\mathrm{I}_{\mathrm{L}}=$ Max. | V peak | 1.6 |
| Static dv/dt (Off-State) (Min.) | $\mathrm{V}_{\mathrm{L}}=280 \mathrm{Vrms}$ | V/us | 200 |
| Thermal Resistance, J unction to Case ( $\mathrm{R}_{\text {өJ-C }}$ ) (Max.) | All Sections On | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ | 1.2 |
| Turn-On Time (Max.) | $\mathrm{f}=60 \mathrm{~Hz}$. | ms | 8.3 for Zero Voltage Tum-On M odels 0.1 for Random Voltage Tum-On Models |
| Turn-Off Time (Max.) | $\mathrm{f}=60 \mathrm{~Hz}$. | ms | 8.3 |
| $\mathrm{I}^{2}$ t Rating | $\mathrm{t}=8.3 \mathrm{~ms}$ | $\mathrm{A}^{2} \mathrm{Sec}$. | 260 |
| Load Power Factor Rating | $\mathrm{I}_{\mathrm{L}}=\mathrm{Max}$. |  | 0.5-1.0 |

*See Thermal Derating Curves. Note: While each output section is rated for a maximum of 20A, the maximum output per package is 60A.

## Electrical Characteristics (Thermal Derating Curves)

## How To Use These Curves

Knowing maximum load current and maximum ambient temperature, use derating curves to determine required heat sink and maximum allowable base plate temperature. On left hand power dissipation curve, locate the point corresponding to maximum load current. Extend a line to the right from that point to the intersection of vertical line on right hand chart corresponding to maximum ambient temperature. From heat sink curve, read directly or extrapolate required heat sink size. Extend the line farther to the right and read on the right hand scale the maximum allowable base plate temperature.


## Operating Diagram



Example \#1:
Given: $I_{L}=$ Four 7.5 A loads $@ 60^{\circ} \mathrm{C}$
Find: Minimum heatsink required
Solution: From Thermal Dissipation Graph $4 \times 7.5 \mathrm{~A}=30 \mathrm{~A} 4$ sections ON Heatsink $=2^{\circ} \mathrm{C} / \mathrm{W}$ minimum

## Example \#2:

Given: SSRQ24020
Find: Maximum rating mounting to $10^{\circ} \mathrm{C} / \mathrm{W} \mathrm{HS} @ 60^{\circ} \mathrm{C}$ All sections ON
Solution: From Thermal Dissipation Graph

$$
\text { Rating mounted to } 10^{\circ} \mathrm{C} / \mathrm{W} \text { HS @ } 60^{\circ} \mathrm{C}=36 \mathrm{~A} \text { total }
$$

9 A for 4 Sections ON $=36 \mathrm{~A}$ total
12A for 3 Sections ON =36A total

## Heatsink Recommendations

- We recommend that solid state relay modules be mounted to a heatsink sufficient to maintain the module's base temperature at less than $85^{\circ} \mathrm{C}$ under worst case ambient temperature and load conditions.
- The heatsink mounting surface should be a smooth ( $30-40$ micro-inch finish), flat ( $30-40$ micro-inch flatness across mating area), un-painted surface which is clean and free of oxidation.
- An even coating of thermal compound (Dow Corning DC340 or equivalent) should be applied to both the heatsink and module mounting surfaces and spread to a uniform depth of .002" to eliminate all air pockets.
- The module should be mounted to the heatsink using two \#10 screws.


## Outline Dimensions



Input Terminals mate with the following connectors or equivalent:

AMP P/N: 103976-4
Consult your local distributor for connectors.


## IAC/OAC IDC/ODC

## Input/Output Modules

听 File E81606 \& E29244
(14) File LR38595M77


#### Abstract

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Features

- Industry standard package and pin-out.
- Color coded by function.
$\cdot 4,000 \mathrm{~V} \mathrm{~ms}$ optical isolation.
- High immunity to false operation.
- Series compatible.
- Output modules can be controlled from sinking or sourcing logic.
- Compatible with 210 series mounting boards.


## Engineering Data (all I/O modules)

Switch Form: 1 Form A (SPST-NO)
Duty: Continuous.
Isolation: $4,000 \mathrm{~V}$ rms, 60 Hz .
Capacitance: 8 pF Typical (input to output).
Operating Temperature: $-30^{\circ} \mathrm{C}$ to $+80^{\circ} \mathrm{C}$.
Storage Temperature: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Potting Compound Flammability: UL94V-0.
Approximate Weight: 138 oz. (35g).

Ordering Information

|  | Typical Part Number | OAC | -5 | H |
| :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> IAC = AC input module - yellow case IDC = DC input module - white case OAC =AC output module - black case ODC = DC output module - red case |  |  |  |  |
| 2. Input or Logic Voltage: $\begin{aligned} & 5=5 \mathrm{VDC} \\ & 15=15 \mathrm{VDC} \\ & 24=24 \mathrm{VDC} \end{aligned}$ |  |  |  |  |
| 3. Options: $\begin{aligned} \text { Blank }= & \text { IAC Type }-120 \mathrm{VACNDC} \text { input ( } 90-140 \mathrm{VACNDC}) * * \\ & \text { IDC Type }-3.3-32 \mathrm{VDC} \text { input * } * \\ & \text { OAC Type - 3A, 24-280VAC, zero voltage turn-on output } \\ & \text { ODC Type }-3 \text {, 3-60VDC output } \end{aligned}$ |  |  |  |  |
| A $\quad=$ IAC Type -240 VACNDC input (180-280VACNDC)** <br>  OAC Type $-3 \mathrm{~A}, 24-280 \mathrm{VAC}$, zero voltage turn-on output <br>  ODC Type $-1 \mathrm{~A}, 3-250 \mathrm{VDC}$ output <br>  IDC Type $-10-60 \mathrm{VDC}$ input * * |  |  |  |  |
| $\mathrm{E} \quad=\mathrm{IAC}$ Type $-18-36 \mathrm{VACNDC}$ input ** |  |  |  |  |
| $\mathrm{F} \quad=\mathrm{IDC}$ Type - 4-32VDC input \& fast turn-on \& turn-off times ** |  |  |  |  |
| H = OAC Type - 5A, 24-280VAC, zero voltage turn-on output |  |  |  |  |
| $\mathrm{R}=$ OAC Type $-5 \mathrm{~A}, 12-280 \mathrm{VAC}$, random voltage turn-on output |  |  |  |  |

*     * Is not polarity sensitive.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| IAC-5 | IDC-24 | OAC-24A |
| :--- | :--- | :--- |
| IAC-5A | OAC-5 | ODC-5 |
| IAC-5E | OAC-5A | ODC-5A |
| IAC-15 | OAC-5H | ODC-15 |
| IAC-24 | OAC-15 | ODC-15A |
| IDC-5 | OAC-24 | ODC-24 |

IAC

## AC Input Modules

## Input Specifications

| Parameter | Conditions | Units | IAC-5 IAC-15 IAC-24 |  |  | IAC-5A IAC-15A IAC-24A |  |  | IAC-5E IAC-15E IAC-24E |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. |
| Control Voltage Range $\mathrm{V}_{\text {IN }}$ |  | VACNDC | 90 | 120 | 140 | 180 | 240 | 280 | 18 | 24 | 36 |
| Must Operate Voltage $\mathrm{V}_{\text {IN(OP) }}$ |  | VACNDC |  |  | 90 |  |  | 180 |  |  | 18 |
| Must Release Voltage $\mathrm{V}_{\text {IN(REL) }}$ |  | VACNDC | 20 |  |  | 20 |  |  | 3 |  |  |
| Max. Input Current | @ $\mathrm{V}_{\text {IN }}=$ Max. | mA |  |  | 6 |  |  | 6 |  |  | 18 |
| Input Resistance |  | Ohms |  | 28K |  |  | 75K |  |  | 2K |  |

## Output Specifications (@+25 $\mathbf{C}$ unless otherwise specified)

| Parameter | Conditions | Units | IAC-5 IAC-5A IAC-5E |  | IAC-15 IAC-15A IAC-15E |  | IAC-24 IAC-24A IAC-24E |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Typ. Max. | Min. | Typ. Max. | Min. | Typ. | Max. |
| Maximum Output Voltage |  | VDC |  | 30 |  | 30 |  |  | 30 |
| Maximum Output Current |  | mADC |  | 50 |  | 50 |  |  | 50 |
| Maximum Output Leakage Current | Vout $=$ Max. | $\mu$ ADC |  | 10 |  | 10 |  |  | 10 |
| Maximum Output Voltage Drop | $\mathrm{I}_{\text {SINK }}=50 \mathrm{~mA}$ | VDC |  | . 2 |  | . 2 |  |  | . 2 |
| Logic Supply Voltage $\mathrm{V}_{\text {CC }}$ |  | VDC | 3 | 56 | 12 | 1518 | 20 | 24 | 30 |
| Logic Supply Current | $\mathrm{V}_{\text {CC }}=$ Max. | mADC |  | 18 |  | 18 |  |  | 18 |
| Turn-On Time (Nominal) | $\mathrm{I}_{\text {SINK }}=25 \mathrm{~mA}$ | ms |  | 20 |  | 20 |  |  | 20 |
| Turn-Off Time (Nominal) | $\mathrm{I}_{\mathrm{SINK}}=25 \mathrm{~mA}$ | ms |  | 30 |  | 30 |  |  | 30 |
| Output Type (Open Collector) |  |  | Norm | Open(SINKING) $^{\text {( }}$ | Norm | Open $_{\text {(SINKING) }}$ | Norm | Ope | KKING) |

## OAC

## AC Output Modules

## Input Specifications

| Parameter | Conditions | Units | OAC-5 OAC-5A OAC-5H OAC-5R |  |  | OAC-15 OAC-15A OAC-15H OAC-15R |  |  | OAC-24 OAC-24A OAC-24H OAC-24R |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. |
| Control Voltage Range $\mathrm{V}_{\text {IN }}$ |  | VDC | 3 | 5 | 8 | 9 | 15 | 18 | 18 | 24 | 32 |
| Must Operate Voltage $\mathrm{V}_{\text {IN(OP) }}$ |  | VDC |  |  | 3 |  |  | 9 |  |  | 18 |
| Must Release Voltage $\mathrm{V}_{\text {IN(REL) }}$ |  | VDC | 1 |  |  | 1 |  |  | 1 |  |  |
| Maximum Input Current | $@ V_{\text {IN }}=$ Nominal | mADC |  |  | 20 |  |  | 16 |  |  | 13 |
| Input Resistance RIN |  | Ohms |  | 220 |  |  | 1000 |  |  | 2000 |  |

PIN-3 must be positive with respect to PIN-4 for correct operation.

## Output Specifications (47 to $\mathbf{6 3 ~ H z} ., @+25^{\circ} \mathrm{C}$ unless otherwise specified)

| Parameter | Conditions | Units | OAC-5 OAC-5A OAC-15 OAC-15A OAC-24 OAC-24A |  | OAC-5H IAC-15H OAC-24H |  | OAC-5R OAC-15R OAC-24R |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Max. | Min. | Typ. Max. | Min. | Typ. | Max. |
| Load Voltage $\mathrm{V}_{\mathrm{L}}$ |  | V rms | 24 | 280 | 24 | 120/240 280 | 24 | 120/240 | 280 |
| Repetitive Blocking Voltage |  | $\checkmark$ peak |  | $\pm 600$ |  | $\pm 600$ |  |  | $\pm 600$ |
| Load Current $\mathrm{l}^{*}$ * |  | A rms | . 05 | 3 | . 05 | 5 | . 05 |  | 5 |
| Ouput Current |  | $\mathrm{mA} /{ }^{\circ} \mathrm{C}$ | $58 \mathrm{~mA} /{ }^{\circ} \mathrm{C}$ |  | $66 \mathrm{~mA} /{ }^{\circ} \mathrm{C}$ |  | $66 \mathrm{~mA} /{ }^{\circ} \mathrm{C}$ |  |  |
| Derating |  |  | $40^{\circ} \mathrm{C}-80^{\circ} \mathrm{C}$ |  | $30^{\circ} \mathrm{C}-80^{\circ} \mathrm{C}$ |  | $30^{\circ} \mathrm{C}-80^{\circ} \mathrm{C}$ |  |  |
| Single Cycle surge Current |  | A peak | 100 |  | 250 |  | 250 |  |  |
| Leakage Current (Off-State) @ 60 Hz . | $\mathrm{V}_{\mathrm{L}}=120 \mathrm{VAC}$ | mA rms |  | 1 | 1 |  | 1 |  |  |
|  | $\mathrm{V}_{\mathrm{L}}=240 \mathrm{VAC}$ | mA rms |  | 2 | 2 |  | 2 |  |  |
| On-State Voltage Drop | $\mathrm{L}=\mathrm{Max}$. | $\checkmark$ peak |  | 16 | 16 |  | 16 |  |  |
| Static dv.dt (Off-State) |  | V/ $/ \mathrm{s}$ |  | 200 | 200 |  | 200 |  |  |
| Turn-On Time | $@ f=60 \mathrm{~Hz}$. | ms |  | 8.3 | 8.3 |  | . 1 |  |  |
| Turn-Off Time |  | ms |  | 8.3 | 8.3 |  | 8.3 |  |  |
| Output Type (Form) |  |  | Normally Open 1A |  | Normally Open 1A |  | Normally Open 1A |  |  |
| H/P/ Rating @ 240VAC |  |  | 1/4HP |  | 1/2HP |  | 1/2HP |  |  |

## DC Input Modules

## Input Specifications

| Parameter | Conditions | Units | IDC-5 IDC-15 IDC-24 |  |  | IDC-5A IDC-15A IDC-24A |  |  | IDC-5F IDC-15F IDC-24F |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. |
| Control Voltage Range $\mathrm{V}_{\mathrm{IN}}$ |  | VDC | $\pm 3.3$ | $\pm 24$ | $\pm 32$ | $\pm 10$ |  | $\pm 60$ | $\pm 4$ |  | $\pm 32$ |
| Must Operate Voltage VIN(OP) |  | VDC |  |  | $\pm 3.3$ |  |  | $\pm 10$ |  |  | $\pm 4$ |
| Must Release Voltage $\mathrm{V}_{\text {IN(REL) }}$ |  | VDC | $\pm 2$ |  |  | $\pm 3$ |  |  | $\pm 1$ |  |  |
| Maximum Input Current | @ $\mathrm{V}_{\text {IN }}=\mathrm{Max}$. | mA |  | 34 |  |  | 34 |  |  | 68 |  |
| Input Resistance |  | Ohms |  | 1K |  |  | 2K |  |  | 500 |  |

## Output Specifications (@+25 $\mathbf{C}$ unless otherwise specified)

| Parameter | Conditions | Units | IDC-5 IDC-5A | IDC-15 IDC-15A IDC-24 IDC-24A |  | IDC-5F | IDC-15F | IDC-24F |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min Typ Max | Min Typ Max | Min Typ Max | Min Typ Max | Min Typ Max | Min Typ Max |
| Maximum Output Voltage |  | VDC | 30 | 30 | 30 | 30 | 30 | 30 |
| Maximum Output Current |  | mADC | 50 | 50 | 50 | 50 | 50 | 50 |
| Maximum Output Leakage Current | Vour=Max. | $\mu \mathrm{ADC}$ | 10 | 10 | 10 | 10 | 10 | 10 |
| Maximum Output Voltage Drop | $\mathrm{I}_{\text {SINK }}=50 \mathrm{~mA}$ | VDC | . 2 | . 2 | . 2 | . 2 | . 2 | . 2 |
| Logic Supply Voltage $\mathrm{V}_{\mathrm{CC}}$ |  | VDC | 356 | $\begin{array}{lll}12 & 15 & 18\end{array}$ | $\begin{array}{lll}20 & 24 & 30\end{array}$ | 356 | $\begin{array}{lll}12 & 15 & 18\end{array}$ | $\begin{array}{lll}20 & 24 & 30\end{array}$ |
| Logic Supply Current | $\mathrm{V}_{\text {CC }}=$ Max. | mADC | 18 | 18 | 18 | 18 | 18 | 18 |
| Turn-On Time (Nominal) | $\mathrm{I}_{\text {SINK }}=25 \mathrm{~mA}$ | ms | 1* | 1* | 1* | . 05 | . 05 | . 05 |
| Tum-Off Time (Nominal) | $\mathrm{I}_{\text {SINK }}=25 \mathrm{~mA}$ | ms | 1* | 1* | 1* | . 10 | . 10 | . 10 |
| Output Type (Open Collector) |  |  | Normally Open (SINKING) | Normally Open (SINKING) | Normally Open (SINKING) | Normally Open (SINKING | Normally Open | Normally Open (SINKING) |

* Nominal Turn-On and Turn-Off times for IDC5A, IDC15A \& IDC24A are 5 ms .


## ODC

## DC Output Modules

## Input Specifications

| Parameter | Conditions | Units | ODC-5 ODC-5A |  |  | ODC-15 ODC-15A |  |  | ODC-24 ODC-24A |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. |
| Control Voltage Range $\mathrm{V}_{\text {IN }}$ |  | VDC | 3 | 5 | 8 | 9 | 15 | 18 | 18 | 24 | 32 |
| Must Operate Voltage $\mathrm{V}_{\text {IN(OP) }}$ |  | VDC |  |  | 3 |  |  | 9 |  |  | 18 |
| Must Release Voltage $\mathrm{V}_{\text {IN(REL) }}$ |  | VDC | 1 |  |  | 1 |  |  | 1 |  |  |
| M aximum Input Current | @ $\mathrm{V}_{\text {IN }}=$ Nominal | mADC |  |  | 18 |  |  | 16 |  |  | 13 |
| Input Resistance R ${ }_{\text {IN }}$ |  | Ohms |  | 250 |  |  | 1000 |  |  | 2000 |  |

PIN-3 must be positive with respect to PIN-4 for correct operation.

## Output Specifications (@+25º unless otherwise specified)

| Parameter | Conditions | Units | ODC-5 ODC-24 ODC-15 |  |  | ODC-5A ODC-24A ODC-15A |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Typ. | Max. | Min. | Typ. | Max. |
| Load Voltage V ${ }_{\text {L }}$ |  | VDC | 3 |  | 60 | 3 |  | 250 |
| Load Current $\mathrm{I}_{\mathrm{L}}$ |  | ADC | . 01 |  | 3 | . 01 |  | 1 |
| Maximum Surge Current for 1 Second |  | ADC |  |  | 5 |  |  | 5 |
| Maximum Leakage Current (Off-State) | $\mathrm{V}_{\mathrm{L}}=\mathrm{MAX}$ | $\mu$ ADC |  |  | 500 |  |  | 2000 |
| Maximum On-State Voltage Drop | $\mathrm{L}_{\mathrm{L}}=\mathrm{MAX}$ | VDC |  |  | 15 |  |  | 15 |
| MaximumTurn-On Time |  | ms |  |  | . 1 |  |  | . 1 |
| MaximumTurn-Off Time |  | ms |  |  | . 75 |  |  | . 75 |

At $40^{\circ} \mathrm{C}$, derate by $50 \mathrm{~mA} /{ }^{\circ} \mathrm{C}$ to $80^{\circ} \mathrm{C}$.
PIN-1 must be positive with respect to PIN-2 for correct operation.

## IAC Operating Diagram



## IDC Operating Diagram



## ODC Operating Diagram



## Outline Dimensions



Note: Pin 5 is not present on Output Modules.

## 210 series



## Mounting Boards for

## Input/Output Modules

- LED status indicators, plug-in fuses \& pull-up resistors
- Card edge logic connections (2IO8, 21016 \& 2IO24)
- Screw terminal logic connections (2104A, 2IO4B, 2IO4C, 21016A, 2IO16B \& 2IO16C)
- Screw terminals for field wiring
- UL recognized/CSA certified for 125 V max. with 5A fuses; 250V max. with \#22 solid copper jumper wire instead of fuses


## ? ${ }^{2}$ File E61482

© ${ }^{\text {®Hile }}$ LR15734-93
Users shouldthoroughlyreview thetechnical databeforeselecting aproduct part number. It is recommendedthatusers also seek outthepertinentapprovals files of the agencies/laboratories andreview themtoensurethe productmeets the requirements foragivenapplication.

Ordering Information - Boldface items listed below are more likely to be maintained in stock by authorized distributors.

| Part Number | 2104A | 2104B | 2IO4C | 2108 | 21016 | 21016A | 21016B | 2IO16C | 21024 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of I/O Channels | 4 | 4 | 4 | 8 | 16 | 16 | 16 | 16 | 24 |
| Number of Module Positions | 4 | 4 | 4 | 8 | 16 | 16 | 16 | 16 | 24 |
| Field Terminals: Screw Terminals | X | X | X | X | X | X | X | X | X |
| Logic Terminals: Screw Terminals | X | X | X |  |  | X | X | X |  |
| Logic Terminals: 26-pin card edge connector |  |  |  | X |  |  |  |  |  |
| Logic Terminals: 50-pin card edge connector |  |  |  | X | X |  |  |  | X |
| Designed for neg. true logic; one logic voltage | X |  |  | X | X | X |  |  | X |
| Designed for neg. or pos. true logic; mult. logic voltages |  | X |  |  |  |  | X |  |  |
| Designed for neg. true logic; mult. logic voltages |  |  | X |  |  |  |  | X |  |

2IO4A, 2IO4B \& 2IO4C Outline Dimensions


2IO4A Schematic
Designed to operate with neg. true logic (active low) systems \& one logic voltage.


## Mating Connectors and Fuses

| 26-pin card edge connector | Thomas \& Betts 622-2615* |
| :--- | :--- |
| 50-pin card edge connector | Thomas \& Betts 622-5015* |
| 5 amp fuse | Littelfuse 251-005* |
| 1 amp fuse** | Littelfuse 251-001* |

* Or equivalent
** Used on 2 IO 24 only.


## 2IO4B Schematic

Designed to operate with either neg. or pos. true logic (active low or high) systems \& different logic voltages. (output modules only - input modules must be used in negative logic systems only.)

FIELD INPUT/OUTPUT SIDE IS IDENTICAL TO 2104A


## 2IO4C Schematic

Designed to operate with neg. true logic (active low) systems \& different logic voltages.

FIELD INPUT/OUTPUT SIDE IS IDENTICAL TO 2104A


2108 Outline Dimensions


## 2108 Schematic

Designed to operate with neg. true logic (active low) systems \& one logic voltage.


## 21016 Outline Dimensions



21016 Schematic
Designed to operate with neg. true logic (active low) systems \& one logic voltage.



## 2IO16A Schematic

Designed to operate with neg. true logic (active low) systems \& one logic voltage.


## 2IO16B Schematic

Designed to operate with either neg. or pos. true logic (active low or high) systems \& different logic voltages.
(Note above applies to output modules only. Input modules must be use in negative logic systems only.)


|  | Dimensions are shown for | Dimensions are in inches over |
| :--- | :--- | :--- |
| (millimeters) unless otherw ise | Specifications and availability | subject to change. |

## 2IO16C Schematic

Designed to operate with neg. true logic (active low) systems \& different logic voltages.


## 21024 Outline Dimensions



## 21024 Schematic

Designed to operate with neg. true logic (active low) systems \& one logic voltage.



## Features

- Slim line .4" (10.16mm) thick package.
- Foot print same as .6 " ( 15.24 mm ) thick package.
- 4,000V rms optical isolation.
- Color coded by function.
- High immunity to false operation.
- Series compatible.
- Output modules can be controlled from sinking or sourcing logic.
- Compatible with 2IOM series mounting boards.


## IACM/OACM IDCM/ODCM

Slim Line<br>Input/Output Modules

귿 File E81606 \& E29244
(18. File LR38595M 77

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Engineering Data (all I/O modules)

Switch Form: 1 Form A (SPST-NO)
Duty: Continuous.
Capacitance: 8 pF Typical (input to output).
Operating Temperature: $-30^{\circ} \mathrm{C}$ to $+80^{\circ} \mathrm{C}$.
Storage Temperature: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Potting Compound Flammability: UL94V-0.
Solderability: $260^{\circ} \mathrm{C}$ for 5 seconds, maximum.
Approximate Weight: .87 oz . $(22.1 \mathrm{~g})$.

## Ordering Information

|  | Typical Part Number |
| :--- | :--- |
| 1. Basic Series: |  |
| IACM = Slim line AC input module - yellow case |  |
| IDCM = Slim line DC input module - white case |  |
| OACM $=$ Slim line AC output module - black case |  |
| ODCM = Slim line DC output module - red case |  |

2. Input or Logic Voltage:
$5=5 \mathrm{VDC}$
$15=15 \mathrm{VDC}$
$24=24 \mathrm{VDC}$
$\mathrm{U}=\mathrm{OACM} \&$ ODCM Types 3-15VDC input voltage
3. Options:

Blank $=$ IACM Type -120 VACNDC input (90-140VACNDC) $* *<$ None $>$ IDCM Type - 3.3-32VDC input **
OACM Type - 3A, 24-280VAC, zero voltage turn-on output
ODCM Type - 3A, 3-60VDC output
A $=$ IACM Type -240 VACNDC input (180-280VACNDC) $* *$
IDCM Type - 10-60VDC input **
OACM Type - 3A, 24-280VAC
ODCM Type - 1A, 5-250VDC output
$\mathrm{E} \quad=\mathrm{IACM}$ Type $-18-36 \mathrm{VACNDC}$ input $* *$
$\mathrm{F} \quad=\mathrm{IDCM}$ Type $-4-32 \mathrm{VDC}$ input \& fast turn-on \& turn-off times $* *$
H $\quad=$ OACM Type $-5 A, 24-280 V A C$, zero voltage turn-on output
** Is not polarity sensitive.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

| IACM-5 | OACM-5H |
| :--- | :--- |
| IACM-5A | OACM-U |
| IDCM-5 | OACM-UH |
| OACM-5 | ODCM-5 |

## IACM

## AC Input Modules

## Input Specifications

| Parameter | Conditions | Units | IACM-5 IACM-15 IACM-24 |  |  | IACM-5A IACM-15A IACM-24A |  |  | IACM-5E IACM-15E IACM-24E |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. |
| Control Voltage Range $\mathrm{V}_{\text {IN }}$ |  | VACNDC | 90 | 120 | 140 | 180 | 240 | 280 | 18 | 24 | 36 |
| Must Operate Voltage $\mathrm{V}_{\text {IN(OP) }}$ |  | VACNDC |  |  | 90 |  |  | 180 |  |  | 18 |
| Must Release Voltage $\mathrm{V}_{\text {IN(REL) }}$ |  | VACNDC | 20 |  |  | 20 |  |  | 3 |  |  |
| Max. Input Current | @ $\mathrm{V}_{\text {IN }}=\mathrm{Max}$. | mA |  |  | 6 |  |  | 6 |  |  | 18 |
| Input Resistance RIN |  | Ohms |  | 28K |  |  | 75K |  |  | 2K |  |

## Output Specifications (@ +25 ${ }^{\circ} \mathrm{C}$ unless otherwise specified)

|  |  |  |  |  |  |  |  | $V-15 A$ |  | $\begin{aligned} & 1-241 \\ & 1-24 E \end{aligned}$ | $1-24 A$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Parameter | Conditions | Units | Min. | Typ | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. |
| M aximum Output Voltage |  | VDC |  |  | 30 |  |  | 30 |  |  | 30 |
| Maximum Output Current $\mathrm{I}_{\text {SINK }}$ |  | mADC |  |  | 50 |  |  | 50 |  |  | 50 |
| M aximum Output Leakage Current | $V_{\text {Out }}=$ Max. | $\mu \mathrm{ADC}$ |  |  | 10 |  |  | 10 |  |  | 10 |
| Maximum Output Voltage Drop | $\mathrm{I}_{\text {SINK }}=50 \mathrm{~mA}$ | VDC |  |  | . 2 |  |  | . 2 |  |  | . 2 |
| Logic Supply Voltage $\mathrm{V}_{\text {CC }}$ |  | VDC | 3 | 5 | 6 | 12 | 15 | 18 | 20 | 24 | 30 |
| Maximum Logic Supply Current | $\mathrm{V}_{\text {cc }}=$ Max. | mADC |  |  | 18 |  |  | 18 |  |  | 18 |
| Turn-On Time (Nominal) | $\mathrm{I}_{\text {SINK }}=25 \mathrm{~mA}$ | ms |  |  | 20 |  |  | 20 |  |  | 20 |
| Turn-Off Time (Nominal) | $\mathrm{ISINK}=25 \mathrm{~mA}$ | ms |  |  | 30 |  |  | 30 |  |  | 30 |
| Output Type (Open Collector) |  |  | $\underset{(\text { Sinking })}{N o r m a l l y ~ O p e n ~}$ |  |  | Normally Open |  |  | Normally Open (Sinking) |  |  |

## OACM

## AC Output Modules

## Input Specifications

| Parameter | Conditions | Units | OACM-5 OACM-5H OACM-5R |  |  | OACM-15 OACM-15H OACM-15R |  |  | OACM-24 OACM-24H OACM-24R |  |  | OACM-U OACM-UH OACM-UH |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max | . Min. | Typ. | Max. |
| Control Voltage Range $\mathrm{V}_{\text {IN }}$ |  | VDC | 3 | 5 | 8 | 9 | 15 | 18 | 18 | 24 | 32 | 3 | 5 | 15 |
| Must Operate Voltage $\mathrm{V}_{\text {IN(OP) }}$ |  | VDC |  |  | 3 |  |  | 9 |  |  | 18 |  |  | 3 |
| Must Release Voltage $\mathrm{V}_{\text {IN(REL) }}$ |  | VDC | 1 |  |  | 1 |  |  | 1 |  |  | 1 |  |  |
| Input Current | $@ \mathrm{~V}_{1 \mathrm{~N}}=$ Nominal | mADC |  |  | 20 |  |  | 16 |  |  | 13 |  |  | 44 |
| Input Resistance Rin |  | Ohms |  | 220 |  |  | 1000 |  |  | 2000 |  |  | 360 |  |

PIN-3 must be positive with respect to PIN-4 for correct operation.

## Output Specifications ( $\mathbf{4 7}$ to $\mathbf{6 3} \mathbf{~ H z}$.,@ $\mathbf{+ 2 5 ^ { \circ }} \mathbf{C}$ unless otherwise specified)

| Parameter | Conditions | Units | OACM-5 OACM-15 OACM-24 OACM-U |  | OACM-5H IAC-15H OAC-24H OACM-UH |  | OACM-5R OACM-15R OACM-24R OACM-UR |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Typ. Max. | Min. | Typ. Max. | Min. | Typ. Max. |
| Load Voltage $\mathrm{V}_{\mathrm{L}}$ |  | V rms | 24 | 120/240 280 | 24 | 120/240 280 | 24 | 120/240 280 |
| Repetitive Blocking Voltage |  | $V$ peak |  | $\pm 600$ |  | $\pm 600$ |  | $\pm 600$ |
| Load Current IL* |  | A mis | . 05 | 3 | . 05 | 5 | . 05 | 5 |
| Output Current |  | $\mathrm{mA} /{ }^{\circ} \mathrm{C}$ | $58 \mathrm{~mA} /{ }^{\circ} \mathrm{C}$ |  | $66 \mathrm{~mA} /{ }^{\circ} \mathrm{C}$ |  | $66 \mathrm{~mA} /{ }^{\circ} \mathrm{C}$ |  |
| Derating |  |  | $40^{\circ} \mathrm{C}-80^{\circ} \mathrm{C}$ |  | $30^{\circ} \mathrm{C}-80^{\circ} \mathrm{C}$ |  | $30^{\circ} \mathrm{C}-80^{\circ} \mathrm{C}$ |  |
| Single Cycle Surge Current |  | A peak |  | 100 |  | 250 |  | 250 |
| Leakage Current (Off-State) | $\mathrm{V}_{\mathrm{L}}=120 \mathrm{VAC}$ | mA rms |  | 1 |  | 1 |  | 1 |
|  | $\mathrm{V}_{\mathrm{L}}=240 \mathrm{VAC}$ | mA rms |  | 2 |  | 2 |  | 2 |
| On-State Voltage Drop | $\mathrm{I}_{\mathrm{L}}=\mathrm{Max}$. | $\checkmark$ peak |  | 16 |  | 16 |  | 16 |
| Static dv.dt (Off-State) |  | V/ $/$ s |  | 200 |  | 200 |  | 200 |
| Tum-On Time | @f=60 Hz. | ms |  | 8.3 |  | 8.3 |  | . 1 |
| Tum-Off Time |  | ms |  | 8.3 |  | 8.3 |  | 8.3 |
| H/P/ Rating | @ 240VAC | HP |  | 1/4 |  | 1/2 |  | 1/2 |

## DC Input Modules

## Input Specifications

| Parameter | Conditions | Units | IDCM-5 IDCM-15 IDCM-24 |  |  | IDCM-5A IDCM-15A IDCM-24A |  |  | IDCM-5F IDCM-15F IDCM-24F |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. |
| Control Voltage Range $\mathrm{V}_{\text {IN }}$ |  | VDC | $\pm 3.3$ | $\pm 24$ | $\pm 32$ | $\pm 10$ |  | $\pm 60$ | $\pm 4$ |  | $\pm 32$ |
| Must Operate Voltage $\mathrm{V}_{\text {IN(OP) }}$ |  | VDC |  |  | $\pm 3.3$ |  |  | $\pm 10$ |  |  | $\pm 4$ |
| Must Release Voltage $\mathrm{V}_{\text {IN(REL) }}$ |  | VDC | $\pm 2$ |  |  | $\pm 3$ |  |  | $\pm 1$ |  |  |
| Maximum Input Current | $@ V_{\text {IN }}=$ Max. | mA |  | 34 |  |  | 34 |  |  | 68 |  |
| Input Resistance $\mathrm{R}_{\text {IN }}$ |  | Ohms |  | 1000 |  |  | 2000 |  |  | 500 |  |

## Output Specifications (@ +25 ${ }^{\circ} \mathrm{C}$ unless otherwise specified)

| Parameter | Conditions | Units | IDCM-5 <br> IDCM-5A |  | $\begin{aligned} & \text { IDCM-15 } \\ & \text { IDCM-15A } \end{aligned}$ |  | $\begin{aligned} & \text { IDCM-24 } \\ & \text { IDCM-24A } \end{aligned}$ |  | IDCM-5F |  | IDCM-15F |  | $\begin{aligned} & \text { IDCM-24 } \\ & \text { IDCM-24F } \end{aligned}$ |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min | Typ Max | Min | Typ Max | Min | Typ Max | Min | Typ Max | Min | Typ Max | Min | Typ | Max |
| Maximum Output Voltage |  | VDC |  | 30 |  | 30 |  | 30 |  | 30 |  | 30 |  |  | 30 |
| Maximum Output Current |  | mADC |  | 50 |  | 50 |  | 50 |  | 50 |  | 50 |  |  | 50 |
| Maximum Output Leakage Current | Vout=Max. | $\mu$ ADC |  | 10 |  | 10 |  | 10 |  | 10 |  | 10 |  |  | 10 |
| Maximum Output Voltage Drop | $\mathrm{I}_{\text {SINK }}=50 \mathrm{~mA}$ | VDC |  | . 2 |  | . 2 |  | . 2 |  | . 2 |  | . 2 |  |  | . 2 |
| Logic Supply Voltage $\mathrm{V}_{\text {CC }}$ |  | VDC | 3 | 56 | 12 | $15 \quad 18$ | 20 | $24 \quad 30$ | 3 | 56 | 12 | $15 \quad 18$ | 20 | 24 | 30 |
| Logic Supply Current | $\mathrm{V}_{\text {CC }}=$ Max. | mADC |  | 18 |  | 18 |  | 18 |  | 18 |  | 18 |  |  | 18 |
| Turn-On Time (Nominal) | $\mathrm{I}_{\text {SINK }}=25 \mathrm{~mA}$ | ms |  | 1* |  | 1* |  | 1* |  | . 05 |  | . 05 |  | . 05 |  |
| Turn-Off Time (Nominal) | $\mathrm{I}_{\text {SINK }}=25 \mathrm{~mA}$ | ms |  | 1* |  | 1* |  | 1* |  | . 10 |  | . 10 |  | . 10 |  |
| Output Type (Open Collector) |  |  | Norm | $\begin{aligned} & \text { ally Open } \\ & \text { inking) } \end{aligned}$ |  | nally Open sinking) | Norm | nally Open SINKING) |  | mally Open SINKING) |  | nally Open SINKING) |  | mally <br> SINKING | Open |

* Nominal Turn-On and Turn-Off times for IDCM 5A, IDCM 15A \& IDCM24A are 5 ms.


## ODCM

## DC Output Modules

## Input Specifications

| Parameter | Conditions | Units | ODCM-5 ODCM-5A |  |  | ODCM-15 ODCM-15A |  |  | ODCM-24 ODCM-24A |  |  | ODCM-U ODCM-UA |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. |
| Control Voltage Range $\mathrm{V}_{\text {IN }}$ |  | VDC | 3 | 5 | 8 | 9 | 15 | 18 | 18 | 24 | 32 | 3 | 5 | 15 |
| Must Operate Voltage $\mathrm{V}_{\text {IN(OP) }}$ |  | VDC |  |  | 3 |  |  | 9 |  |  | 18 |  |  | 3 |
| Must Release Voltage Vin(REL) |  | VDC | 1 |  |  | 1 |  |  | 1 |  |  | 1 |  |  |
| M aximum Input Current | $@ V_{1 N}=$ Nominal | mADC |  |  | 18 |  |  | 16 |  |  | 13 |  |  | 44 |
| Input Resistance $\mathrm{R}_{\text {IN }}$ |  | Ohms |  | 250 |  |  | 1000 |  |  | 2000 |  |  | 360 |  |

PIN-3 must be positive with respect to PIN-4 for correct operation.

