Circuit Breakers
- W28 series: Push to Reset Fuseholder Thermal Circuit Breaker
- W58 series: Push To Reset Only Thermal Circuit Breaker
- W23/W31 series: Toggle or Push/Pull Actuator Thermal Circuit Breaker
- W6/W9 series: Magnetic Hydraulic Circuit Breakers

Printed Circuit Board Relays
- V23100-V4 series: Dual In-line Package and Single In-line Package Dry Reed Relays
- V23111 series: Miniature, Sealed PC Board Relay
- V23026 series: Miniature, Sealed PC Board Relay
- T81N/T81H series: Ultraminiature, High Density PC Board Relay
- V23079 series: 5 Amp, High Dielectric 2 Pole Polarized FCC Part 68 PC Board Relay
- V23105 series: High Sensitivity, DIP PC Board Relay
- T84 series: 4 Pole, High Dielectric PC Board Relay

Printed Circuit Board Relays
- PE series: 5 Amp Miniature Printed Circuit Board Relay
- RE series: 6 Amp Miniature Printed Circuit Board Relay
- T77 series: 10 Amp Miniature PC Board Relay
- T73 series: Low Profile, 10 Amp Printed Circuit Board Relay
- T7N series: 10 Amp Miniature PC Board Relay
- T7C series: 12 Amp Miniature Power PC Board Relay
- T75 series: 14 Amp, PC Board Miniature Relay
- RT series (DC Coil): 16 Amp PC Board Miniature Relay
- RT series (AC Coil): 16 Amp Miniature Printed Circuit Board Relay
- RT series (Latching): 16 Amp miniature Printed Circuit Board Relay

Printed Circuit Board Relays
- T90 series: Low Cost, 30 Amp Printed Circuit Board Relay
- T9A series: Low Cost 30 Amp PC Board or Panel Mount Relay
- T92 series: Two-Pole, 30 Amp PC Board or Panel Mount Relay
- V23047 series: SR2M Safety Relay - PCB, neutral, monostable relay with two forcibly guided contacts.

Safety Relays
- V23049-B series: SR4 Safety Relay - PCB, polarized, monostable relay with four forcibly guided contacts.
- V23050 series: SR6 Safety Relay - PCB, neutral, monostable relay with six forcibly guided contacts.
- V23048 series: ZW Safety Relay - PCB, neutral, monostable relay with six forcibly guided contacts.

General Purpose Relays
- R10 series: General Purpose Dry Circuit to 7.5 Amp Multicontact AC or DC Relay
- KHA series: General Purpose Dry Circuit to 5A Multicontact AC or DC Relay
- PT series: 6 to 12 Amp Miniature Relay 2, 3 or 4 Pole, PCB or Plug-in
- K10 series: 15 Amp General Purpose Miniature Relay
- KU series: KUP Enclosed Relay
  - KUPE VDE 8mm Coil to Contacts
  - KUPG VDE 8mm 3mm Gap Coil to contacts
  - KUEP 10 Amp 150VDC Load Switching UMP 15 Amp 277VAC

General Purpose & Power Relays
- KUP93 series: General Purpose 3 to 10 Amp, Multicontact AC or DC Relay
- RM series: RM2/3/7 2/3 Pole 10/16 Amp RM5/6 VDE 3mm Contact Gap RM8 25 Amp
- KRP, KRP, KA, KR series: 5 to 10 Amp General Purpose Relay
- KRP-3-H series: 20 Amp Small AC or DC Relays
- MT series: 10 Amp General Purpose Relay
- DIN Rail Mount: Screw Terminal Socket Track Mounting System
- KUPH series: 30 Amp Power Relays
- S6R/S87R series: Low Cost 20 Amp Industrial Relays
- PM series: Heavy Duty 25 Amp Multicontact AC or DC Power Relay
Power Relays & Contactors

**PRD series** 10 to 50 Amp Heavy Duty AC or DC Power Relay

**P25 series** Definite Purpose Magnetic Contactor 25 Ampere Full Load 30 Ampere Resistive AC & DC Coils

**P30/P40 series** Magnetic Contactor 30/40 Amp Full Load 40/50 Amp Resistive AC & DC Coils

**P31/P41 series** Magnetic Contactor 16 to 40 Amp Full Load 20 to 50 Amp Resistive

Latch Relays

**KUL series** 10 Amp Magnetic Latching Relay

**KBP series** 10 Amp Dual Coil Latching Relay

**S89R/S90R series** Bistable, Impulse Relay 15 and 20 Amp Industrial Rating Continuous Coil Rating

Automotive Relays

**V23086 series** 20 Amp Micro K (Single & Dual) PC Board Relay for Automotive Applications

**T72M series** 20 Amp Miniature PC Board Relay for Automotive Applications

**VKP series** Compact, 40 Amp, Open or Sealed PC Board Relay For Automotive Applications

**VFM series** 20 Amp Relay With Quick Connect Terminals for Automotive Applications

**VF4 series** 40 Amp Relay With PC Board or Quick Connect Terminals for Automotive Applications

**VF7 series** 70 Amp Relay With PC Board or Quick Connect Terminals for Automotive Applications

**VTF series** Flasher Modules for Automotive Applications

Solid State Relays

**SSRT series** "Hockey Puck" Solid State Relay With Snubberless Triac Output

**SSR series** "Hockey Puck" Solid State Relay With Paired SCR Output

**SSRD series** Dual AC Output Solid State Relay

**SSRQ series** Quad AC Output Solid State Relay

Solid State Input/Output Modules

**IAC/OAC IDC/ODC** Input/Output Modules

**2IO series** Mounting Boards for Input/Output Modules

**IACM/OACM IDCM/ODCM** Slim Line Input/Output Modules

**2IOM series** Space Saving Mounting Boards for Slim Line Input/Output Modules

Time Delay Relays

**3RP15 series** Multifunction Solid State DIN Mount Time Delay Relay

**CNT series** Multifunction, Digital Time Delay Relay/Counter

**CNS series** Multifunction Time Delay Relay

**CNM5 series** Multifunction Time Delay Relay For Plug-In or Panel Mounting

**CN1 series** On Delay, Time Delay Relay For Plug-In or Panel Mounting

**CG series** CMOS IC Time Delay Relay

**CD series** CMOS IC Time Delay Relay

**CK series** Mid-Priced CMOS IC Time Delay Relay

**CH series** Mid- To Low-Priced CMOS IC Time Delay Relay

**CB series** CMOS IC Time Delay Relay

**CR series** Recycle Time Delay Relay

**CL-CU series** Compact Time Delay Relay

Sensors

**CS series** Solid State Hybrid Voltage Sensor

**SDAS-01 series** 1.5 To 15 Amp AC Current Sensor
W28 series

Push to Reset
Fuseholder-Type
Thermal Circuit Breaker

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

Features
- Approved to many international standards.
- Replaces SLOW BLOW glass cartridge fuse.
- Labor-saving snap-in mounting.
- Button extends for visual trip indication.

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 8mm isolation. 16 amp and 20 amp models do not have VDE, DEMKO and SEV approvals at present.

Electrical Data @ 25°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°C.
0.25-2 amp models – may trip between 101% and 174%, but must trip at 175% of rating within one hour at +25°C.
Dielectric Strength: Over 1,500 volts RMS.
Maximum Operating Voltages: 32VDC, 250VAC, 50/60 Hz.
Interrupt Capacity: 1,000 amps at 250VAC, 50/60 Hz and 32VDC in accordance with UL standard 1077.

Typical Resistance vs. Current Rating @ +25°C

<table>
<thead>
<tr>
<th>Current Rating in Amps</th>
<th>Typical Resistance in Ohms</th>
<th>Current Rating in Amps</th>
<th>Typical Resistance in Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>14.0</td>
<td>8.0</td>
<td>0.018</td>
</tr>
<tr>
<td>0.50</td>
<td>3.55</td>
<td>9.0</td>
<td>0.014</td>
</tr>
<tr>
<td>0.75</td>
<td>2.0</td>
<td>10.0</td>
<td>0.011</td>
</tr>
<tr>
<td>1.0</td>
<td>0.89</td>
<td>11.0</td>
<td>0.01</td>
</tr>
<tr>
<td>2.0</td>
<td>0.17</td>
<td>12.0</td>
<td>0.009</td>
</tr>
<tr>
<td>3.0</td>
<td>0.069</td>
<td>13.0</td>
<td>0.009</td>
</tr>
<tr>
<td>4.0</td>
<td>0.043</td>
<td>14.0</td>
<td>0.007</td>
</tr>
<tr>
<td>5.0</td>
<td>0.030</td>
<td>15.0</td>
<td>0.007</td>
</tr>
<tr>
<td>6.0</td>
<td>0.026</td>
<td>16.0</td>
<td>0.007</td>
</tr>
<tr>
<td>7.0</td>
<td>0.017</td>
<td>20.0</td>
<td>0.006</td>
</tr>
</tbody>
</table>

Mechanical/Environmental Data
Operating Temperature Range: –20°C to +60°C.
Termination: 256” (6.35mm) quick connects. Soldering to terminals is not recommended.
Mounting: Snaps into panel from front. See Recommended Panel Cutouts.
Approximate Weight: 0.35 oz. (10g).

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.

Time vs. Current Trip Curve @ +25°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

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>W</th>
<th>28</th>
<th>-X</th>
<th>Q</th>
<th>1</th>
<th>A</th>
<th>-5</th>
</tr>
</thead>
</table>

1. **Designator:**
   - W = Circuit breaker

2. **Series Number:**
   - 28 = Single Pole Fuseholder Type

3. **Circuit Function:**
   - X = Series Trip, Push-to-Reset Button

4. **Terminal Type and Mounting:**
   - **Q** = .250” (6.35mm) Quick Connect will mount in .032”-.062” (.813mm – 1.574mm) thick panel.
   - **T** = .250” (6.35mm) Quick Connect will mount in .075”-.105” (1.905mm – 2.667mm) thick panel.
   - For panel thicknesses other than above, order “Q” type and 55-025B Internal Tooth Push-On Lockwasher.

5. **Bezel Color:**
   - 1 = Black with White Rate Marking
   - 2 = Red with Black Rate Marking
   - B = Black with White “Reset” Marked On Bezel (No Rate Marking)
   - 11 = Black with No Rate Marking
   - 21 = Red with No Rate Marking
   - Consult factory for other bezel colors.

6. **Button Color:**
   - A = Black
   - B = Red
   - Consult factory for other button colors.

7. **Amp Rating:**
   - 0.25 1 4 7 10 13 16
   - 0.50 2 5 8 11 14 20*
   - 0.75 3 6 9 12 15
   - * Contact factory for availability.

### Stock Items
- We recommend that our authorized distributors stock the following items for immediate delivery.

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>W28-XQ1A-0.25</th>
<th>W28-XQ1A-1</th>
<th>W28-XQ1A-6</th>
<th>W28-XQ1A-12</th>
<th>W28-XT1A-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>W28-XQ1A-0.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W28-XQ1A-0.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W28-XQ1A-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Outline Dimensions

![Outline Dimensions Diagram]

### Recommended Panel Cutouts

![Recommended Panel Cutouts Diagram]

### Note:
- 1. Soldering to terminals is not recommended.
- 2. Recommended Panel Thickness: Style Q: .032”-.062” (.813mm – 1.574mm)
   - Style T: .075”-.105” (1.905mm – 2.667mm)
- 3. Internal tooth push-on washer available for panel thickness not covered above. Part No. 55-025B.

Specifications and availability subject to change without notice.

13C9280 Printed in U.S.A.

IH/3-00
W58 series
Push To Reset Only
Thermal Circuit Breaker

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.

Electrical Data @ +25°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°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 amps at 250VAC (0.5 - 30 amp models).
Note: 30 amp model not UL or CSA.
Resettable Overload Capacity: Ten times rated current.

Maximum Resistance vs. Current Rating @ +25°C

<table>
<thead>
<tr>
<th>Current Rating in Amps</th>
<th>Maximum Resistance in Ohms</th>
<th>Current Rating in Amps</th>
<th>Maximum Resistance in Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>5.0</td>
<td>8</td>
<td>0.020</td>
</tr>
<tr>
<td>1</td>
<td>1.35</td>
<td>9</td>
<td>0.020</td>
</tr>
<tr>
<td>2</td>
<td>0.32</td>
<td>10</td>
<td>0.014</td>
</tr>
<tr>
<td>3</td>
<td>0.18</td>
<td>12</td>
<td>0.010</td>
</tr>
<tr>
<td>4</td>
<td>0.10</td>
<td>15</td>
<td>0.010</td>
</tr>
<tr>
<td>5</td>
<td>0.026</td>
<td>20</td>
<td>0.006</td>
</tr>
<tr>
<td>6</td>
<td>0.026</td>
<td>25</td>
<td>0.006</td>
</tr>
<tr>
<td>7</td>
<td>0.020</td>
<td>30*</td>
<td>0.004</td>
</tr>
</tbody>
</table>

*No UL/CSA

Mechanical/Environmental Data
Shock: Withstands to 10g.
Endurance Cycling: Over 1,000 cycles at 200% of rated load.
Vibration: Withstands to 10g at 10-55 Hz.
Weight: Less than 1 1/2 oz. (42.5g).

Time vs. Current Trip Curve @ +25°C

<table>
<thead>
<tr>
<th>Overload</th>
<th>Trip Times</th>
<th>Overload</th>
<th>Trip Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>No Trip</td>
<td>100%</td>
<td>No Trip</td>
</tr>
<tr>
<td>145%</td>
<td>1.8-4.5 Sec</td>
<td>145%</td>
<td>1.8-4.5 Sec</td>
</tr>
<tr>
<td>200%</td>
<td>0.75-3.5 Sec</td>
<td>200%</td>
<td>0.75-3.5 Sec</td>
</tr>
<tr>
<td>300%</td>
<td>0.45-2.0 Sec</td>
<td>300%</td>
<td>0.45-2.0 Sec</td>
</tr>
<tr>
<td>400%</td>
<td>0.31-1.3 Sec</td>
<td>400%</td>
<td>0.31-1.3 Sec</td>
</tr>
<tr>
<td>500%</td>
<td>0.22-0.9 Sec</td>
<td>500%</td>
<td>0.22-0.9 Sec</td>
</tr>
<tr>
<td>600%</td>
<td>0.15-0.5 Sec</td>
<td>600%</td>
<td>0.15-0.5 Sec</td>
</tr>
<tr>
<td>800%</td>
<td>0.09-0.3 Sec</td>
<td>800%</td>
<td>0.09-0.3 Sec</td>
</tr>
<tr>
<td>1000%</td>
<td>0.06-0.2 Sec</td>
<td>1000%</td>
<td>0.06-0.2 Sec</td>
</tr>
</tbody>
</table>

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.
Ordering Information

Typical Part No. ▶ W 58 -X B 1 A 4 A -5

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
   B = White with red rate marking, red trip band
   C = White with black rate marking, red trip band
   E = White with red rate marking, no trip band
   F = White with black rate marking, no trip band

5. Mounting Bushing:
   1 = 7/16" x .500" (12.70mm) long
   4 = 15/32" x .300" (7.62mm) long, black
   6 = 3/8" x .465" (11.81mm) long, round

6. Terminals:
   A = Quick connect .250" (6.35mm) straight
   C = 6/32 screw 90° (screws installed)
   D = 6/32 screw 90° (screws bulk packed)

7. Mounting Hardware:
   4 = Knurled nut/hex nut
   6 = Knurled nut/hex nut(lock washer
   15 = Two hex nuts/lock washer
   99 = No mtg. hardware supplied (Use C, Step #8)
   12 = Knurled nut/lock washer

   Note: For other hardware combinations, order separately. See mounting hardware Ordering Information table.

8. Mounting Hardware Packaging:
   A = Assembled to bushing
   B = Bulk unassembled
   C = No mounting hardware

9. Specify Amp Rating:
   0.5  3  6  9  15  30*
   1  4  7 10  20
   2  5  8 12  25

Stock Items – We recommend that our authorized distributors stock the following items for immediate delivery.


Outline Dimensions

Terminal Options

SEE TERMINAL DRAWINGS FOR DETAIL
SEE MOUNTING BUSHING AND MOUNTING HARDWARE DRAWINGS FOR DETAIL
Mounting Hardware

**Mounting Bushing**

**Type 1**

- 7/16-20 Thread (Silver)
- 3/8-24 Thread (Silver)
- 15/32-32 Thread (Silver)

**Recommended Cutout**

- 3/8" .440 - .450 Dia. (17.3 - 17.7)
- 7/16" .470 - .480 Dia. (18.5 - 18.9)

**Mounting Hardware Dimensions**

<table>
<thead>
<tr>
<th>Dim.</th>
<th>Hex.</th>
<th>Knurled</th>
<th>L/W</th>
<th>Pal</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot;</td>
<td>.556</td>
<td>.562</td>
<td>.562</td>
<td>.562</td>
</tr>
<tr>
<td>7/16&quot;</td>
<td>.625</td>
<td>.625</td>
<td>.540</td>
<td>.625</td>
</tr>
<tr>
<td>15/32&quot;</td>
<td>.556</td>
<td>.625</td>
<td>.600</td>
<td>.625</td>
</tr>
</tbody>
</table>

**Mounting Hardware Ordering Information**

<table>
<thead>
<tr>
<th>Mounting Bushing Code</th>
<th>Knurl Nut</th>
<th>Hex Nut</th>
<th>Pal Nut</th>
<th>Washer</th>
<th>Push to Reset Disc</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>55-010A</td>
<td>55-011A</td>
<td>16S086B</td>
<td>88-021B</td>
<td>33-012A</td>
</tr>
<tr>
<td>4</td>
<td>•</td>
<td>55-001B</td>
<td>16S086C</td>
<td>88-002A</td>
<td>33-012C</td>
</tr>
<tr>
<td>6</td>
<td>55-008A</td>
<td>55-001D</td>
<td>16S086A</td>
<td>88-006K</td>
<td>33-012B</td>
</tr>
</tbody>
</table>

*55-010B (silver) 55-010E (black)*

Specifications and availability subject to change without notice.

13C9580  Printed in U.S.A.  IH3-00
W 23/W 31 series

Toggle or
Push/Pull Actuator
Thermal Circuit Breaker

**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 E9543, and CSA Certified as Appliance Component Protectors, File LR15734.

**Electrical Data @ +25°C**

**Calibration:** Will continuously carry 100% of rating, may trip between 101% and 134% of rating at 25°C. Must trip at 135% in one hour.

**Maximum Operating Voltages:** 50VDC or 250VAC (to 400 Hz).

**Interrupting Capacity:** 0.5-25 amp models — 2,500 amps at 50VDC, 1000 amps at 250VAC. 26-50 amp models — 1000 amps at 50VDC or 250VAC.

**Resettable Overload Capacity:** Ten times rated current.

**Dielectric Strength:** Over 1,500 volts RMS.

**Mechanical/Environmental Data**

**Endurance Cycling:** More than 6,000 cycles at 100% of rating, or 10,000 mechanical cycles.

**Humidity:** Will meet requirements of MILSTD-202, Method 106.

**Salt Spray:** Will meet requirements of MIL-STD-202, Method 101, Test Condition B.

**Termination:** Two #8-32 screw terminals.

**Mounting:** W23 — Threaded bushing, 3/8” (9.53mm) diameter. W31 — Threaded bushing, 15/32” (11.91mm) diameter, with or without anti-rotation flats.

**Weight:** Less than 2 oz. (57g).

**Current Maximum Rating**

<table>
<thead>
<tr>
<th>Current Rating in Amps</th>
<th>Maximum Resistance in Ohms ± 30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.61</td>
</tr>
<tr>
<td>5</td>
<td>.03</td>
</tr>
<tr>
<td>10</td>
<td>.01</td>
</tr>
<tr>
<td>15</td>
<td>.006</td>
</tr>
<tr>
<td>20</td>
<td>.004</td>
</tr>
<tr>
<td>30</td>
<td>.003</td>
</tr>
<tr>
<td>40</td>
<td>.002</td>
</tr>
<tr>
<td>50</td>
<td>.002</td>
</tr>
</tbody>
</table>

**Time Vs. Current Trip Curve @ +25°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.
## Ordering Information

### Typical Part No. **W**

<table>
<thead>
<tr>
<th>Designator (W)</th>
<th>Series Number (X)</th>
<th>Circuit Function (A)</th>
<th>Mounting Bushing (M)</th>
<th>Mounting Hardware (G)</th>
<th>Amp Rating (Z)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W = Circuit breaker</td>
<td>23 = Single pole, push/pull</td>
<td>X = Series trip</td>
<td>A = 3/16”-24 threaded bushing, .375” (9.53mm) long, silver color</td>
<td>A = Knurled nut/hex nut installed</td>
<td>0.5, 3, 7, 5, 20, 35</td>
</tr>
<tr>
<td>1 = Black with white amp rate marking and white trip band.</td>
<td>1 = Screw terminals situated 90° to each other with #8-32 screws and washers installed.</td>
<td>1 = Screw terminals situated parallel to each other, upward with #8-32 screws and washers installed.</td>
<td>1 = Knurled nut/hex nut installed</td>
<td>G = Two hex nuts/lockwasher installed</td>
<td>1, 4, 7, 5, 20, 35</td>
</tr>
<tr>
<td>2 = 15/32”-24 threaded bushing, .375” (9.53mm) long, silver color</td>
<td>2 = Screw terminals situated parallel to each other, downward with #8-32 screws and washers installed.</td>
<td>A = Knurled nut/hex nut installed</td>
<td>G = Two hex nuts/lockwasher installed</td>
<td>Z = No mounting hardware supplied</td>
<td>1, 4, 7, 5, 20, 35</td>
</tr>
<tr>
<td>3 = Screw terminals situated parallel to each other, downward with #8-32 screws and washers installed.</td>
<td>3 = Screw terminals situated parallel to each other, downward with #8-32 screws and washers installed.</td>
<td>Z = No mounting hardware supplied</td>
<td>Z = No mounting hardware supplied</td>
<td>Z = No mounting hardware supplied</td>
<td>1, 4, 7, 5, 20, 35</td>
</tr>
</tbody>
</table>

### Stock Items – The following items are normally maintained in stock for immediate delivery.

- W31-X2M1G-1
- W31-X2M1G-10
- W31-X2M1G-25
- W31-X2M1G-35
- W31-X2M1G-40

### Typical Part No. **W**

<table>
<thead>
<tr>
<th>Designator (W)</th>
<th>Series Number (X)</th>
<th>Circuit Function (A)</th>
<th>Mounting Bushing (M)</th>
<th>Mounting Hardware (G)</th>
<th>Amp Rating (Z)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W = Circuit breaker</td>
<td>31 = Single pole, toggle actuator</td>
<td>X = Series trip</td>
<td>A = 3/16”-24 threaded bushing, .375” (9.53mm) long, silver color</td>
<td>A = Knurled nut/hex nut installed</td>
<td>0.5, 3, 7, 5, 20, 35</td>
</tr>
<tr>
<td>M = Silver color metal toggle, round, with amp rate marking on end</td>
<td>1 = Screw terminals situated 90° to each other with #8-32 screws and washers installed.</td>
<td>1 = Screw terminals situated parallel to each other, downward with #8-32 screws and washers installed.</td>
<td>A = Knurled nut/hex nut installed</td>
<td>G = Two hex nuts/lockwasher installed</td>
<td>1, 4, 7, 5, 20, 35</td>
</tr>
<tr>
<td>2 = 15/32”-32 threaded bushing, .375” (9.53mm) long, silver color</td>
<td>2 = Screw terminals situated parallel to each other, downward with #8-32 screws and washers installed.</td>
<td>Z = No mounting hardware supplied</td>
<td>Z = No mounting hardware supplied</td>
<td>Z = No mounting hardware supplied</td>
<td>1, 4, 7, 5, 20, 35</td>
</tr>
<tr>
<td>3 = Screw terminals situated parallel to each other, downward with #8-32 screws and washers installed.</td>
<td>3 = Screw terminals situated parallel to each other, downward with #8-32 screws and washers installed.</td>
<td>Z = No mounting hardware supplied</td>
<td>Z = No mounting hardware supplied</td>
<td>Z = No mounting hardware supplied</td>
<td>1, 4, 7, 5, 20, 35</td>
</tr>
</tbody>
</table>

### Stock Items – The following items are normally maintained in stock for immediate delivery.

- W31-X2M1G-1
- W31-X2M1G-10
- W31-X2M1G-25
- W31-X2M1G-35
- W31-X2M1G-40

- W31-X2M1G-3
- W31-X2M1G-20
- W31-X2M1G-50
- W31-X2M1G-25
- W31-X2M1G-35
W23 Outline Dimensions

Terminal Style 1

Mounting Hardware
Hex Nut
(55-001D - Silver Color)

Hex Nut
(55-001B - Silver Color)

Lockwasher
(88-006B - Silver Color)

#8-32 Screws with Washers

Kelurled Nut
(55-008A - Silver Color)

Suggested Mounting Holes

Terminal Style 3

All dimensions are given as inches (mm)

Terminal Style 5

Terminal Style 1

Mounting Hardware
Hex Nut
(55-001B - Silver Color)

Suggested Mounting Holes

Specifications and availability subject to change without notice.
13C9230 Printed in U.S.A. IH/3-00
Features

- Designed for the international market. UL Recognized, CSA Certified, and VDE approved.
- Ratings to 50 amps.
- Heavy duty #10-32 stud connections. (W9)
- Optional 10 amp auxiliary switch.
- Optional snap-in mounting. (W6)
- 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 60 934 (Circuit Breakers for Equipment) License No. 73782.

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, 1100V DC.
Insulation Resistance: 100 Megohms 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°C ambient.

Approvals and Ratings Table 1

<table>
<thead>
<tr>
<th>W6 Series</th>
<th>UL/CSA (All Circuit Functions)</th>
<th>W9 Series</th>
<th>UL/CSA (All Circuit Functions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Voltage (Hz)</td>
<td>Frequency</td>
<td>Current Phase</td>
<td>Interrupting Rating (Amps)</td>
</tr>
<tr>
<td>65</td>
<td>DC</td>
<td>-</td>
<td>0.2 - 50</td>
</tr>
<tr>
<td>277</td>
<td>50/60</td>
<td>1</td>
<td>0.2 - 20</td>
</tr>
<tr>
<td>277</td>
<td>50/60</td>
<td>3Ø-Wye</td>
<td>0.2 - 20</td>
</tr>
<tr>
<td>250</td>
<td>400</td>
<td>1</td>
<td>0.2 - 20</td>
</tr>
<tr>
<td>250</td>
<td>400</td>
<td>3Ø-Wye</td>
<td>0.2 - 20</td>
</tr>
</tbody>
</table>

Approvals and Ratings Table 2

<table>
<thead>
<tr>
<th>UL/CSA</th>
<th>Switch Number</th>
<th>Voltage 50/60 Hz.</th>
<th>Current (Amps)</th>
<th>Terminals WxTxL</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>125</td>
<td>10</td>
<td>.093 x .020 x .250 (2.36 x .51 x 6.40)</td>
<td></td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time Delay Curve</th>
<th>Pulse Tolerance Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Standard</td>
</tr>
<tr>
<td>AC 50/60 Hz.</td>
<td>2</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>50/60 Hz.</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>AC 400 Hz.</td>
<td>2</td>
<td>6.5</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>5.5</td>
</tr>
</tbody>
</table>

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

#### W6 Series

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>W</th>
<th>67-</th>
<th>X</th>
<th>2</th>
<th>Q</th>
<th>1</th>
<th>2-</th>
<th>20</th>
</tr>
</thead>
</table>

1. **Circuit Breaker Mounting:**
   - W = #6-32 mounting threads.
   - M = M3.0 x 0.5 mounting threads.
   - X = Snap-in mounting. (Not available in rocker actuated models.)

2. **Number of Poles:**
   - 67 = Single pole
   - 68 = Two pole
   - 69 = Three pole
   - 70 = Four pole

3. **Circuit Function:**
   - (Only X is VDE approved)
   - A = Series trip with auxiliary switch (L093° QC)
   - X = Series trip

4. **Actuator:**
   - (One actuator per pole)
   - 1 = Black toggle
   - 2 = White toggle
   - 3 = Black rocker
   - 4 = White rocker
   - 5 = Red rocker
   - 6 = Grey rocker

5. **Amp Rating:**
   - 0 = Instantaneous
   - 1 = 250VAC, 415/240VAC
   - 2 = 277VAC, 50/60 Hz.
   - 3 = 250V, 400 Hz.
   - 4 = DC high inrush
   - 5 = 65VDC
   - 6 = 65VDC
   - 7 = AC/DC 277VAC or 65VDC

6. **Maximum Line Voltage:**
   - (See Table 1 for current ranges)
   - UL/CSA TYPES
   - 1 = 277VAC, 50/60 Hz.
   - 2 = 277/480
   - 3 = 250VAC, 400 Hz.
   - 5 = 65VDC
   - 7 = AC/DC 277VAC or 65VDC

7. **Time Delay Curve:**
   - 0 = Instantaneous
   - 1 = 250VAC, 415/240VAC
   - 2 = Standard delay
   - 3 = Short delay
   - 5 = DC high inrush
   - 7 = AC/DC 277VAC or 65VDC

8. **Amp Rating:**
   - Consult factory for other values.

9. **VDE Approval:**
   - Blank = UL/CSA approved breaker
   - V = VDE approved breaker without auxiliary switch

#### Stock Items - We recommend that our authorized distributors stock the following items for immediate delivery.

- W6 Series
  - W67-X2Q12-5
  - W67-X2Q12-7
  - W67-X2Q12-10
  - W67-X2Q12-15
  - W67-X2Q12-20
  - W67-X2Q12-25

- W9 Series
  - W91-X112-1
  - W91-X112-2
  - W91-X112-3
  - W91-X112-5
  - W91-X112-7
  - W91-X112-10

### Ordering Information

#### W9 Series

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>W</th>
<th>91-</th>
<th>X</th>
<th>1</th>
<th>1</th>
<th>2-</th>
<th>20</th>
</tr>
</thead>
</table>

1. **Circuit Breaker Mounting:**
   - W = #6-32 mounting threads.
   - M = M3.0 x 0.5 mounting threads.

2. **Number of Poles:**
   - 91 = Single pole
   - 92 = Two pole
   - 93 = Three pole
   - 94 = Four pole

3. **Circuit Function:**
   - (Only X is VDE approved)
   - A = Series trip with auxiliary switch (L093° QC)
   - X = Series trip

4. **Actuator:**
   - (One actuator per pole)
   - 1 = Black toggle
   - 2 = White toggle

5. **Amp Rating:**
   - Consult factory for other values.

6. **VDE Approval:**
   - Blank = UL/CSA approved breaker
   - V = VDE approved breaker without auxiliary switch

#### Stock Items - We recommend that our authorized distributors stock the following items for immediate delivery.

- W9 Series
  - W91-X112-1
  - W91-X112-2
  - W91-X112-3
  - W91-X112-5
  - W91-X112-7
  - W91-X112-10

- W92 Series
  - W92-X112-1
  - W92-X112-2
  - W92-X112-3
  - W92-X112-5
  - W92-X112-7
  - W92-X112-10

- W93 Series
  - W93-X112-1
  - W93-X112-2
  - W93-X112-3
  - W93-X112-5
  - W93-X112-7
  - W93-X112-10

---

**Notes:**
- Curves may be specified with increased pulse tolerance for 1/2 cycle by adding "P" after curve.
- Delay curve 34 must be specified for ratings of 31 amps or above.
- Consult factory for other values.
Outline Dimensions - Toggle Actuator Models

W6 Series

Panel Mounting Cutout

Note:
Multi-pole models furnished with separate handle tie hardware.

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 x .377 (9.58) long. Optional 8-32 x .250 (6.35) or 10-32 x .250 (6.35) screw type.
3. Panel mounting cutout detail mtg. detail tol.: ± .005 (.13) unless noted. Add additional cutouts to correspond to number of poles. Outline drawing tolerance ± .015 (.38) unless noted. Dimensions in brackets ( ) are in millimeters.
Outline Dimensions - Rocker Actuator Models

W6 Series

Panel Mounting Cutout

1 Pole

2, 3 & 4 Pole

VDE Rocker Marking

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

Outline Dimensions - Snap-in Mounted Models

W6 Series

Panel Mounting Cutout

1 Pole

2 Pole

3 Pole

4 Pole

Panel Thickness: .047 (1.2) to .110 (2.8)
Specifications and availability subject to change without notice.

13C9699 Printed in U.S.A. IH/3-00
V23100-V4 series
Dual In-line Package and Single In-line Package Dry Reed Relays

Features
- DIP (flat and high) and SIP versions.
- For use in measuring and control systems.
- Direct coil control with TTL-signals.
- IC pin compatible.
- Low operating noises and low thermoelectric voltage.
- Ultrasonic cleanable.
- High vibration and shock resistance.

Contact Data @ 25°C

<table>
<thead>
<tr>
<th>Type of Relay</th>
<th>DIP Version</th>
<th>SIP Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Contacts</td>
<td>SPST, 1 Form A</td>
<td>SPDT, 1 Form A</td>
</tr>
<tr>
<td>Max. Switch. Current</td>
<td>0.5A</td>
<td>0.25A</td>
</tr>
<tr>
<td>Max. Continuous Current</td>
<td>1A</td>
<td>1.2A</td>
</tr>
<tr>
<td>Max. Switch. Voltage @ nominal voltage</td>
<td>180VDC/200VDC</td>
<td>175VDC</td>
</tr>
<tr>
<td>Max. Switch. Voltage (VDC)</td>
<td>10W</td>
<td>3W</td>
</tr>
<tr>
<td>VDC</td>
<td>10VA</td>
<td>3VA</td>
</tr>
<tr>
<td>Expected Mech. Life</td>
<td>5 Million Ops.</td>
<td>4 Million Ops.</td>
</tr>
<tr>
<td>Initial Contact Resist.</td>
<td>150mΩ @ 10Ma/20mV</td>
<td></td>
</tr>
</tbody>
</table>

Initial Dielectric Strength
- Between Form A Contacts: 250VDC (12V-24V coils), 210VDC (5V coils).
- Between Coil and Contacts: 1,500VDC.

Initial Insulation Resistance
- Between Mutually Insulated Conductors: 10¹¹ ohms @ 500VDC.

Coil Data @ 25°C

<table>
<thead>
<tr>
<th>Nominal Voltage (VDC)</th>
<th>Resistance ± 10% (Ohms)</th>
<th>Operating Voltage (VDC) (Min.) (Max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIP and SIP Version: SPST - 1 Form A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>500</td>
<td>3.5</td>
</tr>
<tr>
<td>12</td>
<td>1,000</td>
<td>8.4</td>
</tr>
<tr>
<td>15</td>
<td>2,000</td>
<td>10.5</td>
</tr>
<tr>
<td>24</td>
<td>2,000</td>
<td>16.8</td>
</tr>
<tr>
<td>DIP Version: DPST - 2 Form A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>200</td>
<td>3.5</td>
</tr>
<tr>
<td>12</td>
<td>500</td>
<td>8.4</td>
</tr>
<tr>
<td>15</td>
<td>2,000</td>
<td>10.5</td>
</tr>
<tr>
<td>24</td>
<td>2,000</td>
<td>16.8</td>
</tr>
<tr>
<td>DIP Version: SPDT - 1 Form C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>200</td>
<td>3.5</td>
</tr>
<tr>
<td>12</td>
<td>500</td>
<td>8.4</td>
</tr>
<tr>
<td>15</td>
<td>2,000</td>
<td>10.5</td>
</tr>
<tr>
<td>24</td>
<td>2,000</td>
<td>16.8</td>
</tr>
</tbody>
</table>

*Values in brackets refer to high relay version with protective diode.

Operate Data @ 20°C

<table>
<thead>
<tr>
<th>Type of Relay</th>
<th>DIP Version</th>
<th>SIP Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Contacts</td>
<td>SPST, 1 Form A</td>
<td>SPDT, 1 Form C</td>
</tr>
<tr>
<td>Operate Time (Including Bounce)</td>
<td>0.5ms</td>
<td>0.7ms</td>
</tr>
<tr>
<td>Release Time (Including Bounce)</td>
<td>0.2ms</td>
<td>1.0ms</td>
</tr>
</tbody>
</table>

Environmental Data
- Temperature Range: -20°C to +70°C.
- Vibration, Operational:
- Shock, Operational:
- Shock, Non-destructive:

Mechanical Data
- Termination:
- Enclosure:
- Weight:
### Ordering Information

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>V23100-V4</th>
<th>3</th>
<th>24</th>
<th>A</th>
<th>011</th>
</tr>
</thead>
</table>

1. **Basic Series:**
   - V23100-V4 = DIL and SIP reed relay.

2. **Version:**
   - DIP flat package: 0 = 1 Form A contacts.
   - 3 = 1 Form C standard and 1 Form C with electrostatical shield.
   - DIP high package: 3 = 2 Form A contacts and 1 Form C with diode or electrostatical shield and diode.
   - SIP package: 5

3. **Coil Voltage:**
   - 05 = 5VDC
   - 12 = 12VDC
   - 15 = 15VDC
   - 24 = 24VDC

4. **Contact Arrangement:**
   - A = 1 Form A (not for high DIP).
   - B = 2 Form A (high DIP only).
   - C = 1 Form C (not for SIP).

5. **Options:**
   - 000 = standard.
   - 001 = with electrostatical shield
   - 010 = with diode.
   - 011 = with electrostatical shield and diode.

---

### Stock Items – The following items are normally maintained in stock for immediate delivery.

- V23100V4005A000
- V23100V4505A000
- V23100V4012A000
- V23100V4617A000
- V23100V4024A000
- V23100V4624A000

---

### Outline Dimensions

#### DIP Version (Flat)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.224</td>
<td>5.7</td>
</tr>
<tr>
<td>0.760 MAX</td>
<td>19.30</td>
</tr>
<tr>
<td>0.30</td>
<td>7.62</td>
</tr>
<tr>
<td>0.10</td>
<td>2.54</td>
</tr>
</tbody>
</table>

#### DIP Version (High)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.252 MAX</td>
<td>6.4</td>
</tr>
<tr>
<td>0.201 MAX</td>
<td>5.04</td>
</tr>
<tr>
<td>0.10</td>
<td>2.54</td>
</tr>
<tr>
<td>0.60</td>
<td>15.24</td>
</tr>
</tbody>
</table>

#### SIP Version

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.307 MAX</td>
<td>7.80</td>
</tr>
<tr>
<td>0.020 MAX</td>
<td>0.50</td>
</tr>
<tr>
<td>0.020</td>
<td>0.50</td>
</tr>
<tr>
<td>0.010</td>
<td>0.25</td>
</tr>
</tbody>
</table>
Wiring Diagrams (Bottom Views)

DIP Version (Flat)

- **SPST-1 Form A** standard
- **SPST-1 Form A** w/diode
- **SPDT-1 Form C** standard
- **SPST-1 Form A** w/electrostatic Shield
- **SPST-1 Form A** w/electrostatic shield and diode
- **SPDT-1 Form C** w/electrostatic shield

DIP Version (High)

- **DPST-2 Form A** standard
- **SPDT-1 Form C** w/diode
- **DPST-2 Form A** w/diode
- **SPDT-1 Form C** w/electrostatic shield and diode

SIP Version

- **SPST-1 Form A** standard
- **SPST-1 Form A** w/diode

PC Board Layouts (Bottom Views)

- **DIP Version (Flat)**
- **DIP Version (High)**
- **SIP Version**
V23111 series

Miniature, Sealed
PC Board Relay

File E82292
File LR48471

Coil Data @ 20°C

<table>
<thead>
<tr>
<th>Voltage (VDC)</th>
<th>Nominal Current (mA)</th>
<th>Coil Resistance ≤ 10% (ohms)</th>
<th>Must Operate Voltage (VDC)</th>
<th>Must Release Voltage (VDC)</th>
<th>Max. Voltage @ 20°C (VDC)</th>
<th>Max. Voltage @ 85°C (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>50.0</td>
<td>60</td>
<td>2.25</td>
<td>0.15</td>
<td>6.61</td>
<td>3.17</td>
</tr>
<tr>
<td>5</td>
<td>30.0</td>
<td>166</td>
<td>3.75</td>
<td>0.25</td>
<td>10.98</td>
<td>6.26</td>
</tr>
<tr>
<td>6</td>
<td>25.0</td>
<td>240</td>
<td>4.50</td>
<td>0.30</td>
<td>13.22</td>
<td>6.33</td>
</tr>
<tr>
<td>9</td>
<td>16.7</td>
<td>540</td>
<td>6.75</td>
<td>0.45</td>
<td>19.83</td>
<td>9.50</td>
</tr>
<tr>
<td>12</td>
<td>12.5</td>
<td>960</td>
<td>9.00</td>
<td>0.60</td>
<td>26.44</td>
<td>12.68</td>
</tr>
<tr>
<td>24</td>
<td>6.3</td>
<td>3,840</td>
<td>18.00</td>
<td>1.20</td>
<td>52.89</td>
<td>26.37</td>
</tr>
</tbody>
</table>

Initial Dielectric Strength

Between Open Contacts: 400VAC, 50/60 Hz (1 minute).
Between Contacts and Coil: 1,500VAC, 50/60 Hz (1 minute).

Environmental Data

Temperature Range: Operating: -40°C to +85°C.
Vibration, Mechanical: 10 to 55 Hz, 1.5mm double amplitude.
Operational: 10 to 55 Hz, 1.5mm double amplitude.
Shock, Mechanical: 500m/s² (50G approximately).
Operational: 100m/s² (10G approximately).

Operate Data @ 20°C

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

Mechanical Data

Termination: Printed circuit terminals.
Enclosure: Plastic sealed case, immersion cleanable (IP67).
Weight: 3g approximately.

Outline Dimensions

PC Board Layout (Bottom View)

Wiring Diagram (Bottom View)
**V23026 series**

**Miniature, Sealed PC Board Relay**

- File E48393
- File LR45064-5
- CECC approved in accordance with CECC 16501-002/VDE400.74/04.90 (Through-hole version)

**Coil Data @ 20°C**

<table>
<thead>
<tr>
<th>Nominal Voltage (VDC)</th>
<th>Maximum Operating Voltage (VDC)</th>
<th>Nominal Operating Power (mW)</th>
<th>Resistance (Ohms) ±10%</th>
<th>Coil Number Order Designation (Step 4 in Ordering Information chart)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>4.5</td>
<td>63</td>
<td>36</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>8.8</td>
<td>66</td>
<td>137</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>14.5</td>
<td>67</td>
<td>370</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>25.5</td>
<td>69</td>
<td>1,165</td>
<td>5</td>
</tr>
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<td>12</td>
<td>35</td>
<td>64</td>
<td>2,250</td>
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<tr>
<td>15</td>
<td>42</td>
<td>72</td>
<td>3,100</td>
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<tr>
<td>24</td>
<td>50</td>
<td>128</td>
<td>4,500</td>
<td>4</td>
</tr>
</tbody>
</table>

**Non-Latching — Surface-Mount versions (D1)**

<table>
<thead>
<tr>
<th>Nominal Voltage (VDC)</th>
<th>Maximum Operating Voltage (VDC)</th>
<th>Nominal Operating Power (mW)</th>
<th>Resistance (Ohms) ±10%</th>
<th>Coil Number Order Designation (Step 4 in Ordering Information chart)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>4</td>
<td>80</td>
<td>26</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>8.5</td>
<td>80</td>
<td>113</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>13.3</td>
<td>80</td>
<td>313</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>24</td>
<td>80</td>
<td>1,013</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>32</td>
<td>80</td>
<td>1,800</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>40</td>
<td>89</td>
<td>2,813</td>
<td>3</td>
</tr>
<tr>
<td>24</td>
<td>50</td>
<td>128</td>
<td>4,500</td>
<td>4</td>
</tr>
</tbody>
</table>

**Bistable, Single Coil — Through-Hole and Surface-Mount versions (C1,F1)**

<table>
<thead>
<tr>
<th>Nominal Voltage (VDC)</th>
<th>Maximum Operating Voltage (VDC)</th>
<th>Nominal Operating Power (mW)</th>
<th>Resistance (Ohms) ±10%</th>
<th>Coil Number Order Designation (Step 4 in Ordering Information chart)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>6</td>
<td>37</td>
<td>61</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>30</td>
<td>300</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>34</td>
<td>740</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>35</td>
<td>38</td>
<td>2,160</td>
<td>7</td>
</tr>
<tr>
<td>12</td>
<td>50</td>
<td>32</td>
<td>4,500</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>50</td>
<td>50</td>
<td>4,500</td>
<td>3</td>
</tr>
<tr>
<td>24</td>
<td>50</td>
<td>128</td>
<td>4,500</td>
<td>4</td>
</tr>
</tbody>
</table>

**Operate Data @ 20°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): 1 ms, typ.
- Operate Bounce Time: 1 ms, typ.
- Release Time (Excluding Bounce): 0.4 ms, typ.
- Set Time (Latching): 1 ms, typ.
- Reset Time (Latching): 0.9 ms, typ.
- Maximum Switching Rate: 200 operations/second.

**Environmental Data**

- Temperature Range: -40°C to +70°C.
- Vibration, Operational: 40g, 10-200 Hz.
- Shock, Operational: 50g at 11 ms 1/2 sinusoidal impulse.
- Surface Mount Version Only:
  - Vapor Phase: 215°C, 40 sec.
  - Double Wave: 260°C, 10 sec.

**Mechanical Data**

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

Typical Part Number ▶ V23026 A1 00 2 B201

1. Basic Series:
   V23026 = Miniature, printed circuit board relay.

2. Termination:

<table>
<thead>
<tr>
<th></th>
<th>Non-Latching</th>
<th>Dual Coil Latching</th>
<th>Single Coil Latching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through-Hole</td>
<td>A1</td>
<td>B1</td>
<td>C1</td>
</tr>
<tr>
<td>Surface Mount</td>
<td>D1</td>
<td>E1</td>
<td>F1</td>
</tr>
</tbody>
</table>

Consult factory regarding availability of models meeting FCC Part 68/1500V surge requirement.

3. Function Type:
   | 00 = Single Coil Non-Latching, Through-Hole terminals |
   | 02 = Single Coil Latching, Surface-Mount terminals   |
   | 05 = Single Coil Latching                              |
   | 10 = Dual Coil Latching                               |
   | 6 = 3VDC (1)                                          |
   | 1 = 5VDC                                             |
   | 5 = 9VDC (1)                                          |
   | 2 = 12VDC                                            |
   | 3 = 15VDC                                            |
   | 4 = 24VDC (2)                                         |

   (1) For single coil latching versions only (C1, F1), 5 = 1.8VDC and 7 = 9VDC
   (2) 24V coil not available on dual coil version

4. Contact Type:
   B201 = Bifurcated, 1 Form C (SPDT).

Stock Items – Recommended part numbers are for new designs.

V23026A1001B201    V23026D1021B201
V23026A1002B201    V23026D1022B201
V23026A1004B201    V23026D1024B201

Outline Dimensions

Through-Hole

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

Specifications and availability subject to change without notice.
13C8026       Printed in U.S.A.
IH/3-00
T81N/T81H series
Ultraminiature, High Density
PC Board Relay

File E29244
File LR48471

Coil Data @ 20°C

<table>
<thead>
<tr>
<th>Standard Coils</th>
<th>Sensitive Coils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Voltage (VDC)</td>
<td>Resistance ±10% (Ohms)</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>55</td>
</tr>
<tr>
<td>6</td>
<td>80</td>
</tr>
<tr>
<td>9</td>
<td>180</td>
</tr>
<tr>
<td>12</td>
<td>320</td>
</tr>
<tr>
<td>24</td>
<td>1,280</td>
</tr>
</tbody>
</table>

Operate Data @ 20°C
Must Operate Voltage: 70% of nominal voltage or less.
Must Release Voltage: 5% of nominal voltage or more.
Operate Time (Excluding Bounce): Standard Coil: 5 ms, approx.
Sensitive Coil: 5 ms, approx.
Release Time (Excluding Bounce): All Models: 2 ms, approx.
1 At or from Nominal Coil Voltage.

Environmental Data
Temperature Range: Standard Coil: -40°C to +55°C.
Sensitive Coil: -40°C to +75°C.
Vibration: 0.059" (1.5mm) max. excursions for 10-40 Hz.
Shock: Standard Coil: 10g for 11 ms.
Sensitive Coil: 6g for 11 ms.

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

Ordering Information

Typical Part Number | T81H5D312-05 | T81H5D312-12 | T81N5D312-05 | T81N5D312-12
1. Basic Series: | T81 = Ultraminiature, PC board relay. |
   | H = Sensitive coil |
3. Contact Arrangement: | 5 = 1 Form C (SPDT) |
4. Coil Input: | D = DC Voltage |
5. Dielectric Strength: | 3 = High dielectric strength, UL recognized |
6. Contact Rating: | 1 = 1A @ 24VDC; 0.5A @ 120VAC. |
7. Contact Material: | 2 = Gold overlay silver-palladium alloy |
8. Coil Voltage: | 03 = 3VDC |
   | 05 = 5VDC |
   | 09 = 9VDC |
   | 12 = 12VDC |
   | 24 = 24VDC |

Stock Items – The following items are maintained in stock.
T81H5D312-05 T81H5D312-12 T81N5D312-05 T81N5D312-12
T81H5D312-06 T81H5D312-24 T81N5D312-06 T81N5D312-24

Specifications and availability subject to change without notice.
13C8810 Printed in U.S.A. IH/3-00
**Features**
- Surface and through hole mounting types.
- Breakdown voltage between contacts and coil: 1,500Vrms.
- 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 x 7.2mm 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.

**Contact Data**
- **Arrangement:** 2 Form C (DPDT).
- **Material:** Stationary and Movable Contacts: Gold overlay on silver nickel.
- **Rating:**
  - Max. Switching Voltage: 250VAC, 220VDC.
  - Max. Switching Current: 5A.
  - Max. Carrying Current: 2A.
  - Max. Switching Power: 60W, DC, resistive.
- **Min. Permissible Load:** 100μV.
- **Expected Mechanical Life:** Approx. 100 million ops.
- **Expected Electrical Life:** 1 million ops. @ 1A, 30VDC, 10 million ops. @ 100mA, 6VDC.
- **Initial Contact Resistance:** 50 milliohms @ 10mA, 20mV.

**Coil Data @ 20°C**
- **Voltage:** 3-48V.
- **Nominal Power:**
  - Non-Latching: 140mW.
  - Single Coil Latching: 70mW.
  - Dual Coil Latching: 140mW.

<table>
<thead>
<tr>
<th>Voltage (VDC)</th>
<th>Operating Range @ 20°C</th>
<th>Max. Voltage (VDC) @ 85°C</th>
<th>Max. Voltage (VDC) @ 60°C</th>
<th>Coil Resistance @ 20°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2.25</td>
<td>6.5</td>
<td>3.4</td>
<td>64 ± 6</td>
</tr>
<tr>
<td>4.5</td>
<td>3.75</td>
<td>9.8</td>
<td>5.1</td>
<td>145 ± 15</td>
</tr>
<tr>
<td>5</td>
<td>3.75</td>
<td>10.9</td>
<td>5.7</td>
<td>178 ± 18</td>
</tr>
<tr>
<td>6</td>
<td>4.50</td>
<td>13.0</td>
<td>6.8</td>
<td>257 ± 26</td>
</tr>
<tr>
<td>9</td>
<td>6.75</td>
<td>19.6</td>
<td>10.3</td>
<td>578 ± 58</td>
</tr>
<tr>
<td>12</td>
<td>9.0</td>
<td>26.1</td>
<td>13.8</td>
<td>1,029 ± 103</td>
</tr>
<tr>
<td>24</td>
<td>18.0</td>
<td>52.3</td>
<td>27.7</td>
<td>4,114 ± 411</td>
</tr>
</tbody>
</table>

- **Single Coil Latching, 70mW Nominal Power**
  - 3: 2.25, 6.5, 3.4, 64 ± 6
  - 4.5: 3.75, 9.8, 5.1, 145 ± 15
  - 5: 3.75, 10.9, 5.7, 178 ± 18
  - 6: 4.50, 13.0, 6.8, 257 ± 26
  - 9: 6.75, 19.6, 10.3, 578 ± 58
  - 12: 9.0, 26.1, 13.8, 1,029 ± 103
  - 24: 18.0, 52.3, 27.7, 4,114 ± 411

- **Dual Coil Latching, 140mW Nominal Power**
  - 3: 2.25, 6.5, –, –, 64 ± 6
  - 4.5: 3.75, 9.8, –, –, 145 ± 15
  - 5: 3.75, 10.9, –, –, 178 ± 18
  - 6: 4.50, 13.0, –, –, 257 ± 26
  - 9: 6.75, 19.6, –, –, 578 ± 58
  - 12: 9.0, 26.1, –, –, 1,029 ± 103
  - 24: 18.0, 52.3, –, –, 4,114 ± 411

**Operate Data @ 20°C**
- **Must Operate Voltage:** 75% of nominal or less.
- **Must Release Voltage:** 10% of nominal or more.
- **Operate Time (Excluding Bounce):** 3ms, typical.
- **Release Time (Excluding Bounce):** 3ms, typical.
- **Bounce Time:** 2ms, typical.

**Environmental Data**
- **Temperature Range:** -40 to +85°C
- **Vibration, Operational:** 35g, 10-1,000 Hz.
- **Shock, Functional:** 50g, 11ms 1/2 sinusoidal impulse.
- **Destructive:** 150g, 11ms 1/2 sinusoidal impulse.

**Mechanical Data**
- **Termination:** Through hole or surface mount printed circuit terminals.
- **Enclosure:** Immersion cleanable sealed plastic case.
- **Weight:** 2.5g approximately.

---

**Figure 1 - Limiting Curve for Contact Loads**

---

**Initial Dielectric Strength**
- Between Open Contacts: 1,000V rms for 1 min.
- Between Adjacent Contact Terminals: 1,000V rms for 1 min.
- Between Contact and Coil: 1,500V rms for 1 min.
- Surge Voltage:
  - Between Contact and Coil (10 x 700 μs): 1,500V (FCC Part 68).
  - Between Contact and Coil (2 x 10 μs): 2,500V (Bellcore).

**Initial Insulation Resistance**
- Between Mutually Isolated Conductors: 10^6 ohms @ 500VDC.
1. Basic Series:
     V23079 = Miniature, printed circuit board relay.

2. Termination:

<table>
<thead>
<tr>
<th>Through-Hole</th>
<th>Non-Latching Normal Ht</th>
<th>Non-Latching Reduced Ht</th>
<th>Dual Coil Latching</th>
<th>Single Coil Latching</th>
</tr>
</thead>
<tbody>
<tr>
<td>A10</td>
<td>A20(1)</td>
<td>B12</td>
<td>C11</td>
<td></td>
</tr>
<tr>
<td>D10</td>
<td>D20(1)</td>
<td>E12</td>
<td>F11</td>
<td></td>
</tr>
<tr>
<td>G10</td>
<td>G20(1)</td>
<td>H12</td>
<td>J11</td>
<td></td>
</tr>
<tr>
<td>SMD Extended Terminal</td>
<td>D10</td>
<td>D20(1)</td>
<td>E12</td>
<td>F11</td>
</tr>
<tr>
<td>SMD Short Terminal</td>
<td>G10</td>
<td>G20(1)</td>
<td>H12</td>
<td>J11</td>
</tr>
</tbody>
</table>

3. Coil Voltage:

| 08 = 3VDC | 11 = 4.5VDC | 01 = 5VDC | 02 = 6VDC | 06 = 9VDC | 03 = 12VDC | 05 = 24VDC(2) |

4. Contact Type:

| B301 = Bifurcated, 2 Form C (DPDT), Silver Nickel. |

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

Stock Items - The following items are normally maintained in stock for immediate delivery.


