Table of Contents

<table>
<thead>
<tr>
<th>Specialty Relays</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDR Series</td>
<td>12-2, 12-3</td>
</tr>
<tr>
<td>2100 Series</td>
<td>12-4 – 12-7</td>
</tr>
<tr>
<td>7000 Series</td>
<td>12-8 – 12-14</td>
</tr>
<tr>
<td>E7000 Series</td>
<td>12-15 – 12-20</td>
</tr>
<tr>
<td>EGP Series</td>
<td>12-21 – 12-27</td>
</tr>
<tr>
<td>EML Series</td>
<td>12-21 – 12-27</td>
</tr>
<tr>
<td>ETR Series</td>
<td>12-21 – 12-27</td>
</tr>
<tr>
<td>GP Series</td>
<td>12-28 – 12-30</td>
</tr>
<tr>
<td>ML Series</td>
<td>12-28, 12-29, 12-32</td>
</tr>
<tr>
<td>TR Series</td>
<td>12-28, 12-31, 12-32</td>
</tr>
<tr>
<td>PMA Series</td>
<td>12-33, 12-34</td>
</tr>
<tr>
<td>PMB Series</td>
<td>12-33, 12-34</td>
</tr>
<tr>
<td>VCA Series</td>
<td>12-35</td>
</tr>
<tr>
<td>VMA Series</td>
<td>12-36</td>
</tr>
<tr>
<td>SCB Series</td>
<td>12-37</td>
</tr>
<tr>
<td>SCC Series</td>
<td>12-37</td>
</tr>
<tr>
<td>SCE Series</td>
<td>12-38</td>
</tr>
<tr>
<td>SCF Series</td>
<td>12-39</td>
</tr>
<tr>
<td>SRC Series</td>
<td>12-40</td>
</tr>
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<td>SSC Series</td>
<td>12-41</td>
</tr>
<tr>
<td>SSF Series</td>
<td>12-42</td>
</tr>
<tr>
<td>SST Series</td>
<td>12-43</td>
</tr>
<tr>
<td>STA Series</td>
<td>12-44</td>
</tr>
<tr>
<td>VTM1 Series</td>
<td>12-45</td>
</tr>
<tr>
<td>VTM-1 Series</td>
<td>12-46</td>
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<tr>
<td>VTM2 Series</td>
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<td>VTM7 Series</td>
<td>12-50</td>
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<tr>
<td>VTMA1 Series</td>
<td>12-51</td>
</tr>
<tr>
<td>VTMR1 Series</td>
<td>12-52</td>
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</tbody>
</table>
MDR Series, 10 Amp Rotary Relay
For Demanding Shock & Vibration Applications

Product Facts
- AC and DC coils, latching and non-latching
- 4PDT through 24PDT contact arrangements
- Contacts will not chatter when relays are subjected to high-impact shock blows of 2000 ft.-lbs

Specifications
Contact Data
Arrangements — 4 Form C (4PDT) through 24 Form C (24PDT).

<table>
<thead>
<tr>
<th>Contact Ratings</th>
<th>Single Contacts</th>
<th>Two Contacts in Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 A, 115 VAC</td>
<td>3 A, 440 VAC</td>
<td></td>
</tr>
<tr>
<td>3 A, 28 VDC</td>
<td>15 A, 115 VAC</td>
<td></td>
</tr>
<tr>
<td>0.5 A, 125 VDC</td>
<td>1.5 A, 125 VDC</td>
<td></td>
</tr>
</tbody>
</table>

The above AC contact ratings are based on contact loads having a 50% power factor. The DC contact ratings are based on resistive loads.

Operate Data @ 77°F [25°C]

<table>
<thead>
<tr>
<th>Type</th>
<th>Typ. Operate Time (ms)</th>
<th>Typ. Release Time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small AC Non-Latching</td>
<td>5 to 12</td>
<td>5 to 18</td>
</tr>
<tr>
<td>Small DC Non-Latching</td>
<td>15 to 30</td>
<td>5 to 15</td>
</tr>
<tr>
<td>Small AC Latching</td>
<td>6 to 12</td>
<td>N/A</td>
</tr>
<tr>
<td>Small DC Latching</td>
<td>10 to 16</td>
<td>N/A</td>
</tr>
<tr>
<td>Medium AC Non-Latching</td>
<td>6 to 12</td>
<td>6 to 20</td>
</tr>
<tr>
<td>Medium DC Non-Latching</td>
<td>65 to 90</td>
<td>10 to 30</td>
</tr>
<tr>
<td>Medium AC Latching</td>
<td>8 to 14</td>
<td>N/A</td>
</tr>
<tr>
<td>Medium DC Latching</td>
<td>30 to 80</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Latching Two-Position Types — Except for the latching feature, MDR latching relays utilize the same general construction as non-latching types. They have two sets of coils and provide a latching two-position operation.

Environmental Data
Temperature Range —
Standard models — 0°F to +149°F
[0°C to +65°C]
Special order models — 0°F to +194°F
[0°C to +90°C]

Mechanical Data
Termination — #5-40 screw terminals supplied

Weight (Approx.) —
Small —
4 & 8PDT — 32 oz. [0.914 kg];
12PDT — 33 oz. [0.943 kg]
Medium —
16PDT — 72 oz. [2.04 kg];
24PDT — 74 oz. [2.10 kg]

Contact Section
Contacts Shown With Coil 1-2 De-Energized and Coil 3-4 Energized.

Coils Must be Energized Alternately, Not Simultaneously.

Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents. Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 01-800-733-8926
C. America: 55-91-1106-0803
South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-8706-080-208
MDR Series, 10 Amp Rotary Relay
For Demanding Shock & Vibration Applications (Continued)

Ordering Information and Coil Characteristics — No models in this series are maintained in stock.

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Number</th>
<th>Contacts</th>
<th>Coil Voltage (60 Hz for AC)</th>
<th>Coil Current (Amps)</th>
<th>DC Coil Resistance (Ohms)</th>
<th>Coil Power* (Watts)</th>
<th>Breakdown (Volts RMS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>MDR-131-1</td>
<td>4PDT</td>
<td>115 VAC</td>
<td>0.215</td>
<td>66</td>
<td>6.5</td>
<td>1,230</td>
</tr>
<tr>
<td></td>
<td>MDR-131-2</td>
<td>4PDT</td>
<td>440 VAC</td>
<td>0.045</td>
<td>1,256</td>
<td>5.1</td>
<td>1,880</td>
</tr>
<tr>
<td></td>
<td>MDR-135-1</td>
<td>4PDT</td>
<td>28 VDC</td>
<td>0.362</td>
<td>76</td>
<td>10.0</td>
<td>1,308</td>
</tr>
<tr>
<td></td>
<td>MDR-137-8</td>
<td>4PDT</td>
<td>125 VDC</td>
<td>0.082</td>
<td>1,520</td>
<td>10.3</td>
<td>2,375</td>
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<td></td>
<td>MDR-134-1</td>
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<td>6.5</td>
<td>1,230</td>
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<td>8PDT</td>
<td>125 VDC</td>
<td>0.082</td>
<td>1,520</td>
<td>10.3</td>
<td>2,375</td>
</tr>
</tbody>
</table>

*Actual Wattmeter readings.

Outline Dimensions

Small Models

![Small Models Diagram]

Medium Models

![Medium Models Diagram]

Overall Height
8PDT 3.53 [89.7] Max.
12PDT 3.88 [98.6] Max.

Coil and Contact Terminal Screws #5-40 Supplied.
AGASTAT 2100 Series, Miniature Electropneumatic Timing Relay

Operation

Series 2112 (On-Delay) — Applying rated voltage to the solenoid coil starts the preset time delay. At the end of the delay period, the NC contacts break and the NO contacts make. Contacts remain in this position until the coil is re-energized. When the switch is de-energized, the switch instantly returns to its original position. Re-energizing the coil, either during or after the delay period, will immediately (within 25 msecs.) recycle the unit. It will then provide another full delay period on re-energization.

Series 2122 (Off-Delay) — Applying rated voltage to the coil for at least 75 msecs. (for accurate timing) will instantaneously transfer the switch, breaking the NC contacts and making the NO contacts. Contacts remain in this position as long as the coil is energized. The preset time delay period begins as soon as the coil is de-energized, at the end of which the switch returns to its original position.