## Output Specifications (@ +25 ${ }^{\circ} \mathrm{C}$ unless otherwise specified)

| Parameter | Conditions | Units | ODCM-5 ODCM-15 ODCM-24 ODCM-U |  | ODCM-5A ODCM-15A ODCM-24A ODCM-UA |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min. | Typ. Max. | Min. | Typ. | Max. |
| Load Voltage V ${ }_{\text {L }}$ |  | VDC | 3 | 60 | 3 |  | 250 |
| Load Current IL* |  | ADC | . 01 | 3 | . 01 |  | 1 |
| Maximum Surge Current for 1 Second |  | ADC |  | 5 |  |  | 5 |
| M aximum Leakage Current (Off-State) | $\mathrm{V}_{\mathrm{L}}=\mathrm{MAX}$ | $\mu$ ADC |  | 500 |  |  | 2000 |
| Maximum On-State Voltage Drop | $\mathrm{I}_{\mathrm{L}}=\mathrm{MAX}$ | VDC |  | 15 |  |  | 15 |
| MaximumTurn-On Time |  | ms |  | . 1 |  |  | . 1 |
| MaximumTurn-Off Time |  | ms |  | . 75 |  |  | . 75 |

* Above $40^{\circ} \mathrm{C}$, derate by $50 \mathrm{~mA} /{ }^{\circ} \mathrm{C}$ to $80^{\circ} \mathrm{C}$.

PIN-1 must be positive with respect to PIN-2 for correct operation.


## IDCM Operating Diagram



ODCM Operating Diagram


## Outline Dimensions



Note: Pin 5 is not present on Output Modules.


## 210 M series

## Space Saving Mounting Boards for Slim Line Input/Output Modules

- LED status indicators, plug-in fuses \& pull-up resistors
- Card edge, straight header, right-angle header and screw terminal logic connections
- Screw terminals for field wiring
- UL recognized/CSA certified for 125 V max. with 5A fuses; 250 V max. with \#22 solid copper jumper wire instead of fuses
況 File E61482
© ${ }^{\text {® }}$ File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Ordering Information - Boldface items listed below are more likely to be maintained in stock by authorized distributors.

| Part Number | 210M4A | 210 M 16 | 2IOM16A | 2IOM16E | 210M24 | 2IOM24D | 2IOM32D |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Number of I/O Channels | 4 | 16 | 16 | 16 | 24 | 24 | 32 |
| Number of M odule Positions | 4 | 16 | 16 | 16 | 24 | 24 | 32 |
| Field Terminals: Screw Terminals | X | X | X | X | X | X | X |
| Logic Terminals: Screw Terminals | X |  | X |  |  |  |  |
| Logic Terminals: 50-pin card edge connector |  | X |  |  | X | X |  |
| Logic Terminals: 50-pin straight header |  |  |  |  |  | X | X |
| Logic Teminals: 50-pin right angle header |  |  |  | X |  |  |  |
| Will accept 50-pin dual row header |  | X |  |  | X |  |  |
| Designed for neg. true logic; one logic voltage | X | X | X | X | X | X | X |

Mating Connectors and Fuses

| 50-pin card edge connector | Thomas \& Betts 622-5015 1 |
| :--- | :--- |
| 50-pin header connector | Thomas \& Betts 609-5030 |
| 5 amp fuse | Littelfuse 251-005 1 |
| $7 \mathrm{amp}^{1}$ fuse ${ }^{3}$ | Littelfuse 251-007 1 |
| $1 \mathrm{amp}^{2}$ fuse $^{2}$ | Littelfuse 251-001 1 |

Notes: 1 Or equivalent.
2. Used only on 24 and 32 position models.
3. Used only on 2IOM4A and 2IOM 16A.

2IOM4A Outline Dimensions


2IOM4A Schematic
Designed to operate with neg. true logic (active low) systems \& one logic voltage.


2IOM16 \& 2IOM16E Outline Dimensions


2IOM16 \& 2IOM16E Schematic
Designed to operate with neg. true logic (active low) systems \& one logic voltage.


2IOM16A Outline Dimensions


## 2IOM16A Schematic

Designed to operate with neg. true logic (active low) systems \& one logic voltage.


2IOM24 \& 2IOM24D Outline Dimensions


## 2IOM24 \& 2IOM24D Schematic

Designed to operate with neg. true logic (active low) systems \& one logic voltage.


## 2IOM32D Outline Dimensions



## 2IOM32D Schematic

Designed to operate with neg. true logic (active low) systems \& one logic voltage.


Engineering Notes

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NOTE: In addition to the products listed in this section of the databook, time delay relays are also described in other sections are available with printed circuit board terminals. Following is a list:

## Plug-in/Panel Mount Relays

 MT**Relay, socket and module combination.
Latching, Impulse, Rotary \& Special Application Relays
TR

Time delay relays are also included in our line of high performance relays (see overview in section 14 of this databook).

## Time Delay Relays \& Modules <br> 1201-1256

## P\&B Solid State Time Delay Terms and Definitions

A wide selection of various types of solid state time delay controls are presented by Potter \& Brumfield to meet the demands of commerce and industry. Typical applications for P\&B time delay relays include data processing operations, machine tool, safety device control and alarm circuit actuating. These diverse applications require a wide variety of time delays such as: fixed time delay on "operate" or "release" which is factory set and cannot be adjusted; resistor-adjustable time delay on "operate" which is adjustable with an external resistor; knob-adjustable time delay on "operate" which has a calibrated knob built into the assembly for ease of adjusting the time period. Each of the series of solid state time delays presented here varies in its degree of accuracy, variety available and cost to meet the requirements of every application.

Timing Variations - Any difference between the actual time delay of a particular device and the nominal value specified for that device.

These variations are due to:
(1) M anufacturing tolerances (component selections and tolerances, adjustments, etc.).
(2) Input voltage variation.

Includes DC or rms voltage variations, plus instantaneous voltage variations at time the control voltage is applied (AC only).
(3) Temperature (ambient plus self heating).
(4) Input cycling conditions:
a. duration of "off" time
b. duration of "on" time after actual time out

The terms used to define and specify time delay relay performance must reflect one or more of these time variation factors with sufficient clarity that both the manufacturer and the usermay arrive at essentially the same evaluation of device performance. To this end, the following terms and definitions are used.

Specified Delay Time - The advertised (or print specified) time of the delay function.

Actual Time, Standard Conditions (ATSC) - The actual delay time of a given device operated at $25^{\circ} \mathrm{C}$ and nominal input voltage, with sufficient "off" time of input voltage to permit full "short term" recovery of the timing interval. For purposes of establishing a reference ATSC it is recommended that the device be cycled @ $25^{\circ} \mathrm{C}$, nominal voltage, with input pulses of 1.3 X specified delay time, with 1 sec . off times. The resulting average of a group of consecutive time delay readings (excluding the 1st, which had an unknown off time) may be used to determine ATSC. Five cycles should be considered adequate for this determination.

The off time required for full "short term" recovery of the timing interval will vary to some extent, depending on relay type, timing circuit impedance (normally related to length of timing period), whether capacitor shorting contacts are used, whether the previous timing cycle was completed or interrupted during time out, and, if completed, the degree to which the input control "on" time extended beyond actual time out.

In practice, off times used may vary from a minimum approaching the release time of the output ( 50 to 200 ms typical, depending on the particular design) to a second or more, with as much as $15 \%$ difference in the resulting delay times. The greatest rate of change occurs as off times become increasingly short, while the rate of change becomes relatively negligible as increasingly long off times approach 1 second. However, for very long off times (measured in hours), and additional change in the first subsequent operation delay time may be experienced.

This additional change may be as much as 1-4\% (depending again on time delay type and design) and is usually obtained with off periods from 1-24 hours or more.

Repeatability - The percent variance of time within a group of consecutive timing cycles, starting with the second operation, when the timing device is operated under constant conditions (constant on-off times, input voltage and temperature). The average of a series of five consecutive operations, at any given set of conditions within specifications, will serve as the reference for determining the variation of individual readings within the group from the average. The maximum variation under such conditions should not exceed the repeatability value specified. For convenience, repeatability understandard conditions could be determined from the test used to measure ATSC (see below, left).

Tolerance - The variation between the specified delay time and the ATSC value, given in percent of the former.

Delta-Time - The percent timing change (from the ATSC value) for any variation of voltage and/or temperature within specified limits. Tests for this parameter would be essentially the same as described for ATSC, except that any constant combination of specified voltage and temperature extremes may be used.

Recycle Time - The length of time the control voltage must be interrupted, immediately following a timing interval, to produce a subsequent delay of at least 95\% of the reference delay under constant conditions of input voltage and ambient temperature. The reference delay may be the ATSC value determined under standard conditions (nominal voltage and $25^{\circ} \mathrm{C}$ ); however, any constant voltage-temperature combination within specifications may be used (must be the same voltage-temperature combination as used for recycle checks).

Note: If control voltage is interrupted prior to completion of a timing period, or at a time other than immediately following time out, the recycle time value (off time) may produce a subsequently shorter timing period, depending upon the particular design and when the interruption occurs within the internal RC charging cycle.

Correspondingly, this subsequent time delay may be from 85\% to 95\% of the reference actual delay as defined above.

Timing Cycle Interrupt "Transfer" - A momentary transfer (pickup and dropout) of the switching relay contacts which may occur if the timing cycle is interrupted. This phenomenon is inherent in CU series time delays; and, depending on when the timing interval is interrupted, the transfer duration may vary from zero to the release time value for that device.

Release Time - The time required, after time out, for the output switch to return to its normal, de-energized state when the control voltage is removed. This will vary to some extent with the duration of "on" time after actual time out and with temperature and voltage; the shortest release time being obtained when control voltage is removed immediately following completion of a timing period under conditions of minimum temperature and input voltage.

Transient Protection is provided so that the time delay will not be damaged by a transient input.

Polarity Protection is provided internally to protect the time delay of DC units from reversal of input voltage.

## External Resistor Selection Guide for P\&B Time Delay Relays

## For CL, CK \& CU Series

The "minimum" time setting on an extemal resistor adjustable model in any of these series is obtained by shorting together the extemal resistor terminals of the relay. The "maximum" time setting (within tolerance limits) is obtained by using the resistance value listed across from the maximum time for that unit in the tables below. Timing values between the minimum and maximum limits are linear with resistance within $10 \%$. It is recommended that a $1 / 4$ watt, mimimum, resistor be used. External timing resistor should have less than 500 PPM temperature coefficient.

The external resistor value $R_{0}$ required to obtain any time $T_{0}$ can be calculated using the following formula:
$R_{0}=R_{1}\left(\frac{T_{0}-T_{s}}{T_{1}-T_{s}}\right)$
$\mathrm{T}_{0}=$ Desired Time
$\mathrm{T}_{\mathrm{S}}=$ Short Time (see relay type)
$\mathrm{T}_{1}=$ Long Time (see relay type)
$\mathrm{R}_{1}=$ Extremal Resistor Value required to obtain $\mathrm{T}_{1}$
$\mathrm{R}_{0}=$ External Resistor Value required to obtain $\mathrm{T}_{0}$
Example: Given a CUH-41-30060, find an external resistor value that will give a 30 second delay.

$$
\begin{aligned}
\text { Known: } \begin{aligned}
& \mathrm{T}_{1}=60 \text { seconds } \\
& \mathrm{T}_{\mathrm{S}}=1 \mathrm{~second} \\
& \mathrm{R}_{1}=1 \mathrm{meg} \\
& \mathrm{R}_{0}=1 \times 10^{6}(29) \\
& 59
\end{aligned}
\end{aligned}
$$

$$
\mathrm{R}_{0}=492 \mathrm{~K}
$$

Note: The actual time obtained will normally be within $5 \%$ of the desired time. This is due to construction tolerance.

## CL \& CU Delay On Operate Resistor Values

| Time (Sec.) |  | Approximate Resistance |  |
| :---: | :---: | :---: | :---: |
| CU | CL | AC | DC |
| 1.0 | 0.1 | Short | Short |
| 10.0 | 10.0 | 200 K | 160 K |
| 1.0 | 0.3 | Short | Short |
| 30.0 | 30.0 | 600 K | 500 K |
| 1.0 | 0.6 | Short | Short |
| 60.0 | 60.0 | 1.2 Meg | 1.0 Meg |
| 1.0 | 1.2 | Short | Short |
| 120.0 | 120.0 | 2.4 Meg | 2.0 Meg |

## CK Delay On Operate Resistor Values

| Time <br> (Sec.) | Approximate Resistance |  |
| :---: | :---: | :---: |
|  | AC | DC |
| 0.1 | Short | Short |
| 10.0 | 750 K | 750 K |
| 1.8 | Short | Short |
| 180.0 | 1.0 Meg | 910 K |

## CK Delay On Release Resistor Values

| Time <br> (Sec.) | Approximate Resistance |
| :---: | :---: |
|  | AC \& DC |
| 0.1 | Short |
| 10.0 | 820 K |
| 0.6 | Short |
| 60.0 | 910 K |

## For CD Series

The "minimum" time setting on an extemal resistor adjustable model in the CD series is obtained by shorting together the external resistor terminals of the relay. The "maximum" time setting (within tolerance limits) is pre-set at the factory, and no external resistor is necessary. Approximate resistance values required to obtain times between the minimum and maximum limits can be determined using the table and graph below. It is recommended that a $1 / 4$ watt, mimimum, resistor be used. External timing resistor should have less than 500 PPM temperature coefficient.

## CD Resistor Values (AC \& DC Models)

| Factory-set <br> Time Delay. <br> No Resistor <br> (seconds) | Approximate <br> Resistance* <br> to Reduce <br> Delay by 1/2 | Short Circuit <br> Time Delay <br> (seconds) |
| :---: | :---: | :---: |
| 1.0 | $33 K$ ohms | 0.1 |
| 5.0 | 200 K ohms | 0.1 |
| 10.0 | 400 K ohms | 0.1 |

* Resistor values shown correspond to a 1.0 multiplying factor. Use the graph below to determine other resistor values required to obtain time periods between the limits stated in the chart.


## CD Timing Resistor Curve



To obtain CD series time delay relays having a linear resistance with time, please consult the factory.

# AGASTAT Solid State Time Delay Terms and Definitions 

Accuracy, absolute (or calibration accuracy) - the deviation of a selected time delay from the actual delay, measured with reference to a time standard, under standard conditions.

Accuracy, "attainable" - the "worst case" deviation in time delay, from a selected value, including all factors that contribute to its "error budget," including long-term drift, temperature drift, resolution, calibration accuracy, line-voltage and line-frequency effects, etc.
Accuracy, overall - the maximum deviation from the average of 100 consecutive time delays at any given time setting throughout the operating temperature, voltage, and frequency ranges.
Accuracy, repeat - the maximum deviation from the average of 100 consecutive time delays at any given time setting and any fixed combination of temperature and operating voltage.
Breakdown, circuit-to-case - the voltage insulation between any part of a TDR's circuitry and the frame or any other conductive part in the structure, including the case.
breakdown, control-to-load - the voltage insulation between control and load circuits.

Calibration linearity - in the mechanical calibration of a TDR delay-setting scale, the largest deviation of the actual delay-vs-rotation curve from a straight line drawn from minimum to maximum delay.
Counting TDR - a TDR in which a stable source generates precisely timed voltage pulses, and a digital counter registers a different voltage pattem or code on its output terminals for each pulse counted. The counter is connected to a digital decoder, preset to recognize a given code, which then operates the load-switching device.
Current drain - the current drawn by the delay and switching circuits in the TDR, not including the current drawn by the load.
delay - an interval of time generated before some planned event is caused to occur.
Delay adjustability - the capability of setting the duration of a time delay generated by a TDR; the
Delay range and resolution - taken together, describe the adjustability.
Delay adjustment - means of setting the duration of a time delay: pointer-knob-and scale, thumbwheel switch, extemal or internal potentiometer, etc. delay range - the span of time within which a TDR can generate time delays.
Dielectric withstand - the ability of insulating materials and spacings to withstand specified overvoltages for a specified time without flashover or puncture.
Electromechanical relay (EMR) - a controlled switch operated by causing sufficient current to flow through an electromagnetic coil; the resultant magnetic field, when strong enough, overcomes aspring force and closes and/ or opens the switch contacts.
Interface- in a TDR, one of the following: the nature of the means of adjusting time delay; of indicating status of delay and load; of powering control and load circuits, or of switching control and load circuits.
Isolation, control-to-load - the degree to which interaction has been prevented between control and load circuits in a TDR usually expressed as the effective impedance between them.
Leakage current - the current conducted by a solid state switching device in an "off" state.
LED readout - a numerical display made up of light-emitting diodes (solid state devices that glow when current is passed through them).
linearity - the regularity of calibration of a delay scale-i.e., the uniformity of the spacing equal delay increments. In aTDR with externally controlled delay, the constancy of the delay-to-resistance ration.
Line-frequency sensitivity - the deviation in delay, at any setting within specifications, per hertz or percent of line-frequency change from the nominal value, measured at specified line voltage and ambient temperature.
Line-voltage sensitivity - the deviation in delay, at any setting within specification, pervolt or percent of line-voltage change from the nominal value, measured at specified line voltage and ambient temperature.
Load-dependent delay - the characteristic of certain TDR's in which there is a significant change, due to internal heating, of a preset delay interval, following a long "load-ON" period.

Load rating - the maximum current, voltage, and frequency (if AC ) of the loadcircuit energy that may be switched by a TDR, for normal life expectancy.
Load gates - solid state circuits that perform logic "switching functions."
Mode - see operating mode.
Noise - any unwanted signal impinging on a circuit or its environment.
Operate time - the longest interval between energization of an output relay and the completion of contact transfer under any combination of operating temperature and voltage.
Operating life-a measure of the number of operations a TDR can be expected to perform within specifications; forTDRs with electromechanical (EMR) loadswitching means, there are two ratings - mechanical and electrical operations at full rated load.
Operating mode - the relationship between control signal input, generation of delay or count, and transfer of load-switching contacts.
operating voltage range - the range of voltages over which a TDR will perform to specification. May be applied to either delay generating circuits, loadswitching circuits or both.
Peak current - the maximum short-duration load-circuit rating of the loadswitching circuit; also called "in-rush" or "surge" current.
R-C timer - an electronic time-delay relay in which the charging of a capacitor (C) through a resistor (R) generated the delay and an electronic circuit establishes a threshold, or critical value, for the capacitor voltage; when this value is reached, a load-switching device is operated.
Release time-the longest time interval between de-energization of an output relay and the complete transfer of its contacts under any combination of operating temperature and voltage.
Resettability - the precision with which a delay adjustment, once changed, can be reset.
Reset time-the shortest allowable interval between complete or interrupted timing cycles without risk of delay error or malfunction.
Resolution-the precision with which delay adjustment may be set; it depends on the type of adjustment means; for example, in a switch-settable design, the smallest change that can be made by moving one unit in the least-significant decade in a selector switch array.
solid-state relay (SSR) - a relay in which a semiconductor device (e.g., an SCR or TRIAC), switches the load.
Stability, long-term - the measure of the effect of time along on the delay generated by a TDR under specific operating conditions - e.g., the difference in the repeat accuracy between that measured when the TDR is new, and that measured one year later.
Stability, temperature - the effect of ambient temperature on the delay of a TDR, expressed in terms of the percent deviation in a preset delay per degree of temperature change from some nominal value.
TDR - time-delay relay.
Time-delay relay (TDR) - a device that upon energization or operation of a control circuit, generates a delay, at the end of which some planned event (e.g., load switching, or secondary control function) is caused to occur.
Timing diagram or timing ladder - a graphic representation of two or more sequences of events, all drawn to the same horizontal time scale, so that any point in one sequence occurs at the same time as any point directly above or below it in another sequence.
Timing range - the range of time intervals over which a particular TDR will generate delays.
Transfer - the switching of a relay's contacts from one state to the other, but in the past tense commonly used to denote the position of the contacts in the relay's energized or "transferred" state as opposed to its de-energized or "normal" state.
Transient protection or transient suppression - the prevention of malfunction of a TDR due to power-line transients, or the means of doing so. Usually effective only over a stated range or up to a stated maximum transient amplitude and duration.
Transient voltage tolerance - the largest momentary overvoltage peak that a TDR will withstand without damage or catastrophic malfunction.

## AGASTAT Time Delay Relay Timing M odes

On-Delay: Time delay is initiated upon application of a control signal (i.e., operating voltage or on 11-pin model closure of the control switch). The output contacts energize at the end of the delay. Output contacts and the time delay circuit reset upon removal of the control signal regardless of state.


Off-Delay: The output contacts energize when the control switch is closed. The time delay is initiated upon opening of the control switch (operating voltage is applied continuously). De-energization occurs at the end of the delay. Output contacts energize and the time delay circuit resets upon closure of the control switch.


Interval: Time delay is initiated upon application of a control signal (i.e., operating voltage or closure of the control switch on 11-pin models). The output contacts energize when the control signal is applied. At the end of the delay, the output contacts de-energize. Output contacts and the time delay circuit reset upon removal of the control signal regardless of state.


On/ Interval : Time delay 1 is initiated upon application of a control signal (i.e., operating voltage or closure of the control switch on 11-pin models). The output contacts energize at the end of time delay 1 and de-energize at the end of time delay 2. Output contacts and the time delay circuit reset upon removal of the control signal regardless of state. Note: For the 48 K series, delay 2 is fixed at 0.5 seconds.


Note: When an extemal control switch is used, it must be closed before the unit is energized. If external control switch is open, the unit will not time out.

On-Delay / Off-Delay: Time delay is initiated for delay 1 upon closure of the control switch, for delay 2 upon opening of the control switch. (Operating voltage is applied continuously.) Output contacts energize at the end of time delay 1 , and de-energize at the end of time delay 2 . If the control state is reversed during the time delay, the time delay circuit automatically resets to zero. Note: For the 48 K series, time delays 1 and 2 are identical.


Repeat Cycle: Application of the operating voltage starts time delay 1. Upon expiration of this delay, the output contacts energize. Time delay 2 begins simultaneously. At the end of time delay 2 , the output contacts de-energize, and a new cycle begins. The cycles continue until power is removed. To reset the timer, input voltage must be removed. The state of the output contacts may be reversed on the 11 -pin 48 K by closing the control switch. Note: For the 48 K series, the time delays are identical.


Accumulating On-Delay: Time delay is initiated upon closure of the control switch. (Operating voltage is applied continuously.) Energization of the output contacts occurs at the end of the delay. If the control switch is opened during the time delay, the time delay pauses, and the relay holds (remembers) the delay accumulated so far. The time delay resumes when the control switch is re-closed. After energization, reset by opening the control switch. Regardless of state, reset by removing the operating voltage.


One Shot (Latching Interval): Operating voltage must be applied continuously. Output contacts energize and time delay is initiated upon closure of the control switch. Once closed, state of control switch has no further influence until time delay has expired. Upon expiration of time delay, output contacts deenergize and timer is reset by opening the control switch.


## Accessories for AGASTAT Solid State Time Delay Relays

## Sockets



## BDS08SS Socket

- 8-pin octal socket
- DIN rail or panel mount
- Rated 10A @ 300VAC
- \#6-32 screws w/captive clamp plates
- 吅 File E140494
- (\$1) File LR29523M 37



## BDS11SS Socket

- 11-pin octal-type socket
- DIN rail or panel mount
- Rated 10A @ 300VAC
- \#6-32 screws w/captive clamp plates
- PJ File E140494
- (1A) File LR29523M 37



## BCSF11SC Socket

- Use with SCF series timer
- 11-pin octal-type socket
- DIN rail or panel mount
- Rated 10A @ 380VAC
- M3 screws w/captive clamp plates
- PJ File E140494
- (4A) File LR29523M37



## BDT11SS Socket

- 11-pin tab socket
- DIN rail or panel mount
- Rated 10A @ 300VAC
- \#6-32 screws w/captive clamp plates
- 기 File E140494
- (\$1A File LR29523M37

Tr




## 3RP1 series



## Standards and Specifications

- IEC 721-3-3 "Ambient conditions"
- IEC 61812-1/DIN VDE 0435 Part 2021 "Solid State Relays, Time Relays"
- IEC 1000 "electromagnetic compatibility"
- IEC 947-5-1: DIN VDE 0660 Part 200 'Low-voltage control circuit devices"


## Timing Specifications

Timing Ranges: 0.05 to $1 / 0.15$ to $3 / 0.5$ to $10 / 1.5$ to $30 / 5$ to 100 sec .; 0.05 to $1 / 0.15$ to $3 / 0.5$ to $10 / 1.5$ to $30 / 5$ to 100 min .; 0.05 to 1 / 0.15 to $3 / 0.5$ to 10 / 1.5 to $30 / 5$ to 100 hr .

Timing Adjustment: Potentiometer adjustable within selected range.
Tolerance: $\pm 5 \%$ of full scale value.
Reset Time: 150 ms .
Minimum On Period: 35 msec .
Repeatability: $\pm 1 \%$.

## Multifunction Solid State DIN Mount Time Delay Relay

- Available as SPDT or DPDT
- 15 time setting ranges
- .05s - 100hr programmable timing range
- Universal 24-240 VACNDC or fixed input types.
- 3A switching current rating
- Fits 35 mm DIN track
- Single function, Delay-On available


## 影

 $\stackrel{18}{81}$Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 1 Form C (SPDT).
2 Form C (DPDT)
Material: Silver tin oxide.
Rating: 3A @ 250VAC.
Switching Frequency: 2,500 ops./hour.
Electrical Life: 200,000 operations min. at rated load.
Mechanical Life: $30 \times 10^{6}$ operations.

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: Universal Input Type: 24-240V, $50 / 60 \mathrm{~Hz}$. AC or DC. Fixed Input Type: 24, 100-127, 200-240AC; 24VDC.
Operating Range: AC: 85 to $110 \%$.

## DC: 80 to $125 \%$.

Power Requirement:
Universal Input Type: AC: 6VA.
DC: 2W.

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+80^{\circ} \mathrm{C}$.
Operating: $-25^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.
Protection Category: IP 20 according to EN 60529.

## Mechanical Data

Termination: Screw terminal.
Enclosure: Plastic DIN case.
Mounting: 35mm DIN track.
Weight: (3RP1505) 5.29 oz . (150g) approximately.
(3RP1525) 3.88 oz. (110g) approximately.

## Configuring

- Changing the timer range and their functions will only be effective when they are carried out in a voltage-free state.
- Trigger input B1 or B3 must only be started when the supply voltage is applied.
- The same potential must be applied to A1 and B1, or A3 and B3. With the two-voltage design, only one voltage range must be connected.
- The triggering of the load paralleled to the start input is not permissible when using AC (see adjacent diagrams).


Ordering Information - Authorized distributors are more likely to stock boldface items listed below.

| Input Voltage |  | Input <br> Type | Contact Arrang. | Wiring Diagram | Functions | Part Number |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| DC | AC |  |  |  |  |  |
| 3RP1505 Multifunction |  |  |  |  |  |  |
| 24 | 24, 100-127 | Fixed | SPDT | 1 to 8 | 1 to 8 | 3RP15 05-1AQ30 |
| 24 | 24, 200-240 | Fixed | SPDT | 1 to 8 | 1 to 8 | 3RP15 05-1AP30 |
| 24 | 24, 100-127 | Fixed | DPDT | 9 to 24 | 9 to 24 | 3RP15 05-1BQ30 |
| 24-240 | 24-240 | Universal | DPDT | 9 to 24 | 9 to 24 | 3RP15 05-1BW30 |
| 3RP1525 Delay On |  |  |  |  |  |  |
| 24 | 24, 100-127 | Fixed | SPDT | 1 | 1 | 3RP15 25-1AQ30 |
| 24 | 24, 200-240 | Fixed | SPDT | 1 | 1 | 3RP15 25-1AP30 |
| 24 | 24, 100-127 | Fixed | DPDT | 9 | 9 | 3RP15 25-1BQ30 |
| 24 | 24, 200-240 | Fixed | DPDT | 9 | 9 | 3RP15 25-1BP30 |

Outline Dimensions


3RP1505-1B, 3RP1525-1B


## Wiring Diagram


5. Making-Pulse Contact

3RP1505-1A
3RP1525-1A

9. On-Delay

13. Making-Pulse Contact

3RP1505-1B

2. Off-Delay

With Auxiliary Voltage 3RP1505-1A

6. Breaking-Pulse Contact With Auxiliary Voltage 3RP1505-1A

10. Off-Delay

With Auxiliary Voltage 3RP1505-1B

14. Breaking-Pulse Contact With Auxiliary Voltage 3RP1505-1B

3. On and Off Delay With Auxiliary Voltage 3RP1505-1A

7. Pulse Forming With Auxiliary Voltage 3RP1505-1A

11. On-and Off-Delay With Auxiliary Voltage 3RP1505-1B

15. Pulse Forming With Auxiliary Voltage 3RP1505-1B


## 4. Flashing

3RP1505-1A

8. Additive On-Delay With Auxiliary Voltage and Instantaneous Contact 3RP1505-1A

12. Flashing

3RP1505-1B

16. Additive On-Delay With Auxiliary Voltage and Instantaneous Contact 3RP1505-1B


Wiring Diagrams (continued)

21. Making-Pulse Contact and Instantaneous Contact

3RP1505-1B

18. Off-Delay

With Auxiliary Voltage and Instantaneous Contact 3RP1505-1B

22. Breaking-Pulse Contact With Auxiliary Voltage and Instantaneous Contact 3RP1505-1B

19. On and Off Delay With Auxiliary Voltage and Instantaneous Contact 3RP1505-1B

23. Pulse Forming With Auxiliary Voltage and Instantaneous Contact 3RP1505-1B

20.Flashing and Instantaneous Contact

3RP1505-1B

24.Star-Delta Function

3RP1505-1B


Timing Function Descriptions and Settings 3RP1505-1A


## 3. On/Off Delay


4. Flasher

5. Impulse On

6. Impulse Off

8. Cumulative On Delay


3RP1505-1B

10. Off Delay

11. On/Off Delay

12. Flasher


14. Impulse Off

15. Pulse Shaping

16. Cumulative On Delay


18. Off Delay

19. On/Off Delay

20. Flasher


22. Impulse Off

23. Pulse Shaping

24. Star/Delta


NOTE: This product is scheduled to soon be discontinued. Suggested altematives are the P\&B CNT, CNS and CNM5 series time delay relays.


## Timing Modes

Modes are user selectable via rotary selector switch (shown above) or screwdriver adjustment on optional recessed knob equipped models that are available on a special order basis for tamper-resistant requirements. Modes offered on specific models are:
48K91U: On-Delay, Off-Delay, Interval, On/Interval, One Shot, Repeat
Cycle, On-Delay/Off-Delay, Accumulating On.
48K90U: On-Delay, Interval, On/Interval, Repeat Cycle.
48K01A: On-Delay.

## Timing Specifications

Timing Ranges: 0.1 to 1 / 1 to 10 / 10 to 100 sec.; 1 to 10 / 10 to 100 min.; 1 to 10 hr .
Timing Adjustment: Potentiometer adjustment with linear reference calibrations. Recessed dial option is available on a special order basis for tamper-resistant requirements.
Accuracy: Repeat Accuracy: $\pm 0.5 \% \pm 0.02 \mathrm{sec}$.
Overall Accuracy: $\pm 1 \% \pm 0.02 \mathrm{sec}$.
Reset Time: 25 ms .
Relay Operate Time: 50 ms .
Relay Release Time: 50 ms .

## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT).
Rating: 10A @ 30VDC or 120/240VAC, resistive.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations, min., at rated load.

## 48K series

## Programmable Time Delay Relay

- Up to 8 user-programmable timing modes
- 0.1 sec . to 10 hr . programmable timing range
- Socket or panel mount (1/16 DIN enclosure)
- Universal (24-240VAC/24-125VDC) and fixed input types
- 10A output relay with DPDT contacts
- Two LED indicators on universal input types
- ANSI C37.90 transient protection on universal input types

叫 File E60363
(18) File LR29186

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Initial Dielectric Strength

Between Coil, Contacts and Case: 1,500VAC.
Input Data @ 25º
Voltage: 48K90U \& 48K91U: $24-240 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. and 24-125VDC.
48K01A: $120 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$.
Power Requirement: 2 W , max.
Transient Protection: 48K90U \& 48K91U: Meets ANSI C37.90 Transient
Specification.
48K01A: 2,500V for 1ms.

## Environmental Data

Temperature Range: Storage: $-25^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$. Operating: $-25^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.
Mechanical Data
Termination: 8 or 11-pin octal style plug.
Enclosure: Grey plastic 1/16 DIN case for socket or panel mounting.

| Indicating LEDs: |
| :--- |


| 48K90U \& 48K91U: |
| :--- |


$\quad$| Power On LED \& Output Contacts LED (Typically |
| :--- |
| flashes when timing, stays on when output relay is |
| $\quad$ energized.) |


| 48K01A: Output Contacts LED |
| :--- |


| Sockets: Fits either 27E123 or 27E892 (snap-on) screw terminal sockets. |
| :--- |
| Weight: 5 oz. (142g) approximately. |

Ordering Information - Authorized distributors are likely to stock boldface part numbers listed below.

| Part Number | Timing Modes | Operating Voltage | Termination Pins |
| :---: | :---: | :---: | :---: |
| 48K01AS | One - On-Delay | $120 \mathrm{VAC} 50 / 60 \mathrm{~Hz}$. | 8 |
| 48K90US | Four - On-Delay, Interval, On/Interval, Repeat Cycle | Universal (24-240VAC, 50/60 Hz. or 24-125VDC) | 8 |
| 48K91US | Eight - On-Delay, Off-Delay, Interval, On/Interval, One Shot, <br> Repeat Cycle, On-Delay/Off-Delay, Accumulating On | Universal (24-240VAC, 50/60 Hz. or 24-125VDC) |  |

Ordering Note: The part numbers listed above are standard products with knobs for adjustment of mode, range and timing. On a special order basis other models are available with recessed dials requiring a screwdriver for adjustment. On the special order versions, the "S" part number suffix is replaced by an "R" suffix. Consult factory for availability of special order models.

## Outline Dimensions



## Wiring Diagrams (Bottom Views)

(pins numbered clockwise from keyway)


48K91US
(dotted line represents
internal connection)


48K90US
48K01AS

## CNT series



## Timing and Counting Modes

See the following page for a complete description of all programmable timing and counting modes.

## Timing Specifications

Timing Ranges: 0.1 to 99.9 / 1 to $999 \mathrm{sec} . ; 0.1$ to 99.9 / 1 to 999 min.; 0.1 to 99.9 / 1 to 999 / 10 to $9,990 \mathrm{hr}$.

Timing Adjustment: Digital adjustment via thumbwheel switches.
Tolerance: $\pm 0.5 \% \pm 0.05 \mathrm{sec}$.
Delta Time (for AC units add $\pm \mathbf{1}$ cycle 60 Hz. ): $\pm 0.1 \% \pm 0.05 \mathrm{sec}$.
Repeatability (Including first cycle of operation.): $\pm 0.1 \% \pm 0.05 \mathrm{sec}$.
Reset Time (power interruption): 45 ms , typ.; 60 ms , max.
Minimum Pulse Width, Control: 50 ms .
Recycle Time: 45 ms , typ.; 60 ms , max.

## Counting Specifications

Maximum Count: 1 to 999; 10 to 9,990 ( $\div 10$ ); 100 to 99,900 ( $\div 100$ ).
Maximum Count Rate: 100 counts per second.
Mimumum Pulse Width:Count (Control): $3 \mathrm{~ms} . ;$ Reset: 3 ms .
Available Counting Functions: Operate at preset count and release at preset count.

## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT).
Material: Silver-cadmium oxide alloy.
Rating: 10A @ 30VDC or 277VAC, resistive; 1/2 HP @ 250VAC; 1/3 HP @ 120VAC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations, min., at rated load.
Initial Dielectric Strength
Between Open Contacts: $1,000 \mathrm{~V}$ rms, 60 Hz .
Between All Other Conductors: $1,500 \mathrm{~V} \mathrm{rms}, 60 \mathrm{~Hz}$.
Ordering Information - Authorized distributors are more likely to
Universal Input Model

| Input Voltage | Part Number |
| :---: | :---: |
| $24-240$ VACNDC | CNT-35-96 |

Fixed Input Models

| Input Voltage | Part Number |
| :---: | :---: |
| 12VDC | CNT-35-26 |
| 120VAC | CNT-35-76 |

## Outline Dimensions



Fits $1.77 \times 1.77(45 \times 45)$
Panel cutout


## Multifunction, Digital Time Delay Relay/ Counter

- 10 programmable timing modes +2 counting modes
- 0.1 sec . to 9,990 hr. programmable timing range
- 1 to 99,900 counting range
- LCD digital display
- Universal (24-240VACNDC) and fixed input types
- 10A output relay with DPDT contacts
- Thumbwheel switches for programming

미 File E22575

## (18) File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: Universal Input Type: $24-240 \mathrm{~V} \pm 15 \%, 50 / 60 \mathrm{~Hz}$. AC or DC. Fixed Input Types: $120 \mathrm{VAC} \pm 15 \%, 50 / 60 \mathrm{~Hz}$ and 12VDC.
Power Requirement:
Universal Input Type: 10VA @ 240VAC; 5VA @ 120VAC; 1VA @ 24VAC.
10W @ 240VDC; 5W @120VDC; 1W @ 24VDC.
Fixed Input Types: 3VA @ 120VAC; 3W @ 12VDC.
Transient Protection: Yes.
Reverse Voltage Protection: Yes.
Input Voltages \& Limits @ $\mathbf{2 5}^{\circ} \mathrm{C}$

| Input <br> Type | Nominal <br> Voltage | Minimum <br> Voltage | Maximum <br> Voltage |
| :---: | :---: | :---: | :---: |
| Universal | $24-240 \mathrm{VACNDC}$ | 20.4 VACNDC | 276 VACNDC |
| Fixed | 120 VAC | 102 VAC | 138 VAC |
|  | 12 VDC | 10.2 VDC | 13.8 VDC |

Note: DC voltage must be filtered (5\% p-p ripple max. at nom. voltage).
AC models will operate on 50 or 60 Hz .