Outline Dimensions

Through-Hole

| Ext. Term. | 0.059 ± 0.004 | 0.059 ± 0.004 |
| Ext. Term. | 0.069 ± 0.004 | 0.069 ± 0.004 |
| Ext. Term. | 0.452 ± 0.004 | 0.452 ± 0.004 |
| Ext. Term. | 0.413 ± 0.004 | 0.413 ± 0.004 |

| SMD Soldering Profile |

Illustrated shows the reset condition. If a positive potential is applied to terminal 1 or 7, the relay adopts the set condition.

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

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 positive potential is applied to terminal 1 or 7, the relay adopts the set position.

PC Board Layout (Bottom View)

Through-Hole

SMD (Solder Pad)

SMD Packaging

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

SMD Soldering Profile

Specifications and availability subject to change without notice.

13C8079 Printed in U.S.A. IH/2-00
Ordering Information

Typical Part Number | V23106 | J20 | 01 | B201
--- | --- | --- | --- | ---
2. Relay Type: J20 = pin version, monostable, 1 coil.
3. Coil Number: 08 = 3VDC 02 = 6VDC 03 = 12VDC 01 = 5VDC 06 = 9VDC 05 = 24VDC

Stock Items
V23106J20018201  V23106J20038201  V23106J20058201

Outline Dimensions

Wiring Diagram (Bottom View)

Single Side Stable

P. C. Board Layout

Specifications and availability subject to change without notice.
13C8106 Printed in U.S.A. IH/3-00
V23105 series
High Sensitivity, DIP
PC Board Relay

File E48393
File LR45064-27

Features

- Standard DIP configuration mates with 16-pin socket.
- For applications in telecommunications, office automation, security devices, measurement and control equipment.
- Immersion cleanable, plastic sealed case.
- 150mW, 200mW, 400mW or 500mW coil.
- Ultrasonic cleaning not recommended.

Contact Data @ 20°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): 250VDC, 230VAC.
Max. Switched Power: 60W DC or 120VA AC, resistive load.
Min. Switching Load: 10mVDC.
Initial Contact Resistance: 100 millionths @ 10mA / 20mV.
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 400mW and 500mW versions only.
300,000 operations @ 500mA / 230VAC.
Thermoelectric potential: <15μV.

Initial Dielectric Strength

Between Open Contacts: 750VAC rms; 1,000VDC for 1 minute.
Between Coil and Contacts: 1,000VAC rms; 1,500VDC for 1 minute.
Between Poles: 750VAC rms; 1,000VDC for 1 minute.
Surge Voltage: 1,500V surge per FCC Part 68.

Initial Insulation Resistance

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

Coil Data @ 20°C

Voltage: 5 to 48VDC.
Nominal Power: See Coil Data table.
Duty Cycle: Continuous.

Operate Data @ 20°C

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

Environmental Data

Temperature Range: 150/200mW coil: -25°C to +85°C.
400mW coil: -25°C to +70°C.
500mW coil: -25°C to +60°C.
Maximum Allowable Coil Temperature: 105°C.
Thermal Resistance: approx. 100K/W.
Shock: Functional: 10g.
Destructive: 40g.
Vibration, 10-55 / 55-500 Hz.: Functional: 10g.
Destructive: 20g.

Mechanical Data

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

Coil Data @ 20°C

<table>
<thead>
<tr>
<th>Nominal Voltage (VDC)</th>
<th>Minimum Voltage (VDC)</th>
<th>Maximum Voltage (VDC)</th>
<th>Resistance ±10% (Ohms)</th>
<th>Coil Version Voltage Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>150mW versions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2.4</td>
<td>10.2</td>
<td>60</td>
<td>006</td>
</tr>
<tr>
<td>5</td>
<td>4.0</td>
<td>13.0</td>
<td>167</td>
<td>001</td>
</tr>
<tr>
<td>6</td>
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<td>200mW versions</td>
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<td>6.3</td>
<td>20.3</td>
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<td>27.0</td>
<td>720</td>
<td>303</td>
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<td>108.3</td>
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<td>400mW versions</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3.5</td>
<td>7.9</td>
<td>62</td>
<td>401</td>
</tr>
<tr>
<td>6</td>
<td>4.2</td>
<td>9.5</td>
<td>90</td>
<td>402</td>
</tr>
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<td>9</td>
<td>6.3</td>
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<td>203</td>
<td>405</td>
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<td>12</td>
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<td>403</td>
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<tr>
<td>24</td>
<td>16.8</td>
<td>37.9</td>
<td>1,440</td>
<td>405</td>
</tr>
<tr>
<td>48</td>
<td>33.6</td>
<td>75.8</td>
<td>5,760</td>
<td>407</td>
</tr>
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<td>500mW versions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>5</td>
<td>3.5</td>
<td>6.3</td>
<td>36</td>
<td>501</td>
</tr>
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<td>4.2</td>
<td>8.9</td>
<td>70</td>
<td>502</td>
</tr>
<tr>
<td>9</td>
<td>6.3</td>
<td>12.5</td>
<td>140</td>
<td>506</td>
</tr>
<tr>
<td>10</td>
<td>7.0</td>
<td>15.0</td>
<td>200</td>
<td>504</td>
</tr>
<tr>
<td>12</td>
<td>8.4</td>
<td>18.0</td>
<td>280</td>
<td>503</td>
</tr>
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<td>24</td>
<td>16.8</td>
<td>36.0</td>
<td>1,050</td>
<td>505</td>
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<tr>
<td>48</td>
<td>33.6</td>
<td>72.0</td>
<td>4,000</td>
<td>507</td>
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</tbody>
</table>
## Ordering Information

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>V23105-A5</th>
<th>4</th>
<th>01</th>
<th>A201</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Version:</td>
<td>0 = 150mW coil.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 = 200mW coil.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 = 400mW coil.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 = 500mW coil.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Coil Voltage:</td>
<td>08 = 3VDC (150mW and 200mW coils only)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>02 = 6VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>04 = 10VDC (500mW coil only)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>05 = 24VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>06 = 9VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>03 = 12VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>07 = 48VDC*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Contact Type and Material:</td>
<td>A201 = DPDT, silver-nickel, gold overlaid.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Not available with 150mW coil.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Stock Items – The following items are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Part Number</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>V23105A5001A201</td>
<td></td>
</tr>
<tr>
<td>V23105A5003A201</td>
<td></td>
</tr>
<tr>
<td>V23105A5005A201</td>
<td></td>
</tr>
<tr>
<td>V23105A5401A201</td>
<td></td>
</tr>
<tr>
<td>V23105A5403A201</td>
<td></td>
</tr>
<tr>
<td>V23105A5405A201</td>
<td></td>
</tr>
<tr>
<td>V23105A5407A201</td>
<td></td>
</tr>
</tbody>
</table>

### Outline Dimensions

![Outline Dimensions Diagram](image-url)

### Wiring Diagram (Bottom View)

![Wiring Diagram](image-url)

### PC Board Layout (Bottom View)

![PC Board Layout](image-url)
T84 series
4 Pole, High Dielectric
PC Board Relay

File E29244
File LR35579

Coil Data @ 20°C

<table>
<thead>
<tr>
<th>Resistance in Ohms ±10%</th>
<th>Standard Coils</th>
<th>Sensitive Coils</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Coil Non-Latching</td>
<td>Single Coil Latching</td>
</tr>
<tr>
<td>Nom. Coil Power Voltage</td>
<td>400mW</td>
<td>360mW</td>
</tr>
<tr>
<td>3</td>
<td>22.5</td>
<td>N/A</td>
</tr>
<tr>
<td>5</td>
<td>62.5</td>
<td>N/A</td>
</tr>
<tr>
<td>6</td>
<td>90</td>
<td>N/A</td>
</tr>
<tr>
<td>12</td>
<td>360</td>
<td>N/A</td>
</tr>
<tr>
<td>24</td>
<td>1,440</td>
<td>N/A</td>
</tr>
<tr>
<td>48</td>
<td>5,760</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Operate Data @ 20°C

Must Operate Voltage: 70% of nominal voltage or less.
Must Release Voltage (non-latching): 10% of nominal voltage or more. (Latching): Must operate voltage applied to reset coil (dual) or negative voltage (single).
Operate Time (Excluding Bounce): 6 ms, max.
Release Time (Excluding Bounce): 4 ms, max.
Reset Time (Latching): 6 ms, max.
Bounce Time: 1 ms, approximately.

† At or from Nominal Coil Voltage

Environmental Data

Temperature Range: Standard Coil: -40°C to +70°C.
Sensitive Coil: -40°C to +80°C.
Vibration: Operational and Non-destructive: 30g from 10-500 Hz.
Shock: Operational: 50g at 11 ms 1/2 sinusoidal impulse.
Non-destructive: 100g at 11 ms 1/2 sinusoidal impulse.

Mechanical Data

Termination: Printed circuit terminals on 0.1" (2.54mm) centers.
Enclosure: Sealed PBT plastic case.
Weight: 0.25 oz. (7g) approximately.

Ordering Information

Typical Part Number

1. Basic Series:
   T84 = High dielectric, PC board relay.

2. Construction:
   S = Sealed.

3. Contact Arrangement:
   17 = 4 Form C (4PDT).

4. Coil Voltage:
   03 = 3VDC 05 = 5VDC 06 = 6VDC 12 = 12VDC 24 = 24VDC 48 = 48VDC

5. Coil Power Voltage ±10%:
   400mW 360mW 200mW 90mW 180mW

6. Contact Material:
   Silver-palladium alloy.

7. Functional Type:
   1 = Single coil non-latching.
   3 = Dual coil latching.

8. Stock Items – The following items are maintained in stock.
   T84S17D214-05 T84S17D214-12 T84S17D414-05 T84S17D414-12 T84S17D414-24 T84S17D414-48

Specifications and availability subject to change without notice.
13C8840 Printed in U.S.A. IH3-00
PE series
5 Amp Miniature
Printed Circuit Board Relay

File E38891
File Pending
File 6656UG

Features
- 1 Form C (SPDT).
- 5 amp rated current.
- Sensitive coil 200mW.
- 10mm height.
- Flux-tight for wave soldering.
- Supplied in tubes.
- DIP configuration.
- 4kV coil-to-contact insulation.

Operate Data
Must Operate Voltage: See Coil Data table.
Operate Time: 5 ms typical, at nom. voltage.
Release Time: 2 ms typical, at nom. voltage.
Bounce Time: 1 ms typical, at nom. voltage.
Switching Rate: 360 ops./hr. max. at rated load.

Environmental Data
Temperature Range:
Operating: -40°C to +85°C DC coil.
Vibration: 30 to 500 Hz. at 15g N/O 5g N/C.
Shock: >100g.

Contact Data @ 85°C
Arrangement: 1 Form C (SPDT).
Material: Silver-nickel 90/10.
Expected Mechanical Life: 15 million operations minimum.
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: >3.2/4mm.

Coil Data DC @ 20°C
Nominal Coil Power: 200mW.

<table>
<thead>
<tr>
<th>Nominal Voltage VDC</th>
<th>DC Resistance in Ohms ±10%</th>
<th>Must Operate Voltage VDC</th>
<th>Drop-out Voltage VDC</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>125</td>
<td>3.8</td>
<td>0.5</td>
<td>40.0</td>
</tr>
<tr>
<td>06</td>
<td>172</td>
<td>4.5</td>
<td>0.6</td>
<td>34.9</td>
</tr>
<tr>
<td>12</td>
<td>685</td>
<td>9.0</td>
<td>1.2</td>
<td>17.5</td>
</tr>
<tr>
<td>24</td>
<td>2,725</td>
<td>18.0</td>
<td>2.4</td>
<td>8.8</td>
</tr>
<tr>
<td>48</td>
<td>10,970</td>
<td>36.0</td>
<td>4.8</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Max. DC Load Breaking Capacity

Coil Operating Range
## Typical Part Number

<table>
<thead>
<tr>
<th></th>
<th>PE</th>
<th>0</th>
<th>1</th>
<th>4</th>
<th>024</th>
</tr>
</thead>
</table>

### 1. Basic Series:
- **PE** = Miniature printed circuit board relay.

### 2. Enclosure*:
- 0 = Flux-tight.

### 3. Contact Arrangement:
- 1 = 1 Form C (SPDT)

### 4. Contact Material:
- 4 = Silver-nickel 90/10

### 5. Coil Voltage:
- 005 = 5VDC
- 006 = 6VDC
- 012 = 12VDC
- 024 = 24VDC
- 048 = 48VDC

* Sealed version available on request.

---

### Stock Items

- PE014005
- PE014024
- PE014012

---

### Outline Dimensions

- .767 (20.0)
- .394 (10.0)
- .055 (1.4)
- .149 (3.8)

### Wiring Diagram (Bottom View)

![Wiring Diagram](attachment:attachment.png)

### PC Board Layout (Bottom View)

![PC Board Layout](attachment:attachment.png)

Specifications and availability subject to change without notice.

13C4521  Printed in U.S.A.  KK/4-99
**Features**
- 1 Form A (SPST-NO).
- 6 amp rated current.
- Sensitive coil 200 mW.
- 10.6mm height.
- Fully sealed with vent hole.
- Supplied in tubes.

**Contact Data @ 70°C**

**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 amp 50 VDC L/R = 40ms 3,000,000 ops.

**UL/CSA AgCdO @ 25°C**
- 6 amp 250VAC general purpose 30,000 ops.
- 10 amp 120VAC general purpose (+70°C) 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.

**UL/CSA AgNI 0.15 @ 70°C**
- 6 amp 250VAC general purpose 6,000 ops.

**VDE 0435 @ 70°C**
- 6 amp 250VAC general purpose 100,000 ops.
- 10mA 5VDC 5,000,000 ops.

**VDE 0660 AC 11 @ 35°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: 4/4mm.

**Coil Data DC @ 20°C**

**Nominal Coil Power:** 200mW.

<table>
<thead>
<tr>
<th>Nominal Voltage VDC</th>
<th>DC Resistance in Ohms ±10%</th>
<th>Must Operate Voltage VDC</th>
<th>Drop-out Voltage VDC</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>125±10%</td>
<td>3.5</td>
<td>0.5</td>
<td>40</td>
</tr>
<tr>
<td>06</td>
<td>180±10%</td>
<td>4.2</td>
<td>0.6</td>
<td>33.3</td>
</tr>
<tr>
<td>12</td>
<td>720±10%</td>
<td>8.4</td>
<td>1.2</td>
<td>16.7</td>
</tr>
<tr>
<td>24</td>
<td>2,880±15%</td>
<td>16.8</td>
<td>2.4</td>
<td>8.3</td>
</tr>
<tr>
<td>48</td>
<td>11,520±15%</td>
<td>33.3</td>
<td>4.8</td>
<td>4.2</td>
</tr>
</tbody>
</table>

**Operate Data**

**Must Operate Voltage:** See Coil Data table.

**Operate Time:** 6 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.

**Environmental Data**

**Temperature Range:**
- Operating: -40°C to +70°C DC coil (+85°C @ 4 amp).
- Vibration: 10 to 150 Hz at 10g N/O 20g N/C.
- Shock: >100g.
### Ordering Information

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>RE</th>
<th>0</th>
<th>3</th>
<th>0</th>
<th>006</th>
</tr>
</thead>
</table>

1. **Basic Series:**
   - RE = Miniature printed circuit board relay.

2. **Enclosure:**
   - 0 = Sealed

3. **Contact Arrangement:**
   - 3 = 1 Form A (SPST-NO)

4. **Contact Material:**
   - 0 = Silver-cadmium oxide.
   - 2 = Silver-nickel 0.15 with gold plating.

5. **Coil Voltage:**
   - 005 = 5VDC
   - 012 = 12VDC
   - 024 = 24VDC
   - 006 = 6VDC
   - 048 = 48VDC

### Stock Items

- RE030005
- RE030024
- RE030012

### Outline Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>0.787 (20.0)</td>
<td></td>
</tr>
<tr>
<td>0.417 (10.6)</td>
<td></td>
</tr>
<tr>
<td>0.394 (10.0)</td>
<td></td>
</tr>
<tr>
<td>1.38 (3.5)</td>
<td></td>
</tr>
<tr>
<td>0.138 (3.5)</td>
<td></td>
</tr>
</tbody>
</table>

### Wiring Diagram (Bottom View)

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)

![PC Board Layout](image-url)

Specifications and availability subject to change without notice.

13C4501 Printed in U.S.A. KK/4-99
**Features**
- Small size for high density PC board mounting.
- 1 Form A contact arrangements.
- Creepage spacings of 6.5mm between contact and coil.
- Ideal for appliance, office equipment.
- 4,000VAC dielectric strength between contact and coil.
- UL Class F (140°C) approved insulation system.

**Coil Data @ 20°C**
- Voltage: 3 to 24VDC.
- Nominal Coil Power:
  - Contact rating 3 = 200mW.
  - Contact rating 10 = 450mW.
- Coil Temperature Rise:
  - Contact rating 3 = 35°C max.
  - Contact rating 10 = 40°C max.
- Max. Coil Power: 120% of nominal.
- Duty Cycle: Continuous.

**Duty Cycle**
- Continuous.

**Features**
- Small size for high density PC board mounting.
- 1 Form A contact arrangements.
- Creepage spacings of 6.5mm between contact and coil.
- Ideal for appliance, office equipment.
- 4,000VAC dielectric strength between contact and coil.
- UL Class F (140°C) approved insulation system.

**Contact Data @ 20°C**
- Arrangements: 1 Form A (SPST-NO).
- Material:
  - Contact rating 3 - Silver.
  - Contact rating 10 - Silver alloy.
- Max. Switching Rate: 300 ops./min. (no load).
- Expected Mechanical Life: 10 million operations.
- Minimum Contact Load: 10mA @ 5VDC.
- Initial Contact Resistance: 100 milliohms max. @ 100mA, 6VDC.

**Contact Ratings @ 20°C with relay properly vented. Remove vent nib after soldering and cleaning.**

<table>
<thead>
<tr>
<th>Contact Rating</th>
<th>UL/CSA Ratings</th>
<th>Type</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3A @ 277VAC</td>
<td>Resistive</td>
<td>6,000</td>
</tr>
<tr>
<td></td>
<td>10LRA/1.5FLA @ 120VAC</td>
<td>Motor</td>
<td>30,000**</td>
</tr>
<tr>
<td></td>
<td>5.4LRA/0.9FLA @ 240VAC</td>
<td>Motor</td>
<td>30,000**</td>
</tr>
<tr>
<td></td>
<td>3LRA/1.5FLA @ 240VAC</td>
<td>Motor</td>
<td>100,000*</td>
</tr>
<tr>
<td></td>
<td>3A @ 250VAC UL</td>
<td>Resistive</td>
<td>100,000</td>
</tr>
<tr>
<td></td>
<td>3A @ 30VDC</td>
<td>General Purpose</td>
<td>100,000</td>
</tr>
<tr>
<td></td>
<td>2A @ 120VAC</td>
<td>Resistive</td>
<td>100,000***</td>
</tr>
<tr>
<td></td>
<td>3A @ 120VAC</td>
<td>General Purpose</td>
<td>100,000***</td>
</tr>
<tr>
<td>10</td>
<td>10LRA/1.5FLA @ 120VAC</td>
<td>Motor</td>
<td>30,000**</td>
</tr>
<tr>
<td></td>
<td>5.4LRA/0.9FLA @ 240VAC</td>
<td>Motor</td>
<td>30,000**</td>
</tr>
<tr>
<td></td>
<td>10A @ 250VAC</td>
<td>Resistive</td>
<td>100,000</td>
</tr>
<tr>
<td></td>
<td>10A @ 30VDC</td>
<td>Resistive</td>
<td>100,000</td>
</tr>
<tr>
<td></td>
<td>10A @ 250VAC UL</td>
<td>General Purpose</td>
<td>200,000</td>
</tr>
</tbody>
</table>

*Denotes test at 70°C ambient temperature.
**Denotes test at 85°C ambient temperature.
***Denotes test at 100°C ambient temperature.

**Coil Data @ 20°C**

<table>
<thead>
<tr>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance (Ohms) ±10%</th>
<th>Contact Rating 3</th>
<th>Contact Rating 10</th>
<th>Must Operate Voltage (VDC)</th>
<th>Must Release Voltage (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>45</td>
<td>20</td>
<td>2.25</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>125</td>
<td>55</td>
<td>3.75</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>720</td>
<td>320</td>
<td>9.00</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>2,800</td>
<td>1,280</td>
<td>18.00</td>
<td>1.20</td>
<td></td>
</tr>
</tbody>
</table>

**Operate Data @ 20°C**
- Operate Time: 10 ms, max. (excluding bounce).
- Release Time: 4 ms, max. (excluding bounce).

**Environmental Data**
- Temperature Range:
  - Storage: -40°C to +130°C.
  - Operating: -30°C to +55°C.
  - Contact Rating 3: -40°C to +80°C.
  - Contact Rating 10: -40°C to +55°C.
- Vibration: Mechanical: 10 to 55 Hz., 1.5mm double amplitude.
- Shock: Mechanical: 100g min.
- Operating Humidity: 45 to 85% RH.

**Initial Dielectric Strength**
- Between Open Contacts: 750VAC 50/60 Hz. (1 minute).
- Between Coil and Contacts: 4,000VAC 50/60 Hz. (1 minute).

**Initial Insulation Resistance**
- Between Mutually Insulated Elements: 10Ω ohms, min. @ 500VDC.

**Mechanical Data**
- Termination: Printed circuit board.
- Enclosures (94V-0 Flammability Ratings):
  - T77S: Immersion cleanable.
  - T77V: Vented, flux-tight, plastic cover.
- Weight: 0.36 oz. (9g).
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

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>V</th>
<th>1</th>
<th>D</th>
<th>10</th>
<th>-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>T77 V 1 D 10 -24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. **Basic Series:**
   - T77 = Miniature PCB relay.

2. **Enclosure:**
   - V = Vented (Flux-tight)*
   - S = Immersion cleanable case

3. **Contact Arrangement:**
   - 1 = (SPST-NO)

4. **Coil Input:**
   - D = DC Voltage

5. **Contact Rating:**
   - 3 = 3A
   - 10 = 10A

6. **Coil Voltage:**
   - 3 = 3VDC
   - 5 = 5VDC
   - 12 = 12VDC
   - 24 = 24VDC

*Not suitable for immersion cleaning processes.

### Stock Items – The following items are maintained in stock.

- 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**
- 10 amp switching capacity.
- UL Class F (140°C) 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 @ 20°C**

**Arrangements:** 1 Form A (SPST-NO) and 1 Form C (SPDT).
**Material:** Silver-cadmium oxide.
**Max. Switching Rate:** 240 ops./min. (no load).
**Expected Mechanical Life:** 10 million operations.
**Expected Electrical Life:** 100,000 operations.
**Minimum Load:** 10mA @ 5VDC.
**Initial Contact Resistance:** 100 millionths max. @ 100mA, 6VDC.

**Initial Dielectric Strength**
- Between Open Contacts: 750VAC 50/60 Hz. (1 minute).
- Between Coil and Contacts: 1,500VAC 50/60 Hz. (1 minute)*.

*Higher dielectric version available.

**Initial Insulation Resistance**
- Between Mutually Insulated Elements: 10^6 ohms min. @ 500VDC.
- Ag contact rating.

**Coil Data @ 20°C**

**Voltage:** 3 to 48VDC.
**Nominal Power:** 450 milliwatts.
**Coil Temperature Rise:** 35°C max. at rated coil voltage.
**Max. Coil Power:** 130% of nominal.

**Operate Data @ 20°C**

**Operate Time:** 10 ms (excluding bounce).
**Release Time:** 5 ms (excluding bounce).

**Environmental Data**
- **Temperature Range:**
  - Storage: -40°C to +130°C.
  - Operating: -30°C to +80°C.
- **Vibration, Mechanical:** 10 to 55 Hz, 1.5mm double amplitude
  - Operational: 10 to 55 Hz, 1.5mm double amplitude.
- **Shock, Mechanical:** 100g min.
  - Operational: 10g min.
- **Operating Humidity:** 45 to 85% RH.

**Mechanical Data**
- **Termination:** Printed circuit terminals.
- **Enclosure:** (94V-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

Typical Part Number | T73 | S | 5 | D | 1 | 5 | -24
--- | --- | --- | --- | --- | --- | --- | ---

1. Basic Series:
   T73 = Miniature, printed circuit board relay.

2. Enclosure:
   V = Vented (Flux-tight)*
   S = Immersion cleanable, plastic sealed case.

3. Contact Arrangement:
   1 = 1 Form A (SPST-NO).
   5 = 1 Form C (SPDT).

4. Coil Input:
   D = DC voltage.

5. Relay Type:
   1 = Standard coil.

6. Contact Material:
   5 = Silver-Cadmium Oxide

7. Coil Voltage:
   03 = 3VDC  06 = 6VDC  12 = 12VDC  24 = 24VDC
   05 = 5VDC  09 = 9VDC  18 = 18VDC  48 = 48VDC

* Not suitable for immersion cleaning process.

Stock Items – The following items are maintained in stock.
T73S5D15-05
T73S5D15-12
T73S5D15-24

Outline Dimensions

Wiring Diagrams (Bottom Views)
1 Form A

1 Form C

Suggested PC Board Layouts (Bottom Views)
1 Form A

1 Form C

Specifications and availability subject to change without notice.
13C8730  Printed in U.S.A.  IH/3-00
T7N series
10 Amp Miniature
PC Board Relay

File E22575
File LR48471

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 (140°C) 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°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/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 @ 20°C with relay properly vented. Remove vent nib after soldering and cleaning.

Contact Arrang.  UL/CSA Ratings Type Operations
1 & 5 1/4HP @ 240VAC Motor 1,000*
1/3HP @ 120VAC Motor 6,000
1/3HP NO @ 120VAC Motor 6,000
1/3HP NO @ 240VAC Motor 6,000**
5A/5A @ 240VAC Motor 6,000*
10A NO @ 240VAC Resistive 6,000
10A NO @ 240VAC Gen. Purpose 6,000
8A NC @ 240VAC Resistive 6,000
1/6HP NC @ 240VAC Motor 6,000**
1/4HP 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 Gen. Purpose 30,000**
34.8LRA/6FLA NO @ 120VAC Motor 100,000
10A/5A @ 120VAC Resistive 100,000
5A/5A @ 240VAC Resistive 100,000
5A/5A @ 28VDC Resistive 100,000

Initial Dielectric Strength
Between Open Contacts: 750VAC, 50/60 Hz. (1 min.)
Between Coil and Contacts: 2,000VAC, 50/60 Hz. (1 min.)

Initial Insulation Resistance
Between Mutually Insulated Elements: 10^9 ohms, min. @ 500VDC.

Coil Data
Voltage: 3 through 48VDC.
Nom. Power: 360mW.
Coil Temp. Rise: See Figure 1.
Max. Coil Power: 150% of nominal.
Duty Cycle: Continuous.

Coil Data @ 20°C
<table>
<thead>
<tr>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance ±10% (Ohms)</th>
<th>Must Operate Voltage (VDC)</th>
<th>Must Release Voltage (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>25</td>
<td>2.1</td>
<td>.15</td>
</tr>
<tr>
<td>5</td>
<td>70</td>
<td>3.5</td>
<td>.25</td>
</tr>
<tr>
<td>6</td>
<td>100</td>
<td>4.2</td>
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<td>9</td>
<td>225</td>
<td>6.3</td>
<td>.45</td>
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<td>12</td>
<td>400</td>
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<td>18</td>
<td>900</td>
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<td>.90</td>
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<tr>
<td>24</td>
<td>1,600</td>
<td>16.8</td>
<td>1.20</td>
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<tr>
<td>36</td>
<td>3,600</td>
<td>25.2</td>
<td>1.80</td>
</tr>
<tr>
<td>48</td>
<td>6,400</td>
<td>33.6</td>
<td>2.40</td>
</tr>
</tbody>
</table>

Operate Data @ 20°C
Operate Time: 10 ms, max. (excluding bounce).
Release Time: 5 ms, max. (excluding bounce).

Environmental Data
Temperature Range:
   Storage: -40°C to +130°C.
   Operating: -40°C to +85°C. (No water condensation and no water drop).
Vibration: 10-55 Hz., .063” (1.6mm) double amplitude;
   10-55 Hz., .079” (2.0mm) double amplitude.
Shock: Mechanical: 100g minimum.
   Operational: 10g minimum.
Operating Humidity: 45 to 85% RH.

Mechanical Data
Termination: Printed circuit terminals.
Enclosure (UL 94V-0 Flammability Ratings): Immersion cleanable case with knock-off nib for ventilation.
Weight: 0.38 oz. (11g) approximately.
Ordering Information

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>T7N S 5 D 1 -24</th>
</tr>
</thead>
</table>

2. Enclosure: S = Immersion cleanable case with knock-off nib.
3. Contact Arrangement: 1 = 1 Form A (SPST-NO) 5 = 1 Form C (SPDT)
5. Contact Material: 1 = Silver-cadmium oxide contacts.
6. Coil Voltage:
   - 03 = 3VDC
   - 06 = 6VDC
   - 12 = 12VDC
   - 24 = 24VDC
   - 48 = 48VDC
   - 05 = 5VDC
   - 09 = 9VDC
   - 18 = 18VDC
   - 36 = 38VDC

Stock Items – The following items are normally maintained in stock for immediate delivery.

- T7NS1D1-12
- T7NS1D1-24
- T7NS5D1-05
- T7NS5D1-12
- T7NS5D1-24
- T7NS5D1-48

Outline Dimensions

Tolerance (unless otherwise noted): 3 decimal: ±0.010 (±0.254); 2 decimal: ±0.015 (±0.381).

Wiring Diagram (Bottom View)

Suggested PC Board Layout (Bottom View)
T7C series
12 Amp Miniature Power PC Board Relay

Features
• 12 amp switching capacity.
• UL Class F (140°C) 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 @ 20°C
Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Silver-cadmium oxide.
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: 100 milliohms max. @ 100mA, 6VDC.

Contact Ratings @ 20°C with relay properly vented. Remove vent nib after soldering and cleaning.

<table>
<thead>
<tr>
<th>Contact Arrang.</th>
<th>UL/CSA Ratings</th>
<th>Type</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 5</td>
<td>1/3HP NO @ 120VAC</td>
<td>Motor</td>
<td>6,000**</td>
</tr>
<tr>
<td></td>
<td>TV-2 NO @ 120VAC</td>
<td>Motor</td>
<td>25,000**</td>
</tr>
<tr>
<td></td>
<td>5.4LRA/0.5LFA NO @ 240VAC</td>
<td>Motor</td>
<td>30,000***</td>
</tr>
<tr>
<td></td>
<td>10LRA/0.5LFA @ 120VAC</td>
<td>Motor</td>
<td>30,000***</td>
</tr>
<tr>
<td></td>
<td>12A NO @ 120VAC</td>
<td>Motor</td>
<td>100,000**</td>
</tr>
<tr>
<td></td>
<td>34.8LRA/0.5LFA NO @ 120VAC</td>
<td>Motor</td>
<td>100,000**</td>
</tr>
<tr>
<td></td>
<td>10A/5A @ 240VAC</td>
<td>Motor</td>
<td>100,000**</td>
</tr>
<tr>
<td></td>
<td>10A/5A @ 28VDC</td>
<td>Motor</td>
<td>100,000**</td>
</tr>
<tr>
<td></td>
<td>240V, 240VAC</td>
<td>Motor</td>
<td>100,000**</td>
</tr>
<tr>
<td></td>
<td>4LRA/0.4LFA NO @ 120VAC</td>
<td>Motor</td>
<td>100,000***</td>
</tr>
<tr>
<td></td>
<td>4LRA/2FLA NC @ 120VAC</td>
<td>Motor</td>
<td>100,000***</td>
</tr>
<tr>
<td></td>
<td>6LRA/6LFA NO @ 120VAC</td>
<td>Motor</td>
<td>100,000***</td>
</tr>
<tr>
<td></td>
<td>7A @ 277VAC</td>
<td>Motor</td>
<td>100,000</td>
</tr>
<tr>
<td></td>
<td>10LRA/2.5LFA NO @ 277VAC</td>
<td>Motor</td>
<td>100,000</td>
</tr>
</tbody>
</table>

Initial Dielectric Strength
Between Open Contacts: 750VAC 50/60 Hz. (1 minute).
Between Coil and Contacts: 1,500VAC 50/60 Hz. (1 minute).

Initial Insulation Resistance
Between Mutually Insulated Elements: 10^8 ohms min. @ 500VDC.

Coil Data @ 20°C
Voltage: 3 to 48VDC
Nominal Power: 360 milliwatts.
510 milliwatts for 48VDC coil.
Coil Temperature Rise: 35°C max, at rated coil voltage.
Max. Coil Voltage: 130% of nominal.
Duty Cycle: Continuous.

T7C series: Immersion cleanable with knock-off nib.
T7CV: Vented, flux-tight, plastic cover with knock-off nib.
Weight: 0.42 oz. (12g).

Consult factory for other ratings.
*Denotes test at 60°C ambient temperature.
**Denotes test at 70°C ambient temperature.
***Denotes test at 85°C ambient temperature.
****Denotes test at 105°C ambient temperature.

Environmental Data
Temperature Range:
Storage: -40°C to +130°C.
Operating: -40°C to +85°C.
Vibration, Mechanical: 10 to 55 Hz., 1.5mm double amplitude
Operational: 10 to 55 Hz., 1.5mm double amplitude.
Shock, Mechanical: 10g min.
Operational: 10g 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

Note: Graphical data should not be used as a substitute for specific application verification. To be used for estimates only.
Ordering Information

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>T7C</th>
<th>V</th>
<th>5</th>
<th>D</th>
<th>-24</th>
</tr>
</thead>
</table>

1. Basic Series:
   T7C = Miniature power relay.

2. Enclosure:
   V = Vented (Flux-tight)*
   S = Immersion cleanable case with knock-off nib.

3. Contact Arrangement:
   1 = 1 Form A (SPST-NO)  5 = 1 Form C (SPDT)

4. Coil Input:
   D = DC Voltage

5. Coil Voltage:
   03 = 3VDC  05 = 5VDC  06 = 6VDC  09 = 9VDC
   12 = 12VDC 18 = 18VDC 24 = 24VDC 48 = 48VDC

* Not suitable for immersion cleaning processes.

Stock Items – The following items are maintained in stock.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T7CV5D-05</td>
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</tr>
<tr>
<td>T7CV5D-12</td>
<td></td>
</tr>
<tr>
<td>T7CV5D-06</td>
<td></td>
</tr>
<tr>
<td>T7CV5D-24</td>
<td></td>
</tr>
<tr>
<td>T7CS5D-05</td>
<td></td>
</tr>
<tr>
<td>T7CS5D-06</td>
<td></td>
</tr>
<tr>
<td>T7CS5D-12</td>
<td></td>
</tr>
<tr>
<td>T7CS5D-24</td>
<td></td>
</tr>
</tbody>
</table>

Outline Dimensions

Movable Contact Terminal:
   .012 x .039 (0.3 x 1.0)

Stationary Contact Terminals:
   .012 x .039 (0.3 x 1.0)

Coil Terminals:
   .022 x .022 (.56 x .56)

Wiring Diagrams (Bottom Views)

1 Form A

<table>
<thead>
<tr>
<th>Diagram</th>
</tr>
</thead>
</table>

1 Form C

<table>
<thead>
<tr>
<th>Diagram</th>
</tr>
</thead>
</table>

Suggested PC Board Layouts (Bottom Views)

1 Form A

<table>
<thead>
<tr>
<th>Diagram</th>
</tr>
</thead>
</table>

1 Form C

<table>
<thead>
<tr>
<th>Diagram</th>
</tr>
</thead>
</table>

Specifications and availability subject to change without notice.
13C8702 Printed in U.S.A. IH/3-00
Sensive, Low Profile, Hi-Current Relay Designed to Meet International Standards

**Features**
- High sensitivity – nominal coil power requirement is as low as 212mW.
- Low profile, 0.591 in. (15mm) tall case uses only .465 in² (3cm²) of area on the printed circuit board, permitting high density circuit design.
- Power switching capability – contacts rated 14 amps in 1 Form A (SPST-NO) 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.

**Contact Ratings @ 25°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 amps, 240VAC.
- 50,000 operations at 14 amps NO / 5 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 (380VA, 240VAC; 470VA, 120VAC).

**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; 2,000VA, AC.

**VDE Contact Ratings:** 8 amps, 250VAC.

**UL/CSA Contact Ratings:**
- 10 amps, 240VAC; 8 amps 24VDC; 1/2 HP, 120VAC; 1/2 HP, 240VAC.

Initial Dielectric Strength
- Between Open Contacts: 1,000V rms.
- Between Contacts and Coil: 4,000V rms, 8mm.

**Coil Data**
- Voltage: 3 to 60VDC.
- Maximum Power @ 25°C: 1W.
- Nominal Power @ 25°C: 230mW, typ.
- Temperature Rise: 85°C per Watt.
- Duty Cycle: Continuous.

**Operate Data @ 25°C**
- Must Operate Voltage: 72% of nom. voltage or less.
- Must Release Voltage: 10% of nom. voltage or more.
- Operate Time (Excluding Bounce): 2.5 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.

**Contact Ratings (See Figure 1):**
- Nominal Voltage
  - DC Resistance in Ohms ±10%
  - Must Operate Voltage
  - Nominal Coil Current (mA)

<table>
<thead>
<tr>
<th>DC Coils</th>
<th>Nominal Voltage</th>
<th>DC Resistance in Ohms</th>
<th>Must Operate Voltage</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>40</td>
<td>2.1</td>
<td>75.0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>118</td>
<td>3.6</td>
<td>42.4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>165</td>
<td>4.3</td>
<td>36.4</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>365</td>
<td>6.4</td>
<td>24.7</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>650</td>
<td>8.5</td>
<td>18.5</td>
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</tr>
<tr>
<td>18</td>
<td>1,455</td>
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<tr>
<td>24</td>
<td>2,270</td>
<td>17.2</td>
<td>10.6</td>
<td></td>
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<tr>
<td>36</td>
<td>5,460</td>
<td>25.4</td>
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<td>8,790</td>
<td>34.5</td>
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<tr>
<td>60</td>
<td>15,265</td>
<td>42.8</td>
<td>3.9</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1 - DC Switching Load Limit Curve**

**Temperature Range**
- Storage: -40°C to +130°C.
- Operating: -40°C to +70°C.

**Mechanical Data**
- Termination: Printed circuit terminals.
- Enclosures: Immersion cleanable, plastic sealed case.
- Weight: 0.65 oz. (18.5g) approximately.
Ordering Information

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>T75</th>
<th>S</th>
<th>5</th>
<th>D</th>
<th>1</th>
<th>1</th>
<th>2</th>
<th>-12</th>
</tr>
</thead>
</table>

1. **Basic Series:**
   
   T75 = Low profile, printed circuit board relay.

2. **Enclosure:**
   
   5 = Immersion cleanable, plastic sealed case.

3. **Contact Arrangement:**
   
   1 = 1 Form A (SPST-NO)
   
   5 = 1 Form C (SPDT)

4. **Coil Input:**
   
   D = DC voltage

5. **Coil Configuration:**
   
   1 = Single coil, non-latching (monostable)

6. **Mounting and Terminals:**
   
   1 = Printed circuit terminals

7. **Contact Material:**
   
   2 = Silver-cadmium oxide (AgCdO)

8. **Coil Voltage:**
   
   - 03 = 3VDC
   - 06 = 6VDC
   - 12 = 12VDC
   - 24 = 24VDC
   - 48 = 48VDC
   - 05 = 5VDC
   - 09 = 9VDC
   - 18 = 18VDC
   - 36 = 36VDC
   - 60 = 60VDC

Stock Items - The following items are normally maintained in stock for immediate delivery.

- T75S5D112-05
- T75S5D112-12
- T75S5D112-24

Outline Dimensions

- **FORM A**
  
  1126 MAX. (28.6)

- **FORM C**
  
  1181 MAX. (30)

  CONTACT TERMINALS: .023 x .040 (.58 x 1.02) REF.

  COIL TERMINALS: .024 (.61) DIA. REF.

Wiring Diagrams (Bottom Views)

- ON SINGLE THROW MODELS, ONLY NECESSARY TERMINALS ARE PRESENT.

PC Board Layouts (Bottom Views)

1 Form C

1 Form A
**RT series (DC Coil)**

**16 Amp PC Board**

**Miniature Relay**

Meets VDE 10mm Spacing, 5KV Dielectric

- File E22575
- File LR15734
- NR 6106

**Coil Data @ 25°C**

**Voltage:** 5 to 48VDC

**Nominal Power @ 25°C:** 400mW.

**Duty Cycle:** Continuous.

**Initial Insulation Resistance:** 10,000 megohms, min., at 25°C, 500VDC and 50% rel. humidity.

**Contact Data**

**Arrangements:**
- Form A (SPST-NO) Wiring Diagram Code 1, 3.
- Form A (DPST-NO) Wiring Diagram Code 5.
- Form C (SPDT) Wiring Diagram Code 1, 3.
- 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 milliseconds max @ 1A 12VDC.

**Features**

- SPST through DPDT contact arrangements.
- Immersion cleanable and flux tight versions available.
- VDE 10mm spacing, 5kV dielectric, coil to contacts.
- UL Class F coil insulation system.
- Conforms to UL 508, 1873, 353 and 1950.
- Low profile: 15.7mm height.
- Sensitive coil: 400mW.
- Withstand surge voltage of 10,000V.

**Initial Dielectric Strength**

- Between Open Contacts: >1,000VAC (1 minute).
- Between Poles (code 5): >2,500VAC (1 minute).
- Between Coil and Contacts: >5,000VAC (1 minute).
- Surge Voltage (DC): >10,000VAC x (1.2 x 50 µsec).

**Operate Data @ 25°C**

- **Must Operate Voltage (DC):** 70% of nominal.
- **Must Release Voltage (DC):** 10% of nominal.
- **Operate Time (Including Bounce):** 7 ms, typ., 15ms max. at nom. voltage.
- **Release Time (Including Bounce):** 3 ms, typ., 6ms max. at nom. voltage.

**Environmental Data**

**Temperature Range:**

- **Storage:** -40°C to +105°C.
- **Operating:** -40°C to +85°C at rated current.

**Vibration, Operational**

N.O.: 0.0585" (1.65mm) max. excursions from 10 - 55 Hz;

N.C.: 0.032" (0.82mm) max. excursions from 10 - 55 Hz;

with no contact opening >10µs.

**Mechanical Data**

**Termination:** Printed circuit terminals.

**Enclosures:**
- RT 1, 3, 4: Flux-tight, top vented, plastic case.
- RT B, D, E: Immersion cleanable, plastic case.

**Weight:** 0.35 oz. (10g) approximately.
1. Basic Series:
   RT = Miniature, printed circuit board relay.

2. Enclosure:
   1 = 1 pole 12A, Pinning 3.5mm, flux-tight (Code 1).
   3 = 1 pole 16A, Pinning 5mm, flux-tight (Code 3).
   4 = 2 pole 8A, Pinning 5mm, flux-tight (Code 5).
   B = 1 pole 12A, Pinning 3.5mm, sealed (Code 1).
   D = 1 pole 16A, Pinning 5mm, sealed (Code 3).
   E = 2 pole 8A, Pinning 5mm, sealed (Code 5).

3. Contact Arrangement:
   1 = 1 Form C (SPDT) (Requires wiring diagram codes 1 or 3.)
   2 = 2 Form C (DPDT) (Requires wiring diagram code 5.)
   3 = 1 Form A (SPST-NO) (Requires wiring diagram codes 1 or 3.)
   4 = 2 Form A (DPST-NO) (Requires wiring diagram code 5.)

4. Contact Material:
   4 = Silver-nickel 90/10 (standard stock).

5. Coil Voltage:
   005 = 5VDC  009 = 9VDC  018 = 18VDC  048 = 48VDC
   006 = 6VDC  012 = 12VDC  024 = 24VDC

5. Coil Insulation Classification
   F = UL Class F, Siemens Brand
   Leave Blank = UL Class A, Schrack Brand

Stock Items
RT114012F RTB14012F RTB34024F RTD14005F RTD34012F RTE24005F RTE44012F
RT114024F RTB14024F RT314012F RTD14012F RT424012F RTE44024F
RTB14005F RTB34012F RT314024F RTD14024F RT424024F RTE44024F

Outline Dimensions

Breaking Capacity

Contact Life for Resistive AC Load (Typical)

Wiring Diagrams (Bottom View)

Note: Data from 250VAC @ 70°C.
RT series (AC Coil)
16 Amp Miniature
Printed Circuit Board Relay

Meets VDE 10mm Spacing, 5KV Dielectric
File E38891
File LR14385
NR 6106

Features
- SPST through DPDT contact arrangements.
- Immersion cleanable and flux tight versions available.
- Meets VDE 10mm spacing, 5kV dielectric, coil to contacts.
- Conforms to UL 508, 1873 and 353.

Contact Data
Arrangements: 1 Form A (SPST-NO) Wiring Diagram Code 1, 3.
2 Form A (DPST-NO) Wiring Diagram Code 5.
1 Form C (DPDT) Wiring Diagram Code 1, 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 @ 25°C:

<table>
<thead>
<tr>
<th>Code</th>
<th>NO/NC Load</th>
<th>Type</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12A @ 240VAC, 8A @ 28VDC, 1HP @ 240VAC, 1/2 HP @ 120VAC, 8A @ 28VDC, B300</td>
<td>GP, Resistive/GP, Motor, Resistive</td>
<td>30K</td>
</tr>
<tr>
<td>3</td>
<td>16A/8A @ 240VAC, 8A @ 28VDC, 1HP @ 240VAC, 48 LRA @ 240VAC, B300</td>
<td>GP, Resistive, Motor, Pilot Duty</td>
<td>6K</td>
</tr>
<tr>
<td>5</td>
<td>8A @ 240VAC, 8A @ 28VDC, 1HP @ 240VAC, B300</td>
<td>Resistive/GP, Motor, Pilot Duty</td>
<td>30K</td>
</tr>
</tbody>
</table>

VDE Ratings @ 25°C:

<table>
<thead>
<tr>
<th>Code</th>
<th>NO/NC Load</th>
<th>Type</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12A @ 250VAC, 12A @ 250VAC</td>
<td>Resistive</td>
<td>30K</td>
</tr>
<tr>
<td>3</td>
<td>16A @ 250VAC, 16A @ 250VAC</td>
<td>Resistive</td>
<td>10K</td>
</tr>
<tr>
<td>5</td>
<td>8A @ 250VAC, 8A @ 250VAC</td>
<td>Resistive</td>
<td>30K</td>
</tr>
</tbody>
</table>

Coil Data @ 20°C
Voltage: 24, 115, 230VAC.
Nominal Power @ 25°C: .75VA.
Duty Cycle: Continuous.
Initial Insulation Resistance: 10,000 megohms, min., at 20°C, 50% rel. humidity.

Initial Dielectric Strength
Between Open Contacts: >1,000VAC (1 minute).
Between Poles (code 5): >2,500VAC (1 minute).
Between Coil and Contacts: >5,000VAC (1 minute).
Creepage/Clearance, Coil to Contact: 10/10mm.

Environmental Data
Temperature Range:
- Storage: -40°C to +105°C.
- Operating: -40°C to +70°C at rated current.
Vibration: 30 - 150 Hz:
  at 20g with no contact opening >10µs on the N.O. contact;
  at 5g with no contact opening >10µs on the N.C. contact.

Mechanical Data
Termination: Printed circuit terminals.
Enclosures: RT 1, 3, 4: Flux-tight, top vented, plastic case.
RT B, D, E: Immersion cleanable, plastic case.
Weight: 0.42 oz. (12g) approximately.
Ordering Information (AC Coil Model)

### Typical Part Number

<table>
<thead>
<tr>
<th>RT</th>
<th>D</th>
<th>1</th>
<th>4</th>
<th>524</th>
</tr>
</thead>
</table>

#### 1. Basic Series:
RT = Miniature, printed circuit board relay.

#### 2. Enclosure:
- 1 = 1 pole 12A, Pinning 3.5mm, flux-tight (Code 1).
- 3 = 1 pole 16A, Pinning 5mm, flux-tight (Code 3).
- 4 = 2 pole 8A, Pinning 5mm, flux-tight (Code 5).
- B = 1 pole 12A, Pinning 3.5mm, sealed (Code 1).
- D = 1 pole 16A, Pinning 5mm, sealed (Code 3).
- E = 2 pole 8A, Pinning 5mm, sealed (Code 5).

#### 3. Contact Arrangement:
- 1 = 1 Form C (SPDT) (Requires wiring diagram codes 1 or 3.)
- 2 = 2 Form C (DPDT) (Requires wiring diagram code 5.)
- 3 = 1 Form A (SPST-NO) (Requires wiring diagram codes 1 or 3.)
- 4 = 2 Form A (DPST-NO) (Requires wiring diagram code 5.)

#### 4. Contact Material:
- 4 = Silver-nickel 90/10.

#### 5. Coil Voltage:
- 524 = 24VAC
- 730 = 230VAC
- 615 = 115VAC

### Stock Items

- RTB14524
- RTB14615
- RTB14730
- RTD14524
- RTD14615
- RTD14730
- RTE24524
- RTE24615
- RTE24730

### Outline Dimensions

- 1 Pole 12A 3.5mm
- 1 Pole 16A 5mm
- 2 Pole 8A 5mm

### Breaking Capacity

#### 1 Pole

<table>
<thead>
<tr>
<th>DC Voltage</th>
<th>Contact Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.1</td>
</tr>
<tr>
<td>20</td>
<td>0.5</td>
</tr>
<tr>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>200</td>
<td>3.6</td>
</tr>
<tr>
<td>300</td>
<td>5</td>
</tr>
</tbody>
</table>

#### 2 Pole

<table>
<thead>
<tr>
<th>DC Voltage</th>
<th>Contact Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.1</td>
</tr>
<tr>
<td>20</td>
<td>0.5</td>
</tr>
<tr>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>200</td>
<td>3.6</td>
</tr>
<tr>
<td>300</td>
<td>5</td>
</tr>
</tbody>
</table>

A: 16A Version.
B: 12A Version.
C: 8A Model

### Wiring Diagrams (Bottom View)

#### 1 Pole 12A

- Code 1
- Code 3
- Code 5

Note: On single throw models, only necessary terminals are present.
RT series (Latching)
16 Amp Miniature
Printed Circuit Board Relay

Meets VDE 10mm Spacing, 5KV Dielectric
- File E38891
- File LR14385
- NR 6106

Features
• Latching relay with 1 or 2 coils.
• SPDT (16A) and DPDT (8A) contact arrangements.
• Flux tight enclosure.
• Meets VDE 10mm spacing, 5KV dielectric, coil to contacts.
• Conforms to UL 508, 1873 and 353.

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: 12V/100mA.
Expected Mechanical Life: 5 million operations, 1 pole.
2 million operations, 2 pole.

Designed to meet UL/CSA/VDE ratings with relay properly vented. Remove vent nib after soldering and cleaning.
UL/CSA ratings @ 70°C:

<table>
<thead>
<tr>
<th>Code</th>
<th>NO/NC Load</th>
<th>Type</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>16A/8A @ 240VAC</td>
<td>GP</td>
<td>6K</td>
</tr>
<tr>
<td></td>
<td>8A @ 28VDC</td>
<td>Resistive</td>
<td>30K</td>
</tr>
<tr>
<td></td>
<td>1/2 HP @ 120VAC*</td>
<td>Motor</td>
<td>6K</td>
</tr>
<tr>
<td></td>
<td>1HP @ 240VAC*</td>
<td>Motor</td>
<td>6K</td>
</tr>
<tr>
<td></td>
<td>48 LRA, 8 FLA @ 240VAC</td>
<td>Pilot Duty</td>
<td>6K</td>
</tr>
<tr>
<td>5</td>
<td>8A @ 240VAC</td>
<td>Resistive</td>
<td>30K</td>
</tr>
<tr>
<td></td>
<td>8A @ 28VDC</td>
<td>Resistive/SP</td>
<td>30K</td>
</tr>
<tr>
<td></td>
<td>1/2 HP @ 240VAC</td>
<td>Motor</td>
<td>6K</td>
</tr>
<tr>
<td></td>
<td>1/4 HP @ 120VAC</td>
<td>Motor</td>
<td>6K</td>
</tr>
<tr>
<td></td>
<td>B300</td>
<td>Pilot Duty</td>
<td>6K</td>
</tr>
</tbody>
</table>

VDE Ratings @ 70°C:

<table>
<thead>
<tr>
<th>Code</th>
<th>NO/NC Load</th>
<th>Type</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>16A @ 250VAC</td>
<td>Resistive</td>
<td>10K</td>
</tr>
<tr>
<td></td>
<td>8A @ 250VAC</td>
<td>Resistive</td>
<td>30K</td>
</tr>
<tr>
<td>5</td>
<td>8A @ 250VAC</td>
<td>Resistive</td>
<td>30K</td>
</tr>
<tr>
<td></td>
<td>8A @ 250VAC</td>
<td>Resistive</td>
<td>100K</td>
</tr>
</tbody>
</table>

Initial Dielectric Strength
Between Open Contacts: >1,000VAC (1 minute).
Between Poles (code 5): >2,500VAC (1 minute).
Between Coil and Contacts: >5,000VAC (1 minute).
Creepage/Clearance, Coil to Contact: 10/10mm.

Coil Data @ 20°C

<table>
<thead>
<tr>
<th>Nominal Voltage VDC</th>
<th>DC Resistance in Ohms ±10%</th>
<th>Set Voltage VDC</th>
<th>Reset Voltage VDC</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>52</td>
<td>3.5—6.0</td>
<td>2.75—6.0</td>
<td>80.0</td>
</tr>
<tr>
<td>06</td>
<td>66</td>
<td>3.8—7.2</td>
<td>3.30—7.2</td>
<td>66.7</td>
</tr>
<tr>
<td>12</td>
<td>124</td>
<td>8.4—14.4</td>
<td>6.60—14.4</td>
<td>33.3</td>
</tr>
<tr>
<td>24</td>
<td>1,440</td>
<td>16.8—28.8</td>
<td>13.20—28.8</td>
<td>16.7</td>
</tr>
</tbody>
</table>

Operate Data @ 20°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°C to +105°C.
- Operating: -40°C to +70°C at rated current.
Vibration: 30 - 500 Hz:
- N/C opens at >3g and changes from reset to set at >5g;
- Shock: N/C opens at >6g and changes from reset to set at >15g.

Mechanical Data
Termination: Printed circuit terminals.
Enclosures: RT 3, 4: Flux-tight, top vented, plastic case.
Weight: 0.46 oz. (13g) approximately.
1. Basic Series:
   RT = Miniature, printed circuit board relay.

2. Enclosure:
   3 = 1 pole 16A, Pinning 5mm, flux-tight (Code 3).
   4 = 2 pole 8A, Pinning 5mm, flux-tight (Code 5).

3. Contact Arrangement:
   1 = 1 Form C (SPDT) (Requires wiring diagram code 3.)
   2 = 2 Form C (DPDT) (Requires wiring diagram code 5.)

4. Contact Material:
   4 = Silver-nickel 90/10.

5. Coil Voltage:

<table>
<thead>
<tr>
<th>1 Coil</th>
<th>2 Coil</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A05</td>
<td>F05</td>
<td>= 5VDC</td>
</tr>
<tr>
<td>A06</td>
<td>F06</td>
<td>= 6VDC</td>
</tr>
<tr>
<td>A12</td>
<td>F12</td>
<td>= 12VDC</td>
</tr>
<tr>
<td>A24</td>
<td>F24</td>
<td>= 24VDC</td>
</tr>
</tbody>
</table>

Stock Items
Consult factory for availability.