No power is required during the timing period. Re-energizing the coil, either during or after the delay period, will immediately start a new cycle with full delay period.

Operation (Listed values at nominal voltage, 25°C unless noted)

Operating Mode — 2112 — On-delay (delay on pull-in); 2122 — Off-delay (delay on drop-out)

Timing Adjustment — All standard models offer easy linear adjustment over one of nine timing ranges listed below. For applications requiring frequent readjustment, the external knob model is recommended. For tamper-proof installation or where readjustment is infrequent, the internal key model may be preferred. This model requires removal of the cover plate for timing adjustment. Hermetically sealed models provide a slotted adjusting screw under the cap nut on the top cover.

Timing Ranges —

<table>
<thead>
<tr>
<th>Code</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>.03 to .1 sec.</td>
</tr>
<tr>
<td>B</td>
<td>.1 to .3 sec.</td>
</tr>
<tr>
<td>C</td>
<td>.15 to 1.0 sec.</td>
</tr>
<tr>
<td>D</td>
<td>.375 to 3.0 sec.</td>
</tr>
<tr>
<td>E</td>
<td>.75 to 10.0 sec.</td>
</tr>
<tr>
<td>F</td>
<td>1.0 to 30.0 sec.</td>
</tr>
<tr>
<td>G</td>
<td>2.0 to 60.0 sec.</td>
</tr>
<tr>
<td>H</td>
<td>5.0 to 120.0 sec.</td>
</tr>
<tr>
<td>J</td>
<td>5.0 to 180.0 sec.</td>
</tr>
<tr>
<td>K</td>
<td>1.5 to 30.0 cycles</td>
</tr>
</tbody>
</table>

Limitations:

L 3.0 to 120.0 cycles

Repeat Accuracy — NORMAL VERTICAL POSITION ±5% at 25°C, ±7% at 85°C, ±8% at -55°C. The average time between -55°C and 85°C will be within ±20% of the average @ 25°C with a proportionally reduced effect at lesser extremes. In extremely short delay settings an additional 8 msecs. may result on AC models due to "half cycle" alternating current effect.

Setting Tolerance — Factory time setting, when specified, subject to additional ±5% tolerance.

Position Sensitivity —

HORIZONTAL POSITION — Approximately 5% increase from the initial time in the vertical position.

INVERTED POSITION — Approximately 10% increase from the initial time in the vertical position.


Relay Release Time — 25 msecs. (2112 Series)

Relay Operate Time — 75 msecs. (2122 Series)

Operating Voltage — Coil Data

<table>
<thead>
<tr>
<th>Code</th>
<th>Nominal Operating Voltage</th>
<th>Resistance Ohms ±10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>12VDC</td>
<td>30</td>
</tr>
<tr>
<td>N</td>
<td>28VDC</td>
<td>131</td>
</tr>
<tr>
<td>P</td>
<td>48VDC</td>
<td>500</td>
</tr>
<tr>
<td>R</td>
<td>110VDC</td>
<td>3200</td>
</tr>
<tr>
<td>S</td>
<td>120V 60 Hz</td>
<td>190 (2112 Series)</td>
</tr>
<tr>
<td>T</td>
<td>240V 60Hz</td>
<td>775</td>
</tr>
<tr>
<td>U</td>
<td>115V 400Hz</td>
<td>2600</td>
</tr>
<tr>
<td>Y</td>
<td>125VDC</td>
<td>3380</td>
</tr>
</tbody>
</table>

Transients — Insensitive to transients of ±1500 VAC for 10 milliseconds

Dielectric — 1000V RMS @ 60Hz between non-connected terminals.

Contact Rating (DPDT Contacts) —

<table>
<thead>
<tr>
<th>Code</th>
<th>Inductive (Amps)</th>
<th>Resistive (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30V DC</td>
<td>110V DC</td>
</tr>
<tr>
<td>L</td>
<td>2</td>
<td>.75</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Based on 100,000 operations electrical, 1,000,000 mechanical. Inductive and capacitive load should not have inrush currents that exceed five times normal operating load.

Ambient Temperature Range — -55°C to +85°C

Weight — Maximum, any unit - 17 ozs.

Mounting/Terminals — Chassis mounting tabs, octal plugs and external (-4) or internal (-5) adjustment. Panel mounting back plate, internal adjustment, and solder hook terminals (-9).

These are minimum standards; where more severe environmental conditions must be met, please consult the factory.
Outline Dimensions for Industrial Models (Dimensions in inches. Multiply by 25.4 to obtain millimeters.)

Ordering Information for Industrial Models

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>21</th>
<th>1</th>
<th>2</th>
<th>D</th>
<th>4</th>
<th>N</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Basic Series:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 = 2100 Miniature electropneumatic timing relay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2. Operation:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 = On-delay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 = Off-delay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3. Contact Arrangement:</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2 = DPDT (2 form C)</td>
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<td></td>
</tr>
<tr>
<td>4. Operating Voltage:</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>A = AC</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>D = DC</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5. Physical Characteristics:</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Code</td>
<td>Enclosure</td>
<td>Adjustment</td>
<td>Connector</td>
<td>Mounting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 = Unsealed</td>
<td>External Knob</td>
<td>Octal Plug</td>
<td>Chassis Mount</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5 = Unsealed</td>
<td>Internal Key</td>
<td>Octal Plug</td>
<td>Chassis Mount</td>
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<tr>
<td>9 = Unsealed</td>
<td>Internal Key</td>
<td>Solder Hook</td>
<td>Panel Mount Plate</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>6. Coil Voltage:</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>M = 12VDC</td>
<td>N = 28VDC</td>
<td>P = 48VDC</td>
<td>R = 110VDC</td>
<td>Y = 125VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S = 120VAC, 50/60 Hz.</td>
<td>T = 240VAC, 60 Hz.</td>
<td></td>
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</tr>
<tr>
<td>7. Timing Range:</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>A = .03 to 1.0 sec.</td>
<td>C = .15 to 1.0 sec.</td>
<td>E = .75 to 10.0 sec.</td>
<td>H = 5.0 to 120.0 sec.</td>
<td>K = 1.5 to 30.0 cycles</td>
<td></td>
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</tr>
<tr>
<td>B = .1 to .3 sec.</td>
<td>D = .375 to 3.0 sec.</td>
<td>F = 1.0 to 30.0 sec.</td>
<td>J = 5.0 to 180.0 sec.</td>
<td>L = 3.0 to 120.0 cycles</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

None at present.
Specifications for Hermetically Sealed Models

**Dielectric** — Withstands 1,000 Volts RMS at 60 Hz between non-connected terminals.

**Other** — AGASTAT Miniature Timing Relays also conform to applicable requirements covering:
- Moisture
- Ozone
- Humidity
- Sunshine
- Sand/Dust
- Acoustic Noise
- Salt Spray
- Prolonged Storage

Outline Dimensions for Hermetically Sealed Models (In inches. Multiply by 25.4 for millimeters.)

---

Catalog 5-1773450-5
Revised 9-08

Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 01-800-733-8926
C. America: 52-55-1106-0803
UK: 44-8706-080-208
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013

www.tycoelectronics.com
AGASTAT 2100 Series, Miniature Electropneumatic Timing Relay (Continued)