## Environmental Data

Temperature Range: Storage: $-20^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Operating: $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.
Humidity: 85\% relative humidity, non-condensing.

## Mechanical Data

Termination: 11-pin octal style plug.
Enclosure: Beige plastic 1/16 DIN case.
Sockets: Fits either 27E123 or 27E892 (snap-on) screw terminal sockets.
Weight: 4.3 oz . (122g) approximately.
External Control: CONTROL, RESET: Active on contact closure or solid state switch closure to RETURN, 0-1.0VDC maximum voltage level (see wiring diagrams for interface circuits.
O stock boldface items listed below.
Accessories

| Part Number | Name | Description |
| :--- | :---: | :---: |
| SSA-24C667 | Mounting Clip | Ratchet-fit clip slides onto CNT from behind <br> to secure CNT in panel mount applications. |
| SSA-24C668 | Protective Cover | Clear, flexible cover slips snugly over bezel of <br> CNT to help protect against dust and moisture. <br> Durable cover also helps prevent inadvertant <br> changes of programming switch settings. |

## Wiring Diagrams (Bottom Views)

(pins numbered clockwise from keyway)
EXTERNAL CONTROL SWITCHES**


* Note: Input polarity for DC operation. For most reliable operation on AC, connect high side to " + " and low side to "-".
** Important: A dry circuit switch is recommended. A "dry circuit" switch is one rated to reliably switch currents of less than 50 mA . Use of a switch rated for other than dry circuit may result in failure of the time delay relay to function properly.


## Protective Cover \& Mounting Clip Dimensions

## SSA-24C668

Protective Cover


SSA-24C667
Mounting Clip


## Programming Switch Diagram

With this setting, the relay would operate after a delay period of 214 seconds.



Time/Counter Setting: 001 to 999


## Timer Function Descriptions

## A . Delay On Operate

Output relay turned on at end of programmed time interval which is started by CONTROL input or power-on with CONTROL on. Relay turned off by RESET input until next cycle is started. With CONTROL on, turning RESET off restarts timing

## B. Delay On Release

Output relay turned on with CONTROL input and remains on for programmed time interval following removal of CONTROL. During time interval after release of CONTROL, RESET tums relay off until cycle restarted with reapplication of CONTROL. With CONTROL on, relay is held off while RESET is activated.

## C. Interval On

Output relay turned on for programmed time interval by CONTROL or poweron with CONTROL on. RESET tums relay off until next cycle is started, and does not restart timing when RESET is removed.

## D. Control-Off Interval On

Output relay turned on for programmed time interval by tum-off of CON-
TROL. RESET turns relay off until next cycle is started, and does not restart timing when RESET is removed.

## E. Recycle

Output relay turned on at end of programmed time interval which is started by momentary CONTROL input or power-on with CONTROL on. Relay stays on for equal time interval, then turns off and cycle is repeated on a freerunning basis until terminated by momentary RESET, turning relay off. With CONTROL on, turning RESET off restarts cycle.

## F. Single Cycle

Output relay turned on at end of programmed time interval which is
started by momentary CONTROL input or power-on with CONTROL on. Relay stays on for equal time interval, then turns off. RESET terminates timing and turns relay off. Turning RESET off does not restart timing.

## G. Control On-Off Interval On (Watch Dog Timer)

Output relay turned on and programmed time interval started or restarted by change of CONTROL input. RESET turns relay off and stops timing. Turning RESET off does not restart timing.

## H. Control On-Off Delay

Output relay turned on at end of programmed timing interval which is started or restarted by change of CONTROL input. If relay is on, turn-off of relay occurs at end of programmed time interval which is started or restarted by change of CONTROL input. RESET turns relay off and stops timing. Turning RESET off does not restart timing.

## I. Pulse

Output relay turned on at end of programmed time interval, which is started by CONTROL input, for 0.5 second duration, and continues in pulsed mode at programmed time interval with fixed 0.5 second on-time. Turning CONTROL off tums relay off and stops timing. RESET turns relay off and inhibits operation. With CONTROL on, removal of RESET restarts timing.

## J. Cumulative Delay On Operate

Output relay turned on at completion of total accumulate CONTROL input duration equal to programmed time. Turning CONTROL off before accumulation of programmed time results in measured time total being held until CONTROL is again turned on and total programmed time value is reached. RESET input resets time value to zero and turns relay off if energized. Turning RESET off restarts timing if CONTROL is on.

## Counter Function Descriptions

## CO - Operate at Preset Count - Normal Mode

After initializing by momentary activation of RESET input, each on/off signal at COUNT (CONTROL) input increments displayed count in upcounting manner from initial 000 value until preset count, set by thumbwheel switches, is reached and output relay tums on. Additional inputs continue to increment displayed count. Continued counting past maximum count (999) results in a "wrap-around" effect to 000, followed by contrinued up-counting. Activation of RESET input turns relay off and resets count to zero.

## CR - Release at Preset Count - Normal Mode

Initializing by momentary activation of RESET input tums relay on. Operation is similar to CO (Operate at Preset Count) except relay turns off at a preset count.

## CO or CR - Divide-by-10 Mode

Operation is as described previously, except count is incremented for every 10 on/off input signals for a maximum presettable count of 9,990.

## CO or CR - Divide-by-100 Mode

Operation is as described previously, except count is incremented for every 100 on/off input signals for a maximum presettable count of 99,900.


## Timing Modes

See the following page for a complete description of timing modes.

## Timing Specifications

Timing Ranges: 0.1 to 1.0 / 1.0 to $10 / 10$ to 100 sec .; 0.1 to 1.0 / 1.0 to 10 / 10 to 100 min .

Timing Adjustment: Knob adjustable within selected range.
Tolerance: $-0,+20 \%$ of $\max$. specified at high end of timing range; min. specified, or less, at low end.
Delta Time (for AC units add $\pm 1$ cycle 60 Hz .): $\pm 10 \%$.
Repeatability (Including first cycle of operation.): $\pm 2 \%$ (for AC units add $\pm 1$ cycle 60 Hz .).
Reset Time (power interruption): 45 ms , typ.; 60 ms , max.
Minimum Pulse Width, Control: 50 ms .
Recycle Time: 45 ms , typ.; 60 ms , max.

## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT).
Material: Silver-cadmium oxide alloy.
Rating: 10 A @ 30VDC or 277VAC, resistive; 1/2 HP @ 250VAC; 1/3 HP @ 120VAC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations, min., at rated load.

## Initial Dielectric Strength

Between Open Contacts: $1,000 \mathrm{~V}$ rms, 60 Hz .
Between All Other Conductors: 1,500V rms, 60 Hz .

## CNS series

## Multifunction Time Delay Relay

- 8 programmable timing modes (4 on 8 -pin models)
- 0.1 sec . to 100 min . programmable timing range
- Universal (24-240VAC/VDC) and fixed input types
- 10A output relay with DPDT contacts
- DIP switch selection of timing mode and range
- Knob and dial scale for setting actual delay time


## 극 File E22575

## (18) File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $\mathbf{2 5}^{\circ} \mathbf{C}$

Voltage: Universal Input Type: $24-240 \mathrm{~V} \pm 15 \%, 50 / 60 \mathrm{~Hz}$. AC or DC. Fixed Input Type: $120 \mathrm{VAC} \pm 15 \%, 50 / 60 \mathrm{~Hz}$.
Power Requirement:
Universal Input Type: 10VA @ 240VAC; 5VA @ 120VAC; 1VA @ 24VAC.
10W @ 240VDC; 5W @ 120VDC; 1W @ 24VDC.
Fixed Input Type: 3VA @ 120VAC.
Transient Protection: Yes.
Reverse Voltage Protection: Yes.
Input Voltages and Limits @ $\mathbf{2 5}^{\circ} \mathrm{C}$

| Input <br> Type | Nominal <br> Voltage | Minimum <br> Voltage | Maximum <br> Voltage |
| :---: | :---: | :---: | :---: |
| Universal | $24-240$ VACNDC | 20.4 VACNDC | 276 VACNDC |
| Fixed | 120 VAC | 102 VAC | 138 VAC |

Note: DC voltage must be filtered ( $5 \%$ p-p ripple max. at nom. voltage).
AC models will operate on 50 or 60 Hz .

## Environmental Data

Temperature Range: Storage: $-20^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Operating: $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.
Humidity: $85 \%$ relative humidity, non-condensing.

## Mechanical Data

Termination: 8- or 11-pin octal style plug.
Enclosure: Beige plastic 1/16 DIN case. Dial scale provided for knob adjustment reference.
Sockets: Models with 8-pin base fit either 27E122 or 27E891 (snap-on) screw terminal sockets. 11-pin types fit either 27E123 or 27E892 (snap-on) screw terminal sockets.
Weight: 4.3 oz . (122g) approximately.

Ordering Information - Authorized distributors are more likely to stock boldface items listed below.

Universal Input Models

| Input Voltage | Timing Functions | No. of Pins | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 24-240VACNDC | 4 | 8 | 1 | CNS-35-92 |
| 24-240VACNDC | 8 | 11 | 2 | CNS-35-96 |

## Fixed Input Models

| Input Voltage | Timing Functions | No. of Pins | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 120VAC | 4 | 8 | 1 | CNS-35-72 |
| 120VAC | 8 | 11 | 2 | CNS-35-76 |

## Outline Dimensions



Wiring Diagrams (Bottom Views) (pins numbered clockwise from keyway)

Accessory

| Part Number | Name | Description |
| :--- | :---: | :---: |
| SSA-24C667 | Mounting Clip | Ratchet-fit clip slides onto CNS from behind <br> to secure CNS in panel mount applications. |

## Mounting Clip Dimensions

## SSA-24C667

Mouting Clip


## DIP Switch Layout



Note: The solid black blocks in the DIP switch diagrams indicate the switch positions. For example, all the switches are "off" in the diagram above.


## Timing Function Descriptions and Switch Settings

## 8 Or 11 Pin


$\begin{array}{llll}1 & 2 & 3 & 4\end{array}$
$72 \& 92$ - Output relay is energized at the completion of the time interval which is initiated by the application of input voltage.

76 \& 96 - Same as the above except, closing the control switch after time out will deenergize the relay and reset the timer. Opening the switch will initiate another time interval. Closing the control switch during timing will reset the time to zero and inhibit timing until opened again.

## Interval On (Input Controlled)



72 \& 92 - Output relay is energized by the application of input voltage. The time interval is initiated at the same time with the relay de-energizing at the completion of the time interval. $76 \& 96$ - Same as above. Closing the control switch will have no effect on timing or the state of the relay.


72 \& 92 - Output relay will begin cycling at a $50 \%$ duty cycle with the application of input power. The initial state of the relay will be de-energized.
$76 \& 96$ - Same as the above except, closing the control switch will de-energize the relay and inhibit timing until it is once again opened, at which time it will start from zero time.

## Recycler (Initially On) <br> 

72 \& 92 - Output relay will begin cycling at a $50 \%$ duty cycle with the application of input power. The initial state of the relay will be energized.
76 \& 96 - Same as the above except, closing the control switch will energize the relay and inhibit timing until it is once again opened, at which time it will start from zero time. Dimensions are shown for Dimensions are in inches over 214 reference purposes only.

## 11 Pin Only

Delay on Release


76 \& 96 - Output relay is energized by the closing of the control switch with the input applied or the application of input voltage with the control switch already closed. The time interval will be initiated by the opening of the control switch with the relay de-energizing at the completion of the time interval. Closing the control switch after time out will energize the relay in preparation for another time interval. Closing the control switch during timing will reset the time to zero and inhibit timing until opened again.

## Inverted Delay on Release



72 \& 92 - No Time Delay - Instantly On
76 \& 96 - Output relay will energize with the application of the input voltage when the control switch is open. Control switch closing will de-energize the relay. A timing interval will be initiated with the opening of the control switch, at the completion of which the relay willenergize. With the control switch closed upon application of input voltage, the relay will wait until the control switch is opened to initiate a time interval after which the relay will energize. Closing of the control switch during timing will reset the time to zero and inhibit timing until opened again.

## Interval On (Switch Controlled)


$76 \& 96$ - Output relay is energized by the application of input voltage with the control switch closed or the closing of the control switch with the input applied. Immediately upon either, timing is initiated with the relay de-energizing at the completion of the time interval. Closing the control switch after time out will reset the timer, energize the relay, and initiate another time interval. Closing the control switch during timing will have no effect on timing or the state of the relay.

## Interval Off


$76 \& 96$ - Output relay will initially be energized with the application of the input voltage when the control switch is open. Control switch closing will de-energize the relay and start a time interval. At the completion of the time interval, the relay will energize. With the control switch closed upon application of input voltage, a time interval will be initiated after which the relay will energize. Closing of the control switch during timing will have no effect on timing or the state of the relay.

Specifications and availability subject to change.

## CNM 5 series



## Timing Functions

See the following page for a complete description of timing functions.

## Timing Specifications

Timing Ranges: 0.1 to 99.9 / 1 to 999 sec .;
0.1 to 99.9 / 1 to 999 min.;
0.1 to 99.9 / 1 to 999 / 10 to $9,990 \mathrm{hr}$.

Timing Adjustment: Digital adjustment via thumbwheel switches.
Tolerance: $\pm 0.05 \% \pm 0.04 \mathrm{sec}$.*
Repeatability (Including first cycle of operation.): $< \pm 0.05 \% \pm 0.04 \mathrm{sec}$.*
Reset Time (power interruption): 45 ms , typ.; 60 ms , max.
Minimum Pulse Width, Control: 50 ms .

* Timing is synchronized with input voltage frequency. Accuracy is dependent on input voltage frequency. Tolerance shows maximum variation from utility companies.


## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangement: 2 Form C (DPDT).
Material: Silver-cadmium oxide alloy.
Rating: 10A @ 30VDC or 277VAC, resistive;
1/2 HP @ 250VAC; 1/3 HP @120VAC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations, min., at rated load.

## Multifunction Time Delay Relay For Plug-In or Panel Mounting

- Five timing functions selectable via rotary switch
- 0.1 sec . to 9,990 hr. timing range
- Fixed input type (120VAC $\pm 15 \%$ )
- 10A output relay with DPDT contacts
- 1/16 DIN style enclosure with 11-pin plug-in base
- Thumbwheel switches for programming delay time

미 File E22575
(\$1 1 File LR15734
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Initial Dielectric Strength

Between Output Poles: $1,500 \mathrm{~V}$ ms, 60 Hz .
Between Input and Output: 1,500V rms, 60 Hz .

## Input Data @ $\mathbf{2 5}{ }^{\circ} \mathrm{C}$

Voltage: 120VAC $\pm 15 \%, 60 \mathrm{~Hz}$.
Power Requirement: 3VA @ 120VAC.
Transient Protection: 13 J oule MOV.
Input Voltage \& Limits

| Nominal <br> Voltage | Minimum <br> Voltage | Maximum <br> Voltage |
| :---: | :---: | :---: |
| 120VAC | 102VAC | 138VAC |

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$
Humidity: 85\% relative humidity, non-condensing.

## Mechanical Data

Termination: 11-pin octal style plug.
Enclosure: Black plastic $1 / 16$ DIN ( $48 \mathrm{~mm} \times 48 \mathrm{~mm}$ ) case.
Sockets: Fits either 27E123 or 27E892 (snap-on) screw terminal sockets.
Weight: 4.3 oz . (122g) approximate.

Ordering Information - Authorized distributors are more likely to stock boldface items listed below.
Time Delay Relay

| Input Voltage | Part Number |
| :---: | :---: |
| 120VAC | CNM5 |



Fits $1.77 \times 1.77(45 \times 45)$ panel cutout.

## Wiring Diagrams (Bottom Views)

(pins numbered clockwise from keyway)
EXTERNAL CONTROL SWITCH** Optional Solid State Input Interface

**Important: A dry circuit switch is recommended. A "dry circuit" switch is one rated to reliably switch currents of less than 50 mA . Use of a switch rated for other than dry circuit may result in failure of the time delay relay to function properly.
Accessory

| Part Number | Name | Description |
| :--- | :---: | :---: |
| SSA-24C667 | Mounting Clip | Ratchet-fit clip slides onto CNM5 from behind <br> to secure CNM5 in panel mount applications. |

## Mounting Clip Dimensions

SSA-24C667
Mounting Clip



## Timer Function Descriptions

LED to show time status. See functional explanation for details.


Time Base:
$\begin{aligned} .1 \mathrm{~S}=1 / 10 \text { Seconds } & \text { Timing Range } 0.1 \text { to } 99.9 \text { Seconds } \\ \mathrm{S}=\text { Seconds } & \text { Timing Range } 1 \text { to } 999 \text { Seconds }\end{aligned}$
$1 \mathrm{M}=1 / 10$ Minutes
$M=$ Minutes
. $1 \mathrm{H}=1 / 10$ Hours
$\mathrm{H}=$ Hours
$10 \mathrm{H}=10$ Hours

Timing Range 0.1 to 99.9 Minutes Timing Range 1 to 999 Minutes Timing Range 0.1 to 99.9 Hours Timing Range 1 to 999 Hours Timing Range 10 to 9990 Hours

Repeat: Output relay is turned on at end of programmed time interval which is started by application of input power. Relay stays on for equal time interval, then turns off and cycle is repeated on a free-running basis with equal on and off times until terminated by removal of input power. LED is flashing when output relay is off and on continuously when the relay is on. Applying CONTROL input during timing will have no effect on timing or the state of the relay.

One Shot: Output relay is tumed on by applying CONTROL input with input voltage present or application of input voltage with the CONTROL input on. Immediately upon either, timing is initiated with the output relay turning off at the completion of the selected time interval. Applying CONTROL input after time out will reset the timer, turn on the output relay and initiate another time interval. LED is on continuously when output relay is off and flashes when the relay is on. Applying CONTROL input during timing will have no effect on timing or the state of the relay.

Off Delay: Output relay is turned on by applying CONTROL input with input voltage present or application of input voltage with the CONTROL input on. The time interval will be started by removing the CONTROL input with the output relay turning off at completion of the time interval. Reapplying the CONTROL during timing will reset the time to zero and inhibit timing until removed. LED is off when CONTROL input is on, flashing during timing and on continuously when the output relay is off.

Interval: Output relay is turned on for a programmed time interval by applying input voltage. LED flashes when output relay is on and is on continuously when the output relay is off. Applying CONTROL input will have no effect on timing or the state of the relay.

On Delay: Output relay is off for a programmed time interval which is started by applying input voltage. LED flashes when output relay is off and is on continuously when the output relay is on. Applying CONTROL input will have no effect on timing or the state of the relay.


## Timing Modes

M odes are user selectable via screwdriver adjustment of recessed 4position selector dial.
Modes offered are: On-Delay, Off-Delay, Interval and Latching Interval.

## Timing Specifications

Timing Ranges: 0.1 to $3 / 0.33$ to $10 / 1$ to $30 / 4$ to 120 sec.; 0.33 to 10 /
1 to 30 / 2 to 60 min.; 0.33 to 10 hr .
Timing Range Selection: Screwdriver select via recessed 8-position selector dial.
Timing Adjustment: Recessed potentiometer adjustment with reference calibrations.
Accuracy: Repeat Accuracy: $\pm 1 \% \pm 0.01 \mathrm{sec}$.
Overall Accuracy: $\pm 3 \% \pm 0.01 \mathrm{sec}$.
Reset Time: 30 ms .
Relay Operate Time: On-Delay and Interval mode: 30 ms .
Relay Release Time: Off-Delay, Interval and Latching Interval: 30 ms . (with factory-installed relay).
Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$
Arrangements: 2 Form C (DPDT).
Rating: 10A @ 28VDC or 120VAC, resistive; 1/3 HP @ 120/240VAC 345VA.
Expected Mechanical Life: 10 million operations (with factory-installed relay).
Expected Electrical Life: 500,000 operations, min., at rated resistive load( with factory-installed relay).

Outline Dimensions
0.188 (5) WIDE SLOT FOR \#8 OR M4 MACHINE SCREW -


Wiring Diagram (Top View)


## SSF series

## Programmable <br> Time Delay Relay

- 4 user-programmable timing modes
- 0.1 sec . to 10 hr . programmable timing range
- Parameters set with recessed screwdriver dials
- Universal voltage (plug-in relay dependent)
- 10A DPDT replaceable output relay minimizes downtime
- Front screw terminals
- DIN-rail, panel or machine tool track mount

T File E15631

## (18) File LR29186

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Initial Dielectric Strength

Between Coil/Control Switch and Contacts: 1,500VAC for one minute.

## Input Data @ $25^{\circ} \mathrm{C}$

Voltage: See Ordering Information section for details.
Power Requirement: 2W, max.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $<\mathbf{0 . 1} \mathbf{~ m s}$ | $<\mathbf{1} \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| $24,48 \mathrm{VACNDC}$ | $1,000 \mathrm{~V}$ | 480 V |
| $120,240 \mathrm{VAC} / \mathrm{NDC}$ | $3,000 \mathrm{~V}$ | $2500 \mathrm{~V}^{*}$ |

* Min. source impedance of 100 ohm@120/240VAC, 3000V <0.1 , sec.


## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting/Termination: Panel, DIN-rail, Machine Tool mounting track mounting case with screw terminals.
Weight: 5.5 oz. ( 156 g ) approximately.

## Ordering Information

| SSF | R | 90 | A |
| :---: | :---: | :---: | :---: |
|  |  |  |  |
| Series SSF | $\mathbf{R}=\mathrm{UL}$ | Operating Mode 90 | Operating Voltage |
| Universal | Recognized | Multiple modes - | (+10\%, -15\%) |
| Timer | Component | On-Delay | A $=120 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. |
|  |  | Off-Delay | $\mathrm{B}=240 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. |
|  |  | Interval | $\mathrm{E}=24 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. |
|  |  | Latching Interval | $\mathrm{F}=48 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. |
|  |  |  | $\mathrm{N}=48 \mathrm{VDC}$ |
|  |  |  | $\mathrm{O}=24 \mathrm{VDC}$ |
|  |  |  | $\mathrm{P}=125 \mathrm{VDC}$ |
|  |  |  | X $=$ No factory - |
|  |  |  | installed relay. $\dagger$ |

$\dagger$ Voltage determined by customer-supplied relay. Only relays that operate on the above-listed voltages should be used. Timer operation using other relay voltages is not recommended.

Authorized distributors are likely to stock the following: SSFR90A SSFR90X


## Timing Modes

Modes are user selectable via screwdriver adjustment of recessed 4position selector dial.
M odes offered are: On-Delay, Off-Delay, Interval and Latching Interval.

## Timing Specifications

Timing Ranges: 0.1 to $3 / 0.33$ to $10 / 1$ to $30 / 4$ to 120 sec.; 0.33 to 10 /

$$
1 \text { to } 30 / 2 \text { to } 60 \text { min.; } 0.33 \text { to } 10 \mathrm{hr} \text {. }
$$

Timing Range Selection: Screwdriver select via recessed 8-position selector dial.
Timing Adjustment: Extemal knob potentiometer adjustment with reference calibrations.
Accuracy: Repeat Accuracy: $\pm 1 \% \pm 0.01 \mathrm{sec}$.
Overall Accuracy: $\pm 3 \% \pm 0.01 \mathrm{sec}$.
Reset Time: 30 ms .
Relay Operate Time: On-Delay and Interval mode: 55 ms . Relay Release Time: Off-Delay, Interval and Latching Interval: 40 ms .

## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT)
Rating: 10A @ 28VDC or 120VAC, resistive; 1/3 HP @ 120/240VAC; 345VA. Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 500,000 operations, min., at rated resistive load.

## Initial Dielectric Strength

Between Terminals and Case: 1,000VAC plus twice the nominal voltage for one minute.

## Outline Dimensions



SCF TIMER


BCSF11SC SOCKET

## Wiring Diagram (Bottom View)



NOTE: External wiring illustrated by broken lines

## SCF series

## Programmable <br> Time Delay Relay

- 4 user-programmable timing modes
- 0.1 sec . to 10 hr . programmable timing range
- Parameters set with recessed dials
- Narrow width saves panel space
- 10A DPDT output relay
- Socket can be DIN-rail or back panel mounted

뮥 File E15631(relay) and E140494 (socket)
(818 File LR29186 (relay) and LR29513M7 (socket)
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: See Ordering Information section for details.
Power Requirement: 2W, max.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $<\mathbf{0 . 1} \mathbf{~ m s}$ | $<1 \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| 12 VDC | $1,000 \mathrm{~V}$ | $240 \mathrm{~V}^{*}$ |
| 24 VACNDC | $1,000 \mathrm{~V}$ | $240 \mathrm{~V}^{*}$ |
| 48 VACNDC | $1,000 \mathrm{~V}$ | $480 \mathrm{~V}^{*}$ |
| $120 \mathrm{VAC}, 125 \mathrm{VDC}$ | $3,000 \mathrm{~V}$ | $2,500 \mathrm{~V}^{*}$ |
| 240 VACNDC | $3,000 \mathrm{~V}$ | $2,500 \mathrm{~V}^{*}$ |

* Minimum source impedance of 100 ohm.


## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting/Termination: 11-pin octal-type plug for use with mating socket.
Mount relay in horizontal position (pins horizontal, knob down, LEDs up).
Status Indication: Power On LED and Output Contacts LED.
Weight: Relay: 3.5 oz. (156g) approx.; Socket: 1.7 oz. (48.3g) approx.

Ordering Information


Authorized distributors are likely to stock the following: None at present.


## CN 1 series

## On Delay, Time Delay Relay For Plug-In or Panel Mounting

- 0.1 sec. to $9,990 \mathrm{hr}$. timing range
- Fixed input type ( $120 \mathrm{VAC} \pm 15 \%$ )
- 10A output relay with DPDT contacts
- 1/16 DIN style enclosure with 8-pin plug-in base
- Thumbwheel switches for programming delay time


## 기 File E22575

(18) File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Initial Dielectric Strength

Between Output Poles: $1,500 \mathrm{~V}$ ms, 60 Hz .
Between Input and Output: 1,500V rms, 60 Hz .
On Delay - Output relay turns on at the end of a programmed time interva which is started by applying input voltage. LED flashes when output relay is off and is on continuously when the output relay is on. Removal of input voltage turns off output relay. Reapplying input voltage resets the unit.


## Timing Specifications

Timing Ranges: 0.1 to 99.9 / 1 to 999 sec.;
0.1 to 99.9 / 1 to 999 min .;
0.1 to 99.9 / 1 to 999 / 10 to $9,990 \mathrm{hr}$.

Timing Adjustment: Digital adjustment via thumbwheel switches.
Tolerance: $\pm 0.05 \% \pm 0.04 \mathrm{sec}$.*
Repeatability (Including first cycle of operation.): $< \pm .05 \% \pm 0.04 \mathrm{sec}$.* Reset Time (power interruption): 45 ms , typ.; 60 ms , max.

* Timing is synchronized with input voltage frequency. Accuracy is dependent on input voltage frequency. Tolerance shows maximum variation from utility companies.


## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangement: 2 Form C (DPDT).
Material: Silver-cadmium oxide alloy.
Rating: 10A @ 30VDC or 277VAC, resistive;
1/2 HP @ 250VAC; 1/3 HP @ 120VAC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations, min., at rated load.

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: 120VAC $\pm 15 \%, 60 \mathrm{~Hz}$.
Power Requirement: 3VA @120VAC.
Transient Protection: 13 J oule MOV.
Input Voltage \& Limits

| Nominal <br> Voltage | Minimum <br> Voltage | Maximum <br> Voltage |
| :---: | :---: | :---: |
| 120VAC | 102VAC | 138VAC |

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.
Humidity: 85\% relative humidity, non-condensing.

## Mechanical Data

Termination: 8-pin octal style plug.
Enclosure: Black plastic $1 / 16$ DIN ( $48 \mathrm{~mm} \times 48 \mathrm{~mm}$ ) case.
Sockets: Fits either 27E122 or 27E891 (snap-on) screw terminal sockets.
Weight: 4.3 oz . ( 122 g ) approximate.

Ordering Information - Authorized distributors are more likely to stock boldface items listed below.
Time Delay Relay

| Input Voltage | Part Number |
| :---: | :---: |
| 120VAC | CN1 |



Fits $1.77 \times 1.77(45 \times 45)$ panel cutout.


## Wiring Diagram (Bottom View)

(pins numbered clockwise from keyway)


Accessory

| Part Number | Name | Description |
| :--- | :---: | :---: |
| SSA-24C667 | Mounting Clip | Ratchet-fit clip slides onto CN1 from behind <br> to secure CN1 in panel mount applications. |

## Mounting Clip Dimensions

## SSA-24C667

Mounting Clip


Time Base

| .1 S | $=1 / 10$ Seconds |  |
| ---: | :--- | ---: |
| Timing Range 0.1 to 99.9 Seconds |  |  |
| S | $=$ Seconds | Timing Range 1 to 999 Seconds |
| .1 M | $=1 / 10$ Minutes | Timing Range 0.1 to 99.9 Minutes |
| M | $=$ Minutes | Timing Range 1 to 999 Minutes |
| .1 H | $=1 / 10$ Hours | Timing Range 0.1 to 99.9 Hours |
| H | $=$ Hours | Timing Range 1 to 999 Hours |
| 10 H | $=10$ Hours | Timing Range 10 to 9990 Hours |

## CG series

## CMOS IC Time Delay Relay

- Repeatability to .05\%
- Choice of timing modes
- Delay on operate
- Delay on release
- Interval on
- Knob adjustable
- 10A output relay with DPDT contacts
- Various models time from 0.5 sec . to 100 min .


## T File E22575

(18) File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT).
Material: Silver-cadmium oxide alloy.
Rating: 10A @ 30VDC or 277VAC, resistive; 1/2 HP @ 250VAC; 1/3 HP @120VAC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations, min., at rated load.

## Initial Dielectric Strength

Between Open Contacts: 500 V rms, 60 Hz .
Between All Other Conductors: 500 V rms, 60 Hz .

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: 120VAC and 24VDC.
Power Requirement: AC Types: Typically less than 3 VA.
DC Types: Typically less than 3 W .
Transient Protection: Yes.
Reverse Voltage Protection: Yes.

Input Voltages \& Limits @ $25^{\circ} \mathrm{C}$

| Voltage <br> Type | Nominal <br> Voltage | Minimum <br> Voltage | Maximum <br> Voltage |
| :---: | :---: | :---: | :---: |
| AC | 120 | 105 | 130 |
| DC | 24 | 20 | 32 |

Note: DC voltage must be filtered ( $5 \%$ p-p ripple max. at nom. voltage).
AC models will operate on 50 or 60 Hz .

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.

## Mechanical Data

## Termination: 8- or 11-pin octal style plug.

Enclosure: Yellow plastic case. Knob adjustable types have dial scale for reference only.
Sockets: Models with 8-pin base fit either 27E122 or 27E891 (snap-on) screw terminal sockets. 11-pin types fit either 27E123 or 27E892 (snap-on) screw terminal sockets.
Weight: 8 oz . $(227 \mathrm{~g})$ approximately.

## Timing Specifications

Timing Ranges: From 0.5 to 5.0 sec . through 10 to 100 min .
Timing Adjustment: Knob adjustable.
Tolerance (for AC units add $\pm \mathbf{1 / 2}$ cycle $\mathbf{6 0 ~ H z}$.):
Knob Adj. Types:-0, $+10 \%$ of max. specified at high end of timing range; $+0,-10 \%$ of $\min$. specified at low end.
Delta Time (for AC units add $\pm 1$ cycle 60 Hz. ): $\pm 2 \%$, typ.; $\pm 5 \%$, max.
Repeatability (including first cycle of operation):
AC: $\pm 0.1 \%$, typ.; $\pm 0.5 \%$, max.; but not less than $\pm 16 \mathrm{~ms}$.
DC: $\pm 0.05 \%$ typ.; $\pm 0.1 \%$ max.; but not less than $\pm 3 \mathrm{~ms}$.
Release Time: 30 ms , typ.; 45 ms , max.
Recycle Time: AC: 40 ms , typ.; 60 ms , max.
DC: 30 ms , typ.; 45 ms , max.

Specifications and availability subject to change.

## Ordering Information - Authorized distributors are more likely to stock boldface items listed below.

Delay on Operate Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :--- | :--- | :---: | :--- |
| 120 VAC | 0.5 to 5 Min. |  |  |  |
|  | 1 to 10 Min. | Knob | 1 | CGB-38-70005M |
|  | 5 to 50 Min. |  |  | CGB-38-70010M |
|  | 10 to 100 Min. |  |  | CGB-38-70050M |
| $24 V D C$ | 5 to 50 Min. | Knob | 1 | CGB-38-70100M |

Delay on Release Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 120VAC | 1 to 10 Min. <br>  <br> 5 to 50 Min. | Knob | 2 | CGB-38-78010M <br> CGB-38-78050M |

Interval on Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 120VAC | 0.5 to 5 Sec. <br> 1 to 10 Min. | Knob | 1 | CGB-38-79005S <br> CGB-38-79010M |
| 24VDC | 1 to 10 Min. | Knob | 1 | CGD-38-39010M |

Outline Dimensions


## Wiring Diagrams - Bottom Views (pins numbered clockwise from keyway)


(DC POLARITY INDICATED)
Fig. 1
8 Pin


* If control switch is closed when power is applied, relay will immediately energize. A 50 millisecond minimum switch closure is required. IM PORTANT: a dry circuit switch is recommemded. A "dry circuit" switch is one rated to reliably switch currents of less than 50 mA . Use of a switch rated for other than dry circuit may result in failure of the time delay relay to function properly.
** Note: input polarity for DC operation. For most reliable operation on AC, connect high side to " + " and low side to " - "



## Timing Modes

Delay on operate - Delay period begins when input voltage is applied. At the end of the delay period, the relay will operate and will not release until input voltage is removed. Reset occurs when input voltage is reapplied.


Delay on release - Input voltage must be applied continuously to operate the internal relay. When control Input is applied, the relay energizes. When control input is removed, timing begins. When timing is complete, the relay will de-energize. Time may be reset to zero during timing by reapplying control input.


## Timing Specifications

Timing Ranges: From 0.1 to 180 sec.
Timing Adjustment: Fixed, extemal resistor and knob adjustable.
Tolerance (for AC units add $\pm 1 / 2$ cycle 60 Hz .):
Knob Adj. Types: $\pm 5 \%$ of max. specified at high end of timing range; min. specified, or less, at low end; $\pm 10 \%$ full scale.
Fixed Types: $\quad \pm 5 \%$.
Res. Adj. Types: $\pm 5 \%$ at high end of timing range; min. specified, or less, at low end.
Delta Time (for AC units add $\pm \mathbf{1}$ cycle $\mathbf{6 0 ~ H z}$.): $\pm 5 \%$.
Repeatability (for AC units add $\pm 1$ cycle 60 Hz .): $\pm 1 \%$.
Release Time: 45 ms , typ.; 60 ms , max.
Recycle Time: 45 ms , typ.; 60 ms , max.

## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT).
Material: Silver-cadmium oxide alloy.
Rating: 10A @30VDC or 277VAC, resistive; 1/2 HP @ 250VAC; 1/3 HP @ 120VAC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations, min., at rated load.

## $C D$ series

## CMOS IC Time Delay Relay

-1\% Repeatability

- Operates from $-40^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$
- Delay on operate or delay on release timing modes
- Fixed, knob or resistor adjustable types
- Calibrated dial on knob adjustable types
- 10A output relay with SPDT or DPDT contacts
- Various models time from 0.1 to 180 sec .

믹 File E22575
(18) File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Initial Dielectric Strength

Between Open Contacts: 500 V rms, 60 Hz .
Between All Other Conductors: 500 V rms, 60 Hz .

## Input Data @ $25^{\circ} \mathrm{C}$

Voltage: 24 \& 120VAC and 12 through 110VDC.
Power Requirement: AC Types: Typically less than 3 VA. DC Types: Typically less than 3 W .
Transient Protection: Yes.
Reverse Voltage Protection: Yes.
Input Voltages \& Limits @ $\mathbf{2 5}^{\circ} \mathrm{C}$

| Voltage <br> Type | Nominal <br> Voltage | Minimum <br> Voltage | Maximum <br> Voltage |
| :---: | :---: | :---: | :---: |
| AC | 24 | 20 | 28 |
|  | 120 | 105 | 130 |
| DC | 12 | 11 | 13 |
|  | 24 | 20 | 32 |
|  | 48 | 41 | 55 |
|  | 110 | 95 | 125 |

Note: DC voltage must be filtered (5\% p-p ripple max. at nom. voltage).
AC models will operate on 50 or 60 Hz .

## Environmental Data

Temperature Range: Storage: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: 8- or 11-pin octal style plug.
Enclosure: Yellow plastic case. Knob adjustable types have dial scale calibrated in seconds $\pm 5 \%$.
Sockets: Models with 8-pin base fit either 27E122 or 27E891 (snap-on) screw terminal sockets. 11-pin types fit either 27E123 or 27E892 (snap-on) screw terminal sockets.
Weight: $8 \mathrm{oz} .(227 \mathrm{~g})$ approximately.