Outline Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Code 3</th>
<th>Code 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>.62 (15.7)</td>
<td>1.14 (29)</td>
<td>.62 (15.7)</td>
</tr>
<tr>
<td>.50 (12.7)</td>
<td>1.14 (29)</td>
<td>.50 (12.7)</td>
</tr>
<tr>
<td>.031 X .020 (.80 X .52)</td>
<td>.020 X .020 (.50 X .50)</td>
<td>.020 X .020 (.50 X .50)</td>
</tr>
<tr>
<td>*2 Coil version only</td>
<td>*2 Coil version only</td>
<td>*2 Coil version only</td>
</tr>
</tbody>
</table>

Wiring Diagrams (Bottom View)

<table>
<thead>
<tr>
<th>Code 3</th>
<th>Code 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operate</td>
<td>+</td>
</tr>
<tr>
<td>A1</td>
<td>A2</td>
</tr>
<tr>
<td>A1</td>
<td>A3</td>
</tr>
<tr>
<td>A2</td>
<td>A3</td>
</tr>
</tbody>
</table>

Reset
- + - +

Contact position not defined at delivery.

PC Board Layout (Bottom View)

1 Pole 16A
2 Pole 8A
5mm

Breaking Capacity

<table>
<thead>
<tr>
<th>DC Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
</tr>
<tr>
<td>0.5</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

A: 16A Version.
B: 12A Version.

A: 1 Contact.
B: 2 Contacts in series.
RT series
Sockets and Accessories

RT78625 with RPMU0730
RP78601
RT16016

Sockets for RT Series Relays

RT78624
10A, 300VAC
3.5mm Pinning

RT78625
1 Pole 10A, 250VAC
2 Pole 2x 10A, 250VAC
5mm Pinning

RT78626
1 Pole 12A, 300VAC
2 Pole 2x 12A, 300VAC
5mm Pinning

Socket and Accessory Selection Table

<table>
<thead>
<tr>
<th>Socket</th>
<th>Socket Termination</th>
<th>Hold-Down Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT78624</td>
<td>DIN Screw Terminal Socket</td>
<td>RT16016</td>
</tr>
<tr>
<td>RT78625</td>
<td>DIN Screw Terminal Socket</td>
<td>RT16016</td>
</tr>
<tr>
<td>RT78626</td>
<td>DIN Screw Terminal Socket</td>
<td>RT16016</td>
</tr>
<tr>
<td>RP78601</td>
<td>PCB Terminal Socket</td>
<td>RT16016</td>
</tr>
<tr>
<td>RP78602</td>
<td>PCB Terminal Socket</td>
<td>RT16016</td>
</tr>
<tr>
<td>RPMU0548</td>
<td>Protection Diode Module 1N4007</td>
<td>–</td>
</tr>
<tr>
<td>RPMU0730</td>
<td>RC Network Module 24-48VAC</td>
<td>–</td>
</tr>
<tr>
<td>RPMU0024</td>
<td>LED Module 12-24VDC</td>
<td>–</td>
</tr>
<tr>
<td>RPMU0524</td>
<td>LED Module 12-48VAC/DC</td>
<td>–</td>
</tr>
<tr>
<td>RPMU0110</td>
<td>LED Module 110VDC</td>
<td>–</td>
</tr>
<tr>
<td>RPMU0730</td>
<td>LED Module 110-230VAC</td>
<td>–</td>
</tr>
</tbody>
</table>

* 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.
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(8), plastic sealed case.
- Meets UL 508 & UL 873 spacing – 1/8” through air, 1/8” over surface.
- UL class F insulation standard.
- Well suited for various industrial, commercial and residential applications, as well as many others.

Contact Ratings @ 25°C
Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT).
Material: Silver-cadmium oxide.
Mechanical Life: 10 million operations, typical.

Contact Ratings @ 25°C with relay properly vented. Remove tape over vent hole after soldering and cleaning.

Typical Electrical Load & Life (Open Style Relay)

<table>
<thead>
<tr>
<th>Form &amp; Contact Material</th>
<th>Contact Load</th>
<th>Type of Load</th>
<th>Ops</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Silver-cadmium oxide</td>
<td>30A @ 240VAC</td>
<td>UL General Purpose</td>
<td>100,000</td>
</tr>
<tr>
<td>(5) Silver-cadmium oxide</td>
<td>20A @ 240VAC</td>
<td>Resistive Heater</td>
<td>100,000</td>
</tr>
</tbody>
</table>

Minimum Contact Load:
- Silver Contacts: 500mA @ 5VDC or 12VAC.
- Silver Cadmium Oxide Contacts: 1A @ 5VDC or 12VAC.
- Initial Contact Resistance: 75 mΩ, max., @ min. rated current (switched).

Initial Dielectric Strength
- Between Open Contacts: 1,500V rms.
- Between Contacts and Coil: 1,500V rms (terminal code 1), 2,500V rms (UL 873 version terminal code 4).

Initial Insulation Resistance
- Between Mutually Insulated Elements: 10⁶ ohms, min., @ 500VDC, 25°C and 50% R.H.

Coil Data @ 25°C
- Voltage: 5 to 110VDC.
- Maximum Coil Power: 2.8 Watt
- Maximum Coil Temperature(5): Class F: 140°C.
- Duty Cycle: Continuous.

Coil Data

<table>
<thead>
<tr>
<th>Nominal Voltage (VDC)</th>
<th>Resistance ± 10% (Ohms)</th>
<th>Nominal Power (mW)</th>
<th>Nominal Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>27</td>
<td>930</td>
<td>185</td>
</tr>
<tr>
<td>6</td>
<td>40</td>
<td>900</td>
<td>150</td>
</tr>
<tr>
<td>9</td>
<td>97</td>
<td>840</td>
<td>93</td>
</tr>
<tr>
<td>12</td>
<td>155</td>
<td>930</td>
<td>77</td>
</tr>
<tr>
<td>15</td>
<td>250</td>
<td>890</td>
<td>59</td>
</tr>
<tr>
<td>18</td>
<td>380</td>
<td>850</td>
<td>47</td>
</tr>
<tr>
<td>24</td>
<td>660</td>
<td>870</td>
<td>36</td>
</tr>
<tr>
<td>48</td>
<td>2,560</td>
<td>900</td>
<td>19</td>
</tr>
<tr>
<td>110</td>
<td>13,450</td>
<td>900</td>
<td>8</td>
</tr>
</tbody>
</table>

Operate Data @ 25°C
- Must Operate Voltage: 75% of nominal voltage or less.
- Must Release Voltage: 90% of nominal voltage or more.
- Operate Time (Including Bounce): 15 ms, max.
- Release Time (Including Bounce): 15 ms, max.

Environmental Data
- Storage Temperature Range: -40°C to 130°C.
- Operating Temperature Range: -55°C to +85°C(1).
- Vibration, Operational: 0.065" (1.65mm) max. excursions from 10-55 Hz with no contact opening >100μs.
- Shock, Operational: 10g for 1 ms with no contact opening >100μs.
- 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, tape sealed plastic case(2).
- Weight: Open Model T90N: 0.7 oz. (20g) approximately.
- Sealed Model T90S: 0.9 oz. (26g) approximately.

Notes
- 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.
- Relay terminals should not be bent.
- Vent tape should be removed after cleaning process for optimum life of sealed relays.
- Maximum soldering temperature is 500°F for 4 seconds.
- Class F coils are UL systems approved for maximum coil temperature of 140°C by change of resistance method.
- 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°C maximum rise @ 30A.

File E22575
File LR15734
Patented

T90 series
Low Cost, 30 Amp
Printed Circuit Board Relay

Typical Coil Temperature Rise
Data below are average values and should be verified in application. Tests were conducted within a 2’ (.6 m) cube (still air) with relay mounted to a 30A, single side P.C. board (6); at nominal coil power @ 25°C; with normally open contact loaded; and with 4’ (1.22 m) long, #10 AWG load wires.
Ordering Information

1. Basic Series:
   T90 = Printed circuit board power relay.

2. Enclosure:
   N = Open, no cover (snap-on dust cover available as an option).
   S = Immersion cleanable, tape sealed plastic case.

3. Contact Arrangement:
   1 = 1 Form A (SPST-NO).  5 = 1 Form C (SPDT).

4. Coil Input:
   D = DC Voltage.

5. Terminals:
   1 = Printed circuit terminals.
   4 = Printed circuit terminals, no common terminal between coil terminals (see wiring diagram).

6. Contact Material:
   2 = Silver-cadmium oxide.

7. Coil Voltage:
   5 = 5V DC  6 = 6V DC  9 = 9V DC  12 = 12V DC  15 = 15V DC  18 = 18V DC  24 = 24V DC  48 = 48V DC  110 = 110V DC

Stock Items – We recommend that our authorized distributors stock the following items for immediate delivery.

T90N1D12-12  T90N5D12-12  T90S1D12-12  T90S5D12-12
T90N1D24-24  T90N5D24-24  T90S1D24-24  T90S5D24-24

Optional Dust Cover For Use With Open-Style Relays

Optional plastic dust cover is a snap-on unit, open on the PC board side of the relay. The cover, when ordered with the relay, is shipped separately. It is designed to be snapped into place by the customer after the relay has been assembled to the PC board.

Cover Ordering Information – Boldface items are stocked.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35C620A</td>
<td>Black dust cover for use on open-style, T90N relay.</td>
</tr>
</tbody>
</table>

UL & CSA Contact Ratings

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Load Type</th>
<th>N.O. Contact</th>
<th>N. C. Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silver Contacts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>240VAC</td>
<td>General Purpose</td>
<td>10A</td>
<td>5A</td>
</tr>
<tr>
<td>240VAC</td>
<td>Resistive</td>
<td>10A</td>
<td>5A</td>
</tr>
<tr>
<td>28VDC</td>
<td>Resistive</td>
<td>10A</td>
<td>5A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Silver-Cadmium Oxide Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>240VAC</td>
</tr>
<tr>
<td>240VAC</td>
</tr>
<tr>
<td>120VAC</td>
</tr>
<tr>
<td>240VAC</td>
</tr>
<tr>
<td>240VAC</td>
</tr>
<tr>
<td>240VAC</td>
</tr>
<tr>
<td>277VAC</td>
</tr>
<tr>
<td>28VDC</td>
</tr>
</tbody>
</table>

† For Form C application, derate current to 67%.
T9A series
Low Cost
30 Amp PC Board or Panel Mount Relay
File E22575
File LR15734

Features
- Up to 30 amp switching in SPST and 20 amp in SPDT arrangements.
- Immersion cleanable 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 @ 25°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).

Initial Dielectric Strength
Between Open Contacts: 1,500V rms.
Between Contacts and Coil: 2,500V rms.
6 kV surge using 1.2µs/50µs Impulse Wave or .5µs – 100kHz Ring Wave

Initial Insulation Resistance
Between Mutually Insulated Elements: 10⁹ ohms, min., @ 500VDC, 25°C and 50% R.H.

Typical Electrical Load & Life - 900mW Coil
<table>
<thead>
<tr>
<th>Contact Arrangement</th>
<th>Contact Load</th>
<th>Type of Load</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>10A/20A @ 120VAC</td>
<td>240VAC</td>
<td>UL General Purpose</td>
<td>100,000</td>
</tr>
<tr>
<td>5A @ 240VAC</td>
<td>250VAC</td>
<td>Resistive</td>
<td>100,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contact Arrangement</th>
<th>Contact Load</th>
<th>Type of Load</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>20A/10A @ 240VAC</td>
<td>UL General Purpose</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>20A/10A @ 28VDC</td>
<td>UL Resistive</td>
<td>100,000</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contact Arrangement</th>
<th>Contact Load</th>
<th>Type of Load</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>5A @ 240VAC</td>
<td>250VAC</td>
<td>Resistive</td>
<td>100,000</td>
</tr>
</tbody>
</table>

Typical Electrical Load & Life - 1 Watt Coil
<table>
<thead>
<tr>
<th>Contact Arrangement</th>
<th>Contact Load</th>
<th>Type of Load</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>30A @ 240VAC</td>
<td>250VAC</td>
<td>Resistive</td>
<td>100,000</td>
</tr>
<tr>
<td>5A @ 240VAC</td>
<td>250VAC</td>
<td>Resistive</td>
<td>100,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contact Arrangement</th>
<th>Contact Load</th>
<th>Type of Load</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>120VAC</td>
<td>50 LRA/16 FLA</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>120VAC</td>
<td>30 LRA/11 FLA</td>
<td>200,000</td>
<td></td>
</tr>
</tbody>
</table>

UL 508/873 & CSA Contact Ratings - 1 Watt Coil
<table>
<thead>
<tr>
<th>Voltage</th>
<th>Load Type</th>
<th>N.O. Contact</th>
<th>N.C. Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>277VAC</td>
<td>Ballast</td>
<td>10A</td>
<td>3A</td>
</tr>
<tr>
<td>240VAC</td>
<td>Motor</td>
<td>2 HP</td>
<td>1/2 HP</td>
</tr>
<tr>
<td>240VAC</td>
<td>Resistive</td>
<td>30A</td>
<td>20A</td>
</tr>
<tr>
<td>240VAC</td>
<td>General Purpose</td>
<td>30A</td>
<td>15A</td>
</tr>
<tr>
<td>240VAC</td>
<td>LRA/FLA</td>
<td>80A/30A</td>
<td>30A/12A</td>
</tr>
<tr>
<td>240VAC</td>
<td>Pilot Duty</td>
<td>470VA</td>
<td>275VA</td>
</tr>
<tr>
<td>125VAC</td>
<td>Motor</td>
<td>1 HP</td>
<td>1/4 HP</td>
</tr>
<tr>
<td>120VAC</td>
<td>LRA/FLA</td>
<td>98A/22A</td>
<td>–</td>
</tr>
<tr>
<td>120VAC</td>
<td>Tungsten</td>
<td>8.3A</td>
<td>–</td>
</tr>
<tr>
<td>120VAC</td>
<td>Pilot Duty</td>
<td>470VA</td>
<td>–</td>
</tr>
<tr>
<td>28VDC</td>
<td>Resistive</td>
<td>20A</td>
<td>10A</td>
</tr>
</tbody>
</table>

Rated 6,000 operations.
** Higher UL & CSA ratings available.
†† For Form C application, derate current to 67%.
Note: Consult factory for other 900mW version contact ratings.

Typical Electrical Load & Life - 900mW Coil
<table>
<thead>
<tr>
<th>Contact Arrangement</th>
<th>Contact Load</th>
<th>Type of Load</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>120VAC</td>
<td>50 LRA/16 FLA</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>120VAC</td>
<td>30 LRA/11 FLA</td>
<td>200,000</td>
<td></td>
</tr>
</tbody>
</table>

Coil Data @ 25°C
Voltage: 5 to 110VDC.
Nominal Coil Power: 1.0W, (approx.) and 900mW (approx.) versions.
Maximum Coil Power: 2.8 Watt.
Maximum Coil Temperature: Class F: 140°C.
Duty Cycle: Continuous.

Nominal DC Resistance
<table>
<thead>
<tr>
<th>Voltage</th>
<th>DC Resistance ± 10% (Ohms)</th>
<th>Nominal Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>25</td>
<td>200</td>
</tr>
<tr>
<td>9</td>
<td>81</td>
<td>111</td>
</tr>
<tr>
<td>12</td>
<td>144</td>
<td>83</td>
</tr>
<tr>
<td>18</td>
<td>324</td>
<td>56</td>
</tr>
<tr>
<td>24</td>
<td>576</td>
<td>42</td>
</tr>
<tr>
<td>48</td>
<td>2,304</td>
<td>21</td>
</tr>
<tr>
<td>110</td>
<td>12,100</td>
<td>9</td>
</tr>
</tbody>
</table>

Coil Data - 900mW
<table>
<thead>
<tr>
<th>Voltage</th>
<th>DC Resistance ± 10% (Ohms)</th>
<th>Nominal Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>27</td>
<td>185</td>
</tr>
<tr>
<td>9</td>
<td>97</td>
<td>93</td>
</tr>
<tr>
<td>12</td>
<td>165</td>
<td>77</td>
</tr>
<tr>
<td>18</td>
<td>380</td>
<td>47</td>
</tr>
<tr>
<td>24</td>
<td>660</td>
<td>36</td>
</tr>
<tr>
<td>48</td>
<td>2,560</td>
<td>19</td>
</tr>
<tr>
<td>110</td>
<td>13,450</td>
<td>8</td>
</tr>
</tbody>
</table>

Operate Data @ 25°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
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. (26g) approx. (mounting code 1).

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 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. Maximum soldering temperature is 500°F for 4 seconds.
5. Class F coils are UL systems approved for maximum coil temperature of 140°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°C maximum rise @ 30A.

Environmental Data

- **Storage Temperature Range**: -55°C to 130°C.
- **Operating Temperature Range**: -55°C to +85°C.
- **Vibration, Operational**: 0.065” (1.65mm) max. excursions from 10-55 Hz. with no contact opening >100µs.
- **Shock, Operational**: 10g for 11 ms with no contact opening >100µs.
- **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. (26g) approx. (mounting code 1).

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. Specification ambient considers 20A load with coil cooled to ambient.
3. Sealed relay terminals should not be bent.
4. Remove knock-off nib after cleaning process for optimum life of sealed relays.
5. Maximum soldering temperature is 500°F for 4 seconds.
6. Class F coils are UL systems approved for maximum coil temperature of 140°C, by change of resistance method.
7. 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°C maximum rise @ 30A.

Ordering Information

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>T9A</th>
<th>S</th>
<th>5</th>
<th>D</th>
<th>2</th>
<th>2</th>
<th>-12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Basic Series:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>T9A</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Enclosure**:
  - **P**: Unsealed, plastic dust cover (mounting code 5).
  - **S**: Immersion cleanable, knock off nib, sealed plastic case (mounting codes 1 & 2).
  - **V**: Vented, flux-tight (mounting code 1).

- **Contact Arrangement**:
  - **1**: 1 Form A (SPST-NO).
  - **5**: 1 Form C (SPDT).

- **Coil Input**:
  - **D**: DC voltage (1 Watt)
  - **L**: DC voltage (900mW)

- **Mounting & Termination**:
  - **1**: Printed circuit board mounting; PC terminals for coil & contacts [a].
  - **2**: Printed circuit board mounting; PC terminals for coil & contacts, and .250” (6.35mm) quick connects for contacts [b].
  - **5**: Flanged mounting; .187” (4.75mm) quick connects for coil and .250” (6.35mm) quick connects for contacts [c].

- **Contact Material**:
  - **2**: Silver-cadmium oxide.

- **Coil Voltage**:
  - **5**: 5VDC
  - **9**: 9VDC
  - **12**: 12VDC
  - **18**: 18VDC
  - **24**: 24VDC
  - **48**: 48VDC
  - **110**: 110VDC

  [a] Only available with enclosure code “S” & “V”.
  [b] Only available with enclosure code “S”.
  [c] Only available with enclosure code “P”.

Stock Items – We recommend that our authorized distributors stock the following items for immediate delivery.

<table>
<thead>
<tr>
<th>T9APSDS2-12</th>
<th>T9AS1D22-12</th>
<th>T9ASSD22-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>T9APSDS2-24</td>
<td>T9AS1D22-24</td>
<td>T9ASSD12-12</td>
</tr>
<tr>
<td>T9AS1D12-12</td>
<td>T9ASSD12-12</td>
<td>T9ASSD12-24</td>
</tr>
<tr>
<td>T9AS1D12-24</td>
<td>T9ASSD12-48</td>
<td>T9ASSD22-12</td>
</tr>
</tbody>
</table>
Outline Dimensions

T9AS – Mounting & Termination Code 1

Wiring Diagrams (Bottom Views)
1 Form A

1 Form C

DIN Mount Adapter - 9T91A001

3 Holes for #6-32 Screw
0.011 Deep
2 Screws

Note: Fits 35mm din track
Includes: 2 Din clips
Must be ordered in multiples of 50

Specifications and availability subject to change without notice.
T92 series

Two-Pole, 30 Amp
PC Board or Panel Mount Relay

**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 9mm spacing, 4kV 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.

**Materials**
- Ari 780-86 Endurance Test (section 6.6):
- Expected Mechanical Life:
- Min. Load Rating: 2,000V rms, 50/60 Hz.
- Max. Load Rating: >100,000 operations at 30A, 240VAC (AC coil).
- Meets requirements of UL 94V-0.
- Meets requirements of VDE 0631, and 0700.
- Conforms to VDE 0435, 0631, and 0700.

**Contact Ratings @ 25°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).

**Coil Data**

<table>
<thead>
<tr>
<th>Nom. Voltage (VDC)</th>
<th>DC Resist. (±10% (Ohms))</th>
<th>Nom. Voltage (VDC)</th>
<th>DC Resist. (±10% (Ohms))</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>80</td>
<td>40</td>
<td>7,390</td>
</tr>
<tr>
<td>24</td>
<td>350</td>
<td>110</td>
<td>7,255</td>
</tr>
</tbody>
</table>

**Operating 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 ms typical, (25 ms max. w/bounce).
Max Operating Frequency: 14 operations per minute.

**Environmental Data**

**Temperature Range:** Storage: -55°C to +155°C.
Operating: AC Coil: -40°C to +65°C.
DC Coil: -40°C to +85°C.

**Vibration:** 0.065” (1.65mm) double amplitude for 10-55 Hz., functional.
**Shock, Mechanical:** 100g for 11 ms, 1/2 sine wave pulse with no contact opening > 100gs.

**Enclosure:** Unsealed, plastic dust cover or immersion cleanable, tape sealed plastic cover.
**Weight:** 3 oz. (86g) approximately.

**Notes**
- FLA, LRA ratings are compatible with 3.5 ton compressor applications.
- Nominal voltage, no coil suppression, excluding bounce.
### Specifications and Availability

- Subject to change without notice.

13C8920 Printed in U.S.A. IH/3-00

---

**Ordering Information**

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>T92</th>
<th>S</th>
<th>11</th>
<th>D</th>
<th>2</th>
<th>2</th>
<th>-24</th>
</tr>
</thead>
</table>

1. **Basic Series:**
   - T92 = Printed circuit board / panel mount power relay.

2. **Enclosure:**
   - P = Plastic dust cover (unsealed).
   - S = Immersion cleanable, tape sealed plastic case (code 1).

3. **Contact Arrangement:**
   - 7 = 2 form A (DPST-NO).
   - 11 = 2 form C (DPDT).

4. **Coil Input:**
   - A = AC voltage, 60 Hz. or 50/60 Hz. (See Coil Data Table)
   - D = DC voltage.

5. **Mounting & Termination:**
   - 1 = Printed circuit board mount; printed circuit board terminals for coil and contacts.
   - 2 = Panel mount via flanged cover; 250° (6.35mm) x .032" (0.81mm) quick connect terminals for coil and contacts.
   - 3 = Panel mount via flanged cover; .187" (4.75mm) x .032" (.81mm) quick connect terminals for coil and contacts.
   - 4 = Panel mount via flanged cover; .167" (4.75mm) x .020" (.51mm) quick connect terminals for coil and contacts.

6. **Contact Material:**
   - 2 = Silver cadmium oxide.

7. **Coil Voltage:**
   - (See Coil Data Table)
   - DC: 12 = 12VDC 24 = 24VDC
   - 60Hz.: 12 = 12VAC, 24 = 24VAC
   - (50/60Hz.): 110 = 100/110VAC, 240 = 220/240VAC, 277 = 250/277VAC

---

**Stock Items** – We recommend that our authorized distributors stock the following items for immediate delivery.

<table>
<thead>
<tr>
<th>Order Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>T92P7A22-24</td>
<td>T92P7A22-240</td>
</tr>
<tr>
<td>T92P7D12-24</td>
<td>T92P7D22-24</td>
</tr>
<tr>
<td>T92P11A22-120</td>
<td>T92P11A22-240</td>
</tr>
<tr>
<td>T92P11D22-12</td>
<td>T92P11D22-24</td>
</tr>
<tr>
<td>T92P11A22-120</td>
<td>T92P11A22-240</td>
</tr>
</tbody>
</table>

---

**Outline Dimensions**

#### Mounting & Termination Type 1

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000</td>
<td>± .010</td>
<td>(25.40 ± .25)</td>
</tr>
<tr>
<td>.600</td>
<td>± .006</td>
<td>(.152 ± .015)</td>
</tr>
<tr>
<td>.500</td>
<td>± .005</td>
<td>(12.70 ± .13)</td>
</tr>
</tbody>
</table>

- DIN Mount Adapter - 9T91A001
- 3 Holes for #6-32 Screw
- 0.011 Deep (0.28mm)

#### Mounting & Termination Types 2, 3 & 4

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.050</td>
<td>MAX</td>
<td>(52.07)</td>
</tr>
<tr>
<td>.630</td>
<td>TYP</td>
<td>(.160)</td>
</tr>
<tr>
<td>.050</td>
<td>TYP</td>
<td>(.127)</td>
</tr>
</tbody>
</table>

---

**Wiring Diagram**

- Only necessary terminals are present on single throw models.

---

**Suggested PC Board Layout (Bottom View)**

- An alternate PC board layout utilizes .076 ± .033 (1.93 ± .81) diameter holes on the same center-to-center spacing shown above. Use of the rectangular holes is recommended for improved solderability.

---

**Note:**

- Fits 35mm din track.
- Includes: 2 Din clips
- 2 Screws
- Must be ordered in multiples of 50.
Features
• 1 NO and 1 NC or 2 Form C contacts.
• 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°C
Type: Single button contacts, forcibly guided.
Arrangements: 1 NO and 1 NC or 2 Form C.
Material: Silver-nickel alloy.
Max. Continuous Current at Max. Amb. Temp.: 6A, 1 contact loaded.
Max. Switched Current: See Expected Electrical Life chart.
Max. Switched Voltage: 250VDC.
Max. Switched Power: 1,500VA. (See Fig. 1, Limit Curve for DC Power Load).
Max. Switching Rate: 6 operations/min. at rated load.
300 operations/min. at minimum load.
Minimum Load: AgNi: >50mW.
Initial Contact Resistance: AgNi: ≤100 mΩ - 1A/24VDC.
Expected Mechanical Life: 10⁷ operations.

V23047 series
SR2M Safety Relay - PCB, neutral, monostable relay with two forcibly guided contacts.
File E48393
No. 116064
TUV-Rheinland, No. 945/EZ 116/99

Initial Insulation Resistance
Between Mutually Insulated Elements: 10⁶ ohms.

Coil Data @ 23°C
Voltage: 5 to 110VDC.
Nominal Power: 700mW.
Max. Coil Temperature: 105°C.
Duty Cycle: Continuous.

Coil Data @ 23°C
Rated Coil Voltage (VDC)  |  Coil Resistance (Ohms)  |  Must Operate Voltage (VDC)  |  Nominal Coil Current (mA)
5                      | 35.7 ± 3.6               | 3.75                      | 140                       |
6                      | 51 ± 5.1                 | 4.5                       | 118                       |
9                      | 116 ± 11.6               | 6.8                       | 78                        |
12                     | 206 ± 20.6               | 9                         | 60                        |
21                     | 630 ± 63.0               | 15.8                      | 34                        |
24                     | 823 ± 82.3               | 18                        | 30                        |
36                     | 1,851 ± 185              | 27                        | 19.5                      |
48                     | 3,291 ± 494              | 36                        | 14.6                      |
60                     | 5,142 ± 817              | 45                        | 11.7                      |
80                     | 9,143 ± 1,097            | 60                        | 8.8                       |
110                    | 17,265 ± 2,074           | 83                        | 6.4                       |

Operate Data @ 23°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

Environmental Data
Temperature Range: -25°C to +70°C.
Solder Bath Temp./Max. Duration: 260°C/5s.

Mechanical Data
Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings): Sealed plastic case.
Weight: 0.6 oz. (18g).
### Ordering Information

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>V23047</th>
<th>A1</th>
<th>012</th>
<th>A</th>
<th>5</th>
<th>01</th>
</tr>
</thead>
</table>

1. **Basic Series:**
   - V23047 = SR2M safety relay.

2. **Enclosure:**
   - A1 = Sealed.

3. **Coil Voltage:**
   - 005 = 5VDC
   - 006 = 6VDC
   - 009 = 9VDC
   - 012 = 12VDC
   - 021 = 21VDC
   - 024 = 24VDC
   - 036 = 36VDC
   - 048 = 48VDC
   - 060 = 60VDC
   - 080 = 80VDC
   - 110 = 110VDC

4. **Contact Type:**
   - A = Single button, forcibly guided.

5. **Contact Material:**
   - 5 = Silver nickel.

6. **Contact Arrangement:**
   - 01 = 2 Form C.
   - 11 = 1 NO and 1 NC.

### Stock Items – The following items are maintained in stock.

- V23047A1012A501
- V23047A1012A511

### Outline Dimensions

![Outline Dimensions Diagram](image)

### Wiring Diagrams (Bottom Views)

1. **1 NO and 1 NC**

   ![Wiring Diagram 1 NO and 1 NC](image)

2. **2 Form C**

   ![Wiring Diagram 2 Form C](image)

### Suggested PC Board Layouts (Bottom Views)

1. **1 NO and 1 NC**

   ![PC Board Layout 1 NO and 1 NC](image)

2. **2 Form C**

   ![PC Board Layout 2 Form C](image)
Sockets for V23047 Series Relays

RP78602
Socket with PCB Terminals

RT78625
DIN Rail Mount Socket with Screw-Type Terminals

RT78626
DIN Rail Mount Socket with Screw-Type Terminals

RT16040 Marking Tags

Function and Protection Modules

- Easy insertion of module into the socket.
- Wiring in parallel to the coil.

<table>
<thead>
<tr>
<th>Ordering Code</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT16040</td>
<td>Marking Tags</td>
</tr>
<tr>
<td>RPMT00A0</td>
<td>Protection Diode 1N4007*</td>
</tr>
<tr>
<td>RPML0024</td>
<td>LED 12 - 24VDC*</td>
</tr>
<tr>
<td>RPML0524</td>
<td>LED 12 - 48VDC</td>
</tr>
<tr>
<td>RPML0110</td>
<td>LED 110VDC*</td>
</tr>
</tbody>
</table>


- White
- Marking area .610 (15.5) x .236 (6.0).
- Snaps on socket in up to 4 positions.
### Features
- 3 NO and 1 NC or 2 NO and 2 NC contacts.
- Compact dimensions.
- Low coil power of 550mW.
- Sealed case.
- Ideal for emergency shut-off, machine control, elevator and escalator control, light barrier control.

### Contact Data @ 23°C
**Type:** Single button contacts.
**Arrangements:** 3 NO and 1 NC or 2 NO and 2 NC.
**Material:** Silver-cadmium oxide.
**Max. Continuous Current at Max. Amb. Temp.:** 6A, 1 contact loaded.
**Max. Switched Current:** See Expected Electrical Life chart.
**Max. Switched Voltage:** 250VAC/VDC.
**Max. Switched Power:** 1,500VA. (See Fig. 1, Limit. Curve for DC Power).
**Max. Switching Rate:** 15 operations/min. at rated load, 1,200 operations/min. at minimum load.
**Minimum Load:** AgCdO: 50mW.
**Initial Contact Resistance:** AgCdO: 100mΩ - 1A/24VDC.
**Expected Mechanical Life:** 10⁶ operations.

### Expected Electrical Life
<table>
<thead>
<tr>
<th>Contact Material</th>
<th>UL/CSA Ratings</th>
<th>Type</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgCdO</td>
<td>3A @ 480VAC</td>
<td>Resistive</td>
<td>100,000*</td>
</tr>
<tr>
<td></td>
<td>6A @ 250VAC</td>
<td>Resistive</td>
<td>100,000**</td>
</tr>
</tbody>
</table>

* Denotes test at 80°C ambient temperature.
** Denotes test at 85°C ambient temperature.

### Mechanical Data
- **Termination:** Printed circuit terminals.
- **Enclosure (94V-0 Flammability Ratings):** Sealed plastic case.
- **Weight:** 1.07oz. (32g).

### Environmental Data
- **Temperature Range:** -25°C to +80°C.
- **Vibration, Operational:** 5g, 10 - 200 Hz.
- **Shock, Operational:** 9g.
- **Solder Bath Temp./Max. Duration:** 260°C/5s.

### Coil Data @ 23°C
**Voltage:** 6 to 110VDC.
**Nominal Power:** 550mW.
**Max. Coil Temperature:** 120°C.
**Duty Cycle:** Continuous.

### Operate Data @ 23°C
**Operate Time:** 20 ms (excluding bounce).
**Release Time (wo/w parallel diode, typ.):** 8 ms/22 ms (excluding bounce).
**Bounce Time:** 10 ms.
**Must Release Voltage:** 10% of nominal voltage.

### V23049-B series
**SR4 Safety Relay - PCB, polarized, monostable relay with four forcibly guided contacts.**

- File E48393
- File LR89731-16
- File R9819004
- File 6019

### Initial Dielectric Strength
- Between Open Contacts: 1,000VAC rms.
- Between Adjacent Contacts: 2,000VAC rms.
- Between Coil and Contacts: 2,500VAC rms.

### Figure 1 - Limiting Curve For DC Power Load
![Curve Chart](attachment://curve_chart.png)

- Curve 1 - Must operate voltage when the coil is not pre-energized.
- Curve 2 - Operate voltage increases due to a pre-energizing with Vnom. The voltage should not be applied as an increasing ramp. The switching time and electrical endurance can only be achieved by driving the relay by a fast impulse.
- Curve 3 - Maximum allowable voltage.

- Operating
- Release

The must release voltage may fall to ≥ 5% of Vnom during operation life of the relay.

- Denotes recommended operation area.
Ordering Information

<table>
<thead>
<tr>
<th>Basic Series:</th>
<th>V23049-B = SR4 safety relay.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure:</td>
<td>1 = Sealed.</td>
</tr>
<tr>
<td>Coil Voltage:</td>
<td>003 = 6VDC  004 = 9VDC  005 = 12VDC  006 = 21VDC  007 = 24VDC  008 = 48VDC  010 = 60VDC  012 = 110VDC  015 = 19.4VDC</td>
</tr>
<tr>
<td>Contact Type:</td>
<td>A = Single button, forcibly guided.</td>
</tr>
<tr>
<td>Contact Material:</td>
<td>1 = Silver-cadmium oxide.</td>
</tr>
<tr>
<td>Contact Arrangement:</td>
<td>22 = 2 NO and 2 NC.  31 = 3 NO and 1 NC.</td>
</tr>
</tbody>
</table>

Stock Items – The following items are maintained in stock.
V23049B1005A122
V23049B1005A131

Outline Dimensions

Wiring Diagrams (Bottom Views)
3 NO and 1 NC

Suggested PC Board Layouts (Bottom View)

Specifications and availability subject to change without notice.
13C8049 Printed in U.S.A. IH/4-00
**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.

**Coil Data @ 23°C**

<table>
<thead>
<tr>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance (Ohms)</th>
<th>Must Operate Voltage (VDC)</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>21 ± 2</td>
<td>3.75</td>
<td>240</td>
</tr>
<tr>
<td>6</td>
<td>30 ± 3</td>
<td>4.5</td>
<td>200</td>
</tr>
<tr>
<td>9</td>
<td>68 ± 7</td>
<td>8.6</td>
<td>130</td>
</tr>
<tr>
<td>12</td>
<td>120 ± 12</td>
<td>9.0</td>
<td>100</td>
</tr>
<tr>
<td>18</td>
<td>270 ± 27</td>
<td>13.5</td>
<td>70</td>
</tr>
<tr>
<td>21</td>
<td>370 ± 40</td>
<td>11.8</td>
<td>60</td>
</tr>
<tr>
<td>24</td>
<td>480 ± 50</td>
<td>19.0</td>
<td>50</td>
</tr>
<tr>
<td>40</td>
<td>1,330 ± 130</td>
<td>30.0</td>
<td>30</td>
</tr>
<tr>
<td>60</td>
<td>3,000 ± 300</td>
<td>45.0</td>
<td>20</td>
</tr>
<tr>
<td>85</td>
<td>6,020 ± 600</td>
<td>64.0</td>
<td>14</td>
</tr>
<tr>
<td>110</td>
<td>10,000 ± 1,000</td>
<td>122.5</td>
<td>11</td>
</tr>
</tbody>
</table>

**Operate Data @ 23°C**
- Minimum Release Voltage: 10% of nominal voltage.
- Minimum Operating Voltage @ 70°C: 85% of nominal voltage.

**Environmental Data**
- Temperature Range: -25°C to +70°C.
- Solder Bath Temp./Max. Duration: 260°C/5s.

**Mechanical Data**
- Termination: Printed circuit terminals.
- Weight: 1.01 oz. (30g).
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:
   005 = 5VDC  006 = 6VDC  009 = 9VDC  012 = 12VDC  021 = 21VDC
   024 = 24VDC  040 = 40VDC  060 = 60VDC  085 = 85VDC  110 = 110VDC

4. Contact Type:
   A = Single contact.

5. Contact Material:
   5 = Silver nickel.

6. Contact Arrangement:
   33 = 3 NO and 3 NC.
   42 = 4 NO and 2 NC.
   51 = 5 NO and 1 NC.

Stock Items – The following items are maintained in stock.

No items in this series are stocked.

Outline Dimensions

![Outline Dimensions Diagram]

Wiring Diagrams (Bottom Views)

3 NO and 3 NC

4 NO and 2 NC

5 NO and 1 NC

Suggested PC Board Layouts (Bottom Views)

3 NO and 3 NC, 4 NO and 2 NC

5 NO and 1 NC

Specifications and availability subject to change without notice.

13C8050  Printed in U.S.A.  IH/4-00
V23048 series
ZW Safety Relay - PCB, neutral, monostable relay with six forcibly guided contacts.

File E48393
File Nr. 945/EL 10001

Features
- 4 NO and 2 NO or 3 NO and 3 NC contacts.
- Dust protected.
- Ideal for emergency shut-off, machine control, elevator and escalator control, light barrier control.

Contact Data @ 23°C
Type: Single button contacts, forcibly guided.
Arrangements: 3 NO and 3 NC or 4 NO and 2 NC.
Material: Silver, gold flashed.
Max. Continuous Current at Max. Amb. Temp.: 4A
Max. Switched Current: See Expected Electrical Life chart.
Max. Switched Voltage: 400VAC/DC.
Max. Switched Power: 1,000VA. (See Fig. 1. Limit. Curve for DC Power).
Max. Switching Rate: 30 operations/min. at rated load.
120 operations/min. at minimum load.
Minimum Load: >500mW.
Initial Contact Resistance: ≤100 mΩ - 100mA/6VDC.
Expected Mechanical Life: 10⁷ operations.

Expected Electrical Life

<table>
<thead>
<tr>
<th>Contact Material</th>
<th>UL/CSA Ratings</th>
<th>Type</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag. gold flashed</td>
<td>4A @ 250VAC</td>
<td>Resistive</td>
<td>&gt;500,000</td>
</tr>
<tr>
<td></td>
<td>4A @ 12VDC</td>
<td>Resistive</td>
<td>&gt;5,000,000</td>
</tr>
<tr>
<td></td>
<td>1A @ 12VDC</td>
<td>Resistive</td>
<td>&gt;10,000,000</td>
</tr>
<tr>
<td></td>
<td>4A @ 24VDC</td>
<td>Resistive</td>
<td>&gt;600,000</td>
</tr>
<tr>
<td></td>
<td>1A @ 24VDC</td>
<td>Resistive</td>
<td>&gt;1,000,000</td>
</tr>
<tr>
<td></td>
<td>1A @ 48VDC</td>
<td>Resistive</td>
<td>&gt;300,000</td>
</tr>
<tr>
<td></td>
<td>0.5A @ 48VDC</td>
<td>Resistive</td>
<td>&gt;8,000,000</td>
</tr>
</tbody>
</table>

Electrical endurance is tested at one single pole make (NO) and 23°C ambient temperature.

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 x Vnom.
- Curve 3 - Maximum allowable voltage.

Release
- The must release voltage may fall to 5% of Vnom during operation life of the relay.

Denotes recommended operation area.

Environmental Data
Temperature Range: -25°C to +70°C.
Vibration, Operational: 5g, 10 - 55Hz.
Shock, Operational: 30g.
Solder Bath Temp./Max. Duration: 260°C/5s.

Mechanical Data
Termination: Printed circuit terminals.
Enclosure (94V-0 Flammability Ratings): Plastic dust cover.
Weight: 2.67oz. (80g).

Initial Dielectric Strength
Between Open Contacts: 2,000VAC rms.
Between Adjacent Contacts: 2,000VAC rms.
Between Coil and Contacts: 4,000VAC rms.
### Ordering Information

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>V23048 A1 001 A 1 33</th>
</tr>
</thead>
</table>

1. **Basic Series:**
   - V23048 = ZW power relay.

2. **Enclosure:**
   - A1 = Sealed.

3. **Coil Voltage:**
   - 001 = 12VDC
   - 003 = 24VDC
   - 005 = 48VDC
   - 002 = 110VDC

4. **Contact Type:**
   - A = Single button, forcibly guided.

5. **Contact Material:**
   - 1 = Silver, gold flashed.

6. **Contact Arrangement:**
   - 01 = 4 NO and 2 NC.
   - 33 = 3 NO and 3 NC.

---

### Stock Items – The following items are maintained in stock.

V23048A1001A101  V23048A1003A101  V23048A1001A133  V23048A1003A133

### Outline Dimensions

![Outline Dimensions Diagram]

### Wiring Diagrams (Bottom Views)

**3 NO and 3 NC**

![Wiring Diagram 3 NO and 3 NC]

**4 NO and 2 NC**

![Wiring Diagram 4 NO and 2 NC]

### Suggested PC Board Layouts (Bottom View)

![Suggested Board Layout Diagram]

Specifications and availability subject to change without notice.

13C8048  Printed in U.S.A.  IH/4-00
**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

**Features**

- Broad range of coil options provide sensitivity ranging from 25 to 750mW.
- Various contacts switch from dry circuit to 7.5 amps.
- Many mounting and termination options.

**Contact Data @ 25°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°C**

<table>
<thead>
<tr>
<th>Contact Code</th>
<th>Contact Material</th>
<th>Contact Style</th>
<th>Coil Code Available</th>
<th>Contact Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>Silver-Cadmium Oxide</td>
<td>Single Button</td>
<td>V, Q, S, J</td>
<td>500mA</td>
</tr>
<tr>
<td>X</td>
<td>Silver-Cadmium Oxide</td>
<td>Single Button</td>
<td>V, Q, S, J</td>
<td>500mA</td>
</tr>
<tr>
<td>Y</td>
<td>Fine Silver</td>
<td>Single Button</td>
<td>All</td>
<td>100mA</td>
</tr>
<tr>
<td>Z</td>
<td>Fine Silver</td>
<td>Bifurcated</td>
<td>All</td>
<td>1mA, 100mA</td>
</tr>
<tr>
<td>P</td>
<td>Gold overlay on Silver</td>
<td>Bifurcated Crossbar</td>
<td>All Dry Circuit</td>
<td>1mA</td>
</tr>
</tbody>
</table>

Ratings are at 28VDC or 155VAC unless otherwise specified. Total load must not exceed 30A per relay.

‡ 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 28VDC for coil codes S and J.

**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: 10¹⁰ ohms @ 25°C, 50% RH. Consult factory for optional acetal resin material rated 10¹² ohms.

**Coil Data @ 25°C (also see Coil Data tables)**

**Voltage:** 3 to 115VDC and 6 to 115VAC.

**Maximum Coil Power:** 2.2 Watts.

**Coil Temperature Rise:** 30°C per Watt.

**Maximum Coil Temperature:** 105°C.

**Operate Data @ 25°C**

**R10 Relays (DC Only) Typical Ranges of Operations**

**Typical Operate and Release Times**

<table>
<thead>
<tr>
<th>Multiple of Max. Pull-In Voltage or Current</th>
<th>Operate Time (Milliseconds)</th>
<th>Release Time (Milliseconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>1.33</td>
<td>1.33</td>
<td>1.33</td>
</tr>
<tr>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
</tr>
<tr>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>

**Environmental Data**

- Storage Temperature Range: -55°C to +105°C.
- Operating Temperature Range: -55°C to +75°C.

**Mechanical Data**

- Terminal Finish: Tin plating standard.
- Weight: 0.8 to 1.4 oz. (23 to 40g) approximately.
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.
## Stock Items

The following items are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R10-E1P2-115V</td>
<td>Relay with Form C contacts.</td>
</tr>
<tr>
<td>R10-E1P2-V700</td>
<td>Super sensitive R10 (case and terminals E1 &amp; E2 only, J coil adj. only).</td>
</tr>
<tr>
<td>R10-E1P4-115V</td>
<td></td>
</tr>
<tr>
<td>R10-E1P4-V700</td>
<td></td>
</tr>
<tr>
<td>R10-E1W2-V185</td>
<td></td>
</tr>
<tr>
<td>R10-E1W2-V700</td>
<td></td>
</tr>
<tr>
<td>R10-E1W4-V185</td>
<td></td>
</tr>
<tr>
<td>R10-E1W4-V700</td>
<td></td>
</tr>
<tr>
<td>R10-E1X2-115V</td>
<td></td>
</tr>
<tr>
<td>R10-E1X2-24V</td>
<td></td>
</tr>
<tr>
<td>R10-E1X2-S800</td>
<td></td>
</tr>
<tr>
<td>R10-E1X2-V185</td>
<td></td>
</tr>
<tr>
<td>R10-E1X2-V700</td>
<td></td>
</tr>
<tr>
<td>R10-E1Y2-V185</td>
<td></td>
</tr>
<tr>
<td>R10-E1Y2-V700</td>
<td></td>
</tr>
<tr>
<td>R10-E1Y4-V185</td>
<td></td>
</tr>
<tr>
<td>R10-E1Y4-V700</td>
<td></td>
</tr>
<tr>
<td>R10-E1Y4-V2.5K</td>
<td></td>
</tr>
<tr>
<td>R10-E1Y6-V1.5K</td>
<td></td>
</tr>
<tr>
<td>R10-E1Y6-V430</td>
<td></td>
</tr>
<tr>
<td>R10-E2P4-V185</td>
<td></td>
</tr>
<tr>
<td>R10-E2P4-V700</td>
<td></td>
</tr>
<tr>
<td>R10-E2X2-V185</td>
<td></td>
</tr>
<tr>
<td>R10-E2X2-V700</td>
<td></td>
</tr>
<tr>
<td>R10-E2X4-V185</td>
<td></td>
</tr>
<tr>
<td>R10-E2X4-V700</td>
<td></td>
</tr>
<tr>
<td>R10-E2Y2-V185</td>
<td></td>
</tr>
<tr>
<td>R10-E2Y2-V700</td>
<td></td>
</tr>
</tbody>
</table>

### Ordering Information

#### 1. Basic Series:

R10 = Relay with Form C contacts.
R10S = Super sensitive R10 (case and terminals E1 & E2 only, J coil adj. only).

#### 2. Case Style:

E = Non-sealed polycarbonate cover.
R = Immersion cleanable, tape sealed plastic case (R10 only [Form C], terminal code 2 & 9 only [std. PCB]).

No ground or stud included. Not available on R10S.

#### 3. Terminals & Mounting:

1 = Solder/plug-in terminals with #3-48 mounting stud.
2 = Printed circuit terminals (std.) .064” (1.62mm) clearance, 1.25” (31.75mm) seated ht.
3 = Side mounting plate with #6-32 stud, solder/plug-in terminals (#3-48 stud not included).
7 = Narrow .04” (1.02mm) wide printed circuit terminals .013” (.33mm) clearance, 1.2” (30.48mm) seated ht.
9 = Non-shouldered, narrow .04” (1.02mm) wide printed circuit terminals in a staggered arrangement (1 to 6 poles only).

#### 4. Contact Style & Rating:

<table>
<thead>
<tr>
<th>W</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Contact</td>
<td>Single Contact</td>
<td>Single Contact</td>
<td>Bifurcated, Low</td>
<td>Bifurcated Crossbar,</td>
</tr>
<tr>
<td>V, O, S &amp; J Coil Adjustment Only</td>
<td>Level Contacts</td>
<td>Typ. 2A</td>
<td>Typ. 100mA</td>
<td>Typ. 1mA</td>
</tr>
<tr>
<td>Min. 500mA</td>
<td>Max. 5A</td>
<td>Max. 3A</td>
<td>Min. 1mA</td>
<td>Min. Dry Circuit</td>
</tr>
</tbody>
</table>

Ratings are at 28VDC or 115VAC. Total load must not exceed 30A per relay.

† 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 & J.

‡ Use ungrounded frame for AC loads of 5A or greater. Max. ratings are 5A at 115VAC and 3A at 28VDC for coil codes S & J.

#### 5. Number of Poles:

1 = 1 pole.
2 = 2 pole.
3 = 3 pole.
4 = 4 pole
6 = 6 pole (not available with W contacts).
8 = 8 pole (available on case style E only; not available with W contacts).

#### 6. Coil (Refer to Coil Data Tables):

**AC Voltage (available on R10 only):**

Specify nominal coil voltage followed by V (example: 24V).

**DC Voltage**

Specify coil adjustment code letter followed by coil resistance (example: V700).

---

![Tyco Electronics logo](https://example.com/tyco-electronics-logo)
**Outline Dimensions**

**Wiring Diagrams (Bottom Views)**

**R10 Wiring Diagrams**

**R10-AC Wiring Diagram**

**Suggested PC Board Layout (Component Side of Board)**

Terminal Types E2 & R2

Terminal Types E9 & R9

**Suggested Panel Cutout For Relay or Socket**

**Mounting Hole Layout For Terminal & Mounting Style 6**

CASE R ONLY

Recommend tape tab be removed after immersion cleaning and before relay is put in service. Peel off to permit proper relay ventilation.

**PC Terminal Dimensions**

<table>
<thead>
<tr>
<th>Arrang.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 2</td>
<td>121</td>
<td>050</td>
<td>064</td>
<td>1.25</td>
</tr>
<tr>
<td>Type 7</td>
<td>131</td>
<td>040</td>
<td>012</td>
<td>1.20</td>
</tr>
<tr>
<td>Type 9</td>
<td>170</td>
<td>040</td>
<td>000</td>
<td>1.197</td>
</tr>
<tr>
<td>Thickness</td>
<td>.012</td>
<td>.012</td>
<td>.012</td>
<td>–––</td>
</tr>
</tbody>
</table>

**Solder Terminal Dimensions**

**Holes**

+ .005
– .000
+ .10
– .00

**DIA.:**

+ .005
– .000
+ .10
– .00

**X = 2 POLE – 343 ± .020 (8.71 ± .51)
4 POLE – 562 ± .020 (14.27 ± .51)
6 POLE – 781 ± .020 (19.84 ± .51)
8 POLE – 1,000 ± .020 (25.40 ± .51)**

**Electronics**

**CASE R ONLY**

Recommend tape tab be removed after immersion cleaning and before relay is put in service. Peel off to permit proper relay ventilation.
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: 2 and 4 pole: polyester.
6 and 8 pole: phenolic.

Insulation Resistance: 10^6 megohms.

Max. Current: 10A.

Solder or PC Terminal Sockets
Rugged, molded socket body retains floating terminals of either solder or retains circuit pin configuration. PC terminal sockets are offered with pins in either 0.1" (2.54mm) 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.

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.

Solder & PC Terminal Socket Outline Dimensions

Ordering Data – Stock items are boldfaced.

<table>
<thead>
<tr>
<th>Socket Part No.</th>
<th>No. of Poles</th>
<th>Type of Terminal</th>
<th>Grounding Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>27E125</td>
<td>2</td>
<td>Solder</td>
<td>Strip</td>
</tr>
<tr>
<td>27E126</td>
<td>4</td>
<td>Solder</td>
<td>Strip</td>
</tr>
<tr>
<td>27E127</td>
<td>6</td>
<td>Solder</td>
<td>Strip</td>
</tr>
<tr>
<td>27E162</td>
<td>2</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>27E163</td>
<td>4</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>27E164</td>
<td>6</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>27E128</td>
<td>2</td>
<td>Strip</td>
<td>Strip</td>
</tr>
<tr>
<td>27E129</td>
<td>4</td>
<td>Strip</td>
<td>Strip</td>
</tr>
<tr>
<td>27E130</td>
<td>6</td>
<td>Strip</td>
<td>Strip</td>
</tr>
<tr>
<td>27E254</td>
<td>8</td>
<td>Strip</td>
<td>Strip</td>
</tr>
<tr>
<td>27E212</td>
<td>2</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>27E213</td>
<td>4</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>27E271</td>
<td>6</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>27E258</td>
<td>8</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>27E183</td>
<td>2</td>
<td>Terminal</td>
<td>Terminal</td>
</tr>
<tr>
<td>27E194</td>
<td>4</td>
<td>Terminal</td>
<td>Terminal</td>
</tr>
<tr>
<td>27E636</td>
<td>2</td>
<td>.210&quot; long</td>
<td>Strip</td>
</tr>
<tr>
<td>27E637</td>
<td>4</td>
<td>.210&quot; long</td>
<td>Strip</td>
</tr>
<tr>
<td>27E631</td>
<td>2</td>
<td>Strip</td>
<td>Strip</td>
</tr>
<tr>
<td>27E632</td>
<td>4</td>
<td>Strip</td>
<td>Strip</td>
</tr>
<tr>
<td>27E340</td>
<td>6</td>
<td>Strip</td>
<td>Strip</td>
</tr>
<tr>
<td>27E342</td>
<td>2</td>
<td>.180&quot; long</td>
<td>Strip</td>
</tr>
<tr>
<td>27E629</td>
<td>4</td>
<td>Strip</td>
<td>Strip</td>
</tr>
<tr>
<td>27E630</td>
<td>6</td>
<td>Strip</td>
<td>Strip</td>
</tr>
<tr>
<td>27E638</td>
<td>4</td>
<td>Strip</td>
<td>Strip</td>
</tr>
<tr>
<td>27E633</td>
<td>2</td>
<td>.210&quot; long</td>
<td>Strip</td>
</tr>
<tr>
<td>27E634</td>
<td>4</td>
<td>.210&quot; long</td>
<td>Strip</td>
</tr>
<tr>
<td>27E635</td>
<td>6</td>
<td>(5.33mm)</td>
<td>Strip</td>
</tr>
</tbody>
</table>

Suggested Panel Cutout

Suggested Board Layout (Component Side)

Suggested Board Layout (Component Side)

Hold Downs For Use With R10 Sockets

<table>
<thead>
<tr>
<th>Part No.</th>
<th>No. of Poles</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20C249</td>
<td>2</td>
<td>Wire Hold Down Spring</td>
</tr>
<tr>
<td>20C250</td>
<td>4</td>
<td>Wire Hold Down Spring</td>
</tr>
<tr>
<td>20C251</td>
<td>6</td>
<td>Wire Hold Down Spring</td>
</tr>
<tr>
<td>20C266</td>
<td>8</td>
<td>Wire Hold Down Spring</td>
</tr>
<tr>
<td>20C259</td>
<td>All</td>
<td>Wire Hold Down Strap (PC only)</td>
</tr>
<tr>
<td>20C305</td>
<td>2 (R10S)</td>
<td>Hold Down Spring</td>
</tr>
<tr>
<td>20C301</td>
<td>4 (R10S)</td>
<td>Hold Down Spring</td>
</tr>
</tbody>
</table>

Hold Down Spring

Hold Down Strap (PC Sockets Only)

37D645 – Mounting Strip
Strip of .060" (1.52mm) aluminum contains ten pre-punched, breakaway mounting plates. Each plate accommodates a 2, 4, 6 or 8 pole solder terminal R10 relay or socket to facilitate chassis- or rack mounting.

See following page for additional sockets & accessories.
### Bracket Mount Socket
Allows solder terminal relay to mount flat on a chassis.

### Flange Mount Socket
Solder terminal socket with tin-plated terminals and grounding strip pre-assembled on .065" (1.65mm) steel mounting plate. Requires only one chassis cutout.