Ordering Information for Hermetically Sealed & Unsealed Models

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>21</th>
<th>1</th>
<th>2</th>
<th>D</th>
<th>H1</th>
<th>N</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Basic Series:</td>
<td>21 = 2100 Miniature electropneumatic timing relay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Operation:</td>
<td>1 = On-delay</td>
<td>2 = Off-delay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Contact Arrangement:</td>
<td>2 = DPDT (2 form C)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Operating Voltage:</td>
<td>A = AC</td>
<td>D = DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Physical Characteristics:</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Enclosure</td>
<td>Adjustment</td>
<td>Connector</td>
<td>Mounting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1 = Hermetically Sealed</td>
<td>External Screw</td>
<td>Solder Hook</td>
<td>Panel Mount Plate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2 = Hermetically Sealed</td>
<td>External Screw</td>
<td>Octal Plug</td>
<td>Chassis Mount</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H3 = Hermetically Sealed</td>
<td>External Screw</td>
<td>&quot;AN&quot; Connector</td>
<td>Panel Mount Plate</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4 = Unsealed</td>
<td>External Knob</td>
<td>Octal Plug</td>
<td>Chassis Mount</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 = Unsealed</td>
<td>Internal Key</td>
<td>Octal Plug</td>
<td>Chassis Mount</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 = Unsealed</td>
<td>Internal Key</td>
<td>Solder Hook</td>
<td>Panel Mount Plate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Coil Voltage:</td>
<td>M = 12VDC</td>
<td>N = 28VDC</td>
<td>P = 48VDC</td>
<td>R = 110VDC</td>
<td>Y = 125VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S = 120VAC, 50/60 Hz.</td>
<td>T = 240VAC, 60 Hz.</td>
<td>U = 115VAC, 400 Hz.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Timing Range:</td>
<td>A = .03 to .1 sec.</td>
<td>C = .15 to 1.0 sec.</td>
<td>E = .75 to 10.0 sec.</td>
<td>H = 5.0 to 120.0 sec.</td>
<td>K = 1.5 to 30.0 cycles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B = .1 to .3 sec.</td>
<td>D = .375 to 3.0 sec.</td>
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<td>L = 3.0 to 120.0 cycles</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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

None at present.
**AGASTAT 7000 Series, Industrial Electropneumatic Timing Relay**

**Product Facts**
- Available in on-delay, true off-delay, and on/off-delay
- Timing from 0.1 seconds to 60 minutes, in linear increments
- Oversize time-calibrated adjustment knobs, serrated with high-resolution markings visible from all angles makes the timer easy to set timers
- Inherent transient immunity
- Standard voltages from 6-550V AC and 12-550V DC (special voltages available)
- Available in 2-pole or 4-pole models
- Numerous enclosure options — explosion proof, dust tight, watertight, hermetically-sealed, NEMA 1
- Auxiliary timed and instantaneous switches can be added for greater switching flexibility
- Many mounting options — Surface mount, Panel mount, Octal plug-in mounting
- Options: quick-connect terminals, dial stops, and transient protection module
- Easy-to-reach screw terminals, all on the face of the unit, clearly identified
- Modular assembly — timing head, coil assembly and switchblock are all individual modules, with switches field-replaceable
- File E15631, File LR29186

**Design & Construction**
There are three main components of Series 7000 Timing Relays:
- **Calibrated Timing Head** circulates air through a variable length to provide linearly adjustable timing. Patented design provides easy adjustment and long service life under severe operating conditions.
- **Precision-Wound Potted Coil** Total sealing without external leads eliminates moisture problems, gives maximum insulation value.
- **Snap-Action Switch Assembly** — custom-designed over-center mechanism provides snap action. Standard switches are DPDT arrangement.

Each of these subassemblies forms self-contained modules assembled at the factory with the other two to afford a wide choice of operating types, coil voltages, and timing ranges.

The squared design with front terminals and rear mounting permits the grouping of Series 7000 units side-by-side in minimum panel space. Auxiliary switches may be added in the base of the unit, without affecting the overall width or depth.

**Operation**
Two basic operating types are available:
- "On-Delay" models provide a delay period on energization, at the end of which the switch transfers the load from one set of contacts to another. De-energizing the unit during the delay period immediately recycles the unit, readying it for another full delay period on re-energization.
- In "Off-Delay" models the switch transfers the load immediately upon energization and the delay period does not begin until the unit is de-energized. At the end of the delay period the switch returns to its original position.

In addition to these basic operating types, "Double-Head" models offer sequential changes on pull-in and drop-out in one unit. With the addition of auxiliary switches the basic models provide two-step timing.

**Note:** Seismic & radiation tested E7000 models are available. Consult factory for detailed information.

Applying voltage to the coil (L1-L2) for at least 50 msec starts a time delay lasting for the preset time. During this period the normally closed contacts (3-5 and 4-6) remain closed. At the end of the delay period the normally closed contacts break and the normally open contacts (1-5 and 2-6) make. The contacts remain in this transferred position until the coil is de-energized, at which time the switch returns to its original position.

De-energizing the coil, either during or after the delay period, will recycle the unit within 50 msec. It will then provide a full delay period upon re-energization, regardless of how often the coil voltage is interrupted before the unit has been permitted to "time-out" to its full delay setting.

Applying voltage to the coil (for at least 50 msec) will transfer the switch, breaking the normally closed contacts (1-5 and 2-6), and making the normally open contacts (3-5 and 4-6). Contacts remain in this transferred position as long as the coil is energized. The time delay begins immediately upon de-energization. At the end of the delay period the switch returns to its normal position.

Re-energizing the coil during the delay period will immediately return the timing mechanism to a point where it will provide a full delay period upon subsequent de-energization. The switch remains in the transferred position.

**On-delay model 7012 (delay on pickup)**

**Off-delay model 7022 (delay on dropout)**

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

Consult factory for ordering information.

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**Series 7000 Units: Benefits and Features**
- **Numerous enclosure options** — explosion proof, dust tight, watertight, hermetically-sealed, NEMA 1.
- **Auxiliary timed and instantaneous switches** can be added for greater switching flexibility.
- **Many mounting options** — Surface mount, Panel mount, Octal plug-in mounting.
- **Options** include quick-connect terminals, dial stops, and transient protection module.
- **Easy-to-reach screw terminals** are all on the face of the unit, clearly identified.
- **Modular assembly** — timing head, coil assembly and switchblock are all individual modules, with switches field-replaceable.

**File References**
- File E15631, File LR29186

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**Contact Information**
- **USA:** 1-800-522-6752
- **Canada:** 1-905-470-4425
- **Mexico:** 01-800-733-8926
- **C. America:** 52-55-1106-0803
- **UK:** 44-8706-080-208

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**Specifications**
- **Dimensions** are shown for reference purposes only. Specifications subject to change.
- **Note:** 7032 types and certain models with accessories are not agency approved.

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**List of approved agencies/laboratories**
- UL
- CE

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**Publication Information**
- **Catalog:** 5-1773450-5
- **Revised:** 9-08
- **www.tycoelectronics.com**

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**Technical Support**
- **Consult factory for ordering information.**
Auxiliary Switch Options

To increase the versatility of the basic timer models, auxiliary switches may be added to either on-delay or off-delay types. They switch additional circuits, provide two-step timing action, or furnish electrical interlock for sustained coil energization from a momentary impulse, depending on the type selected and its adjustment. They are installed at the factory. All auxiliary switches are SPOT with UL listings of 10A @ 125, 250, or 480 VAC. A maximum of one Code T or two Code L auxiliary switches may be added to each relay. The L or LL switch is available with on-delay relays only. The T switch is available with both the on-delay and off-delay relays.

**Auxiliary Switch Options for On-Delay**

**Instant Transfer (Auxiliary Switch Code L, maximum of 2 per relay.)**

1. Energizing coil begins time delay and transfers auxiliary switch.
2. Main switch transfers after total preset delay.
3. De-energizing coil resets both switches instantly.

Auxiliary switch is nonadjustable.

**Two-Step Timing (Auxiliary Switch Code T, maximum of 1 per relay.)**

1. Energizing coil begins time delay.
2. After first delay auxiliary switch transfers.
3. Main switch transfers after total preset delay.
4. De-energizing coil resets both switches instantly. First delay is independently adjustable, up to 30% of overall delay. (Recommended maximum 100 seconds.)

**Auxiliary Switch Options for Off-Delay**

In these models the same auxiliary switch provides either two-step timing or instant transfer action, depending on the adjustment of the actuator.

**Two-Step Timing (Auxiliary Switch Code T, maximum of 1 per relay.)**

1. Energizing coil transfers main and auxiliary switches instantly.
2. De-energizing coil begins time delay.
3. After first delay auxiliary switch transfers.
4. Main switch transfers after total preset delay. First delay is independently adjustable, up to 30% of overall delay. (Recommended maximum 100 seconds.)

**Instant Transfer (Auxiliary Switch Code L, maximum of 1 per relay.)**

1. Energizing coil transfers main and auxiliary switches instantly.
2. De-energizing coil resets auxiliary switch and begins time delay.
3. Main switch transfers after total preset delay.

Auxiliary switch is factory adjusted to give instant transfer operation. Two-step timing may be set at the factory to customer specification up to a 3:2 ratio.