## Ordering Information - Authorized distributors are more likely to stock boldface items listed below.

Delay on Operate Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 120VAC | 0.1 to 1 Sec . 0.1 to 5 Sec . 0.1 to 10 Sec . 0.3 to 30 Sec . 0.6 to 60 Sec . 1.8 to 180 Sec . | Knob | 1 | CDB-38-70001 CDB-38-70002 CDB-38-70003 CDB-38-70006 CDB-38-70004 CDB-38-70005 |
| 120VAC | 1 Sec . | Fixed |  | CDA-38-70012 |
| 120VAC | 0.1 to 1 Sec . 0.1 to 5 Sec . 0.1 to 10 Sec . | Resistor | 2 | $\begin{aligned} & \text { CDF-38-70001 } \\ & \text { CDF-38-70002 } \\ & \text { CDF-38-70003 } \end{aligned}$ |
| 24VDC | 0.1 to 10 Sec . 0.6 to 60 Sec . 1.8 to 180 Sec . | Knob | 1 | CDD-38-30003 CDD-38-30004 CDD-38-30005 |
| 48VDC | 0.6 to 60 Sec . | Knob | 1 | CDD-38-40002 |
| 110VDC | 0.1 to 1 Sec. <br> 0.1 to 10 Sec . <br> 0.6 to 60 Sec . <br> 1.8 to 180 Sec . | Knob | 1 | CDD-38-60004 CDD- $38-60001$ CDD- $38-60002$ CDD-38-60003 |

Delay on Release Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 120VAC | 0.1 to 1 Sec . | Knob | 3 | CDB-38-70016 |
|  | 0.1 to 5 Sec . |  |  | CDB-38-70091 |
|  | 0.1 to 10 Sec . |  |  | CDB-38-70014 |
|  | 0.3 to 30 Sec . |  |  | CDB-38-70092 |
|  | 0.6 to 60 Sec . |  |  | CDB-38-70012 |
|  | 1.8 to 180 Sec . |  |  | CDB-38-70015 |
| 120VAC | 1 Sec . | Fixed | 3 | CDA-38-70025 |
| 12VDC | 180 Sec . | Fixed | 3 | CDC-38-20026 |
| 24VDC | 0.1 to 10 Sec . | Knob | 3 | CDD-38-30014 |
|  | 0.6 to 60 Sec . |  |  | CDD-38-30012 |
|  | 1.8 to 180 Sec . |  |  | CDD-38-30008 |

## Outline Dimensions



Wiring Diagrams - Bottom Views (pins numbered clockwise from keyway)


EXTERNAL RESISTOR

(DC POLARITY INDICATED)**

(DC POLARITY INDICATED)**

Fig. 1
8 Pin

Fig. 2
11 Pin

Fig. 3
11 Pin

* If control input is applied when supply input is applied, relay will immediately energize. A 50 millisecond minimum control pulse is required
** Note Input polarity for DC operation. For most reliable operation on AC, connect high side to " + " and low side to "-".


## External Resistor Selection Chart

See External Resistor Selection Charts at beginning of Time Delay Relay section of this Databook.

| Dimensions are shown for | Dimensions are in inches over | Specifications and availability |
| :--- | :--- | :--- |
| reference purposes only. | (millimeters) unless otherw ise | subject to change. |

## CK series

## Mid-Priced CMOS IC Time Delay Relay

- Choice of timing modes
- Delay on operate
- Delay on release
- Delay on dropout (no input required during timing)
- Interval on
- Knob or resistor adjustable types
- 10A output relay with DPDT contacts
- Various models time from 0.1 to 180 sec.


## ? ${ }^{\text {o }}$ File E22575

## (14B File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT).
Material: Silver-cadmium oxide alloy.
Rating: 10A @ 30VDC or 277VAC, resistive; 1/2 HP @ 250VAC; 1/3 HP @ 120VAC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations, min., at rated load.

## Initial Dielectric Strength

Between Open Contacts: 500 V rms, 60 Hz .
Between All Other Conductors: 500 V rms, 60 Hz .

## Input Data @ $25^{\circ} \mathrm{C}$

Voltage: 24 \& 120VAC and 12 \& 24VDC.
Power Requirement: AC Types: Typically less than 3 VA.
DC Types: Typically less than 3 W .
Initiate Time: Delay on dropout timers must have input voltage applied for a minimum of three seconds for dropout function to be guaranteed.
Transient Protection: Yes.
Reverse Voltage Protection: Yes.
Input Voltages \& Limits @ $\mathbf{2 5}^{\circ} \mathrm{C}$

| Voltage <br> Type | Nominal <br> Voltage | Minimum <br> Voltage | Maximum <br> Voltage |
| :---: | :---: | :---: | :---: |
| AC | 24 | 20 | 28 |
| DC | 120 | 105 | 130 |
| 24 | 11 | 13 |  |

Note: DC voltage must be filtered (5\% p-p ripple max. at nom. voltage).
AC models will operate on 50 or 60 Hz .

## Environmental Data

Temperature Range: Storage: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: 8- or 11-pin octal style plug.
Enclosure: White plastic case. Knob adjustable types have dial scale for reference only.
Sockets: Models with 8-pin base fit either 27E122 or 27E891 (snap-on) screw terminal sockets. 11-pin types fit either 27E123 or 27E892 (snap-on) screw terminal sockets.
Weight: $6 \mathrm{oz} .(170 \mathrm{~g})$ approximately.

## Timing Specifications

Timing Ranges: From 0.1 to 180 sec .
Timing Adjustment: External resistor and knob adjustable.
Tolerance (for AC units add $\pm \mathbf{1 / 2}$ cycle $\mathbf{6 0 ~ H z}$.):
Knob Adj. Types:-0, +20\% of max. specified at high end of timing range; min. specified, or less, at low end.
Fixed Types: $\pm 5 \%$.
Res. Adj. Types: $\pm 5 \%$ at high end of timing range; min. specified, or less, at low end.
Delta Time (for AC units add $\pm 1$ cycle 60 Hz .): $\pm 10 \%$.
Repeatability (for AC units add $\pm \mathbf{1}$ cycle 60 Hz. ): $\pm 2 \%$.
Release Time: 60 ms , typ.; 100 ms , max.
Recycle Time: 60 ms , typ.; 100 ms , max.

## Ordering Information - Authorized distributors are more likely to stock boldface items listed below.

## Delay On Operate Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 24VAC | 0.1 to 10 Sec . | Knob | 1 | CKB-38-30010 |
| 120VAC | 0.1 to 10 Sec . 0.6 to 60 Sec . 1.2 to 120 Sec . 1.8 to 180 Sec . | Knob | 1 | $\begin{aligned} & \text { CKB-38-70010 } \\ & \text { CKB-38-70060 } \\ & \text { CKB-38-70120 } \\ & \text { CKB-38-70180 } \end{aligned}$ |
| 120VAC | 0.1 to 10 Sec . | Resistor | 2 | CKF-38-70010 |
| 12VDC | 0.1 to 10 Sec . | Knob | 1 | CKD-38-20010 |

## Delay On Release Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :--- | :--- | :---: | :--- |
|  | 0.1 to 10 Sec. |  |  | CKB-38-78010 |
| 120VAC | 0.6 to 60 Sec. | Knob | 3 | CKB-38-78060 <br>  <br>  <br>  <br> 1.8 to 180 Sec. |
|  |  |  | CKB-38-78180 |  |

Delay On Dropout Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 24VAC | 0.1 to 10 Sec . | Knob | 1 | CKB-38-37010 |
|  | 0.6 to 60 Sec . |  |  | CKB-38-37060 |
| 120VAC | 0.1 to 10 Sec . |  |  | CKB-38-77010 |
|  | 0.6 to 60 Sec . | Knob | 1 | CKB-38-77060 |
|  | 1.2 to 120 Sec . |  |  | CKB-38-77120 |

Interval On Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :--- | :--- | :---: | :---: | :--- |
| 120VAC | 0.1 to 10 Sec. | Knob | 3 | CKB-38-79010 |

## Outline Dimensions



Wiring Diagrams - Bottom Views (pins numbered clockwise from keyway)


INPUT (DC POLARITY INDICATED)** Fig. 1
8 Pin


INPUT
(DC POLARITY INDICATED)**
Fig. 2
11 Pin


CONTINUOUS SUPPLY INPUT
(DC POLARITY INDICATED)**
Fig. 3
11 Pin


Fig. 3

EXTERNAL SWITCH*
-



EXTERNAL CONTROL

CONTINUOUS SUPPLY
INPUT
(DC POLARITY INDICATED)**
Fig. 4
11 Pin

circuit" switch is one rated to reliably switch currents of less than 50 mA . Use of a switch rated for other than dry circuit may result in failure of the time delay relay to function properly.
** Note: Input polarity for DC operation. For most reliable operation on AC, connect high side to " + " and low side to " - ".

## External Resistor Chart

See External Resistor Selection Charts at beginning of Time Delay Relay section of this Databook.

| Dimensions are shown for | Dimensions are in inches over | Specifications and availability |
| :--- | :--- | :--- |
| reference purposes only. | (millimeters) unless otherwise | subject to change. |



## Timing Modes

Delay on operate - Delay period begins when input voltage is applied. At the end of the delay period, the relay will operate and will not release until input voltage is removed. Reset occurs when input voltage is reapplied.


Delay on release - Input voltage must be applied continuously to operate the intemal relay. When the control switch is closed, the relay energizes. When the control switch is opened, timing begins. When timing is complete, the relay will de-energize. Time may be reset to zero during timing by closing the control switch.


Interval on - The relay energizes and timing begins when input voltage is applied. At the end of the time delay period the relay will de-energize. Reset is accomplished by removing, then reapplying, the input voltage.


## Timing Specifications

Timing Ranges: From 1 to 180 sec .
Timing Adjustment: Fixed and knob adjustable.
Tolerance (for AC units add $\pm \mathbf{1 / 2}$ cycle $\mathbf{6 0 ~ H z .}$.):
Knob Adj. Types:-0, $+20 \%$ of max. specified at high end of timing range; min. specified, or less, at low end.
Fixed Types: $\quad \pm 5 \%$.
Res. Adj. Types: $\pm 5 \%$ at high end of timing range; min. specified, or less, at low end.
Delta Time (for AC units add $\pm 1$ cycle $\mathbf{6 0 ~ H z}$.): $\pm 10 \%$.
Repeatability (for AC units add $\pm 1$ cycle $\mathbf{6 0 ~ H z}$.): $\pm 2 \%$.
Release Time: 125 ms , typ.; 200 ms , max.
Recycle Time: 125 ms , typ.; 200 ms , max.

## CH series

## Mid- To Low-Priced CMOS IC Time Delay Relay

## - Choice of timing modes

- Delay on operate
- Delay on release
- Interval on
- Fixed or knob adjustable types
- 10A output relay with DPDT contacts
- Various models time from 1 to 180 sec .


## 吹 File E22575 <br> (18 File LR15734

> Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT).
Material: Silver-cadmium oxide alloy.
Rating: 10A @ 30VDC or 277VAC, resistive; 1/2 HP @ 250VAC; 1/3 HP @ 120VAC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations, min., at rated load.

## Initial Dielectric Strength

Between Open Contacts: 500 V rms, 60 Hz .
Between All Other Conductors: 500 V rms, 60 Hz .

## Input Data @ $25^{\circ} \mathrm{C}$

Voltage: 24 through 240VAC and 24VDC.
Power Requirement: AC Types: Typically less than 3 VA.
DC Types: Typically less than 3 W .
Transient Protection: Yes.
Reverse Voltage Protection: Yes.
Input Voltages \& Limits @ $\mathbf{2 5}^{\circ} \mathrm{C}$

| Voltage <br> Type | Nominal <br> Voltage | Minimum <br> Voltage | Maximum <br> Voltage |
| :---: | :---: | :---: | :---: |
| AC | 24 | 20 | 28 |
| DC | 240 | 105 | 130 |
| 24 | 20 | 260 |  |

Note: DC voltage must be filtered (5\% p-p ripple max. at nom. voltage).
AC models will operate on 50 or 60 Hz .

## Environmental Data

Temperature Range: Storage: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$. Operating: $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: 8- or 11-pin octal style plug.
Enclosure: White plastic case. Knob adjustable types have dial scale for reference only.
Sockets: M odels with 8-pin base fit either 27E122 or 27E891 (snap-on) screw terminal sockets. 11-pin types fit either 27E123 or 27E892 (snap-on) screw terminal sockets.
Weight: $6 \mathrm{oz} .(170 \mathrm{~g})$ approximately.

## Ordering Information - Authorized distributors are more likely to stock boldface items listed below.

Delay on Operate Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :--- | :---: | :---: | :--- |
| 24 VAC | 1 to 10 Sec. <br> 1 to 180 Sec. | Knob | 1 | CHB-38-30001 <br> CHB-38-30003 |
| 120VAC | 1 to 10 Sec. <br> 1 to 60 Sec. <br> 1 to 180 Sec. | Knob | 1 | CHB-38-70001 <br> CHB-38-70002 <br> CHB-38-70003 |
| 120VAC | 10 Sec. | Fixed | 1 | CHA-38-70001 |
| 240 VAC | 1 to 10 Sec. | Knob | 1 | CHB-38-80001 |
| 24 VDC | 1 to 10 Sec. <br> 1 1 to $60 ~ S e c$. <br> 1 to 180 Sec. | Knob | 1 | CHD-38-30001 <br> CHD-38-30002 <br> CHD-38-30003 |

## Delay on Release Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :--- | :---: | :---: | :--- |
| 24VAC | 1 to 10 Sec. | Knob | 3 | CHB-38-30011 |
| 120VAC | 1 to 10 Sec. <br> 1 to $60 ~ S e c . ~$ <br> 1 to 180 Sec. | Knob | 3 | CHB-38-70011 <br> CHB-38-70012 <br> CHB-38-70013 |
| 24 VDC | 1 to 10 Sec. <br> 1 to 180 Sec. | Knob | 3 | CHD-38-30011 <br> CHD-38-30013 |

Interval on Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :--- | :---: | :---: | :--- |
|  | 1 to 10 Sec. |  |  | CHB-38-70021 <br> CHB-38-70022 <br> 120VAC |
|  | 1 to 60 Sec. <br> 1 to 180 Sec. | Knob | 1 | CHB-38-70023 |
| 24 VDC | 1 to 10 Sec. | Knob | 1 | CHD-38-30021 |

Outline Dimensions


Wiring Diagrams - Bottom Views (pins numbered clockwise from keyway)

(DC POLARITY INDICATED)
Fig. 2
11 Pin


AC INPUT
Fig. 3
11 Pin

[^29]** Note: Input polarity for DC operation. For most reliable operation on AC, connect high side to " + " and low side to " - ".

| Dimensions are shown for reference purposes only. | Dimensions are in inches over (millimeters) unless otherw ise specified. | Specifications and availability subject to change. | www.tycoelectronics.com Technical support: <br> Refer to inside back cover. |
| :---: | :---: | :---: | :---: |



## Timing Modes

Delay on operate - Delay period begins when input voltage is applied. At the end of the delay period, the relay will operate and will not release until input voltage is removed. Reset occurs when input voltage is reapplied.


Delay on release - Input voltage must be applied continuously to operate the internal relay. When the control switch is closed, the relay energizes. When the control switch is opened, timing begins. When timing is complete, the relay will de-energize. Time may be reset to zero during timing by closing the control switch.


Interval on (without control switch) - The relay energizes and timing begins when input voltage is applied. At the end of the time delay period the relay will de-energize. Reset is accomplished by removing, then reapplying, the input voltage.


Interval on (with control switch) - Input voltage must be applied continuously to operate the internal relay. The relay energizes and timing begins when the external switch is closed. At the end of the time delay period the relay will de-energize. Reset is accomplished by opening and reclosing the control switch.

N.O. RELAY ON

CONTACTS OF


## Timing Specifications

Timing Ranges: From 0.1 to 1.0 sec . through 10 to 100 min .
Timing Adjustment: Knob adjustable.
Tolerance (for AC units add $\pm \mathbf{1 / 2}$ cycle $\mathbf{6 0 ~ H z}$.):
Knob Adj. Types: $-0,+30 \%$ of max. specified at high end of timing range; min. specified, or less, at low end.
Fixed Types: $\pm 10 \%$.
Res. Adj. Types: $\pm 10 \%$ at high end of timing range; min. specified, or less, at low end.
Delta Time (for AC units add $\pm 1$ cycle 60 Hz .): $\pm 10 \%$.
Repeatability (for AC units add $\pm \mathbf{1}$ cycle $\mathbf{6 0 ~ H z}$.): $\pm 2 \%$.
Release Time: 60 ms , typ.; 100 ms , max.
Recycle Time: 60 ms , typ.; 100 ms , max.

## CB series

## CMOS IC Time Delay Relay

- Choice of timing modes
- Delay on operate
- Delay on release
- Interval on with or without control switch
- Knob adjustable
- 10A output relay with SPDT or DPDT contacts
- Various models time from 0.1 sec . to 100 min .
rat File E22575
(15 File LR15734
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT), except 8-pin delay on release model has 1 Form C (SPDT).
Material: Silver-cadmium oxide alloy.
Rating: 10A @ 30VDC or 277VAC, resistive; 1/2 HP @ 250VAC; 1/3 HP @ 120VAC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations, min., at rated load.

## Initial Dielectric Strength

Between Open Contacts: 500 V rms, 60 Hz .
Between All Other Conductors: 500 V rms, 60 Hz .

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: 24 and 120VAC, and 12 and 24VDC.
Power Requirement: AC Types: Typically less than 3 VA.
DC Types: Typically less than 3 W .
Transient Protection: Yes.
Reverse Voltage Protection: Yes.
Input Voltages \& Limits @ $\mathbf{2 5}^{\circ} \mathrm{C}$

| Voltage <br> Type | Nominal <br> Voltage | Minimum <br> Voltage | Maximum <br> Voltage |
| :---: | :---: | :---: | :---: |
| AC | 24 | 20 | 28 |
| DC | 120 | 105 | 130 |
| 24 | 11 | 13 |  |
|  | 20 | 32 |  |

Note: DC voltage must be filtered (5\% p-p ripple max. at nom. voltage).
AC models will operate on 50 or 60 Hz .

## Environmental Data

Temperature Range: Storage: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$. Operating: $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: 8- or 11-pin octal style plug.
Enclosure: White plastic case. Knob adjustable types have dial scale for reference only.
Sockets: Models with 8-pin base fit either 27E122 or 27E891 (snap-on) screw terminal sockets. 11-pin types fit either 27E123 or 27E892 (snap-on) screw terminal sockets.
Weight: 6 oz. ( 170 g ) approximately.

Ordering Information - Authorized distributors are more likely to stock boldface items listed below.

Delay on Operate Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 24VAC | 0.1 to 10 Sec . <br> 1.8 to 180 Sec | Knob | 1 | $\begin{aligned} & \text { CB-1041B-30 } \\ & \text { CB-1042B-30 } \end{aligned}$ |
| 120VAC | 0.1 to 1 Sec . 0.1 to 5 Sec . 0.1 to 10 Sec . 0.6 to 60 Sec . 1.8 to 180 Sec 1 to 10 Min . 10 to 100 Min . | Knob | 1 | CB-1001B-70 <br> CB-1002B-70 <br> CB-1003B-70 <br> CB-1004B-70 <br> CB-1005B-70 <br> CB-1006B-70 <br> CB-1007B-70 |
| 12VDC | 0.1 to 10 Sec . | Knob | 1 | CB-1047D-20 |
| 24VDC | 0.1 to 1 Sec. 0.1 to 10 Sec . 0.6 to 60 Sec . 1.8 to 180 Sec . | Knob | 1 | $\begin{aligned} & \text { CB-1026D-30 } \\ & \text { CB-1028D-30 } \\ & \text { CB-1029D-30 } \\ & \text { CB-1030D-30 } \end{aligned}$ |

## Delay on Release Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 24VAC | 0.1 to 10 Sec . | Knob | 3 | CB-1045B-38 |
|  | 1.8 to 180 Sec |  |  | CB-1046B-38 |
| 120VAC | 0.1 to 10 Sec . | Knob | 3 | CB-1021B-78 |
|  | 0.1 to 10 Sec . |  | 5 | CB-1022B-78 |
|  | 0.6 to 60 Sec . |  | 3 | CB-1023B-78 |
|  | 1.8 to 180 Sec . |  | 3 | CB-1024B-78 |
| 24VDC | 0.1 to 10 Sec . | Knob | 3 | CB-1038D-38 |
|  | 1.8 to 180 Sec . |  |  | CB-1039D-38 |

Interval on Models

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :--- | :---: | :---: | :--- |
| 24VAC | 0.1 to 10 Sec. | Knob | 1 | CB-1043B-39 |
| 120VAC | 0.1 to 5 Sec. |  | 1 | CB-1011B-79 |
|  | 0.1 to 10 Sec. | Knob | 1 | CB-1014B-79 |
|  | 1 to 10 Min. |  | 1 | CB-1018B-79 |
| 24 VDC | 0.1 to 5 Sec. | Knob | 1 | CB-1034D-39 |
|  | 1.8 to 180 Sec. |  |  | CB-1036D-39 |

## Outline Dimensions



Wiring Diagrams - Bottom Views (pins numbered clockwise from keyway)

|  | EXTERNAL CONTROL SWITCH* | EXTERNA CONTRO SWITCH* |
| :---: | :---: | :---: |
|  |  |  |
| + - | CONTINUOUS SUPPLY | CONTINUOUS SUPPLY |
| INPUT (DC POLARITY INDICATED)** | INPUT <br> (DC POLARITY INDICATED)** | INPUT (DC POLARITY INDICATED)** |
| Fig. 1 8 Pin | Fig. 3 11 Pin | Fig. 5 8 Pin |

[^30]

## Timing Mode

Recycle timing - First delay period begins when input voltage is applied. At the end of the first delay, or " off" period, the relay will operate and the second delay, or "on" period, begins. When the second delay period ends, the relay de-energizes. This recycling sequence will continue until input voltage is removed. When input voltage is removed, the relay will deenergize.

NPUT
VOLTAGE


## Timing Specifications

Timing Ranges: From 0.1 to 180 sec .
Timing Adjustment: Knob adjustable.
Tolerance (for AC units add $\pm \mathbf{1 / 2}$ cycle 60 Hz. ): $-0 \%$, +20\% of max. specified at high end of timing range; min. specified, or less, at low end.
Delta Time (for AC units add $\pm 1$ cycle 60 Hz .): $\pm 10 \%$.
Repeatability (for AC units add $\pm \mathbf{1}$ cycle $\mathbf{6 0 ~ H z}$.): $\pm 2 \%$.
Release Time: 60ms, typ.; 100 ms , max.

## CR series

## Recycle Time Delay Relay

- Individual ON and OFF time adjustment knobs
- 10A output relay with DPDT contacts
- Various models time from 0.1 to 180 sec.


## 只 File E22575

(181) File LR15734

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Initial Dielectric Strength

Between Open Contacts: 500 V rms, 60 Hz .
Between All Other Conductors: 500 V ms, 60 Hz .

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: 120VAC and 24VDC.
Power Requirement: AC Types: Typically less than 3 VA.
DC Types: Typically less than 3 W.
Transient Protection: Yes
Reverse Voltage Protection: Yes.
Input Voltages \& Limits @ $25^{\circ} \mathrm{C}$

| Voltage <br> Type | Nominal <br> Voltage | Minimum <br> Voltage | Maximum <br> Voltage |
| :---: | :---: | :---: | :---: |
| AC | 120 | 105 | 130 |
| DC | 24 | 20 | 32 |

Note: DC voltage must be filtered (5\% p-p ripple max. at nom. voltage)
AC models will operate on 50 or 60 Hz .

## Environmental Data

Temperature Range: Storage: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.

$$
\text { Operating: }-10^{\circ} \mathrm{C} \text { to }+55^{\circ} \mathrm{C} \text {. }
$$

## Mechanical Data

Termination: Octal plug.
Enclosure: White plastic case with dial scales for reference only.
Sockets: Fits either 27E122 or 27E891 (snap-on) 8-pin screw terminal sockets.
Weight: 6 oz. (170g) approximately.

Ordering Information - Authorized distributors are more likely to stock boldface items listed below.

|  | Voltage | Time | Part Number |
| :---: | :---: | :---: | :---: |
| AC | 0.1 to 10 Sec | CRB-48-70010 |  |
| Types | 120VAC | 0.3 to 30 Sec. | CRB-48-70030 |
|  | 0.6 to 60 Sec. | CRB-48-70060 |  |
|  | 1.8 to 180 Sec. | CRB-48-70180 |  |


| DC | Voltage | Time | Part Number |
| :---: | :--- | :---: | :---: |
| Type | 24 VDC | 1.8 to 180 Sec. | CRD-48-30180 |

## Outline Dimensions



Wiring Diagram - Bottom View (pins numbered clockwise form keyway)

(DC POLARITY INDICATED)
Fig. 1
8 Pin
** Note: Input polarity for DC operation. For most reliable operation on AC, connect high side to " + " and low side to " - ".

## CL-CU series



## Timing Mode

Delay on operate - Delay period begins when input voltage is applied. At the end of the delay period, the relay will operate and will not release until input voltage is removed. Reset occurs when input voltage is reapplied.


## CL Timing Specifications

Timing Ranges: From 0.1 to 1.0 sec . through 1.2 to 120 sec .
Timing Adjustment: Fixed, external resistor and knob adjustable.
Tolerance (for AC units add $\pm \mathbf{1 / 2}$ cycle $\mathbf{6 0 ~ H z}$.):
Knob Adj. Types:-0, +20\% of max. specified at high end of timing range; min. specified, or less, at low end.
Fixed Types: $\pm 5 \%$.
Res. Adj. Types: $\pm 10 \%$ at high end of timing range; min. specified, or less, at low end.
Repeatability (for AC units add $\pm \mathbf{1}$ cycle $\mathbf{6 0 ~ H z}$.): $\pm 3 \%$.
Release Time: 100 ms , typ.; 150 ms , max.
Recycle Time: 100 ms , typ.; 150 ms , max.

## CU Timing Specifications

Timing Ranges: From 1.0 to 10 sec . through 1.0 to 120 sec .
Timing Adjustment: Fixed, external resistor and knob adjustable.
Tolerance (for AC units add $\pm \mathbf{1 / 2}$ cycle $\mathbf{6 0 ~ H z}$.):
Knob Adj. Types:-0, $+20 \%$ of max. specified at high end of timing range; min. specified, or less, at low end.
Fixed Types: $\pm 5 \%$.
Res. Adj. Types: $\pm 10 \%$ at high end of timing range; min. specified, or less, at low end.
Repeatability (for AC units add $\pm 1$ cycle $\mathbf{6 0 ~ H z}$.): $\pm 3 \%$.
Release Time: 150 ms , typ.; 225 ms , max.
Recycle Time: 150 ms, typ.; 225 ms, max.

Note: On CU types the switching contact may momentarily transfer if the timing interval is interupted. CL types have no timing cycle interrupt transfer.

## Compact Time Delay Relay

- Delay on operate timing mode
- Fixed, knob or resistor adjustable types
- 10A output relay with DPDT contacts
- Variety of mounting options
- Various models time from 0.1 to 120 sec.
- No timing cycle interrupt transfer (CL only)

只 File E22575
(6A) File LR15734
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT).
Material: Silver-cadmium oxide alloy.
Rating: 10A @ 30VDC or 277VAC, resistive; 1/2 HP @ 250VAC;
1/3 HP @ 120VAC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 100,000 operations, min., at rated load.

## Initial Dielectric Strength

Between Open Contacts: 500 V rms, 60 Hz .
Between All Other Conductors: $500 \mathrm{~V} \mathrm{rms}, 60 \mathrm{~Hz}$.

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: 24 \& 120VAC and 12 \& 24VDC.
Power Requirement: AC Types: Typically less than 3 VA. DC Types: Typically less than 3 W.
Transient Protection: Yes.
Reverse Voltage Protection: Yes.
Input Voltages \& Limits @ $\mathbf{2 5}^{\circ} \mathrm{C}$

| Voltage <br> Type | Nominal <br> Voltage | Minimum <br> Voltage | Maximum <br> Voltage |
| :---: | :---: | :---: | :---: |
| AC | 24 | 20 | 28 |
| DC | 120 | 105 | 130 |
| 24 | 11 | 13 |  |

Note: DC voltage must be filtered (5\% p-p ripple max. at nom. voltage).
AC models will operate on 50 or 60 Hz .

## Environmental Data

Temperature Range: Storage: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.

## Mechanical Data

Termination: 0.187 in . ( 4.75 mm ) quick-connect.
Enclosure: Yellow plastic case (see outline drawings for various options). Knob adjustable types have dial scale for reference only.
Sockets: Solder, printed circuit and screw terminal sockets available.
Weight: 3.5 oz . 99 g ) approximately.

CL Ordering Information - Authorized distributors are more likely to stock boldface items listed below.

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 24VAC | 0.1 to 10 Sec . | Knob | 1 | CLB-51-30010 |
| 24VAC | 0.1 to 10 Sec . | Resistor | 2 | CLF-42-30010 |
| 120VAC | 0.1 to 10 Sec . 0.3 to 30 Sec . 1.2 to 120 Sec . | Knob | 1 | $\begin{aligned} & \text { CLB-51-70010 } \\ & \text { CLB-51-70030 } \\ & \text { CLB-51-70120 } \end{aligned}$ |
| 120VAC | $\begin{aligned} & 3 \mathrm{Sec} . \\ & 30 \mathrm{Sec} . \end{aligned}$ | Fixed | 1 | $\begin{aligned} & \text { CLA-41-70003 } \\ & \text { CLA-41-70030 } \end{aligned}$ |
| 120VAC | 0.1 to 10 Sec . 0.1 to 10 Sec . 1.2 to 120 Sec . | Resistor | 2 | $\begin{aligned} & \text { CLF-41-70010 } \\ & \text { CLF-42-70010 } \\ & \text { CLF-41-70120 } \end{aligned}$ |


| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :--- | :--- | :---: | :---: | :--- |
| 12VDC | 0.1 to 10 Sec. | Knob | 1 | CLD-51-20010 |
| 12VDC | 10 Sec. | Fixed | 1 | CLC-41-20010 |
| 12VDC | 1.2 to 120 Sec. | Resistor | 2 | CLH-41-20120 |
| 24 VDC | 5 Sec. | Fixed | 1 | CLC-41-30005 |
|  | 0.1 to 10 Sec. |  |  | CLH-41-30010 <br> $24 V D C$ |
|  | 0.3 to 30 Sec. <br> 0.1 to 10 Sec. | Resistor | 2 | CLH-41-30030 <br> CLH-45-30010 |

41 style models (e.g. CLA-41-70010) have plain case.
42 style models (e.g. CLF-42-70010) have bracket mount case.
45 style models (e.g. CLH-45-30010) have bracket mount case with test button.
51 style models (e.g. CLB-51-30010) have plain case with knob.

CU Ordering Information - Authorized distributors are more likely to stock boldface items listed below.

| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 24VAC | 10 Sec . | Fixed | 1 | CUA-41-30010 |
| 24VAC | 1 to 10 Sec . <br> 1 to 10 Sec . | Resistor | 2 | CUF-41-30010 <br> CUF-42-30010 |
| 120VAC | 1 to 10 Sec . <br> 1 to 30 Sec . <br> 1 to 60 Sec . <br> 1 to 120 Sec . | Knob | 1 | CUB-51-70010 <br> CUB-51-70030 <br> CUB-51-70060 <br> CUB-51-70120 |
| 120VAC | 1 Sec . <br> 3 Sec . <br> 3 Sec . <br> 5 Sec . <br> 10 Sec . <br> 10 Sec . <br> 30 Sec . <br> 120 Sec . | Fixed | 1 | CUA-41-70001 <br> CUA-41-70003 <br> CUA-42-70003 <br> CUA-41-70005 <br> CUA-41-70010 <br> CUA-42-70010 <br> CUA-42-70030 <br> CUA-41-70120 |


| Voltage | Time | Adjustment | Wiring Dia. | Part Number |
| :---: | :---: | :---: | :---: | :---: |
| 120VAC | 1 to 10 Sec . | Resistor | 2 | CUF-41-70010 |
|  | 1 to 10 Sec . |  |  | CUF-42-70010 |
|  | 1 to 30 Sec . |  |  | CUF-41-70030 |
|  | 1 to 120 Sec . |  |  | CUF-41-70120 |
|  | 1 to 120 Sec . |  |  | CUF-42-70120 |
| 24VDC | 1 to 10 Sec . | Resistor | 2 | CUH-41-30010 |
|  | 1 to 10 Sec . |  |  | CUH-42-30010 |
|  | 1 to 120 Sec . |  |  | CUH-41-30120 |
|  | 1 to 120 Sec . |  |  | CUH-42-30120 |

41 style models (e.g. CUA-41-70010) have plain case.
42 style models (e.g. CUA-42-70010) have bracket mount case.
51 style models (e.g. CUB-51-70010) have plain case with knob.

Outline Dimensions
41 Style


Wiring Diagrams - Bottom Views

(DC DC POLARITY INDICATED) **
Fig. 1

(DC POLARITY INDICATED) **

Fig. 2
** Note: Input polarity for DC operation. For most reliable operation on AC, connect high side to " + " and low side to " - ".

## External Resistor Selection Chart

See External Resistor Selection Charts at beginning of Time Delay Relay section of this Databook.


## Timing Mode

On-Delay.


## Timing Specifications

Timing Ranges: Instantaneous; 0.1 to 1 / 1 to 10 / 10 to 100 sec.; 1 to 10 / 10 to 100 min.; 1 to 10 hr .
Timing Range Selection: Screwdriver select via recessed dial on side.
Timing Adjustment: Screwdriver adjust via recessed dial with reference calibrations on top.
Accuracy: Repeat Accuracy: $\pm 0.5 \%$
Overall Accuracy: $\pm 1 \% \pm 0.02 \mathrm{sec}$.
Reset Time: 25 ms .

## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT) or 4 Form C (4PDT).
Rating: 5A @ 30VDC or 240VAC, resistive.
Expected Electrical Life: 100,000 operations, min., at rated resistive load.

## Outline Dimensions



## Terminal Base Diagram



NOTE: Only necessary terminals are present on DPDT models.

## M D0 series

## Subminiature, On-Delay Time Delay Relay

- On-delay timing mode
- Seven user-selectable timing ranges ( 0.1 sec . to 10 hr .)
- High accuracy and reliability
- Exceptional transient protection (ANSI C37.90)
- 5A DPDT or 4PDT output contacts
- Universal voltage

미 File E60363

## (81) File LR51332

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: Universal: 24-240VAC, 50/60 Hz. or 24-125VDC.
Power Requirement: 2W, max.
Transient Protection: Meets ANSI C37.90 Transient Specification.

## Environmental Data

Temperature Range: Storage: $-25^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-25^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting/Termination: MDO series time delay relays can be socket mounted horizontally or vertically and will operate within repeat accuracy of $\pm 0.5 \%$.
Sockets: Fits either 27E166 or 27E894 (snap-on) screw terminal sockets.
Status Indication: Power On LED and Output Contacts LED.
Weight: $4 \mathrm{oz} .(96 \mathrm{~g})$ approximately.

## Ordering Information

| Part Number | Contacts | Input Voltage |
| :---: | :---: | :---: |
| MD012AU | DPDT | Universal |
| MD014AU | 4PDT | $24-240 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. or 24-125VDC |

Authorized distributors are likely to stock the following: MD014AU

## Wiring Diagrams (Bottom Views)

DPDT


4PDT



## Timing Modes

On-Delay, Off-Delay and Interval.

## Timing Specifications

Timing Ranges: 6 to 180 cycles; 0.1 to 3 / 0.1 to 10 / 0.33 to 10 / 1 to 30 / 4 to 120 sec.; 0.33 to $10 / 1$ to $30 / 2$ to 60 min.; 0.33 to 10 hr. (All are $+10 \%,-1 \%$ of maximum values).
Timing Adjustment: Knob or fixed time (intemal fixed resistor) - all models; customer supplied extemal potentiometer or resistor - On-Delay and Interval models only.

Accuracy: Repeat Accuracy: $\pm 1 \% \pm 0.004 \mathrm{sec}$. at any combination of operating temperature and voltage.
Overall Accuracy: $\pm 5.25 \%$ throughout operating temperature and voltage ranges.
Reset Time: 25 ms . (minimum deenergized interval for on-delay or off-delay models, or minimum required closure interval for interval models without affecting accuracy.)
Relay Operate Time: Off-Delay mode only: 35 ms .
Relay Release Time: On-Delay mode only: 20 ms .

## Contact Data @ $25^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT),
Rating: 10A @ 28VDC or 120VAC, resistive; 1/3 HP @ 120/240VAC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 500,000 operations, min., at rated resistive load.

## Initial Dielectric Strength

Between Terminals and Case: 1,000VAC plus twice the nominal voltage for one minute.

## Outline Dimensions



Wiring Diagrams (Bottom Views)


Off-Delay
Fixed or Knob Adjust
 Adjust

## SSC series

## Specification Grade Discrete Plug-in Time Delay Relay

- On-Delay, Off-Delay and Interval timing modes
- 13 timing ranges from 0.1 sec . to 60 min .
- 10A DPDT output contacts
- Escellent repeatability of $\pm 1 \%$ or better.
- Exceptional immunity to transients and noise.
- Wide operating temperature range.
<n> File 3520
C
File LR29186
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.


## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: See Ordering Information section for details.
Power Requirement: 3W, max.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $<\mathbf{0 . 1} \mathbf{~ m s}$ | $<\mathbf{1} \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| 12 VDC | $1,000 \mathrm{~V}$ | $240 \mathrm{~V}^{*}$ |
| 24 VACNDC | $1,000 \mathrm{~V}$ | $240 \mathrm{~V}^{*}$ |
| 48 VACNDC | $1,000 \mathrm{~V}$ | $480 \mathrm{~V}^{*}$ |
| 120 VACNDC | $3,000 \mathrm{~V}$ | $2,500 \mathrm{~V}^{*}$ |
| 240 VAC | $3,000 \mathrm{~V}$ | $2,500 \mathrm{~V}^{*}$ |

* Minimum source impedance of 100 ohm.


## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting/Termination: 8- or 11-pin octal type plug. 8-pin types fit either 27E122 or 27E891, while 11-pin types fit 27E123 or 27E892. Weight: 4 oz. (112g) approximately.

## Ordering Information



Operating Voltage Timing Adjustment
( $+10 \%,-15 \%$ ) $\quad A=$ Knob Adjust
$A=120 \mathrm{VAC}, 50 / 60 \mathrm{~Hz} . \quad \mathrm{B}=$ External
/ 120VDC
Potentiometer or
$B=240 \mathrm{VAC}, 50 / 60 \mathrm{~Hz} . \quad$ resistor (Operating
$\mathrm{E}=24 \mathrm{VAC}, 50 / 60 \mathrm{~Hz} . / \quad$ modes 1 and 3 only $)$.
24VDC
$\mathrm{F}=48 \mathrm{VAC}, 50 / 60 \mathrm{~Hz} . /$
48VDC
$\mathrm{Q}=12 \mathrm{VDC}( \pm 10 \%)$
$\mathrm{F}=$ Fixed Times
Specify time delay
in seconds per the
following examples:
F9.000 $=9 \mathrm{sec}$.
F99.00 $=99 \mathrm{sec}$.
F999.0 = 9999 sec .
F1000 = 1000 sec .

## Authorized distributors are likely to stock the following:

| SSC12AAA | SSC12ACA | SSC12AGA |
| :--- | :--- | :--- |
| SSC12ABA | SSC12ADA | SSC12ALA. |



## Timing Modes

On-Delay, Off-Delay and Interval.

## Timing Specifications

Timing Ranges: 6 to 180 cycles; 0.1 to 3 / 0.1 to 10 / 0.33 to 10 / 1 to 30 / 4 to 120 sec.; 0.33 to $10 / 1$ to $30 / 2$ to 60 min.; 0.33 to 10 hr. (All are $+5 \%,-0 \%$ of maximum values).
Timing Adjustment: Knob or fixed time (internal fixed resistor) - all models; customer supplied external potentiometer or resistor - On-Delay and Interval models only.

Accuracy: Repeat Accuracy: $\pm 0.5 \% \pm 0.004 \mathrm{sec}$. Overall Accuracy: $\pm 2 \%$ max.

## Reset Time: 25 ms .

Relay Operate Time: Off-Delay mode: 30 ms ; Interval mode: 20 ms ..
Relay Release Time: On-Delay mode only: 15 ms .

## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT).
Rating: 10A @ 28VDC or 120VAC, resistive; 1/3 HP @ 120/240VAC; 345VA. Same polarity.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 500,000 operations, min., at rated resistive load.

## Initial Dielectric Strength

Between Terminals and Case: 1,000VAC plus twice the nominal voltage for one minute.

## Outline Dimensions



Wiring Diagrams (Bottom Views)


Off-Delay
Fixed or Knob Adjust


## SCB/SCC series

## Specification Grade Discrete Plug-in Time Delay Relay

- On-Delay, Off-Delay and Interval timing modes
- 13 timing ranges from 0.1 sec . to 60 min .
- 10A DPDT output contacts
- Knob, fixed or external timing adjustment.
- Rated for pilot duty
- Premium components
File 3520

7. File E60363
C
File LR51332
(IL) File E60363 (SCC only)

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $25^{\circ} \mathrm{C}$

Voltage: See Ordering Information section for details.
Power Requirement: 3W, max.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $<\mathbf{0 . 1} \mathbf{~ m s}$ | $<\mathbf{1} \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| All except 12 \& 24 | $3,000 \mathrm{~V}$ | 2,500 |
| $12 \& 24$ | Consult Factory |  |

## Environmental Data

Temperature Range:
Storage: SCB and SCC: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: SCB: $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$; SCC: $-30^{\circ} \mathrm{C}$ to $+50^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting/Termination:
SCB: UL recognized. Optional 8- or 11-pin octal-type sockets may be ordered separately.
SCC: 8- or 11-pin octal type sockets supplied with timer. (Must be used to qualify as "UL Listed" device.)
Weight: SCB: 5.3 oz . ( 149 g ) approx.; SCC: 7.5 oz ( 210 g ) approx.
Ordering Information (All "X's" must be included to complete part number)


## Authorized distributors are likely to stock the following:

None at present.


## Timing Modes

On-Delay, Off-Delay, Interval and Accumulating On-Delay.

## Timing Specifications

Timing Ranges: 6 to 180 cycles; 0.1 to 3 / 0.5 to 15 / 1 to 30 / 2 to 60 / 4 to 120 / 6 to 180 / 10 to 300 sec.; 0.33 to $10 / 0.5$ to 15 / 1 to 30 min .; 1 to $6 / 2$ to 48 hr . (All are $+5 \%,-0 \%$ of maximum values).
Timing Adjustment: Knob or fixed time (intemal fixed resistor) - all models; customer supplied external potentiometer or resistor - On-Delay and Interval models only.

Accuracy: Repeat Accuracy: $\pm .5 \% \pm 0.004 \mathrm{sec}$..
Overall Accuracy: $\pm 2 \%$ throughout operating temperature and voltage ranges.
Reset Time: 30 ms . min. (between deenergization and reenergization without affecting accuracy.)
Relay Operate Time: Off-Delay mode: 35 ms .; Interval mode: 20 ms .
Relay Release Time: On-Delay and Accumulating On-Delay modes: 20 ms .

## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT).
Rating: 10A @ 28VDC or 120VAC, resistive; 1/3 HP @ 120/240VAC; 345VA. Same polarity.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 500,000 operations, min., at rated resistive load.

## Initial Dielectric Strength

Between Terminals and Case: $1,000 \mathrm{VAC}$ plus twice the nominal voltage for one minute.

## Outline Dimensions



Wiring Diagrams (Bottom Views)


Off-Delay \& Accumulating On-Delay Fixed or Knob Adjust
 Adjust

## STA series

## Specification Grade Discrete Plug-in Time Delay Relay With QC Terminals

- On-Delay, Off-Delay, Interval and Accumulating On-Delay timing modes
- 13 timing ranges from 0.1 sec . to 48 hr .
- 10A DPDT output contacts
- Knob, fixed or external timing adjustment.
- QC plug-in terminals save space, two LEDs show status
© $\stackrel{\text { Qile }}{ } 3520$
7I File E60363
File LR51332

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: See Ordering Information section for details. Power Requirement: 3W, max.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $<\mathbf{0 . 1} \mathbf{~ m s}$ | $<1 \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| All except 12 \& 24 | $3,000 \mathrm{~V}$ | 2,500 |
| $12 \& 24$ | Consult Factory |  |

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting/Termination: Quick connect terminals fit either 27E121 or 27E893 (snap-on) socket (order separately).
Status Indication: Power On LED and Output Contacts LED (optional).
Weight: 4.2 oz . ( 119 g ) approximately.
Ordering Information (All "X's" must be included to complete part number)


Operating Voltage Timing Adjustment
( $+10 \%,-15 \%$ ) XA $=$ Knob Adjust
$\mathrm{A}=120 \mathrm{VAC}, 50 / 60 \quad \mathrm{XB}=$ External
Hz. / 120VDC
Potentiometer or
resistor (Operating
$F=48 \mathrm{VAC}, 50 / 60$
Hz. / 48VDC
$\mathrm{Q}=12 \mathrm{VDC}$ modes 1 and 3
only).
XF =Fixed Times Specify time delay in seconds per the following examples: XF9.000 $=9 \mathrm{sec}$.
XF99.00 $=99 \mathrm{sec}$.
XF999.0 $=9999 \mathrm{sec}$.
$X F 1000=1000 \mathrm{sec}$.
Authorized distributors are likely to stock the following: None at present.


## Timing Modes

Repeat Cycle: Application of line voltage starts the pre-set OFF-time period Upon expiration of the period, the output relay is energized, its contacts transfer, and the pre-set ON-time period begins. At the end of this period the output relay is deenergized, and a new cycle begins. The OFF and ON cycles continue until power is removed. To reset the timer, input voltage must be removed for at least 25 ms .

## Timing Specifications

Timing Ranges: OFF time and ON time ranges need not be the same. 6 to 180 cycles; 0.1 to 3 / 1 to 10 / 0.5 to 15 / 1 to 30 / 2 to $60 / 4$ to $120 / 6$ to $180 / 10$ to 300 sec.; 0.33 to $10 / 0.5$ to 15 / 1 to $30 / 2$ to 60 min . (All are $+10 \%,-1 \%$ of maximum values).
Timing Adjustment: Two intemal potentiometers with external knobs.
Accuracy: Repeat Accuracy: $\pm 1 \% \pm 0.004 \mathrm{sec}$.
Overall Accuracy: $\pm 2.25 \%$ max.
Reset Time: 25 ms . max. (between deenergization and reenergization without affecting accuracy.)
Relay Operate Time: 20 ms .
Relay Release Time: 15 ms .

## Contact Data @ $25^{\circ} \mathbf{C}$

Arrangements: 2 Form C (DPDT).
Rating: 10A @ 28VDC or 120VAC, resistive; 1/3 HP @ 120/240VAC.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 500,000 operations, min., at rated resistive load.
Initial Dielectric Strength
Between Terminals \& Case and Mutually Isolated Contacts: 1,480VAC.
Outline Dimensions


## Wiring Diagram (Bottom View)



## SRC series

## Specification Grade Repeat Cycle Plug-in Time Delay Relay

- Repeat Cycle timing mode
- Dual knobs for user adjustment of on and off times.
- 13 timing ranges from 0.1 sec . to 60 min .
- 10A DPDT output contacts
- Exceptional immunity to line transients and noise
- Premium components enhance reliability
- Superior reset time of 24 msec .


## C

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: See Ordering Information section for details. Power Requirement: 3W, max.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $<\mathbf{0 . 1} \mathbf{~ m s}$ | $\boldsymbol{< 1} \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| 12 VDC | $1,000 \mathrm{~V}$ | $240 \mathrm{~V}^{*}$ |
| 24 VACNDC | $1,000 \mathrm{~V}$ | $240 \mathrm{~V}^{*}$ |
| 48 VACNDC | $1,000 \mathrm{~V}$ | $480 \mathrm{~V}^{*}$ |
| 120 VACNDC | $3,000 \mathrm{~V}$ | $2,500 \mathrm{~V}^{*}$ |
| 240 VAC | $3,000 \mathrm{~V}$ | $2,500 \mathrm{~V}^{*}$ |

* Minimum source impedance of 100 ohm.


## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting/Termination: Quick connect terminals fit either 27E121 or 27E893 (snap-on) socket (order separately).
Weight: 5.3 oz . (149g) approximately.


Authorized distributors are likely to stock the following: None at present.


## Timing Modes

On-Delay, Off-Delay, Interval, One Shot (Latching Interval) or Repeat Cycle.

## Timing Specifications

Timing Ranges: Nine ranges spanning 0.1 sec . to 120 min .
Timing Adjustment: Knob adjust.
Accuracy: Repeat Accuracy: $\pm 1 \%$.
Overall Accuracy: $\pm 5 \%$.
Reset Time: $50 \mathrm{~ms} .$, max., ( 25 ms typ.) for on-delay and interval; 300 ms , max., for off-delay and one shot; 500 ms , max., for repeat type.
Relay Operate Time: 50 ms .
Relay Release Time: 30 ms .

## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 2 Form C (DPDT).
Rating: 10A @ 120/240VAC, resistive; 1/3 HP @ 120/240VAC, 50/60 Hz.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 500,000 operations, min., at rated resistive load.

## Initial Dielectric Strength

Between Contacts, Line Inputs and Control Circuits:
$1,500 \mathrm{~V}$ RMS, minimum, at 60 Hz .

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: See Ordering Information section for details.

## Power Requirement: 3W, max.

Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $<\mathbf{0 . 1} \mathbf{~ m s}$ | $<\mathbf{1} \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| $12 \& 24 \mathrm{VACNDC}$ | 860 V | $208 \mathrm{~V}^{*}$ |
| 120 VAC | $2,580 \mathrm{~V}$ | $2,150 \mathrm{~V}^{*}$ |

* M inimum source impedance of 100 ohm.


## Environmental Data

Temperature Range: Storage: $-23^{\circ} \mathrm{C}$ to $+71^{\circ} \mathrm{C}$. Operating: $-23^{\circ} \mathrm{C}$ to $+54^{\circ} \mathrm{C}$.
Outline Dimensions


Wiring Diagrams (Bottom Views)


| Dimensions are shown for | Dimensions are in inches over |
| :--- | :--- |
| reference purposes only. | (millimeters) unless otherw ise |

(millimeters) unless otherw ise specified.


## SST series

## Industrial Grade Discrete Plug-in Time Delay Relay

- On-Delay, Off-Delay, Interval, One Shot \& Repeat modes
- Time delays to 120 min .
- Fast setting with time calibrated knobs.
- Superior transient protection.
- Rugged construction with 8- or 11-pin plug.
- Flame retardant housing.

TJ File E15631
(818) File LR33434

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Mechanical Data

Mounting/Termination: On-Delay, Interval and Repeat types have 8- pin octal plug that fits either 27E122 or 27E891 socket. Off-Delay and One Shot types have 11-pin octal-type plug that fits 27E123 or 27E892. Sockets must be orderd separately.
Weight: 4 oz. (112g) approximately.
Ordering Information

SST1 - On Delay Types

| Input | Time Range | Part No. |
| :--- | :--- | :--- |
| 120 | $0.1-10 \mathrm{sec}$. | SST12AAA |
| VAC | $0.6-60 \mathrm{sec}$. | SST12ACA |
|  | $1.8-180 \mathrm{sec}$. | SST12ADA |
|  | $3-300 \mathrm{sec}$. | SST12AEA |
|  | $18 \mathrm{sec} .-30 \mathrm{~min}$. | SST12AGA |
|  | $36 \mathrm{sec} .-60 \mathrm{~min}$. | SST12AHA |
| 24 | $0.1-10 \mathrm{sec}$. | SST12EAA |
| VAC | $1.8-180 \mathrm{sec}$. | SST12EDA |
|  | $3-300 \mathrm{sec}$. | SST12EEA |
| 24 | $0.1-10 \mathrm{sec}$. | SST12OAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST12ODA |
|  | $3-300 \mathrm{sec}$. | SST12OEA |
| 12 | $0.1-10 \mathrm{sec}$. | SST12QAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST12QDA |
|  | $3-300 \mathrm{sec}$. | SST12QEA |

SST3 - Interval Types

| Input | Time Range | Part No. |
| :--- | :--- | :--- |
| 120 | $0.1-10 \mathrm{sec}$. | SST32AAA |
| VAC | $1.8-180 \mathrm{sec}$. | SST32ADA |
|  | $3-300 \mathrm{sec}$. | SST32AEA |
|  | $36 \mathrm{sec} .-60 \mathrm{~min}$. | SST32AHA |
| 24 | $0.1-10 \mathrm{sec}$. | SST32EAA |
| VAC | $1.8-180 \mathrm{sec}$. | SST32EDA |
| 24 | $0.1-10 \mathrm{sec}$. | SST32OAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST32ODA |
| 12 | $0.1-10 \mathrm{sec}$. | SST32QAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST32QDA |

SST7 - Repeat Cycle Types

| Input | Time Range | Part No. |
| :--- | :--- | :--- |
| 120 | $0.1-10 \mathrm{sec}$. | SST72AAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST72ADA |
|  | $3-300 \mathrm{sec}$. | SST72AEA |
|  | $18 \mathrm{sec} .-30 \mathrm{~min}$. | SST72AGA |
|  | $36 \mathrm{sec} .-60 \mathrm{~min}$. | SST72AHA |
| 24 | $0.1-10 \mathrm{sec}$. | SST72EAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST72EDA |
| 24 | $0.1-10 \mathrm{sec}$. | SST72OAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST72ODA |
| 12 | $0.1-10 \mathrm{sec}$. | SST72QAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST72QDA |

Authorized distributors are likely to stock the following: None at present.

SST4 - One Shot* Types

| Input | Time Range | Part No. |
| :--- | :--- | :--- |
| 120 | $0.1-10 \mathrm{sec}$. | SST42AAAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST42ADA |
|  | $3-300 \mathrm{sec}$. | SST42AEA |
|  | $18 \mathrm{sec} .-30 \mathrm{~min}$. | SST42AGA |
|  | $36 \mathrm{sec} .-60 \mathrm{~min}$. | SST42AHA |
| 24 | $0.1-10 \mathrm{sec}$. | SST42EAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST42EDA |
| 24 | $0.1-10 \mathrm{sec}$. | SST42OAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST42ODA |
| 12 | $0.1-10 \mathrm{sec}$. | SST42QAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST42QDA |

* Also known as Latching Interval

SST2 - Off Delay Types

| Input | Time Range | Part No. |
| :--- | :--- | :--- |
| 120 | $0.1-10 \mathrm{sec}$. | SST22AAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST22ADA |
|  | $3-300 \mathrm{sec}$. | SST22AEA |
|  | $18 \mathrm{sec} .-30 \mathrm{~min}$. | SST22AGA |
|  | $36 \mathrm{sec} .-60 \mathrm{~min}$. | SST22AHA |
| 24 | $0.1-10 \mathrm{sec}$. | SST22EAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST22EDA |
| 24 | $0.1-10 \mathrm{sec}$. | SST22OAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST22ODA |
| 12 | $0.1-10 \mathrm{sec}$. | SST22QAA |
| VDC | $1.8-180 \mathrm{sec}$. | SST22QDA |




## CAUTION:

If unit has not been energized for several months, apply operating voltage for $\mathbf{2 0}$ minutes prior to initial time delay.

## Timing Modes

True Off-Delay - Upon application of operating voltage (min. 100ms), output relay contacts transfer. When operating voltage is removed, the time delay period is initiated. At the end of the delay period, output relay contacts release. If operating voltage is reapplied prior to expiration of the delay period, the delay will be cancelled and output relay contacts will remain transferred.

## Timing Specifications

Timing Ranges: 0.1 to 3 / 0.5 to 15 / 1 to $30 / 4$ to $120 / 10$ to 300 sec.; 0.33 to 10 min .

Timing Adjustment: Knob adjustment - Intemal potentiometer with extemal knob adjustment. Maximum time calibrated with $+10 \%,-0 \%$ of values shown below at rated voltage, at $68^{\circ} \mathrm{F}$. Fixed time - internal fixed resistor.
Accuracy: Repeat Accuracy: $\pm 1$.
Overall Accuracy: $\pm 5 \%$.
Reset Time: 30 ms . min.
Relay Operate Time: 30 ms .

## Contact Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Arrangements: 1 Form C (SPDT) and 2 Form C (DPDT).
Rating: 1 Form C: 10A @ 120/240VAC, resistive; 1/3 HP @ 120VAC; 345VA @ 120VAC; 1/4 HP @ 240VAC; 275VA @ 240VAC. Same polarity. 2 Form C: 5A @ 28VDC or 120/240VAC, resistive; 1/6 HP @ 120/ 240VAC; 200VA @ 120/240VAC. Same polarity.
Expected Mechanical Life: 10 million operations.
Expected Electrical Life: 200,000 operations, min., at rated resistive load.

## Outline Dimensions



## Wiring Diagrams (Bottom Views)



Fixed Time Or Knob Adjust


Fixed Time Or Knob Adjust

## SCE series

## Specification Grade Discrete Plug-in True Off-Delay Time Delay Relay

- True Off-Delay timing modes
- Six time delays from 0.1 sec . to 10 min .
- 10A SPDT or 5A DPDT output contacts.
- Excellent repeat accuracy - typically better than $\pm 1 \%$.
- 8--pin octal plug.

71 File E15631
(18) File LR51332

## C

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Initial Dielectric Strength

Between Terminals and Case and relay contacts and active circuitry: $1,480 \mathrm{VAC}$ for one minute.

## Input Data @ $25^{\circ} \mathrm{C}$

Voltage: See Ordering Information section for details.
Power Requirement: 750mw.
Transient Protection: 1,000V plus twice rated voltage for 0.1 ms .

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting/Termination: 8-pin octal plug fits either 27E122 or 27E891
(snap-on) socket (order separately).
Weight: 4 oz. ( 112 g ) approximately.


Authorized distributors are likely to stock the following: None at present.


## Timing Mode

On-Delay - VTM-1 in-line timing module is wired in series with the load circuit. Time delay is initiated when power is applied to the series network. Connecting a resistor across the center terminals provides tamper-proof setting of time delay from 1-1000 sec.

## Timing Specifications

Timing Ranges: 1 to $1,000 \mathrm{sec}$.
Timing Adjustment: Time delay is set by connecting an appropriately rated resistor or potentiometer between the center two terminals. As supplied, the unit provides a nominal 1 second delay. Add 10k ohm of resistance for every additional second of delay required. For example: 5 seconds $=40 \mathrm{k}$ ohms; 10 seconds $=90 \mathrm{k}$ ohms.
Accuracy: Repeat Accuracy: $\pm 2 \%$
Reset Time: 100 ms , max., in the timing or time-out condition.

## Output Switch Data

Arrangement: 1 Form A (SPST-NO).
Rating: 5A, inductive, at nominal operating voltage.
Inrush: Not to exceed 10A for one cycle.
Max. Leakage Current: 4mA rms.
Expected Electrical Life: 10,000,000 operations at rated load.

## Initial Dielectric Strength

Between Active Terminals and Outside of Case: 1,480VAC for one min.

## Outline Dimensions



## VTM - 1 series

## Specification Grade, On-Delay Timing Module

- On-delay timing mode
- Timing from 1 to 1000 sec .
- 1A solid state SPST-NO output
- $0.25^{\prime \prime}$ (6.35) quick connect terminals
- Universal voltage: 24 to 240VACNDC
- Rated to 10 million operations


## 吹 File E60363

(18) File LR51332

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $25^{\circ} \mathrm{C}$

Operating Voltage: Universal: 24-240VACNDC (19-288VACNDC).
Current: 2mA (max.) required to operate timer regardless of output state. Power Requirement: 3W, max.
Transient Protection: MOV across input 2,000V for $11 \mu$ s on line side of load.

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-30^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Screw mount in horizontal or vertical position through built-in mounting ears.
Termination: 0.250 in (6.35) quick connect terminals for input line, load output and timing resistor connection.
Weight: $3 \mathrm{oz} .(84 \mathrm{~g})$ approximately.

## Ordering Information

| Part Number | Mode | Input Voltage |
| :---: | :---: | :---: |
| VTM-1 | On-Delay | 24-240VAC or VDC |

## Authorized distributors are likely to stock the following: VTM-1

## Wiring Diagram

## Notes:

1. Do not operate timer without connecting load in series with line voltage.
2. For a time delay of 1 second, connect a jumper across the center two terminals.


## VTM 1 series

## On-Delay Timing Module

- On-delay timing mode
- Reliable solid state timing circuitry.
- Excellent transient protection.
- Compact design.
- Flame retardant, solvent resistant housing.


## 9 File E60363

## (81) File LR33434

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $\mathbf{2 5}^{\circ} \mathbf{C}$

Voltage: 12 VACNDC, 24VACNDC, 120 VACNDC.
Power Requirement: 3W, max.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $<\mathbf{0 . 1} \mathbf{~ m s}$ | $<\mathbf{1} \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| $12,24 \mathrm{VAC} / \mathrm{NDC}$ | $860 \mathrm{~V}^{*}$ | $208 \mathrm{~V}^{*}$ |
| $120 \mathrm{VAC} / \mathrm{NDC}$ | $2,580 \mathrm{~V}$ | $2,150 \mathrm{~V}^{*}$ |

* Min. source impedance of 100 ohm.


## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Panel mount with one \#8 screw.
Termination: 0.250 in (6.35) quick connect teminals.
Weight: 3 oz . $(84 \mathrm{~g})$ approximately.

Ordering Information


On-Delay Timing Module


Input Voltage
A $=120 \mathrm{VAC}$ NDC
$\mathrm{E}=24 \mathrm{VAC} N D C$
$\mathrm{Q}=12 \mathrm{VAC} / \mathrm{NDC}$


Authorized distributors are likely to stock the following: VTM1ECD
VTM 1EDD

## VTM A 1 series



## Timing Mode

On-Delay.

## Timing Specifications

Timing Ranges: VMTA1ULA only: 24 to 480 sec .
All others: 0.5 to $10 / 3$ to $60 / 15$ to 300 sec .; 3 to 60 min .
Timing Adjustment: Intemal potentiometer.
Accuracy: Repeat Accuracy: $\pm 5 \%$
Overall Accuracy: Max. Time: $-0 \%,+10 \%$.
Min. Time: $-30 \%,+10 \%$.
Reset Time: 250 ms , max., before time-out; 10 ms , max., after time-out.

## Output Switch Data

Arrangement: Solid state 1 Form A (SPST-NO).
Rating: 1A, inductive, at nominal operating voltage.
Expected Electrical Life: 10,000,000 operations at rated load.

## Initial Dielectric Strength

Between Terminals and Mounting: 3,000VAC ms.
Between Input and Output: 1,500VAC rms.
Outline Dimensions amd Wiring Diagram


## On-Delay Timing Module With Intemal Potentiometer

- On-delay timing mode
- Discrete voltage or universal type.
- Internal potentiometer for timing adjustment.
- Reliable solid state timing circuitry.
- Excellent transient protection.
- Flame retardant, solvent resistant housing.


## 听 File E60363

## (18) File LR33434

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$
Voltage: $\pm 10 \% 120 \mathrm{VAC}$ NDC (unfiltered DC must be full-wave rectified) or 24 to 240 VACNDC.
Power Requirement: 250 mW during timing; 3W, max. after time out.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $<\mathbf{0 . 1} \mathbf{~ m s}$ | $<\mathbf{1} \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| $24 \mathrm{VAC} N D C$ | $860 \mathrm{~V}^{*}$ | $208 \mathrm{~V}^{*}$ |
| $120 / 240 \mathrm{VAC} / \mathrm{VDC}$ | $2,580 \mathrm{~V}$ | $2,150 \mathrm{~V}^{*}$ |

* Min. source impedance of 100 ohms.

Current Drain: 2mA, Max.

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Panel mount with one \#8 screw.
Termination: 0.250 in (6.35) quick connect terminals.
Weight: 4 oz . (112g) approximately.

Ordering Information

| Part Number | Time Range | Input Voltage |
| :---: | :---: | :---: |
| VTMA1ACA | 0.5 to 10 sec. | 120VAC or VDC |
| VTMA1ADA | 3 to 60 sec. |  |
| VTMA1ACA | 24 to 480 sec. | $24-240 \mathrm{VAC}$ or VDC |

Authorized distributors are likely to stock the following: None at present.


## Timing Mode

On-Delay.

## Timing Specifications

Timing Ranges: 15 to 300 sec .
Timing Adjustment: Intemal potentiometer.
Accuracy: Repeat Accuracy: $\pm 5 \%$ max. ( $0.25 \%$ typ.)
Overall Accuracy: Max. Time: $-0 \%,+10 \%$. Min. Time: $-30 \%,+10 \%$.
Reset Time: 250 ms , max.

## Output Contact Data

Arrangement: 1 Form C (SPDT).
Rating: 8A, resistive, at nominal operating voltage.
Expected Mechanical Life: 10,000,000 operations.
Expected Electrical Life: 100,000 operations.

## Initial Dielectric Strength

Between Terminals and Mounting: 3,000VAC ms.
Between Input and Output: 1,500VAC rms.
Outline Dimensions and Wiring Diagram


## VTM R1 series

## On-Delay Timing Module <br> With Internal Potentiometer, Relay Output

- On-delay timing mode
- 8A SPDT relay output.
- Internal potentiometer for timing adjustment.
- Reliable solid state timing circuitry.
- Excellent transient protection.
- Flame retardant, solvent resistant housing.


## 9 File E60363

## (81) File LR33434

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage: $\pm 10 \%$ 120VACNDC.
Power Requirement: 3.5VA, max.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $<\mathbf{0 . 1} \mathbf{~ m s}$ | $<\mathbf{1} \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| 120 VACNDC | $2,580 \mathrm{~V}$ | $2,150 \mathrm{~V}^{*}$ |

* Min. source impedance of 100 ohms.

Current Drain: 30mA, Max.

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Panel mount with one \#8 screw.
Termination: 0.250 in (6.35) quick connect terminals.
Weight: 4 oz . (112g) approximately.

## Ordering Information

| Part Number | Time Range | Input Voltage |
| :---: | :---: | :---: |
| VTMR1AEA | 15 to 300 sec. | 120VAC |

Authorized distributors are likely to stock the following: None at present.


## Timing Mode

Off-Delay.

## Timing Specifications

Timing Ranges: 0.5 to $10 / 3$ to 60 sec .; 3 to 60 min .
Timing Adjustment: Extemal resistor or potentiometer. An external resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:

$$
\mathrm{R}_{\mathrm{t}}=\left(\frac{T_{\text {req }}-T_{\text {min }}}{T_{\text {max }}-T_{\text {min }}}\right) \times 1,000,000 \text { ohms }
$$

## Accuracy: Repeat Accuracy: $\pm 1 \%$

Overall Accuracy: $\pm 2 \%$ at $\mathrm{R}=1$ megohm.
Reset Time: 50 ms , max.

## Output Switch Data

Arrangement: Solid state 1 Form A (SPST-NO).
Rating: 1A, inductive, at nominal operating voltage.
Expected Electrical Life: 10,000,000 operations at rated load.

## Initial Dielectric Strength

Between Terminals and Mounting: 3,000VAC rms. Between Input and Output: 1,500VAC rms.

## Outline Dimensions



## Wiring Diagram



An extemal resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:

$$
\mathrm{R}_{\mathrm{t}}=\left(\frac{T_{\text {req }}-T_{\min }}{T_{\text {max }}-T_{\text {min }}}\right) \times 1,000,000 \text { ohms }
$$

## VTM 2 series

## Off-Delay

## Timing Module

- Off-delay timing mode
- Reliable solid state timing circuitry.
- Excellent transient protection.
- Compact design.
- Flame retardant, solvent resistant housing.


## ㄱTㄱ File E60363

## (18) File LR33434

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $\mathbf{2 5}^{\circ} \mathbf{C}$

Voltage:( $\pm \mathbf{1 0 \%} \mathbf{\%}): 12$ VACNDC, $24 \mathrm{VACNDC}, 120$ VACNDC.
Power Requirement: 4W, with rated load.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $<\mathbf{0 . 1} \mathbf{~ m s}$ | $<\mathbf{1} \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| 12,24 VACNDC | $860 \mathrm{~V}^{*}$ | $208 \mathrm{~V}^{*}$ |
| $120 \mathrm{VAC} / \mathrm{VDC}$ | $2,580 \mathrm{~V}$ | $2,150 \mathrm{~V}^{*}$ |

* Min. source impedance of 100 ohms.

Current Drain: Less than 5mA.

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Panel mount with one \#8 screw.
Termination: 0.250 in (6.35) quick connect terminals.
Weight: 4 oz . (112g) approximately.

## Ordering Information

| VTM2 | A | CD |
| :--- | :--- | :--- |
| \| | \| | \| |
| Series VTM2 | Input Voltage | Time Range |
| Off-Delay | $\mathrm{A}=120 \mathrm{VACNDC}$ | $\mathrm{CD}=0.5-10 \mathrm{sec}$. |
| Timing Module | $\mathrm{E}=24 \mathrm{VACNDCC}$ | $\mathrm{DD}=3-60 \mathrm{sec}$. |
|  | $\mathrm{Q}=12 \mathrm{VACNDCD}$ | $\mathrm{GD}=3-60 \mathrm{~min}$. |

Authorized distributors are likely to stock the following: None at present.


## Timing Mode

Interval.

## Timing Specifications

Timing Ranges: 0.5 to $10 / 3$ to 60 sec .; 3 to 60 min .
Timing Adjustment: External resistor or potentiometer. An extemal resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:

$$
R_{t}=\left(\frac{T_{\text {req }}-T_{\text {min }}}{T_{\text {max }}-T_{\text {min }}}\right) \times 1,000,000 \text { ohms }
$$

Accuracy: Repeat Accuracy: $\pm 1 \%$
Overall Accuracy: $\pm 2 \%$ at $\mathrm{R}=1$ megohm.
Reset Time: 50 ms , max.

## Output Switch Data

Arrangement: Solid state 1 Form A (SPST-NO).
Rating: 1A, inductive, at nominal operating voltage.
Expected Electrical Life: 100,000,000 operations at rated load.

## Initial Dielectric Strength

Between Terminals and Mounting: 3,000VAC ms. Between Input and Output: 1,500VAC rms.

## Outline Dimensions



## Wiring Diagram



An extemal resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:

$$
R_{t}=\left(\frac{T_{\text {req }}-T_{\text {min }}}{T_{\text {max }}-T_{\text {min }}}\right) \times 1,000,000 \text { ohms }
$$

## VTM 3 series

## Interval

Timing Module

- Interval timing mode
- Reliable solid state timing circuitry.
- Excellent transient protection.
- Compact design.
- Flame retardant, solvent resistant housing.


## 긱 File E60363

## (81) File LR33434

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $\mathbf{2 5}^{\circ} \mathbf{C}$

Voltage:( $\mathbf{1 0 \%}$ ): 12 VACNDC, 24VACNDC, 120 VAC/NDC.
Power Requirement: 4W, with rated load.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $\mathbf{0 . 1 ~ m s}$ |  |
| :---: | :---: | :---: |
| $12,24 \mathrm{VACNDC}$ | $\mathbf{8} \mathbf{~ m s}$ |  |
| 120 VACNDC | $2,580 \mathrm{~V}$ | $208 \mathrm{~V}^{*}$ |

* Min. source impedance of 100 ohms.

Current Drain: Less than 5mA.

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Panel mount with one \#8 screw.
Termination: 0.250 in ( 6.35 ) quick connect terminals.
Weight: 4 oz . (112g) approximately.

Ordering Information

| VTM3 | A | CD |
| :---: | :--- | :--- |
| \| | \| | \| |
| Series VTM3 | Input Voltage | Time Range |
| Interval | $\mathrm{A}=120 \mathrm{VACNDC}$ | $\mathrm{CD}=0.5-10 \mathrm{sec}$. |
| Timing Module | $\mathrm{E}=24 \mathrm{VACNDC}$ | $\mathrm{DD}=3-60 \mathrm{sec}$. |
|  | $\mathrm{Q}=12 \mathrm{VACNDC}$ | $\mathrm{GD}=3-60 \mathrm{~min}$. |

## Authorized distributors are likely to stock the following:

 None at present.

## Timing Mode

One Shot (Latching Interval).

## Timing Specifications

Timing Ranges: 0.5 to $10 / 3$ to 60 sec .; 0.5 to $10 / 3$ to 60 min . Timing Adjustment: Extemal resistor or potentiometer. An extemal resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:

$$
\mathrm{R}_{\mathrm{t}}=\left(\frac{T_{\mathrm{req}}-T_{\min }}{T_{\max }-T_{\min }}\right) \times 1,000,000 \text { ohms }
$$

## Accuracy: Repeat Accuracy: $\pm 1 \%$

Overall Accuracy: $\pm 2 \%$ at $\mathrm{R}=1$ megohm.

## Reset Time: 50 ms , max.

## Output Switch Data

Arrangement: Solid state 1 Form A (SPST-NO).
Rating: 1A, inductive, at nominal operating voltage.
Expected Electrical Life: 100,000,000 operations at rated load.

## Initial Dielectric Strength

Between Terminals and Mounting: 3,000VAC rms. Between Input and Output: 1,500VAC rms.

## Outline Dimensions



## Wiring Diagram



## VTM 4 series

## One Shot (Latching Interval) Timing Module

- One shot (latching interval) timing mode
- Reliable solid state timing circuitry.
- Excellent transient protection.
- Compact design.
- Flame retardant, solvent resistant housing.


## ㄱTㄱ File E60363

## © File LR33434

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $\mathbf{2 5}^{\circ} \mathrm{C}$

Voltage:( $\mathbf{\pm 1 0 \%}$ ): 12 VACNDC, 24VACNDC, 120 VACNDC.
Power Requirement: 4W, with rated load.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $<\mathbf{0 . 1} \mathbf{~ m s}$ | $<\mathbf{1} \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| $12,24 \mathrm{VACNDC}$ | $860 \mathrm{~V}^{*}$ | $208 \mathrm{~V}^{*}$ |
| 120 VACNDC | $2,580 \mathrm{~V}$ | $2,150 \mathrm{~V}^{*}$ |

* Min. source impedance of 100 ohms.

Current Drain: Less than 5mA.

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Panel mount with one \#8 screw.
Termination: 0.250 in ( 6.35 ) quick connect terminals.
Weight: 4 oz. (112g) approximately.

Ordering Information

| VTM4 | A | CD |
| :--- | :--- | :--- |
|  |  |  |
| \| | \| | \| |
| Series VTM4 | Input Voltage | Time Range |
| One Shot | $\mathrm{A}=120 \mathrm{VACNDC}$ | $\mathrm{CD}=0.5-10 \mathrm{sec}$. |
| (Latching Interval) | $\mathrm{E}=24 \mathrm{VACNDCD}$ | $\mathrm{DD}=3-60 \mathrm{sec}$. |
| Timing Module | $\mathrm{Q}=12 \mathrm{VACNDC}$ | $\mathrm{FD}=0.5-10 \mathrm{~min}$. |
|  |  | $\mathrm{GD}=3-60 \mathrm{~min}$. |

Authorized distributors are likely to stock the following: None at present.