### Track Mount Socket
Provides front wiring, screw terminal connections for R10 family relays. No grounding provision.

#### Suggested Track Mounting
![Suggested Track Mounting Diagram]

#### Suggested Chassis Mounting
![Suggested Chassis Mounting Diagram]

#### Ordering Data – Stock items are boldfaced.

<table>
<thead>
<tr>
<th>Socket Part No.</th>
<th>No. of Poles</th>
<th>Type of Terminal Provision</th>
<th>Grounding Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>27E446</td>
<td>2</td>
<td>Bracket</td>
<td>Strip</td>
</tr>
<tr>
<td>27E447</td>
<td>4</td>
<td>Solder/Strip</td>
<td>Strip</td>
</tr>
<tr>
<td>27E448</td>
<td>6</td>
<td>Solder/Strip</td>
<td>Strip</td>
</tr>
</tbody>
</table>

#### Specifications and Availability
Specifications and availability subject to change without notice.

---

<table>
<thead>
<tr>
<th>Socket No. of Type of Grounding Provision</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Solder/Strip</td>
</tr>
<tr>
<td>- Bracket</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>27E460</td>
<td>2</td>
<td>1.800</td>
<td>2.230</td>
<td>2.00</td>
</tr>
<tr>
<td>27E461</td>
<td>4</td>
<td>2.125</td>
<td>2.830</td>
<td>3.37</td>
</tr>
<tr>
<td>27E462</td>
<td>6</td>
<td>2.912</td>
<td>3.830</td>
<td>4.94</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>27E317</td>
<td>2</td>
<td>1.437</td>
<td>1.822</td>
<td>0.937</td>
</tr>
<tr>
<td>27E152</td>
<td>4</td>
<td>1.687</td>
<td>2.072</td>
<td>1.125</td>
</tr>
<tr>
<td>27E446</td>
<td>6</td>
<td>1.975</td>
<td>2.260</td>
<td>1.343</td>
</tr>
</tbody>
</table>

---

See preceding page for hold down springs.
KHA series
General Purpose
Dry Circuit to 5A
Multicontact
AC or DC Relay

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 @ 25°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: 500V rms, 60 Hz., between open contacts. 1240V rms, 60 Hz., between all other elements.

Contact Ratings

<table>
<thead>
<tr>
<th>Contact Code</th>
<th>Material</th>
<th>Resistive Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Silver</td>
<td>Resistive Rating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100mA @ 12VAC/12VDC</td>
</tr>
<tr>
<td>2*</td>
<td>Silver-cadmium oxide</td>
<td>500mA @ 12VAC/12VDC</td>
</tr>
<tr>
<td>3</td>
<td>Gold-silver-nickel</td>
<td>10mA @ 12VAC/12VDC</td>
</tr>
<tr>
<td>6</td>
<td>Bifurcated cross bar, gold overlay silver</td>
<td>Dry circuit</td>
</tr>
<tr>
<td>8</td>
<td>Gold diffused silver</td>
<td>50mA @ 12VAC/12VDC</td>
</tr>
</tbody>
</table>

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.

Operate Data @ 25°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°C to +70°C operate. -60°C to +130°C 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

1. Basic Series: (See Note 1)

2. Type:
   - E = Printed circuit terminals, nylon dust cover, contacts rated opposite polarity (UL & CSA).
   - S = Solder terminals, hermetically sealed steel case (UL & CSA). Note: Do not ground KHS frame without consulting factory for load levels. (Order as KHS, not KHAS.)
   - U = Solder terminals, clear polycarbonate dust cover, contacts rated same polarity (UL & CSA).

3. Contact Arrangement:
   - 11 = 2 Form C (DPDT)
   - 17 = 4 Form C (4PDT)

4. Operating Coil:
   - A = AC
   - D = DC

5. Mounting and Termination:
   - 1 = Socket mount, solder terminals on S, U types; printed circuit terminals on E types.

6. Contact Material:

<table>
<thead>
<tr>
<th>Relay Type</th>
<th>E</th>
<th>S</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Codes</td>
<td>1, 2, 3</td>
<td>1*, 2*, 3</td>
<td>1, 2, 6, 8</td>
</tr>
</tbody>
</table>

*UL Rated 1/10 HP, 3A, 120VAC when used with mounting & termination 1.

1 = Silver. 3 = Gold-silver-nickel. 8 = Gold diffused silver.

2 = Silver-cadmium oxide. 6 = Bifurcated crossbar, gold overlay silver.

7. Options Available:

<table>
<thead>
<tr>
<th>Relay Type</th>
<th>E</th>
<th>S</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Codes</td>
<td>B (DPDT only)</td>
<td>None</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>M</td>
</tr>
</tbody>
</table>

B = Push to test button.
N = Neon indicator. Only available with 120VAC or 110VDC coils. Not available with mounting & termination 4 or 8.
H = Neon indicator and push to test button. Only available with 120VAC or DC coils. Not available with mounting & termination 4 or 8.
L = LED indicator. Only available with 6-48VDC coils.
M = LED indicator and push-to-test button. Only available with 6-48VDC coils.

8. Coil Voltage:

<table>
<thead>
<tr>
<th>6, 12, 24, 48, 120, 240**VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>6, 12, 24, 48, 110VDC</td>
</tr>
</tbody>
</table>

**240VAC coil is not available on KHS type relays.

Note 1: Some KHA models available in KH construction. Specify KH instead of KHA.

Stock Items - The following items are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>KHAU-17D12-24</th>
<th>KHAU-17D11-24</th>
<th>KHS-17D11-48</th>
</tr>
</thead>
<tbody>
<tr>
<td>KHAU-17D11-120</td>
<td>KHAU-17D11-48</td>
<td>KHS-17D11-110</td>
</tr>
<tr>
<td>KHAU-11D11-24</td>
<td>KHAU-17D11-110</td>
<td>KHS-17D12-12</td>
</tr>
<tr>
<td>KHAU-17A11-12</td>
<td>KHAU-17D12-12</td>
<td>KHS-17D12-24</td>
</tr>
<tr>
<td>KHAU-17A11-24</td>
<td>KHAU-17D12-24</td>
<td></td>
</tr>
<tr>
<td>KHAU-17A11-120</td>
<td>KHAU-17D12-48</td>
<td></td>
</tr>
<tr>
<td>KHAU-17A11N-120</td>
<td>KHAU-17D12-110</td>
<td></td>
</tr>
<tr>
<td>KHAU-17A12-120</td>
<td>KHAU-17D16-12</td>
<td></td>
</tr>
<tr>
<td>KHAU-17A13-120</td>
<td>KHAU-17D16-24</td>
<td></td>
</tr>
<tr>
<td>KHAU-17A16-24</td>
<td>KHS-17A11-24</td>
<td></td>
</tr>
<tr>
<td>KHAU-17A16-120</td>
<td>KHS-17A11-120</td>
<td></td>
</tr>
<tr>
<td>KHAU-17A18-120</td>
<td>KHS-17A12-120</td>
<td></td>
</tr>
<tr>
<td>KHAU-17D11-6</td>
<td>KHS-17D11-12</td>
<td></td>
</tr>
<tr>
<td>KHAU-17D11-12</td>
<td>KHS-17D11-24</td>
<td></td>
</tr>
</tbody>
</table>
### Outline Dimensions

#### Mounting Code 1 - KHAU only.
2 & 4 Pole

PC terminal models have rivet, not stud. Max. seated height in 27E006 socket is 1.37" (34.8mm).

#### 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

4 Pole

* = Polarity for LED indicator.

#### PC Board Layout (Bottom View)

For KHAE Relays with PC terminals and sockets with PC terminals

14 PLACES .070 DIA. (1.78)
Sockets For KHA And KHS Series

All sockets are normally maintained in stock for immediate delivery.

For KHAU, KHAX, KHS Relays. Relays with solder terminals are required for use with sockets.

### Socket Description

<table>
<thead>
<tr>
<th>Industrial Part No.</th>
<th>No. of Poles</th>
<th>Terminal Grounding Provision</th>
<th>Socket Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>27E006*</td>
<td>4</td>
<td>Solder .375&quot; (9.53mm)</td>
<td>Nylon</td>
</tr>
<tr>
<td>27E007*</td>
<td>4</td>
<td>P.C. .218&quot; (5.54mm)</td>
<td>Nylon</td>
</tr>
<tr>
<td>27E023* 27E220*</td>
<td>4 2</td>
<td>P.C. .218&quot; (5.54mm)</td>
<td>No</td>
</tr>
<tr>
<td>27E166**</td>
<td>4</td>
<td>Screw</td>
<td>Glass-filled Polyester</td>
</tr>
<tr>
<td>27E894**</td>
<td>4</td>
<td>Screw</td>
<td>Glass-filled Polyester</td>
</tr>
<tr>
<td>20C217 20C297</td>
<td>Relay Hold Down Spring Relay Hold Down Spring (use with 27E166 &amp; 27E894)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Pierced Solder Terminals

- .125 ± .010 (3.18 ± .25)
- .062 ± .010 (1.57 ± .25)
- GROUND LUG

### Screw Terminal Socket 27E166

Relays with solder terminals are required for use with screw terminal sockets.

### Screw Terminal DIN Rail, Snap-Mount Socket 27E894

(Use with mounting track 24A110)

### Printed Circuit Terminals With Grounding Lug

- .061 (1.55)
- GROUND LUG
- .171 (4.34)

### Without Grounding Lug

- .061 (1.55)
- .171 (4.34)

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.

### Recommended Chassis Cutouts For Mounting Sockets

- 37D633 will mount eight solder terminal sockets in one length of aluminum strip measuring 10.97" x 2.25" x .062 (278.6 x 57.15 x 1.57)

### Specifications and availability subject to change without notice.

13C5420 Printed in U.S.A. IH3-00
**Features**
- Low profile height of 29mm.
- 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.

**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: Storage: -45°C to +70°C. Operating: -25°C to +125°C.
- Vibration: 55 to 150 Hz. at 7g N/O, 4g N/C.
- Shock: 20g N/O, 5g N/C.

**PT series**
6 to 12 Amp Miniature Relay
2, 3 or 4 Pole, PCB or Plug-in
- UL File E 79990
- CSA File LR5947
- NR 5353

**Contact Data @ 20°C**
- Arrangements: 2 Form C (DPDT), 3 Form C (3PDT) and 4 Form C (4PDT).
- Material: Silver-nickel 90/10 with optional gold plating.
- Expected Mechanical Life: DC coil 30 million operations minimum.
- AC coil 20 million operations minimum.

<table>
<thead>
<tr>
<th>Ratings</th>
<th>2 Form C</th>
<th>3 Form C</th>
<th>4 Form C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Current</td>
<td>12A</td>
<td>10A</td>
<td>6A</td>
</tr>
<tr>
<td>Rated Voltage</td>
<td>250VAC</td>
<td>250VAC</td>
<td>250VAC</td>
</tr>
<tr>
<td>Maximum Switching Voltage</td>
<td>440VAC</td>
<td>440VAC</td>
<td>440VAC</td>
</tr>
<tr>
<td>Rated Breaking Capacity</td>
<td>3,000VA</td>
<td>2,500VA</td>
<td>1,500VA</td>
</tr>
<tr>
<td>Make Current</td>
<td>24A</td>
<td>20A</td>
<td>12A</td>
</tr>
</tbody>
</table>

**Initial Dielectric Strength**
- Between Open Contacts: 1,500VAC.
- Between Coil and Contacts: 2,500VAC.
- Between Poles: 2 and 3 Pole: 2,500VAC, 4 Pole: 2,000VAC.

**DC Coil Data @ 20°C (Nominal Coil Power: 750mW)**

<table>
<thead>
<tr>
<th>Nominal Voltage VDC</th>
<th>DC Resistance in Ohms ±10%</th>
<th>Must Operate Voltage VDC</th>
<th>Drop-out Voltage VDC</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>06</td>
<td>48</td>
<td>4.5</td>
<td>0.9</td>
<td>125.0</td>
</tr>
<tr>
<td>12</td>
<td>192</td>
<td>9.0</td>
<td>1.8</td>
<td>62.5</td>
</tr>
<tr>
<td>24</td>
<td>777</td>
<td>18.0</td>
<td>3.6</td>
<td>31.3</td>
</tr>
<tr>
<td>48</td>
<td>3,072</td>
<td>36.0</td>
<td>7.2</td>
<td>15.6</td>
</tr>
<tr>
<td>60</td>
<td>4,845</td>
<td>45.0</td>
<td>9.0</td>
<td>12.5</td>
</tr>
<tr>
<td>110</td>
<td>16,133</td>
<td>82.5</td>
<td>16.5</td>
<td>6.8</td>
</tr>
<tr>
<td>220</td>
<td>64,533</td>
<td>165.0</td>
<td>33.0</td>
<td>3.4</td>
</tr>
</tbody>
</table>

**AC Coil Data @ 20°C (Nominal Coil Power: 1.0VA)**

<table>
<thead>
<tr>
<th>Nominal Voltage VAC</th>
<th>DC Resistance in Ohms ±10%</th>
<th>Must Operate Voltage VAC</th>
<th>Drop-out Voltage VAC</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>06</td>
<td>11</td>
<td>4.8</td>
<td>1.8</td>
<td>166.5</td>
</tr>
<tr>
<td>12</td>
<td>48</td>
<td>9.6</td>
<td>3.6</td>
<td>83.3</td>
</tr>
<tr>
<td>24</td>
<td>192</td>
<td>19.2</td>
<td>7.2</td>
<td>41.6</td>
</tr>
<tr>
<td>48</td>
<td>777</td>
<td>38.4</td>
<td>14.4</td>
<td>21.3</td>
</tr>
<tr>
<td>60</td>
<td>1,306</td>
<td>48.0</td>
<td>18.0</td>
<td>16.7</td>
</tr>
<tr>
<td>115</td>
<td>4,845</td>
<td>92.0</td>
<td>34.5</td>
<td>8.8</td>
</tr>
<tr>
<td>230</td>
<td>19,465</td>
<td>164.5</td>
<td>69.0</td>
<td>4.3</td>
</tr>
</tbody>
</table>

**Electrical Life (preliminary data)**

<table>
<thead>
<tr>
<th>Switching Current (A)</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10^7</td>
</tr>
<tr>
<td>4</td>
<td>10^6</td>
</tr>
<tr>
<td>8</td>
<td>10^5</td>
</tr>
<tr>
<td>12</td>
<td>10^4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DC Coil @ 250VAC Resistive Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching Current (A)</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>8</td>
</tr>
</tbody>
</table>

**Max. DC Load Breaking Capacity (resistive load)**

<table>
<thead>
<tr>
<th>DC Current (A)</th>
<th>DC Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>10</td>
</tr>
<tr>
<td>0.5</td>
<td>20</td>
</tr>
<tr>
<td>0.7</td>
<td>30</td>
</tr>
<tr>
<td>0.8</td>
<td>40</td>
</tr>
<tr>
<td>1</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2 Pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Pole</td>
</tr>
<tr>
<td>4 Pole</td>
</tr>
</tbody>
</table>

**Coil Operating Range**

- **AC Coil**
  - Applied Coil Voltage (% of Nominal)
  - Ambient Temperature (°C)
  - Range: Min. 60°C, Max. +100°C

- **DC Coil**
  - Applied Coil Voltage (% of Nominal)
  - Ambient Temperature (°C)
  - Range: Min. 60°C, Max. +100°C
1. Basic Series:
   PT = General purpose relay.

2. Contact Arrangement:
   2 = 2 Form C (DPDT)  3 = 3 Form C (3PDT)  5 = 4 Form C (4PDT)

3. Contact Material:
   7 = Silver-Nickel 90/10 with test button.  8 = Silver-Nickel 90/10, with gold plating, and test button.

4. Termination:
   0 = Socket mount, solder terminals.  1 = Printed circuit board terminal.

5. Coil Voltage:
   006 = 6VDC  012 = 12VDC  024 = 24VDC  048 = 48VDC  060 = 60VDC  110 = 110VDC  220 = 220VDC
   506 = 6VAC  512 = 12VAC  524 = 24VAC  548 = 48VAC  560 = 60VAC  615 = 115VAC  730 = 230VAC

Stock Items – We recommend that our authorized distributors stock the following items for immediate delivery.

PT270024  PT370024  PTS80024
PT270524  PT370524  PTS80524
PT270615  PT370615  PTS80615

Outline Dimensions

Socket Mount, Solder Terminals

Printed Circuit Board Terminals

Wiring Diagrams (Bottom Views)

PC Board Layout (Bottom Views)
<table>
<thead>
<tr>
<th>Socket Part No.</th>
<th>Socket Termination</th>
<th>Mounting Style</th>
<th>No. of Poles</th>
<th>Accepts Modules?</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZG78700</td>
<td>Screw Terminals</td>
<td>DIN-rail</td>
<td>4</td>
<td>No</td>
</tr>
<tr>
<td>27E894</td>
<td>Screw Terminals</td>
<td>DIN-rail</td>
<td>4</td>
<td>No</td>
</tr>
<tr>
<td>PT78702, PT78703, PT78704</td>
<td>2, 3 and 4 Pole</td>
<td>DIN Rail Socket with Screw Terminals</td>
<td>2, 3 and 4 Pole</td>
<td>No</td>
</tr>
<tr>
<td>27E006</td>
<td>4 Pole Solder Terminals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27E220</td>
<td>2 Pole PCB Terminals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27E023</td>
<td>4 Pole PCB Terminals</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Socket Selection Table**

Stock items are boldfaced.

**LED and Protection Module Selection Table**

Stock items are boldfaced.

<table>
<thead>
<tr>
<th>Module Part No.</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPM T0 0A0</td>
<td>Protection diode 1N4007</td>
</tr>
<tr>
<td>RPM U0 548</td>
<td>RC network 24-48VAC</td>
</tr>
<tr>
<td>RPM U0 730</td>
<td>RC network 110-230VAC</td>
</tr>
<tr>
<td>RPM L0 024</td>
<td>LED 12-24VDC (Note 1)</td>
</tr>
<tr>
<td>RPM L0 524</td>
<td>LED 12-48VDC</td>
</tr>
<tr>
<td>RPM L0 110</td>
<td>LED 110VDC (Note 1)</td>
</tr>
<tr>
<td>RPM L0 730</td>
<td>LED 110-230VAC</td>
</tr>
</tbody>
</table>


Specifications and availability subject to change without notice.

13C0078 Printed in U.S.A. IH/3-00
K10 series
15 Amp General Purpose Miniature Relay

File E22575  File LR15734

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°C
Materials: Silver-cadmium oxide.
Expected Life: 10 million operations, mechanical; 100,000 operations minimum at rated loads.

Contact Ratings

<table>
<thead>
<tr>
<th>Contact Code</th>
<th>Material</th>
<th>UL/CSA Ratings</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Silver-cadmium oxide</td>
<td>15A @ 30VDC 15A @ 120VAC 1/3HP @ 120VAC 1/2HP @ 250VAC</td>
<td>Resistive Resistive</td>
</tr>
</tbody>
</table>

Initial Dielectric Strength
Between Open Contacts: 1,000V rms.
Between Adjacent Contacts: 1,500V rms.
Between Contacts and Coil: 1,500V rms.

Coil Data @ 25°C
Nominal Power:
DC Coils: .9 Watts.
AC Coils: 1.2VA.
Maximum Power: 2.0 Watts.
Duty Cycle: Continuous.
Insulation: Class B (130°C).

Coil Data

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>DC Coils</th>
<th>AC Coils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance in Ohms ± 10%</td>
<td>Nominal Current in Milliamps</td>
<td>Resistance in Ohms ± 15%</td>
</tr>
<tr>
<td>6</td>
<td>40</td>
<td>150</td>
</tr>
<tr>
<td>12</td>
<td>160</td>
<td>75</td>
</tr>
<tr>
<td>24</td>
<td>650</td>
<td>37</td>
</tr>
<tr>
<td>48</td>
<td>2,600</td>
<td>18.5</td>
</tr>
<tr>
<td>110</td>
<td>11,000</td>
<td>10</td>
</tr>
<tr>
<td>120*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>240*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*For 220/240VDC operation, use 11,000 Ohm, 5 Watt dropping resistor in series with the 110VDC coil.

Operate Data @ 25°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°C to +105°C.
Operating: -45°C to +70°C.

Mechanical Data
Mounting: Socket mount, printed circuit board, top flange.
Termination: 187” (4.75mm) quick connect/solder terminals, or printed circuit terminals.
Enclosure: Smoke-color polycarbonate dust cover.
Weight: 1.8 oz. (51g) approximately.
**Ordering Information**

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>K10</th>
<th>P-11</th>
<th>D</th>
<th>1</th>
<th>5</th>
<th>-6</th>
</tr>
</thead>
</table>

1. **Basic Series:**
   K10 = 15 amp miniature relay.

2. **Cover:**
   P = Polycarbonate (smoke color).

3. **Contact Arrangement:**
   11 = 2 Form C (DPDT)

4. **Coil Input:**
   A = 50/60 Hz. AC  D = DC

5. **Mounting & Termination:**
   1 = Socket mount; 0.187" (4.75mm) quick connect/solder terminals.
   5 = Printed circuit terminals; 0.160" length.
   T = Mounting bracket on end of cover; 0.187" (4.75mm) quick connect/solder terminals.

6. **Contact Type:**
   5 = 15 amp silver-cadmium oxide

7. **Coil Voltage:**
   To 240VAC or 110VDC, see coil data table.

---

**Stock Items – The following items are normally maintained in stock for immediate delivery.**

<table>
<thead>
<tr>
<th>K10P-11A1S-6</th>
<th>K10P-11D1S-6</th>
<th>K10P-11D5S-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>K10P-11A1S-12</td>
<td>K10P-11D1S-12</td>
<td>K10P-11D5S-110</td>
</tr>
<tr>
<td>K10P-11A1S-24</td>
<td>K10P-11D1S-24</td>
<td>K10P-11DTS-12</td>
</tr>
<tr>
<td>K10P-11A1S-120</td>
<td>K10P-11D1S-110</td>
<td>K10P-11DTS-24</td>
</tr>
<tr>
<td>K10P-11AT5-120</td>
<td>K10P-11D5S-12</td>
<td></td>
</tr>
</tbody>
</table>

---

**Outline Dimensions**

**Mounting Code 1**

**Socket Mount**

**Mounting Code 5**

**Printed Circuit Terminals**

**Mounting Code T**

---

**PC Board Layout**

**Wiring Diagram**

1. **Basic Series:**
   K10 = 15 amp miniature relay.

2. **Cover:**
   P = Polycarbonate (smoke color).

3. **Contact Arrangement:**
   11 = 2 Form C (DPDT)

4. **Coil Input:**
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   T = Mounting bracket on end of cover; 0.187" (4.75mm) quick connect/solder terminals.

6. **Contact Type:**
   5 = 15 amp silver-cadmium oxide

7. **Coil Voltage:**
   To 240VAC or 110VDC, see coil data table.

---

**Stock Items – The following items are normally maintained in stock for immediate delivery.**

<table>
<thead>
<tr>
<th>K10P-11A1S-6</th>
<th>K10P-11D1S-6</th>
<th>K10P-11D5S-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>K10P-11A1S-12</td>
<td>K10P-11D1S-12</td>
<td>K10P-11D5S-110</td>
</tr>
<tr>
<td>K10P-11A1S-24</td>
<td>K10P-11D1S-24</td>
<td>K10P-11DTS-12</td>
</tr>
<tr>
<td>K10P-11A1S-120</td>
<td>K10P-11D1S-110</td>
<td>K10P-11DTS-24</td>
</tr>
<tr>
<td>K10P-11AT5-120</td>
<td>K10P-11D5S-12</td>
<td></td>
</tr>
</tbody>
</table>

---

**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 recognized, File E59244, and CSA certified, File LR15734.

**27E488**

Pierced Solder Terminals

**20C217**

Hold Down Spring For 27E488 & 27E489

**Chassis Cutout For Mounting 27E488 Socket**

**37D633**

Mounting Strip

---

**27E489**

Printed Circuit Terminals

**P.C. Board Layout For Socket**

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.

**27E895**

Screw Terminals, DIN Rail Snap-Mount

(Use with mounting track 24A110)

**27E487**

Screw Terminals

**20C287**

Hold Down Spring For 27E487

---

Specifications and availability subject to change without notice.

13C5100 Printed in U S A IH/3 00
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

File E22575
File LR15734
0435 Registration 1792 (KUIP)
0435 Registration 1792 (KUGP)
License 81.12102.01

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°C
Arrangements: See respective ordering information table.
Gold flash available as standard.
Gold diffused and gold alloy on special order.

Expected Mechanical Life:

 Coil Data @ 25°C
Voltage: 6 to 110VDC and 6 to 240VAC.
Nominal Coil Power:
DC Coils: 1.2 Watts - KUP, KUIP, KUMP 1-3 pole; KUEP, 1 pole.
DC Coils: 1.8 Watts - KUP, 4 pole; KUEP, 2 pole; KUGP.
AC Coils: 2.0VA - KUP, KUIP, 1-2 pole; KUEP 1 pole.
AC Coils: 2.7VA - KUP, KUIP, 3 pole; KUEP, 2 pole; KUGP, KUMP.

Operate Data @ 25°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°C to maximum listed in table below.
Open Relays: Add 15°C to maximum listed.

<table>
<thead>
<tr>
<th>Material</th>
<th>UL/CSA Ratings</th>
<th>Expected Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Silver</td>
<td>5 amps @ 28VDC or 240VAC, 80% PF, 5 amp tungsten @ 120VAC, 1/2 amp @ 120VDC</td>
<td>100,000</td>
</tr>
<tr>
<td>All</td>
<td>5 amp @ 227VAC, 80% PF KUM KUMP</td>
<td>100,000</td>
</tr>
<tr>
<td>KUMP 3 Pole</td>
<td>10 amp @ 28VDC or 120VAC, 80% PF, 6 2/3 amp @ 240VAC, 80% PF</td>
<td>100,000</td>
</tr>
<tr>
<td>KUIP 3 Pole</td>
<td>10 amp @ 28VDC or 120VAC, 80% PF, 6 2/3 amp @ 240VAC, 80% PF</td>
<td>100,000</td>
</tr>
<tr>
<td>KUEP 3 Pole</td>
<td>10 amp @ 150VDC</td>
<td>100,000</td>
</tr>
<tr>
<td>KUGP 3 Pole</td>
<td>10 amp @ 150VDC</td>
<td>100,000</td>
</tr>
<tr>
<td>KUIP 4 Pole</td>
<td>10 amp per pole not to exceed 30 amp total @ 28VDC, 120VAC, 80% PF, 6 2/3 amp @ 240VAC, 80% PF</td>
<td>100,000</td>
</tr>
<tr>
<td>KUEP 4 Pole</td>
<td>10 amp @ 150VDC</td>
<td>100,000</td>
</tr>
<tr>
<td>KUGP 4 Pole</td>
<td>10 amp @ 150VDC</td>
<td>100,000</td>
</tr>
</tbody>
</table>

Initial Dielectric Strength
Between Open Contacts: 1200V rms; KUGP, 3,500V rms.
Between Adjacent Contacts: 2,200V rms.
Between Contacts and Coil: 2,200V rms; KUGP, KUIP, 3,750V rms.

Contact Ratings

<table>
<thead>
<tr>
<th>Material</th>
<th>Arrangement</th>
<th>UL/CSA Ratings</th>
<th>Expected Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Silver</td>
<td>All</td>
<td>5 amps @ 28VDC or 240VAC, 80% PF, 5 amp tungsten @ 120VAC, 1/2 amp @ 120VDC</td>
<td>100,000</td>
</tr>
<tr>
<td>KUIP 1-2 Pole</td>
<td>1/2 HP @ 120VAC, 1/2 HP @ 240VAC, 5 FLA, 15 LRA @ 250VAC (FLA covered by 30,000 operations)</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>KUGP 1-2 Pole</td>
<td>1/2 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)</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>KUEP 1-2 Pole</td>
<td>1/2 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)</td>
<td>100,000</td>
<td></td>
</tr>
</tbody>
</table>

Coil Data
DC Volts
Nominal | 1.2 Watt | 1.8 Watt |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Ohms ± 10%</td>
<td>Nom. I ma</td>
<td>DC Ohms ± 10%</td>
</tr>
<tr>
<td>5</td>
<td>21</td>
<td>238</td>
</tr>
<tr>
<td>6</td>
<td>32.1</td>
<td>187</td>
</tr>
<tr>
<td>12</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>24</td>
<td>472</td>
<td>51</td>
</tr>
<tr>
<td>48</td>
<td>1,800</td>
<td>26.7</td>
</tr>
<tr>
<td>110</td>
<td>10,000</td>
<td>11</td>
</tr>
</tbody>
</table>

AC Volts
Nominal | 2VA | 2.7VA |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Ohms ± 15%</td>
<td>Nom. I ma</td>
<td>DC Ohms ± 15%</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>335</td>
</tr>
<tr>
<td>12</td>
<td>24</td>
<td>188</td>
</tr>
<tr>
<td>24</td>
<td>86</td>
<td>84</td>
</tr>
<tr>
<td>120</td>
<td>2,250</td>
<td>175</td>
</tr>
<tr>
<td>240</td>
<td>9,110</td>
<td>8.75</td>
</tr>
</tbody>
</table>
### Ordering Information

<table>
<thead>
<tr>
<th>Type</th>
<th>KU</th>
<th>KUP (through 3 poles)</th>
<th>KUP (4 pole models)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codes Available</td>
<td>1, 3, 4</td>
<td>1, 2, 3, 4, 5, A, E, T</td>
<td>1, 3, 5, A, E</td>
</tr>
<tr>
<td>OPEN STYLE</td>
<td>1 = PLAIN CASE</td>
<td>I = PLAIN CASE:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 = with test button</td>
<td>2 = with test button</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 = with indicator lamp.*</td>
<td>3 = with indicator lamp.*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 = with test button &amp; indicator lamp.*</td>
<td>4 = with test button &amp; indicator lamp.*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 = BRACKET MOUNT CASE</td>
<td>5 = BRACKET MOUNT CASE:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A = PLAIN CASE, #6-32 stud, locating tab</td>
<td>A = PLAIN CASE, #6-32 stud, locating tab</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E = PLAIN CASE, tapped core, locating tab</td>
<td>E = PLAIN CASE, tapped core, locating tab</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T = TOP FLANGE CASE</td>
<td>T = TOP FLANGE CASE</td>
<td></td>
</tr>
</tbody>
</table>

* Indicator lamps are available on models with the following coils: 6-24VAC and DC, 110VDC and 120-240VAC. Only models with 120-240VAC coils are UL recognized.

#### Terminal & Contact Material:

<table>
<thead>
<tr>
<th>Type</th>
<th>1 &amp; 2 Pole Models</th>
<th>3 Pole Models</th>
<th>4 Pole Models **</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codes Available</td>
<td>1, 5, 7, K</td>
<td>1, 5, 7</td>
<td>1, <strong>, 5</strong>, 7</td>
</tr>
<tr>
<td>1 = .187” (4.75mm) quick-connect/solder; silver, 5 amps.</td>
<td>2 = .187” (4.75mm) quick connect/solder; silver-cadmium oxide, 10 amps.</td>
<td>3 = .047” (.119mm) printed circuit; silver-cadmium oxide, 10 amps.</td>
<td></td>
</tr>
<tr>
<td>5 = .187” (4.75mm) quick connect/solder; silver-cadmium oxide, 10 amps.</td>
<td>7 = K = .250” (6.35mm) quick connect; silver-cadmium oxide, 10 amps.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 = 4 pole KU, KUP: .110” (2.79mm) quick connect/solder; silver-cadmium oxide, 10 amps.</td>
<td>**4 pole KUP with .187” (4.75mm) quick connect/solder terminals will not plug into sockets. Must use .110&quot; (2.79 mm) quick connect solder terminals for socket mounting.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Stock Items – The following items are normally maintained in stock for immediate delivery.

- KUP-5A15-24
- KUP-5A15-120
- KUP-11A11-12
- KUP-11D11-24
- KUP-14A11-120
- KUP-14A15-120
- KUP-14A25-120
- KUP-14A55-120
- KUP-14D11-24
- KUP-14D15-120
- KUP-14D25-120
- KUP-14D55-24
- KUP-17A11-120
- KUP-17A25-120
- KUP-17A55-24
- KUP-17D11-24
- KUP-17D15-120
- KUP-17D25-120
- KUP-17D55-24
- KUP-17D55-120
- KUP-17D55-240
- KUP-17D55-48
- KUP-17D55-6
- KUP-17D55-12
- KUP-17D55-24
- KUP-17D55-48
- KUP-17D55-120
- KUP-17D55-110
- KUP-17D55-24
- KUP-17D55-48
- KUP-17D55-120
- KUP-17D55-110

#### Mechanical Data

- **Termination:** Quick connect, solder and PC board.
- **Enclosure:** Clear polycarbonate dust cover.
- **Weight:** 3.0 oz. (85g) approximately.
### Stock Items – The following items are normally maintained in stock for immediate delivery.

- KUGP-7D55-24
- KUIP-5A55-120
- KUIP-11D55-12
- KUIP-11D55-24
- KUEP-3A15-12
- KUEP-3D15-12
- KUEP-7D15-24
- KUEP-11A15-120
- KUEP-14A15-120
- KUEP-14D15-12
- KUEP-14D15-24

<table>
<thead>
<tr>
<th>VDE Approved Design</th>
<th>Typical Part No.</th>
<th>KUIP</th>
<th>KUGP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Basic Series &amp; Type:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KUIP = Enclosed relay designed for General VDE 0435.*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KUGP = Enclosed relay with 3mm open contact spacing. (Form A and Form X arrangements only)!</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Contact Arrangement:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 = 1 Form C (SPDT)*</td>
<td>11 = 2 Form C (DPDT)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 = 2 Form A (DPSTNO)</td>
<td>14 = 3 Form C (3PDT)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Coil Input:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A = AC, 50/60 Hz.*</td>
<td>D = DC*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Mountings:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 = PLAIN CASE, SOCKET MOUNT.*</td>
<td>T = TOP FLANGE CASE.*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 = BRACKET MOUNT CASE.*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Terminal &amp; Contact Material:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 = .047” (1.19mm) printed circuit board; silver.</td>
<td>5 = .187” (4.75mm) quick connect/solder; silver-cadmium oxide.*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Coil Voltage:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To 240VAC, 50/60 Hz. or 110VDC. (For 277VAC, consult factory.)*</td>
<td>See coil data tables.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### High Voltage DC Switching

<table>
<thead>
<tr>
<th>Ordering Information</th>
<th>Typical Part No.</th>
<th>KUEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Basic Series &amp; Type:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KUEP = Enclosed relay with magnetic blow-outs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Contact Arrangement:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 = 1X (SPST-NO-DM)</td>
<td>7 = 2A (DPST-NO)</td>
<td>11 = 2C (DPDT)</td>
</tr>
<tr>
<td>3. Coil Input:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A = AC 50/60 Hz.</td>
<td>D = DC</td>
<td></td>
</tr>
<tr>
<td>4. Mountings:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 = PLAIN CASE;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 = with indicator lamp.*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 = BRACKET MOUNT CASE</td>
<td>T = TOP FLANGE CASE.*</td>
<td></td>
</tr>
<tr>
<td>*Indicator lamps are available on models with the following coils: 6-24VAC and DC, 110VDC and 120-240VAC. Only models with 120-240VAC coils are UL recognized.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Terminal &amp; Contact Material:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 = .187” (4.75mm) quick connect/solder; silver-cadmium oxide.</td>
<td>7 = .047” (1.19mm) printed circuit; silver-cadmium oxide.</td>
<td></td>
</tr>
<tr>
<td>6. Coil Voltage:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To 240VAC, 50/60 Hz. or 110VDC. (For 277VAC, consult factory.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Stock Items – The following items are normally maintained in stock for immediate delivery.

- KUEP-3A15-120
- KUEP-3D15-12
- KUEP-3D15-24
- KUEP-7D15-24
- KUEP-11D15-12
- KUEP-11D15-24
- KUEP-11A15-120
### Ordering Information

**15 Amp Switching**

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>KUM-14</th>
<th>A</th>
<th>1</th>
<th>8</th>
<th>-120</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KUM</strong></td>
<td>-14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>KUMP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**1. Basic Series & Type:**
- KUM = 15 amp open relay
- KUMP = 15 amp enclosed relay

**2. Contact Arrangement:**
- 1 = 1A (SPST-NO)
- 2 = 1B (SPST-NC)
- 3 = 1X (SPST-NO-DM)
- 4 = 1Y (SPST-NC-DB)
- 5 = 1C (SPDT)
- 6 = 1Z (SPDT-NC-DB)
- 7 = 2A (DPST-NO)
- 8 = 2B (DPST-NC)
- 11 = 2C (DPDT)
- 12 = 3A (DPST-NC)
- 13 = 3B (DPST-NC)
- 14 = 3C (DPDT)

**3. Coil Input:**
- A = AC, 50/60 Hz
- D = DC

**4. Mountings:**

<table>
<thead>
<tr>
<th>Type</th>
<th>KUM</th>
<th>KUMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEN STYLE</td>
<td>1 = PLAIN CASE;</td>
<td>A = PLAIN CASE;</td>
</tr>
<tr>
<td></td>
<td>2 = with test button.</td>
<td>B = with test button.</td>
</tr>
<tr>
<td></td>
<td>3 = with indicator lamp.*</td>
<td>C = with indicator lamp.*</td>
</tr>
<tr>
<td></td>
<td>4 = with test button &amp; indicator lamp.*</td>
<td>D = with test button &amp; indicator lamp.*</td>
</tr>
<tr>
<td></td>
<td>5 = BRACKET MOUNT CASE;</td>
<td>E = PLAIN CASE, TAPPED CORE, LOCATING TAB;</td>
</tr>
<tr>
<td></td>
<td>6 = with test button.</td>
<td>F = with test button.</td>
</tr>
<tr>
<td></td>
<td>7 = with indicator lamp.*</td>
<td>G = with indicator lamp.*</td>
</tr>
<tr>
<td></td>
<td>8 = with test button &amp; indicator lamp.*</td>
<td>H = with test button &amp; indicator lamp.*</td>
</tr>
<tr>
<td></td>
<td>9 = STUD ON END OF PLAIN CASE.</td>
<td>T = TOP FLANGE CASE.</td>
</tr>
</tbody>
</table>

*Indicator lamps are available on models with the following coils: 5-624VAC and 110VDC and 120-240VAC. Only models with 120-240VAC coils are UL recognized.

**5. Terminal & Contact Material:**

<table>
<thead>
<tr>
<th>Type</th>
<th>1 &amp; 2 Pole Models</th>
<th>3 Pole Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codes Available</td>
<td>6,8,9,G</td>
<td>6,8,9</td>
</tr>
</tbody>
</table>

6 = .205" (5.21mm) quick connect/solder; silver-cadmium-oxide.
8 = .187" (4.75mm) quick connect/solder; silver-cadmium-oxide.
9 = .047" (1.19mm) printed circuit; silver-cadmium-oxide.
G = .250" (6.35mm) quick connect; silver-cadmium-oxide. (Not available on 3 pole models.)

**6. Coil Voltage:**
- To 240VAC, 50/60 Hz, or 110VDC (For 277VAC, consult factory.)

---

**Stock Items** – The following items are normally maintained in stock for immediate delivery.

- KUMP-11A18-24
- KUMP-11D18-12
- KUMP-14A18-24
- KUMP-14D18-24
- KUMP-11A18-120
- KUMP-11D18-24
- KUMP-14A18-120
- KUMP-14D18-12
- KUMP-11A18-240
- KUMP-11D18-110
- KUMP-14D18-12
Open Relays

**Bracket Type**

Tapped Holes

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.43 MAX.**</td>
<td>(61.72)</td>
</tr>
<tr>
<td>2.33 MAX.***</td>
<td>(59.18)</td>
</tr>
<tr>
<td>2.29 MAX.****</td>
<td>(58.17)</td>
</tr>
</tbody>
</table>

#6-32 THREAD

Tapped Core

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.27 MAX.**</td>
<td>(57.7)</td>
</tr>
<tr>
<td>2.17 MAX.***</td>
<td>(55.14)</td>
</tr>
<tr>
<td>2.125 MAX.****</td>
<td>(53.98)</td>
</tr>
</tbody>
</table>

Enclosed Relays

**Plain Case**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.468 MAX.***</td>
<td>(37.29)</td>
</tr>
<tr>
<td>1.262 MAX.****</td>
<td>(35.58)</td>
</tr>
<tr>
<td>1.167 MAX.*****</td>
<td>(42.85)</td>
</tr>
</tbody>
</table>

Core and Stud Mount Cases

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.968 MAX.†</td>
<td>(49.99)</td>
</tr>
<tr>
<td>1.906 MAX.‡</td>
<td>(48.41)</td>
</tr>
</tbody>
</table>

Core on End Case

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>.085 MAX.</td>
<td>(2.16)</td>
</tr>
</tbody>
</table>

Seat Heights For Open Relays

- **1.391”** (35.33mm) for #6-32 stud with 2.16” (5.4mm) locating tab.
- **1.52”** (38.6mm) for bracket with 2-#6 32 tapped holes.
- **1.262”** (32.56mm) for #6-32 tapped core with 2.16” (5.4mm) locating tab.
- **2.046”** (51.97mm) for relay with printed circuit terminals.

STUD TYPE also available with .125” (3.18mm) tab, as well as without stud and locating tab. Models without stud have core tapped #6-32 THREAD, .25” (6.4mm) minimum depth.

*Dimensions with .250” (6.35mm) terminals.
**Dimensions with .110” (2.79mm) or .205” (5.21mm) terminals.
***Dimensions with .187” (4.75mm) terminals.

Stud Type

2.27 MAX.**

2.17 MAX.***

2.125 MAX.****

.187 (4.75) DIA.

PUSH-TO-TEST BUTTON AVAILABLE ON KUP, & KUMP

Enclosed Relays

**Top Flange Case**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.713 ± .003</td>
<td>(43.51 ± .08)</td>
</tr>
<tr>
<td>1.373 ± .010</td>
<td>(34.87 ± .25)</td>
</tr>
<tr>
<td>1.989 ± .003</td>
<td>(50.52)</td>
</tr>
</tbody>
</table>

**Bracket Mount Case**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.906 MAX.</td>
<td>(48.41)</td>
</tr>
</tbody>
</table>

*Dimensions with .250” (6.35mm) terminals.
**Dimensions with .110” (2.79mm) or .205” (5.21mm) terminals.
***Dimensions with .187” (4.75mm) terminals.

STUD TYPE also available with .125” (3.18mm) tab, as well as without stud and locating tab. Models without stud have core tapped #6-32 THREAD, .25” (6.4mm) minimum depth.

*Dimensions with .250” (6.35mm) terminals.
**Dimensions with .110” (2.79mm) or .205” (5.21mm) terminals.
***Dimensions with .187” (4.75mm) terminals.

Note: All dimensions are in millimeters unless otherwise specified.
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 Connect

.205" (5.21mm) Quick Connect

.250" (6.35mm)

Printed Circuit

Wiring Diagrams

*1 Form X

1 Form C

*2 Form A

*2 Form C

3 Form C

4 Form C

PC Board Layouts (Bottom Views)

1 Form X

3 Pole Models

4 Pole Models

*Recommended Load Polarity for Optimum Arc Suppression.
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" (4.75mm) quick connect termination.

<table>
<thead>
<tr>
<th>Socket</th>
<th>Socket Termination</th>
<th>Hold-Down Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>27E043</td>
<td>Solder eyelet</td>
<td>20C228 or 20C254*</td>
</tr>
<tr>
<td>27E046</td>
<td>PC board, .144&quot; (3.66mm) terminals</td>
<td>20C228 or 20C254</td>
</tr>
<tr>
<td>27E067</td>
<td>.187&quot; (4.75mm) quick connect</td>
<td>20C228 or 20C254</td>
</tr>
<tr>
<td>27E121</td>
<td>Screw terminals</td>
<td>20C314 (2 per socket required)</td>
</tr>
<tr>
<td>27E305</td>
<td>PC board, .194&quot; (4.67mm) terminals</td>
<td>20C228 or 20C254</td>
</tr>
<tr>
<td>27E396</td>
<td>.187&quot; (4.75mm) quick connect*</td>
<td>20C254</td>
</tr>
<tr>
<td>27E939</td>
<td>Screw terminals†</td>
<td>20C318</td>
</tr>
</tbody>
</table>

* 20C228 held in place by socket hold-down screw where as 20C254 snaps onto socket.
† 20C318 is DIN rail mounting.

Hard Mount Sockets For Relays Through 3 Poles
Nylon sockets with .187" (4.75mm) quick connect, solder or printed circuit terminals are available for KUEP, KUGP, KUIP, and KUMP relays, through 3 poles, with .187" (4.75mm) 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" (4.75mm) quick connect terminals.

27E046, 27E305 Socket With Printed Circuit Terminals
Suggested Socket PC Board Layout

27E396—Snap-In Socket For Relays Through 3 Poles
Snap-in socket with .187" (4.75mm) quick connect terminals is available for KUEP, KUGP, KUIP, and KUMP relays, through 3 poles, with .187" (4.75mm) quick connect terminals. Snap-in sockets reduce labor by eliminating time consuming screw or rivet mounting. Preassembled wiring harnesses may also be used as the sockets are designed to snap into the chassis from either front or back. All are rated 15 amps and UL recognized, File E59244. The 27E396 uses chassis cutout shown on this page.

27E396—with .187" (4.75mm) quick connect terminals.

Recommended Chassis Cutout
For Hard Mount Sockets

Recommended Chassis Cutout
For Snap-In Sockets

Recommended chassis thickness .031" (.79mm) to .062" (1.57mm).
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 1.700" (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" (4.75mm) 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.

Screws Terminal Socket For 4 Pole Relays
27E867 offers screw termination for 4 pole KUP relays with .110" (2.79mm) quick connect/socket mount terminals. Rated 10 amps and is UL recognized, File E59244.
**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 @ 25°C**
Material: Fine silver or silver-cadmium oxide.

**Initial Dielectric Strength**
- Between Open Contacts: 500V rms.
- Between Adjacent Contacts: 1,500V rms.
- Between Contacts and Coil: 1,500V rms.

**Operate Data @ 25°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.

**Environment Data**
Temperature Range:
- Storage: -45°C to +105°C.
- Operating: DC Coils: -45°C to +70°C.
  AC Coils: -45°C to +45°C.

**Mechanical Data**
Termination: .187” x .020” quick connect.
Enclosures: Clear polycarbonate dust cover.
Weight: 3.0 oz. (86g) approximately.

**Coil Data**

<table>
<thead>
<tr>
<th>Material</th>
<th>UL/CSA Ratings</th>
<th>Life Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine silver</td>
<td>5A @ 28VDC or 240VAC, 80% PF, 1/10 HP @ 120VAC, 1/4 HP @ 240VAC</td>
<td>100,000</td>
</tr>
<tr>
<td>Silver-cadmium oxide</td>
<td>10A @ 28VDC or 240VAC, 80% PF, 1/4 HP @ 120VAC, 1/3 HP @ 240VAC, 10 FLA, 30 LRA @ 120VAC, 5 FLA, 15 LRA @ 240VAC</td>
<td>100,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>DC Resistance in Ohms ± 10%*</th>
<th>Must Operate Voltage</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Coils</td>
<td>12</td>
<td>120</td>
<td>9.0</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>472</td>
<td>18.0</td>
</tr>
<tr>
<td>AC Coils</td>
<td>24</td>
<td>72</td>
<td>20.4</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>1,700</td>
<td>102.0</td>
</tr>
<tr>
<td></td>
<td>240</td>
<td>7,200</td>
<td>204.0</td>
</tr>
</tbody>
</table>

*AC coils, ±15%
Stock Items – The following items are normally maintained in stock for immediate delivery.

No items in this series are stocked.

Outline Dimensions

Wiring Diagrams

3 Form C

KUP93 Sockets

Socket PC Board Layout (Component Side of Board)

KUP93 Socket Number

**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 @ 25°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:
UL/CSA @ 25°C
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).

VDE @ 35°C
RM 3/6: 2 Form C (DPDT).
RM 5/7: 2 Form A (DPST-NO) and 3 Form A (3PST-NO).
RM 8: 2 Form C (DPDT).

Initial Dielectric Strength
Between Open Contacts: 1,500VAC (RM 5/6 2,500VAC).
Between Coil and Contacts: 2,500VAC.
Creepage/Clearance coil-contact: 6/3.5mm (RM 8 4/2.8).

DC Coil Data @ 25°C

<table>
<thead>
<tr>
<th>Nominal Voltage VDC</th>
<th>Operate DC Voltage VDC</th>
<th>Drop-out DC Voltage VDC</th>
<th>DC Resistance in Ohms @ ±10%</th>
<th>DC Resistance in Ohms @ ±10%</th>
<th>Nominal Coil Current (mA)</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM 2/3/7: 2 Form C (DPDT)</td>
<td>4.5</td>
<td>0.9</td>
<td>32</td>
<td>24</td>
<td>187.5</td>
<td>250.0</td>
</tr>
<tr>
<td>RM 5/6: 2 Form A (DPST-NO)</td>
<td>9.0</td>
<td>1.8</td>
<td>110</td>
<td>86</td>
<td>109.1</td>
<td>139.5</td>
</tr>
<tr>
<td>RM 8: 2 Form C (DPDT)</td>
<td>18.0</td>
<td>3.6</td>
<td>475</td>
<td>345</td>
<td>50.5</td>
<td>69.6</td>
</tr>
<tr>
<td>RM 2/3/7: 2 Form C (DPDT)</td>
<td>36</td>
<td>7.2</td>
<td>2,000</td>
<td>1,340</td>
<td>24.0</td>
<td>35.8</td>
</tr>
<tr>
<td>RM 5/6: 2 Form A (DPST-NO)</td>
<td>45</td>
<td>9.0</td>
<td>2,050</td>
<td>2,200</td>
<td>21.1</td>
<td>27.3</td>
</tr>
<tr>
<td>RM 8: 2 Form C (DPDT)</td>
<td>82.5</td>
<td>16.5</td>
<td>10,000</td>
<td>7,300</td>
<td>11.0</td>
<td>15.1</td>
</tr>
<tr>
<td>RM 2/3/7: 2 Form C (DPDT)</td>
<td>165</td>
<td>33</td>
<td>40,000</td>
<td>30,000</td>
<td>5.5</td>
<td>7.3</td>
</tr>
</tbody>
</table>

AC Coil Data @ 25°C

<table>
<thead>
<tr>
<th>Nominal Voltage VAC</th>
<th>Operate AC Voltage VAC</th>
<th>Drop-out AC Voltage VAC</th>
<th>DC Resistance in Ohms @ ±10%</th>
<th>DC Resistance in Ohms @ ±10%</th>
<th>Nominal Coil Current (mA)</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM 2/3/7: 2 Form C (DPDT)</td>
<td>4.8</td>
<td>2.4</td>
<td>5.3</td>
<td>4.7</td>
<td>381.7</td>
<td>476.7</td>
</tr>
<tr>
<td>RM 5/6: 2 Form A (DPST-NO)</td>
<td>9.6</td>
<td>4.8</td>
<td>24.0</td>
<td>19.5</td>
<td>182.5</td>
<td>225.8</td>
</tr>
<tr>
<td>RM 8: 2 Form C (DPDT)</td>
<td>19.2</td>
<td>9.6</td>
<td>86.0</td>
<td>80.0</td>
<td>94.2</td>
<td>109.2</td>
</tr>
<tr>
<td>RM 2/3/7: 2 Form C (DPDT)</td>
<td>38.4</td>
<td>19.2</td>
<td>345.0</td>
<td>320.0</td>
<td>47.5</td>
<td>54.2</td>
</tr>
<tr>
<td>RM 5/6: 2 Form A (DPST-NO)</td>
<td>48.0</td>
<td>24.0</td>
<td>544.0</td>
<td>500.0</td>
<td>37.8</td>
<td>43.7</td>
</tr>
<tr>
<td>RM 8: 2 Form C (DPDT)</td>
<td>92.0</td>
<td>46.0</td>
<td>2,000.0</td>
<td>1,850.0</td>
<td>20.6</td>
<td>23.0</td>
</tr>
<tr>
<td>RM 2/3/7: 2 Form C (DPDT)</td>
<td>184.0</td>
<td>92.0</td>
<td>8,300.0</td>
<td>7,500.0</td>
<td>10.1</td>
<td>11.7</td>
</tr>
<tr>
<td>RM 5/6: 2 Form A (DPST-NO)</td>
<td>320.0</td>
<td>160.0</td>
<td>27,500.0</td>
<td>23,500.0</td>
<td>5.8</td>
<td>6.5</td>
</tr>
<tr>
<td>RM 8: 2 Form C (DPDT)</td>
<td>320.0</td>
<td>160.0</td>
<td>27,500.0</td>
<td>23,500.0</td>
<td>5.8</td>
<td>6.5</td>
</tr>
</tbody>
</table>

Operate Data

Must Operate Voltage: see coil data.
Operate Time: Approximate ms
RM 2/3/7: 5/6: 8
Pull-in: 15 15 15
Drop Out: 10 10 10
Bounce: 3 4 3
Switching Rate: 1000 ops/hr max. at rated load.

Environmental Data

Temperature Range:
Operating: -45°C to maximum °C listed below.
RM 2/3/7: 30 to 150 Hz at 5g N/O, 2g N/C
RM 5/6: 30 to 150 Hz at 12g N/O.
RM 8: 30 to 150 Hz at 10g N/O, 5g N/C
Outline Dimensions
RM .187 quick connect terminals

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.398 MAX.</td>
<td>35.50</td>
</tr>
<tr>
<td>.020</td>
<td>.50</td>
</tr>
<tr>
<td>.189</td>
<td>4.80</td>
</tr>
<tr>
<td>.303</td>
<td>7.70</td>
</tr>
<tr>
<td>1.909 MAX.</td>
<td>48.50</td>
</tr>
</tbody>
</table>

RM with PCB terminals

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.516 MAX.</td>
<td>38.50</td>
</tr>
<tr>
<td>2.185 MAX.</td>
<td>55.50</td>
</tr>
<tr>
<td>.187</td>
<td>4.00</td>
</tr>
<tr>
<td>.295</td>
<td>7.50</td>
</tr>
<tr>
<td>2.03</td>
<td>51.60</td>
</tr>
</tbody>
</table>

Wiring Diagrams (Bottom Views)

RM2/8 2 Pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>12</td>
</tr>
<tr>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>32</td>
</tr>
<tr>
<td>(4)</td>
<td></td>
</tr>
</tbody>
</table>

RM3/7 3 Pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>12</td>
</tr>
<tr>
<td>(2)</td>
<td>22</td>
</tr>
<tr>
<td>(3)</td>
<td>32</td>
</tr>
<tr>
<td>(4)</td>
<td></td>
</tr>
</tbody>
</table>

RM5 2 Pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>12</td>
</tr>
<tr>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>32</td>
</tr>
<tr>
<td>(4)</td>
<td></td>
</tr>
</tbody>
</table>

RM6 3 Pole

<table>
<thead>
<tr>
<th>Pin</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>12</td>
</tr>
<tr>
<td>(2)</td>
<td>22</td>
</tr>
<tr>
<td>(3)</td>
<td>32</td>
</tr>
<tr>
<td>(4)</td>
<td></td>
</tr>
</tbody>
</table>

RM Sockets and Accessories

RM78700/701

RM78700 has QC Terminals
RM78701 has Solder Terminals

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.299</td>
<td>32.50</td>
</tr>
<tr>
<td>1.687</td>
<td>42.50</td>
</tr>
<tr>
<td>.866</td>
<td>22.00</td>
</tr>
<tr>
<td>1.398</td>
<td>35.50</td>
</tr>
<tr>
<td>.630</td>
<td>16.00</td>
</tr>
</tbody>
</table>

Hold-Down Spring RM28802

Socket Selection Table

<table>
<thead>
<tr>
<th>Socket</th>
<th>Socket Termination</th>
<th>Hold-Down Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM78700</td>
<td>.187/4.75/QC Terminals</td>
<td>RM28802</td>
</tr>
<tr>
<td>RM78701</td>
<td>Solder Terminals</td>
<td>RM28802</td>
</tr>
<tr>
<td>RM78702</td>
<td>.142(3.61)/PCB Terminals</td>
<td>RM28802</td>
</tr>
<tr>
<td>RM78705</td>
<td>Screw Terminals</td>
<td>RM28802</td>
</tr>
</tbody>
</table>

Hold-Down Spring RM28802

RM78705

16A, 250VAC, Socket with Screw Terminals

Specifications and availability subject to change without notice.
13C4512 Printed in U.S.A. KK/4-99
KRPA, KRP, KA, KR series

5 to 10 Amp
General Purpose Relay

File E29244, E22575, E81558 (KR Hermetic)
File LR15734

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°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°C
(Except KR)

<table>
<thead>
<tr>
<th>Contact Code</th>
<th>Arrangement</th>
<th>Contact Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y (Silver)</td>
<td>1, 2, 3 Poles</td>
<td>5A @ 120VAC, 3A @ 240VAC, 1/10HP @ 120VAC, 1/6HP @ 240VAC</td>
</tr>
<tr>
<td>G &amp; N (Silver-Cad. Oxide)</td>
<td>1, 2, 3 Poles</td>
<td>10A @ 240VAC, 1/2 HP @ 240VAC, 1/3HP @ 120VAC</td>
</tr>
</tbody>
</table>

KR-E (Herm. Sealed)
UL Contact Ratings @ 25°C
Class I, Div. 2, Hazardous Loc.