---

**On-delay, Off-delay Model 7032 (Double Head)**

The Double Head model provides delayed switch transfer on energization of its coil, and delayed resetting upon coil de-energization. Each delay period is independently adjustable. In new circuit designs or the improvement of existing controls now using two or more conventional timers, the Double Head unit offers distinct advantages.

Its compact design saves panel space, while the simplified wiring reduces costly interconnection.

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**On-delay Model 7014, Off-delay Model 7024**

With the addition of an extra switch block at the bottom of the basic unit, this version of the Series 7000 offers four pole switch capacity with simultaneous timing or two-step timing. The two-step operation is achieved by factory adjustment to your specifications.

For two-step operation, a maximum timing ratio between upper and lower switches of 3:2 is recommended. Once adjusted at the factory, this ratio remains constant regardless of changes in dial settings. (Ex: if upper switch transfer is set on dial at 60 sec., minimum time on lower switch should be 40 sec.)

This Series 7000 unit offers many of the performance features found in basic models — voltage ranges, timing and switch capacities.

Four pole models add approximately 1-1/4" to the maximum height of the basic model, approximately 1/8" to the depth. They are designed for vertical operation only.
AGASTAT 7000 Series, Industrial Electropneumatic Timing Relay (Continued)

Surge/Transient Protection Option

Product Facts
- Protect electronic control circuits from voltage transients generated by the timer coil
- Fast response to the rapidly rising back E.M.F.
- High performance clamping voltage characteristics
- UL recognized, (except varistor and coil together).
- Timer NOT polarity sensitive

Timing Specifications (All values shown are at nominal voltage and 25°C unless otherwise specified)

Operating Modes —
Model 7012/7014 — On-delay (delay on pick-up).
Model 7022/7024 — Off-delay (delay on drop-out).
Model 7032 — On-delay, off-delay (double head).

Timing Adjustment — Timing is set by simply turning the dial to the desired time value. In the zone of approximately 25° separating the high and low end of timing ranges A, D, and K, instantaneous operation (no time delay) will occur. All other ranges produce an infinite time delay when the dial is set in this zone.

Models 7014 and 7032 are available with letter-calibrated dials only. The upper end of the time ranges in these models may be twice the values shown.

Linear Timing Ranges —

<table>
<thead>
<tr>
<th>Code</th>
<th>Code</th>
<th>Models 7012, 7022, 7024</th>
<th>Operating Voltage Coil Data (for DPDT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operating Voltage Range @60Hz</td>
</tr>
<tr>
<td>A</td>
<td>120</td>
<td>102-132</td>
<td>110</td>
</tr>
<tr>
<td>B</td>
<td>240</td>
<td>204-264</td>
<td>220</td>
</tr>
<tr>
<td>C</td>
<td>480</td>
<td>408-528</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>550</td>
<td>468-605</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>24</td>
<td>20.5-26.5</td>
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<tr>
<td>F</td>
<td>127</td>
<td>108-140</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>240</td>
<td>204-264</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>12</td>
<td>10.2-13.2</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>6</td>
<td>5.1-6.6</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>208</td>
<td>178-229</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Special AC Coils (L1, L2, etc.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Linear Timing Ranges —

<table>
<thead>
<tr>
<th>Code</th>
<th>Code</th>
<th>Models 7012, 7022, 7024</th>
<th>Operating Voltage Coil Data (for DPDT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operating Voltage Range @60Hz</td>
</tr>
<tr>
<td>A</td>
<td>28</td>
<td>22.4-30.8</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>48</td>
<td>38.4-52.8</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>24</td>
<td>19.2-26.4</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>125</td>
<td>100-137.5</td>
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</tr>
<tr>
<td>E</td>
<td>12</td>
<td>9.6-13.2</td>
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<td>F</td>
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<td>550</td>
<td>440-605</td>
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<tr>
<td>I</td>
<td>16</td>
<td>12.8-17.6</td>
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</tr>
<tr>
<td>J</td>
<td>32</td>
<td>25.8-35.2</td>
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<tr>
<td>K</td>
<td>96</td>
<td>76.8-105.6</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>6</td>
<td>4.8-6.6</td>
<td></td>
</tr>
</tbody>
</table>

Repeat Accuracy —
- For delays of 200 seconds or less: ±5%
- For delays greater than 200 seconds: ±10%

* The first time delay afforded by Model 7012 with H (3 to 30 min.) and I (6 to 60 min.) time ranges or Model 7014 with H time range will be approx. 15% longer than subsequent delays due to coil temperature rise.

Reset Time — 50 msc. (except model 7032)

Relay Release Time — 50 msc. for on-delay models (7012/7014)

Relay Operate Time — 50 msc. for off-delay models (7022/7024)

See next page for more coil data.
AGASTAT 7000 Series, Industrial Electropneumatic Timing Relay (Continued)

Timing Specifications (All values shown are at nominal voltage and 25°C unless otherwise specified)

Minimum operating voltages are based on vertically mounted 7012 units. 7012 horizontally mounted or 7022 vertically or horizontally mounted units will operate satisfactorily at minimum voltages approximately 5% lower than those listed.

AC units drop out at approximately 50% of rated voltage. DC units drop out at approximately 10% of rated voltage.

All units may be operated on intermittent duty cycles at voltages 10% above the listed maximums (intermittent duty - maximum 50% duty cycle and 30 minutes "on" time.)

Surge/Transient Protection Option Characteristics (DC Timers Only)

<table>
<thead>
<tr>
<th>Coil Voltage Nominal (DC)</th>
<th>Max Excess Energy Capacity (Joule)</th>
<th>Max De-energization Transient Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V</td>
<td>0.4 J</td>
<td>48 V</td>
</tr>
<tr>
<td>24 V</td>
<td>1.8 J</td>
<td>93 V</td>
</tr>
<tr>
<td>28 V</td>
<td>1.8 J</td>
<td>93 V</td>
</tr>
<tr>
<td>32 V</td>
<td>2.5 J</td>
<td>135 V</td>
</tr>
<tr>
<td>48 V</td>
<td>3.57 J</td>
<td>145 V</td>
</tr>
<tr>
<td>60 V</td>
<td>6 J</td>
<td>250 V</td>
</tr>
<tr>
<td>96 V</td>
<td>10 J</td>
<td>340 V</td>
</tr>
<tr>
<td>110 V</td>
<td>10 J</td>
<td>340 V</td>
</tr>
<tr>
<td>125 V</td>
<td>10 J</td>
<td>340 V</td>
</tr>
<tr>
<td>220 V</td>
<td>17 J</td>
<td>366 V</td>
</tr>
<tr>
<td>250 V</td>
<td>17 J</td>
<td>366 V</td>
</tr>
</tbody>
</table>

Surge Life —
Applied 100,000 times continuously with the interval of 10 seconds at room temperature. Below 68 VAC: 12A; Above 68 VAC: 35A

Temperature Range —
Operating — -22°F to +167°F (-30°C to +75°C)
Storage — -40°F to +167°F (-40°C to +75°C)

Output/Life Contact Ratings — Contact Capacity in Amps (Resistive Load)

<table>
<thead>
<tr>
<th>Contact Voltage</th>
<th>Min. 100,000 Operations</th>
<th>Min. 1,000,000 Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 VDC</td>
<td>15.0</td>
<td>7.0</td>
</tr>
<tr>
<td>110 VDC</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>120 V 60Hz</td>
<td>20.0</td>
<td>15.0</td>
</tr>
<tr>
<td>240 V 60Hz</td>
<td>20.0</td>
<td>15.0</td>
</tr>
<tr>
<td>480 V 60Hz</td>
<td>12.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>

10 Amps Resistive, 240 VAC
1/4 Horsepower, 120 VAC/240VAC (per pole)
15 Amps 30 VDC (per pole)
5 Amps, General Purpose, 600VAC (per pole)

Dielectric — Withstands 1500 volts RMS 60Hz between terminals and ground. 1,000 volts RMS 60 Hz between non-connected terminals. For dielectric specification on hermetically sealed models consult factory.

Insulation Resistance — 500 Megohms with 500VDC applied.