## Timing Mode

## Repeat Cycle.

## Timing Specifications

Timing Ranges: 0.5 to $10 / 3$ to 60 sec .; 3 to 60 min .
Timing Adjustment: External resistor or potentiometer. An external resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:

$$
R_{t}=\left(\frac{T_{\text {req }}-T_{\text {min }}}{T_{\text {max }}-T_{\text {min }}}\right) \times 1,000,000 \text { ohms }
$$

Accuracy: Repeat Accuracy: $\pm 1 \%$
Overall Accuracy: $\pm 2 \%$ at $\mathrm{R}=1$ megohm.
Reset Time: 500 ms .

## Output Switch Data

Arrangement: Solid state 1 Form A (SPST-NO).
Rating: 1A, inductive, at nominal operating voltage.
Expected Electrical Life: 100,000,000 operations at rated load.

## Initial Dielectric Strength

Between Terminals and Mounting: 3,000VAC ms. Between Input and Output: 1,500VAC rms.

## Outline Dimensions



## Wiring Diagram



An extemal resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:

$$
\mathrm{R}_{\mathrm{t}}=\left(\frac{T_{\text {req }}-T_{\min }}{T_{\max }-T_{\min }}\right) \times 1,000,000 \mathrm{ohms}
$$

## VTM 7 series <br> Repeat Cycle <br> Timing Module

- Repeat cycle timing mode
- Independently adjustable On and Off times.
- Reliable solid state timing circuitry.
- Excellent transient protection.
- Compact design.
- Flame retardant, solvent resistant housing.

T File E60363

## (81) File LR33434

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data @ $25^{\circ} \mathrm{C}$

Voltage:( $\pm \mathbf{1 0 \%}$ ): 12 VACNDC, 24VACNDC, 120 VACNDC.
Power Requirement: 4W, with rated load.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

| Operating Voltage | $\boldsymbol{< 0 . 1 ~ m s}$ | $<\mathbf{1} \mathbf{~ m s}$ |
| :---: | :---: | :---: |
| $12,24 \mathrm{VACNDC}$ | $860 \mathrm{~V}^{*}$ | $208 \mathrm{~V}^{*}$ |
| 120 VACNDC | $2,580 \mathrm{~V}$ | $2,150 \mathrm{~V}^{*}$ |

* Min. source impedance of 100 ohms.

Current Drain: Less than 5mA.

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-40^{\circ} \mathrm{C}$ to $+65^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Panel mount with one \#8 screw.
Termination: 0.250 in (6.35) quick connect terminals.
Weight: 4 oz . (112g) approximately.

Ordering Information

| VTM7 | A | CD |
| :---: | :--- | :--- |
| \| | \| | \| |
| Series VTM7 | Input Voltage | Time Range |
| Repat Cycle | $\mathrm{A}=120 \mathrm{VACNDC}$ | $\mathrm{CD}=0.5-10 \mathrm{sec}$. |
| Timing Module | $\mathrm{E}=24 \mathrm{VACNDC}$ | $\mathrm{DD}=3-60 \mathrm{sec}$. |
|  | $\mathrm{Q}=12 \mathrm{VACNDC}$ | $\mathrm{GD}=3-60 \mathrm{~min}$. |

Authorized distributors are likely to stock the following: None at present.


## Design Features

- Available in on-delay, true off-delay, and on/off-delay.
- Timing from 0.1 seconds to 60 minutes, fully calibrated in linear increments.
- Oversize time-calibrated adjustment knobs, semated with high-resolution markings visible from all angles makes the timer easy to set timers.
- Inherent transient immunity.
- Standard voltages from 6-550VAC and 12-550VDC (special voltages available.)
- Available in 2-pole or 4-pole models.
- Numerous enclosure options: explosion proof, dust tight, watertight, hemmetically-sealed, NEMA 1.
- Auxiliary timed and instantaneous switches can be added for greater switching flexibility.
- Many mounting options: Surface mount, Panel mount, Octal plug-in mounting.
- Options: quick-connect teminals, dial stops, and transient protection module.
- Easy-to-reach screw teminals, all on the face of the unit, clearly identified.
- Modular assembly - timing head, coil assembly and switchblock are all individual modules, with switches field-replaceable.


## Design \& Construction

There are three main components of Series 7000 Timing Relays:
Calibrated Timing Head uses no needle valve, recirculates air under controlled pressure through a variable orifice to provide linearly adjustable timing. Patented design provides instant recycling, easy adjustment and long service life under severe operating conditions.

Precision-Wound Potted Coil module supplies the initial motive force with minimum current drain. Total sealing without external leads eliminates moisture problems, gives maximum insulation value.

Snap-Action Switch Assembly - custom-designed over-center mechanism provides greater contact pressure up to transfer time for positive, no flutter action. Standard switches are DPDT arrangement, with flexible beryllium copper blades and silver-cadmium oxide contacts. Special "timing-duty" design assures positive wiping action, sustained contact pressure and greater heat dissipation during long delay periods.

Each of these subassemblies forms a self-contained module which is then assembled at the factory with the other two to afford a wide choice of operating types, coil voltages, and timing ranges.

The squared design with front terminals and rear mounting permits the grouping of Series 7000 units side-by-side in minimum panel space. Auxiliary switches may be added in the base of the unit, without affecting the overall width or depth.

## Operation

Two basic operating types are available.
"On-Delay" models provide a delay period on energization, at the end of which the switch transfers the load from one set of contacts to another. Deenergizing the unit during the delay period immediately recycles the unit, readying it for another full delay period on re-energization.

In "Off-Delay" models the switch transfers the load immediately upon energization, and the delay period does not begin until the unit is deenergized. At the end of the delay period the switch returns to its original position. Re-energizing the unit during the delay period immediately resets the timing, readying it for another full delay period on de-energization. No power is required during the timing period

In addition to these basic operating types, "Double-Head" models offer sequential delays on pull-in and drop-out in one unit. With the addition of auxiliary switches the basic models provide two-step timing, pulse actuation for interlock circuits, or added circuit capacity.

## NOTE: Seismic \& radiation tested E7000 models are available. Consult factory for detailed information.

## 7000 series

## Industrial Electropneumatic Timing Relay

(1L) File E15631<br>(1). File LR29186<br>C

Series 7000 Timing Relays are also manufactured to MIL-SPEC requirements, conforming to requirements of MIL-C-2212F (SHIPS) with the exception of MIL S-901. Consult factory for ordering information.
Note:7032 types and certain models with accessories are not agency approved. Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application

## On-delay model 7012 (delay on pickup)



Applying continuous voltage to the coil (L1-L2) starts a time delay lasting for the preset time. During this period the normally closed contacts (3-5 and 4-6) remain closed. At the end of the delay period the nomally closed contacts break and the nomally open contacts (1-5 and 2-6) make. The contacts remain in this transferred position until the coil is deenergized, at which time the switch instantaneously retums to its original position

De-energizing the coil, either during or after the delay period, will recycle the unit within 50 msec . It will then provide a full delay period upon re-energization, regardless of how often the coil voltage is intemupted before the unit has been pemitted to "time-out" to its full delay setting.

Off-delay model 7022 (delay on dropout)


Applying voltage to the coil (for at least 50 msec ) will instantaneously transfer the switch, breaking the normally closed contacts (1-5 and 2-6), and making the normally open contacts (3-5 and 4-6). Contacts remain in this transferred position as long as the coil is energized. The time delay begins immediately upon de-energization. At the end of the delay period the switch returns to its normal position.

Re-energizing the coil during the delay period will immediately return the timing mechanism to a point where it will provide a full delay period upon subsequent de energization. The switch remains in the transferred position.

To increase the versatility of the basic timer models, auxiliary switches may be added to either on-delay or off-delay types. They switch additional circuits, provide two-step timing action, or fumish electrical interlock for sustained coil energization from a momentary impulse, depending on the type selected and its adjustment. Because of their simple attachment and adjustment features, they can be installed at the factory or in the field, by any competent mechanic. All auxiliary switches are SPDT with UL listings of 10A @ 125,250 , or 480 VAC. A maximum of one Code T or two Code L auxiliary switches may be added to each relay. The L or LL switch is available with on-delay relays only. The T switch is available with both the on-delay and off-delay relays.
Auxiliary Switch Options for On-Delay
Instant Transfer (Auxiliary Switch Code L, maximum of 2 per relay.)

1. Energizing coil begins time delay and transfers auxiliary switch.
2. Main switch transfers after total preset delay.
3. Deenergizing coil resets both switches instantly. Auxiliary switch is nonadjustable.
Two-Step Timing (Auxiliary Switch Code T, maximum of 1 per relay.)

Auxiliary switch options
To increase the versatility of the basic timer models, auxiliary switches may be added to either on-delay or off-delay types. They switch additional circuits, provide two-step timing action, or fumish electrical interlock for sustained coil energization from a momentary impulse, depending on the type selected and its adjustment. Because of their simple attachment and adjustment features, they can be installed at the factory or in the field, by any competent mechanic. All auxiliary switches are SPDT with UL listings of 10A @ 125, 250, or 480 VAC. A maximum of one Code T or two Code $L$ auxiliary switches may be added to each relay. The $L$ or $L L$ switch is available with on-delay relays only. The $T$ switch is available with both the on-delay and off-delay relays.

## Auxiliary Switch Options for On-Delay

Instant Transfer (Auxiliary Switch Code L, maximum of 2 per relay.)

1. Energizing coil begins time delay and transfers auxiliary switch.
2. Main switch transfers after total preset delay.
3. De-energizing coil resets both switches instantly. Auxiliary switch is nonadjustable.
Two-Step Timing (Auxiliary Switch Code T, maximum of 1 per relay.)
4. Energizing coil begins time delay.
5. After first delay auxiliary switch transfers.
6. Main switch transfers after total preset delay.
7. De-energizing coil resets both switches instantly. First delay is independently adjustable, up to $30 \%$ of overall delay. (Recommended maximum 100 seconds.)

## Auxiliary Switch Options for Off-Delay

In these models the same auxiliary switch provides either two-step timing or instant transfer action, depending on the adjustment of the actuator.
Two-Step Timing (Auxiliary Switch Code T, maximum of 1 per relay.)

1. Energizing coil transfers main and auxiliary switches instantly.
2. De-energizing coil begins time delay.
3. After first delay auxiliary switch transfers.
4. Main switch transfers after total preset delay. First delay is independently adjustable, up to $30 \%$ of overall delay. (Recommended maximum 100 seconds.)
Instant Transfer (Auxiliary Switch Code L, maximum of 1 per relay.)
5. Energizing coil transfers main and auxiliary switches instantly.
6. De-energizing coil resets auxiliary switch and begins time delay.
7. Main switch transfers after total preset delay.

Auxiliary switch is factory adjusted to give instant transfer operation, but may be easily adjusted in the field to provide two-step timing.

On-delay, off-delay model 7032 (double head)


The Double Head model provides delayed switch transfer on energization of its coil, followed by delayed resetting upon coil deenergization. Each delay period is independently adjustable.

In new circuit designs or the improvement of existing controls now using two or more conventional timers, the Double Head unit offers distinct advantages.

Its compact design saves precious panel space, while the simplified wiring reduces costly interconnection.

On-delay, off-delay model 7032 (double head)


With the addition of an extra switch block at the bottom of the basic unit, this version of the Series 7000 offers four pole switch capacity with simultaneous timing or two-step timing. The two-step operation is achieved by factory adjustment to your specifications.

For two-step operation, a maximum timing ratio between upper and lower switches of $3: 2$ is recommended. Once adjusted at the factory, this ratio remains constant regardless of changes in dial settings. (Ex: If upper switch transfer is set on dial at 60 sec., minimum time on lower switch should be 40 sec .)

This Series 7000 unit offers many of the performance features found in basic models - voltage ranges, timing and switch capacities are virtually identical.

Four pole models add approximately $1-1 / 4$ "to the maximum height of the basic model, approximately $1 / 8$ "to the depth. They are designed for vertical operation only.

Surge/transient protection option


## Features

- Protect electronic control circuits from voltage transients generated by the timer coil.
- Fast response to the rapidly rising back E.M.F.
- High performance clamping voltage characteristics.
- UL recognized, (except varistor and coil together).
- Timer NOT polarity sensitive.

The Surge/Transient Protection Option protects electronic control circuits from transients and surges which are generated when the timer coil is activated. Built with a minimum of moving parts, the unit provides a fast response to rapidly rising voltage transients. The accurate, precision-made device is not polarity sensitive and permits the user to initiate, delay, sequence and program equipment actions over a wide range of applications under the most severe operating conditions.

It consists of a specially modified coil case, varistor, varistor cover, terminal extensions and cup washers so that normal terminations can be used. The varistor will not affect the operating characteristics of the 7000 Timer. The varistor has bilateral and symmetrical voltage and current characteristics and therefore can be used in place of the back-to-back zener diodes. This characteristic also means that the coil will not be polarity sensitive.

## Transient Suppressor

 Option "V"Timing Specifications (All values shown are at nominal voltage and $25^{\circ} \mathrm{C}$ unless otherwise specified).

Operating Modes:
Model 7012/7014: On-delay (delay on pick-up).
Model 7022/7024: Off-delay (delay on drop-out).
Model 7032: On-delay, off-delay (double head).
Timing Adjustment: Timing is set by simply turning the calibrated dial to the desired time value. In the zone of approximately $25^{\circ}$ separating the high and low end of timing ranges $A, D, E$, and $K$, instantaneous operation (no time delay) will occur. All other ranges produce an infinite time delay when the dial is set in this zone.

Models 7014 and 7032 are available with letter-calibrated dials only. The upper end of the time ranges in these models may be twice the values shown.


* The first time delay afforded by Model 7012 with H (3 to 30 min .) and I (6 to 60 min .) time ranges or Model 7014 with H time range will be approx. $15 \%$ longer than subsequent delays due to coil temperature rise.
Reset Time: 50 msec . (except model 7032)
Relay Release Time: 50 msec . for on-delay models (7012/7014)
Relay Operate Time: 50 msec . for off-delay models (7022/7024)


## Operating Voltage Coil Data (for DPDT)

| Coil <br> Part \# | Code <br> Letter | Rated Voltage | Operating* Voltage Range @ 60Hz | Rated Voltage | Operating Voltage Range @ 50 Hz |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 7000 | A | 120 | 102-132 | 110 | 93.5-121 |
|  | B | 240 | 204-264 | 220 | 187-242 |
|  | C | 480 | 408-528 |  |  |
|  | D | 550 | 468-605 |  |  |
|  | E | 24 | 20.5-26.5 |  |  |
| AC | F |  |  | 127 | 108-140 |
|  | G |  |  | 240 | 204-264 |
|  | H | 12 | 10.2-13.2 |  |  |
|  | I | 6 | 5.1-6.6 |  |  |
|  | J | 208 | 178-229 |  |  |
|  | K |  | Dual Voltage Coil |  |  |
|  |  |  | (Combines A\&B) |  |  |
|  | L |  | Special AC Coils (L1, L2, etc.) |  |  |
| 7010 | M | 28 | 22.4-30.8 |  |  |
|  | N | 48 | 38.4-52.8 |  |  |
|  | 0 | 24 | 19.2-26.4 |  |  |
|  | P | 125 | 100-137.5 |  |  |
|  | Q | 12 | 9.6-13.2 |  |  |
|  | R | 60 | 48-66 |  |  |
| DC | S | 250 | 200-275 |  |  |
|  | T | 550 | 440-605 |  |  |
|  | U | 16 | 12.8-17.6 |  |  |
|  | V | 32 | 25.8-35.2 |  |  |
|  | W | 96 | 76.8-105.6 |  |  |
|  | Y | 6 | 4.8-6.6 |  |  |
|  | Z | 220 | 176-242 |  |  |
|  | X |  | Special DC Coils (X1, X2, etc.) |  |  |

*Four pole Models: Operational voltage range $90 \%$ to $110 \%$ for AC units; 85\% to 110\% for DC units.

See next column for more coil data.

Minimum operating voltages are based on vertically mounted 7012 units.
7012 horizontally mounted or 7022 vertically or horizontally mounted units will operate satisfactorily at minimum voltages approximately $5 \%$ lower than those listed.
AC units drop out at approximately 50\% of rated voltage. DC units drop out at approximately $10 \%$ of rated voltage.
All units may be operated on intermittent duty cycles at voltages 10\% above the listed maximums (intermittent duty - maximum $50 \%$ duty cycle and 30 minutes "on" time.)

| Surge/Transient Protection Option Characteristics (DC Timers Only) |  |  |
| :--- | :--- | :--- |
| Coil Voltage |  | Max Excess |
| Nominal (DC) | Energy Capacity (Joule) | Max De-energization <br> Transient Voltage |
| 12 V | 0.4 J | 48 V |
| 24 V | 1.8 J | 93 V |
| 28 V | 1.8 J | 93 V |
| 32 V | 2.5 J | 135 V |
| 48 V | 3.57 J | 145 V |
| 60 V | 6 J | 250 V |
| 96 V | 10 J | 340 V |
| 110 V | 10 J | 340 V |
| 125 V | 10 J | 340 V |
| 220 V | 17 J | 366 V |
| 250 V | 17 J | 366 V |

Surge Life
Applied 100,000 times continuously with the interval of 10 seconds at room temperature. Below 68 VAC: 12A; Above 68 VAC: 35A
Temperature Range
Operating: $-22^{\circ} \mathrm{F}$ to $+167^{\circ} \mathrm{F}\left(-30^{\circ} \mathrm{C}\right.$ to $\left.+75^{\circ} \mathrm{C}\right)$
Storage: $\quad-40^{\circ} \mathrm{F}$ to $+167^{\circ} \mathrm{F}\left(-40^{\circ} \mathrm{C}\right.$ to $\left.+75^{\circ} \mathrm{C}\right)$
Output/Life Contact Ratings: Contact Capacity in Amps (Resistive Load) Contact Min. 100,000 Min. 1,000,000
Voltage Operations Operations
30 VDC $\quad 15.0 \quad 7.0$
110 VDC $1.0 \quad 0.5$
$120 \mathrm{~V} 60 \mathrm{~Hz} \quad 20.0 \quad 15.0$
$240 \mathrm{~V} 60 \mathrm{~Hz} \quad 20.0 \quad 15.0$
$480 \mathrm{~V} \mathrm{60Hz} \quad 12.0 \quad 10.0$
10 Amps Resistive, 240 VAC
1/4 Horsepower, 120 VAC/240VAC (per pole)
15 Amps 30 VDC (per pole)
5 Amps , General Purpose, 600VAC (per pole)
Dielectric: Withstands 1500 volts RMS 60 Hz between terminals and ground. 1,000 volts RMS 60 Hz between non-connected terminals. For dielectric specification on hermetically sealed models consult factory. Insulation Resistance: 500 Megohms with 500VDC applied.
Temperature Range: Operating: $-20^{\circ} \mathrm{F}$ to $+165^{\circ} \mathrm{F}\left(-29^{\circ} \mathrm{C}\right.$ to $\left.74^{\circ} \mathrm{C}\right)$
Storage: $-67^{\circ} \mathrm{F}$ to $+165^{\circ} \mathrm{F}\left(-55^{\circ} \mathrm{C}\right.$ to $\left.74^{\circ} \mathrm{C}\right)$
Temperature Variation: Using a fixed time delay which was set and measured when the ambient temperature was $77^{\circ} \mathrm{F}\left(25^{\circ} \mathrm{C}\right)$, the maximum observed shift in the average of three consecutive time delays was -20\% at $-20^{\circ} \mathrm{F}\left(-29^{\circ} \mathrm{C}\right)$ and $+20 \%$ at $165^{\circ} \mathrm{F}\left(74^{\circ} \mathrm{C}\right)$.
Mounting/Terminals: Normal mounting of the basic unit is in a vertical position, from the back of the panel. A front mounting bracket is also supplied with each basic unit, for installation from the front of the panel. All units are calibrated for vertical operation. Basic models (7012, 7022) may also be horizontally mounted, and will be adjusted accordingly when Accessory Y1 is specified in your order.

Standard screw terminals (8-32 truss head screws supplied) are located on the front of the unit, with permanent schematic markings. Barrier isolation is designed to accommodate spade or ring tongue terminals, with spacing to meet all industrial control specifications.

The basic Series 7000 may also be panel mounted with the addition of a panelmount kit that includes all necessary hardware and faceplate. This offers the convenience of "out-front" adjustment, with large calibrated dial skirt knob. The faceplate and knob blend with advanced equipment and console designs, while the body of the unit and its wiring are protected behind the panel.

Other mounting options include plug-in styles and special configurations to meet unusual installation requirements. Contact factory for details.
Power Consumption: Approximately 8 watts power at rated voltage .
Approximate Weights:

```
Models 7012, 7022 . . . . . . . 2 lbs. }4\mathrm{ ozs.
    7014, 7024 . . . . . . . 2 lbs. }10\mathrm{ ozs.
    7032 . . . . . . . . . . . }3\mathrm{ lbs. }5\mathrm{ ozs.
```

Weight may vary slightly with coil voltage.

Outline Dimensions (Dimensions in inches).

Models 7012, 7022


Models 7014, 7024


Model 7032


## Panel mount Option "X"





## Notes:

1. Cannot be combined with B, P or X Options
2. Cannot be combined with B, P or Y2 Options
3. Cannot be combined with GZ, H, I1, I2, K, W or Y1 Options
4. Not Avail. on 4-Pole Models
5. Not Available with L, T or LL options.
6. Not Available on hermetically sealed units.

* Sized to accommodate one L or T Auxiliary Switch
** Not available on On-Delay, Off-Delay (Double Head) model.
$\dagger$ Available with letter calibrated dials only. Upper end of time range may be twice the value shown
$\dagger \dagger 120$ cycles $=2 \mathrm{sec}$.


## Our authorized distributors are more likely to maintain the following items in stock for immediate delivery..

| 7012AA | 7012BC | 7012PKX | 7022AI |
| :--- | :--- | :--- | :--- |
| 7012AB | 7012NC | 7012PJX | 7022AJ |
| 7012AC | 7012PA | 7022AA | 7022AKT |
| 7012AD | 7012PB | 7022AB | 7022BC |
| 7012AE | 7012PC | 7022AC | 7022BK |
| 7012AF | $7012 P D$ | $7022 A D$ | $7022 P A$ |
| 7012AH | $7012 P F$ | $7022 A E$ | $7022 P B$ |
| 7012AK | $7012 P J$ | $7022 A F$ | $7022 P C$ |
| 7012ACL | $7012 P K$ | $7022 A H$ | $7022 P K$ |

Electronics
Ordering options - can only be orderd as factory installed options (Dimensions, where shown, are in inches.)


With knockouts for bottom connection.
$3.16^{\prime \prime} \mathrm{W} \times 3.84$ " $\mathrm{D} \times 7.63^{\prime \prime} \mathrm{H}$

K - Explosion proof Enclosure

(Meets requirements for Class I, Groups C\&D locations).
7.50'W x 6.00" D x $10.38^{\prime \prime} \mathrm{H}$


> T - Auxiliary Switch


Accessories (Not available for 7032 models)
Plug-In Receptacle (Accessory C)
Screw Terminals Catalog No. 700137. For use with "B" Option


H - Hermetically Sealed Enclosure


L - Auxiliary Switch


V - Transient/Surge Protection



I-Tamper-Proof Cover


LL - Auxiliary Switch


W - Watertight Enclosure (NEMA-4)



Plug-In Receptacle (Accessory D)


## Ordering options can only be ordered as factory installed options.



## Design Features

- High Repeat Accuracy over voltage and temperature extremes
- Hermetically sealed units are designed for high shock and vibration applications
- Instant recycling - easy linear adjustment
- Exclusive Dial Head adjustment - no needle valves
- Delay ranges from milliseconds to 3 minutes
- DPDT contacts


## Design \& Construction

Sealed patented timing head circulates air under controlled pressure through a variable orifice to provide adjustable timing. Circular-path Dial Head principle replaces traditional needle valve.
Snap-action switch assembly provides sustained contact pressure during timing cycles. Specially designed over center mechanism assures flutterfree load transfer after extended delay periods.
Precision-wound solenoid assembly supplies the basic motive force when the control circuit is closed.
These assemblies are mounted in a rigid self-supporting framework within a steel enclosure. This rugged construction assures permanent alignment of all operating members, the key to this unit's long trouble-free operation.

## Operation

Series 2112 (On-Delay) - Applying rated voltage to the solenoid coil starts the preset time delay. At the end of the delay period the NC contacts break and the NO contacts make. Contacts remain in this position until the coil is deenergized, when the switch instantaneously returns to its original position. De-energizing the coil, either during or after the delay period, will immediately (within 25 msec. ) recycle the unit. It will then provide another full delay period on re-energization.
Series 2122 (Off-Delay) - Applying rated voltage to the coil for at least 75 msec . (for accurate timing) will instantaneously transfer the switch, breaking the NC contacts and making the NO contacts. Contacts remain in this position as long as the coil is energized. The preset time delay period begins as soon as the coil is de-energized, at the end of which the switch returns to its original position.
 No power is required during the timing period. Reenergizing the coil, either during or after the delay period, will immediately start a new cycle with full delay period.

Operation (Listed values at nom. voltage, $25^{\circ} \mathrm{C}$ unless noted).

## Operating Mode:

2112: On-delay (delay on pull-in); 2122: Off-delay (delay on drop-out) Timing Adjustment: All standard models offer easy linear adjustment over one of nine timing ranges listed below. For applications requiring frequent readjustment, the extemal knob model with calibrated dial is recommended. For tamper-proof installation or where readjustment is infrequent, the internal key model may be preferred. This model requires removal of the cover plate for timing adjustment. Hemetically sealed models provide a slotted adjusting screw under the cap nut on the top cover.
Timing Ranges:

| Code | Range | Code | Range |
| :---: | :---: | :---: | :---: |
| A | .03 to .1 sec. | G | 2.0 to 60.0 sec. |
| B | .1 to .3 sec. | H | 5.0 to 120.0 sec. |
| C | .15 to 1.0 sec. | J | 5.0 to 180.0 sec. |
| D | .375 to 3.0 sec. | L | 1.5 to 30.0 cycles |
| E | .75 to 10.0 sec. |  |  |
| F | 1.0 to 30.0 sec. |  |  |

## 2100 series

## Miniature Electropneumatic Timing Relay

## C $\epsilon$

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

Repeat Accuracy: NORMAL VERTICAL POSITION
$\pm 5 \%$ at $25^{\circ} \mathrm{C} ; \pm 7 \%$ at $85^{\circ} \mathrm{C} ; \pm 8 \%$ at $-55^{\circ} \mathrm{C}$.
The average time between $-55^{\circ} \mathrm{C}$ and $85^{\circ} \mathrm{C}$ will be within $\pm 20 \%$ of the average @ $25^{\circ} \mathrm{C}$ with a proportionally reduced effect at lesser extremes.
In extremely short delay settings an additional 8 msec . variation may result on AC models due to "half cycle" altemating current effect.
Setting Tolerance: Factory time setting, when specified, subject to additional +5\% tolerance.
Position Sensitivity:
HORIZONTAL POSITION: Approximately 5\% increase from the initial time in the vertical position.
INVERTED POSITION: Approximately 10\% increase from the initial time in the vertical position.
Reset Time: 2112 Series: 25 msec.; 2122 Series: 75 msec
Relay Release Time: 25 msec . ( 2112 Series)
Relay Operate Time: 75 msec . (2122 Series)
Operating Voltage: Coil Data

|  | Nominal <br> Operating <br> Coltage | Resistance <br> Ohms <br> $\mathbf{\pm 1 0 \%}$ | Code | Nominal <br> Operating <br> Voltage | Resistance <br> Ohms <br> $\mathbf{\pm 1 0 \%}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| M | 12VDC | 30 | S | 120 V 60 Hz | 190 (2112 Series) |
| N | 28VDC | 131 | S | 120 V 60 Hz | 285 (2122 Series) |
| P | 48VDC | 500 | T | 240 V 60 Hz | 765 |
| R | 110VDC | 3200 | U | 115 V 400 Hz | 2600 |
| Y | 125VDC | 3380 |  |  |  |

Transients: Insensitive to transients of $\pm 1500$ VAC for 10 milliseconds Dielectric: 1000 V RMS @ 60Hz between non-connected terminals.
Contact Rating (DPDT Contacts):

|  | 30V <br> DC | $\mathbf{1 1 0 V}$ <br> DC | $\mathbf{1 2 0 V}$ <br> $\mathbf{6 0 H z}$ | $\mathbf{1 2 0 V}$ <br> $\mathbf{4 0 0 H z}$ | $\mathbf{2 4 0 V}$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
|  | $\mathbf{6 0 H z}$ |  |  |  |  |
| Inductive (Amps) | 2 | .75 | 3 | 2 | 1.5 |
| Resistive (Amps) | 10 | 1 | 10 | 10 | 5 |

Based on 100,000 operations electrical, 1,000,000 mechanical. Inductive and capacitive load should not have inrush currents that exceed five times nomal operating load.
Ambient Temperature Range: $-55^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$
Weight: Maximum, any unit - 17 ozs.
Mounting/Terminals: Chassis mounting tabs, octal plugs and extemal (-4) or intemal (-5) adjustment. Panel mounting back plate, intemal adjustment, and solder hook terminals (-9).

--4



These are minimum standards; where more severe environmental conditions must be met, please consult the factory.

## Outline Dimensions for Industrial Models (Dimensions in inches. Multiply by $\mathbf{2 5 . 4}$ to obtain millimeters.)



## Ordering Information for Industrial Models



Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.. None at present.

## Specifications for MIL-Spec and Hermetically Sealed Models



Dielectric: In accordance with specification MIL-R6106E (ASG). Also withstands 1,000 Volts RMS at 60 Hz between non-connected terminals.

Other: Agastat Miniature Timing Relays also conform to applicable Mil-Spec. requirements covering: Moisture Humidity Sand/Dust Ozone Sunshine Sand/Dust


Agastat timing relays perform to military specifications in Patriot missiles.

Outline Dimensions for MIL-Spec and Hermetically Sealed Models (In inches. Multiply by 25.4 for millimeters).


Ordering Information for MIL-Spec and Hermetically Sealed Models


Our authorized distributors are more likely to maintain the following items in stock for immediate delivery..
None at present.

## Alphanumeric Index

| Series Type | Page |
| :---: | :---: |
| CS...................... Voltage Sens | 1302 |
| PMA/PMB ........... Three Phase Power Quality M onitor .. | 1305 |
| SDAS-01.............. Current Monitor | 1307 |
| VCA .................... Single Phase Undervoltage Relay | 1303 |
| VMA ................... Single Phase Undervoltage Relay | 1304 |
| WD25 ................. Paralleling (Synch Check) Relay | 1308 |
| WD2759 .............. Over/Undervoltage Relay | 1308 |
| WD32 ................. Reverse Power Relay | 1308 |
| WD47 .................. Phase Sequence Relay | 1308 |
| WD5051 .............. 1 or 3-Phase Overcurrent Relay | 1308 |
| WD810U ............. Over/Underfrequency Relay | 1308 |

## Steel-Cased Protective Relays

Our KILOVAC steel-cased protective relays (listed below) are not described in this technical databook, as they do not represent the most cost effective solution for many new design requirements. M ost customers find our plastic-cased KILOVAC WD... series products are more appropriate for many new industrial applications. However, we still offer our steelcased protective relays. For details on KILOVAC steel-cased protective relays consult your Tyco Electronics sales engineer or visit our website at www.tycoelectronics.com.

1000 $\qquad$ Loss of Phase, Undervoltage Relay
1800 $\qquad$ Paralleling (volt) Relay
20-000 $\qquad$ Frequency, $56-66 \mathrm{~Hz}$ Relay
20-050-19 .......................................... Voltage/Frequency Relay
25-000 .......................................... Over/Underfrequency Relay
250 ................................................... Over/Undervoltage Relay
700 1 \& 3 Phase
700 1 \& 3 Phase, Adjustable Time Delay Relay
900 $\qquad$
$\qquad$ Phase Sequence Relay
D100X ................................... Close Differential, 1 Phase Relay
D101X Series Close Differential, 3 Phase
WC1 \& WCT1 Overcurrent, Time Delay, 1 Phase Relay
WC1G. $\qquad$ Power Factor \& Ground Fault Detector
WC3 \& WCT3............. Overcurrent, Time Delay, 3 Phase Relay
WCB $\qquad$ Current Balance Relay
WCD $\qquad$ Current Differential Relay
WGD $\qquad$ Power Factor \& Ground Fault Detector
WOF \& WUF $\qquad$ Overfrequency \& Underfrequency Relay WOUF ............ Over/Underfrequency, Time Delay Option Relay WOUV ................................... DC Over/Undervoltage DC Relay WOUVT .......................... Over/Undervoltage, Time Delay Relay WUV/WOV $\qquad$ Under- \& Overvoltage Relay
WUV/WOV ........................ DC Under- \& Overvoltage DC Relay WUVT/WOVT ..... Under- \& Overvoltage with Time Delay Relay WSYN $\qquad$ Voltage Frequency, Phase Angle Relay

NOTE: KILOVAC protective relays were previously sold under the WILMAR brand name.


Fixed Pick-up and Adjustable Drop-out


Adjustable Pick-up and Drop-out

## Sensing Modes

The CS can be used as an over or undervoltage sensor, depending upon whether the load is connected to the normally closed ( NC ) or normally open (NO) contacts of the sensor's output relay.

Overvoltage sensor - The NC contacts are used. The relay remains deenergized until an overvoltage is sensed.

Undervoltage sensor - The NO contacts are used. The relay remains energized until the voltage decreases to the preset level, where the sensor de-energizes the relay.

## Adjustable Voltage Sensor Operation



Note 1 - As voltage increases, the relay will pick-up at its selected point and remain energized while voltage is maintained at that level or higher.

Note 2 - As voltage decreases, after pick-up, the relay will drop-out at its selected point.

Note 3 - Minimum hysterisis, the voltage differential between pick-up and drop-out, is typically $2 \%$ of pick-up.

## Outline Dimensions



## CS series

## Solid State Hybrid Voltage Sensor

- Close differential
- Choice of two types
- Fixed pick-up and knob adjustable drop-out
- Knob adjustable pick-up and drop-out
- Internal 2 Form C (DPDT) output relay


## 楊 File E22575

(18 File LR15734
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Engineering Data

Power Requirement: Typically less than 3VA or 3W.
Duty Cycle: Continuous.
Repeatability: $\pm 1 \%$, max.
Response Time: 10-25 ms, typ.
Internal Relay Contact Arrangement: 2 Form C (DPDT).
Internal Relay Contact Rating: 10A @ 28 VDC , res., or 120VAC, $80 \%$ p.f.
Reverse Polarity Protection: On DC types.
Temperature Range: $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.
Temperature Coefficient: $0.2 \% /{ }^{\circ} \mathrm{C}$, max.
Enclosure: Plastic dust cover.
Mounting: 8-pin octal style plug. Fits either 27E122 or 27E891 (snap-on) screw terminal sockets.
Weight: 8 oz . $(227 \mathrm{~g})$ approximately.

## Ordering Information -

Distributors are more likely to stock boldface items.
Fixed Pick-Up and Adjustable Drop-Out

| Part Number | Pick-Up <br> (Volts) | Drop-Out Range <br> (Volts) | Maximum <br> Voltage |
| :---: | :---: | :---: | :---: |
| CSJ-38-71010 | 105 | $90-103$ | $140 \mathrm{VAC}(50 / 60 \mathrm{~Hz}$.) |
| CSL-38-31010 | 22 | $16-21$ | 32 VDC |

Adjustable Pick-Up and Adjustable Drop-Out

| Part Number | Pick-Up Range <br> (Volts) | Drop-Out Range* <br> (Volts) | Maximum <br> Voltage |
| :--- | :---: | :---: | :---: |
| CSJ-38-70010 | $92-140$ | $90-138$ | 150VAC (50/60 Hz.) |
| CSL-38-30010 | $20-30$ | $18-28$ | 32 VDC |
| CSL-38-40010 | $40-58$ | $38-56$ | 60 VDC |
| CSL-38-60010 | $92-140$ | $90-138$ | 150 VDC |

* Actual maximum drop-out voltage is the selected pick-up voltage less the hysterisis voltage.


## Wiring Diagrams - Bottom Views

 (pins numbered clockwise from keyway)

## VCA series



## Function

Single phase undervoltage relay.

## Sensing Specifications

Voltage Set-Point Adjustment: Internal potentiometer (screwdriver adjustable) with linear calibrated dial.
Response Time: Depending on severity of undervoltage: 0.1-1 sec.
Accuracy: Repeat Accuracy: $\pm 0.2 \%$
Overall Accuracy: $\pm 1 \%$.

## Output Data

Arrangement: 1 Form C (SPDT).
Rating: 7A @ 250VAC; 1/6 HP @ 250VAC; 300VA @ 120/240VAC; 3A @ 30VDC.
Expected Mechcanical Life: 10,000,000 operations.
Expected Electrical Life: 100,000 operations at rated resistive load.

## Initial Dielectric Strength

Between Terminals and Case: $1,480 \mathrm{~V}$.
Between Relay Contacts and Active Circuitry: 1,480V.

Outline Dimensions and Wiring Diagram


## Single Phase Undervoltage Relay

- Automatic reset minimizes equipment downtime.
- Fixed pickup point prevents low voltage start-up.
- Adjustable dropout point protects against undervoltage operation.
- Delayed dropout prevents nuisance tripping.
- Compact, inexpensive design saves space, reduces cost.
- Solid state circuitry for enhanced accuracy and long life.
- LED indicates normal voltage condition.

기 File E60363

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data

Voltage: 120VAC, 240VAC.
Power Requirement: 4W, max.
Transient Protection: 120VAC
240VDC ................... 30 joules
120VAC ............. 10 joules
120VDC ............ 10 joules

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-23^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Panel mount with one \#8 screw.
Termination: 0.250 in (6.35) quick connect terminals.
Status Indication: LED indicates normal voltage condition.
Weight: 3.2 oz. ( 90.7 g ) approximately.