<table>
<thead>
<tr>
<th>Contact Code</th>
<th>Arrangement</th>
<th>Contact Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y (Silver)</td>
<td>1, 2, 3 Poles</td>
<td>5A @ 120VAC, 3A @ 240VAC, 1/10HP @ 120VAC, 1/6HP @ 240VAC</td>
</tr>
<tr>
<td>G &amp; N (Silver-Cad. Oxide)</td>
<td>1, 2, 3 Poles</td>
<td>10A @ 240VAC, 1/6 HP @ 120VAC</td>
</tr>
</tbody>
</table>

Initial Dielectric Strength
- Between Open Contacts: 500V rms.
- Between All Elements: 1,500V rms.

Coil Data @ 25°C

<table>
<thead>
<tr>
<th>Nominal Power</th>
<th>Maximum Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRP KC 48 1,800 26.6</td>
<td>Enclosed Models - 4VA</td>
</tr>
<tr>
<td>KC 220 Use 110V relay with 10,000Ω 5W Resistor in series</td>
<td></td>
</tr>
<tr>
<td>AC Coils</td>
<td>DC Coils</td>
</tr>
<tr>
<td>6 6 6</td>
<td>188</td>
</tr>
<tr>
<td>12 120 120</td>
<td>100</td>
</tr>
<tr>
<td>24 472 472</td>
<td>51</td>
</tr>
<tr>
<td>98 1,800 1,800</td>
<td>26.6</td>
</tr>
<tr>
<td>110 10,000 10,000</td>
<td>11.5</td>
</tr>
<tr>
<td>220 220 Use 110V relay with 10,000Ω 5W Resistor in series</td>
<td></td>
</tr>
</tbody>
</table>

Operate Data @ 25°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°C to +70°C.
  - DC: -45°C to +85°C.
  - Enclosed Models: AC: -45°C to +55°C.
  - DC: -45°C to +70°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: 1.7 oz. (48.2g) approximately.
KRPA, KRP: 3.0 oz. (85g) approximately.
Stock Items – The following items are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Type</th>
<th>KRPA-5-5</th>
<th>A</th>
<th>Y</th>
<th>-120</th>
</tr>
</thead>
<tbody>
<tr>
<td>KA-5AG-120</td>
<td>KRPA-5AG-120</td>
<td>KRPA-11AG-120</td>
<td>KRPA-14AG-120</td>
<td></td>
</tr>
<tr>
<td>KA-5AY-120</td>
<td>KRPA-5AY-120</td>
<td>KRPA-11AY-120</td>
<td>KRPA-14AY-120</td>
<td></td>
</tr>
<tr>
<td>KA-5DG-6</td>
<td>KRPA-5DG-6</td>
<td>KRPA-11DG-6</td>
<td>KRPA-14DG-6</td>
<td></td>
</tr>
<tr>
<td>KA-5DG-12</td>
<td>KRPA-5DG-12</td>
<td>KRPA-11DG-12</td>
<td>KRPA-14DG-12</td>
<td></td>
</tr>
<tr>
<td>KA-5DG-110</td>
<td>KRPA-5DG-110</td>
<td>KRPA-11DG-110</td>
<td>KRPA-14DG-110</td>
<td></td>
</tr>
<tr>
<td>KA-11AG-120</td>
<td>KRPA-11AG-120</td>
<td>KRPA-14AG-120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KA-11AY-6</td>
<td>KRPA-11AY-6</td>
<td>KRPA-14AY-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KA-11AY-120</td>
<td>KRPA-11AY-120</td>
<td>KRPA-14AY-120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KA-11DG-12</td>
<td>KRPA-11DG-12</td>
<td>KRPA-14DG-12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KA-11DG-24</td>
<td>KRPA-11DG-24</td>
<td>KRPA-14DG-24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KA-11DG-110</td>
<td>KRPA-11DG-110</td>
<td>KRPA-14DG-110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KA-11DG-120</td>
<td>KRPA-11DG-120</td>
<td>KRPA-14DG-120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KA-11DG-125</td>
<td>KRPA-11DG-125</td>
<td>KRPA-14DG-125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KA-14DG-120</td>
<td>KRPA-14DG-120</td>
<td>KRPA-14DG-120</td>
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<tr>
<td>KA-14DG-110</td>
<td>KRPA-14DG-110</td>
<td>KRPA-14DG-110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KR-11AG-120</td>
<td>KRPA-11AG-120</td>
<td>KRPA-14AG-120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KR-11DY-12</td>
<td>KRPA-11DY-12</td>
<td>KRPA-14DY-12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ordering Information:

1. Series:
   - KRPA (Newer version, enclosed)
   - KRP (Older version, enclosed)
   - KR (Hermetically sealed option 'E' only)
   - KA (Open style)

2. Contact Arrangement:
   - 5 = 1 Form C (SPDT)
   - 11 = 2 Form C (DPDT)
   - 14 = 3 Form C (3PDT)

3. Coil Input:
   - A = AC, 50/60 Hz.
   - D = DC

4. Contact Rating and Indicator Lamp Option:

<table>
<thead>
<tr>
<th>TYPE</th>
<th>KRPA</th>
<th>KRP</th>
<th>KR</th>
<th>KA</th>
</tr>
</thead>
</table>

   Leave Blank = Silver, no indicator lamp for hermetically sealed KR (option E below).
   - Y = Silver, no indicator lamp
   - G = Silver-cadmium oxide, no indicator lamp
   - N = Silver-cadmium oxide, with indicator lamp

5. Options:
   - Leave Blank = No options (except KR).
   - E = Hermetically Sealed Option (KR only).

6. Coil Voltage:
   - Up to 240VAC
   - Up to 125VDC

*Indicating Lamp not available on 25-90V coils. Only 120-240VAC and 110VDC models are UL recognized and CSA certified.
**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°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:** 500V rms, 60 Hz. between all elements.

**Coil Data @ 25°C**

See chart on page 105.

**Nominal Power:**
- DC Coils: 1.2W
- AC Coils: 2.0VA

**Initial Insulation Resistance:** 1,000 megohms.

**Operate Data @ 25°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: AC: -45°C to +55°C.
- DC: -45°C to +70°C.

**Mechanical Data**

**Mounting:** Socket mounting.

**Termination:** Octal-type plug.

**Enclosure:** Polycarbonate enclosure with octal-type mounting.

**Weight:** 2 oz. (57g) approximately.

---

**Ordering Information**

**Typical Part No.**

<table>
<thead>
<tr>
<th>KR</th>
<th>P</th>
<th>D</th>
<th>H</th>
<th>-12</th>
</tr>
</thead>
<tbody>
<tr>
<td>KR</td>
<td>P</td>
<td>D</td>
<td>H</td>
<td>-12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1. Basic Series:</th>
<th>KR</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>2. Type:</th>
<th>P = Enclosed</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>3. Contact Arrangement:</th>
<th>3 = 1 Form X (SPST - NO - DM)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>4. Coil Input:</th>
<th>A = AC</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>5. Contact Material &amp; Rating:</th>
<th>H = Silver-cadmium oxide, 1/4&quot; (6.35mm) dia., 20 amps.</th>
</tr>
</thead>
</table>

| 6. Coil Voltage: | To 240VAC, 50/60 Hz. or 110VDC. |

---

**Stock Items**

- KRP-3AH-120
- KRP-3DH-24
- KRP-5AG-120
Outline Dimensions
KA Series

[Diagrams and dimensions for KA Series relays]

KR Series Enclosures
Type “P” Clear Dust Cover
For KRPA and KRP

[Diagrams and dimensions for KR Series enclosures]

Hermetically Sealed Enclosure
(KR only)

[Diagram and dimensions for hermetically sealed enclosure]

Hold-Down Spring
20C176 KRPA & KRP
20C206 KAP and KRP

[Diagram and description for hold-down spring]

Durable stainless steel spring can be moved aside for relay removal or installation. Mounts with same machine screws or rivets that secure socket to chassis. Two .156" (3.96mm) dia. holes required.

Height: 2.125" (53.98mm) max.

Wiring Diagrams (Bottom Views)
KA
KR5
KAP5
KRP5
KRP5
KRPA5
KR11
KAP11
KRP11
KRP11
KRPA11
KR14*
KAP14
KRP14
KRP14
KRPA14
KR3AH

*[The hermetically sealed KR14 has pins 5 and 6 reversed.]

Tolerances on .XX Decimals ± .02 (.5) Unless Otherwise Specified
Tolerances on .XXX Decimals ± .005 (13) Unless Otherwise Specified
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)

Sockets have M3.5 screw terminals which accept up to two #12 AWG wires. Rated 10 amps @ 300VAC and meets UL 94V-0.

Screw Terminal Sockets

27E122
10A, 300VAC
8-pin

27E123
10A, 300VAC
11-pin

Specifications and availability subject to change without notice.

13C5272 Printed in U.S.A. IH/3-00
Environmental Data

Temperature Range:
- Operating: -45°C to +60°C DC coil.
- AC coil: -45°C to +50°C.
- Vibration: 30 to 1,500 Hz. at 5g N/O, 2g N/C.
- Shock: 50g N/O, 10g N/C.

MT series
10 Amp General Purpose Relay

File E38891
File LR 59548
NR 6182

Features
- DPDT or 3PDT contact arrangements.
- AC and DC coils.
- 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°C

Arrangements: 2 Form C (DPDT).
3 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:
- UL/CSA NO/N/C @ 25°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°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: 2,500VAC.
Between Poles: 2,500VAC.
Creepage/Clearance Coil-Contact: 4/2.8mm.

Coil Data @ 25°C

Nominal Coil Power: 1.2W, 2.3VA.

DC Data

<table>
<thead>
<tr>
<th>Nominal Voltage VDC</th>
<th>DC Resistance in Ohms ±10%</th>
<th>Must Operate Voltage VDC</th>
<th>Must Release Voltage VDC</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>06</td>
<td>32</td>
<td>4.5</td>
<td>0.6</td>
<td>187.5</td>
</tr>
<tr>
<td>12</td>
<td>110</td>
<td>9</td>
<td>1.2</td>
<td>109.1</td>
</tr>
<tr>
<td>24</td>
<td>475</td>
<td>18</td>
<td>2.4</td>
<td>50.5</td>
</tr>
<tr>
<td>48</td>
<td>2,000</td>
<td>36</td>
<td>4.8</td>
<td>24.0</td>
</tr>
<tr>
<td>60</td>
<td>2,850</td>
<td>45</td>
<td>6.0</td>
<td>21.1</td>
</tr>
<tr>
<td>110</td>
<td>10,000</td>
<td>82.5</td>
<td>11.5</td>
<td>11.0</td>
</tr>
<tr>
<td>220</td>
<td>40,000</td>
<td>165</td>
<td>22.0</td>
<td>5.5</td>
</tr>
</tbody>
</table>

AC Data

<table>
<thead>
<tr>
<th>Nominal Voltage VAC</th>
<th>DC Resistance in Ohms ±10%</th>
<th>Must Operate Voltage VAC</th>
<th>Must Release Voltage VAC</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>06</td>
<td>5.3</td>
<td>4.8</td>
<td>2.4</td>
<td>381.7</td>
</tr>
<tr>
<td>12</td>
<td>24</td>
<td>9.6</td>
<td>4.8</td>
<td>182.5</td>
</tr>
<tr>
<td>24</td>
<td>86</td>
<td>19.2</td>
<td>9.6</td>
<td>94.2</td>
</tr>
<tr>
<td>48</td>
<td>345</td>
<td>38.4</td>
<td>19.2</td>
<td>47.5</td>
</tr>
<tr>
<td>60</td>
<td>544</td>
<td>48</td>
<td>24</td>
<td>37.8</td>
</tr>
<tr>
<td>115</td>
<td>2,000</td>
<td>92</td>
<td>46</td>
<td>20.6</td>
</tr>
<tr>
<td>220</td>
<td>8,300</td>
<td>184</td>
<td>92</td>
<td>10.1</td>
</tr>
</tbody>
</table>

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°C to +60°C DC coil.
- AC coil: -45°C to +50°C.
- Vibration: 30 to 1,500 Hz. at 5g N/O, 2g N/C.
- Shock: 50g N/O, 10g N/C.

Electrical Life

Max. DC Load Breaking Capacity

Coil Operating Range

A: DC coil.
B: AC coil.
Ordering Information

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>MT</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>012</th>
</tr>
</thead>
</table>

1. Basic Series:
MT = General purpose relay.

2. Contact Arrangement:
2 = 2 Form C (DPDT) 8 pin
3 = 3 Form C (3PDT) 11 pin

3. Contact Material:
2 = Silver Nickel 90/10 with mechanical actuator.
3 = Silver Nickel 90/10, gold plated, with mechanical actuator.
B = 4 amp Silver Nickel 90/10 bifurcated contact with gold plating.

4. Test:
1 = DC coil with test-button.
3 = DC coil with test-button and LED.
6 = AC coil with test-button.
8 = AC coil with test-button and LED.

5. Coil Voltage:
Standard With protection diode Standard With protection diode
006 = 6VDC 0A6 = 6VDC 006 = 6VAC N/A
012 = 12VDC 0B2 = 12VDC 012 = 12VAC N/A
024 = 24VDC 0C4 = 24VDC 024 = 24VAC N/A
048 = 48VDC 0E8 = 48VDC 048 = 48VAC N/A
060 = 60VDC 0G0 = 60VDC 060 = 60VAC N/A
110 = 110VDC 1B0 = 110VDC 110 = 110VAC N/A
220 = 220VDC 2C0 = 220VDC 230 = 230VAC N/A

Stock Items
MT221012 MT226024 MT226230 MT321024 MT326115
MT221024 MT226115 MT321012 MT326024 MT326230

Outline Dimensions

Wiring Diagrams (Bottom Views)

MT Sockets and Accessories

MR78750
10A, 400VAC
11 Pin Socket

MR78755
10A, 400VAC
8 Pin Socket

Mounting Hole Centers

Hold-Down Spring MR28800

Hold-Down Spring MR28800
MT Sockets and Accessories (continued)

Module-capable Sockets

Timing Module Selection Table

<table>
<thead>
<tr>
<th>Module</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTMZ0W00</td>
<td>Delay ON timing module</td>
</tr>
<tr>
<td>MTMF0W00</td>
<td>Multifunction timing module</td>
</tr>
</tbody>
</table>

Timings Module Functional Data

- **Nominal Voltage:** 24 – 240 VAC / VDC
- **Frequency:** 48 – 63 Hz.
- **Precision of Time Setting:** ± 0.5%.
- **Readiness for Repetition:** ≤ 0.5% or 5 ms.
- **Influence of Temperature:** ≤ 0.1%/°C.
- **Time Range Switchable:** 0.05 s – 240 h in 8 ranges.
- **Ambient Temperature:** -25°C to +55°C.

LED and Protection Module Selection Table

<table>
<thead>
<tr>
<th>Module</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTMT00A0</td>
<td>Protection diode 1N4007</td>
</tr>
<tr>
<td>MTMU0524</td>
<td>RC-network 24 – 115 VAC</td>
</tr>
<tr>
<td>MTMU0730</td>
<td>RC-network 230 VAC</td>
</tr>
<tr>
<td>MTML0024</td>
<td>LED 24 VAC / VDC</td>
</tr>
<tr>
<td>MTML0615</td>
<td>LED 115 VAC</td>
</tr>
</tbody>
</table>

Timing Function Diagrams

- **Delay ON**
  - Uₐ
  - R
- **Delay OFF**
  - Uₐ
  - S
  - R
- **Single shot leading edge**
  - Uₐ
  - S
  - R
- **Single shot trailing edge**
  - Uₐ
  - S
  - R
- **Single shot**
  - Uₐ
  - S
  - R
- **Delay ON triggered by signal contact**
  - Uₐ
  - R
- **Flasher starting with pause**
  - Uₐ
  - R
- **Flasher starting with pulse**
  - Uₐ
  - R

Specifications and availability subject to change without notice.

13C4519 Printed in U.S.A. KK/4-99
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.
- All DIN sockets, except 27E1038 and 27E1039, are shipped with two anchor clips for hold down springs. Hold-down springs must be ordered separately. See Relay & Socket Usage Chart beginning on page 112.
- End clips can be used to further stabilize sockets on track.

Location of Socket Dimensions

<table>
<thead>
<tr>
<th>Typical Relay</th>
<th>Base</th>
<th>Socket Part Number</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRPA (DPDT)</td>
<td>8-pin octal-type</td>
<td>27E891</td>
<td>109</td>
</tr>
<tr>
<td>KRPA (3PDT)</td>
<td>11-pin octal-type</td>
<td>27E892</td>
<td>109</td>
</tr>
<tr>
<td>KUP</td>
<td>11-blade square</td>
<td>27E893</td>
<td>102</td>
</tr>
<tr>
<td>KH</td>
<td>14-blade square</td>
<td>27E894</td>
<td>91</td>
</tr>
<tr>
<td>K10</td>
<td>8-blade square</td>
<td>27E895</td>
<td>94</td>
</tr>
<tr>
<td>RKS (code 1)</td>
<td>5-blade square</td>
<td>27E1038</td>
<td>72</td>
</tr>
<tr>
<td>RKS (codes 2, 3 &amp; 5)</td>
<td>8-blade square</td>
<td>27E1039</td>
<td>72</td>
</tr>
</tbody>
</table>

24A110 – DIN Rail Style Mounting Track

24A110 mounting track is designed to accept snap-mount sockets, as well as all other 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 (152mm) centers. Track can be cut to shorter lengths or used end-to-end.

20C317 – Anchor Clip

20C317 steel anchor clip snaps into the body of the socket and is used as an anchor point for relay hold down spring. Two clips are shipped with each socket except 27E1038 and 27E1039.

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.

Ordering Information – Boldface items are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>24A110</td>
<td>DIN rail style extruded aluminum mounting track for DIN or standard sockets.</td>
</tr>
<tr>
<td>20C317</td>
<td>Anchor clip to secure relay hold down spring to socket base.</td>
</tr>
<tr>
<td>24A071</td>
<td>Steel mounting clip with one #6-32 screw 7/16” (11.1mm) long. Use with 40G432 below to make end clip.</td>
</tr>
<tr>
<td>40G432</td>
<td>Plastic insulator. Use with 24A071 above to make end clip.</td>
</tr>
</tbody>
</table>
Track Mounting System – Chart below lists typical applications. See Relay & Socket Usage Chart on following pages for more detail.

<table>
<thead>
<tr>
<th>Socket</th>
<th>Typ. Relay</th>
<th>Component Hold Down Spring</th>
<th>24A110 Track Mounting Hardware</th>
<th>Chassis Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>27E121</td>
<td>KUP</td>
<td>20C314 Hooks into slots below mounting ears. Two hold downs required per socket.</td>
<td>24A071 36” (914cm) strip will mount 19 sockets.</td>
<td>Two suitable screws on 1.7” (43.2mm) centers.</td>
</tr>
<tr>
<td>27E122</td>
<td>KRPA</td>
<td>See Socket Usage Chart.</td>
<td>24A071 36” (914cm) strip will mount 22 sockets.</td>
<td>Two suitable screws on 1.296” (32.92mm) centers.</td>
</tr>
<tr>
<td>27E123</td>
<td>KRPA</td>
<td>See Socket Usage Chart.</td>
<td>24A071 36” (914cm) strip will mount 15 sockets.</td>
<td>Two suitable screw on 1.296” (32.92mm) or 2.96” (52.3mm) centers.</td>
</tr>
<tr>
<td>27E166</td>
<td>KHALI</td>
<td>20C297 Hooks into slots on side of socket body.</td>
<td>24A071 36” (914cm) strip will mount 30 sockets.</td>
<td>Two suitable screws on .94” (23.9mm) centers.</td>
</tr>
<tr>
<td>27E460</td>
<td>R10</td>
<td>20C249 20C250 20C251</td>
<td>40G432 36” (914cm) strip will mount 16 27E460, 12 27E461 or 9 27E462 sockets.</td>
<td>Two 40G432 insulators and two suitable screws on 1.8” (45.7mm), 2.125” (53.98mm) or 2.812” (71.42mm) centers.</td>
</tr>
<tr>
<td>27E461</td>
<td>K10</td>
<td>20C297</td>
<td>24A071 24A072 36” (914cm) strip will mount 31 sockets. 24A072 can be used on small ear only.</td>
<td>Two suitable screws on 1.143” (29.03mm) centers.</td>
</tr>
<tr>
<td>27E462</td>
<td>KUP (4PDT)</td>
<td>20C254</td>
<td>24A071 40G432 36” (914cm) strip will mount 13 sockets.</td>
<td>Two 40G432 insulators and two suitable screws on 2.25” (57.15mm) centers.</td>
</tr>
</tbody>
</table>
## Relay and Socket Usage Chart

<table>
<thead>
<tr>
<th>Relay</th>
<th>Socket Type</th>
<th>Terminal Hold-Down Socket</th>
<th>Hold-Down Spring</th>
<th>Notes</th>
<th>Socket Page</th>
<th>Comments</th>
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<tbody>
<tr>
<td>CB</td>
<td>27E122 Screw</td>
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<td>—</td>
<td>109</td>
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<tr>
<td></td>
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<td>109</td>
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<td>CD</td>
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<td>27E891 Screw</td>
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<tr>
<td>CL-41 &amp; CL-44</td>
<td>27E043 Screw</td>
<td>20C228 or 20C254</td>
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<td>101</td>
<td>20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket.</td>
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<tr>
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<td>27E046 PC</td>
<td>20C228 or 20C254</td>
<td>—</td>
<td>101</td>
<td>20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket.</td>
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<tr>
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<td>27E067 QC &amp; Solder</td>
<td>20C228 or 20C254</td>
<td>—</td>
<td>101</td>
<td>20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket.</td>
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<td>27E043 Solder</td>
<td>20C247</td>
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<td>27E046 PC</td>
<td>20C247</td>
<td>—</td>
<td>101</td>
<td>20C247 held in place by socket hold down screw.</td>
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<tr>
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<td>27E067 QC &amp; Solder</td>
<td>20C247</td>
<td>—</td>
<td>101</td>
<td>20C247 held in place by socket hold down screw.</td>
<td></td>
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<td>CN1</td>
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<td>27E892 Screw</td>
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<td>CNS</td>
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<td></td>
<td>27E891 Screw</td>
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<td>—</td>
<td>109</td>
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<td>27E892 Screw</td>
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<td>CR</td>
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<td>—</td>
<td>—</td>
<td>—</td>
<td>109</td>
<td></td>
</tr>
</tbody>
</table>

### Notes:

**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:** 27E893 cannot be used with KUIP and KUGP series relays.
<table>
<thead>
<tr>
<th>Relay</th>
<th>Socket</th>
<th>Terminal Type</th>
<th>Hold-Down Spring</th>
<th>Notes</th>
<th>Socket Page</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>CU-41 &amp; CU-44</td>
<td>27E043</td>
<td>Solder</td>
<td>20C228 or 20C254</td>
<td>—</td>
<td>101</td>
<td>20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket.</td>
</tr>
<tr>
<td></td>
<td>27E046</td>
<td>PC</td>
<td>20C228 or 20C254</td>
<td>—</td>
<td>101</td>
<td>20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket.</td>
</tr>
<tr>
<td></td>
<td>27E067</td>
<td>QC &amp; Solder</td>
<td>20C228 or 20C254</td>
<td>—</td>
<td>101</td>
<td>20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket.</td>
</tr>
<tr>
<td></td>
<td>27E396</td>
<td>QC &amp; Solder</td>
<td>20C254</td>
<td>—</td>
<td>101</td>
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<tr>
<td></td>
<td>27E400</td>
<td>Solder</td>
<td>20C254</td>
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<td>101</td>
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<tr>
<td></td>
<td>27E121</td>
<td>Screw</td>
<td>20C314</td>
<td>—</td>
<td>102</td>
<td>Use 2 pieces 20C314 per socket.</td>
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<tr>
<td></td>
<td>27E893</td>
<td>Screw</td>
<td>20C318</td>
<td>5</td>
<td>102</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
</tr>
<tr>
<td>CU-51</td>
<td>27E043</td>
<td>Solder</td>
<td>20C247</td>
<td>—</td>
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<td>20C247 held in place by socket hold down screw.</td>
</tr>
<tr>
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<td>27E046</td>
<td>PC</td>
<td>20C247</td>
<td>—</td>
<td>101</td>
<td>20C247 held in place by socket hold down screw.</td>
</tr>
<tr>
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<td>27E067</td>
<td>QC &amp; Solder</td>
<td>20C247</td>
<td>—</td>
<td>101</td>
<td>20C247 held in place by socket hold down screw.</td>
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<tr>
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<td>27E121</td>
<td>Screw</td>
<td>20C314</td>
<td>—</td>
<td>102</td>
<td>Use 2 pieces 20C314 per socket.</td>
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<tr>
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<td>27E396</td>
<td>QC &amp; Solder</td>
<td>20C318</td>
<td>—</td>
<td>102</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
</tr>
<tr>
<td>IAC &amp; IDC</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Refer to page 176 for I/O modules mounting board details.</td>
</tr>
<tr>
<td>IACM &amp; IDCM</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<td>Refer to page 184 for Slim Line I/O modules mounting board details.</td>
</tr>
<tr>
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<td>27E487</td>
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<td>27E488</td>
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<td></td>
<td>27E489</td>
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<td>27E895</td>
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<td>20C297</td>
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<td>94</td>
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</tr>
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<td>KBP</td>
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<td>(11-pin octal)</td>
<td>27E892</td>
<td>Screw</td>
<td>—</td>
<td>—</td>
<td>109</td>
<td>—</td>
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<tr>
<td>KH &amp; KHA</td>
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<td>Solder</td>
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<td>27E894</td>
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<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
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<tr>
<td>KR Sealed</td>
<td>27E122</td>
<td>Screw</td>
<td>—</td>
<td>—</td>
<td>109</td>
<td>—</td>
</tr>
<tr>
<td>(8-pin octal)</td>
<td>27E891</td>
<td>Screw</td>
<td>20C318</td>
<td>5</td>
<td>109</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
</tr>
<tr>
<td>KR Sealed</td>
<td>27E123</td>
<td>Screw</td>
<td>—</td>
<td>—</td>
<td>109</td>
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</tr>
<tr>
<td>(11-pin octal)</td>
<td>27E892</td>
<td>Screw</td>
<td>20C318</td>
<td>5</td>
<td>109</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
</tr>
<tr>
<td>KRP-H</td>
<td>27E122</td>
<td>Screw</td>
<td>—</td>
<td>—</td>
<td>109</td>
<td>—</td>
</tr>
<tr>
<td>(8-pin octal)</td>
<td>27E891</td>
<td>Screw</td>
<td>20C318</td>
<td>5</td>
<td>109</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
</tr>
<tr>
<td>KRP &amp; KRPA</td>
<td>27E122</td>
<td>Screw</td>
<td>—</td>
<td>—</td>
<td>109</td>
<td>—</td>
</tr>
<tr>
<td>(8-pin octal)</td>
<td>27E891</td>
<td>Screw</td>
<td>20C318</td>
<td>5</td>
<td>109</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
</tr>
<tr>
<td>KRP &amp; KRPA</td>
<td>27E123</td>
<td>Screw</td>
<td>—</td>
<td>—</td>
<td>109</td>
<td>—</td>
</tr>
<tr>
<td>(11-pin octal)</td>
<td>27E892</td>
<td>Screw</td>
<td>20C318</td>
<td>5</td>
<td>109</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
</tr>
<tr>
<td>KUEP, KUGP, KUIP, KUMP &amp; KUP</td>
<td>27E043</td>
<td>Solder</td>
<td>20C228 or 20C254</td>
<td>—</td>
<td>101</td>
<td>20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket.</td>
</tr>
<tr>
<td>[1-3 poles with .187” (4.75mm) QC]</td>
<td>27E046</td>
<td>PC</td>
<td>20C228 or 20C254</td>
<td>—</td>
<td>101</td>
<td>20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket.</td>
</tr>
<tr>
<td></td>
<td>27E067</td>
<td>QC &amp; Solder</td>
<td>20C228 or 20C254</td>
<td>—</td>
<td>101</td>
<td>20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket.</td>
</tr>
<tr>
<td></td>
<td>27E121</td>
<td>Screw</td>
<td>20C314</td>
<td>—</td>
<td>102</td>
<td>Use 2 pieces 20C314 per socket.</td>
</tr>
<tr>
<td></td>
<td>27E396</td>
<td>QC &amp; Solder</td>
<td>20C318</td>
<td>5, 6</td>
<td>102</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
</tr>
<tr>
<td>KUL</td>
<td>27E043</td>
<td>Solder</td>
<td>20C247</td>
<td>—</td>
<td>101</td>
<td>20C247 held in place by socket hold down screw.</td>
</tr>
<tr>
<td>[with .187” (4.75mm) QC]</td>
<td>27E046</td>
<td>PC</td>
<td>20C247</td>
<td>—</td>
<td>101</td>
<td>20C247 held in place by socket hold down screw.</td>
</tr>
<tr>
<td></td>
<td>27E067</td>
<td>QC &amp; Solder</td>
<td>20C247</td>
<td>—</td>
<td>101</td>
<td>20C247 held in place by socket hold down screw.</td>
</tr>
<tr>
<td></td>
<td>27E121</td>
<td>Screw</td>
<td>20C314</td>
<td>—</td>
<td>102</td>
<td>Use 2 pieces 20C314 per socket.</td>
</tr>
<tr>
<td></td>
<td>27E396</td>
<td>QC &amp; Solder</td>
<td>20C318</td>
<td>—</td>
<td>102</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
</tr>
<tr>
<td></td>
<td>27E893</td>
<td>Screw</td>
<td>20C318</td>
<td>5</td>
<td>102</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
</tr>
</tbody>
</table>

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: 27E893 cannot be used with KUIP and KUGP series relays.  

Relay and Socket Usage Chart continued on next page.
## Relay and Socket Usage Chart

<table>
<thead>
<tr>
<th>Relay</th>
<th>Socket</th>
<th>Terminal Type</th>
<th>Hold-Down Springs</th>
<th>Notes</th>
<th>Socket Page</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KUP (4 pole with .110’’ (2.79mm) QC)</strong></td>
<td>27E415</td>
<td>QC &amp; Solder</td>
<td>20C228 or 20C254</td>
<td>—</td>
<td>101</td>
<td>20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket.</td>
</tr>
<tr>
<td>27E419</td>
<td>PC</td>
<td>20C228 or 20C254</td>
<td>—</td>
<td>—</td>
<td>101</td>
<td>20C228 held in place by socket hold down screw whereas 20C254 snaps onto socket.</td>
</tr>
<tr>
<td><strong>OAC &amp; ODC</strong></td>
<td>27E867</td>
<td>Screw</td>
<td>20C254</td>
<td>4</td>
<td>101</td>
<td>Refer to page 176 for I/O module mounting board details.</td>
</tr>
<tr>
<td><strong>OACM &amp; ODCM</strong></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>Refer to page 184 for Slim Line I/O modules mounting board details.</td>
</tr>
<tr>
<td><strong>R10, R10L &amp; R10S (2 pole)</strong></td>
<td>27E125</td>
<td>Solder</td>
<td>20C249</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding strip.</td>
</tr>
<tr>
<td>27E126</td>
<td>Solder</td>
<td>20C250</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding strip.</td>
<td></td>
</tr>
<tr>
<td>27E162</td>
<td>Solder</td>
<td>20C249</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding strip.</td>
<td></td>
</tr>
<tr>
<td>27E174</td>
<td>Solder</td>
<td>20C250 or 20C259</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding strip.</td>
<td></td>
</tr>
<tr>
<td>27E193</td>
<td>PC Stag.</td>
<td>20C249 or 20C259</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding terminals.</td>
<td></td>
</tr>
<tr>
<td>27E212</td>
<td>PC Stag.</td>
<td>20C249 or 20C259</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding terminals.</td>
<td></td>
</tr>
<tr>
<td>27E342</td>
<td>PC In-Line</td>
<td>20C249 or 20C259</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding terminals.</td>
<td></td>
</tr>
<tr>
<td>27E317</td>
<td>Solder/Bkt. Mt.</td>
<td>20C249</td>
<td>2, 3</td>
<td>87</td>
<td>Tin plated terminals with grounding strip.</td>
<td></td>
</tr>
<tr>
<td>27E460</td>
<td>Screw</td>
<td>20C249 or 20C259</td>
<td>2, 3, 4</td>
<td>87</td>
<td>Tin plated terminals with grounding provision.</td>
<td></td>
</tr>
<tr>
<td><strong>R10, R10L &amp; R10S (4 pole)</strong></td>
<td>27E126</td>
<td>Solder</td>
<td>20C250</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding strip.</td>
</tr>
<tr>
<td>27E163</td>
<td>Solder</td>
<td>20C250</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding strip.</td>
<td></td>
</tr>
<tr>
<td>27E174</td>
<td>PC Stag.</td>
<td>20C250 or 20C259</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding strip.</td>
<td></td>
</tr>
<tr>
<td>27E193</td>
<td>PC Stag.</td>
<td>20C250 or 20C259</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding strip.</td>
<td></td>
</tr>
<tr>
<td>27E212</td>
<td>PC Stag.</td>
<td>20C250 or 20C259</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding strip.</td>
<td></td>
</tr>
<tr>
<td>27E342</td>
<td>PC In-Line</td>
<td>20C250 or 20C259</td>
<td>2, 3</td>
<td>86</td>
<td>Tin plated terminals with grounding terminals.</td>
<td></td>
</tr>
<tr>
<td>27E317</td>
<td>Screw</td>
<td>20C250 or 20C259</td>
<td>2, 3, 4</td>
<td>87</td>
<td>Tin plated terminals with grounding provision.</td>
<td></td>
</tr>
<tr>
<td><strong>R10 &amp; R10 L (6 pole)</strong></td>
<td>27E127</td>
<td>Solder</td>
<td>20C251</td>
<td>3</td>
<td>86</td>
<td>Tin plated terminals with grounding strip.</td>
</tr>
<tr>
<td>27E130</td>
<td>PC Stag.</td>
<td>20C251 or 20C259</td>
<td>3</td>
<td>86</td>
<td>Tin plated terminals with grounding strip.</td>
<td></td>
</tr>
<tr>
<td>27E195</td>
<td>PC Stag.</td>
<td>20C251 or 20C259</td>
<td>3</td>
<td>86</td>
<td>Tin plated terminals with grounding terminal.</td>
<td></td>
</tr>
<tr>
<td>27E330</td>
<td>PC In-Line</td>
<td>20C251 or 20C259</td>
<td>3</td>
<td>86</td>
<td>Tin plated terminals with grounding provision.</td>
<td></td>
</tr>
<tr>
<td>27E342</td>
<td>Screw</td>
<td>20C251 or 20C259</td>
<td>3, 4</td>
<td>87</td>
<td>Tin plated terminals with grounding provision.</td>
<td></td>
</tr>
<tr>
<td><strong>R10-T1 (8-pin octal)</strong></td>
<td>27E922</td>
<td>Screw</td>
<td>20C318</td>
<td>5</td>
<td>109</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
</tr>
<tr>
<td>27E991</td>
<td>Screw</td>
<td>20C318</td>
<td>5</td>
<td>109</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
<td></td>
</tr>
<tr>
<td><strong>R10-T2 (11-pin octal)</strong></td>
<td>27E922</td>
<td>Screw</td>
<td>20C318</td>
<td>5</td>
<td>109</td>
<td>Use 20C317 anchor clip for hold down spring (2 supplied per socket).</td>
</tr>
<tr>
<td><strong>RKA/RKS</strong></td>
<td>27E936</td>
<td>PC</td>
<td>20C330</td>
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<tr>
<td>27E937</td>
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<td>20C330</td>
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<td>72</td>
<td>Use with Codes 2, 3 &amp; 5.</td>
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<tr>
<td>27E1038</td>
<td>Screw</td>
<td>20C330</td>
<td>5</td>
<td>72</td>
<td>Use with Code 1.</td>
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<tr>
<td>27E1039</td>
<td>Screw</td>
<td>20C330</td>
<td>5</td>
<td>72</td>
<td>Use with Codes 2, 3 &amp; 5.</td>
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<tr>
<td><strong>S89R11APP &amp; S89R11DPP (8-pin octal)</strong></td>
<td>27E122</td>
<td>Screw</td>
<td>—</td>
<td>—</td>
<td>109</td>
<td></td>
</tr>
<tr>
<td>27E991</td>
<td>Screw</td>
<td>20C318</td>
<td>5</td>
<td>109</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SDAS-01</strong></td>
<td>27E043</td>
<td>Solder</td>
<td>—</td>
<td>—</td>
<td>101</td>
<td></td>
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<tr>
<td>27E046</td>
<td>PC</td>
<td>—</td>
<td>—</td>
<td>101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27E067</td>
<td>QC &amp; Solder</td>
<td>—</td>
<td>—</td>
<td>101</td>
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<td>27E088</td>
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<tr>
<td>27E121</td>
<td>Screw</td>
<td>20C314</td>
<td>—</td>
<td>101</td>
<td>Use 2 pieces 20C314 per socket.</td>
<td></td>
</tr>
<tr>
<td>27E396</td>
<td>QC &amp; Solder</td>
<td>—</td>
<td>—</td>
<td>101</td>
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<td></td>
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<tr>
<td>27E400</td>
<td>Solder</td>
<td>—</td>
<td>—</td>
<td>101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27E893</td>
<td>Screw</td>
<td>—</td>
<td>5</td>
<td>101</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note 1:** Flange mount sockets pre-assembled on steel mounting plates. Grounding is not recommended for currents of 5amps 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 40G342 insulator or suitable insulator (2 per socket).  
**Note 5:** Snap-mount relay sockets snap onto 24A110 mounting rail without extra hardware.  
**Note 6:** 27E993 cannot be used with KUIP and KUGP series relays.
**KUHP series**

**30 Amp Power Relays**

- File E22575
- File LR15734-123

**Features**
- AC coils 6-277VAC 50/60 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°C**
- Arrangements: 1 Form C (SPDT) and 2 Form C (DPDT).
- Material: Silver or silver-cadmium oxide.
- Expected Mechanical Life: 10 million operations.

**Coil Data**

<table>
<thead>
<tr>
<th>Coil</th>
<th>Nominal Voltage</th>
<th>DC Resistance in Ohms ±10%*</th>
<th>Must Operate Voltage</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Coils</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>32.1</td>
<td>4.5</td>
<td>107</td>
<td>100</td>
</tr>
<tr>
<td>12</td>
<td>120</td>
<td>9.0</td>
<td>51</td>
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</tr>
<tr>
<td>24</td>
<td>472</td>
<td>18.0</td>
<td>28.7</td>
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</tr>
<tr>
<td>48</td>
<td>1,800</td>
<td>36.0</td>
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<td></td>
</tr>
<tr>
<td>110</td>
<td>10,000</td>
<td>82.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC Coils</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4.2</td>
<td>5.1</td>
<td>480</td>
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</tr>
<tr>
<td>12</td>
<td>18</td>
<td>10.2</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>72</td>
<td>20.4</td>
<td>115</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>1,700</td>
<td>102.0</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>240</td>
<td>7,200</td>
<td>204.0</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>277</td>
<td>10,250</td>
<td>235.5</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

*±15% for AC coils.

**Operate Data @ 25°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°C to +70°C.
  - AC Coils: -45°C to +45°C.
- Shock: 15g’s, 11 ms (non-operating).
- Vibration: .065” double amplitude, 10-55 Hz.

**Contact Ratings**

<table>
<thead>
<tr>
<th>Contact Arrangement</th>
<th>UL/CSA Ratings</th>
<th>Expected Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Form C Single Pole</td>
<td>30A @ 120/240VAC</td>
<td>100,000 ops.</td>
</tr>
<tr>
<td>Double Throw</td>
<td>1 HP @ 120VAC, 25A @ 28VDC</td>
<td></td>
</tr>
<tr>
<td>2 Form C Double Pole</td>
<td>20A @ 120/240VAC</td>
<td>100,000 ops.</td>
</tr>
<tr>
<td>Double Throw</td>
<td>3/4 HP @ 120VAC, 20A @ 28VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7A @ 120VAC (Tungsten)*</td>
<td></td>
</tr>
</tbody>
</table>

*NO contacts only.

**Initial Dielectric Strength**
- Between Open Contacts: 1,200V rms.
- Between Adjacent Contacts: 3,750V rms.
- Between Contacts and Coil: 3,750V rms.
- Between Coil and Frame: 2,000V rms.

**Coil Data @ 25°C**
- Voltage: 6-110VDC and 6-277VAC.
- Nominal Power:
  - DC Coils: 1.2 Watts.
  - AC Coils: 2.7VA.
- Duty Cycle: Continuous.
- Initial Insulation Resistance: 100 megohms, min.
- Insulation: Class B, 130°C.

**Ordering Information**

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>KUHP-11 A 5 1 -120</th>
</tr>
</thead>
</table>

1. Basic Series and Type: KUHP = Enclosed 20/30 amp relay.
2. Contact Arrangement and Rating: 1 = 1C (SPDT); 30 amps. 2 = 2C (DPDT); 20 amps.
3. Coil Input: A = AC, 50/60 Hz. D = DC
4. Mountings: 1 = PLAIN CASE 5 = BRACKET MOUNT CASE T = TOP FLANGE CASE
5. Terminals and Contact Materials: 1 = .250” (6.35mm) quick connect/solder; silver-cadmium oxide. 7 = .047” (1.19mm) printed circuit; silver-cadmium oxide.
6. Coil Voltage: AC coils to 277VAC, 50/60 Hz. DC coils to 110VDC.

**Note:** No sockets are available for this relay.

**Stock Items** – The following items are normally maintained in stock for immediate delivery:

- KUHP-5AT1-24
- KUHP-5AT1-120
- KUHP-SD1-24
- KUHP-SD1-120
- KUHP-SDT1-24
- KUHP-SDT1-120
- KUHP-11AS1-24
- KUHP-11AS1-120
- KUHP-11D1-24
- KUHP-11D1-120
- KUHP-11DT1-24
- KUHP-11DT1-120
Outline Dimensions

Plain Case

Top Flange Enclosure

Bracket Mount Case

Terminal Dimensions

Printed Circuit

Wiring Diagrams

PC Board Layouts (Bottom Views)

Specifications and availability subject to change without notice.

Printed in U.S.A. IH/3-00
S86R/S87R series

Low Cost
20 Amp
Industrial Relays

File E22575
File LR15734

Features

- Low cost.
- Contact forms to 2 Form C.
- Applications include spa controls, vending machines, HVAC, and machine tool controls.
- Variety of mounting styles.
- Sensitive coil version.

Contact Data @ 25°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 rms, 60 Hz.

Coil Data

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>Coil Resistance (Ohms)</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>@ 25°C*</td>
</tr>
<tr>
<td>S86R &amp; S87R (AC)</td>
<td>All Models</td>
<td>All Models</td>
</tr>
<tr>
<td>12VAC</td>
<td>8.0</td>
<td>330</td>
</tr>
<tr>
<td>24VAC</td>
<td>32</td>
<td>165</td>
</tr>
<tr>
<td>129VAC</td>
<td>800</td>
<td>33.0</td>
</tr>
<tr>
<td>240VAC</td>
<td>3,200</td>
<td>16.5</td>
</tr>
<tr>
<td>S87R (DC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6VDC</td>
<td>12.5</td>
<td>8</td>
</tr>
<tr>
<td>12VDC</td>
<td>50</td>
<td>32</td>
</tr>
<tr>
<td>24VDC</td>
<td>200</td>
<td>128</td>
</tr>
<tr>
<td>36VDC</td>
<td>450</td>
<td>288</td>
</tr>
<tr>
<td>48VDC</td>
<td>800</td>
<td>512</td>
</tr>
<tr>
<td>72VDC</td>
<td>1,800</td>
<td>1,150</td>
</tr>
<tr>
<td>126VDC</td>
<td>5,425</td>
<td>3,470</td>
</tr>
</tbody>
</table>

*Increase AC current values by 25% for mounting style 2 with single switch.

Operate Data

Must Operate Voltage:
- DC Coils: 75% of nominal voltage @ +25°C.
- AC Coils: 85% of nominal voltage @ +25°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.

Environmental Data

Temperature Range: -10°C to +65°C.
Ordering Information

Typical Part No. ➤ S86R 5 A 1 B 1 D 1 -120

1. Basic Series:
   S86R = Standard relay with AC or DC coil, 20 Amp contacts.
   S87R = Standard relay with AC or DC coil, 20 Amp contacts.

2. Contact Arrangement:
   5 = SPDT       7 = DPSTNO     11 = DPDT

3. Coil Input:
   A = AC (available on S86R and S87R)
   D = DC (available on S87R only)

4. Mounting Style:
   S86:   S87: (See outline dimensions)
   1 = Style 1   2 = Style 2

5. Coil Terminal Style:
   B = .250” (6.35mm) Quick-connect/solder.

6. Coil Terminal Location (S86): Coi Terminal Location (S87):
   1 = Same side as switch terminals.   1 = Located perpendicular to switch terminals.

7. Switch Terminal Style:
   D = .250” (6.35mm) Quick-connect/solder.

8. Switch Terminal Configuration:
   1 = Style 1

9. Coil Voltage:
   AC coils to 240VAC, 50/60 Hz.
   DC coils to 125VDC.

Stock Items – The following items are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>S86</th>
<th>S87</th>
</tr>
</thead>
<tbody>
<tr>
<td>S86R1A1B1D1-120</td>
<td>S87R5A2B1D1-120</td>
<td>S87R5D2B1D1-12</td>
</tr>
<tr>
<td>S86R1A1B1D1-240</td>
<td>S87R5A2B1D1-240</td>
<td>S87R5D2B1D1-24</td>
</tr>
</tbody>
</table>

Outline Dimensions

S86R (2 pole shown) Style 1

Switch Terminal Style

.250” (6.35mm) Quick Connect

Switch Terminal Configuration

Style 1

COM. N.O. N.C.

Specifications and availability subject to change without notice.
13C7867 Printed in U.S.A. IH/3-00
PM series

Heavy Duty
25 Amp Multicontact
AC or DC Power Relay

File E22575 (PM)
File E22575 (PMT)
File 15734

Features
- Contact ratings to 25 amps.
- 8-32 screw or .250 O.C. termination.
- AC and DC coils available.
- 4PDT contact arrangement.
- Plastic and metal covers available.

Contact Data @ 25°C
Arrangements: 4 Form C (4PDT).
Ratings: PM & PMT: 25 amps @ 277VAC, max.; 10 amps @ 28VDC.
1 HP @ 120/240VAC, Single Phase.
Material: Silver-cadmium oxide.
Expected Life: 10 million operations, mechanical; 100,000 operations at rated loads @ 25°C.

Initial Dielectric Strength
Initial Breakdown Voltage: 2,000V rms minimum between all elements and ground.

Coil Data @ 25°C
Voltage: From 6 to 125VDC and 12 to 240VAC, 50/60 Hz.
Nom. Power: DC: 4.4 Watts @ 25°C.
AC: 14VA @ 25°C.
Duty Cycle: Continuous.
Initial Insulation Resistance: 100 megohms, minimum.

Operate Data @ 25°C
Must-Operate Voltage: DC: 75% of nominal voltage @ +25°C.
AC: 85% of nominal voltage @ +25°C.

Environmental Data
Temperature Range: AC: -55°C to +45°C @ nominal coil power.
DC: -55°C to +55°C @ nominal coil power (+75°C available on special order).

Mechanical Data
Mounting: Standard: Three holes; one front key-hole and two rear channel slots for #8-32 screws.
Special: Adaptor plate available for adapting these relays to a chassis pre-drilled for our PRD series relays.
Termination: PM: Heavy-duty screw type with #6-32 BH screw.
PMT: .250" (6.35mm) 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.

DC Coils
Nominal Voltage DC Resis. DC Resis. Nominal Current in Milliamps Nominal Voltage Nominal Current in Milliamps
<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>DC Resis. (In Ohms ±10% @ +25°C)</th>
<th>Nominal Current in Milliamps</th>
<th>Nominal Voltage</th>
<th>DC Resis. (In Ohms ±15% @ +25°C)</th>
</tr>
</thead>
</table>
| 5               | 220                              | Use a 110 volt relay with 2700 to 3300 ohm 5 watt wire wound resistor in series.
| 6               | 8                                | 732                           | 12              | 1.4                             | 1070                          |
| 12              | 33                               | 364                           | 24              | 5.0                             | 540                           |
| 24              | 132                              | 182                           | 48              | 120                             | 120                           |
| 110             | 2760                             | 40                            | 120             | 120                             | 128                           |
| 125             | 3570                             | 35                            | 240             | 587                             | 61                            |
| 220             |                                   |                                |                 |                                  |                                |

Typical Part No. PM Y-17 A Y-120

1. Basic Series: PM
2. Type:
   Leave blank = Open relay with screw terminals.
   T = Open relay with .250" (6.35mm) quick connect terminals.
3. Contact Arrangement:
   17 = 4 Form C (4PDT)
4. Coil Input:
   A = AC
   D = DC
5. Contact Material:
   Y = Silver-cadmium oxide.
6. Coil Voltage:
   To 240VAC or 125VDC (to 220V with resistor).

Stock Items – The following items are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Stock Items</th>
<th>PM-17AY-24</th>
<th>PM-17DY-12</th>
<th>PMT-17DY-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM-17AY-120</td>
<td>PM-17DY-24</td>
<td>PM-17DY-110</td>
<td></td>
</tr>
</tbody>
</table>
Outline Dimensions

PM Plastic Dust Cover 35D203

PM Metal Cover 35D227

Overall Dimensions In Inches (mm)

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>35D203</td>
<td>3.394*</td>
<td>2.500</td>
<td>2.719 MAX.</td>
</tr>
<tr>
<td></td>
<td>(86.21)</td>
<td>(63.50)</td>
<td>(69.06)</td>
</tr>
<tr>
<td>35D227</td>
<td>5.313</td>
<td>3.813</td>
<td>3.813</td>
</tr>
<tr>
<td></td>
<td>(134.95)</td>
<td>(96.85)</td>
<td>(96.85)</td>
</tr>
</tbody>
</table>

*When Mounted On Relay

Specifications and availability subject to change without notice.
**PRD series**

**10 to 50 Amp Heavy Duty AC or DC Power Relay**

- File E22575 (Models With All Screw Terminals)
- File E22575 (All Others)
- File 15734

**Features**
- Contact ratings to 50 amps.
- Magnetic blowouts available for switching DC loads.
- Arrangements to DPDT.
- SPDT auxiliary switch available.
- Replaces PR series.

**Contact Data @ 25°C**

**Arrangements:** Available to 2 Form C (DPDT). See ordering information table.

**Ratings:** See UL contact rating table.

**Material: Silver and silver-cadmium oxide standard.** Other materials available for special applications.

**Expected Life:** 100,000 operations at rated loads @25°C. Contact life increases at reduced loads or with appropriate arc suppression.

**UL/CSA Contact Ratings**

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply</th>
<th>Contact Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRD 1, 3 or 5</td>
<td>AC</td>
<td>25 amps @ 277VAC 1 HP at 120VAC 2 HP at 250VAC 7 amps at 50VDC Res.</td>
</tr>
<tr>
<td></td>
<td>DC</td>
<td>10 amps at 600VAC</td>
</tr>
<tr>
<td></td>
<td>AY</td>
<td>20 amps at 277VAC 1.5 HP at 120VAC 2 HP at 250VAC 7 amps at 50VDC Res.</td>
</tr>
<tr>
<td></td>
<td>DY</td>
<td>10 amp at 600VAC</td>
</tr>
<tr>
<td>PRD 7 or 11</td>
<td>AG</td>
<td>30 amps at 277VAC Res. 1.5 HP at 120VAC 2 HP at 250VAC</td>
</tr>
<tr>
<td></td>
<td>DG</td>
<td>10 amp at 600VAC</td>
</tr>
<tr>
<td>PRD 7 or 11</td>
<td>AY</td>
<td>25 amps at 240VAC 20 amps at 277VAC 1 HP at 120VAC 2 HP at 250VAC 7 amps at 50VDC Res. 10 amp at 600VAC</td>
</tr>
<tr>
<td></td>
<td>DY</td>
<td></td>
</tr>
<tr>
<td>PRD 3,7 or 11</td>
<td>AH</td>
<td>20 amp at 125VDC 1/3 HP at 125VDC</td>
</tr>
<tr>
<td></td>
<td>AJ</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DH</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DJ</td>
<td></td>
</tr>
</tbody>
</table>

**Initial Dielectric Strength**

**Initial Breakdown Voltage:** 2,000V rms minimum between all elements and ground. (2,200V rms on 600V ratings.)

**Coil Data @ 25°C**

**Voltage:** From 6 to 220VDC, and 6 to 480VAC.

**Resistance:** See coil data table.

**Nom. Power: DC coils:** - 2.0 watts @ 25°C.
**AC coils:** - 9.8VA @ 25°C.

**Max Power: DC coils:** - 8.0 watts @ 25°C.

**Duty Cycle:** Continuous.

**Initial Insulation Resistance:** 100 megohms, minimum.

<table>
<thead>
<tr>
<th>Coil Data</th>
<th>Nominal DC Volts</th>
<th>Resistance In Ohms</th>
<th>Nominal DC Current In Milliamps</th>
</tr>
</thead>
<tbody>
<tr>
<td>“DY” and “DG”</td>
<td>6</td>
<td>18</td>
<td>333</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>71</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>288</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>110</td>
<td>6050</td>
<td>18.2</td>
</tr>
<tr>
<td></td>
<td>220</td>
<td>Use 110V relay with approx. 6,000 ohm 5W wire-wound resistor in series.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coil Data</th>
<th>Nominal AC Volts</th>
<th>Resistance In Ohms</th>
<th>Nominal AC Current In Milliamps</th>
</tr>
</thead>
<tbody>
<tr>
<td>“DY” and “DG”</td>
<td>6</td>
<td>18</td>
<td>333</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>71</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>288</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>110</td>
<td>6050</td>
<td>18.2</td>
</tr>
<tr>
<td></td>
<td>220</td>
<td>Use 110V relay with approx. 6,000 ohm 5W wire-wound resistor in series.</td>
<td></td>
</tr>
</tbody>
</table>

**Operate Data @ +25°C**

**Must-Operate Voltage:** DC: 75% of nominal voltage @ 25°C.
AC: 85% of nominal voltage @ 25°C.

**Environmental Data**

**Temperature Range:** AC: -55°C to +45°C.
DC: -55°C to +80°C.

**Mechanical Data**

**Mounting:** Two .187”(4.75mm) diameter holes on 1.875” (47.63mm) centers.

**Termination:** See ordering information tables for various options.

**Enclosure:** Metal dust cover, 35D013, available. Order separately.

**Weight:** 10 oz. (284g) approximately.
### Ordering Information

**Typical Part No.**

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>PRD</th>
<th>A</th>
<th>Y</th>
<th>0</th>
<th>-120</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRD</td>
<td>-7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 1. Type:
- PRD = Open relay.
- PRDA = Open relay with aux. SPDT snap-action switch.