Temperature Range —
Operating — -20°F to +165°F (-29°C to 74°C)
Storage — -67°F to +165°F (-55°C to 74°C)

Temperature Variation — Using a fixed time delay which was set and measured when the ambient temperature was 77°F (25°C), the maximum observed shift in the average of three consecutive time delays was -20% at -20°F (-29°C) and +20% at 165°F (74°C).

Mounting/Terminals — Normal mounting of the basic unit is in a vertical position, from the back of the panel. All units are calibrated for vertical operation. Basic models (7012, 7022) may also be horizontally mounted, and will be adjusted accordingly when Accessory Y1 is specified in your order.

Standard screw terminals (8-32 truss head screws supplied) are located on the front of the unit, with permanent schematic markings. Barrier isolation is designed to accommodate spade or ring tongue terminals, with spacing to meet all industrial control specifications.

The basic Series 7000 may also be panel mounted with the addition of a panel mount kit, X option, that includes all necessary hardware and faceplate. This offers the convenience of "out-front" adjustment, with large calibrated dial skirt knob. The faceplate and knob blend with advanced equipment and console designs, while the body of the unit and its wiring are protected behind the panel.

Other mounting options include plug-in styles and special configurations to meet unusual installation requirements. Contact factory for details.

Power Consumption — Approximately 8 watts power at rated voltage.

Approximate Weights —
Models 7012, 7022 .......................... 2 lbs. 4 ozs.
7014, 7024 .......................... 2 lbs. 10 ozs.
7032 .......................... 3 lbs. 5 ozs.

Weight may vary slightly with coil voltage.
AGASTAT 7000 Series, Industrial Electopneumatic Timing Relay (Continued)

Outline Dimensions (Dimensions in inches)

Models 7012, 7022:
- Panel Mount Option “X”:
  - 3.81 Max.
  - 1.256 Typ.
  - 2.817 Typ.
  - 1.256 Dia. Mounting Holes (4)

Models 7014, 7024:
- Surge/Transient Protection Option:
  - 2.57 Max.
  - 2.57 Max.
  - .43

Model 7032:
- .199 Dia. Mounting Holes (4)
- 3.38 Max.
- 3.00 Max.
- 1.17 Max.
- 2.26 Max.

Panel Mount Option “X”:
- Can be mounted with terminals on bottom or top side
- Auxiliary Switch (Optional)

Specifications subject to change. Values in brackets are metric equivalents.
AGASTAT 7000 Series, Industrial Electropneumatic Timing Relay (Continued)

Ordering Information

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>70</th>
<th>1</th>
<th>2</th>
<th>A</th>
<th>D</th>
<th>GZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Basic Series:</td>
<td>70 = 7000 series electropneumatic timing relay</td>
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<td>2. Operation:</td>
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<tr>
<td>1 = On-delay</td>
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<tr>
<td>2 = Off-delay</td>
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<tr>
<td>3 = On-delay, off-delay (double head)</td>
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<tr>
<td>3. Contact Arrangement:</td>
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<tr>
<td>2 = 2PDT (2 form C)</td>
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<tr>
<td><strong>4 = 4PDT (4 form C)</strong></td>
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<tr>
<td>4. Coil Voltage:</td>
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<tr>
<td>AC Coils</td>
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<tr>
<td>DC Coils</td>
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<tr>
<td>A = 120VAC, 60 Hz.; 110VAC, 50Hz.</td>
<td>M = 28VDC</td>
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<tr>
<td>B = 240VAC, 60 Hz.; 220VAC, 50Hz.</td>
<td>N = 48VDC</td>
<td></td>
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<tr>
<td>C = 480VAC, 60 Hz.</td>
<td>O = 24VDC</td>
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<tr>
<td>D = 550VAC, 60 Hz.</td>
<td>P = 125VDC</td>
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<tr>
<td>E = 24VAC, 60 Hz.</td>
<td>Q = 12VDC</td>
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<tr>
<td>F = 127VAC, 50 Hz.</td>
<td>R = 60VDC</td>
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<tr>
<td>G = 240VAC, 50Hz.</td>
<td>S = 250VDC</td>
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<tr>
<td>H = 12VAC, 60 Hz.</td>
<td>T = 550VDC</td>
<td></td>
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<tr>
<td>E = Dual voltage (combines A &amp; B)</td>
<td>U = 16VDC</td>
<td></td>
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<tr>
<td>L = Special AC coils (L1, L2, etc.)</td>
<td>V = 32VDC</td>
<td></td>
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<tr>
<td>M = Dust-tight Gasketing (notes 4 &amp; 5).</td>
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<tr>
<td>N = 48VD C</td>
<td>* = 6VDC</td>
<td></td>
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<tr>
<td>O = 24VAC, 60 Hz.</td>
<td>* = 6VDC</td>
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<tr>
<td>P = 24VAC, 50Hz.</td>
<td>* = 6VDC</td>
<td></td>
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</tr>
<tr>
<td>Q = 24VDC</td>
<td>* = 6VDC</td>
<td></td>
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</tr>
<tr>
<td>R = 24VD C</td>
<td>* = 6VDC</td>
<td></td>
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<tr>
<td>S = 24VAC, 50Hz.</td>
<td>* = 6VDC</td>
<td></td>
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<tr>
<td>T = 24VDC</td>
<td>* = 6VDC</td>
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</tr>
<tr>
<td>U = 24VD C</td>
<td>* = 6VDC</td>
<td></td>
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<tr>
<td>V = 24VD C</td>
<td>* = 6VDC</td>
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<tr>
<td>W = 24VD C</td>
<td>* = 6VDC</td>
<td></td>
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</tr>
<tr>
<td>X = 24VD C</td>
<td>* = 6VDC</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Y = 24VD C</td>
<td>* = 6VDC</td>
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<tr>
<td>Z = 24VD C</td>
<td>* = 6VDC</td>
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<tr>
<td>H2 = Hermetically sealed enclosure, 8 pin solder (notes 1 &amp; 4).</td>
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<tr>
<td>H3 = Hermetically sealed enclosure, 8 pin octal (notes 1 &amp; 4).</td>
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<tr>
<td>H4 = Hermetically sealed enclosure, 8 screw terminal block (notes 1 &amp; 4).</td>
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<tr>
<td>I = Tamper-proof Cap, opaque black (Cannot be combined with Option X).</td>
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<tr>
<td>I2 = Tamper-proof Cap, transparent (Cannot be combined with Option X).</td>
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<tr>
<td>J = 1, 2, or 3 min.</td>
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<tr>
<td>K = 3 to 300 sec.</td>
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<tr>
<td>L = Auxiliary Switch, instant transfer, 7012 only (notes 2 &amp; 6).</td>
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<tr>
<td>LL = Two Aux. Switches, instant transfer. On Model 7014 Factory Installed Only. (notes 2 &amp; 6)</td>
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<tr>
<td>M = Dust-tight Gasketing (notes 4 &amp; 5).</td>
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<tr>
<td>P = Octal Plug Adapter. Can be combined only with options H1, I2, M, S, X, or Y1. (note 4).</td>
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<tr>
<td>Q = Vertical calibration, for vertical operation (note 4).</td>
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<tr>
<td>R = Panelmount includes hardware and adjustment for horizontal operation (note 4)</td>
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<tr>
<td>S = Dial Stops.</td>
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<tr>
<td>T = Auxiliary Switch, two-step timing (notes 2 &amp; 6).</td>
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<tr>
<td>U = Transient/Surge Protection (for DC coil voltage only).</td>
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<tr>
<td>V = Panelmount includes hardware and adjustment for horizontal operation (note 4)</td>
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<tr>
<td>W = Panelmount includes hardware and adjustment for horizontal operation without panel mounting (note 4).</td>
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<tr>
<td>X = Horizontal calibration, with Compensating Spring for vertical operation (note 4).</td>
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<tr>
<td>Notes:</td>
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<td></td>
</tr>
<tr>
<td>1. Cannot be combined with B, P or X Options</td>
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<tr>
<td>2. Cannot be combined with B, P or Y2 Options</td>
<td></td>
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</tr>
<tr>
<td>3. Cannot be combined with GZ, H, I1, I2, K, W or Y1 Options</td>
<td></td>
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<tr>
<td>4. Not Avail. on 4-Pole Models</td>
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<tr>
<td>5. Not Available with L, T or LL options.</td>
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<tr>
<td>6. Not Available on hermetically sealed units.</td>
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<tr>
<td>* SIZED to accommodate one L or T Auxiliary Switch</td>
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<tr>
<td>** Not available on 7032 model.</td>
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</tbody>
</table>