## Ordering Information

| Part Number | Operating Voltage |
| :---: | :---: |
| VCAA | 120VAC |
| VCAB | 240 VAC |

Authorized distributors are likely to stock the following: None at present.


## VM A series

## Single Phase, Plug-in <br> Undervoltage Relay

- Automatic reset minimizes equipment downtime.
- Fixed pickup point prevents low voltage start-up.
- Adjustable dropout point protects against undervoltage operation.
- Locking potentiometer maintains selected set point.
- Delayed dropout prevents nuisance tripping.
- Plug-in mounting for easier installation.
- Built-in protection against polarity reversal.
- LED indicates normal voltage condition.

기 File E60363
Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Input Data

Voltage: See ordering information.
Power Requirement: 4W, max.
Transient Protection: 24VAC ................. 1.5 joules
24VDC ..................... 1.5 joules
48VDC .............. 10 joules
120VAC ............. 10 joules
125VDC ............ 10 joules
240VDC ............. 20 joules

Reverse Polarity Protection: On DC models.
Duty Cycle: Continuous.

## Environmental Data

Temperature Range: Storage: $-30^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.
Operating: $-10^{\circ} \mathrm{C}$ to $+55^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Octal plug. Fits 27E122 or 27E891 (snap-on) screw terminal socket. Order socket separately.
Enclosure: Nylon cover protects against particles.
Status Indication: LED indicates normal voltage condition.
Weight: 6 oz . (168g) approximately.

## Ordering Information

| Part Number | Nominal Voltage | Pick-Up (V) | Drop-Out Range (V) |
| :---: | :---: | :---: | :---: |
| VMAXEA | 24VAC | 21 | 15 to 20 |
| VMAXAA | 120VAC | 104 | 78 to 99 |
| VMAXBA | 240VAC | 209 | 156 to 199 |
| VMAXOA | $24 V D C$ | 21 | 15 to 20 |
| VMAXEA | 48VDC | 42 | 31 to 40 |
| VMAXEA | 125VDC | 109 | 81 to 103 |

[^31]


PMA


PMB

## Function

Three phase power quality monitor.

## Monitoring Specifications

Threshold Accuracy: $\pm 0.2 \%$ of the average of 10 consecutive measurements of the threshold point at any fixed temperature within the operating temperature range. $\pm 2 \%$ of the average of 10 consecutive measurements of the threshold point over the operating temperature range.
Response Time: Phase loss and phase reversal: 2 line cycles +5 ms . Undervoltage and phase imbalance: See Figures 1 and 2 on the following page.

## Input Data

Nominal Voltage: 110 to 120VAC; 208 to 240VAC; 380 to 440VAC; 440 to $480 \mathrm{VAC} ; 550$ to 600VAC.
Maximum Voltage: 132VAC for the 110 to 120VAC model; 264VAC for the 208 to 240VAC model; 484 VAC for the 380 to 440VAC model; 528VAC for the 440 to 480VAC model; 650 VAC for the 550 to 600VAC model.
Frequency: $50 / 60 \mathrm{~Hz}$.
Power Requirement: 750mW.
Transient Noise Immunity: ICS 2-230, ANSI C37.40.

## Output Data

Arrangement: 1 Form A (SPST-NO) + 1 Form B (SPST-NC).
Rating: 8A @ 250VAC, resistive; 3A @ 30VDC, resistive;
1/4 HP @ 125/250VAC; 275VAC pilot duty.
Expected Mechcanical Life: 10,000,000 operations.
Expected Electrical Life: 100,000 operations at rated resistive load.

## Initial Dielectric Strength

Between Input Terminals and Case or Active Circuitry: 2,200V.
Between Relay Contacts and Active Circuitry: 1,500V.

## Environmental Data

Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+75^{\circ} \mathrm{C}$.
Operating: $-10^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.

## Mechanical Data

Mounting: Can be mounted on a flat surface with two screws or snapped on/off a furnished adapter plate which has been pre-mounted on a flat surface. Can also be mounted on a 300-volt machine tool relay channel using the adapter plate. Direct mounting (no adapter plate used) on a symmetrical DIN track is also possible.
Termination: Screw terminals.
Connections: 3 wire wye or delta.
Vibration: Chatterless operation 5 to $60 \mathrm{~Hz} ., 0.030 \mathrm{in} .(0.762 \mathrm{~mm})$ amplitude, 1 minute sweep.
Status Indication: "Contacts Transferred" LED plus four additional LEDs to designate the specific fault that released the relay.
Weight: 24 oz ( 625 g ) approximately.

## PM A/PM B series

## Three Phase <br> Power Quality Monitor

- Monitors deviation from nominal system voltage, phase imbalance, phase sequence and phase loss.
- Locking potentiometer prevents tampering (PMA only).
- Start-up delay permits staggered restarting (PMB only).
- Four LEDs show nature of temporary/sustained faults.
- 3-wire wye or delta connections for simple installation.
- Calibrated nominal voltage potentiometer assures precise monitoring.
- Superior transient immunity per ANSI C37.40.
- Not fooled by back EMF.
- 8 user-selectable thresholds - 4 undervoltage and 4 phase imbalance - match protection to load.
- Manual or automatic reset for application flexibility.
- Suitable for commonly used grounded or ungrounded three-phase systems.


## 況 File E60363

## (181) File LR29186 CE

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Outline Dimensions



Ordering Information

| PMA | LB | S |
| :---: | :---: | :---: |
|  |  |  |
| Series | Nominal Operating Voltage | Phas |
| PMA = Power | LA $=110$ to 120VAC, $50 / 60 \mathrm{~Hz}$. |  |
| Quality M onitor | LB $=208$ to 240VAC, $50 / 60 \mathrm{~Hz}$. | L = Low |
| with Locking | LG $=380$ to 440VAC, $50 / 60 \mathrm{~Hz}$. | 退 $\quad \mathrm{H}=\mathrm{H}$ |
| Potentiometer | LC = 440 to 480VAC, $50 / 60 \mathrm{~Hz}$. |  |
|  | LD $=550$ to $600 \mathrm{VAC}, 50 / 60 \mathrm{~Hz}$. |  |
| PM B = Power |  |  |
| Quality M onitor |  | Status Indicators |
| with Start-Up |  | S = "Contacts |
| Delay |  | Transferred"and |
|  |  | four fault status |
|  |  | indicators |

Authorized distributors are likely to stock the following: None at present.

## Operation

Monitor Operation: When the input voltage parameters are normal, the "Contacts Transferred" LED will be on and relay is energized. Once the unit has responded to a fault by releasing the output relay and simultaneously extinguishing the "Contacts Transferred" LED, the nature of the fault that caused the release will be identified by one of the four fault status indicators. In the automatic reset mode, the status indicator will extinguish and the "Contacts Transferred" LED will re-light once all faults are corrected and restart delay period has expired. In the manual reset mode, the fault indicator will flash when all faults have been corrected, thus indicating that the unit is ready for manual reset. When manually reset, the flashing fault status indicator will extinguish and the "Contacts Transferred" LED will relight. Series PMA has a fixed start-up delay of approximately 375 milliseconds. Series PMB has a start-up delay, adjustable from 0 to 5 minutes, which permits staggered restarting of motors, etc., affected by a common power outage. If the unit is wired for manual reset, the external reset switch must also be opened.

The output relay will remain in the transferred state until one of the fault conditions occur. (See Figures 1 and 2)

Phase Loss Condition: If the voltage of any phase drops below 68\% of the nominal voltage setting for more than two line cycles, the output relay will release. If back EMF accompanies the loss of a phase, the unit will sense the loss as a phase imbalance and the relay will drop out.

Phase Reversal Condition: If any two phases become reversed for more than two line cycles, the output relay will release.

Undervoltage Condition: By strapping, the user can select one of four undervoltage thresholds: $10 \%, 14 \%, 17 \%$ or $20 \%$ below the nominal voltage, which is entered by means of a calibrated potentiometer located on the front panel. When the average voltage drops below the selected threshold, a time delay shown in Fig. 1 is initiated. The unit then continues to monitor the severity of the fault and modifies the time delay accordingly. If the undervoltage condition persists, the time delay will expire and the output relay will release.

Phase Imbalance Condition: The unit continuously averages the three phase voltages and recognizes individual deviations from the average. By strapping, the user can select one of four imbalance thresholds: Either $2.0 \%, 3.0 \%, 3.5 \%, 4.0 \%$, or $5.0 \%, 7.0 \%, 8.5 \%, 10.0 \%$ depending on model. When any phase voltage deviates more than the selected percentage from the three phase average, a time delay as shown in Fig. 2 is initiated. The unit then continues to monitor the severity of the fault and modifies the time delay accordingly. If the phase imbalance condition persists, the time delay will expire and the output relay will release.

## Typical Connection Diagram





Figure 2

## Strapping Diagrams

 Undervoltage Threshold| 10.0\% | $\stackrel{6}{\mathscr{D}}$ | $\stackrel{7}{\mathscr{D}}$ | $\stackrel{8}{\varnothing}$ | $\stackrel{9}{\varnothing}$ | $\begin{aligned} & 10 \\ & \bigotimes \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 14.0\% | $\oslash$ | $\square$ | $\oslash$ | $\oslash$ | $\varnothing$ |
| 17.0\% | $\square$ | $\oslash$ | $\oslash$ | $\oslash$ | $\varnothing$ |
| 20.0\% | $\bigcirc$ | $\square$ | Ø | $\oslash$ | $\varnothing$ |

Low Phase Imbalance Threshold
Model PMAL*SL or PMBL*SL

| 2.0\% | $\stackrel{6}{\varnothing}$ | $\stackrel{7}{\varnothing}$ | $\stackrel{8}{\varnothing}$ | $\stackrel{9}{\varnothing}$ | $\begin{aligned} & 10 \\ & \varnothing \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 3.0\% | $\varnothing$ | $\oslash$ | $\oslash$ | 0 | $\square$ |
| 3.5\% | $\varnothing$ | ® | 0 | $\varnothing$ | $\square$ |
| 4.0\% | $\oslash$ | $\oslash$ | $\square$ | ठ | $\varnothing$ |

## High Phase Imbalance Threshold

Model PMAL*SH or PMBL*SH



## Sensing Modes

Overcurrent sensor - Detects a current in excess of the value determined by the potentiometer setting. A built-in time delay, 200 ms , minimum, allows for normal starting and surge currents. Actual time delay is dependent upon potentiometer setting and magnitude of overcurrent. Any overcurrent lasting longer than this causes the internal relay of the SDAS01 to energize. The relay will remain energized until sensor control voltage is removed, even if the overcurrent ceases to exist.

Undercurrent sensor - Reacts to a complete loss of sense current, or any current of less than the potentiometer setting. Upon application of sensor control voltage, there is a nominal 350ms delay during which time power line current must begin. This delay gives line components time to turn on. If, at the end of the delay, sense current should decrease to less than the potentiometer setting of the SDAS-01 and remain there for approximately 350 ms , the intemal relay of the SDAS-01 will energize. It will remain energized until either sense control current again exceeds the potentiometer setting, or until sensor control voltage is removed.

## Engineering Data

Control Voltage: 24VAC $50 / 60 \mathrm{~Hz} . / \mathrm{DC} \pm 10 \%$.
Sense-Current Range: 1.5 to $15 \mathrm{amps} A C$.
Internal Relay Contact Data:
1 Form C (SPDT) type (code X1): 5A @ 28VDC or 2.5A @ 120VAC, res.
2 Form C (DPDT) type (code Y2): 2A @ 28VDC or 1A @ 120VAC, res.
Set Point Variation: $\pm 25 \%$ over operating temperature range.

## Time Delay:

Overcurrent sensor: 200 ms , min., after beginning of overcurrent. Actual delay is dependent upon potentiometer setting and magnitude of overcurrent (see Figure 1).
Undercurrent sensor: 350 ms , typ.; 200 ms , min., from beginning of undercurrent after control voltage is applied.
Power Requirement: 1.7W or 1.7VA @ 24VAC.
Temperature Range: Storage: $-40^{\circ} \mathrm{C}$ to $+85^{\circ} \mathrm{C}$.
Operating: $-25^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$.
Enclosure: Plastic dust cover.
Mounting: Socket. For sockets see KUP 3 pole sockets.
Weight: 3.17 oz ( 90 g ) approximately.

## Outline Dimensions



## Wiring Diagrams - Bottom Views

## 1 Form C



2 Form C



## W D series

## DIN Rail or Screw Mounted Protective Relays

- WD25 Paralleling (Synch Check) Relays
- WD2759 Over/undervoltage Relays
- WD32 Reverse Power Relays
- WD47 Phase Sequence Relays
- WD5051 Single- or Three-Phase Overcurrent Relays
- WD810U Over/Underfrequency Relays


## 미 File E58048 <br> DIN EN50022-35

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

## Specifications common to all models

Power Consumption: 2.5 VA , maximum.
Contact Ratings: 5 amps , resistive, at 120VAC.

$$
5 \mathrm{amps} \text {, resistive, at } 30 \mathrm{VDC} \text {. }
$$

Isolation from Control to Sense Inputs: 2,500VAC.
Mechanical Life: 10 million operations.
Shock: 10g.
Vibration: 0.062 ( 1.57 ) double amplitude at $10-55 \mathrm{~Hz}$.
Terminals: M 3.5 screws.
Maximum Wire Size: $2 \times 24$ AWG ( $2.5 \mathrm{~mm}^{2}$ ) solid to DIN 46288 or $2 \times 16$ AWG ( $1.5 \mathrm{~mm}^{2}$ ) stranded w/end sleeves.
Operating Temperature Range: $-40^{\circ} \mathrm{C}$ to $+60^{\circ} \mathrm{C}$.
Enclosure: Plastic case (not sealed).
Mounting Options: Snap mounts on standard DIN rail (DIN-EN 50022-35) or panel mounts with M4, M5, \#8 or \#10 screws.
Weight: 14.4 oz ( 400 g ) approximately.

## Installation and Maintenance Information

Installation: To mount the WD series protective relay on a DIN rail, hook the top edge of the cutout on the base of the case over one edge of the DIN rail, then press the opposite side of the cutout containing the release clip over the opposite side of the DIN rail. To remove or reposition the relay, lever the release clip and move the relay as required. WD series relays should be installed in a dry location where the ambient temperature will be within the operating temperature range.
Maintenance: WD series protective relays are solid state devices that require no maintenance. They are not designed to be serviced by the user. Consult KILOVAC customer service at 805-220-2023 if repairs should be necessary.

## Overview

The WD series offers several different models of protective relays in a common package that is suitable for either DIN rail or screw mounting. These flexible, multifunction devices offer user selectable voltages, sense currents and frequencies. Adjustable time delays are standard. This allows a single part number to be suitable for multiple applications, thereby reducing inventory costs.

## Outline Dimensions



## WD25 Paralleling Relays

- Function 25
- ANSI/IEEE C37.90-1978


## WD25 Calibration

The calibration marks on the faceplate are provided only as guides. Proper calibration requires using an accurate voltmeter. Use the following procedure to calibrate the WD25:

1. Remove the cover.
2. Adjust the SYNC VOLTAGE control fully counterclockwise (CCW). Apply nominal voltage to the LINE B (bus) sensing terminals.
3. Apply the maximum desired synchronization voltage to the LINE A (generator) terminals. This voltage should be in phase with LINE B (bus) voltage and have the same frequency.
4. Slowly adjust the SYNC VOLTAGE control clockwise (CW) until the relay energizes.

## WD25 Controls



## WD25 Connections

Our authorized distributor is more likely to stock these items.
WD25-001
WD25-013


## WD25 Typical Hookup

NOTE:
For single dead bus option, connect the generator to $1 \& 2$ and the bus to $4 \& 5$.


CONTROL
BI-DIRECTIONAL AC OR DC INPUT

## WD2759 Over/Undervoltage Relays

- Function 27/59
- ANSI/IEEE C37.90-1978


## WD2759 Operation

WD2759 AC voltage sensing relays provide voltage monitoring and protection in AC systems from 50 to 400 Hz . Sensing voltages, number of phases, over and undervoltage setpoint, and time delays are user configured. WD2759 voltage relays operate when the externally adjustable trip point is reached. An external time delay control is provided with an adjustment of .5 to 10 seconds. This time delay may be used to prevent false tripping when there are slight variations in the voltage supply. On overvoltage (OV) the output relay energizes when the input signal exceeds the trip point. On undervoltage (UV) the output relay de-energizes when the input signal goes below the trip point. A green LED indicates power to the relay. Red LED lights indicate the state of the undervoltage and overvoltage trips.

## WD2759 Specifications

Nominal Operating Range: 120, 208, 277 or 480 VAC, selectable.
Maximum Sensing Range: 700VAC.
Nominal Frequency Range: $50-400 \mathrm{~Hz}$.
Contact Form: 1 form C (SPDT) for undervoltage and 1 form C (SPDT) for overvoltage.
Time Delay Adjustment: 0.5 to 10 sec .
Sense Voltage:

| Voltage (nominal) | 120 | 208 | 277 | 480 |
| :--- | :---: | :---: | :---: | :---: |
| UV Adjustment Range | $72-120$ | $125-208$ | $166-277$ | $288-480$ |
| OV Adjustment Range | $120-168$ | $208-291$ | $277-388$ | $480-672$ |
| Control Voltage: |  |  |  |  |
| Model WD2759 | -001 | -002 | -003 |  |
| Input Voltage (VDC) | 18 to 54 | 13.5 to 32 | 100 to 200 |  |
| Input Voltage (VAC) | - | - | 100 to 140 |  |


| Ordering Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Typical Part Number $>$ | WD | 2759 | -002 |
| 1. Basic Series: WD = DIN mount Protective Relay. |  |  |  |
| 2. Type: <br> 2759 = Over/Undervoltage Relay. |  |  |  |
| 3. Control Voltage: $\begin{aligned} & 001=18 \text { to } 54 \mathrm{VDC} \\ & 002=13.5 \text { to } 32 \mathrm{VDC} \\ & 003=100-200 \mathrm{VDC} \text { or } 100-140 \mathrm{VAC} . \end{aligned}$ |  |  |  |

Our authorized distributor is more likely to stock these items. WD2759-003.

## WD2759 Calibration

The calibration marks on the faceplate have a maximum error of 10\% and are provided only as guides. Proper calibration requires using an accurate voltmeter in parallel with the input signal. Use the following procedure to calibrate your relay.

## OVER VOLTAGE

1. Remove cover.
2. Adjust the TRIP SET control fully clockwise (CW) and the TIME DELAY control fully counterclockwise (CCW).
3. Apply the desired trip voltage to the relay.
4. Slowly adjust the TRIP SET control CCW until the relay trips.
5. Remove the applied voltage (do not change the voltage level) and set the TIME DELAY control to the desired time delay.
6. Apply the trip voltage to the relay and measure the time to trip.
7. Adjust the TIME DELAY and repeat steps 4 and 5 until you have the desired time delay.

## UNDER VOLTAGE

1. Remove cover.
2. Adjust the TRIP SET control fully CCW and the TIME DELAY control fully CCW.
3. Decrease the applied sensing voltage from the nominal value until the desired tripping voltage is reached.
4. Slowly adjust the TRIP SET control CW until the relay trips.
5. Set the TIME DELAY control to the desired time delay and apply nominal voltage to the relay.
6. Step down the applied voltage from nominal to a level jest below the trip level set in Step 3 and measure the time delay.
7. Adjust the TIME DELAY and repeat steps 4 and 5 until the desired time delay is achieved.

## WD2759 Controls



## WD2759 Typical Hookup

## WD2759 Connections



BI-DIRECTIONAL AC OR DC INPUT

## WD32 Reverse Power Relays

## - Function 32

## WD32 Operation

WD32 reverse power relays are used to monitor the direction of power from AC generators. This is accomplished by measuring I cos $q$. If current from the generator is reversed and exceeds the adjustable setting, the relay will trip. A 0.5 to 20 second time delay is provided. A correct setting of the trip point and time delay will prevent motorizing the generator and prevent tripping during transients that occur while synchronizing. A POWER LED indicates the condition of the power supply and a REVERSE POWER TRIP LED indicates the output status of the relay.

## WD32 Specifications

Nominal Operating Range: 120 to 480 VAC, 1 or 3 phase.
Maximum Sensing Range: 575VAC.
Nominal Sensing Current: 5A.
Nominal Frequency Range: WD32-00X: 40-400 Hz.; WD32-01X: 60 Hz.
Contact Form: 2 form C (DPDT).
Time Delay Adjustment: 0.5 to 20 sec .
Sense Current:
Reverse Power Trip: 0.2 to 1.0A (4-20\% of nominal sense current).
Control Voltage:

| Model WD32 | -001 | -002 | -003 |
| :--- | :---: | :---: | :---: |
| Input Voltage (VDC) | 18 to 54 | 13.5 to 32 | 100 to 200 |
| Input Voltage (VAC) | - | - | 100 to 140 |

## Ordering Information

| Typical Part Number | WD | 32 | -00 | 2 |
| :---: | :---: | :---: | :---: | :---: |
| 1. Basic Series: <br> WD = DIN mount Protective Relay. |  |  |  |  |
| 2. Type: <br> 32 = Reverse Power Relay. |  |  |  |  |
| 3. Load: $00=$ Resistive (power) <br> 01 = Inductive (Kvar, 60 Hz .) |  |  |  |  |
| 4. Control Voltage: $\begin{aligned} & 1=18 \text { to } 54 \mathrm{VDC} \\ & 2=13.5 \text { to } 32 \mathrm{VDC} \\ & 3=100-200 \mathrm{VDC} \text { or } 100-140 \mathrm{VAC} \end{aligned}$ |  |  |  |  |

Our authorized distributor is more likely to stock these items.
WD32-003
WD32-011

## WD32 Calibration

The calibration marks on the faceplate have a maximum error of $10 \%$ and are provided only as guides. Proper calibration requires using an accurate Current Meter in series with the input current. Use the following procedure to calibrate your relay.
REVERSE POWER

1. Remove cover.
2. Adjust the TRIP SET control fully clockwise (CW) and the TIME DELAY control fully counterclockwise (CCW).
3. Apply the desired trip current to the relay. NOTE: for the Reverse Power (WD32-00X) a resistive load must be used and for the Reverse KVAR (WD32-01X) an inductive load must be used
4. Slowly adjust the TRIP SET control CCW until the relay trips.
5. Remove the applied Current and set the TIME DELAY control to the desired time delay.
6. Re-apply the Current ( $10 \%$ more than the trip current) to the relay and measure the time to trip.
7. Adjust the TIME DELAY and repeat steps 4 and 5 until you have the desired time delay.

## WD32 Controls



## WD32 Connections



## WD32 Typical Hookup

SINGLE PHASE INPUT


CONTROL BI-DIRECTIONAL AC OR DC INPUT


CONTROL


CONTROL BI-DIRECTIONAL AC OR DC INPUT

## WD47 Phase Sequence Relays

- Function 47
- ANSI/IEEE C37.90-1978


## WD47 Calibration

The WD47 has no adjustments and no calibration is necessary. Proper operation may be verified as follows:

1. Apply a nominal, three-phase input with the correct phase sequence. The output relay should dropout and the green LED should light.
2. Apply a nominal, three-phase input with an incorrect phase sequence. The output relay should pickup and the red LED should light.
3. Apply only one or two phases with the correct phase sequence. The output relay should pickup and the red LED should light.

## WD47 Specifications

Nominal Operating Range: 120 to 480 VAC .
Maximum Sensing Range: 575 VAC .
Nominal Frequency Range: $40-400 \mathrm{~Hz}$.
Contact Form: $\quad 2$ form C (DPDT).

Control Voltage:
Model WD47

## Ordering Information

| Typical Part Number | WD | 47 |
| :--- | :--- | :--- |
| 1. Basic Series: <br> WD $=$ <br> DIN mount Protective Relay. |  |  |
| 2. Type: <br> 47 $=$ Phase Sequence Relay. |  |  |
| 3. Control Voltage: |  |  |
| $001=18$ to 54VDC |  |  |
| $002=13.5$ to 32 VDC |  |  |
| $003=100-200$ VDC or 100-140VAC. |  |  |

Our authorized distributor is more likely to stock these items. WD47-001

## WD47 Controls



## WD47 Connections



## WD47 Typical Hookup



## WD5051 10 and 3Ø Overcurrent Relays

- Function 5051


## WD5051 Operation

WD5051 AC current sensing relays provide current monitoring and protection in AC systems from 50 to 400 Hz . Nominal Sensing Current, Instantaneous Over Current setpoint, Time Over Current setpoint, and Time Over Current time delay are user configured. WD5051 current relays operate when the externally adjustable trip point is reached. An external time over current time delay control is provided with an adjustment of .5 to 20 seconds. This time delay may be used to prevent false tripping when there are slight variations in the sensed current. With control power applied, the Instantaneous Over Current (IOC) contacts pick-up when the input signal exceeds the IOC trip setpoint. Similarly, with control power applied, the Time Over Current (TOC) contacts pick-up after the preset time delay when the Sense Current rises above the TOC trip setpoint. The IOC contacts may also be configured to function as an under current relay. A green LED indicates power to the relay. Red LED lights indicate the state of the IOC and TOC trips.

## WD5051 Specifications

Sense Current Full Scale: 1, 3, 6 or 8A, selectable.
Maximum Sensing Current: 10A continuous; 30A for 10 sec.;
60A for 2.5 sec .; 100A for 0.9 sec .
Nominal Frequency Range: $50-400 \mathrm{~Hz}$.
Contact Form: 1 form C (SPDT) for IOC and 1 form C (SPDT) for TOC.
TOC Time Delay Adjustment: 0.5 to 20 sec .
IOC Operate Time (max.): 0.2 sec .
Sense Current:

| Current (nominal) | 1 | 3 | 6 | 8 |
| :--- | :---: | :---: | :---: | :---: |
| IOC | 0.2 to 1.2 | 0.6 to 3.6 | 1.2 to 7.2 | 1.6 to 9.6 |
| TOC | 0.2 to 1.2 | 0.6 to 3.6 | 1.2 to 7.2 | 1.6 to 9.6 |


| Control Voltage: |  |  |  |
| :--- | :---: | :---: | :---: |
| Model WD5051 | -001 | -002 | -003 |
| Input Voltage (VDC) | 18 to 54 | 13.5 to 32 | 100 to 200 |
| Input Voltage (VAC) | - | - | 100 to 140 |


| Ordering Information |  |  |  |
| :---: | :---: | :---: | :---: |
| Typical Part Number | WD | 5051 | -002 |
| 1. Basic Series: WD = DIN mount Protective Relay. |  |  |  |
| 2. Type: <br> 5051 = Single Phase Overcurrent Relay. <br> 5051-3 = Three Phase Overcurrent Relay. |  |  |  |
| 3. Control Voltage: $\begin{aligned} & 001=18 \text { to } 54 \mathrm{VDC} \\ & 002=13.5 \text { to } 32 \mathrm{VDC} \\ & 003=100-200 \mathrm{VDC} \text { Or } 100-140 \mathrm{VAC} . \end{aligned}$ |  |  |  |

Our authorized distributors are more likely to stock these items.
WD5051-001
WD5051-003
WD5051-3-001

## WD5051 Calibration

The calibration marks on the faceplate are provided only as guides. Proper calibration requires using an accurate ammeter in series with the current source. Use the following procedure to calibrate your relay:
OVERCURRENT

1. Remover the cover.
2. Adjust the TRIP SET control fully clockwise (CW) and the TIME DELAY control (TOC only) fully counterclockwise (CCW).
3. Apply the desired trip current to the relay.
4. Slowly adjust the TRIP SET control CCW until the relay trips.
5. Remove the applied current (do not change the current level). Set the TIME DELAY (TOC only) control to the desired time delay.

## WD5051 Controls



## WD5051 Connections

## WD5051

Single Phase Model

WD5051-3
Three Phase Model


WD5051-3
Three Phase Model

WD5051
Single Phase Model


CONTROL
BI-DIRECTIONAL AC OR DC INPUT

## WD810U Over/Underfrequency Relays

- Function 81 OU
- ANSI/IEEE C37.90-1978


## WD810U Calibration

The calibration marks on the faceplate are provided only as guides. Proper calibration requires using an accurate frequency meter in parallel with the input signal.

## UNDER FREQUENCY

1. Remove the cover.
2. Set the SENSE FREQUENCY to the nominal system frequency. Adjust the Under Frequency TRIP SET fully clockwise (CW) and the TIME DELAY control fully counterclockwise (CCW).
3. Apply the desired trip frequency to the relay.
4. Slowly adjust the TRIP SET control CCW until the relay trips.
5. Set the TIME DELAY control to the desired time delay and apply nominal frequency to the relay.
6. Step down the applied frequency from nominal to just below the trip level set in Step 4 and measure the time delay.
7. Adjust the TIME DELAY and repeat steps 5 and 6 until the desired time delay is set.
OVER FREQUENCY
8. Remove the cover.
9. Set the SENSE FREQUENCY to the nominal system frequency. Adjust the OF TRIP SET and TIME DELAY controls fully counterclockwise (CCW).
10. Apply the desired trip frequency to the relay.
11. Slowly adjust the TRIP SET control clockwise (CW) until the relay trips.
12. Set the TIME DELAY control to the desired time delay and apply nominal frequency to the relay.
13. Step down the applied frequency from nominal to just below the trip level set in Step 4 and measure the time delay.
14. Adjust the TIME DELAY and repeat steps 5 and 6 until the desired time delay is set.

## WD810U Controls



Our authorized distributors are more likely to stock these items.
None at present.
WD810U Typical Hookup


CONTROL
BI-DIRECTIONAL AC OR DC INPUT

Specifications and availability

## Alphanumeric Index

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NOTE: This section of the databook provides only a brief overview of our CII, HARTM AN and KILOVAC high performance relay products. For more detailed specifications on these products, visit our website at www.tycoelectronics.com.

High Performance Signal Level Relays

| T0-5 Relays <br> - Hermetically Sealed <br> - Standard or Sensitive Coils <br> - Optional Diodes/Transistors |  |  | Sensitive Version |  | dard <br> sion |  | Standard Version |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| P/N Series | Contact Form | Contact Rating | Coil Voltage | Temperature Rating | Vibration | Shock | Mil-Spec | Features/Options |  |  |
| HM | 2 Form C | Up to 1A | 5 to 30 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial | - |  |  |
| HMD | 2 Form C | Up to 1A | 5 to 30 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  | - | - |
| HS | 2 Form C | Up to 1A | 5 to 48 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  |  | - |
| HSD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  | - | - 1 |
| MA | 2 Form C | Up to 1A | 5 to 30 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/9 | $\bullet$ |  | - 1.5 |
| 1MA | 1 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/7 | - |  | - 1.5 |
| MAD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G ' | 75 G 's | M39016/15 | - | - | - 1.5 |
| 1MAD | 1 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G ' | 75 G 's | M39016/23 | - | - | - 1.5 |
| MADD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/20 | - | - | - 1.5 |
| 1MADD | 1 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/24 | - | - | - 1.5 |
| MAT | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | M28776/1 | - |  | - 1.5 |
| 1MAT | 1 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M28776/5 | - |  | -1.5 |
| MAV | 2 Form C | Up to 1A | 5 to 30 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 380 G 's | 150 G's | M39016/9 Design | $\bullet$ |  | $\bullet$ |
| MAVD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 380 G 's | 150 G's | M39016/15 Design | - | - | - |
| MAVDD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 380 G 's | 150 G's | M39016/20 Design | - | $\bullet$ | - |
| MS | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | M39016/11 |  |  | - 1.5 |
| 1MS | 1 Form C | Up to 1A | 5 to 40 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/10 |  |  | - 1.5 |
| MSD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/16 |  | - | - 1.5 |
| 1MSD | 1 Form C | Up to 1A | 5 to 40 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/25 |  | - | - 1.5 |
| MSDD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/21 |  | - | - 1.5 |
| 1MSDD | 1 Form C | Up to 1A | 5 to 40 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | M39016/26 |  | - | - 1.5 |
| MST | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M28776/3 |  | - | - 1.5 |
| 1MST | 1 Form C | Up to 1A | 5 to 40 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G ' | 75 G 's | M28776/4 |  |  | - 1.5 |
| MSV | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 380 G 's | 150 G's | M39016/11 Design |  |  | - |
| MSVD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 380 G 's | 150 G's | M39016/16 Design |  | - | $\bullet$ |
| MSVDD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 380 G 's | 150 G's | M39016/21 Design |  | - | - |
| PRMA | 2 Form C | Up to 1A | 5 to 30 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | COTS Version* | - |  | - 1.5 |
| PR1MA | 1 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | COTS Version* | - |  | - 1.5 |
| PRMAD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* | $\bullet$ | $\bullet$ | - 1.5 |
| PR1MAD | 1 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | COTS Version* | - | - | - 1.5 |
| PRMADD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* | - | - | - 1.5 |
| PR1MADD | 1 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* | - | - | - 1.5 |
| PRMAT | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* | - |  | - 1.5 |
| PR1MAT | 1 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* | - | - | - 1.5 |
| PRMS | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* |  |  | - 1.5 |
| PR1MS | 1 Form C | Up to 1A | 5 to 40 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* |  |  | - 1.5 |
| PRMSD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* |  | - | - 1.5 |
| PR1MSD | 1 Form C | Up to 1A | 5 to 40 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | COTS Version* |  | - | - 1.5 |
| PRMSDD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* |  | - | - 1.5 |
| PR1MSDD | 1 Form C | Up to 1A | 5 to 40 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* |  | - | - 1.5 |
| PRMST | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* |  |  | - 1.5 |
| PR1MST | 1 Form C | Up to 1A | 5 to 40 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* |  | - | - 1.5 |

## High Performance Signal Level Relays

| . 100 Grid Relays <br> - Hermetically Sealed <br> - Standard or Sensitive Co <br> - Optional Diodes/MOSFET |  |  |  |  | MOSFET Version | Surface Mount Version |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| P/N Series | Contact Form | Contact Rating | Coil Voltage | Temperature Rating | Vibration | Shock | Mil-Spec |  | Featu | ur | tions |  |
| HC | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial | $\bullet$ |  |  |  | - 1 |
| HCD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  | - |  |  |  |
| HCS | 2 Form C | Up to 1A | 5 to 48 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  |  |  |  | 1 |
| HCSD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  |  |  |  | - 1 |
| SHC | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial | $\bullet$ |  |  | $\bullet$ | 1 |
| SHCD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  | - |  | - | 1 |
| SHCS | 2 Form C | Up to 1A | 5 to 48 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  |  |  | - | 1 |
| SHCSD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  |  |  | - | 1 |
| MGA | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/17 | $\bullet$ |  |  |  | 1.5 |
| MGAD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/18 | - | - |  |  | 1.5 |
| MGADD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/19 | $\bullet$ |  | $\bullet$ |  | 1.5 |
| MGAT | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | M28776/6 | - |  |  |  | 1.5 |
| SMGA | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | M39016/17 Design | $\bullet$ |  |  | $\bullet$ | 1.5 |
| SMGAD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/18 Design | - | - |  | - |  |
| SMGADD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | M39016/19 Design | $\bullet$ |  | - | - | 1.5 |
| MGS | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/41 |  |  |  |  | 1.5 |
| MGSD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/42 |  |  |  |  | 1.5 |
| MGSDD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/43 |  |  | - |  | 1.5 |
| MGST | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M28776/7 |  |  |  |  | 1.5 |
| SMGS | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/41 Design |  |  |  | - |  |
| SMGSD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | M39016/42 Design |  |  |  | $\bullet$ | 1.5 |
| SMGSDD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | M39016/43 Design |  |  | - | - | 1.5 |
| PRMGA | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | COTS Version* | $\bullet$ |  |  |  | - 1.5 |
| PRMGAD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | COTS Version* | - | - |  |  | - 1.5 |
| PRMGADD | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | COTS Version* | - |  | - |  | 1.5 |
| PRMGAT | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | COTS Version* | - |  |  |  | 1.5 |
| PRMGS | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | COTS Version* |  |  |  |  | - 1.5 |
| PRMGSD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | COTS Version* |  |  |  |  | 1.5 |
| PRMGSDD | 2 Form C | Up to 1A | 5 to 48 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G's | COTS Version* |  |  | - |  | 1.5 |
| PRMGST | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 75 G 's | COTS Version* |  |  |  |  | 1.5 |
| * Commercial-Off-The-Shelf |  |  |  |  |  |  |  |  |  |  |  |  |
| High Frequency Relays <br> - Hermetically Sealed <br> - Standard or Sensitive Coils <br> - Standard or High Performance Versions <br> - Excellent RF Performance |  |  |  | Standard T0-5 <br> Package |  |  | Sensitive <br> Grid <br> Package |  |  |  |  |  |
| P/N Series | Contact Form | Contact Rating | Coil Voltage | Temperature Rating | Vibration | Shock | Mil-Spec | Features/Options |  |  |  |  |
| MW3 | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  | - |  | - | 3 |
| MW3S | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  |  |  | - | 3 |
| MW4 | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  | $\bullet$ |  |  | - 4 |
| MW4S | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  |  | - |  | 4 |
| MW6 | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  | - |  |  | 6 |
| MW6S | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-55^{\circ}$ to $+85^{\circ} \mathrm{C}$ | 10 G 's | 30 G 's | Commercial |  |  | - |  | 6 |
| MW3HP | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 100 G 's | Commercial |  | $\bullet$ |  | - | 3 |
| MW3HPS | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 100 G 's | Commercial |  |  | - | - | 3 |
| MW4HP | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 100 G 's | Commercial |  | $\bullet$ |  |  | - 4 |
| MW4HPS | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 100 G 's | Commercial |  |  | - |  | 4 |
| MW6 | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 100 G 's | Commercial |  | $\bullet$ |  |  | 6 |
| MW6HPS | 2 Form C | Up to 1A | 5 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ | 30 G 's | 100 G 's | Commercial |  |  | - |  | - 6 |

RF Performance Excellence - MW series high frequency relays are designed to provide excellent insertion loss repeatability over the frequency range from DC to 6 GHz . Exceptional isolation performance makes the MW series relays the logical choices for high performance RF applications.