#### 2. Main Contact Arrangement:
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SPST-NO</td>
</tr>
<tr>
<td>3</td>
<td>SPST-NO-DM</td>
</tr>
<tr>
<td>5</td>
<td>SPDT</td>
</tr>
</tbody>
</table>

#### 3. Coil Input:
<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = AC, 50/60 Hz.</td>
<td></td>
</tr>
<tr>
<td>D = DC</td>
<td></td>
</tr>
</tbody>
</table>

#### 4. Main Contact Material:
<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y = .312” (7.92mm) dia. silver.</td>
<td></td>
</tr>
<tr>
<td>G = .312” (7.92mm) dia. silver cad.-oxide.</td>
<td></td>
</tr>
<tr>
<td>H = Silver w/magnetic blow out.</td>
<td></td>
</tr>
<tr>
<td>J = Silver cad.-oxide w/magnetic blow out.</td>
<td></td>
</tr>
<tr>
<td>N = Tungsten stationary &amp; silver cad.-oxide movable. Code 1, 5, 7 &amp; 11 only.</td>
<td></td>
</tr>
</tbody>
</table>

#### 5. Termination:

<table>
<thead>
<tr>
<th>CODE</th>
<th>PRD</th>
<th>PRDA (With Aux. SPDT Snap-Action Switch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>MAIN Screw Term. .250” (6.35mm) QC</td>
<td>Screw Term. .250” (6.35mm) QC</td>
</tr>
<tr>
<td>1</td>
<td>COIL Screw Term. .250” (6.35mm) QC</td>
<td>Screw Term. .250” (6.35mm) QC</td>
</tr>
<tr>
<td>3</td>
<td>AUX. SWITCH Screw Term. .250” (6.35mm) QC</td>
<td>Screw Term. .250” (6.35mm) QC</td>
</tr>
<tr>
<td>A</td>
<td>Screw Term. .250” (6.35mm) QC</td>
<td>Twin .250” (6.35mm) QC</td>
</tr>
<tr>
<td>B</td>
<td>Screw Term. .250” (6.35mm) QC</td>
<td>Screw Term. .250” (6.35mm) QC</td>
</tr>
<tr>
<td>L</td>
<td>Screw Term. .250” (6.35mm) QC</td>
<td>Screw Term. .250” (6.35mm) QC</td>
</tr>
</tbody>
</table>

#### 6. Coil Voltage:
- 6, 12, 24, 110VDC
- 6, 12, 24, 120, 240, 480VAC, 50/60 Hz. Coil voltages are available to 125VDC and 600VAC.

---

**Stock Items – The following items are normally maintained in stock for immediate delivery.**

- PRD-1AY0-24
- PRD-1AY0-120
- PRD-3AY0-24
- PRD-3AY0-120
- PRD-3DY0-24
- PRD-3DY0-120
- PRD-5AY0-24
- PRD-5AY0-120
- PRD-5DY0-24
- PRD-5DY0-120
- PRD-7AG0-120
- PRD-7AY0-24
- PRD-7AY0-120
- PRD-7DY0-120
- PRD-7DY0-12
- PRD-11AG0-24
- PRD-11AG0-120
- PRD-11AG0-240
- PRD-11AG0-480
- PRD-11AH0-120
- PRD-11AY0-24
- PRD-11AY0-120
- PRD-11AY0-240
- PRD-11AY0-480
- PRD-11AH0-24
- PRD-11AY0-120
- PRD-11AY0-480
- PRD-11AH0-120
- PRD-11AY0-12
- PRD-11AY0-24
- PRD-11AY0-110
- PRD-11AH0-24
- PRD-11AH0-120
- PRD-11AH0-240
- PRD-11AH0-110
- PRD-11AH0-240

---

**Ordering Information**

**Typical Part No.**

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>PRD</th>
<th>A</th>
<th>P</th>
<th>4</th>
<th>-120</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRD</td>
<td>-3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 1. Type:
- PRD = Open power relay.

#### 2. Main Contact Arrangement:

- 3 = Form X (SPST-NO-DM)

#### 3. Coil Input:
- A = AC, 50/60 Hz.
- D = DC

#### 4. Main Contact Material:
- P = 50 amp, silver.
- R = 50 amp, silver with magnetic blow out.

#### 5. Termination:
- 4 = Main — boxlug terminals which accept #6-#14 wire.
- Coil — #6-32 screw terminals.

#### 6. Coil Voltage:
- 12, 24, 48, 110, 125VDC
- 24, 120, 240, 277, 480VAC, 50/60 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

35D013 Dust Cover

PRD dust cover has a steel base with knockouts for 0.5” (12.7mm) dia. conduit and a cover fitted with two screws. Fits PRD relays, except with auxiliary contacts. Finished in gray baked enamel.

Mounting:
Three No. 10 holes on 1.875” (47.63mm) x 4.125” (104.77mm) centers.

Specifications and availability subject to change without notice.

13C7730 Printed in U.S.A. IH/3-00
**P25 series**

Definite Purpose Magnetic Contactor
25 Ampere Full Load
30 Ampere Resistive
AC & DC Coils

- **File E22575**
- **File LR15734**
- **No. R 97069**

**Features**
- AC and DC coils.
- For controlling motors, power supplies, heating elements and lighting.
- Dust cover available.
- Auxiliary switch available.

**Contact Data @ 25°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°C, 60 Hz.**

<table>
<thead>
<tr>
<th>Type</th>
<th>Motor Rating in Horsepower</th>
<th>Resistive Rating (Electric Heat) @ 600V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type</td>
<td>@ 120V</td>
</tr>
<tr>
<td></td>
<td>1Ø2P</td>
<td>1.5HP</td>
</tr>
<tr>
<td></td>
<td>3Ø3P</td>
<td>3HP</td>
</tr>
</tbody>
</table>

**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 120VAC, 60 Hz. @ 25°C.

**Material:** Silver.

**Initial Dielectric Strength**

**Initial Breakdown Voltage:** 2,200V rms. minimum between all elements and between all elements and ground.

**Coil Data @ 25°C**

- **Voltage:** From 6 to 240VDC and 24 to 600VAC, 50/60 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.

**Nominal**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Resistance (Ohms ±10% @ 25°C)</th>
<th>Must Operate* Volts</th>
<th>Maximum Operating Volts</th>
<th>Nominal Coil Current (ma) @ Nominal Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>34</td>
<td>9</td>
<td>15</td>
<td>353</td>
</tr>
<tr>
<td>24</td>
<td>133</td>
<td>18</td>
<td>30</td>
<td>180</td>
</tr>
</tbody>
</table>

**AC Voltage Rating**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Nominal</th>
<th>Must Operate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60 Hz.</td>
<td>50 Hz.</td>
</tr>
<tr>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>120</td>
<td>120</td>
<td>110</td>
</tr>
<tr>
<td>240</td>
<td>208/240</td>
<td>208/220</td>
</tr>
</tbody>
</table>

**Operate Data @ 25°C**

**Must-Operate Voltage:** See coil data tables.

**Environmental Data**

**Temperature Range:**
- **AC:** —55°C to +65°C
- **DC:** —55°C to +55°C

Contact sales representative for higher temperature ratings.

**Mechanical Data**

**Mounting:** No. 10 screws on 2.125” (53.98mm) centers or universal mounting bracket.

**Termination:**
- **Contacts:** 8-32 screw for No. 16 to No. 8 wire, dual .250” (6.35mm) quick connect, box lug or captive pressure plate.
- **Coil:** Combination 8-32 screw and .250” (6.35mm) or .187” (4.75mm) quick connect, combination captive pressure plate and .250” (6.35mm) quick connect, or .250” (6.35mm) quick connect.
- **Aux. Switch:** .250” (6.35mm) quick connect, .187” (4.75mm) quick connect.

**Weight:** 14 oz. (397g).
### Stock Items – The following items are normally maintained in stock for immediate delivery.

- P25P42A12P1-120
- P25P42A12P1-240
- P25P42A22P1-120
- P25P42A22P1-240
- P25P42D22P1-12
- P25P42D22P1-24

### Ordering Information

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>P</th>
<th>42</th>
<th>A</th>
<th>1</th>
<th>4</th>
<th>P</th>
<th>1</th>
<th>-240</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Type:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P25 Definite Purpose Contactor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **2. Auxiliary Switch:** |   |   |   |   |   |   |   |      |
| P = No Aux Switch       |   |   |   |   |   |   |   |      |
| C = 1 Form C (SPDT), silver contacts |
| F = 2 Form C (DPDT), silver contacts |
| Double pole contact forms require two switches. |

| **3. Main Contact Arrangement:** |   |   |   |   |   |   |   |      |
| 42 = 3 Form X (3PST-NO-DM)      |   |   |   |   |   |   |   |      |
| 43 = 2 Form X (DPST-NO-DM) & 1 Form Y (SPST-NC-DB) |
| Other contact arrangements are available. |

| **4. Coil Control Input:** |   |   |   |   |   |   |   |      |
| A = Alternating Current, 50/60 Hz. |   |   |   |   |   |   |   |      |
| D = Direct Current |

| **5. Mounting and Installed Accessories:** |   |   |   |   |   |   |   |      |
| 1 = Without Mounting Plate*               |   |   |   |   |   |   |   |      |
| 2 = With Mounting Plate                   |   |   |   |   |   |   |   |      |
| * Order separately any mounting hardware which is to be bulk packed. |

| **6. Main Contact Terminals:** |   |   |   |   |   |   |   |      |
| 2 = 8-32 Screw Terminals               |   |   |   |   |   |   |   |      |
| 3 = Dual .250” (6.35mm) Quick Connect  |   |   |   |   |   |   |   |      |
| 5 = 8-32 Screw with Captive Pressure Plate |

| **7. Auxiliary Contact Terminals:** |   |   |   |   |   |   |   |      |
| P = No Auxiliary Switch                 |   |   |   |   |   |   |   |      |
| D = .250” (6.35mm) Quick Connect       |   |   |   |   |   |   |   |      |

| **8. Coil Terminals:** |   |   |   |   |   |   |   |      |
| 1 = Combination 8-32 Screw Terminal and .250” (6.35mm) Quick Connect |
| 6-32 Screw Terminal available on DC Coils only. |

| **9. Coil Voltage:** |   |   |   |   |   |   |   |      |
| 24, 120 or 240VAC |   |   |   |   |   |   |   |      |
| 12 or 24VDC   |   |   |   |   |   |   |   |      |
| See Coil Data table. |   |   |   |   |   |   |   |      |
### Outline Dimensions

#### P25 With AC Coil

- 2.90 MAX. (73.7)
- 3.35 MAX. (85.1)
- 3.75 MAX. (95.3)
- 4.050 MAX. (102.87)

#### P25 With DC Coil

- 2.50 MAX. (63.5)
- 2.00 MAX. (50.8)
- 1.625 MAX. (41.28)
- 1.875 MAX. (47.63)

#### Mounting Plate Footprint

- .218 ± .01 (5.54 ± .25)
- 2.90 MAX. (73.7)
- 3.35 MAX. (85.1)
- 4.050 MAX. (102.87)

### Contact Terminal Options

#### Code 2

- #8-32 UNF-2A X .375" (9.525mm)
- Binder Terminal Screw 15S334

#### Code 3

- Dual .250" (6.35mm)
- Quick Connect 26A902

#### Code 4

- Box Lug Connector 26A866

#### Code 5

- #8-32 UNF-2A X .500" (12.7mm)
- Screw With Captive Pressure Plate 15S354

Specifications and availability subject to change without notice.

13C7250  Printed in U.S.A.  IH/3-00
**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°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**

<table>
<thead>
<tr>
<th>Type</th>
<th>Motor Rating in Amps, 3Ø3P or 1Ø2P</th>
<th>Resistive Rating @600V</th>
<th>Tungsten Rating @277V</th>
</tr>
</thead>
<tbody>
<tr>
<td>P30</td>
<td>30A</td>
<td>180A</td>
<td>50A</td>
</tr>
<tr>
<td>P40</td>
<td>40A</td>
<td>200A</td>
<td>50A</td>
</tr>
</tbody>
</table>

P30 Electrical Discharge Lamp Control: 40A @ 240V (Delta), 40A @ 600V (Wye).
P40 Electrical Discharge Lamp Control: 50A @ 600V (Wye).

**Operate Data**

**Must-Operate Voltage:** See coil data tables.

**Environmental Data**

**Temperature Range:** –55°C to +65°C.

**Initial Dielectric Strength**

**Initial Breakdown Voltage:** 2,200V rms minimum between all elements and between all elements to ground.

**Coil Data @ 25°C**

**Voltage:** From 12 to 120VDC, and 24 to 277VAC, 50/60 Hz.

**Power:** DC, 75 W; AC, 92VA. Inrush; 12 VA Sealed.

**Duty Cycle:** Continuous.

**Insulation Class:** Class A, standard, Class B available.

**Initial Insulation Resistance:** 100 megohms, minimum.

**Coil Data**

<table>
<thead>
<tr>
<th>Nominal VDC</th>
<th>Resistance (Ohms ± 10% @ 25°C)</th>
<th>Must Operate* Volts</th>
<th>Maximum Operating Volts</th>
<th>Nominal Coil Current (ma) @ Nominal Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>20.8</td>
<td>9</td>
<td>15</td>
<td>577</td>
</tr>
<tr>
<td>24</td>
<td>84</td>
<td>18</td>
<td>30</td>
<td>286</td>
</tr>
<tr>
<td>48</td>
<td>334</td>
<td>36</td>
<td>57</td>
<td>144</td>
</tr>
<tr>
<td>120</td>
<td>2,110</td>
<td>90</td>
<td>144</td>
<td>57</td>
</tr>
</tbody>
</table>

*Applicable for vertical mounting, but not for upside-down mounting.

Note: Coil suppression is recommended for all DC coil units, particularly 120 and 240VDC coils.

**Motor Rating in Amps, 3Ø3P or 1Ø2P Resistive Type Full Load Locked Rotor**

<table>
<thead>
<tr>
<th>Type</th>
<th>Full Load</th>
<th>Locked Rotor</th>
</tr>
</thead>
<tbody>
<tr>
<td>P30</td>
<td>30A</td>
<td>180A</td>
</tr>
<tr>
<td>P40</td>
<td>40A</td>
<td>200A</td>
</tr>
</tbody>
</table>

**Motor Rating in Horsepower**

<table>
<thead>
<tr>
<th>Type</th>
<th>1Ø2P</th>
<th>3Ø3P</th>
<th>1Ø2P</th>
<th>3Ø3P</th>
</tr>
</thead>
<tbody>
<tr>
<td>P30</td>
<td>1.5HP</td>
<td>3HP</td>
<td>75HP</td>
<td>15HP</td>
</tr>
<tr>
<td>P40</td>
<td>2HP</td>
<td>5HP</td>
<td>—</td>
<td>10HP</td>
</tr>
</tbody>
</table>

**Auxiliary Snap-Action Switch**

**Arrangements:** Up to 2 Form C (DPDT).

**Rating:** 10 amps at 120-250VAC @ 25°C.

**Material:** Silver.

**P30/P 40 series**

**Definite Pupose Magnetic Contactor**

**30/40 Ampere Full Load**

**40/50 Ampere Resistive**

**AC & DC Coils**

- File E22575
- File LR15734
- P30 No. R 97070
- P40 No. R 97071

**Motor Rating in Horsepower**

<table>
<thead>
<tr>
<th>Type</th>
<th>1Ø2P</th>
<th>3Ø3P</th>
<th>1Ø2P</th>
<th>3Ø3P</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>24</td>
<td>24</td>
<td>110/120</td>
<td>94</td>
</tr>
<tr>
<td>3</td>
<td>240</td>
<td>208/240</td>
<td>177</td>
<td></td>
</tr>
<tr>
<td>277</td>
<td>277</td>
<td>236</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mechanical Data**

**Mounting:** Universal mounting bracket. See outline drawings.

**Termination:**

- **Contacts:** Binder screw, box lug, captive pressure plate, combination screw and dual .250” (6.35mm) quick connect, or combination box lug and dual .250” (6.35mm) quick connect. See Main Contact Terminal Options photo.
- **Coil:** Combination 8-32 screw and .250” (6.35mm) quick connect.
- **Aux. Switch:** .250” (6.35mm) quick connect, .187” (4.75mm) quick connect.

**Weight:**
- 3 Pole Models: 25 oz. (709g) approximately.
- 4 Pole Models: 28 oz. (794g) approximately.
Stock Items – The following items are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>P30</th>
<th>P</th>
<th>42</th>
<th>A</th>
<th>1</th>
<th>4</th>
<th>P</th>
<th>1</th>
<th>-240</th>
</tr>
</thead>
<tbody>
<tr>
<td>P30P42A12P1-120</td>
<td>P30</td>
<td>P</td>
<td>42</td>
<td>A</td>
<td>1</td>
<td>4</td>
<td>P</td>
<td>1</td>
<td>-240</td>
</tr>
<tr>
<td>P30P42D12P1-24</td>
<td>P30</td>
<td>P</td>
<td>42</td>
<td>A</td>
<td>1</td>
<td>4</td>
<td>P</td>
<td>1</td>
<td>-240</td>
</tr>
<tr>
<td>P30P47A12P1-120</td>
<td>P30</td>
<td>P</td>
<td>42</td>
<td>A</td>
<td>1</td>
<td>4</td>
<td>P</td>
<td>1</td>
<td>-240</td>
</tr>
<tr>
<td>P30P47D12P1-24</td>
<td>P30</td>
<td>P</td>
<td>42</td>
<td>A</td>
<td>1</td>
<td>4</td>
<td>P</td>
<td>1</td>
<td>-240</td>
</tr>
</tbody>
</table>

1. **Type:**
   - P30 = Definite Purpose Contactor, 30 amp.
   - P40 = Definite Purpose Contactor, 40 amp.

2. **Auxiliary Switch:**
   - P = No Aux. Switch
   - C = 1 Form C (SPDT)
   - F = 2 Form C (DPDT)

3. **Main Contact Arrangement:**
   - 42 = 3 Form X (3PST-NO-DM)
   - 43 = 2 Form X (DPST-NO-DM)
   - 47 = 4 Form X (4PST-NO-DM)
   - 45 = 1 Form X (SPST-NC-DB)

4. **Coil Control Input:**
   - A = Alternating Current, 50/60 Hz.
   - D = Direct Current

5. **Mounting and Installed Accessories:**
   - 1 = Standard Mounting

6. **Main Contact Terminals:**
   - 2 = Screw Terminals
   - 3 = Screw Terminals & Dual .250” (6.35mm) Quick Connect
   - 4 = Box Lug
   - 5 = Captive Pressure Plate
   - 6 = Box Lug & Dual .250” (6.35mm) Quick Connect

7. **Auxiliary Contact Terminals:**
   - P = No Auxiliary Switch
   - C = .187” (4.75mm) Quick Connect
   - D = .250” (6.35mm) Quick Connect

8. **Coil Terminals:**
   - 1 = Combination 8-32* Screw Terminal and .250” (6.35mm) Quick Connect

9. **Coil Voltage:**
   - 24, 120, 240 or 277VAC
   - 12, 24 or 120VDC
Outline Dimensions

3 Pole Models

AC Coil

DC Coil

4 Pole Models

AC Coil

DC Coil

Contact Terminal Options

Code 2

Code 3

Code 4

Code 5

Code 6

Specifications and availability subject to change without notice.

13C7304 Printed in U.S.A. IH/3-00
P31/P41 series
Definite Purpose
Magnetic Contactor
16 to 40 Amp Full Load
20 to 50 Amp Resistive
File E25575, P31 No. R 9071107
File LR15734, P41 No. R 9071106

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 @ 25°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: 2,200V rms minimum between all elements and between all elements to ground.
Expected Life: 200,000 operations at motor load.
500,000 operations, mechanical.

Initial Dielectric Strength
Initial Breakdown Voltage: 2,200V rms minimum between all elements and between all elements and ground.

Main Contact Ratings @ 25°C, 60 Hz. AC (Per Pole)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Resistance (±10%)</th>
<th>Must Operate Voltage</th>
<th>Nominal Coil Current (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFO</td>
<td>12DC</td>
<td>21</td>
<td>9</td>
</tr>
<tr>
<td>DHO</td>
<td>24DC</td>
<td>84</td>
<td>18</td>
</tr>
</tbody>
</table>

*Applicable for vertical or horizontal mounting, but not for upside-down mounting.
Note: Coil suppression is recommended for all units.

Operate Data @ 25°C
Must-Operate Voltage: See Coil Data Table.

Environmental Data
Temperature Range: −55°C to +65°C.

Mechanical Data
Mounting: Universal mounting bracket. See Outline Drawings.
Termination:
Contacts: Dual .250” (6.35mm) quick connect with or without binder head screw or box lug.
Coil: Dual .250” (6.35mm) quick connect.
Weight: 18 oz. (510g) approximately.

Ordering Information

1. Type:
P31 = 3 Pole
P41 = 4 Pole

2. Contact Rating
C = 25 Amp
E = 40 Amp

3. Contact Arrangement:
42 = 3 Form X (3PST-NO-DM)
47 = 4 Form X (4PST-NO-DM) P41 only

4. Coil Input:
D = Direct Current (Direct Operated)

5. Coil Voltage:
FO = 12VDC, with coil cover
HO = 24VDC, with coil cover

6. Coil Terminal Location And Marking (See Terminal Location and Marking Diagram):
1 = Dual .250” (6.35mm) quick connect

7. Contact Terminals (See Contact Terminal Options Diagram):
03 = Dual .250” (6.35mm) quick connect turned up per Figure 03 (25 amps, Max.)
05 = #10-32 binder head screw with dual .250” (6.35mm) quick connect per Figure 05
08 = Aluminum box lug (for #4-#14 copper wire) with dual .250” (6.35mm) quick connect per Figure 08

Stock Items – The following items are normally maintained in stock for immediate delivery.
At present, no models in the P31/P41 series are maintained in stock.
Contact Terminal Options

**Figure 02**

#10-32 UNF-2B Tapped Hole

**Figure 03**

250° (6.35mm) Quick Connect Turned Up

**Figure 05**

#10-32 UNF-2A X .375" (9.525mm) Binder Head Screw

**Figure 06**

#10-32 UNF-2A X .375" (9.525mm) Screw With #12 Binder Head

**Figure 07**

#10-32 UNF-2A X .500" (12.7mm) Screw With Captive Pressure Plate

**Figure 08**

Box Lug Connector
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 @ 25°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: Silver-cadmium oxide.
Expected Life:
- Mechanical: 10 million operations.
- Electrical: 100,000 operations minimum at rated load.

Coil Data @ 25°C

<table>
<thead>
<tr>
<th>Contact Arrangement</th>
<th>Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1,2,3 poles</td>
</tr>
</tbody>
</table>

DC Nominal Voltage: 10A @ 28VDC or 240VAC, 80% PF; 1/4 HP @ 120VAC, 1/3 HP @ 240VAC

Initial Dielectric Strength
- Between Open Contacts: 500V rms.
- Between Adjacent Contacts: 1,500V rms.
- Between Contacts and Coil: 1,500V rms.

Coil Data @ 25°C

<table>
<thead>
<tr>
<th>Duty Cycle: Continuous. (Latch and reset not to be energized simultaneously).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Insulation Resistance: 100 megohms, minimum.</td>
</tr>
<tr>
<td>Initial Breakdown Voltage: 1500V rms, 60 Hz. between all elements.</td>
</tr>
</tbody>
</table>

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.
Ordering Information

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>KUL-11D15S-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Series:</td>
<td>KUL magnetic latching relay</td>
</tr>
<tr>
<td>Contact Arrangement:</td>
<td>5 = 1 Form C (SPDT) 11 = 2 Form C (DPDT) 14 = 3 Form C (3PDT)</td>
</tr>
<tr>
<td>Coil Input:</td>
<td>A = AC  D = DC</td>
</tr>
<tr>
<td>Mounting:</td>
<td>1 = Plain case  5 = Bracket mount case</td>
</tr>
<tr>
<td>Terminal &amp; Contact Materials:</td>
<td>5 = .187” (4.75mm) quick connect/solder; silver-cadmium oxide, 10 amps.</td>
</tr>
<tr>
<td>Number of Coils:</td>
<td>S = Single coil  D = Dual coil (1 &amp; 2 pole models only)</td>
</tr>
<tr>
<td>Coil Voltages:</td>
<td>Single coil—24-240VAC 12-48VDC Dual coil—12-48VDC, 24 or 120VAC (to 2 Form C)</td>
</tr>
</tbody>
</table>

Stock Items – The following items are normally maintained in stock for immediate delivery.


Outline Dimensions

Wiring Diagrams (Bottom Views)

Single Coil Type S
DC Single Coil 1 Form C

AC Coil 1 Form C

Dual Coil Type D
AC or DC Dual Coil 1 Form C

2 Form C

2 Form C

2 Form C

Terminal Dimensions

.187” (4.75mm) Standard

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.
KBP series
10 Amp Dual Coil Latching Relay
File E29244

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°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.

Initial Dielectric Strength
Between Open Contacts: 500V rms.
Between Adjacent Contacts: 1,000V rms.
Between Contacts and Coil: 1,000V rms.

Coil Data

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>Resistance in Ohms ±10% @ 25°C</th>
<th>Nominal Current Milliamperes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Coils</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>52.0</td>
<td>230</td>
</tr>
<tr>
<td>24</td>
<td>230</td>
<td>104</td>
</tr>
<tr>
<td>48</td>
<td>850</td>
<td>56.5</td>
</tr>
<tr>
<td>110</td>
<td>4560</td>
<td>24</td>
</tr>
<tr>
<td>220</td>
<td>Use 110 volt relay with 5000 Ohms, 5 watt resistor in series.</td>
<td></td>
</tr>
</tbody>
</table>

AC Coils

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>Resistance in Ohms ±15% @ 25°C</th>
<th>Nominal Current Milliamperes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 4 Pole Relays</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>42</td>
<td>210</td>
</tr>
<tr>
<td>120</td>
<td>1030</td>
<td>44</td>
</tr>
<tr>
<td>240</td>
<td>4100</td>
<td>22</td>
</tr>
<tr>
<td>For 5 Pole Relays</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>27</td>
<td>325</td>
</tr>
<tr>
<td>120</td>
<td>700</td>
<td>68</td>
</tr>
</tbody>
</table>

Operate Data @ +25°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°C
Operating: -45°C to +85°C.

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. (306g) approximately.

Coil Data @ +25°C
Nominal Power:
DC Coils: 2.7W.
AC Coils: 5.3VA to 4 pole; 78VA to 5 pole.
Maximum Power: DC coils - 4.0W.
Duty Cycle: Intermittent.
Initial Insulation Resistance: 100 megohms.
Ordering Information

1. **Type:**
   - KBP = Enclosed, dual coil latching relay.
   - 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:**
   - A = AC
   - D = DC

4. **Contact Rating:**
   - G = 10 amps @ 120VAC, 80% PF.

5. **Coil Voltage:**
   - 12, 24, 48, 110VDC
   - 24, 120, 240VAC
   - Specify the same latch and release coil voltage for standard KBP relays. Unlike coils available on special order.

**Stock Items** – The following items are normally maintained in stock for immediate delivery.

| KB-17AG-120 | KBP-11AG-120 | KBP-11DG-110 |
| KB-17DG-12 | KBP-11DG-24 | KBP-20AG-120 |

**Outline Dimensions**

**Dust Cover**

**27E928 Socket**

**KB-Open Style**

**Wiring Diagrams (Bottom Views)**

- KBP11
- KBP17
- KBP20

**Note:** Shown with reset coil energized last.
S89R/S90R series

Bistable, Impulse Relay
15 and 20 Amp Industrial Rating
Continuous Coil Rating

File E22575
File LR15734

Features
- Low cost, bistable impulse relay.
- Operates on 75ms 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°C

Ratings: S89R: 15 amps, 1/2 HP, 125/250VAC; 5 amps, 125VAC, tungsten filament lamp load; 1/2 amp, 125VDC; 1/4 amp, 250VDC.

Expected Life: 100,000 operations, mechanical; 50,000 operations at rated loads.

Ratings: S90R:

<table>
<thead>
<tr>
<th>Load</th>
<th>Minimum Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>20A, 120VAC or 7.5A, 277VAC, Tungsten.</td>
<td>10,000 Cycles</td>
</tr>
<tr>
<td>15A, 125VAC or 7A, 277VAC, Fluorescent.</td>
<td>10,000 Cycles</td>
</tr>
<tr>
<td>20A, 277VAC, 75-80% PF.</td>
<td>50,000 Cycles</td>
</tr>
<tr>
<td>1 HP 125VAC, 50/60 Hz.</td>
<td>50,000 Cycles</td>
</tr>
<tr>
<td>2 HP 250VAC, 50/60 Hz.</td>
<td>50,000 Cycles</td>
</tr>
<tr>
<td>12 FLA, 60 LRA, 120VAC.</td>
<td>50,000 Cycles</td>
</tr>
<tr>
<td>8 FLA, 48 LRA, 240VAC.</td>
<td>50,000 Cycles</td>
</tr>
<tr>
<td>Pilot Duty, 360VA, 125/250VAC.</td>
<td>50,000 Cycles</td>
</tr>
</tbody>
</table>

Coil Data @ 25°C

Nominal Power:
- DC Coils: 6.33 Watts @ +25°C.
- AC Coils: 9VA @ +25°C.

Ordering Information

Typical Part No.

1. Basic Series:
   S89R = 15A
   S90R = 20A

2. Contact Arrangement:
   5 = SPDT
   11 = DPDT
   17 = 4PDT

3. Coil Input:
   A = AC
   D = DC

4. Coil Terminal Style:
   A = .187" (4.75mm) Quick connect/solder.
   B = .250" (6.35mm) Quick connect/solder.
   P = Dust cover with octal plug-in base. (S89R only.)

5. Switch Terminal Style:
   C = .187" (4.75mm) Quick connect.*
   D = .250" (6.35mm) Quick connect.*
   P = Dust cover with octal plug-in base.*
   S89R only.

6. Switch Terminal Configuration:
   1 = Style 1 (See outline drawings.)

7. Coil Voltage:
   24, 120, 240VAC
   6, 12, 24VDC

Stock Items – The following items are normally maintained in stock for immediate delivery.

S89R5ABD1-24
S89R11AAC1-24
S89R11ABD1-120
S89R11ADB1-12
S89R11DAC1-24
S89R11DBD1-12
S90R5ABD1-120
S90R11AAC1-120
S90R11APD1-120
S90R11BD1-12
S90R11DBD1-24
S90R11ADB1-120

Environmental Data

Temperature Range: -10°C to +60°C.

Mechanical Data

Weight: 7.75 oz. (241g) approximately.

Insulation: Class B (130°C).
Initial Breakdown Voltage: 1,500V rms, 60 Hz.
Must-Operate Voltage:
- DC Coils: 75% of nominal voltage @ +25°C.
- AC Coils: 85% of nominal voltage @ +25°C.

Coil Data

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>Resistance DC Ohms ±15% @ +25°C</th>
<th>Nominal Current mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VAC</td>
<td>8.7</td>
<td>375</td>
</tr>
<tr>
<td>120VAC</td>
<td>260</td>
<td>75</td>
</tr>
<tr>
<td>240VAC</td>
<td>1004</td>
<td>38</td>
</tr>
<tr>
<td>6VDC</td>
<td>5.8</td>
<td>1035</td>
</tr>
<tr>
<td>12VDC</td>
<td>22.5</td>
<td>533</td>
</tr>
<tr>
<td>24VDC</td>
<td>92</td>
<td>260</td>
</tr>
</tbody>
</table>

Typical Part No.
Switch Terminal Configuration

Style 1

Open Relays

Enclosed Relays

S89 Series

Wiring Diagram

Switch Terminal Style

C = .187" (4.75mm) Quick-connect
D = .250" (6.35mm) Quick-connect

1.86 MAX. (47.2)
2.00 MAX. (50.8)
1.00
24.5
1.000 (25.40)
1.326 ± .006
(33.68 ± .152)

2.42 MAX. (61.5)
1.98 MAX. (50.3)

3.050 MAX. (77.47)
1.844 ± .015
(46.84 ± .381)
203 (5.16)
.078 (1.98)

2.42 MAX. (61.5)

.055 D. (1.40)
.188 (4.79)
.066 D. (1.68)
.065 D. (1.65)

250 (6.35)
3.588 MAX. (91.14)
.56 (14.2)
1.781 MAX. (45.24)

2.406 MAX. (61.11)

S89R
S90R

Specifications and availability subject to change without notice.
13C7890 Printed in U.S.A. IH/3-00
Coil Data
Voltage: 12 VDC.
Resistance: See Coil Data table.
Nom. Power: 0.55 watts @ 23°C coil temp. and rated coil voltage.
Thermal Resistance: 50°C per actual coil watt in still air with no contact load current.
Choice of AgNi 0.15 or AgSnO contacts.

Contact Data
Arrangements: 1 Form A (SPST-NO) and 1 Form C (SPDT) in single relay and dual relay configurations.
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.
Max. Load Current (@ 14VDC Load Voltage):

<table>
<thead>
<tr>
<th>Load</th>
<th>Form A (NO)</th>
<th>Form C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Continuous Current</td>
<td>30A</td>
<td>30A</td>
</tr>
<tr>
<td>Max. Break Current</td>
<td>30A</td>
<td>30A</td>
</tr>
<tr>
<td>Max. Make Current</td>
<td>100A</td>
<td>100A</td>
</tr>
<tr>
<td>AgSnO</td>
<td>40A</td>
<td>40A</td>
</tr>
<tr>
<td>AgNi 0.15</td>
<td>25A</td>
<td>25A</td>
</tr>
</tbody>
</table>

Max. Switching Power: 35-320 watts DC (voltage dependent).
Min. Recommended Current: 0.5 amp @ 12VDC.
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: 500V rms.

Coil Data
Voltage: 12 VDC.
Resistance: See Coil Data table.
Nom. Power: 0.55 watts @ 23°C coil temp. and rated coil voltage.
Thermal Resistance: 50°C per actual coil watt in still air with no contact load current.

Coil Data (at 23°C Coil Temperature)

<table>
<thead>
<tr>
<th>Coil Designator</th>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance ±10% (Ohms)</th>
<th>Must-Operate Voltage (VDC)</th>
<th>Must-Release Voltage (VDC)</th>
<th>Allowable Overdrive (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>@ 23°C @ 105°C</td>
</tr>
<tr>
<td>001</td>
<td>12</td>
<td>254</td>
<td>6.9</td>
<td>1.5</td>
<td>27.2 16.5</td>
</tr>
</tbody>
</table>

Notes
(1) Allowable overdrive is rated at ambient temperature of 23°C and 105°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, carry and break the specified current.
Stock Items - The following items are normally maintained in stock for immediate delivery.

- V23086-C1001-A303
- V23086-C1001-A403
- V23086-C2001-A303
- V23086-C2001-A403

**Ordering Information**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Contact Arrangement</th>
<th>Enclosure</th>
<th>Contact Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>V23086-C1001-A303</td>
<td>1 Form C</td>
<td>Sealed, Plastic Cover</td>
<td>AgNi 0.15</td>
</tr>
<tr>
<td>V23086-C1001-A402</td>
<td>1 Form A</td>
<td>Sealed, Plastic Cover</td>
<td>AgSnO</td>
</tr>
<tr>
<td>V23086-C1001-A403</td>
<td>1 Form C</td>
<td>Sealed, Plastic Cover</td>
<td>AgSnO</td>
</tr>
<tr>
<td>V23086-C2001-A303</td>
<td>Dual Form C</td>
<td>Sealed, Plastic Cover</td>
<td>AgNi 0.15</td>
</tr>
<tr>
<td>V23086-C2001-A403</td>
<td>Dual Form C</td>
<td>Sealed, Plastic Cover</td>
<td>AgSnO</td>
</tr>
</tbody>
</table>

**Outline Dimensions – Single Relay**

- Knock-off-nib
  - The Knock-off-nib may be removed after soldering and washing (for ventilation)
  - .037 ± .008 (0.95 ± 0.2)
  - .508 ± .008 (12.9 ± 0.2)
  - .390 ± .004 (9.9 ± 0.1)
  - .110 ± .008* (2.8 ± 0.2)
  - .016 ± .004 (0.4 ± 0.1)

- Terminals tinned
- .024 ± .006 (0.6 ± 0.2)
- .098 ± .008 (2.5 ± 0.2)
- .301 ± .004 (7.65 ± 0.1)

**Wiring Diagrams – Single Relay (Bottom Views)**

1 Form A
1 Form C

**Suggested PC Board Layout – Single Relay (Bottom View)**

- .087 (2.2)
- .118 ± .002 (3 ± 0.05)
- .067 ± .002 (1.7 ± 0.05)
- .020 ± .008 (0.5 ± 0.2)
- .043 ± .002 (1.1 ± 0.05)
Outline Dimensions – Dual Relay

Knock-off-nibs
The knock-off-nibs may be removed after soldering and washing (for ventilation)

The knock-off-nibs may be removed after soldering and washing (for ventilation)

Specifications and availability subject to change without notice.
13C8570 Printed in U.S.A. IH/4-00

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
Coil Data
Voltage: 12 and 24VDC.
Resistance: See Coil Data table.
Nom. Power: 0.80 watts @ 23°C coil temp. and rated coil voltage.
Thermal Resistance: 50°C per actual coil watt in still 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: 2 milliseconds, typical, with zero volts applied (for unsuppressed relays after having been energized at rated coil voltage.)

Environmental Data
Temperature Range: Storage: -40°C to +155°C.
Operating: -40°C to +105°C.
Shock: 20g, 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.)
10-40 Hz., 1.27mm double amplitude.
40-70 Hz., 5g’s constant.
70-100 Hz., 0.5mm double amplitude.
100-600 Hz., 10g’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 cm, 14VDC coil voltage.
77dBA @ 1 M, 14VDC coil voltage.

Abnormal Operation
Overload Current: 40A, 36 sec.(5)
20A, 10 sec.
150A, 2.5 sec.
24V Jump Start: 24VDC for 5 minutes conducting rated contact current @ 23°C.
Drop Test: Capable of meeting specifications after a 1.0 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°C and 105°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 Temperature 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.

Initial Dielectric Strength
Between Contacts and Coil: 500V rms.

Coil Data
Voltage: 12 and 24VDC.
Resistance: See Coil Data table.
Nom. Power: 0.80 watts @ 23°C coil temp. and rated coil voltage.
Thermal Resistance: 50°C per actual coil watt in still air with no contact load current.

T72M series
20 Amp Miniature PC Board Relay for Automotive Applications

Features
• 20A, 16VDC switching rating.
• 60A inrush at 16VDC.
• 15A continuous contact rating @ 105°C.
• Immersion cleanable plastic case with knock-off nib for ventilation.
• Low profile package has a seated height of only .87” (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°C Ambient, 20-50% RH, 29.5 ± 1.0” 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):

<table>
<thead>
<tr>
<th>Load</th>
<th>Form C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Continuous Current</td>
<td></td>
</tr>
<tr>
<td>Max. Break Current (1)</td>
<td></td>
</tr>
<tr>
<td>Max. Make Current (2)</td>
<td></td>
</tr>
<tr>
<td>AgNi 0.15</td>
<td></td>
</tr>
<tr>
<td>AgSnO</td>
<td></td>
</tr>
</tbody>
</table>

Min. Recommended Current: 0.5 amp @ 12VDC.
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: 500V rms.

Coil Data
Voltage: 12 and 24VDC.
Resistance: See Coil Data table.
Nom. Power: 0.80 watts @ 23°C coil temp. and rated coil voltage.
Thermal Resistance: 50°C per actual coil watt in still air with no contact load current.

Initial Dielectric Strength
Between Contacts and Coil: 500V rms.

Coil Data
<table>
<thead>
<tr>
<th>Coil Designator</th>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance ±10% (Ohms)</th>
<th>Coil Inductance (H) (Ref.)</th>
<th>Must-Operate Voltage (VDC)</th>
<th>Must-Release Voltage (VDC)</th>
<th>Allowable (3) Overdrive (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>12</td>
<td>120</td>
<td>0.9</td>
<td>6.3</td>
<td>1.2</td>
<td>24.6</td>
</tr>
<tr>
<td>24</td>
<td>24</td>
<td>720</td>
<td>3.2</td>
<td>12.6</td>
<td>2.4</td>
<td>49.3</td>
</tr>
</tbody>
</table>

Notes
(1) See Figure 1.
(2) Inrush current for lamp load.
(3) Allowable overdrive is rated at ambient temperature of 23°C and 105°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 Temperature 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.
**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°C per watt
2. Still air
3. Nominal coil resistance
4. Maximum mean coil temperature = 155°C
5. Coil temperature rise due to load
   - = 8°C @ 10 amps
   - = 20°C @ 15 amps
   - = 35.5°C @ 20 amps
6. Curves are based on 800mW at 23°C
7. When full lifetime is at high ambient and high load current, subtract 25°C from maximum allowable ambient temperature.

**Ordering Information**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Contact Arrangement</th>
<th>Enclosure</th>
<th>Contact Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>T72M5D121-*</td>
<td>1 Form C</td>
<td>Sealed, Plastic Cover</td>
<td>AgNi 0.</td>
</tr>
<tr>
<td>T72M5D155-*</td>
<td>1 Form C</td>
<td>Sealed, Plastic Cover</td>
<td>AgSnO</td>
</tr>
</tbody>
</table>

*Standard Coil Voltages: 12 = 12VDC 24 = 24VDC (Consult factory for availability).

**Stock Items - The following items are normally maintained in stock for immediate delivery.**

No items in this series are stocked.

**Outline Dimensions**

Tolerance (unless otherwise noted): 3 decimal: ± .010 (±.254); 2 decimal: ± .015 (±.381).

**Wiring Diagram (Bottom View)**

**Code 5**

1 Form C

**Suggested PC Board Layout (Bottom View)**
**Features**

- 40A continuous contact rating @ 85°C.
- 1 Form A and 1 Form C arrangements.
- PC board terminals.
- Available as open frame or sealed relay.
- 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°C Ambient, 20-50% RH, 29.5 ± 1.0” Hg) unless otherwise noted.

**Contact Data**

- **Arrangements:** 1 Form A (SPST-NO) and 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.
  
  **Max. Switching Voltage:** 75VDC
  
  **Max. Load Current (@ 14VDC Load Voltage):**

<table>
<thead>
<tr>
<th>Load</th>
<th>Form A (NO)</th>
<th>Form C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Continuous Current</td>
<td>45A</td>
<td>45A</td>
</tr>
<tr>
<td>Loaded</td>
<td>45A</td>
<td>45A</td>
</tr>
<tr>
<td>AgNi 0.15</td>
<td>60A</td>
<td>60A</td>
</tr>
<tr>
<td>AgSnO</td>
<td>100A</td>
<td>100A</td>
</tr>
<tr>
<td>180A</td>
<td>180A</td>
<td></td>
</tr>
</tbody>
</table>

**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°C to +155°C.
  
  Operating: -40°C to +125°C
  
- **Shock:** 20g, 11 milliseconds, half sine wave pulse.
- **Vibration:** (For NC contacts, NO contacts are significantly higher.)
  
  10-40 Hz., 1.27mm double amplitude.
  
  40-70 Hz., 5g’s constant.
  
  70-100 Hz., 0.5mm double amplitude.
  
  100-500 Hz., 10g’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 corner of the relay after processing using a 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°C.
- **Drop Test:** Capable of meeting specifications after a 1.0 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°C or 85°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°C Coil Temperature**

<table>
<thead>
<tr>
<th>Designator</th>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance ±10% (Ohms)</th>
<th>Coil Inductance (H) (Ref.)</th>
<th>Must-Operate Voltage (VDC)</th>
<th>Must-Release Voltage (VDC)</th>
<th>Allowable [3] Overdrive (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>12</td>
<td>90</td>
<td>0.6</td>
<td>6.8</td>
<td>1.2</td>
<td>19.6</td>
</tr>
<tr>
<td>H</td>
<td>24</td>
<td>362</td>
<td>2.3</td>
<td>13.9</td>
<td>2.4</td>
<td>39.3</td>
</tr>
</tbody>
</table>
Figure 1 – Limiting Curve for Power Load

Figure 2 – Ambient Temperature vs. Coil Voltage for Continuous Duty

Assumptions:
1. Thermal resistance = 40°C per watt.
2. Still air.
3. Nominal coil resistance.
4. Maximum mean coil temperature = 180°C.
5. Coil temperature rise due to load.
   - = 3.5°C @ 8 amps.
   - = 10°C @ 16 amps.
   - = 20°C @ 24 amps.
   - = 36°C @ 32 amps.
   - = 55°C @ 40 amps.
6. Thermal resistance and power dissipation based on coil resistance at 180°C.
7. Curves are based on 1.6 watts at 23°C.
8. When full lifetime is at high ambient and high load current, subtract 25°C from maximum allowable ambient temperature.
9. Data is for open relays.
10. Subtract 10°C from the maximum allowable ambient temperature for sealed version.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Contact Arrangement</th>
<th>Contact Material</th>
<th>Enclosure</th>
<th>Termination Footprint</th>
</tr>
</thead>
<tbody>
<tr>
<td>VKP-11 42</td>
<td>1 Form A</td>
<td>AgNi 0.15</td>
<td>Open</td>
<td>U.S.A.</td>
</tr>
<tr>
<td>VKP-15 42</td>
<td>1 Form C</td>
<td>AgNi 0.15</td>
<td>Open</td>
<td>U.S.A.</td>
</tr>
<tr>
<td>VKP-11 52</td>
<td>1 Form A</td>
<td>AgSnO</td>
<td>Open</td>
<td>U.S.A.</td>
</tr>
<tr>
<td>VKP-15 52</td>
<td>1 Form C</td>
<td>AgSnO</td>
<td>Open</td>
<td>U.S.A.</td>
</tr>
<tr>
<td>VKP-31 42</td>
<td>1 Form A</td>
<td>AgNi 0.15</td>
<td>Immersion Cleanable Case</td>
<td>U.S.A.</td>
</tr>
<tr>
<td>VKP-35 42</td>
<td>1 Form C</td>
<td>AgNi 0.15</td>
<td>Immersion Cleanable Case</td>
<td>U.S.A.</td>
</tr>
<tr>
<td>VKP-31 52</td>
<td>1 Form A</td>
<td>AgSnO</td>
<td>Immersion Cleanable Case</td>
<td>U.S.A.</td>
</tr>
<tr>
<td>VKP-35 52</td>
<td>1 Form C</td>
<td>AgSnO</td>
<td>Immersion Cleanable Case</td>
<td>U.S.A.</td>
</tr>
</tbody>
</table>

*Standard Coil Voltages:  
F = 12VDC  
H = 24VDC (Consult factory for availability)

Stock Items – The following items are normally maintained in stock for immediate delivery.
No items in this series are stocked.

Note: See page 155 for Wiring Diagrams, Suggested PC Board Layouts and Outline Dimensions.

Safe breaking, arc extinguished (normally open contact) for resistive loads.
New Relay for Flashing Lamp Applications

Features
- 30A flashing lamp rating up to 85°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 according to EIA Standard RS-407-A at standard test conditions (23°C Ambient, 20-50% RH, 29.5 ± 1.0" 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):

<table>
<thead>
<tr>
<th>Standard Current Types</th>
<th>Load</th>
<th>Form A (NO)</th>
<th>Form C</th>
<th>NO</th>
<th>NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steady-State Flushing(1)</td>
<td>Open Frame</td>
<td>15A</td>
<td>15A</td>
<td>5A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sealed Cover</td>
<td>12A</td>
<td>12A</td>
<td>5A</td>
<td></td>
</tr>
<tr>
<td>Alternate Flushing(2)</td>
<td>Open Frame</td>
<td>-</td>
<td>4A</td>
<td></td>
<td>4A</td>
</tr>
<tr>
<td></td>
<td>Sealed Cover</td>
<td>-</td>
<td>4A</td>
<td></td>
<td>4A</td>
</tr>
<tr>
<td>Max. Make Current(3)</td>
<td>120A</td>
<td>120A</td>
<td>30A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Break Current</td>
<td>20A</td>
<td>20A</td>
<td>10A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High Current Types</th>
<th>Load</th>
<th>Form A (NO)</th>
<th>Form C</th>
<th>NO</th>
<th>NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steady-State Flashing</td>
<td>Open Frame</td>
<td>30A</td>
<td>30A</td>
<td>10A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sealed Cover</td>
<td>25A</td>
<td>25A</td>
<td>10A</td>
<td></td>
</tr>
<tr>
<td>Alternate Flushing</td>
<td>Open Frame</td>
<td>-</td>
<td>8A</td>
<td></td>
<td>8A</td>
</tr>
<tr>
<td></td>
<td>Sealed Cover</td>
<td>-</td>
<td>8A</td>
<td></td>
<td>8A</td>
</tr>
<tr>
<td>Max. Make Current(3)</td>
<td>240A</td>
<td>240A</td>
<td>60A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Break Current</td>
<td>30A</td>
<td>30A</td>
<td>20A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

Coil Data (Rated Coil Temperature 23°C) Table

<table>
<thead>
<tr>
<th>Coi Designator</th>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance ±10% (Ohms)</th>
<th>Coil Inductance (H) (Ref.)</th>
<th>Must-Operate Voltage (VDC)</th>
<th>Must-Release Voltage (VDC)</th>
<th>Allowable(4) Overdrive (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>12</td>
<td>90</td>
<td>6.6</td>
<td>6.8</td>
<td>1.2</td>
<td>19.6</td>
</tr>
<tr>
<td>H</td>
<td>24</td>
<td>382</td>
<td>2.3</td>
<td>13.9</td>
<td>2.4</td>
<td>39.3</td>
</tr>
</tbody>
</table>

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 approximately a 50% duty cycle.
(3) Inrush current for lamp load.
(4) Allowable overdrive is rated at ambient temperature for 23°C or 85°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.

VKP series
PC Board Relay

Coil Data (Voltage: 12 and 24VDC)
Voltage: See Coil Data table.
Resistance: See Coil Data table.
Nom. Power: 1.6 watts @ 23°C coil temp. and rated coil voltage.
Thermal Resistance: 15°C per actual coil watt in still 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°C to +155°C.
- Sealed Types: -40°C to +125°C.
Operating: -40°C to 125°C.
Shock: 20g, 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.)
- 10-40 Hz., 1.27mm double amplitude.
- 40-70 Hz., 5g’s constant.
- 70-100 Hz., 0.5mm double amplitude.
- 100-500 Hz., 10g’s constant.

Abnormal Operation
Overload Current: Consult factory.
24V Jump Start: 24VDC for 5 minutes conducting rated contact current @ 23°C.
Drop Test: Capable of meeting specifications after a 1.0 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 approximately a 50% duty cycle.
(3) Inrush current for lamp load.
(4) Allowable overdrive is rated at ambient temperature for 23°C or 85°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.
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 warning 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 (turn signal) system, combined turn signal and hazard warning with normal trailering (test requirements):
- 3 bulb 1.8 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°C, 23°C, and 85°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 amper) 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°C, 23°C, and 85°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.

Ordering Information

Part Number | Contact Arrangement | Contact Material | Enclosure | Load Ratings
--- | --- | --- | --- | ---
VKP-11 32 | 1 Form A | PdCuAgNi 0.15 | Open | Standard Current
VKP-11 62 | 1 Form A | PdCuAgNi 0.15 | Open | Standard Current
VKP-15 62 | 1 Form C | PdCuAgNi 0.15 | Open | High Current
VKP-31 32 | 1 Form A | PdCuAgNi 0.15 | Immersion Cleanable Case | Standard Current
VKP-31 62 | 1 Form A | PdCuAgNi 0.15 | Immersion Cleanable Case | High Current
VKP-35 62 | 1 Form C | PdCuAgNi 0.15 | Immersion Cleanable Case | High Current

*Standard Coil Voltages: F = 12VDC  H = 24VDC (Consult factory for availability)*

Stock Items – The following items are normally maintained in stock for immediate delivery.

No items in this series are stocked.
Coil Data
Voltage: 12VDC.
Resistance: See Coil Data table.
Thermal Resistance: 55°C per actual coil watt in still 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: 2 milliseconds, typical, with zero volts applied (for unsuppressed relays after having been energized at rated coil voltage.)

Environmental Data
Temperature Range: Storage: -40°C to +155°C.
Operating: -40°C to +105°C. (2)
Shock: 20g, 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.)
10-40 Hz., 1.27mm double amplitude.
40-70 Hz., 5g’s constant.
70-100 Hz., 0.5mm double amplitude.
100-500 Hz., 10g’s constant.

Mechanical Data
Termination: Printed circuit terminals.
Enclosure: Immersion cleanable, sealed plastic cover.
Weight: Sealed: 25 gm (0.9 oz.) approximately.
Audible Sound: 95dBA @ 10 cm, 14VDC coil voltage.
77dBA @ 1 M, 14VDC 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°C.
Drop Test: Capable of meeting specifications after a 1.0 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 compatible 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°C and 105°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 (AmbientTemperature vs. Coil Voltage for Continuous Duty.)

Coil Data (Rated Coil Voltage (VDC))
<table>
<thead>
<tr>
<th>Relay Part Number</th>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance ±10% (Ohms)</th>
<th>Coil Inductance (H) (Ref.)</th>
<th>Must-Operate Voltage (VDC)</th>
<th>Must-Release Voltage (VDC)</th>
<th>Nominal Power (Watts)</th>
<th>Allowable Overdrive (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2R-1001</td>
<td>12</td>
<td>150</td>
<td>0.7</td>
<td>6.0</td>
<td>0.9</td>
<td>0.93</td>
<td>24V</td>
</tr>
</tbody>
</table>

Coil Data (Rated Coil Voltage (VDC))
<table>
<thead>
<tr>
<th>Relay Part Number</th>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance ±10% (Ohms)</th>
<th>Coil Inductance (H) (Ref.)</th>
<th>Must-Operate Voltage (VDC)</th>
<th>Must-Release Voltage (VDC)</th>
<th>Nominal Power (Watts)</th>
<th>Allowable Overdrive (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2R-1001</td>
<td>12</td>
<td>150</td>
<td>0.7</td>
<td>6.0</td>
<td>0.9</td>
<td>0.93</td>
<td>24V</td>
</tr>
</tbody>
</table>
Assumptions:
1. Thermal resistance = 55°C per watt
2. Still air
3. Nominal coil resistance (150 Ω)
4. Maximum mean coil temperature = 180°C
5. Coil temperature rise due to load
   - 3°C @ 4 amps
   - 9°C @ 8 amps
   - 19°C @ 12 amps
   - 31°C @ 16 amps
   - 51°C @ 20 amps
6. Thermal resistance and power dissipation based on coil resistance at 180°C
7. Curves are based on 0.96 watts at 23°C
8. When full lifetime is at high ambient and high load current, subtract 25°C from maximum allowable ambient temperature.