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

| 7012AA | 7012AE | 7012ACL | 7012PB | 7012PJ | 7022AA | 7022AE | 7022AJ | 7022PA |
| 7012AB | 7012AF | 7012BC | 7012PC | 7012PK | 7022AB | 7022AF | 7022AKT | 7022PB |
| 7012AC | 7012AH | 7012NC | 7012PD | 7012PKX | 7022AC | 7022AH | 7022BC | 7022PC |
| 7012AD | 7012AK | 7012PA | 7012PF | 7012PJX | 7022AD | 7022AI | 7022BK | 7022PK |
AGASTAT 7000 Series, Industrial Electropneumatic Timing Relay (Continued)

Ordering Options — Can only be ordered as factory installed options (Dimensions, where shown, are in inches)

A1 – Single Quick-Connect Terminals
A2 – Double Quick-Connect Terminals
B – Plug-In Connectors
   Use with Accessory “C” or “D” below.
GZ – Metal Enclosure
   With knockouts for bottom connection.
   3.16”W x 3.84”D x 7.63”H

H – Hermetically Sealed Enclosure
I – Tamper-Proof Cover
L – Auxiliary Switch
LL – Auxiliary Switch

M – Dust tight
P – Octal Plug Adapter
S – Dial Stops
T – Auxiliary Switch

V – Transient/Surge Protection
X – Panelmount Kit
   Mounting hardware included.

Accessories (Not available for 7032 models)

Plug-In Receptacle (Accessory C)

Screw Terminals
Catalog No. 700137
For use with “B” Option.

Plug-In Receptacle (Accessory D)

Quick Connect Terminals
Catalog No. 700141
For use with “B” Option.

Ordering options can only be ordered as factory installed options.
AGASTAT E7000 Series, Nuclear Qualified Time Delay Relays

Seismic and Radiation Tested

In order to satisfy the growing need for electrical control components suitable for class 1E service in nuclear power generating stations, AGASTAT timing relays have been tested for three applications. These E7000 Series electropneumatic devices have demonstrated compliance with the requirements of IEEE Standards 323-1974 (Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations) and IEEE Standard 344-1975 (Seismic Qualifications for Nuclear Power Generating Stations). Testing was also referenced to ANSI/IEEE C37.98 (formerly IEEE Standard 501-1978, Standard for Seismic Testing of Relays). The present E7000 Series design has evolved over 40 years of continual field use in a wider range of industrial applications. On-Delay, Off-Delay and Four-Pole versions are available for use with a choice of 23 coil voltages, as well as time-calibrated delay adjustment to as long as 60 minutes.

Test Procedure

Operate Time (milliseconds)
Recycle Time (milliseconds)
Time Delay (seconds)
Repeatability (percent)
Contact Bounce (milliseconds at 28VDC, 1 amp)
Contact Resistance (milliohms at 28VDC, 1 amp)

Baseline Performance

In addition to aging tests, a series of baseline tests were conducted before, and immediately after each aging sequence:
- Pull-in Voltage
- Drop-out Voltage
- Dielectric Strength at 1650V 60Hz
- Insulation Resistance

Temperature Aging

This test subjected the relays to a temperature of 100°C for 42 days, with performance measured before and after thermal stress.

Seismic Aging

Sufficient interactions were performed at levels less than the fragility levels of the devices in order to satisfy the seismic aging requirements of IEEE STD 323-1974 and IEEE STD 344-1975.

Seismic Qualification

Artificially aged relays were subjected to simulated seismic vibration, which verified the ability of the individual device to perform its required function before, during and/or following design basis earthquakes. Relays were tested in the non-operating, operating and transitional modes.

Radiation Aging

Relays were subjected to a radiation dosage of 2.0 x 10^5 Rads, which is considered to exceed adverse plant operating requirements for such areas as auxiliary and control buildings.

Cycling with Load Aging

The radiated units were then subjected to 27,500 operations at accelerated rate, with one set of contacts loaded to 120VAC, 60Hz at 10 amps; or 125VDC at 1 amp, and the number of mechanical operations exceeding those experienced in actual service.

Hostile Environment

Since the timing relays are intended for use in auxiliary and control buildings, and not in the reactor containment areas, a hostile environment test was performed in place of the Loss of Coolant Accident (LOCA) test. Relays were subjected to combination extreme temperature/humidity plus under/over voltage testing to prove their ability to function under adverse conditions even after having undergone all the previous aging simulation and seismic testing. The devices were operated at minimum and maximum voltage extremes, 85 and 120 percent of rated voltage for AC units, and 80 and 120 percent of rated voltage for DC units, with temperatures ranging from 40°F to 172°F at 95 percent relative humidity.

The SRS shape (at 5 percent damping), is defined by four points:
- point A = 1.0 Hz and an acceleration equal to 25 percent of the Zero Period Acceleration
- point D = 4.0 Hz and 250 percent of the ZPA
- point E = 16.0 Hz and 250 percent of the ZPA
- point G = 33.0 Hz and a level equal to the ZPA

SPECIMEN 1 & 3 (E7012 SERIES)
RELAY STATE: TRANSITIONAL MODE (TD X 2)
AXIS (H + V):
TEST RUN NO. 41, 45, 60, 63
COMPOSITE OF FB/V-, SS/V-, SS/V+, FB/V+ X .707
DUE TO 45° INCLINATION OF TEST MACHINE.

Figure 1. Response Spectrum, Transitional Mode
AGASTAT E7000 Series, Nuclear Qualified Time Delay Relays (Continued)

Operation
Two basic operating types are available: On-delay models provide a delay period on energization, at the end of which the switch transfers the load from one set of contacts to another. Deenergizing the unit during the delay period immediately recycles the unit, readying it for another full delay period on reenergization.

In off-delay models the switch transfers the load immediately upon energization, and the delay period does not begin until the unit is deenergized. At the end of the delay period the switch returns to its original position. Reenergizing the unit during the delay period immediately resets the timing, readying it for another full delay period on deenergization. No power is required during the timing period.

On-Delay Models, E7012
(Delay on pick-up)

Off-Delay Models, E7022
(Delay on drop-out)

Applying for at least 50 msec voltage to the coil (L1-L2) starts a time delay lasting for the preset time. During this period the normally closed contacts (3–5 and 4–6) remain closed. At the end of the delay period the normally closed contacts break and the normally open contacts (1–5 and 2–6) make. The contacts remain in this transferred position until the coil is deenergized, at which time the switch instantaneously returns to its original position.

Deenergizing the coil, either during or after the delay period, will recycle the unit within .050 second. It will then provide a full delay period upon reenergization, regardless of how often the coil voltage is interrupted before the unit has been permitted to “time-out” to its full delay setting.

Applying voltage to the coil (for at least .050 second) will instantaneously transfer the switch, breaking the normally closed contacts (1–5 and 2–6), and making the normally open contacts (3–5 and 4–6). Contacts remain in this transferred position as long as the coil is energized. The time delay begins immediately upon deenergization. At the end of the delay period the switch returns to its normal position.

Reenergizing the coil during the delay period will immediately return the timing mechanism to a point where it will provide a full delay period upon subsequent deenergization. The switch remains in the transferred position.

Four Pole Models, E7014, E7024
With the addition of an extra switch block at the bottom of the basic units, this version of the E7000 Series offers four pole switch capacity with simultaneous timing or two-step timing. The two-step operation is achieved by factory adjustment to your specifications.
AGASTAT E7000 Series, Nuclear Qualified Time Delay Relays (Continued)

Time Delay Information

All units are furnished with dials calibrated in linear increments covering the range selected. (See "Catalog Number Code"). In addition, time-calibrated ranges B through K provide non-linear adjustment from .2 second to the beginning of the linear zone.

Repeat Accuracy

Repeat accuracy at any fixed temperature is defined as:

\[ A_R = \pm \frac{100}{T_1 + T_2} (T_1 - T_2) \]

Where —

T_1 = Maximum time delay.
T_2 = Minimum time delay.