High Performance Subminiature Relays


Full Size Relays

- Hermetically Sealed
- Optional Terminals
- Optional Mounting Styles



| P/N Series | Contact Form | Contact Rating | Coil Voltage | Temperature Rating |
| :---: | :---: | :---: | :---: | :---: |
| 02 | 2 Form C | Up to 2A | 6 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ |
| 07 | 2 Form C | Up to 10A | 6-120 Vdc, 115 Vac | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ |
| 3SAM | 2 Form C | Up to 2A | 6 to 24 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ |
| 3SDM | 2 Form C | Up to 2A | 6 to 24 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ |
| FW | 2 Form C | Up to 3A | 6.3 to 110 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ |
| FW5A | 2 Form C | Up to 5A | 6.3 to 110 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ |
| RD4 | 4 Form C | Up to 2A | 6 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ |
| RD6 | 6 Form C | Up to 2A | 6 to 26.5 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ |
| RFB | 1 or 2 Form C | Up to 2A | 6 to 26.5 Vdc | $-65^{\circ}$ to $+85^{\circ} \mathrm{C}$ |
| SF | 2 Form C | Up to 2A | 1.8 to 40 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ |
| SF5A | 2 Form C | Up to 5A | 1.8 to 40 Vdc | $-65^{\circ}$ to $+125^{\circ} \mathrm{C}$ |

High Reliability Space Relays

| Products | Services | Features |
| :---: | :---: | :---: |
| Half Size Non-Latching <br> 1, 2, 4, 6 Form C configurations, low level to 10 amps switching <br> Half Size Latching <br> 2 and 4 Form C configurations, low level to 2 amps switching | CII Hi -Rel products from Tyco Electronics are extensively tested to assure that your reliability standards and requirements are met or exceeded. Our services include: <br> - Precision cleaning | - High shock ratings <br> - High vibration ratings <br> - Latching versions <br> - Class 100 cleanroom <br> - Welded assemblies |
| 1/5 Size Non-Latching <br> 2 and 4 Form C configurations, low level to 2 amps switching <br> 1/5 Size Latching 4 Form C, low level to 2 amps switching <br> T0-5/.100 Grid <br> 2 Form C, round and square outlines, low level to 1 amp switching | - Particle impact noise detection <br> - Serialized test data <br> - High shock testing <br> - Test profiles can be <br> - High vibration testing tailored to individual <br> - X-ray testing customer requirements. <br> - Qualification testing | Applications <br> - Space satellites (telecommunications) <br> - Weather tracking <br> - Surveillance <br> - Infrared observation instrumentation <br> - Missile systems <br> - Torpedo guidance circuits |

## High Performance Solid State Relays



## High Performance DC Tubular Solenoids - Series 3000



Pull-Type Solenoid
Custom configurations available
DC tubular pull-type solenoids are designed to provide up to 90 lbs of force with a maximum stroke of .500 inches.

Actual usable force will depend on the stroke and power level.

Coils are available from 6 to 115 Vdc with a continuous duty power level of 2.2 to 54 watts and an intermittent duty power level of 12 to 585 watts.


Push-Type Solenoid
Custom configurations available
DC tubular push-type solenoids provide up to 50 lbs of force with a maximum stroke of . 562 inches.

Actual usable force will depend on the stroke and power level.

Coils are available from 6 to 115 Vdc with a continuous duty power level of 3 to 36 watts and an intermittent duty power level of 9 to 240 watts.


Switch-Type Solenoid Custom configurations available

DC tubular switch-type solenoids provide up to 120 lbs of force with a maximum stroke of 1 inch.

Actual usable force will depend on the stroke and power level.

Coils are available from 12 to 115 Vdc. Two coils are utilized, one energized at pull-in for extra force and a holding coil for continuous operation. Intermittent duty power level of 112 to 700 watts and a continuous power level of 3 to 14 watts.

## High Performance Custom Solenoids - Series 7000



Tyco Electronics can provide customized solenoids with many of the following features :

| Solenoid Styles | Connector Styles | Mounting Styles | Plunger Styles |
| :---: | :---: | :---: | :---: |
| High Temperature | Flexible Leads | Round Flanges | Internal Threads |
| $400 H z$ AC | Connector Assemblies | Square Flanges | External Threads |
| Commercial AC | Right Angle AN Connectors | Threaded Flanges | Clevice Plungers |
| Airframe | Square Flange AN Connectors | Shaped Flanges | Extension Plungers |
| Heavy Duty | Quick-Connects |  | Captive Plungers |
| Two Coil Designs | Screw, Solder \& Stud Terminals |  |  |
| Pressure Sealed |  |  |  |

## High Performance AC Contactors

Side Stable Contactors Latching Contactors Center Off Contactors


FEATURES:

- High reliability
- Meets requirements of Mil-R-6106
- Hermetic or gasket seal available
- Repairable
- Easily tailored to customer requirements

| P/N | Current Rating | Description | P/N | Current Rating | Description |
| :---: | :---: | :---: | :---: | :---: | :---: |
| DH-7YC | 25 Amps | 4PST N.O., 115/208 VAC, 400 Hz | D-31TFA | 100 Amps | 3PDT, Center Off, 115/208 VAC, 400 Hz |
| B-347A | 25 Amps | 3PDT, Double Break, 115/220 VAC, 400 Hz | B-233R | 120 Amps | 3 PDT, 115/200 VAC, 400 Hz |
| DH-14B-3 | 25 Amps | $3 P D T, 115 / 200$ VAC, 400 Hz | BH-201B | 120 Amps | 3PST N.0., 115/200 VAC, 400 Hz |
| B-252 | 30 Amps | 3PDT, Center Off, 115/200 VAC, 400 Hz | D-100A | 120 Amps | 3PST N.0., 115/200 VAC, 400 Hz |
| B-140C | 30 Amps | 3PDT, Center Off, 120 VAC, 60 Hz | B-435K-3 | 140 Amps | 3PDT, Center Off, 115/200 VAC, 400 Hz |
| N-415A-1 | 30 Amps | 3PDT, Double Break, 115/200 VAC, 400 Hz | B-233T | 160 Amps | 3 PDT, 115/200 VAC, 400 Hz |
| SA106E | 30 Amps | 3PDT, 115 VAC, 400/60 Hz | B-451 | 175 Amps | 3PST, Magnetic Latch, 115/200 VAC, 400 Hz |
| DH-7ZAB | 50 Amps | 3 3PD, $115 / 200$ VAC, 400 Hz | B-312D-1 | 175 Amps | 3 3PST N.O., 120/208 VAC, $50 / 60 \mathrm{~Hz}$ |
| D-7GRZ | 50 Amps | 3 PDT, 115/200 VAC, 400 Hz | B-499 | 35/200A | 3PDT, Double Break, 115 VAC, $400 \mathrm{~Hz} / 28$ VDC |
| NN-301 | 50 Amps | SPDT w/Time Delay on Pickup, 115 VAC, 400 Hz | BR-301AY | 200 Amps | 3PST N.0., 115/200 VAC, 400 Hz |
| D-7GR | 50 Amps | 3PDT, 115/200 VAC, 400 Hz | B-393P | 200 Amps | 3PDT, Center Off, 120/208 VAC, 50/60/400 Hz |
| N-421A | 50 Amps | 3PST N.C., 115/200 VAC, 400 Hz | B-345LS | 225 Amps | 3PDT, Center Off, 115/200 VAC, 400 Hz |
| D-18F | 50 Amps | 3PDT, Center Off, 115/200 VAC, 400 Hz | B-394 | 250 Amps | $3 P D T, 115 / 200$ VAC, 400 Hz |
| DR-18E-5 | 50 Amps | 2SPST, Center Off, 115/208 VAC, 400 Hz | BH-124AA | 250 Amps | 3PDT, Center Off, 115/200 VAC, 400 Hz |
| B-227 | 60 Amps | 3PDT, Center Off, 115/200 VAC, 400 Hz | BH-360A | 250 Amps | $3 P D T, 115 / 200$ VAC, 400 Hz |
| B-138S | 60 Amps | 3PST N.O., 115/200 VAC, 300-600 Hz | B-430-1 | 275 Amps | 3PST, Magnetic Latch, 115/200 VAC, 400 Hz |
| DH-7BC | 60 Amps | 3 3PD, 115/208 VAC, 400 Hz | B-429A-1 | 300 Amps | 3PST N.O., 115/200 VAC, 400 Hz |
| BR-329BC | 60 Amps | 2PST N.0., $115 \mathrm{VAC}, 60 \mathrm{~Hz}$ | B-874L | 335 Amps | 3 PST, $200 \mathrm{VAC}, 400 \mathrm{~Hz}$ |
| SA120B | 60 Amps | 3PDT, Side Stable, 115/200 VAC, 400 Hz | B-429CA | 350 Amps | 3PST N.O., 120/208 VAC, 400 Hz |
| NH-505 | 90 Amps | 3PDT, Center Off, 115/200 VAC, 400 Hz | B-479A-1 | 350 Amps | 3PST, Magnetic Latch, 120/208 VAC, 400 Hz |
| D-25BD | 100 Amps | 3 3PD, 115/200 VAC, 400 Hz | B-484 | 500 Amps | 3PST, Magnetic Latch, 115/200 VAC, 400 Hz |

## High Performance DC Contactors



## FEATURES:

- High reliability
- Meets requirements of Mil-R-6106
- Hermetic or gasket seal available
- Repairable
- Easily tailored to customer requirements

| P/N | Current Rating | Description |  | P/N | Current Rating |
| :---: | :---: | :---: | :---: | :---: | :---: |

## High Performance AC/DC Contactors

| Side Stable Contactors |  |  |  |
| :--- | :--- | :--- | :--- |
| P/N | Current Rating | 2PDT N.C., $28 \mathrm{VDC}, 60$ or 400 Hz |  |

## Sensors \& Monitors

Voltage \& Current Sensors Phase Rotation Sensors Ground Power Monitors Frequency Sensors


## FEATURES:

- High reliability
- Meets requirements of Mil-R-6106
- Hermetic or gasket seal available
- Lightweight construction units available
- Epoxy encapsulated units available

| P/N | Current Rating | Description | P/N | Current Rating | Description |
| :---: | :---: | :---: | :---: | :---: | :---: |
| AVR-869C |  | SPDT, 28 VDC, $3 \varnothing$ Sequence Relay | Q-50AC | 0.3 Amp | SPDT, 28 VDC, Encapsulated Current Indicator |
| E-312P | 5 Amps | SPDT, 28 VDC, 400 Hz, Overvoltage Sensor | CH-27 | 0.75 Amp | 2PDT, 28 VDC, Current Sensor |
| E-381 | 5 Amps | SPDT, $130 \mathrm{VAC}, 400 \mathrm{~Hz}$, Undervoltage Sensor | CH-26 | 1 Amp | SPST, 28 VDC, Current Sensor |
| E-308AA | 7.5 Amps | SPDT, $120 \mathrm{VDC}, 60 \mathrm{~Hz}, 3 \varnothing$ Undervoltage Sensor | A-848KK | 75 Amps | 2PST, 28 VDC, Automatic Drop Out |
| E-329E | 10 Amps | 3PDT, 115 VAC, Drop Out Time Delay | A-772XTB | 200 Amps | SPST N.O., 28 VDC, Delayed Drop Out |
| E-308AH | 10 Amps | 3PDT, 115 VAC, Drop Out Time Delay | A-701P-1 | 400 Amps | SPST N.O., 28 VDC , Remote Reset |
| E-312A-1 | 10 Amps | $2 P D T, 440$ VAC, $400 \mathrm{~Hz}, 3 \varnothing$ Voltage Sensor | A-701P-3 | 500 Amps | SPST N.O., 28 VDC, Remote Reset |
| E-348 | 0.25 Amp | SPST N.O., 28 VDC, Overload Relay | A-792CA | 600 Amps | 2 PST N.O., 28 VDC, Automatic Drop Out |
| E-308 | 3 Amps | SPDT, 28 VDC, Adjustment Pick-Up Voltage | E-326 | 1 Amp | 115 VAC, $400 \mathrm{~Hz}, 3 \varnothing$ Rotation Sensor |
| AVR-834 | 3 Amps | SPDT, 28 VDC, DC Voltage Sensor | E-326A | 1 Amp | $115 \mathrm{VAC}, 60 \mathrm{~Hz}, 3 \varnothing$ Rotation Sensor |
| E-311P | 10 Amps | 2PDT, 28 VDC, Drop Out Time Delay | E-341 | 2 Amps | SPDT, 208 VAC, $400 \mathrm{~Hz}, 3 \varnothing$ Rotation Sensor |
| QR-50AF | 0.25 Amp | SPST, 115 VAC, Encapsulated Current Indicator | E-326E | 5 Amps | SPDT, 460 VAC, $60 \mathrm{~Hz}, 3 \varnothing$ Rotation Sensor |
| QR-50DA | 0.25 Amp | SPST, 115 VAC, Encapsulated Current Indicator | E-145Z | 25 Amps | 2PST, 120/208 VAC, 400 Hz , Phase Loss Relay |
| E-387 | 1 Amp | SPDT, 115 VAC, 400 Hz, Current Sensor | E-145Y | 60 Amps | 2PST, 120/208 VAC, 400 Hz , Phase Loss Relay |
| E-145AK-4 | 5 Amps | SPST, 115 VAC, $3 \varnothing$ Current Sensor | E-327AD | 1 Amp | 2PST, 115 VAC, Ground Power Monitor |
| BE-500G-1 | 50 Amps | 3PST N.O., 120 VAC, Overload Current Sensor | E-384 | 3 Amps | SPDT, 28 VDC, Under Frequency Sensor |
| Q-50B | 0.25 Amps | SPDT, 28 VDC, Encapsulated Current Indicator |  |  |  |

Plug-In Contactors
Side Stable Contactors Latching Contactors Center Off Contactors

| P/N | Current Rating | Description |  |
| :---: | :---: | :---: | :---: |
| BP-353 | 50 Amps | 3PST N.O., $115 / 200 \mathrm{VAC}, 400 \mathrm{~Hz}$ | BP |
| DP-25BD | 100 Amps | 3PDT, $115 / 200 \mathrm{VAC}, 400 \mathrm{~Hz}$ | B |
| DP-31C | 100 Amps | 3PDT, Center $0 \mathrm{ff}, 115 / 200 \mathrm{VAC}, 400 \mathrm{~Hz}$ | BP |




## FEATURES:

- Fast installation/removal time
- Improved maintenance safety
- High reliability
- Meets requirements of Mil-R-6106
- Lightweight construction


## Description

3PST N.O., ELCU, 115/200 VAC, 400 Hz 3PST N.0., 115/200 VAC, 400 Hz
3PST, Magnetic Latch, 115/200 VAC, 400 Hz

## DC Automatic Dropout Contactors

## DC Automatic Drop Out

Time Delay Relays
Phase Imbalance Sensors
Automatic Drop Out Contactors

| P/N | Current Rating | Description |
| :---: | :---: | :---: |
| E-55 | 2 Amps | 4PDT, 28 VDC, Time Delay |
| B-178 | 60 Amps | 3PST, 120/208 VAC, 400 Hz, Phase Sensor |



P/N Current Rating Description
A-757D 600 Amps SPST, 28 VDC, Automatic Dropout @ 180 Amps

## AC \& DC High Voltage Contactors

| High Voltage <br> AC Contactors <br> DC Contactors <br> Center Off Contactors <br> Latching Contactors |  |
| :--- | :--- | :--- | :--- |
| P/N | Current Rating |

## Space Contactors



| Power Distribution Panels <br> Modular Units <br> Standard Panels | FEATURES: <br> - Primary and secondary power distribution <br> - Main power contactors <br> - Secondary power contactors/relays <br> - Current and voltage sensing <br> - Logic/control signals | - Contactors/circuit breaker plug-in units <br> - Power management capabilities <br> - Value added <br> - Space saving/weight saving designs <br> - Custom designs for specific applications |
| :---: | :---: | :---: |
| Modular Units |  | Standard Panels |
| - Utilizes plug-in line replaceable modules installed on a panel mounting system, or back-plane. LRMs may be contactors, circuit breakers, sensing units, ELCUs, etc. <br> - Designed as a fault-free zone with no moving parts. Intended as a permanent installation on mother vehicle. <br> FEATURES: <br> - Weight savings over standard discrete components <br> - Value added <br> - Ease of maintenance <br> - Reduced OEM labor | ounting system, or - Utilizes actuator and conta <br> together and packaged in  <br> control connections.  | assemblies from discrete contactors, bussed e or more enclosures with external power and <br> sing, fuses, circuit breakers, power monitors, etc distribution approach <br> ance <br> abor |
| These are just some of the HARTMAN products capabilities from Tyco Electronics: |  |  |
| - Voltage, Current \& Power Sensing <br> - Over \& Reverse Current <br> - Over \& Under Voltage <br> - Over \& Under Frequency <br> - Ground Fault \& Detection <br> - Time Delay | - Phase Sequence, Unbalance \& Failure <br> - Impedance Relays <br> - Ripple Detection <br> - Positive, Negative \& Zero Sequence Voltage <br> - Signal Amplification | - Turbine Starting <br> - Trip-Free, Electrical \& Mechanical Interlocking <br> - Electrical \& Magnetic Latching <br> - Polarization <br> - Power Switching |

High Voltage DC Relays \& Contactors



## High Voltage DC Relays \& Contactors

| 8 kV <br> High Volt Vacuum Gas Filled | Reed Relays ays elays |  |  |  | $20 \mathrm{kV}$ <br> Vacuum Relay |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| P/N Series | Carry Current | Power Switching* | RF Ratings | Contact Form | P/N Series | Carry Current | Power Switching* | RF Ratings | Contact Form |
| S06JNB | 6 amps | Carry Only | Yes | SPST-NC | H-19 | 30 amps | Special | Yes | DPDT |
| HC-6 | 8 amps | Make Only | No | SPDT | 25 kV <br> Vacuum Relays Gas Filled Relays |  | - |  | - |
| H-18 | 10 amps | Yes | Yes | SPDT |  |  | 4 |  | W |
| K47A | 12 amps | Yes | Yes | SPST-NO |  |  |  |  |  |
| K47B | 12 amps | Yes | Yes | SPST-NC |  |  |  |  |  |
| HC-4 | 15 amps | Yes | No | SPDT |  |  |  |  |  |
| HC-2 | 25 amps | No | No | SPDT |  |  | Power Switching* | RF Ratings | Contact Form |
| K44P | 50 amps | Yes | Yes | SPST-Latch | KC-38 | 15 amps | Make Only | No | SPST-NC |
| 10 kV |  |  |  |  | K62A | 18 amps | Special | No | SPST-NO |
| High Vo | Reed Relays | novae |  |  | K62B | 18 amps | Special | No | SPST-NC |
| Vacuum | lays | SO5LTA135 |  | Klowe sigy | K62C | 18 amps | Special | No | SPDT |
|  |  |  |  |  | H-17 | 30 amps | Special | Yes | SPDT |
|  |  |  | 1 |  | KC-28 | 30 amps | Make Only | No | SPST-NO |
| P/N Series | Carry Current | Power Switching* | RF Ratings | Contact Form | KC-32 | 45 amps | Special | No | SPST-NC |
| S05LTA | 5 amps | Yes | No | SPST-NO | KC-30 | 55 amps | Carry Only | Yes | SPST-NC |
| S05LTB | 5 amps | Yes | No | SPST-NC | KC-22 | 65 amps | Special | No | SPST-NO |
| K81A | 10 amps | Special | No | SPST-NO | KC-20 | 110 amps | Carry Only | Yes | SPST-NO |
| K81B | 10 amps | Special | No | SPST-NC | 30 kV |  |  |  |  |
| K81C | 10 amps | Special | No | SPDT | Vacuum |  |  |  |  |
| K43A | 25 amps | Special | Yes | SPST-NO |  |  |  |  |  |
| K43B | 25 amps | Special | Yes | SPST-NC |  |  |  |  |  |
| K43C | 25 amps | Special | Yes | SPDT |  |  |  |  |  |
| K43R | 24 amps | Carry Only | Yes | SPDT-Latch | P/N Series | Carry Current | Power Switching* | RF Ratings | Contact Form |
| K43P | 24 amps | Carry Only | Yes | SPST-Latch |  | 30 amps | Carry Only | Yes | SPST-NC |
|  |  |  |  |  | H-24 | 30 amps | Carry Only | Yes | SPST-NO |
| 12 kV <br> Vacuum |  |  |  |  | $35 \text { kV }$ <br> Gas Fille |  |  |  |  |
| P/N Series | Carry Current | Power Switching* | RF Ratings | Contact Form | P/N Series | Carry Current | Power Switching* | RF Ratings | Contact Form |
| H-14 | 30 mps | Carry Only | Yes | DPDT | K61A | 10 amps | Make Only | No | SPST-NO |
| H-16 | 30 mps | Carry Only | Yes | DPDT | K61B | 10 amps | Make Only | No | SPST-NC |
| 15 kV |  | \% |  |  | K61C | 10 amps | Make Only | No | SPDT |
| High Volt | Reed Relays |  |  |  | K60C | 10 amps | Make Only | No | SPDT |
| Vacuum Gas Filled | lays <br> elays |  |  |  | 50 kV <br> Vacuum <br> Gas Fille | lays <br> elays |  |  |  |
| P/N Series | Carry Current | Power Switching* | RF Ratings | Contact Form |  |  |  | $\cdots$ |  |
| S05MTA | 5 mps | Carry Only | No | SPST-NO |  |  |  |  |  |
| KC-15 | 12 amps | Make Only | No | SPDT | P/N Series | Carry Current | Power Switching* | RF Ratings | Contact Form |
| KC-16 | 12 amps | Make Only | No | SPDT | K64C | 10 amps | Make Only | No | SPDT |
| KC-14 | 15 amps | Yes | No | SPDT | H-25 | 30 mps | Special | No | SPDT |
| KC-18 | 15 amps | Yes | No | SPDT | 70 kV |  |  |  |  |
| H-8 | 15 amps | Yes | No | SPDT | Gas Filled |  |  |  |  |
| KC-12 | 30 amps | Yes | Yes | SPDT |  |  |  |  |  |
| H-26 | 30 amps | Carry Only | Yes | 4PDT |  |  |  |  |  |
| KC-8 | 30 amps | Yes | Yes | SPDT |  |  |  |  |  |
| KC-2 | 50 amps | Carry Only | Yes | SPDT | P/N Series | Carry Current | Power Switching* | RF Ratings | Contact Form |
| KC-11 | 50 amps | Carry Only | Yes | SPDT | K70A | 10 amps | Make Only Make Only | No | SPST-NO SPST-NC |
| Consult | for Power | ching Level |  |  | K70C | 10 amps | Make Only | No | SPDT |

* Consult Factory for Power Switching Level


## Protective Relays

We offer a broad range of protective relays for use in portable generators, automatic transfer switches, irrigation pumps, industrial facilities, utilities, refineries, oil field, urban rapid transit systems, aircraft, ships and submarines. Some models are qualified by the military for use in ground support equipment, aircraft and Navy ships' high shock applications. These are managed in the DOD supply system under NSN classes 5945 and 6110. KILOVAC protective relays were previously marketed under the WILMAR brand.

Following is a just a partial listing of our protective relay offering:


## NOTE

WD.. Series protective relays are described in section 13 of this databook. For details on other models, please visit our website at www.tycoelectronics.com.

## Americas

| Argentina - Buenos Aires |  |
| :--- | :--- |
| Phone: $\quad+54-11-4733-2200$ |  |
| Fax: | $+54-11-4733-2250$ |
|  |  |
| Brasil - São Paulo |  |
| Phone: $\quad+55-11-3611-1311$ |  |
| Fax: $\quad+55-11-3611-0397$ |  |

Canada - Markham
Phone: $\quad+905-475-6222$
Fax: $\quad+905-474-5520$
Product Information Center:

| (Technical |
| :--- |
| Support) |

Phone: $\quad+905-470-4425$
Fax: $\quad+905-474-5525$
Colombia - Bogota
Phone: $\quad+57-1-240-9396$
Fax: $\quad+57-1-660-0206$
Mexico - Mexico City
Phone: $\quad+52-55-5-729-0425$
Fax: $\quad+52-55-5-398-1430$

United States-Harrisburg, PA
Phone: $\quad+717-564-0100$
Fax: $\quad+717-986-7575$
Product Information Center:
(Technical Support)
Phone: +800-522-6752
Fax: $\quad+717-986-7575$

For Latin/South American
Countries not shown
Phone: +57-1-240-9396
Fax: +57-1-660-0206
+55-11-3611-0397

| Japan - Kawasaki, Kanagawa | New Zealand - Auckland |
| :---: | :---: |
| Phone: +81-44-844-8079 | Phone: +64-9-634-4580 |
| Fax: $\quad+81-44-844-8733$ | Fax: $\quad+64-9-634-4586$ |
| Product Information Center: |  |
| (Technical Support) | Philippines - Makati City |
| Phone: +81-44-844-8013 | Phone: +632-867-8641 |
| Fax: +81-44-812-3200 | Fax: +632-867-8661 |
| Raychem Products |  |
| Phone: +81-44-900-5102 | People's Republic of China |
| Fax: $\quad+81-44-5025-5027$ | Hong Kong |
|  | Phone: +852-2735-1628 |
| Korea - Seoul | Fax: +852-2735-0243 |
| Phone: +82-2-3274-0535 |  |
| Fax: $\quad+82-2-3274-0524 / 0531$ | Shanghai |
|  | Phone: +86-21-6485-0602 |
| Malaysia - Selangor | Fax: $\quad+86-21-6485-0728$ |
| Phone: +60-3-7053055 |  |
| Fax: +60-3-7053066 | Shunde |
|  | Phone: +86-765-775-1368 |
|  | Fax: $\quad+86-765-775-2823$ |


| Singapore - Singapore |  |
| :---: | :---: |
| Phone: | +65-4820-311 |
| Fax: | +65-4821-012 |
| Raychem P | Products |
| Phone: | +65-4866-151 |
| Fax: | +65-6545-514 |
| Taiwan - Taipei |  |
| Phone: | +886-2-2664-9977 |
| Fax: | +886-2-2664-9900 |
| Thailand - Bangkok |  |
| Phone: | +66-2-955-0500 |
| Fax: | +66-2-955-0505 |
| Vietnam - Ho Chi Minh City |  |
| Phone: | +84-8-8232-546/7 |
| Fax: | +84-8-8221-443 |

Asia/Pacific

| Australia - Sydney |  |
| :---: | :---: |
| Phone: | +61-2-9840-8200 |
| Fax: | +61-2-9899-5649 |
| Product Information Center: |  |
| (Technical Support) |  |
| Phone: | +61-2-9554-2600 |
| Fax: | +61-2-9502-2556 |
| India - Bangalore |  |
| Phone: | +91-80-841-0200 |
| Fax: | +91-80-841-0210 |
| Indonesia - Jakarta |  |
| Phone: | +6221-526-7852 |
| Fax: | +6221-526-7856 |

## Europe/Middle East/Africa

| Austria - Vienna |  | Germany - Bensheim |  |
| :---: | :---: | :---: | :---: |
| Phone: | +43-190-560-0 | Phone: | +49-6251-133-0 |
| Fax: | +43-190-560-1333 | Fax: | +49-6251-133-1600 |
|  |  | Produc (Techn | nformation Center: |
| Belgium - Kessel-Lo |  | (Technical Support) |  |
| Phone: | +32-16-352-300 | Phone: | +49-6251-133-1999 |
| Fax: | +32-16-352-352 | Fax: | +49-6251-133-1988 |
| Bulgaria - Sofia |  | Germany - Langen |  |
| Phone: | +359-2-971-2152 | Phone: | +49-6103-709-0 |
| Fax: | +359-2-971-2153 | Fax: | +49-6103-709-1223 |
| Czech Republic - Kurim |  | Germany - Speyer |  |
| Phone: | +420-5-41-162-111 | Phone: | +49-6232-30-0 |
| Fax: | +420-5-41-162-223 | Fax: | +49-6232-30-2243 |
| Denmark - Viby J |  | Germany |  |
| Phone: | +45-70-15-52-00 | HTS Di | sion - Neunkirchen |
| Fax: | +45-86-29-51-33 | Phone: | +49-2247-305-0 |
|  |  | Fax: | +49-2247-305-122 |
| Egypt - Cairo |  | Great Britain - |  |
| Phone: | +20-2-417-76-47 |  |  |
|  | +20-2-419-23-34 | Stanmore Middlesex |  |
|  |  | Phone: | +44-181-954-2356 |
| Estonia - Tallinn |  | Fax: | +44-181-954-6234 |
| Phone: | $+372-65-05-474$ | Product Information Center: (Technical Support) |  |
|  | +372-65-05-470 | Freeph | GB: 0800-267-666 |
|  |  | Phone: | +44-141 $8108967 \ldots 69$ |
| Finland - Helsinki |  | Fax: | +44-141810 8971 |
| Phone: | +358-95-12-34-20 | Great Britain - Dorcan, Swindon |  |
|  | +358-95-12-34-250 | Raychem Products |  |
|  |  | Phone: | +44-1793-528171 |
| France - |  | Fax: | +44-1793-572516 |
| Cergy-Pontoise |  |  |  |
| Phone: | +33-1-3420-8888 | Greece - Athens |  |
| Fax: | +33-1-3420-8600 | Phone: | +30-1-9370-396/397 |
| Product Information Center: (Technical Support) |  | Fax: | +30-1-9370-655 |
| Phone:Fax: | $\begin{aligned} & +33-1-3420-8943 \\ & +33-1-3420-8623 \end{aligned}$ | Hungary - Budapest |  |
|  |  | Phone: | +36-1-289-1000 |
|  |  | Fax: | +36-1-289-1010 |
| France |  |  |  |
| Tyco Electronics Export -St Ouen L'Aumone |  | Ireland - Dublin |  |
|  |  | Phone: | +353-1-820-3000 |
| Phone:Fax: | $\begin{aligned} & +33-1-3440-7200 \\ & +33-1-3440-7220 \text { or } \\ & +33-1-3440-7230 \end{aligned}$ |  | +353-1-820-9790 |
|  |  | Israel | okneam |
|  |  | Phone: | +972-4-959-0508 |
|  |  | Fax: | +972-4-959-0506 |





[^0]:    | Specifications and/or agency recognitions do not necessarily apply to all models within a particular series. When multiple ratings are listed, no individual rating may be exceeded by the combination of others. |
    | :--- |
    | Dimensions are shown for |
    | Dimensions are in inches over | reference purposes only. (millimeters) unless otherwise specified.

[^1]:    Specifications and／or agency recognitions do not necessarily apply to all models within a particular series．When multiple ratings are listed，no individual rating may be exceeded by the combination of others．
    $\begin{array}{ll}\text { Dimensions are shown for } & \text { Dimensions are in inches over } \\ \text {（millimeters）unless otherwise }\end{array}$ （millimeters）unless otherw ise specified．

[^2]:    | Specifications and/or agency recognitions do not necessarily apply to all models within a particular series. When multiple ratings are listed, no individual rating may be exceeded by the combination of others. |
    | :--- |
    | Dimensions are shown for $\quad$ Dimensions are in inches over | reference purposes only.

[^3]:    | Specifications and/or agency recognitions do not necessarily apply to all models within a particular series. When multiple ratings are listed, no individual rating may be exceeded by the combination of others. |
    | :--- |
    | Dimensions are shown for $\quad$ Dimensions are in inches over | reference purposes only. (millimeters) unless otherwis subject to change.

[^4]:    Specifications and/or agency recognitions do not necessarily apply to all models within a particular series. When multiple ratings are listed, no individual rating may be exceeded by the combination of others.

[^5]:    Specifications and/or agency recognitions do not necessarily apply to all models within a particular series. When multiple ratings are listed, no individual rating may be exceeded by the combination of others.

[^6]:    | Specifications and/or agency recognitions do not necessarily apply to all models within a particular series. When multiple ratings are listed, no individual rating may be exceeded by the combination of others. |
    | :--- |
    | Dimensions are shown for $\quad$ Dimensions are in inches over | reference purposes only. (millimeters) unless otherwise subject to change.

[^7]:    Specifications and/or agency recognitions do not necessarily apply to all models within a particular series. When multiple ratings are listed, no individual rating may be exceeded by the combination of others.

[^8]:    Specifications and／or agency recognitions do not necessarily apply to all models within a particular series．When multiple ratings are listed，no individual rating may be exceeded by the combination of others．
    Dimensions are shown for Dimensions are in inches over Specifications and availability www．tycoelectronics．com reference purposes only．

[^9]:    $\frac{\text { Specifications and/or agency recognitions do not necessarily apply to all models within a particular series. When multiple ratings are listed, no individual rating may be exceeded by the combination of others. }}{\text { Dimensions are shown for }}$.

[^10]:    | Specifications and／or agency recognitions do not necessarily apply to all models within a particular series．When multiple ratings are listed，no individual rating may be exceeded by the combination of others． |
    | :--- |
    | Dimensions are shown for $\quad$ Dimensions are in inches over |

[^11]:    NOTE: A question tree that may help you in selecting an appropriate low-signal relay for your application can be found on the next page.

[^12]:    Mechanical Data
    Termination: Printed circuit terminals.
    Enclosure ( $94 \mathrm{~V}-\mathbf{0}$ Flammability Ratings): OMR: Open, no cover.
    OMR-C: Snap-on dust cover.
    Weight: $0.16 \mathrm{oz}(4.5 \mathrm{~g})$ approximately.

[^13]:    Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

[^14]:    Note: This data is based on the max. allowable

[^15]:    * Not suitable for immersion cleaning processes.

[^16]:    All values are given for coil without preenergization, at $20^{\circ} \mathrm{C}$ ambient. At $70^{\circ} \mathrm{C}$ after preenergization with $11 \times$ nominal voltage, the maximum operating voltage is $85 \%$ of nominal.
    At $70^{\circ} \mathrm{C}$ maximum coil voltage is $11 \times$ nominal

[^17]:    * Typical loads at 28VDC or 120VAC, resistive, for comparison purposes. See catalog pages for a given series for detailed rating specifications.

[^18]:    $1_{\text {Listed by C.S.A. for } 5 \text { A @ 120VAC }} 80 \%$ PF

[^19]:    Note 1: Flange mount sockets pre-assembled on steel mounting plates. Grounding is not recommended for currents of 5 amps $A C \&$ above.
    Note 2: Listed hold-down springs cannot be used for R10S.
    Note 3: On R10L series hold down spring fits to the side of light emitting diode.
    Note 4: Use 40G432 insulator or suitable insulator (2 per socket).
    Note 5: Snap-mount relay sockets snap onto 24A110 mounting rail without extra hardware.
    Note 6: $27 E 893$ cannot be used with KUIP and KUGP series relays.
    Relay and Socket Usage Chart continued on next page.

[^20]:    Note 1: Flange mount sockets pre-assembled on steel mounting plates. Grounding is not recommended for currents of $5 \mathrm{amps} A C \&$ above
    Note 2: Listed hold-down springs cannot be used for R10S.
    Note 3: On R10L series hold down spring fits to the side of light emitting diode.
    Note 4: Use 40G432 insulator or suitable insulator (2 per socket).
    Note 5: Snap-mount relay sockets snap onto 24A110 mounting rail without extra hardware.
    Note 6: $27 E 893$ cannot be used with KUIP and KUGP series relays.

[^21]:    * Typical loads for comparison purposes. See catalog pages for a given series for detailed rating specifications

[^22]:    Our authorized distributors are more likely to maintain the following items in stock for immediate delivery.

[^23]:    ORDERING NOTE: "Standard" terminals need not be specified in the "Ordering Information" chart above. "Special" terminals are offered on a special order basis. Special order items may be subject to extended leadtimes and significant minimum order quantities. Your Tyco Electronics sales engineer must consult with the factory before providing price and availability information regarding items with these options.

[^24]:    ORDERING NOTE: "Standard" terminals need not be specified in the "Ordering Information" chart above. "Special" terminals are offered on a special order basis. Special order items may be subject to extended leadtimes and significant minimum order quantities. Your Tyco Electronics sales engineer must consult with the factory before providing price and availability information regarding items with these options.

[^25]:    * Typical loads at 14VDC, resistive, for comparison purposes. See catalog pages for a given series for detailed rating specifications.

[^26]:    Note: See page 1011 for Wiring Diagrams, Suggested PC Board Layouts and Outline Dimensions.

[^27]:    *Standard Coil Voltages: F = 12VDC
    $\mathrm{H}=24 \mathrm{VDC}$ (Consult factory for availability)

[^28]:    *Standard Coil Voltages: $\mathrm{F}=12 \mathrm{VDC}$
    $\mathrm{H}=24 \mathrm{VDC}$ (Consult factory for availability)

[^29]:    * If control switch is closed when power is applied, relay will immediately energize. A 50 millisecond minimum switch closure is required. IMPORTANT: A dry circuit switch is recommended. A "dry circuit" switch is one rated to reliably switch currents of less than 50mA. Use of a switch rated for other than dry circuit may result in failure of the time delay relay to function properly.

[^30]:    * If control switch is closed when power is applied, relay will immediately energize. A 50 millisecond minimum switch closure is required. IMPORTANT: A dry circuit switch is recommended. A dry circuit" switch is one rated to reliably switch currents of less than 50mA. Use of a switch rated for other than dry circuit may result in failure of the time delay relay to function properly.
    ** Note: Input polarity for DC operation. For most reliable operation on AC, connect high side to " + " and low side to "-".

[^31]:    Authorized distributors are likely to stock the following:
    None at present.