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

<table>
<thead>
<tr>
<th>Applied Coil Voltage (% of Rated Nominal)</th>
<th>Maximum Allowable Ambient Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>130</td>
</tr>
<tr>
<td>95</td>
<td>120</td>
</tr>
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<td>100</td>
<td>110</td>
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<td>145</td>
<td>25</td>
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<tr>
<td>150</td>
<td>15</td>
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</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Coil Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2R-1001</td>
<td>150 Ω</td>
</tr>
</tbody>
</table>

Typical Application Schematic

Stock Items - The following items are normally maintained in stock for immediate delivery.
No items in this series are stocked.

Outline Dimensions

<table>
<thead>
<tr>
<th>Tolerance (unless otherwise noted): 3 decimal: ± .010 (± .254); 2 decimal: ± .015 (± .381).</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.46 MAX. (371)</td>
</tr>
<tr>
<td>0.480 (12.2)</td>
</tr>
<tr>
<td>0.632 (16.1)</td>
</tr>
<tr>
<td>0.140 (3.6)</td>
</tr>
</tbody>
</table>

Wiring Diagram (Bottom View)

2 x 1 Form C (H-Bridge)

Suggested PC Board Layout

Specifications and availability subject to change without notice.
13C8270 Printed in U.S.A. IH4-00
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):

<table>
<thead>
<tr>
<th>Load</th>
<th>Form A</th>
<th>Form C</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>20A</td>
<td>20A (2)</td>
</tr>
<tr>
<td>NC</td>
<td>30A</td>
<td>30A</td>
</tr>
</tbody>
</table>

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: 1.5 milliseconds, typical, with zero volts applied (for unsuppressed relays after having been energized at rated coil voltage).

Environmental Data

Temperature Range: Storage: -40°C to +155°C.
Operating: -40°C to +125°C.
Shock: 10g, 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.)
10-40 Hz., 1.27mm double amplitude.
40-70 Hz., 5g’s constant.
70-100 Hz., 0.5mm double amplitude.
100-500 Hz., 10g’s constant.

Mechanical Data

Termination: Quick connect.
Enclosure: Plastic dust cover.
Weight: With QC terminals: 20g (0.7 oz.) approximately.

Notes

(1) See Figure 1.
(2) Inrush current for lamp load.
(3) Allowable overdrive is rated at ambient temperature for 23°C or 85°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 (@ 23°C Coil Temperature)

<table>
<thead>
<tr>
<th>Coil Designator (VDC)</th>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance ±10% (Ohms)</th>
<th>Coil Inductance (H) (Ref.)</th>
<th>Must-Operate Voltage (VDC)</th>
<th>Must-Release Voltage (VDC)</th>
<th>Allowable Overdrive (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>12</td>
<td>90</td>
<td>0.5</td>
<td>72</td>
<td>12</td>
<td>20.4/14.9</td>
</tr>
</tbody>
</table>
Assumptions:
1. Thermal resistance = 50°C per watt
2. Still air
3. Nominal coil resistance
4. Maximum mean coil temperature = 180°C
5. Coil temperature rise due to load
   = 1°C @ 4 amps
   = 4.5°C @ 8 amps
   = 9.5°C @ 12 amps
   = 18°C @ 16 amps
   = 26.5°C @ 20 amps
6. Thermal resistance and power dissipation based on coil resistance at 180°C
7. Curves are based on 1.5 watts at 23°C
8. When full lifetime is at high ambient and high load current, subtract 25°C from maximum allowable ambient temperature.

Optional Coil Suppression
Add suffix -S01 for 680 ohm resistor in parallel with 12VDC coil.

Stock Items – The following items are normally maintained in stock for immediate delivery.
No items in this series are stocked.
Outline Dimensions

Wiring Diagrams (Bottom Views)

1 Form A

1 Form C

RESISTOR IF USED

1 Form A

1 Form C

RESISTOR IF USED

Connector/Terminal Usage Chart - Boldface items are stocked.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal P/N</th>
<th>Required Crimp Terminals (Order Separately)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alternate P/N</td>
<td>Wire AWG</td>
</tr>
<tr>
<td></td>
<td>Form A</td>
<td>Form C</td>
</tr>
<tr>
<td>VCFM-1000</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>VCFM-1002</td>
<td>26A1349A</td>
<td>AMP 60249-1</td>
</tr>
<tr>
<td></td>
<td>26A1349B</td>
<td>AMP 42281-1</td>
</tr>
<tr>
<td></td>
<td>26A1492A</td>
<td>G&amp;H K26313</td>
</tr>
<tr>
<td></td>
<td>26A1492B</td>
<td>G&amp;H K26312</td>
</tr>
</tbody>
</table>

Specifications and availability subject to change without notice.

13C8360 Printed in U.S.A. IH/4-00
VF4 series
40 Amp Relay
With PC Board or Quick Connect Terminals
for Automotive Applications

Features
- 40A continuous contact rating @ 85°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°C Ambient, 20-50% RH, 29.5 ± 1.0” 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.
Max. Switching Voltage: 75VDC(1).
Max. Load Current (@ 14VDC Load Voltage):

<table>
<thead>
<tr>
<th>Load</th>
<th>Form A (NO)</th>
<th>Form C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Continuous Current</td>
<td>60A</td>
<td>60A</td>
</tr>
<tr>
<td>Max. Make Current(2)</td>
<td>120A</td>
<td>120A</td>
</tr>
<tr>
<td>Max. Break Current(1)</td>
<td>60A</td>
<td>60A</td>
</tr>
</tbody>
</table>

Max. Switching Power: 50-500 watts DC (voltage dependent)(1).
Min. Recommended Current: 1 amp @ 12VDC.
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: 5000V rms.

Coil Data
Voltage: 6, 12 and 24VDC.
Resistance: See Coil Data table.
Nom. Power: (@ 23°C coil temp. and rated coil voltage;)
1.6W, unsuppressed.
1.81W, with 680 ohm resistor.
Thermal Resistance: 50°C per actual coil watt in still air with no contact load current.

Coil Data

<table>
<thead>
<tr>
<th>Coil Designator</th>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance ±10% (Ohms)</th>
<th>Coil Inductance (H) (Ref.)</th>
<th>Must-Operate Voltage (VDC)</th>
<th>Must-Release Voltage (VDC)</th>
<th>Allowable Overdrive (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>6</td>
<td>22.5</td>
<td>0.2</td>
<td>3.6</td>
<td>0.6</td>
<td>10.1</td>
</tr>
<tr>
<td>F</td>
<td>12</td>
<td>90</td>
<td>0.8</td>
<td>7.2</td>
<td>1.2</td>
<td>20.2</td>
</tr>
<tr>
<td>H</td>
<td>24</td>
<td>360</td>
<td>2.7</td>
<td>14.4</td>
<td>2.4</td>
<td>40.5</td>
</tr>
</tbody>
</table>

Environmental Data
Temperature Range: Storage: -40°C to +155°C.
Operating: -40°C to +125°C(4).
Shock: 20g, 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.)
10-40 Hz., 1.27mm double amplitude.
40-70 Hz., 5 g’s constant.
70-100 Hz, 0.5mm double amplitude.
100-500 Hz, 10 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 (1.1 oz.) approximately (dust cover model).

Abnormal Operation
Overload Current: Consult factory.
24V Jump Start: 24VDC for 5 minutes conducting rated contact current @ 23°C.
Drop Test: Capable of meeting specifications after a 3.28 foot (1.0 meter) drop onto concrete.
Flammability: UL94V-0 external; 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°C or 85°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.
Safe breaking, arc extinguished (normally open contact) for resistive loads.

**Assumptions:**
1. Thermal resistance = 50°C per watt
2. Still air
3. Nominal coil resistance
4. Maximum mean coil temperature = 180°C
5. Coil temperature rise due to load
   - = 2°C @ 8 amps
   - = 5°C @ 16 amps
   - = 11°C @ 24 amps
   - = 20°C @ 32 amps
   - = 32°C @ 40 amps
6. Thermal resistance and power dissipation based on coil resistance at 180°C
7. Curves are based on 1.6 watts at 23°C
8. When full lifetime is at high ambient and high load current, subtract 25°C from maximum allowable ambient temperature.

**Ordering Information**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Contact Arrangement</th>
<th>Contact Material</th>
<th>Enclosure</th>
<th>Terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF4-11 * 11</td>
<td>1 Form A</td>
<td>AgNi0.15</td>
<td>Dust cover</td>
<td>Quick connect</td>
</tr>
<tr>
<td>VF4-13 * 13</td>
<td>1 Form A</td>
<td>AgNi0.15</td>
<td>Dust cover</td>
<td>Printed circuit</td>
</tr>
<tr>
<td>VF4-11 * 11</td>
<td>1 Form C</td>
<td>AgNi0.15</td>
<td>Dust cover</td>
<td>Printed circuit</td>
</tr>
<tr>
<td>VF4-15 * 11</td>
<td>1 Form C</td>
<td>AgNi0.15</td>
<td>Shrouded dust cover</td>
<td>Quick connect</td>
</tr>
<tr>
<td>VF4-25 * 11</td>
<td>1 Form C</td>
<td>AgNi0.15</td>
<td>Dust cover with bracket</td>
<td>Quick connect</td>
</tr>
<tr>
<td>VF4-45 * 11</td>
<td>1 Form A</td>
<td>AgNi0.15</td>
<td>Dust cover with bracket</td>
<td>Quick connect</td>
</tr>
<tr>
<td>VF4-45 * 11</td>
<td>1 Form C</td>
<td>AgNi0.15</td>
<td>Dust cover with bracket</td>
<td>Quick connect</td>
</tr>
<tr>
<td>VF4-45 * 21</td>
<td>1 Form C</td>
<td>AgSnO</td>
<td>Weatherproof cover</td>
<td>Quick connect</td>
</tr>
<tr>
<td>VF4-51 * 11</td>
<td>1 Form A</td>
<td>AgNi0.15</td>
<td>Shrouded dust cover with bracket</td>
<td>Quick connect</td>
</tr>
<tr>
<td>VF4-55 * 11</td>
<td>1 Form C</td>
<td>AgNi0.15</td>
<td>Shrouded dust cover with bracket</td>
<td>Quick connect</td>
</tr>
<tr>
<td>VF4-61 * 11</td>
<td>1 Form A</td>
<td>AgNi0.15</td>
<td>Weatherproof cover with bracket</td>
<td>Quick connect</td>
</tr>
<tr>
<td>VF4-65 * 11</td>
<td>1 Form C</td>
<td>AgNi0.15</td>
<td>Weatherproof cover with bracket</td>
<td>Quick connect</td>
</tr>
<tr>
<td>VF4-81 * 11</td>
<td>1 Form A</td>
<td>AgNi0.15</td>
<td>Dust cover with molded bracket</td>
<td>Quick connect</td>
</tr>
<tr>
<td>VF4-85 * 11</td>
<td>1 Form C</td>
<td>AgNi0.15</td>
<td>Dust cover with molded bracket</td>
<td>Quick connect</td>
</tr>
</tbody>
</table>

*Standard Coil Voltages: D = 6VDC (Consult factory for availability).
F = 12VDC.
H = 24VDC (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 -C06 for epoxy sealed unit with resistor.
Connectors

Connectors For Use With Quick Connect Terminal VF4-1___ or VF4-4___ and VF4-8___ Relays

Wiring Harness Style Connector (order terminals separately)
VCF4-1001

Connectors For Use With VF4-2___ or VF4-5___ Relays With Shrouded Dust Cover (order terminals separately)
VCF4-1003

PC Board Socket
VCF4-1000

Wiring Harness Style, Bracket Mount Socket (order terminals separately)
(Mount individually or can be interlocked)
VCF4-1002

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 - Boldface items are stocked.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal P/N</th>
<th>Required Crimp Terminals (Order Separately)</th>
<th>Alternate P/N</th>
<th>Wire AWG</th>
<th>Qty. Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Form A</td>
</tr>
<tr>
<td>VCF4-1000</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>VCF4-1001</td>
<td>26A1349A</td>
<td>AMP 60249-1</td>
<td>12-16</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>26A1349B</td>
<td>AMP 42281-1</td>
<td>14-18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VCF4-1002</td>
<td>26A1348A</td>
<td>Packard 1201S964</td>
<td>18-20</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>26A1348B</td>
<td>Packard 1201S865</td>
<td>14-16</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>26A1348C</td>
<td>Packard 12084588</td>
<td>10-12</td>
<td></td>
<td></td>
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</tbody>
</table>

Specifications and availability subject to change without notice.
13C8340 Printed in U.S.A. IH/4-00
VF7series
70 Amp Relay
With PC Board or
Quick Connect Terminals
for Automotive Applications

Features
• 70A continuous contact rating @ 85°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°C Ambient, 20-50% RH, 29.5 ± 1.0” 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).
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°C coil temp. and rated coil voltage):
  • 2.0W, unsuppressed.
  • 2.21W, with 680 ohm resistor.
Thermal Resistance: 50°C per actual coil watt in still air with no contact load current.

Coil Data (@ 23°C Coil Temperature)

<table>
<thead>
<tr>
<th>Coil Designator</th>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance ±10% (Ohms)</th>
<th>Coil Inductance (H) (Ref)</th>
<th>Must-Operate Voltage (VDC)</th>
<th>Must-Release Voltage (VDC)</th>
<th>Allowable Overdrive (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>12</td>
<td>72</td>
<td>0.5</td>
<td>7.2</td>
<td>1.2</td>
<td>18.1</td>
</tr>
<tr>
<td>H</td>
<td>24</td>
<td>288</td>
<td>2.0</td>
<td>14.4</td>
<td>2.4</td>
<td>36.2</td>
</tr>
</tbody>
</table>

Notes
(1) See Figure 1.
(2) Inrush current for lamp load.
(3) Allowable overdrive is rated at ambient temperature for 23°C or 85°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, carry and break the specified current.

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°C to +155°C.
Operating: -40°C to +125°C (4).
Shock: 20g, 11 milliseconds, half sine wave pulse.
Vibration: (For NC contacts, NO contacts are significantly higher.)
  • 10-40 Hz., 1.27mm double amplitude.
  • 40-70 Hz., 5g’s constant.
  • 70-100 Hz., 0.5mm double amplitude.
  • 100-500 Hz., 10g’s constant.

Mechanical Data
Termination: 0.250” and 0.375” 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 (1.1 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°C.
Drop Test: Capable of meeting specifications after a 1.0 meter drop onto concrete. (Sealed model only.)
Flammability: UL94-HB or better (meets FMVSS 302).
Assumptions:
1. Thermal resistance = 50°C per watt
2. Still air
3. Nominal coil resistance
4. Maximum mean coil temperature = 180°C
5. Coil temperature rise due to load
   - 2°C @ 14 amps
   - 4°C @ 28 amps
   - 7°C @ 42 amps
   - 12°C @ 56 amps
   - 22°C @ 70 amps
6. Thermal resistance and power dissipation based on coil resistance at 180°C
7. Curves are based on 2.0 watts at 23°C
8. When full lifetime is at high ambient and high load current, subtract 25°C from maximum allowable ambient temperature.

Safe breaking, arc extinguished (normally open contact) for resistive loads.

Figure 1 - Limiting Curve for Power Load

Figure 2 - Ambient Temperature vs. Coil Voltage for Continuous Duty

Assumptions:
1. Thermal resistance = 50°C per watt
2. Still air
3. Nominal coil resistance
4. Maximum mean coil temperature = 180°C
5. Coil temperature rise due to load
   - 2°C @ 14 amps
   - 4°C @ 28 amps
   - 7°C @ 42 amps
   - 12°C @ 56 amps
   - 22°C @ 70 amps
6. Thermal resistance and power dissipation based on coil resistance at 180°C
7. Curves are based on 2.0 watts at 23°C
8. When full lifetime is at high ambient and high load current, subtract 25°C from maximum allowable ambient temperature.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Contact Arrangement</th>
<th>Enclosure</th>
<th>Terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF7-11F11</td>
<td>1 Form A</td>
<td>Dust cover</td>
<td>Quick connect</td>
</tr>
<tr>
<td>VF7-11F12</td>
<td>1 Form A</td>
<td>Dust cover with bracket</td>
<td>Printed circuit (clinch)</td>
</tr>
<tr>
<td>VF7-41F11</td>
<td>1 Form A</td>
<td></td>
<td>Quick connect</td>
</tr>
</tbody>
</table>

*Standard Coil Voltages: F = 12VDC
H = 24VDC (Consult factory for availability)

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.

Stock Items - The following items are normally maintained in stock for immediate delivery.
VF7-11F11
VF7-11F12
VF7-41F11
Connector

Wiring Harness Style Connector For Use With Quick Connect VF7 Relays
(order terminals separately)
VCF7-1000

Connector/Terminal Usage Chart - Boldface items are stocked.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Terminal P/N</th>
<th>Required Crimp Terminals (Order Separately)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCF7-1000</td>
<td>26A 1350A</td>
<td>AMP 280756-4 10-12 2 (Contacts)</td>
</tr>
<tr>
<td></td>
<td>26A 1350B</td>
<td>AMP 280755-4 6-10 2 (Contacts)</td>
</tr>
<tr>
<td></td>
<td>26A 1349B</td>
<td>AMP 42281-1 14-18 2 (Coil)</td>
</tr>
</tbody>
</table>

Note: For information on crimping tools, please consult local representative or factory.
VTF series
Flashter Modules for Automotive Applications

Safety Standards:
U.S.A.:
- SAE J 590 (turn signal)
- SAE J 945 (hazard warning)
- SAE J 2068 (turn signal/hazard warning)
- FMVSS 108 (all)
European:
- Designed to meet ECO guideline 76/756 requirements.

Features
- Combination turn signal and hazard warning signal flasher.(1)
- Meets all applicable U.S.A. safety standards.
- Stable electronic timing.
- VKP relay with PdCu contact for output.
- Fits ISO 7688 socket.
- Wide operating voltage and temperature range.

Conditions
All parametric, environmental and life tests are performed according to EIA Standard RS407-A at standard test conditions (23°C Ambient, 20-50% RH, 29.5 ± 1.0” Hg.) unless otherwise noted.

Environmental Data
Operating Ambient Temperature Range: -40°C to +85°C.
Storage Ambient Temperature Range: -40°C to +125°C.
Shock: 20g, 10 millisecond, half sine wave pulse.
Vibration: 10-40 Hz., 1.27mm double amplitude.
70-100 Hz., 0.5mm double amplitude.
100-500 Hz., 10g’s constant.

Mechanical Data
Termination: 0.250”(6.35mm) quick connect.
Enclosures:
- Dust Cover: Protects relay from dust.
- Cover Retention: 50 pound (220 Newton) minimum.
- Weight: 1.3 oz. (37g) approximately.

Abnormal Operation
Drop Test: Capable of meeting specifications after a 3.28 foot (1.0 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.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Meets the Safety Standard of:</th>
<th>Flasher Type</th>
<th>Turn Signal Mode</th>
<th>Max. Number of Lamps</th>
<th>Lamp Outage Sensing</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTF-11F31</td>
<td>U.S.A.</td>
<td>Turn</td>
<td>5 Lamp System</td>
<td>Hazard</td>
<td>No</td>
</tr>
<tr>
<td>VTF-14F11</td>
<td></td>
<td>Turn/Hazard Warning</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Stock Items – The following items are normally maintained in stock for immediate delivery.
Consult factory for availability.
Figure 1 - Electrical Contact Life vs. Load Power

Wiring Diagram (Bottom View)

Outline Dimensions

Connectors

Sockets

PC Board Socket
VCF4-1000

Wiring Harness Style Connector
(order terminals separately)
VCF4-1001

Wiring Harness Style, Bracket Mount Socket
(order terminals separately)
VCF4-1002

Connector/Terminal Usage Chart - Boldface items are stocked.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Required Crimp Terminals (Order Separately)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCF4-1000</td>
<td>None None N/A 0</td>
</tr>
<tr>
<td>VCF4-1001</td>
<td>26A1349A AMP 60249-1 12-16 3</td>
</tr>
<tr>
<td></td>
<td>26A1349B AMP 42281-1 14-18</td>
</tr>
<tr>
<td></td>
<td>26A1348A Packard 12015864 10-20</td>
</tr>
<tr>
<td></td>
<td>26A1348B Packard 12015865 14-16</td>
</tr>
<tr>
<td></td>
<td>26A1348C Packard 12084588 10-12</td>
</tr>
</tbody>
</table>

Specifications and availability subject to change without notice.
13C8831 Printed in U.S.A. IH/4-00
SSRT series

“Hockey Puck”
Solid State Relay With Snubberless Triac Output

File E29244
File E29244  UL Recognized for Canada

Features
• Standard “hockey puck” package.
• Exposed ceramic base plate for reduced thermal resistance.
• Floating terminal design.
• Low cost snubberless triac outputs.
• 10A & 25A rms versions.
• AC & DC input versions.
• 4000V rms isolation.

Engineering Data
Form: 1 Form A (SPST-NO).
Duty: Continuous.
Isolation: 4000V rms minimum, input - output.
Isolation Resistance: 10^10 ohms @ 500VDC minimum.
Capacitance: 10 pf maximum (input to output).
Temperature Range:
Storage: -40°C to +120°C
Operating Temperature: -25°C to + 80°C
Case Material: Plastic, UL rated 94V-0.
Base Plate Material: Ceramic.
Case and Mounting: Refer to outline dimension.
Termination: Refer to outline dimension.
Approximate Weight: 3.5 oz. (98g).

Ordering Information

<table>
<thead>
<tr>
<th>Sample Part Number</th>
<th>SSRT -240 D 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Basic Series:</td>
<td>SSRT = “hockey puck” triac output solid state relay</td>
</tr>
<tr>
<td>2. Line Voltage:</td>
<td>240 = 24-240 VAC</td>
</tr>
<tr>
<td>3. Input Type &amp; Voltage:</td>
<td>A = 90-280 VAC/VDC linear</td>
</tr>
<tr>
<td></td>
<td>D = 3-32 VDC constant current</td>
</tr>
<tr>
<td>4. Maximum Switcing Rating:</td>
<td>10 = .05-10A rms, mounted to heatsink</td>
</tr>
<tr>
<td></td>
<td>25 = .05-25A rms, mounted to heatsink</td>
</tr>
</tbody>
</table>

Stock Items – The following items are normally maintained in stock for immediate delivery.

SSRT-240A10  SSRT-240D10
SSRT-240A25  SSRT-240D25

Input Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>AC/DC Input/AC Output</th>
<th>DC Input/AC Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Voltage Range $V_{IN}$</td>
<td>90-280VAC/VDC</td>
<td>3-32VDC</td>
</tr>
<tr>
<td>Must Operate Voltage $V_{INOPER}$ (Max.)</td>
<td>90VAC/VDC</td>
<td>3VDC</td>
</tr>
<tr>
<td>Must Release Voltage $V_{INREL}$ (Min.)</td>
<td>10VAC/VDC</td>
<td>1VDC</td>
</tr>
<tr>
<td>Input Current</td>
<td>15mA Max. @ 90VAC</td>
<td>15mA Max. @ 5VDC</td>
</tr>
</tbody>
</table>
Output Specification (@ 25°C, unless otherwise specified)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Voltage Range V_L</td>
<td>V rms</td>
<td>24-240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repetitive Blocking Voltage (Min.)</td>
<td>V peak</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load Current Range I_L -</td>
<td>Resitive</td>
<td>A rms</td>
<td>0.05-10</td>
<td>0.05-25</td>
</tr>
<tr>
<td>Single Cycle Surge Current (Min.)</td>
<td>A peak</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leakage Current (Off-State) (Max.)</td>
<td>f = 60 Hz.</td>
<td>mA rms</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>On-State Voltage Drop (Max.)</td>
<td>I_L = Max.</td>
<td>V peak</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Static dv/dt (Off-State) (Max.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal Resistance, Junction to Case (RθJC) (Max.)</td>
<td>* CW</td>
<td>0.6</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Turn-On Time (Max.)</td>
<td>f = 60 Hz.</td>
<td>ms</td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>Turn-Off Time (Max.)</td>
<td>f = 60 Hz.</td>
<td>ms</td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>f^2 t Rating</td>
<td>t = 8.3 ms</td>
<td>A^2 Sec.</td>
<td>60</td>
<td>260</td>
</tr>
<tr>
<td>Load Power Factor Rating</td>
<td>I_L = Max.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*See Derating Curves

Electrical Characteristics (Thermal Derating Curves)

How To Use These Curves

Knowing maximum load current and maximum ambient temperature, use dereting curves to determine the minimum 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.

Example #1:
Given: IL = 8A rms @ 40°C
Find: Heatsink required
Solution: From 10A curve
    Heatsink = 4°C/W

Example #2:
Given: IL = 20A rms @ 70°C
Find: Required heatsink
Solution: Heatsink = 2°C/W

Heatsink Dimensions

- We recommend that solid State Relay Modules be mounted to a heatsink sufficient to maintain the module’s base temperature at less than 85°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. The mounting screws should be torqued to 10 inch-pounds by alternately tightening the screws one quarter turn at a time.
Load Current vs. Base Temperature

10A Units

Max. Load Current (Amps RMS)

-25 0 25 50 75 100 125
Ceramic Base Temperature (°C)

25A Units

Max. Load Current (Amps RMS)

-25 0 25 50 75 100 125
Ceramic Base Temperature (°C)

Allowable Peak Surge vs. Duration/Expected Lifetime

10A Units

Max. Load Current (A rms)

Number of Equal Amplitude Current Pulses @ 60 Hz.

25A Units

Max. Load Current (A rms)

Number of Equal Amplitude Current Pulses @ 60 Hz.

Operating Diagrams

Outline Dimensions

Specifications and availability subject to change without notice.
13C7778 Printed in U.S.A.
SSR series

“Hockey Puck”
Solid State Relay With
Paired SCR Output

File E29244
File E29244  UL Recognized for Canada

Features
• Standard “hockey puck” package.
• Inverse parallel SCR output.
• 25, 50, & 125A rms versions.
• 120/240VAC & 480VAC output types.
• Zero voltage and random voltage turn-on versions.
• AC & DC input versions.
• 4,000V rms optical isolation.
• Exposed ceramic base plate for reduced thermal impedance.
• Floating terminal design.

Engineering Data
Form: 1 Form A (SPST-NO).
Duty: Continuous.
Isolation: 4,000V rms minimum.
Isolation Resistance: $10^{10}$ ohms @ 500VDC minimum.
Capacitance: 10 pf maximum (input to output).
Temperature Range:
Storage: -40°C to +120°C
Operating: -25°C to +80°C
Case Material: Plastic, UL rated 94V-0.
Base Plate Material: Ceramic.
Case and Mounting: Refer to outline dimension.
Termination: Refer to outline dimension.
Approximate Weight: 3.5 oz. (98g).

Ordering Information

<table>
<thead>
<tr>
<th>Sample Part Number</th>
<th>SSR-240 D</th>
<th>25</th>
</tr>
</thead>
</table>

1. **Basic Series**: SSR = “hockey puck” inverse parallel SCR output solid state relay
2. **Line Voltage**: 240 = 24 - 240VAC
480 = 48 - 480VAC
3. **Input Type & Voltage**:
   A = 90-280VAC/VDC
   D = 3-32VDC on zero voltage turn-on types
   = 3.5-26VDC on random voltage turn-on types
4. **Maximum Switching Rating/Output**: 25 = .06-25A rms, mounted to heatsink
   50 = .06-50A rms, mounted to heatsink
   125 = .06-125A rms, mounted to heatsink
5. **Options**: Leave Blank = Zero voltage turn-on
   R = Random voltage turn-on (phase controllable)

Stock Items – The following items are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSR-240A25</td>
<td>SSR-240A25</td>
</tr>
<tr>
<td>SSR-240A50</td>
<td>SSR-240A50</td>
</tr>
<tr>
<td>SSR-240D25</td>
<td>SSR-240D25</td>
</tr>
<tr>
<td>SSR-240D50</td>
<td>SSR-240D50</td>
</tr>
<tr>
<td>SSR-240D25R</td>
<td>SSR-240D25R</td>
</tr>
<tr>
<td>SSR-480D125</td>
<td>SSR-480D125</td>
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</tbody>
</table>

**Input Specifications**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>AC/DC Input</th>
<th>DC Input</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zero V Turn-on Units</td>
<td>Zero V Turn-on Units</td>
</tr>
<tr>
<td>Control Voltage Range V&lt;sub&gt;IN&lt;/sub&gt;</td>
<td>90-280VAC/VDC</td>
<td>3-32VDC</td>
</tr>
<tr>
<td>Must Operate Voltage V&lt;sub&gt;MIN&lt;/sub&gt;</td>
<td>90VAC/VDC</td>
<td>3VDC</td>
</tr>
<tr>
<td>Must Release Voltage V&lt;sub&gt;REL&lt;/sub&gt;</td>
<td>10VAC/VDC</td>
<td>1VDC</td>
</tr>
<tr>
<td>Input Current (Max.)</td>
<td>15mA @ 90VAC</td>
<td>15mA @ 5VDC</td>
</tr>
</tbody>
</table>
Output Specifications (@ 25°C, unless otherwise specified)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Nom. Line Voltage</th>
<th>Conditions</th>
<th>Units</th>
<th>25A Models</th>
<th>50A Models</th>
<th>125A Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Voltage Range V_L</td>
<td>120/240V Model</td>
<td>V rms</td>
<td></td>
<td>24-240</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>480V Model</td>
<td>V rms</td>
<td></td>
<td>48-480</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repetitive Blocking Voltage (Min.)</td>
<td>120/240 Model</td>
<td>V peak</td>
<td></td>
<td>±600</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>480V Model</td>
<td>V peak</td>
<td></td>
<td>±1200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load Current Range I_L*</td>
<td>120/240 &amp; 480V Models</td>
<td>Resistive</td>
<td>A rms</td>
<td>.05-25</td>
<td>.05-50</td>
<td>.05-125</td>
</tr>
<tr>
<td>Single Cycle Surge Current (Min.)</td>
<td>120/240 &amp; 480V Models</td>
<td></td>
<td>A peak</td>
<td>250</td>
<td>600</td>
<td>1,400</td>
</tr>
<tr>
<td>Leakage Current (Off-State) (Max.)</td>
<td>120/240V Model</td>
<td>f = 60 Hz; V_L = 240V rms</td>
<td>mA rms</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>480V Model</td>
<td>f = 60 Hz; V_L = 480V rms</td>
<td>mA rms</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-State Voltage Drop (Max.)</td>
<td>120/240 &amp; 480V Models</td>
<td>I_L = Max.</td>
<td>V/µs</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Static dv/dt (Off-State) (Min.)</td>
<td>120/240 &amp; 480V Models</td>
<td></td>
<td>V/µs</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal Resistance, Junction to Case (R_J-C)</td>
<td>120/240 &amp; 480V Models</td>
<td>*C/W</td>
<td>0.4</td>
<td>0.35</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>Turn-On Time (Max.)</td>
<td>120/240 &amp; 480V Models</td>
<td>f = 60 Hz.</td>
<td>ms</td>
<td>8.3 for Zero Voltage Turn-On, 0.02 for Random Voltage Turn-On Models</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn-Off Time (Max.)</td>
<td>120/240 &amp; 480V Models</td>
<td>f = 60 Hz.</td>
<td>ms</td>
<td>8.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i^2t Rating</td>
<td>120/240 &amp; 480V Models</td>
<td>t = 8.3 ms</td>
<td>A² Sec.</td>
<td>600</td>
<td>3,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Load Power Factor Rating</td>
<td>120/240 &amp; 480V Models</td>
<td>I_L = Max.</td>
<td></td>
<td>0.5-1.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*See Derating Curves

**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.

**Heatsink Dimensions**

- We recommend that solid State Relay Modules be mounted to a heatsink sufficient to maintain the module’s base temperature at less than 85°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. The mounting screws should be torqued to 10 inch-pounds by alternately tightening the screws one quarter turn at a time.
Load Current vs. Base Temperature

Allowable Peak Surge Current vs. Duration/Expected Lifetime

Operating Diagrams

Outline Dimensions

Family of curves shows approximate expected lifetime of relay when subjected to repetitive current surges, i.e., number of surges of a specific magnitude and duration.

* Random Turn-on Units have a Random Turn-on circuit instead of Zero Voltage Circuit.
SSRD series

Dual AC Output
Solid State Relay

File E29244
File E29244  UL Recognized for Canada

Features
- Two independent AC output solid state relays in one standard package.
- Inverse parallel SCR outputs.
- 25A rms & 40A rms versions available.
- 3 - 32 VDC input control.
- Zero voltage and random voltage turn-on versions.
- 2500V rms optical isolation.
- Quick connect style terminals.

Engineering Data
- Form: 2 Form A (2 SPST-NO).
- Duty: Continuous.
- Isolation: 2500V rms minimum.
- Isolation Resistance: $10^{10}$ ohms @ 500VDC Min.
- Capacitance: 10 pf maximum (input to output).
- Temperature Range: Storage: -40°C to +120°C Operating: -25°C to + 80°C
- Case Material: Plastic, UL rated 94V-0.
- Base Plate Material: Ceramic.
- Case and Mounting: Refer to outline dimension.
- Termination: Refer to outline dimension.
- Approximate Weight: 3.5 oz. (98g).

Ordering Information

<table>
<thead>
<tr>
<th>Sample Part Number</th>
<th>SSRD-240 D 25</th>
</tr>
</thead>
</table>

1. **Basic Series**: SSRD = Dual output SSR - 2 SPST - NO

2. **Line Voltage**: 240 = 24-240 VAC

3. **Input Type & Voltage**: D = 3-32 VDC on zero voltage turn-on types

4. **Maximum Switching Rating/Output**: 25 = .05-25A rms @ 25°C, mounted to heatsink
40 = .05-40A rms @ 25°C, mounted to heatsink

5. **Options**: Blank = Zero voltage turn-on (both outputs)
R = Random voltage turn-on (both outputs)

Stock Items – The following items are normally maintained in stock for immediate delivery.
SSRD-240D25
SSRD-240D40

Input Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Zero V Turn-on Units</th>
<th>Random V Turn-on Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Voltage Range $V_{c}$</td>
<td>VDC</td>
<td>3-32</td>
<td>4-15</td>
</tr>
<tr>
<td>Must Operate Voltage $V_{op}$ (Min.)</td>
<td>VDC</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Must Release Voltage $V_{rel}$ (Min.)</td>
<td>VDC</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Input Current (Max.) @ 5VDC</td>
<td>mA DC</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>
Output Specifications (@ 25°C, unless otherwise specified)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Units</th>
<th>25A Models</th>
<th>40A Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Voltage Range V_L</td>
<td>V rms</td>
<td></td>
<td>24-240</td>
<td></td>
</tr>
<tr>
<td>Repetitive Blocking Voltage (Min.)</td>
<td>V peak</td>
<td></td>
<td>4,600</td>
<td></td>
</tr>
<tr>
<td>Load Current Range I_L</td>
<td>Resistive</td>
<td>A rms</td>
<td>.06-25</td>
<td>.06-40</td>
</tr>
<tr>
<td>Single Cycle Surge Current (Min.)</td>
<td>A peak</td>
<td></td>
<td>300</td>
<td>500</td>
</tr>
<tr>
<td>Leakage Current (Off-State) (Max.)</td>
<td>f = 60 Hz, V_L = 240V rms</td>
<td>mA rms</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>On-State Voltage Drop (Max.)</td>
<td>I_L = Max.</td>
<td>V peak</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Static dv/dt (Off-State) (Min.)</td>
<td>V/µs</td>
<td></td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Thermal Resistance, Junction to Case (R_J-CASE) (Max.)</td>
<td>Both Sections On</td>
<td>°C/W</td>
<td>0.30</td>
<td>0.25</td>
</tr>
<tr>
<td>Turn-On Time (Max.)</td>
<td>f = 60 Hz.</td>
<td>ms</td>
<td>8.3</td>
<td>0.02 for Random Voltage Turn-On Models</td>
</tr>
<tr>
<td>Turn-Off Time (Max.)</td>
<td>f = 60 Hz.</td>
<td>ms</td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>I^2t Rating</td>
<td>t = 8.3 ms</td>
<td>A^2 Sec.</td>
<td>370</td>
<td>1,040</td>
</tr>
<tr>
<td>Load Power Factor Rating</td>
<td>I_L = Max.</td>
<td></td>
<td>0.5 - 1.0</td>
<td></td>
</tr>
</tbody>
</table>

*See Derating Curves

Electrical Characteristics (Thermal Derating Curves)

How To Use These Curves

Knowing maximum load current and maximum ambient temperature, use derating curves to determine the minimum 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.

Heatsink Requirements

- We recommend that solid State Relay Modules be mounted to a heatsink sufficient to maintain the module’s base temperature at less than 85°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. The mounting screws should be torqued to 10 inch-pounds by alternately tightening the screws one quarter turn at a time.
**Load Current vs. Base Temperature**

![Graph showing Load Current vs. Base Temperature for 25A and 40A Units](image)

**Allowable Peak Surge Current vs. Duration/Expected Lifetime**

![Graph showing Allowable Peak Surge Current for 25A and 40A Units](image)

Family of curves shows approximate expected lifetime of relay when subjected to repetitive current surges, i.e., number of surges of a specific magnitude.

**Operating Diagram**

![Operating Diagram](image)

1 Random Turn-on Units have a Random Turn-on circuit instead of Zero Voltage Circuit

**Outline Dimensions**

![Outline Dimensions](image)

Tolerances: ±.035 (0.88)

Input Terminals 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.
SSRQ series
Quad AC Output
Solid State Relay

File E29244
File E29244 UL Recognized for Canada

**Features**
- Four electrically independent solid state relays in a single industrial standard “hockey puck” package.
- 20A rms, triac outputs.
- DC input control.
- Zero voltage and random voltage turn-on versions.
- 2500V rms optical isolation.

**Ordering Information**

<table>
<thead>
<tr>
<th>Sample Part Number</th>
<th>SSRQ-240D20</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Basic Series:</strong></td>
<td>SSRQ = Quad output SSR - 4 SPST - NO</td>
</tr>
<tr>
<td><strong>2. Line Voltage:</strong></td>
<td>240 = 24 - 240 VAC</td>
</tr>
<tr>
<td><strong>3. Input Type &amp; Voltage:</strong></td>
<td>D = 3 - 32VDC on zero voltage turn-on types.</td>
</tr>
<tr>
<td></td>
<td>R = 4 - 15VDC on random voltage turn-on types.</td>
</tr>
<tr>
<td><strong>4. Maximum Switching Rating/Output:</strong></td>
<td>20 = .05 - 20A rms, mounted to heatsink</td>
</tr>
<tr>
<td><strong>5. Options:</strong></td>
<td>Blank = Zero voltage turn-on (all sections)</td>
</tr>
<tr>
<td></td>
<td>R = Random voltage turn-on (all sections)</td>
</tr>
</tbody>
</table>

**Engineering Data**
- **Form:** 4 Form A (4 SPST-NO).
- **Duty:** Continuous.
- **Isolation:** 2500V rms minimum.
- **Capacitance:** 10 pf maximum (input to output).
- **Temperature Range:**
  - Storage: -40°C to +120°C.
  - Operating: -25°C to + 80°C.
- **Case Material:** Plastic, UL rated 94V-0.
- **Base Plate Material:** Ceramic.
- **Case and Mounting:** Refer to outline dimension.
- **Termination:** Refer to outline dimension.
- **Approximate Weight:** 3.19 oz. (81g).

**Input Specifications**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Units</th>
<th>Zero V Turn-on Units</th>
<th>Random V Turn-on Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Voltage Range $V_{IN}$</td>
<td>VDC</td>
<td>3-32</td>
<td>4-15</td>
<td></td>
</tr>
<tr>
<td>Must Operate Voltage $V_{MOP}$ (Min.)</td>
<td>VDC</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Must Release Voltage $V_{MREL}$ (Min.)</td>
<td>VDC</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Input Current (Max.)</td>
<td>$V_{IN} = 5VDC$</td>
<td>mA DC</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

Stock Items – The following items are normally maintained in stock for immediate delivery.
SSRQ-240D20
Output Specification (@ 25°C, unless otherwise specified)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Voltage Range V_L</td>
<td>V rms</td>
<td>24-240</td>
</tr>
<tr>
<td>Repetitive Blocking Voltage (Min.)</td>
<td>V peak</td>
<td>500</td>
</tr>
<tr>
<td>Load Current Range I_L*</td>
<td>A rms</td>
<td>0.05-20</td>
</tr>
<tr>
<td>Single Cycle Surge Current (Min.)</td>
<td>A peak</td>
<td>200</td>
</tr>
<tr>
<td>Leakage Current (Off-State) (Max.)</td>
<td>mA rms</td>
<td>0.5</td>
</tr>
<tr>
<td>On-State Voltage Drop (Max.)</td>
<td>V peak</td>
<td>1.5</td>
</tr>
<tr>
<td>Static dv/dt (Off-State) (Max.)</td>
<td>V/µs</td>
<td></td>
</tr>
<tr>
<td>Thermal Resistance, Junction to Case (R_{a,j}) (Max.)</td>
<td>All Sections On</td>
<td>°C/W</td>
</tr>
<tr>
<td>Turn-On Time</td>
<td>t = 60 Hz.</td>
<td>ms</td>
</tr>
<tr>
<td>Turn-Off Time</td>
<td>f = 60 Hz.</td>
<td>ms</td>
</tr>
<tr>
<td>I^2t Rating</td>
<td>t = 8.3 ms</td>
<td>A^2 Sec.</td>
</tr>
<tr>
<td>Load Power Factor Rating</td>
<td>I_L = Max.</td>
<td></td>
</tr>
</tbody>
</table>

*See Derating Curves

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.

Example #1:

Given: I_L = Four 12.5A loads @ 45°C
Find: Minimum heatsink required
Solution: From Thermal Dissipation Graph
4 x 12.5A = 50A 4 sections ON
Heatsink = 1°C/W minimum

Example #2:

Given: SSRQ24020
Find: Maximum rating mounting to .67°C/W HS @ 55°C All sections ON
Solution: From Thermal Dissipation Graph
Rating mounted to .67°C/W HS @ 55°C = 60A total
15A for 4 Sections ON = 60A total
20A for 3 Sections ON = 60A total

Heatsink Requirements

- We recommend that solid State Relay Modules be mounted to a heatsink sufficient to maintain the module’s base temperature at less than 85°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. The mounting screws should be torqued to 10 inch-pounds by alternately tightening the screws one quarter turn at a time.

Steady State Current vs. Ambient Temperature
Allowable Peak Surge Current vs. Duration/Expected Lifetime

The graph shows the relationship between the number of equal amplitude current pulses at 60 Hz and the max. load current in A rms. It indicates the approximate expected lifetime of the relay when subjected to repetitive current surges, i.e., the number of surges of a specific magnitude and duration.

Operating Diagrams

The diagram illustrates the connections and configurations of the relay, including outputs A, B, C, and D. Each output has a zero voltage circuit and an equivalent circuit only. The diagram also indicates random turn-on units having a random turn-on circuit instead of a zero voltage circuit.

Outline Dimensions

The dimensions provided include the outline size, pin counts, and tolerances. All dimensions are given in inches (mm), with tolerances specified for each dimension.

Input Terminals Connectors are available from several different manufacturers.

AMP P/N: 103976-4
Methode P/N: 1300-005-422

Consult your local distributor for these or equivalent connectors.

Specifications and availability subject to change without notice.

13C7772 Printed in U.S.A. IH/4-00
IAC/OAC  
IDC/ODC  
Input/Output Modules

**Features**
- Industry standard package and pin-out.
- Color coded by function.
- 4,000V rms optical isolation.
- High immunity to false operation.
- Series compatible.
- Output modules can be controlled from sinking or sourcing logic.
- Compatible with 2I/O series mounting boards.

**Engineering Data (all I/O modules)**
- **Switch Form:** 1 Form A (SPST-NO)
- **Duty:** Continuous
- **Isolation:** 4,000V rms, 60 Hz.
- **Capacitance:** 8 pF Typical (input to output).
- **Operating Temperature:** –30°C to +80°C.
- **Storage Temperature:** –40°C to +85°C.
- **Potting Compound Flammability:** UL94V-0.
- **Approximate Weight:** 1.38 oz. (35g).

**Ordering Information**

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<thead>
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<th>Typical Part Number</th>
<th>OAC</th>
<th>-5</th>
<th>H</th>
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<tbody>
<tr>
<td>1. Basic Series:</td>
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<tr>
<td>IAC = AC input module - yellow case</td>
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<tr>
<td>IDC = DC input module - white case</td>
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</tr>
<tr>
<td>OAC = AC output module - black case</td>
<td></td>
<td></td>
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<tr>
<td>ODC = DC output module - red case</td>
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</table>

<table>
<thead>
<tr>
<th>2. Input or Logic Voltage:</th>
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</thead>
<tbody>
<tr>
<td>5 = 5VDC</td>
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<tr>
<td>15 = 15VDC</td>
<td></td>
<td></td>
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<tr>
<td>24 = 24VDC</td>
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<thead>
<tr>
<th>3. Options:</th>
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<tbody>
<tr>
<td>Blank = IAC Type</td>
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</tr>
<tr>
<td>IDC Type</td>
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<tr>
<td>OAC Type</td>
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<td>ODC Type</td>
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<td>A = IAC Type</td>
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<td>IDC Type</td>
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<td></td>
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<tr>
<td>OAC Type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ODC Type</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>A = IAC Type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDC Type</td>
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<td>OAC Type</td>
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<tr>
<td>ODC Type</td>
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<tr>
<td>A = IAC Type</td>
<td></td>
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<tr>
<td>IDC Type</td>
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<td>OAC Type</td>
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<td>ODC Type</td>
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<tr>
<td>A = IAC Type</td>
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<tr>
<td>IDC Type</td>
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<tr>
<td>OAC Type</td>
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<tr>
<td>ODC Type</td>
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</tbody>
</table>

* * Is not polarity sensitive.

**Stock Items – The following items are normally maintained in stock for immediate delivery.**

<table>
<thead>
<tr>
<th>IAC-5</th>
<th>IDC-24</th>
<th>OAC-24A</th>
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<tbody>
<tr>
<td>IAC-5A</td>
<td>OAC-5</td>
<td>ODC-5</td>
</tr>
<tr>
<td>IAC-5E</td>
<td>OAC-5A</td>
<td>ODC-5A</td>
</tr>
<tr>
<td>IAC-15</td>
<td>OAC-5H</td>
<td>ODC-15</td>
</tr>
<tr>
<td>IAC-24</td>
<td>OAC-15</td>
<td>ODC-15A</td>
</tr>
<tr>
<td>IDC-5</td>
<td>OAC-24</td>
<td>ODC-24</td>
</tr>
</tbody>
</table>

File E81606 & E29244  
File LR38595M77
# AC Input Modules

## Input Specifications

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Control Voltage Range V_IN</td>
<td>VIN</td>
<td>VDC</td>
<td>90</td>
<td>120</td>
<td>140</td>
<td>180</td>
<td>240</td>
<td>280</td>
<td>18</td>
<td>24</td>
<td>36</td>
</tr>
<tr>
<td>Must Operate Voltage V_IN</td>
<td>V_IN</td>
<td>VAC/VDC</td>
<td>90</td>
<td>120</td>
<td>140</td>
<td>180</td>
<td>240</td>
<td>280</td>
<td>18</td>
<td>24</td>
<td>36</td>
</tr>
<tr>
<td>Must Release Voltage V_REL</td>
<td>V_REL</td>
<td>VAC/VDC</td>
<td>20</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Max. Input Current @V_IN = Max.</td>
<td>mA</td>
<td></td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Input Resistance</td>
<td>Ohms</td>
<td></td>
<td>28K</td>
<td>75K</td>
<td>2K</td>
<td></td>
<td></td>
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</table>

## Output Specifications (@ +25°C unless otherwise specified)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Maximum Output Voltage</td>
<td>VDC</td>
<td></td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
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</tr>
<tr>
<td>Maximum Output Current</td>
<td>mA</td>
<td></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
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</tr>
<tr>
<td>Maximum Output Leakage Current</td>
<td>V_OUT = Max.</td>
<td>µADC</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
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</tr>
<tr>
<td>Maximum Output Voltage Drop</td>
<td>I_SINK = 50mA</td>
<td>VDC</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
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<tr>
<td>Logic Supply Current</td>
<td>V_SCC = Max.</td>
<td>mADC</td>
<td>12</td>
<td>12</td>
<td>12</td>
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<tr>
<td>Logic Supply Current</td>
<td>V_SCC = Max.</td>
<td>mADC</td>
<td>12</td>
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<tr>
<td>Logic Supply Voltage</td>
<td>Logic Supply Voltage</td>
<td></td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>12</td>
<td>15</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>Turn-On Time (Nominal)</td>
<td>I_SINK = 25mA</td>
<td>ms</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Turn-Off Time (Nominal)</td>
<td>I_SINK = 25mA</td>
<td>ms</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
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<tr>
<td>Output Type (Open Collector)</td>
<td></td>
<td></td>
<td>Normally Open</td>
<td>Normally Open</td>
<td>Normally Open</td>
<td>Normally Open</td>
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</table>

# AC Output Modules

## Input Specifications

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Control Voltage Range V_IN</td>
<td>VIN</td>
<td>VDC</td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>6</td>
<td>10</td>
<td>18</td>
<td>24</td>
<td>28</td>
<td>24</td>
<td>32</td>
</tr>
<tr>
<td>Must Operate Voltage V_IN</td>
<td>V_IN</td>
<td>VDC</td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>6</td>
<td>10</td>
<td>18</td>
<td>24</td>
<td>28</td>
<td>24</td>
<td>32</td>
</tr>
<tr>
<td>Must Release Voltage V_REL</td>
<td>V_REL</td>
<td>VDC</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>13</td>
<td>13</td>
<td>13</td>
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<td>13</td>
</tr>
<tr>
<td>Maximum Input Current @V_IN = Nominal</td>
<td>mA</td>
<td></td>
<td>220</td>
<td>1000</td>
<td>2000</td>
<td></td>
<td></td>
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## Output Specifications (47 to 63 Hz., @ +25°C unless otherwise specified)

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</thead>
<tbody>
<tr>
<td>Load Voltage V_L</td>
<td>Vrms</td>
<td></td>
<td>24</td>
<td>120/240</td>
<td>280</td>
<td>24</td>
<td>120/240</td>
<td>280</td>
<td>24</td>
<td>120/240</td>
<td>280</td>
<td></td>
</tr>
<tr>
<td>Repetitive Blocking Voltage</td>
<td>Vpeak</td>
<td></td>
<td>±800</td>
<td>±800</td>
<td>±800</td>
<td>±800</td>
<td>±800</td>
<td>±800</td>
<td>±800</td>
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</tr>
<tr>
<td>Load Current I_L</td>
<td>A rms</td>
<td>0.6</td>
<td>3</td>
<td>0.6</td>
<td>5</td>
<td>0.6</td>
<td>5</td>
<td>0.6</td>
<td>5</td>
<td>0.6</td>
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</tr>
<tr>
<td>Output Current</td>
<td>mA/°C</td>
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<td>68mA/°C</td>
<td>68mA/°C</td>
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<td>68mA/°C</td>
<td>68mA/°C</td>
<td></td>
</tr>
<tr>
<td>Derating</td>
<td></td>
<td></td>
<td>40°C - 80°C</td>
<td>40°C - 80°C</td>
<td>40°C - 80°C</td>
<td>40°C - 80°C</td>
<td>40°C - 80°C</td>
<td>40°C - 80°C</td>
<td>40°C - 80°C</td>
<td>40°C - 80°C</td>
<td>40°C - 80°C</td>
<td></td>
</tr>
<tr>
<td>Single Cycle surge Current</td>
<td></td>
<td></td>
<td>100</td>
<td></td>
<td>250</td>
<td></td>
<td>250</td>
<td></td>
<td>250</td>
<td></td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Leakage Current (Off-State) @ 60 Hz</td>
<td>V_L = 120VAC</td>
<td>mA rms</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Leakage Current (Off-State) @ 60 Hz</td>
<td>V_L = 240VAC</td>
<td>mA rms</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>On-State Voltage Drop</td>
<td></td>
<td></td>
<td>1.6</td>
<td></td>
<td>1.6</td>
<td></td>
<td>1.6</td>
<td></td>
<td>1.6</td>
<td></td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Static dv/dt (Off-State)</td>
<td></td>
<td></td>
<td>200</td>
<td></td>
<td>200</td>
<td></td>
<td>200</td>
<td></td>
<td>200</td>
<td></td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Turn-On Time</td>
<td></td>
<td></td>
<td>8.3</td>
<td></td>
<td>8.3</td>
<td></td>
<td>8.3</td>
<td></td>
<td>8.3</td>
<td></td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>Turn-Off Time</td>
<td></td>
<td></td>
<td>8.3</td>
<td></td>
<td>8.3</td>
<td></td>
<td>8.3</td>
<td></td>
<td>8.3</td>
<td></td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>Output Type (Form)</td>
<td></td>
<td></td>
<td>Normally Open</td>
<td>Normally Open</td>
<td>Normally Open</td>
<td>Normally Open</td>
<td>Normally Open</td>
<td>Normally Open</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HP/1/2HP</td>
<td></td>
<td></td>
<td>1/4HP</td>
<td></td>
<td>1/2HP</td>
<td></td>
<td>1/2HP</td>
<td></td>
<td>1/2HP</td>
<td></td>
<td>1/2HP</td>
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</tr>
</tbody>
</table>

PIN-3 must be positive with respect to PIN-4 for correct operation.
## IDC
### DC Input Modules

#### Input Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Units</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Voltage Range ( V_{IN} )</td>
<td>VDC</td>
<td>±3.3</td>
<td>±24</td>
<td>±32</td>
<td>±10</td>
</tr>
<tr>
<td>Maximum Input Current ( I_{IN} )</td>
<td>mA</td>
<td>34</td>
<td>34</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Input Resistance</td>
<td>Ohms</td>
<td>1K</td>
<td>2K</td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>

#### Output Specifications (@ +25˚C unless otherwise specified)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Output Voltage ( V_{OUT} )</td>
<td>VDC</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Maximum Output Leakage Current ( I_{SLK} )</td>
<td>mA</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Maximum Output Voltage Drop ( I_{SLK} )</td>
<td>mADC</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Logic Supply Voltage ( V_{CC} )</td>
<td>VDC</td>
<td>3</td>
<td>6</td>
<td>12</td>
<td>15</td>
<td>18</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>Logic Supply Current ( I_{CC} )</td>
<td>mADC</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Turn-On Time (Nominal) ( I_{ON} )</td>
<td>ms</td>
<td>1*</td>
<td>1*</td>
<td>1*</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Output Type (Open Collector)</td>
<td>Normal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

* Nominal Turn-On and Turn-Off times for IDC5A, IDC15A & IDC24A are 5 ms.