*Repeat accuracy deviation (A_R) of a time-delay relay is a measure of the maximum deviation in the time-delay that will be experienced in successive operations at any particular time setting of the relay and for any particular operating voltage or current.

Repeat accuracy is obtained from the following formula:

\[ A_R = \pm \frac{100}{T_1 + T_2} (T_1 - T_2) \]

Delay Setting

Dial calibrations are provided to minimize the time required to set the unit to a specific delay. Rotate the dial clockwise to increase the delay; counter-clockwise to decrease it.

The following procedure is recommended if the unit must be set to a very precise delay value:

1. Set dial to desired time delay. (On letter-calibrated units, this requires an approximation of a percentage value between the arrowhead "H" on the dial, which provides minimum time, and the letter "E," which provides maximum time.)
2. Record as many time delays as required to establish a stable average.
3. If the recorded average delay is shorter than the desired time, turn dial slightly clockwise; if it is longer, turn dial counter-clockwise.
4. Repeat step 2 after each adjustment, until required delay is recorded.

Contact Ratings — Nuclear

Resistive at 125 VDC . . . . . . . . 1.0 Amp
Resistive at 120 VAC 60 Hz . . . 20.0 Amp

Contact Ratings — Non-Nuclear

Contact Capacity in Amps (Resistive Loads)

<table>
<thead>
<tr>
<th>Contact Voltage</th>
<th>Min. 100,000 Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>30VDC</td>
<td>15.0</td>
</tr>
<tr>
<td>110VDC</td>
<td>1.0</td>
</tr>
<tr>
<td>120V 60Hz</td>
<td>20.0</td>
</tr>
<tr>
<td>240V 60Hz</td>
<td>20.0</td>
</tr>
<tr>
<td>480V 60Hz</td>
<td>12.0</td>
</tr>
</tbody>
</table>

Four pole models add approximately 1-1/4" to the maximum height of the basic model, approximately 1/8" to the depth. They are designed for vertical operation only.

Timing Adjustment

The AGASTAT E7000 Series is the first electropneumatic timer to offer the ease of adjustment and resetting of a calibrated dial head. Discrete ranges covering a total span from .1 second to 60 minutes are available. (See table on page 12-20.) Each has its own calibrated, clearly identified dial. Timing is set by simply turning the dial to the desired time value. In the zone of approximately 25° separating the high and low ends of timing ranges A, D, E, and K, instantaneous operation (no time delay) will occur. All other ranges produce an infinite time delay when the dial is set in this zone.
AGASTAT E7000 Series, Nuclear Qualified Time Delay Relays

Environmental Characteristics (Qualified Life) Parameter

**Temperature**
- Minimum: -40°F
- Normal: 70°F - 104°F
- Maximum: 156°F

**Humidity (R.H. %)**
- Minimum: 10%
- Normal: 40-60%
- Maximum: 95%

**Pressure**
- Atmospheric

**Radiation (rads)**
- 2.0 x 10^5 Gamma max.

Operating Conditions (Normal Environment)

- **Coil Operating Voltage, Nominal (Rated)**
  - Pull-in (% of rated value)
    - 80% min. with DC, 85% min. with AC coils
  - Drop-out (% of rated value)
    - 10% approx. with DC coils;
      50% approx. with AC coils
  - Power (Watts at rated value)
    - 8 approx. with DC or AC coils

Relay Operate Time
- Model E7012 — N/A
- Model E7022 — 50 ms. max. with DC or AC coils

Relay Release (Recycle) Time
- Model E7012 — 50 ms max. with DC or AC coils
- Model E7022 — N/A

Contact Ratings, Continuous
- (Resistive at 125 Vdc)
  - 1.0 amp with DC or AC coils
  - 1.0 amp with DC or AC coils

Insulation Resistance
- (In megohms at 500 Vdc)
  - Between Terminals and Ground — 1,500 with DC or AC coils
  - Between Non-connected Terminals — 1,000 with DC or AC coils

Repeat Accuracy
- ±10% with DC or AC coils

Operating Conditions (Abnormal Environment)

<table>
<thead>
<tr>
<th>Adverse Operating Specifications</th>
<th>Normal</th>
<th>DBE “A”</th>
<th>DBE “B”</th>
<th>DBE “C”</th>
<th>DBE “D”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°F)</td>
<td>70-104</td>
<td>40</td>
<td>120</td>
<td>145</td>
<td>156</td>
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<tr>
<td>Humidity (R.H. %)</td>
<td>40-60</td>
<td>10-95</td>
<td>10-95</td>
<td>10-95</td>
<td>10-95</td>
</tr>
<tr>
<td>Coil Operating Voltage “A” (% of Rated)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model E7012 (AC)</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
</tr>
<tr>
<td>(DC)</td>
<td>80-110</td>
<td>80-110</td>
<td>80-110</td>
<td>90-110</td>
<td>90-110</td>
</tr>
<tr>
<td>Model E7022 (AC)</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
</tr>
<tr>
<td>(DC)</td>
<td>80-110</td>
<td>80-110</td>
<td>80-110</td>
<td>80-110</td>
<td>80-110</td>
</tr>
</tbody>
</table>

*All coils may be operated on intermittent duty cycles at voltages 10% above listed maximums (Intermittent Duty = Maximum 50% duty cycle and 30 minutes “ON” time.)

**Coil Data**
All units draw approximately 8 watts power at rated voltage.

The operating voltage range for AC relays is 85 to 110 percent of nominal rated value.

AC units drop-out at approximately 50% of rated voltage.

The operating range of DC relays is 80 to 110 percent of nominal rated value.

DC units drop-out at approximately 10% of rated voltage.

All units may be operated on intermittent duty cycles (50% on/off, maximum 30 minutes on) at voltages 10% above the listed maximums.

**Approximate Weight**
- Model E7012 and E7022 with AC Coils — 2.13 lbs.
- Model E7012 and E7022 with DC Coils — 2.25 lbs.
- Model E7014 and E7024 with AC Coils — 2.43 lbs.
- Model E7014 and E7024 with DC Coils — 2.57 lbs.

(Weight may vary slightly with particular coil voltage.)

**Terminals**
Standard screw terminals (#8 – 32 truss head screws supplied) are located on the front of the unit, with permanent schematic markings. Barrier isolation is designed to accommodate spade or ring-tongue terminals with spacing to meet industrial control specifications.

**Note:** Tyco Electronics Corporation cannot recommend the use of its products in the containment areas of Nuclear Power Generating Stations.

**Replacement Schedule**
The qualified life of this unit is 25,000 operations or 10 years from the date of manufacture, whichever occurs first.

**Contact Ratings as listed under the UL Component Recognition Program for 100,000 operations (Per pole)**
- 10 Amps, resistive, 240 VAC;
- 1/4 horsepower, 120 VAC/240 VAC;
- 15 Amps, 30 VDC;
- 5 Amps, General Purpose, 600 VAC

**Coil Data**
- All units draw approximately 8 watts power at rated voltage.
- The operating voltage range for AC relays is 85 to 110 percent of nominal rated value.
- AC units drop-out at approximately 50% of rated voltage.
- The operating range of DC relays is 80 to 110 percent of nominal rated value.
- DC units drop-out at approximately 10% of rated voltage.
- All units may be operated on intermittent duty cycles (50% on/off, maximum 30 minutes on) at voltages 10% above the listed maximums.

**Approximate Weight**
- Model E7012 and E7022 with AC Coils — 2.13 lbs.
- Model E7012 and E7022 with DC Coils — 2.25 lbs.
- Model E7014 and E7024 with AC Coils — 2.43 lbs.
- Model E7014 and E7024 with DC Coils — 2.57 lbs.

(Weight may vary slightly with particular coil voltage.)

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- Standard screw terminals (#8 – 32 truss head screws supplied) are located on the front of the unit, with permanent schematic markings. Barrier isolation is designed to accommodate spade or ring-tongue terminals with spacing to meet industrial control specifications.

**Note:** Tyco Electronics Corporation cannot recommend the use of its products in the containment areas of Nuclear Power Generating Stations.

The date of manufacture can be found in the first four (4) digits of the serial number on the nameplate:
- First two digits indicate XX XX the year
- Second two digits indicate the week.