## ODC
### DC Output Modules

#### Input Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Units</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Voltage Range ( V_{IN} )</td>
<td>VDC</td>
<td>3</td>
<td>5</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Maximum Input Current ( I_{IN} )</td>
<td>mA</td>
<td>18</td>
<td>16</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Input Resistance</td>
<td>Ohms</td>
<td>250</td>
<td>1000</td>
<td>2000</td>
<td></td>
</tr>
</tbody>
</table>

#### Output Specifications (@ +25˚C unless otherwise specified)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Units</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Voltage ( V_{L} )</td>
<td>VDC</td>
<td>3</td>
<td>60</td>
<td>3</td>
<td>250</td>
</tr>
<tr>
<td>Load Current ( I_{L} )</td>
<td>ADC</td>
<td>0.01</td>
<td>0.01</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Maximum Surge Current for 1 Second</td>
<td>ADC</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Leakage Current (Off-State)</td>
<td>( V_{L} )</td>
<td>µADC</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum On-State Voltage Drop ( I_{P} )</td>
<td>VDC</td>
<td>1.5</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Turn-Off Time ( I_{T} )</td>
<td>ms</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Turn-Off Time ( I_{T} )</td>
<td>ms</td>
<td>75</td>
<td>75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

At 40˚C, derate by 50mA/°C to 80˚C.
PIN-3 must be positive with respect to PIN-4 for correct operation.
Outline Dimensions

Note: Pin 5 is not present on Output Modules.
2IO series

Mounting Boards for Input/Output Modules

- LED status indicators, plug-in fuses & pull-up resistors
- Card edge logic connections (2I08, 2I016 & 2I024)
- Screw terminal logic connections (2I04A, 2I04B, 2I04C, 2I016A, 2I016B & 2I016C)
- Screw terminals for field wiring
- UL recognized/CSA certified for 125V max. with 5A fuses; 250V max. with #22 solid copper jumper wire instead of fuses

File E61482
File LR15734-93

Ordering Information – Boldface items listed below are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>2I04A</th>
<th>2I04B</th>
<th>2I04C</th>
<th>2I08</th>
<th>2I016</th>
<th>2I016A</th>
<th>2I016B</th>
<th>2I016C</th>
<th>2I024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of I/O Channels</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>Number of Module Positions</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>Field Terminals: Screw Terminals</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Logic Terminals: Screw Terminals</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Logic Terminals: 26-pin card edge connector</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Logic Terminals: 50-pin card edge connector</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Designed for neg. true logic; one logic voltage</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Designed for neg. or pos. true logic; mult. logic voltages</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**2I04A, 2I04B & 2I04C Outline Dimensions**

**2I04A Schematic**

Designed to operate with neg. true logic (active low) systems & one logic voltage.

**2I04C Schematic**

Designed to operate with neg. true logic (active low) systems & different logic voltages.

**Mating Connectors and Fuses**

<table>
<thead>
<tr>
<th>Connectors and Fuses</th>
<th>26-pin card edge connector</th>
<th>50-pin card edge connector</th>
<th>5 amp fuse</th>
<th>1 amp fuse**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thomas &amp; Betts 622-2615*</td>
<td>Thomas &amp; Betts 622-5015*</td>
<td>Littelfuse 251-005*</td>
<td>Littelfuse 251-001*</td>
<td></td>
</tr>
<tr>
<td>Or equivalent</td>
<td>Or equivalent</td>
<td>Or equivalent</td>
<td>Or equivalent</td>
<td></td>
</tr>
</tbody>
</table>

**2I04B 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.)
2iO8 Schematic
Designed to operate with neg. true logic (active low) systems & one logic voltage.

2iO16 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 used in negative logic systems only.)
2IO16C Schematic
Designed to operate with neg. true logic (active low) systems & different logic voltages.

2IO24 Schematic
Designed to operate with neg. true logic (active low) systems & one logic voltage.

Specifications and availability subject to change without notice.
13C4220 Printed in U.S.A. IH/4-00
IACM / OACM
IDCM / ODCM

Slim Line
Input/Output Modules

File E81606 & E29244
File LR38595M77

**Features**
- Slim line .4” (10.16mm) thick package.
- Foot print same as .6” (15.24mm) thick package.
- 4,000V rms optical isolation.
- Color coded by function.
- High immunity to false operation.
- Output modules can be controlled from sinking or sourcing logic.
- Compatible with 2IOM series mounting boards.

**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°C to +80°C.
- Storage Temperature: –40°C to +85°C.
- Potting Compound Flammability: UL94V-0.
- Solderability: 260°C for 5 seconds, maximum.
- Approximate Weight: .87 oz. (22.1g).

**Ordering Information**

<table>
<thead>
<tr>
<th>Typical Part Number</th>
<th>OACM</th>
<th>5</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Basic Series:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IACM = Slim line AC input module — yellow case</td>
<td>OACM –5 H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDCM = Slim line DC input module — white case</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OACM = Slim line AC output module — black case</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ODCM = Slim line DC output module — red case</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **2. Input or Logic Voltage:** | |
| 5 = 5VDC | |
| 15 = 15VDC | |
| 24 = 24VDC | |
| U = OACM & ODCM Types 3-15VDC input voltage | |

| **3. Options:** | |
| Blank = IACM Type — 120VAC/VDC input (90-140VAC/VDC) * *<None> | |
| IDCM Type — 3.3-32VDC input * * OACM Type — 3A, 24-280VAC, zero voltage turn-on output | |
| ODCM Type — 3A, 3-60VDC output | |
| IDCM Type — 10-60VDC input * * OACM Type — 3A, 24-280VAC | |
| ODCM Type — 1A, 5-250VDC output | |
| A = IACM Type — 240VAC/VDC input (180-280VAC/VDC) * * | |
| IDCM Type — | |
| OACM Type — 3A, 24-280VAC | |
| ODCM Type — 1A, 5-250VDC output | |
| E = IACM Type — 18-36VAC/VDC input * * | |
| F = IDCM Type — 4-32VDC input & fast turn-on & turn-off times * * | |
| H = OACM Type — 5A, 24-280VAC, zero voltage turn-on output | |

* * Is not polarity sensitive.

**Stock Items** — The following items are normally maintained 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

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Voltage Range $V_{IN}$</td>
<td>VAC/VDC</td>
<td>Min.</td>
<td>90</td>
<td>120</td>
<td>140</td>
<td>180</td>
<td>240</td>
<td>280</td>
<td>18</td>
<td>24</td>
<td>36</td>
</tr>
<tr>
<td>Must Operate Voltage $V_{INOP}$</td>
<td>VAC/VDC</td>
<td>Typ.</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>180</td>
<td>180</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Must Release Voltage $V_{INREL}$</td>
<td>VAC/VDC</td>
<td>Max.</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>10</td>
<td>20</td>
<td>20</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Max. Input Current @ $V_{INMax}$</td>
<td>mA</td>
<td>Min.</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Input Resistance $R_{IN}$</td>
<td>Ohms</td>
<td>Max.</td>
<td>28K</td>
<td>75K</td>
<td>2K</td>
<td>2K</td>
<td>2K</td>
<td>2K</td>
<td>2K</td>
<td>2K</td>
<td>2K</td>
</tr>
</tbody>
</table>

**Output Specifications (@ +25°C unless otherwise specified)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Output Voltage</td>
<td>VDC</td>
<td>Min.</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Maximum Output Current $I_{Omax}$</td>
<td>mADC</td>
<td>Typ.</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Maximum Output Leakage Current</td>
<td>V_{OUTMax}</td>
<td>µADC</td>
<td>10</td>
<td>20</td>
<td>10</td>
<td>20</td>
<td>10</td>
<td>20</td>
<td>10</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Maximum Output Voltage Drop $V_{PC}$</td>
<td>VDC</td>
<td>Min.</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>12</td>
<td>15</td>
<td>18</td>
<td>20</td>
<td>24</td>
<td>20</td>
</tr>
<tr>
<td>Logic Supply Voltage $V_{CC}$</td>
<td>VDC</td>
<td>Typ.</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Turn-On Time (Nominal)</td>
<td>ms</td>
<td>Min.</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Turn-Off Time (Nominal)</td>
<td>ms</td>
<td>Max.</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
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</tr>
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</table>

**OACM**  
**AC Output Modules**

### Input Specifications

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<tbody>
<tr>
<td>Control Voltage Range $V_{IN}$</td>
<td>VDC</td>
<td>Min.</td>
<td>3</td>
<td>5</td>
<td>8</td>
<td>9</td>
<td>15</td>
<td>18</td>
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<tr>
<td>Must Operate Voltage $V_{INOP}$</td>
<td>VDC</td>
<td>Typ.</td>
<td>3</td>
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<tr>
<td>Must Release Voltage $V_{INREL}$</td>
<td>VDC</td>
<td>Max.</td>
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<tr>
<td>Input Current @ $V_{IN}$ Nominal</td>
<td>mADC</td>
<td>Min.</td>
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<tr>
<td>Input Resistance $R_{IN}$</td>
<td>Ohms</td>
<td>Max.</td>
<td>220</td>
<td>1600</td>
<td>2000</td>
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**Output Specifications (47 to 63 Hz., @ +25°C unless otherwise specified)**

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<td>Load Voltage $V_{L}$</td>
<td>Vrms</td>
<td>Min.</td>
<td>24</td>
<td>120/240</td>
<td>280</td>
<td>24</td>
<td>120/240</td>
<td>280</td>
<td>24</td>
<td>120/240</td>
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<tr>
<td>Repetitive Blocking Voltage</td>
<td>Vpeak</td>
<td>Max.</td>
<td>280</td>
<td>±600</td>
<td>±600</td>
<td>±600</td>
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<tr>
<td>Output Current $I_{O}$</td>
<td>mA/°C</td>
<td>Min.</td>
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<td>mA/°C</td>
<td>Typ.</td>
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<td>A peak</td>
<td>Min.</td>
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<tr>
<td>Leakage Current (Off-State)</td>
<td>Vrms</td>
<td>Max.</td>
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<td>On-State Voltage Drop $I_{L}=Max.$</td>
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<td>Min.</td>
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<td>Static dv/dt (Off-State)</td>
<td>Vrms</td>
<td>Min.</td>
<td>2000</td>
<td>2000</td>
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<tr>
<td>Turn-On Time @ f=60 Hz</td>
<td>ms</td>
<td>Min.</td>
<td>8.3</td>
<td>8.3</td>
<td>8.3</td>
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<td>.1</td>
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<tr>
<td>Turn-Off Time</td>
<td>ms</td>
<td>Max.</td>
<td>8.3</td>
<td>8.3</td>
<td>8.3</td>
<td>8.3</td>
<td>8.3</td>
<td>8.3</td>
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<td>HP/FP Rating</td>
<td>HP</td>
<td>Min.</td>
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<td>1/2</td>
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**Notes:**  
- PIN-3 must be positive with respect to PIN-4 for correct operation.
## IDCM DC Input Modules

### Input Specifications

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<tbody>
<tr>
<td>Control Voltage Range $V_{IN}$</td>
<td>$V_{DC}$</td>
<td>±3.3</td>
<td>±2.4</td>
<td>±3.2</td>
<td>±1.0</td>
<td>±0.6</td>
<td>±4</td>
<td>±4</td>
<td>±4</td>
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<tr>
<td>Must Operate Voltage $V_{IN\text{OP}}$</td>
<td>$V_{DC}$</td>
<td>±3.3</td>
<td>±2.4</td>
<td>±3.2</td>
<td>±1.0</td>
<td>±0.6</td>
<td>±4</td>
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<tr>
<td>Must Release Voltage $V_{IN\text{REL}}$</td>
<td>$V_{DC}$</td>
<td>±2.4</td>
<td>±3.2</td>
<td>±1.0</td>
<td>±0.6</td>
<td>±4</td>
<td>±4</td>
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<tr>
<td>Maximum Input Current $I_{IN\text{MAX}}$</td>
<td>$mA$</td>
<td>34</td>
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<td>Input Resistance $R_{IN}$</td>
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</table>

Above 40°C, derate by 50mA/°C to 80°C.

PIN-1 must be positive with respect to PIN-2 for correct operation.

### Output Specifications (© +25°C unless otherwise specified)

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<tr>
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</thead>
<tbody>
<tr>
<td>Maximum Output Voltage $V_{OUT\text{MAX}}$</td>
<td>$V_{DC}$</td>
<td>30</td>
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<tr>
<td>Maximum Output Current $I_{OUT\text{MAX}}$</td>
<td>$mA$</td>
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<td>50</td>
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<tr>
<td>Maximum Output Leakage Current $V_{OUT\text{MAX}}$</td>
<td>$\mu A$</td>
<td>10</td>
<td>10</td>
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<tr>
<td>Maximum Output Voltage Drop $V_{OUT\text{MAX}}$</td>
<td>$\mu A$</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Logic Supply Voltage $V_{CC}$</td>
<td>$V_{DC}$</td>
<td>6.2</td>
<td>6.2</td>
<td>6.2</td>
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<tr>
<td>Logic Supply Current $I_{CC\text{MAX}}$</td>
<td>$mA$</td>
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<tr>
<td>Turn-On Time (Nominal) $I_{CC\text{MAX}}$</td>
<td>$ms$</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<td>Output Type (Open Collector)</td>
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<td>Normally Open</td>
<td>Normally Open</td>
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* Nominal Turn-On and Turn-Off times for IDCM5A, IDCM15A & IDCM24A are 5 ms.

## ODCM DC Output Modules

### Input Specifications

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</thead>
<tbody>
<tr>
<td>Control Voltage Range $V_{IN}$</td>
<td>$V_{DC}$</td>
<td>3</td>
<td>5</td>
<td>8</td>
<td>9</td>
<td>15</td>
<td>18</td>
<td>18</td>
<td>15</td>
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<tr>
<td>Must Operate Voltage $V_{IN\text{OP}}$</td>
<td>$V_{DC}$</td>
<td>5</td>
<td>6</td>
<td>9</td>
<td>9</td>
<td>15</td>
<td>18</td>
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<tr>
<td>Must Release Voltage $V_{IN\text{REL}}$</td>
<td>$V_{DC}$</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<td>1</td>
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<tr>
<td>Maximum Input Current $I_{IN\text{MAX}}$</td>
<td>$mA$</td>
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<tr>
<td>Input Resistance $R_{IN}$</td>
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PIN-3 must be positive with respect to PIN-4 for correct operation.

### Output Specifications (© +25°C unless otherwise specified)

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<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Units</th>
<th>ODCM-5</th>
<th>ODCM-15</th>
<th>ODCM-24</th>
<th>ODCM-U</th>
<th>ODCM-UA</th>
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<tbody>
<tr>
<td>Load Voltage $V_{L}$</td>
<td>$V_{DC}$</td>
<td>3</td>
<td>60</td>
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<td>Load Current $I_{L\text{MAX}}$</td>
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<td>0.01</td>
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<td>Maximum Surge Current for 1 Second</td>
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<tr>
<td>Maximum Leakage Current (Off-State)</td>
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<tr>
<td>Maximum On-State Voltage Drop $I_{L\text{MAX}}$</td>
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<td>Maximum Turn-On Time</td>
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* Above 40°C, derate by 50mA/°C to 80°C.

PIN-1 must be positive with respect to PIN-2 for correct operation.
**Note:** Pin 5 is not present on Output Modules.
### 2IOM 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 125V max. with 5A fuses; 250V max. with #22 solid copper jumper wire instead of fuses

File E61482
File LR15734

### Ordering Information - Boldface items listed below are normally maintained in stock for immediate delivery.

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<td>Logic Terminals: 50-pin straight header</td>
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<tr>
<td>Designed for neg. true logic; one logic voltage</td>
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<td>Designed for neg. or pos. true logic; multi logic voltages</td>
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</tbody>
</table>

### Mating Connectors and Fuses

- 50-pin card edge connector: Thomas & Betts 622-5015
- 50-pin header connector: Thomas & Betts 609-5030
- 5 amp fuse: Littelfuse 251-005
- 7 amp fuse: Littelfuse 251-007
- 1 amp fuse: Littelfuse 251-001

**Notes:**
1. Or equivalent.
2. Used only on 24 and 32 position models.
3. Used only on 2IOM4A, 2IOM4B, 2IOM16D and 2IOM16A.

### 2IOM4A & 2IOM4B Outline Dimensions

**2IOM4A Schematic**

Designed to operate with neg. true logic (active low) systems & one logic voltage.

**2IOM4B Schematic**

Designed to operate with neg. or pos. true logic systems & multi. logic voltage. (Note above applies to output modules only. Input modules must be used in negative systems only.)
2IOM8D Outline Dimensions

2IOM8D Schematic
Designed to operate with neg. true logic (active low) systems & one logic voltage.

2IOM16, 2IOM16D & 2IOM16E Outline Dimensions

2IOM16, 2IOM16D & 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 & 2IOM24E Outline Dimensions

2IOM24D With Straight Header

2IOM24E With Right-Angle Header
2IOM24, 2IOM24D & 2IOM24E Schematic

Designed to operate with neg. true logic (active low) systems & one logic voltage.

2IOM32, 2IOM32D & 2IOM32E Outline Dimensions

2IOM32, 2IOM32D & 2IOM32E Schematic

Designed to operate with neg. true logic (active low) systems & one logic voltage.
SSA-0009-Hold Down Cover Kit For 2IOM4A, 2IOM4B
Consists Of: One Hold Down Cover
One Nylon Standoff For Hold Down Cover
One Standoff Nut

SSA-0010-Hold Down Cover Kit For 2IOM8D
Consists Of: One Hold Down Cover
One Nylon Standoff For Hold Down Cover
One Standoff/Nut

SSA-0003-Hold Down Cover Kit For 2IOM16, 2IOM16D, 2IOM16E, 2IOM32*, 2IOM32D* & 2IOM32E*
Consists Of: One Hold Down Cover
One Nylon Standoff For Hold Down Cover
One Standoff/Nut

* Two kits are required for each 32 position board.
3RP15 series

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 VAC/VDC or fixed input types.
- 3A switching current rating
- Fits 35mm DIN track
- Single function, Delay-On available

Input Data @ 25°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 x 10^6 operations.

Environmental Data

Temperature Range: Storage: -40°C to +80°C.
Operating: -25°C to +60°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.

Contact Data @ 25°C

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: ±5% of full scale value.
Reset Time: 150 ms.
Minimum On Period: 35 msec.
Repeatability: ± 1%.

Timing Modes

See the following page for a description of timing modes.

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 – Boldface items listed below are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Input Type</th>
<th>Contact Arrang.</th>
<th>Wiring Diagram</th>
<th>Functions</th>
<th>Part Number</th>
</tr>
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<tbody>
<tr>
<td>DC</td>
<td>AC</td>
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<td>DPDT</td>
<td>9 to 24</td>
<td>9 to 24</td>
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<td>24, 200-240</td>
<td>Universal</td>
<td>DPDT</td>
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<td>24, 200-240</td>
<td>Fixed</td>
<td>DPDT</td>
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</tbody>
</table>
Outline Dimensions
3RP1505-1A, 3RP1525-1A

3RP1505-1B, 3RP1525-1B

Wiring Diagram

1. On-Delay

3RP1505-1A
3RP1525-1A

AC/DC 24V
AC100/127V
AC200/240V

2. Off-Delay

2. Off-Delay

With Auxiliary Voltage

3RP1505-1A

AC/DC 24V
AC100/127V
AC200/240V

3. On and Off Delay

With Auxiliary Voltage

3RP1505-1A

AC/DC 24V
AC100/127V
AC200/240V

4. Flashing

3RP1505-1A

AC/DC 24V
AC100/127V
AC200/240V

5. Making-Pulse Contact

3RP1505-1A
3RP1525-1A

AC/DC 24V
AC100/127V
AC200/240V

6. Breaking-Pulse Contact

With Auxiliary Voltage

3RP1505-1A

AC/DC 24V
AC100/127V
AC200/240V

7. Pulse Forming

With Auxiliary Voltage

3RP1505-1A

AC/DC 24V
AC100/127V
AC200/240V

8. Additive On-Delay With Auxiliary Voltage and Instantaneous Contact

3RP1505-1A

AC/DC 24V
AC100/127V
AC200/240V

9. On-Delay

3RP1505-1B
3RP1525-1B

AC/DC 24V
AC100/127V
AC200/240V

10. Off-Delay

With Auxiliary Voltage

3RP1505-1B

AC/DC 24V
AC100/127V
AC200/240V

11. On-and Off-Delay

With Auxiliary Voltage

3RP1505-1B

AC/DC 24V
AC100/127V
AC200/240V

12. Flashing

3RP1505-1B

AC/DC 24V
AC100/127V
AC200/240V

13. Making-Pulse Contact

3RP1505-1B

AC/DC 24V
AC100/127V
AC200/240V

14. Breaking-Pulse Contact

With Auxiliary Voltage

3RP1505-1B

AC/DC 24V
AC100/127V
AC200/240V

15. Pulse Forming

With Auxiliary Voltage

3RP1505-1B

AC/DC 24V
AC100/127V
AC200/240V

16. Additive On-Delay With Auxiliary Voltage and Instantaneous Contact

3RP1505-1B

AC/DC 24V
AC100/127V
AC200/240V
Timing Function Descriptions and Settings

3RP1505-1A

17. On-Delay and Instantaneous Contact

18. Off-Delay With Auxiliary Voltage and Instantaneous Contact

19. On and Off Delay With Auxiliary Voltage and Instantaneous Contact

20. Flashing and Instantaneous Contact

21. Making-Pulse Contact and Instantaneous Contact

22. Breaking-Pulse Contact With Auxiliary Voltage and Instantaneous Contact

23. Pulse Forming With Auxiliary Voltage and Instantaneous Contact

24. Star-Delta Function

Specifications and availability subject to change without notice.

13C3771 Printed in U.S.A. IH/4-00
CNT series

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 (24-240VAC/VDC) and fixed input types
- 10A output relay with DPDT contacts
- Thumbwheel switches for programming

Ordering Information – Boldface items listed below are normally maintained in stock for immediate delivery.

Universal Input Model

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Part Number</th>
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<tbody>
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<td>24-240VAC/VDC</td>
<td>CNT-35-96</td>
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Fixed Input Models

<table>
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<th>Input Voltage</th>
<th>Part Number</th>
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<tbody>
<tr>
<td>12VDC</td>
<td>CNT-35-26</td>
</tr>
<tr>
<td>120VAC</td>
<td>CNT-35-76</td>
</tr>
</tbody>
</table>

Input Data @ 25°C

Voltage: Universal Input Type: 24 - 240V ± 15%, 50/60 Hz. AC or DC.
Fixed Input Types: 120VAC ± 15%, 50/60 Hz and 12VDC.

Power Requirement:
- Universal Input Type: 10W @ 240VAC; 5VA @ 120VAC; 1VA @ 24VAC.
- 10W @ 240VDC; 5W @ 120VDC; 1W @ 24VDC.

Fixed Input Types: 3VA @ 120VAC; 3W @ 12VDC.

Environmental Data
- Temperature Range: Storage: -20°C to +70°C.
- Operating: -10°C to +55°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. See KRPA sockets (pg. 109) for details.
- 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).

Wiring Diagrams (Bottom Views)

- 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 50mA. Use of a switch rated for other than dry circuit may result in failure of the time delay relay to function properly.
Activation of RESET input turns relay off and resets count to zero. Continued counting past maximum count (999) switches, is reached and output relay turns on. Additional inputs continue to increment displayed count. Continued counting past maximum count (999) results in a "wrap-around" effect to 000, followed by continued up-counting. Operation is as described previously, except count is incremented for every 10 on/off input signals.
### 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

### Input Data @ 25°C

**Voltage: Universal Input Type:** 24 - 240V ±15%, 50/60 Hz. AC or DC.
**Fixed Input Type:** 120VAC ±15%, 50/60 Hz.

**Power Requirement:**
- Universal Input Type: 10VA @ 240VAC; 5VA @ 120VAC; 1VA @ 24VAC.
- Fixed Input Type: 3VA @ 120VAC.

**Transient Protection:** Yes.
**Reverse Voltage Protection:** Yes.

### Input Voltages and Limits @ 25°C

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Nominal Voltage</th>
<th>Minimum Voltage</th>
<th>Maximum Voltage</th>
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<tbody>
<tr>
<td>Universal</td>
<td>24-240VAC/VDC</td>
<td>20.4VAC/VDC</td>
<td>276VAC/VDC</td>
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<tr>
<td>Fixed</td>
<td>120VAC</td>
<td>102VAC</td>
<td>138VAC</td>
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</table>

*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°C to +70°C.
**Operating:** -10°C to +55°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. See KRPA sockets (pg. 109) for details.

**Weight:** 4.3 oz. (122g) approximately.

### Contact Data @ 25°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:** 1,000V rms, 60 Hz.
**Between All Other Conductors:** 1,500V rms, 60 Hz.

### 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:** ± 10% specified at high end of timing range; min.
**Repeatability (Including first cycle of operation):** ± 2% for AC units add ± 1 cycle 60 Hz.
**Delta Time (for AC units add ± 1 cycle 60 Hz.):** ± 10%.
**Reset Time (power interruption):** 45 ms, typ.; 60 ms, max.
**Minimum Pulse Width, Control:** 50 ms.
**Recycle Time:** 45 ms, typ.; 60 ms, max.

### Outline Dimensions

Fits 1.77 x 1.77 (45 x 45)
Panel Cutout

---

**Input Data @ 25°C**

**Voltage: Universal Input Type:** 24 - 240V ±15%, 50/60 Hz. AC or DC.
**Fixed Input Type:** 120VAC ±15%, 50/60 Hz.

**Power Requirement:**
- Universal Input Type: 10VA @ 240VAC; 5VA @ 120VAC; 1VA @ 24VAC.
- Fixed Input Type: 3VA @ 120VAC.

**Transient Protection:** Yes.
**Reverse Voltage Protection:** Yes.

**Input Voltages and Limits @ 25°C**

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Nominal Voltage</th>
<th>Minimum Voltage</th>
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<tr>
<td>Universal</td>
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<td>276VAC/VDC</td>
</tr>
<tr>
<td>Fixed</td>
<td>120VAC</td>
<td>102VAC</td>
<td>138VAC</td>
</tr>
</tbody>
</table>

*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°C to +70°C.
**Operating:** -10°C to +55°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. See KRPA sockets (pg. 109) for details.

**Weight:** 4.3 oz. (122g) approximately.

**Contact Data @ 25°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:** 1,000V rms, 60 Hz.
**Between All Other Conductors:** 1,500V rms, 60 Hz.

**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:** ± 10% specified at high end of timing range; min.
**Repeatability (Including first cycle of operation):** ± 2% for AC units add ± 1 cycle 60 Hz.
**Delta Time (for AC units add ± 1 cycle 60 Hz.):** ± 10%.
**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 @ 25°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:** 1,000V rms, 60 Hz.
**Between All Other Conductors:** 1,500V rms, 60 Hz.
Mounting Clip Dimensions
SSA-24C667
Mounting Clip

DIP Switch Layout

Timing Range Switch Settings

Function Setting
Time Setting

Timing Function Descriptions and Switch Settings

Delay on Operate

Interval On (Input Controlled)

Recycler (Initially Off)

Recycler (Initially On)

Delay on Release

Inverted Delay on Release

Interval On (Switch Controlled)

Interval Off

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.
CNM 5 series

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 ± 15%)
- 10A output relay with DPDT contacts
- 1/16 DIN style enclosure with 11-pin plug-in base
- Thumbwheel switches for programming delay time

Initial Dielectric Strength
Between Output Poles: 1,500V rms, 60 Hz.
Between Input and Output: 1,500V rms, 60Hz.

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 hr.
Timing Adjustment: Digital adjustment via thumbwheel switches.
Tolerance: ±0.05% ±0.04 sec.*
Repeatability (Including first cycle of operation): < ±0.05% ±0.04 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 @ 25°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 @ 25°C
Voltage: 120VAC ± 15%, 60 Hz.
Power Requirement: 3VA @ 120VAC.
Transient Protection: 13 Joule MOV.

Input Voltage & Limits

<table>
<thead>
<tr>
<th>Nominal Voltage</th>
<th>Minimum Voltage</th>
<th>Maximum Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>120VAC</td>
<td>102VAC</td>
<td>138VAC</td>
</tr>
</tbody>
</table>

Environmental Data
Temperature Range: Storage: -40°C to +85°C.
Operating: -10°C to +55°C.
Humidity: 85% relative humidity, non-condensing.

Mechanical Data
Termination: 11-pin octal style plug.
Enclosure: Black plastic 1/16 DIN (48mm x 48mm) case.
Sockets: Fits either 27E123 or 27E892 (snap-on) screw terminal sockets.
Weight: 4.3 oz. (122g) approximate.

Ordering Information –The following items are normally maintained in stock for immediate delivery.

Time Delay Relay

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Part Number</th>
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</thead>
<tbody>
<tr>
<td>120VAC</td>
<td>CNM5</td>
</tr>
</tbody>
</table>

Outline Dimensions
Fits 1.77 x 1.77 (45 x 45) panel cutout.

Wiring Diagrams (Bottom Views)
(pins numbered clockwise from keyway)

**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.
Timer Function Descriptions

**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 turned 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.

**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

LED to show time status. See functional explanation for details.
CN1 series

On Delay, Time Delay Relay For Plug-In or Panel Mounting

- 0.1 sec. to 9,990 hr. timing range
- Fixed input type (120VAC ± 15%)
- 10A output relay with DPDT contacts
- 1/16 DIN style enclosure with 8-pin plug-in base
- Thumbwheel switches for programming delay time

Specifications and availability subject to change without notice.

13C2610 Printed in U.S.A. IH/4-00
**CG series**

**CMOS IC Time Delay Relay**
- Repeatability to .05%
- 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 0.5 sec. to 100 min.

Contact Data @ 25°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: 500V rms, 60 Hz.
Between All Other Conductors: 500V rms, 60 Hz.

Input Data @ 25°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°C

<table>
<thead>
<tr>
<th>Voltage Type</th>
<th>Nominal Voltage</th>
<th>Minimum Voltage</th>
<th>Maximum Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>120</td>
<td>105</td>
<td>130</td>
</tr>
<tr>
<td>DC</td>
<td>24</td>
<td>20</td>
<td>32</td>
</tr>
</tbody>
</table>

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°C to +85°C.
- Operating: -10°C to +55°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. (227g) approximately.
Delay on Operate Models

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>120VAC</td>
<td>0.5 to 5 Min.</td>
<td>Knob</td>
<td>CGB-38-70005M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 to 10 Min.</td>
<td></td>
<td>CGB-38-70010M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 to 50 Min.</td>
<td></td>
<td>CGB-38-70050M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 to 100 Min.</td>
<td></td>
<td>CGB-38-70100M</td>
<td></td>
</tr>
<tr>
<td>24VDC</td>
<td>5 to 50 Min.</td>
<td></td>
<td>CGD-38-30050M</td>
<td></td>
</tr>
</tbody>
</table>

Delay on Release Models

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>120VAC</td>
<td>1 to 10 Min.</td>
<td>Knob</td>
<td>CGB-38-78010M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 to 50 Min.</td>
<td></td>
<td>CGB-38-78050M</td>
<td></td>
</tr>
</tbody>
</table>

Interval on Models

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>120VAC</td>
<td>0.5 to 5 Sec.</td>
<td>Knob</td>
<td>CGB-38-79005S</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 to 10 Min.</td>
<td></td>
<td>CGB-38-79010M</td>
<td></td>
</tr>
<tr>
<td>24VDC</td>
<td>1 to 10 Min.</td>
<td></td>
<td>CGD-38-39010M</td>
<td></td>
</tr>
</tbody>
</table>

Outline Dimensions

![Outline Dimensions Diagram]

Wiring Diagrams – Bottom Views (pins numbered clockwise from keyway)

![Wiring Diagram 1](#)

![Wiring Diagram 2](#)

* 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 “−”.

Specifications and availability subject to change without notice. 
13C2400 Printed in U.S.A. IH4-00
CD series

CMOS IC Time Delay Relay
• 1% Repeatability
• Operates from -40°C to +55°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.

File E22575
File LR15734

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.

Initial Dielectric Strength
Between Open Contacts: 500V rms, 60 Hz.
Between All Other Conductors: 500V rms, 60 Hz.

Input Data @ 25°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 @ 25°C

<table>
<thead>
<tr>
<th>Voltage Type</th>
<th>Nominal Voltage</th>
<th>Minimum Voltage</th>
<th>Maximum Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>24</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>105</td>
<td>130</td>
</tr>
<tr>
<td>DC</td>
<td>12</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>20</td>
<td>32</td>
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<td></td>
<td>48</td>
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<td>55</td>
</tr>
<tr>
<td></td>
<td>110</td>
<td>95</td>
<td>125</td>
</tr>
</tbody>
</table>

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°C to +85°C.
Operating: -40°C to +55°C.

Mechanical Data
Termination: 8- or 11-pin octal style plug.
Enclosure: Yellow plastic case. Knob adjustable types have dial scale calibrated in seconds ±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 oz. (227g) approximately.

Contact Data @ 25°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.
Ordering Information – Boldface items listed below are normally maintained in stock for immediate delivery.

### Delay on Operate Models

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>120VAC</td>
<td>0.1 to 1 Sec.</td>
<td></td>
<td>CDB-38-70001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.1 to 5 Sec.</td>
<td></td>
<td>CDB-38-70002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.3 to 30 Sec.</td>
<td>Knob</td>
<td>CDB-38-70006</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.6 to 60 Sec.</td>
<td>Knob</td>
<td>CDB-38-70004</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.8 to 180 Sec.</td>
<td>Knob</td>
<td>CDB-38-70005</td>
<td></td>
</tr>
<tr>
<td>120VAC</td>
<td>1 Sec.</td>
<td>Fixed</td>
<td>CDA-38-70012</td>
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</tr>
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</table>

### Delay on Release Models

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>120VAC</td>
<td>0.1 to 1 Sec.</td>
<td></td>
<td>CDB-38-70016</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.1 to 5 Sec.</td>
<td></td>
<td>CDB-38-70091</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.1 to 10 Sec.</td>
<td>Knob</td>
<td>CDB-38-70014</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.3 to 30 Sec.</td>
<td>Knob</td>
<td>CDB-38-70092</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.6 to 60 Sec.</td>
<td>Knob</td>
<td>CDB-38-70012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.8 to 180 Sec.</td>
<td>Knob</td>
<td>CDB-38-70015</td>
<td></td>
</tr>
<tr>
<td>120VAC</td>
<td>1 Sec.</td>
<td>Fixed</td>
<td>CDA-38-70025</td>
<td></td>
</tr>
<tr>
<td>12VDC</td>
<td>180 Sec.</td>
<td>Fixed</td>
<td>CDC-38-20026</td>
<td></td>
</tr>
<tr>
<td>24VDC</td>
<td>0.1 to 10 Sec.</td>
<td></td>
<td>CDD-38-30014</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.6 to 60 Sec.</td>
<td>Knob</td>
<td>CDD-38-30012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.8 to 180 Sec.</td>
<td>Knob</td>
<td>CDD-38-30008</td>
<td></td>
</tr>
</tbody>
</table>

### Outline Dimensions

![Outline Dimensions Diagram]

### Wiring Diagrams – Bottom Views (pins numbered clockwise from keyway)

![Wiring Diagrams](Fig. 1 8 Pin) ![Wiring Diagrams](Fig. 2 11 Pin) ![Wiring Diagrams](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.
Initial Dielectric Strength

Between Open Contacts: 500V rms, 60 Hz.
Between All Other Conductors: 500V rms, 60 Hz.

### 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.

- **Delay on dropout**
  - The relay operates immediately upon application of input voltage. Timing begins when input voltage is removed. When timing is complete, the relay will de-energize. Reset occurs when input voltage is reapplied.

- **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.

### Timing Specifications

- **Timing Ranges**: From 0.1 to 180 sec.
- **Timing Adjustment**: External resistor and knob adjustable.
- **Tolerance (for AC units add ±1/2 cycle 60 Hz)**:
  - Knob Adj. Types: ±0, +20% of max. specified at high end of timing range; min. specified, or less, at low end.
  - Fixed Types: ±5%.
  - Res. Adj. Types: ±5% at high end of timing range; min. specified, or less, at low end.
  - Delta Time (for AC units add ±1 cycle 60 Hz): ±10%.
  - Repeatability (for AC units add ±1 cycle 60 Hz): ±2%.
  - Release Time: 60 ms, typ.; 100 ms, max.
  - Recycle Time: 60 ms, typ.; 100 ms, max.

### Contact Data @ 25°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.

### Environmental Data

- **Temperature Range**: Storage: -55°C to +85°C.
- **Operating**: -10°C to +55°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. (170g) approximately.
Ordering Information – Boldface items listed below are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Delay On Operate Models</th>
<th>Delay On Release Models</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voltage</strong></td>
<td><strong>Time</strong></td>
</tr>
<tr>
<td>24VAC</td>
<td>0.1 to 10 Sec.</td>
</tr>
<tr>
<td>120VAC</td>
<td>0.1 to 10 Sec.</td>
</tr>
<tr>
<td>1.2 to 120 Sec.</td>
<td>CKB-38-70120</td>
</tr>
<tr>
<td>120VAC</td>
<td>0.1 to 10 Sec.</td>
</tr>
<tr>
<td>12VDC</td>
<td>0.1 to 10 Sec.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Delay On Dropout Models</th>
<th>Interval On Models</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voltage</strong></td>
<td><strong>Time</strong></td>
</tr>
<tr>
<td>24VAC</td>
<td>0.1 to 10 Sec.</td>
</tr>
<tr>
<td>0.6 to 60 Sec.</td>
<td>CKB-38-77010</td>
</tr>
<tr>
<td>1.2 to 120 Sec.</td>
<td>CKB-38-77120</td>
</tr>
<tr>
<td>120VAC</td>
<td>0.1 to 10 Sec.</td>
</tr>
<tr>
<td>12VDC</td>
<td>0.1 to 10 Sec.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interval On Models</th>
<th><strong>Voltage</strong></th>
<th><strong>Time</strong></th>
<th><strong>Adjustment</strong></th>
<th><strong>Wiring Dia.</strong></th>
<th><strong>Part Number</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>120VAC</td>
<td>0.1 to 10 Sec.</td>
<td>Knob 3</td>
<td>CKB-38-79010</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Outline Dimensions

Wiring Diagrams – Bottom Views (pins numbered clockwise from keyway)

* 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 “−”.

External Resistor Chart

See External Resistor Selection Charts at beginning of Time Delay Relay section of this Databook.
**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.

**Contact Data @ 25°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: 500V rms, 60 Hz.
- Between All Other Conductors: 500V rms, 60 Hz.

**Input Data @ 25°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 @ 25°C**

<table>
<thead>
<tr>
<th>Voltage Type</th>
<th>Nominal Voltage</th>
<th>Minimum Voltage</th>
<th>Maximum Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>24</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>105</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>240</td>
<td>210</td>
<td>260</td>
</tr>
<tr>
<td>DC</td>
<td>24</td>
<td>20</td>
<td>32</td>
</tr>
</tbody>
</table>

*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: -65°C to +85°C.
  - Operating: -10°C to +55°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. (170g) approximately.
Ordering Information – Boldface items listed below are normally maintained in stock for immediate delivery.

### Delay on Operate Models

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VAC</td>
<td>1 to 10 Sec.</td>
<td>Knob 1</td>
<td>CHB-38-30001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 to 180 Sec.</td>
<td></td>
<td>CHB-38-30003</td>
<td></td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 10 Sec.</td>
<td>Knob 1</td>
<td>CHB-38-70001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 to 60 Sec.</td>
<td></td>
<td>CHB-38-70002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 to 180 Sec.</td>
<td></td>
<td>CHB-38-70003</td>
<td></td>
</tr>
<tr>
<td>120VAC</td>
<td>10 Sec.</td>
<td>Fixed 1</td>
<td>CHA-38-70001</td>
<td></td>
</tr>
<tr>
<td>240VAC</td>
<td>1 to 10 Sec.</td>
<td>Knob 1</td>
<td>CHB-38-80001</td>
<td></td>
</tr>
<tr>
<td>24VDC</td>
<td>1 to 10 Sec.</td>
<td>Knob 1</td>
<td>CHD-38-30001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 to 180 Sec.</td>
<td></td>
<td>CHD-38-30003</td>
<td></td>
</tr>
</tbody>
</table>

### Delay on Release Models

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VAC</td>
<td>1 to 10 Sec.</td>
<td>Knob 3</td>
<td>CHB-38-70011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 to 180 Sec.</td>
<td></td>
<td>CHB-38-70013</td>
<td></td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 10 Sec.</td>
<td>Knob 3</td>
<td>CHB-38-70011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 to 180 Sec.</td>
<td></td>
<td>CHB-38-70013</td>
<td></td>
</tr>
<tr>
<td>24VDC</td>
<td>1 to 10 Sec.</td>
<td>Knob 3</td>
<td>CHB-38-30011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 to 180 Sec.</td>
<td></td>
<td>CHB-38-30013</td>
<td></td>
</tr>
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</table>

### Interval on Models

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>120VAC</td>
<td>1 to 10 Sec.</td>
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<td>CHB-38-70021</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 to 180 Sec.</td>
<td></td>
<td>CHB-38-70023</td>
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<td>1 to 10 Sec.</td>
<td>Knob 1</td>
<td>CHB-38-30021</td>
<td></td>
</tr>
</tbody>
</table>

### Outline Dimensions

- **External Resistor**: Input 8 Pin, 11 Pin
- **Ext Switch**: Ac Input

**If control switch is closed when power is applied, relay will immediately energize.**

**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 “–”.

### Wiring Diagrams – Bottom Views (pins numbered clockwise from keyway)

Fig. 1 8 Pin
Fig. 2 11 Pin
Fig. 3 11 Pin
**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.

**Contact Data @ 25°C**

**Input Data @ 25°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.

**Environmental Data**
Temperature Range: Storage: -55°C to +85°C.
Operating: -10°C to +55°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. (170g) approximately.
Ordering Information – Boldface items listed below are normally maintained in stock for immediate delivery.

### Delay on Operate Models

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VAC</td>
<td>0.1 to 10 Sec.</td>
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<td>1</td>
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<tr>
<td></td>
<td>1.8 to 180 Sec</td>
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<td></td>
<td>CB-1042B-30</td>
</tr>
<tr>
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<td>0.1 to 1 Sec.</td>
<td>Knob</td>
<td>1</td>
<td>CB-1001B-70</td>
</tr>
<tr>
<td></td>
<td>0.1 to 5 Sec.</td>
<td></td>
<td></td>
<td>CB-1002B-70</td>
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<tr>
<td></td>
<td>0.6 to 60 Sec.</td>
<td></td>
<td></td>
<td>CB-1004B-70</td>
</tr>
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<td></td>
<td>1.8 to 180 Sec</td>
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<td></td>
<td>CB-1005B-70</td>
</tr>
<tr>
<td></td>
<td>1 to 10 Min.</td>
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<td></td>
<td>CB-1006B-70</td>
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<td></td>
<td>10 to 100 Min.</td>
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<td>0.6 to 60 Sec.</td>
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### Delay on Release Models

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<tr>
<td>120VAC</td>
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<td>Knob</td>
<td>3</td>
<td>CB-1021B-78</td>
</tr>
<tr>
<td></td>
<td>0.1 to 10 Sec.</td>
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<td>CB-1022B-78</td>
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<td></td>
<td>0.6 to 60 Sec.</td>
<td></td>
<td></td>
<td>CB-1023B-78</td>
</tr>
<tr>
<td></td>
<td>1.8 to 180 Sec</td>
<td></td>
<td></td>
<td>CB-1024B-78</td>
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<tr>
<td>24VDC</td>
<td>0.1 to 10 Sec.</td>
<td>Knob</td>
<td>3</td>
<td>CB-1038D-38</td>
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<tr>
<td></td>
<td>1.8 to 180 Sec</td>
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<td>CB-1039D-38</td>
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### Interval on Models

<table>
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<tr>
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<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Knob</td>
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<tr>
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<td>0.1 to 5 Sec.</td>
<td>Knob</td>
<td>1</td>
<td>CB-1011B-79</td>
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<tr>
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<td>0.1 to 10 Sec.</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>1 to 10 Min.</td>
<td></td>
<td></td>
<td>CB-1018B-79</td>
</tr>
<tr>
<td>24VDC</td>
<td>0.1 to 5 Sec.</td>
<td>Knob</td>
<td>1</td>
<td>CB-1034D-39</td>
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<td></td>
<td>1.8 to 180 Sec</td>
<td></td>
<td></td>
<td>CB-1036D-39</td>
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</table>

### Wiring Diagrams - Bottom Views (pins numbered clockwise from keyway)

* 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 "-".
Specifications and availability subject to change without notice.

---

**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.

File E22575
File LR15734

### Timing Specifications

**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 de-energize.

### Input Data @ 25°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.

### Contact Data @ 25°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.

### Environmental Data

- **Temperature Range:**
  - **Storage:** -55°C to +85°C.
  - **Operating:** -10°C to +55°C.

### 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

- **Boldface items listed below are normally maintained in stock for immediate delivery.**

<table>
<thead>
<tr>
<th>AC Types</th>
<th>Voltage Time</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.1 to 10 Sec.</td>
<td>CRB-48-70010</td>
</tr>
<tr>
<td>120VAC</td>
<td>0.3 to 30 Sec.</td>
<td>CRB-48-70030</td>
</tr>
<tr>
<td>0.6 to 60 Sec.</td>
<td>CRB-48-70060</td>
<td></td>
</tr>
<tr>
<td>1.8 to 190 Sec.</td>
<td>CRB-48-70180</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DC Type</th>
<th>Voltage Time</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24VDC 1.8 to 180 Sec.</td>
<td>CRD-48-30180</td>
</tr>
</tbody>
</table>

### Outline Dimensions

- **Wiring Diagram – Bottom View**
  - (pins numbered clockwise form keyway)
  - **Note:** Input polarity for DC operation. For most reliable operation on AC, connect high side to "+" and low side to "-".
CL-CU series

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)

Environmental Data

Temperature Range: Storage: -55°C to +85°C.
Operating: -10°C to +55°C.

Mechanical Data

Termination: 0.187 in. (4.75mm) quick-connect.
Enclosure: Yellow plastic case (see outline drawings for various options).
Sockets: Solder, printed circuit and screw terminal sockets available.
Weight: 3.5 oz. (99g) approximately.

CL Ordering Information – Boldface items listed below are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Voltage Type</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VAC</td>
<td>0.1 to 10 Sec.</td>
<td>Knob</td>
<td>1</td>
<td>CLB-51-30010</td>
</tr>
<tr>
<td>24VAC</td>
<td>0.1 to 10 Sec.</td>
<td>Resistor</td>
<td>2</td>
<td>CLF-42-30010</td>
</tr>
<tr>
<td>120VAC</td>
<td>0.1 to 10 Sec.</td>
<td>Knob</td>
<td>1</td>
<td>CLB-71-70010</td>
</tr>
<tr>
<td>120VAC</td>
<td>0.1 to 10 Sec.</td>
<td>Resistor</td>
<td>2</td>
<td>CLF-41-70010</td>
</tr>
<tr>
<td>120VAC</td>
<td>0.1 to 10 Sec.</td>
<td>Resistor</td>
<td>2</td>
<td>CLF-42-70010</td>
</tr>
<tr>
<td>120VAC</td>
<td>0.1 to 10 Sec.</td>
<td>Resistor</td>
<td>2</td>
<td>CLF-41-70010</td>
</tr>
<tr>
<td>120VAC</td>
<td>0.1 to 10 Sec.</td>
<td>Resistor</td>
<td>2</td>
<td>CLF-42-70010</td>
</tr>
<tr>
<td>120VAC</td>
<td>0.1 to 10 Sec.</td>
<td>Resistor</td>
<td>2</td>
<td>CLF-41-70010</td>
</tr>
<tr>
<td>120VAC</td>
<td>0.1 to 10 Sec.</td>
<td>Resistor</td>
<td>2</td>
<td>CLF-42-70010</td>
</tr>
</tbody>
</table>

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 ±1/2 cycle 60 Hz.):
Knob Adj. Types: ±0, +20% of max. specified at high end of timing range; min. specified, or less, at low end.
Fixed Types: ±5%.
Res. Adj. Types: ±10% at high end of timing range; min. specified, or less, at low end.
Repeatability (for AC units add ±1 cycle 60 Hz.): ±3%.
Release Time: 150 ms, typ.; 225 ms, max.
Recycle Time: 150 ms, typ.; 225 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 ±1/2 cycle 60 Hz.):
Knob Adj. Types: ±0, +20% of max. specified at high end of timing range; min. specified, or less, at low end.
Fixed Types: ±5%.
Res. Adj. Types: ±10% at high end of timing range; min. specified, or less, at low end.
Repeatability (for AC units add ±1 cycle 60 Hz.): ±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 interrupted. CL types have no timing cycle interrupt transfer.

Input Data @ 25°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 @ 25°C

<table>
<thead>
<tr>
<th>Voltage Type</th>
<th>Nominal Voltage</th>
<th>Minimum Voltage</th>
<th>Maximum Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>24</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td>DC</td>
<td>12</td>
<td>105</td>
<td>130</td>
</tr>
<tr>
<td>AC</td>
<td>120</td>
<td>105</td>
<td>130</td>
</tr>
<tr>
<td>DC</td>
<td>24</td>
<td>20</td>
<td>32</td>
</tr>
</tbody>
</table>

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°C to +85°C.
Operating: -10°C to +55°C.

Initial Dielectric Strength

Between Open Contacts: 500V rms, 60 Hz.
Between All Other Conductors: 500V rms, 60 Hz.

Contact Data @ 25°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.

File E22575
File LR15734
Specifications and availability subject to change without notice.

13C2580 Printed in U.S.A. IH/4-00

CU Ordering Information – Boldface items listed below are normally maintained in stock for immediate delivery.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VAC</td>
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<tr>
<td>24VAC</td>
<td>1 to 10 Sec.</td>
<td>Resistor 2</td>
<td>2</td>
<td>CUF-42-30010</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 10 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70010</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 30 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70030</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 60 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70060</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 120 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70120</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 10 Sec.</td>
<td></td>
<td>1</td>
<td>CUH-41-30010</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 120 Sec.</td>
<td></td>
<td>1</td>
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<tr>
<td>24VDC</td>
<td>1 to 120 Sec.</td>
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<td>CUH-42-30010</td>
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</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
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<tr>
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<tr>
<td>24VAC</td>
<td>1 to 10 Sec.</td>
<td>Resistor 2</td>
<td>2</td>
<td>CUF-42-30010</td>
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<tr>
<td>120VAC</td>
<td>1 to 10 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70010</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 30 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70030</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 60 Sec.</td>
<td>Knob 1</td>
<td>1</td>
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<tr>
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<td>1 to 120 Sec.</td>
<td>Knob 1</td>
<td>1</td>
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</tr>
<tr>
<td>120VAC</td>
<td>1 to 10 Sec.</td>
<td></td>
<td>1</td>
<td>CUH-41-30010</td>
</tr>
<tr>
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**42 & 45 Style**

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<th>Wiring Dia.</th>
<th>Part Number</th>
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<tr>
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<tr>
<td>24VAC</td>
<td>1 to 10 Sec.</td>
<td>Resistor 2</td>
<td>2</td>
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</tr>
<tr>
<td>120VAC</td>
<td>1 to 10 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70010</td>
</tr>
<tr>
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<td>Knob 1</td>
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</tr>
<tr>
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<td>1 to 60 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70060</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 120 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70120</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 10 Sec.</td>
<td></td>
<td>1</td>
<td>CUH-41-30010</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 120 Sec.</td>
<td></td>
<td>1</td>
<td>CUH-42-30120</td>
</tr>
</tbody>
</table>

**51 Style**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Time</th>
<th>Adjustment</th>
<th>Wiring Dia.</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VAC</td>
<td>10 Sec.</td>
<td>Fixed</td>
<td>1</td>
<td>CUA-41-30010</td>
</tr>
<tr>
<td>24VAC</td>
<td>1 to 10 Sec.</td>
<td>Resistor 2</td>
<td>2</td>
<td>CUF-42-30010</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 10 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70010</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 30 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70030</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 60 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70060</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 120 Sec.</td>
<td>Knob 1</td>
<td>1</td>
<td>CUB-51-70120</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 10 Sec.</td>
<td></td>
<td>1</td>
<td>CUH-41-30010</td>
</tr>
<tr>
<td>120VAC</td>
<td>1 to 120 Sec.</td>
<td></td>
<td>1</td>
<td>CUH-42-30120</td>
</tr>
</tbody>
</table>

External Resistor Selection Chart

See External Resistor Selection Charts at beginning of Time Delay Relay section of this Databook.

**Note:** Input polarity for DC operation. For most reliable operation on AC, connect high side to “+” and low side to “-”.

---

Fig. 1

Fig. 2
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

Specifications and availability subject to change without notice.

File E22575
File LR15734

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 de-energized 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.

Engineering Data

Power Requirement: Typically less than 3VA or 3W.
Duty Cycle: Continuous.
Repeatability: ±1%, max.
Response Time: 10-25 ms, typ.
Internal Relay Contact Arrangement: 2 Form C (DPDT).
Internal Relay Contact Rating: 10A @ 28VDC, res., or 120VAC, 80% p.f.
Reverse Polarity Protection: On DC types.
Temperature Range: -10°C to +55°C.
Temperature Coefficient: 0.2%/°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. (227g) approximately.

Ordering Information – Boldface items are stocked.

Fixed Pick-Up and Adjustable Drop-Out

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Pick-Up (Volts)</th>
<th>Drop-Out Range (Volts)</th>
<th>Maximum Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSJ-38-71010</td>
<td>105</td>
<td>90-103</td>
<td>140VAC (50/60 Hz.)</td>
</tr>
<tr>
<td>CSL-38-31010</td>
<td>22</td>
<td>16-21</td>
<td>32VDC</td>
</tr>
</tbody>
</table>

Adjustable Pick-Up and Adjustable Drop-Out

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Pick-Up Range (Volts)</th>
<th>Drop-Out Range* (Volts)</th>
<th>Maximum Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSJ-38-70010</td>
<td>92-140</td>
<td>90-138</td>
<td>150VAC (50/60 Hz.)</td>
</tr>
<tr>
<td>CSL-38-30010</td>
<td>20-30</td>
<td>18-28</td>
<td>32VDC</td>
</tr>
<tr>
<td>CSL-38-40010</td>
<td>40-68</td>
<td>38-56</td>
<td>60VDC</td>
</tr>
<tr>
<td>CSL-38-60010</td>
<td>92-140</td>
<td>90-138</td>
<td>150VDC</td>
</tr>
</tbody>
</table>

* Actual maximum drop-out voltage is the selected pick-up voltage less the hysterisis voltage.

Outline Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 MAX. (15.24)</td>
<td></td>
</tr>
<tr>
<td>2,987 MAX. (76.60)</td>
<td></td>
</tr>
<tr>
<td>560 (14.22)</td>
<td></td>
</tr>
<tr>
<td>2,406 MAX. (61.11)</td>
<td></td>
</tr>
<tr>
<td>1.781 MAX. (44.24)</td>
<td></td>
</tr>
<tr>
<td>875 (22.23)</td>
<td></td>
</tr>
<tr>
<td>1.187 (30.15)</td>
<td></td>
</tr>
</tbody>
</table>

Wiring Diagrams – Bottom Views
(pins numbered clockwise from keyway)
SDAS-01 series
1.5 To 15 Amp AC Current Sensor

- Zero insertion loss
- Inductive coupling to power line
- Choice of modes
  - Adjustable overcurrent sensor
  - Adjustable undercurrent sensor
- Solid state sensing circuit
- 1 Form C (SPDT) or 2 Form C (DPDT) internal relay

### 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 SDAS-01 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 internal 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 Hz./DC ± 10%.

**Sense-Current Range:** 1.5 to 15 amps AC.

**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:** ±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°C to +85°C.

**Operating:** -25°C to +70°C.

**Enclosure:** Plastic dust cover.

**Mounting:** Socket. For sockets see KUP 3 pole sockets.

**Weight:** 3.17 oz. (90g) approximately.

### Ordering Information – Boldface items are stocked.

#### Undercurrent Sensors

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Contacts</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDAS-01-7Y2S1024</td>
<td>DPDT, 2A DC/1A AC</td>
<td>Socket</td>
</tr>
<tr>
<td>SDAS-01-7X1S1024</td>
<td>SPDT, 5A DC/2.5A AC</td>
<td>Socket</td>
</tr>
</tbody>
</table>

#### Overcurrent Sensors

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Contacts</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDAS-01-8Y2S1024</td>
<td>DPDT, 2A DC/1A AC</td>
<td>Socket</td>
</tr>
</tbody>
</table>

### Wiring Diagrams – Bottom Views

#### 1 Form C

1. 2
2. INPUT VOLTS AC or DC
3. 5
4. 7
5. 9
6. 6

#### 2 Form C

1. 2
2. INPUT VOLTS AC or DC
3. 5
4. 7
5. 9
6. 6