**Example:** Date code 8014; 80 indicates 1980; 14 indicates the week of April 2 through 8.

**MODEL E7012PC003**
- **COIL** 125VDC
- **Serial** 8014
- **TIME** 1.5 TO 15 SEC.
- **L1**
- **L2**
AGASTAT E7000 Series, Nuclear Qualified Time Delay Relays (Continued)

**Dimensions and Mounting**

**MODEL E7012, E7022**

- Dimensions are shown for USA: 1-800-522-6752
- Dimensions are shown for South America: 55-11-2103-6000
- Dimensions are shown for Mexico: 01-800-733-8926
- Dimensions are shown for Japan: 81-44-844-8013
- Dimensions are shown for C. America: 52-55-1106-0803
- Dimensions are shown for UK: 44-8706-080-208

Mounting Instructions

The E7000 Series relay must be mounted in the vertical position. All performance specifications of these units are valid only when they are mounted in this manner. A bracket for mounting the device and the screws and lockwashers required to attach it to the relay are supplied with each unit. Four #8-32 tapped holes are provided in the rear of the device for attaching the mounting bracket, or for mounting the relay directly to a panel, from the rear.

QUALIFICATION TESTED FOR VERTICAL OPERATION ONLY
AGASTAT E7000 Series, Nuclear Qualified Time Delay Relays

Ordering Information

Catalog Number Code

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tr>
<td>E</td>
<td>Nuclear Safety Related</td>
</tr>
<tr>
<td>70</td>
<td>AGASTAT 7000 Series Timing Relay</td>
</tr>
<tr>
<td>1</td>
<td>Operation 1 – On-delay 2 – Off-delay</td>
</tr>
<tr>
<td>2</td>
<td>Contact Arrangement 2 – Double Pole Double Throw 4 – Four Pole Double Throw</td>
</tr>
<tr>
<td>A</td>
<td>Coil Voltage</td>
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<tr>
<td>A</td>
<td>Time Range E7012, E7022</td>
</tr>
<tr>
<td><strong>004</strong></td>
<td>Configuration Code</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>120V 60 Hz</td>
</tr>
<tr>
<td>A</td>
<td>110V 50 Hz</td>
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<tr>
<td>B</td>
<td>240V 60 Hz</td>
</tr>
<tr>
<td>B</td>
<td>220V 50 Hz</td>
</tr>
<tr>
<td>C</td>
<td>480V 60 Hz</td>
</tr>
<tr>
<td>D</td>
<td>550V 60 Hz</td>
</tr>
<tr>
<td>E</td>
<td>24V 60 Hz 24V 50 Hz</td>
</tr>
<tr>
<td>F</td>
<td>127V 50 Hz</td>
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<tr>
<td>G</td>
<td>240V 50 Hz</td>
</tr>
<tr>
<td>H</td>
<td>12V 60 Hz</td>
</tr>
<tr>
<td>I</td>
<td>6V 60 Hz</td>
</tr>
<tr>
<td>J</td>
<td>208V 60 Hz</td>
</tr>
<tr>
<td>M</td>
<td>28 VDC</td>
</tr>
<tr>
<td>N</td>
<td>48 VDC</td>
</tr>
<tr>
<td>O</td>
<td>24 VDC</td>
</tr>
<tr>
<td>P</td>
<td>125 VDC</td>
</tr>
<tr>
<td>Q</td>
<td>12 VDC</td>
</tr>
<tr>
<td>R</td>
<td>60 VDC</td>
</tr>
<tr>
<td>S</td>
<td>250 VDC</td>
</tr>
<tr>
<td>T</td>
<td>550 VDC</td>
</tr>
<tr>
<td>U</td>
<td>16 VDC</td>
</tr>
<tr>
<td>V</td>
<td>32 VDC</td>
</tr>
<tr>
<td>W</td>
<td>96 VDC</td>
</tr>
<tr>
<td>Y</td>
<td>6 VDC</td>
</tr>
<tr>
<td>Z</td>
<td>220 VDC</td>
</tr>
</tbody>
</table>

- Model E7014 is available with letter-calibrated dials only. The upper end of the time ranges in these models may be twice the values shown.

** Configuration Code

The Configuration Code is a suffix to the Model Number which provides a means of identification. When a significant product change is introduced, the Configuration code and specification sheets will be revised. (001, 002, 003, 004, etc.).

Relay Classifications Control Code Summary

|---------|------------|------------|------------|------------|

Configuration Code: The Configuration code is a suffix to the Model Number which provides a means of identification. When a significant product change is introduced, the Configuration code and specification sheets will be revised. (001, 002, 003, 004, etc.).

PPG is a trademark of PPG Industries.
Sherwin-Williams is a trademark of The Sherwin-Williams Company.
AGASTAT EGP/EML/ETR Series, Nuclear Qualified Control Relays

Seismic and Radiation Tested

In order to satisfy the need for electrical control components suitable for class 1E service in nuclear power generating stations, AGASTAT control relays have been tested for these applications. Series EGP, EML and ETR have demonstrated compliance with the requirements of IEEE Standards 323-1974 (Standard for qualifying Class 1E Equipment for Nuclear Power Generating Stations) and IEEE Standard 344-1975 (Seismic Qualification for Nuclear Power Generating Stations). Testing was also referenced to ANSI/IEEE C37.98 (formerly IEEE Standard 501-1978, Standard for Seismic Testing of Relays).

The design of Series EGP, EML and ETR control relays has evolved over 20 years of continual use in a wide range of industrial applications. Control Relay, Magnetic Latch and Timing Relay versions are available for use with a choice of coil voltages, as well as an internal fixed or adjustable potentiometer in the Series ETR time delay version.

Test Procedure

AGASTAT control relay Series EGP, EML and ETR were tested in accordance with the requirements of IEEE STD. 323-1974 (Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations), IEEE STD. 344-1975 (Seismic Qualification for Nuclear Power Generating Stations) and referenced to ANSI/IEEE C37.98 (formerly IEEE Standard 501-1978, Standard for Seismic Testing of Relays). The relays were tested according to parameters which in practice, should encompass the majority of applications. Documented data applies to relays which were mounted on rigid test fixtures. The following descriptions of the tests performed are presented in their actual sequence.

Baseline Performance

In addition to aging tests, a series of baseline tests were conducted before, and immediately after each aging sequence:
- Pull-in Voltage
- Drop-out Voltage
- Dielectric Strength at 1650V 60Hz
- Insulation Resistance
- Operate Time (milliseconds)
- Recycle Time (milliseconds)
- Time Delay (seconds)
- Series ETR Repeatability (percent)
- only Contact Bounce (milliseconds at 28VDC, 1 amp)
- Contact Resistance (milliohms at 28VDC, 1 amp)

Data was measured and recorded and used for comparison throughout the qualification test program in order to detect any degradation of performance.

Seismic Qualification

Relays were subjected to artificial seismic qualification as well as artificial aging testing. The devices were operated at minimum station supply voltages, as well as an acceleration equal to 25 percent of the Zero Period Acceleration (ZPA), and a level equal to the ZPA.

Seismic Aging

Relays were subjected to radiation dosage of 2.0 x 10^9 Rads, which is considered to exceed adverse plant operating requirements for such areas as auxiliary and control buildings.

Cycling with Load Aging

The radiated units were then subjected to 27,500 operations at accelerated rate, with one set of contacts loaded to 27,500 operations at 27VDC, 60Hz at 10 amps; or 125VDC at 1 amp, and the number of mechanical operations exceeding those experienced in actual service.

Temperature Aging

This test subjected the relays to a temperature of 100°C for 42 days, with performance measured before and after thermal stress.

Seismic Aging

Sufficient interactions were performed at levels less than the fragility levels of the devices in order to satisfy the seismic aging requirements of IEEE STD 323-1974 and IEEE STD 344-1975.

Seismic Qualification

Artificially aged relays were subjected to simulated seismic vibration, which verified the reliability of the individual device to perform its required function before, during and/or following design basis earthquakes. Relays were tested in the non-operating, operating and transitional modes.

Hostile Environment

Since the timing relays are intended for use in auxiliary and control buildings, and not in the reactor containment areas, a hostile environment test was performed in place of the Loss of Coolant Accident (LOCA) test. Relays were subjected to combination extreme temperature/humidity plus under/over voltage testing to prove their ability to function under adverse conditions, even after having undergone all the previous aging simulation and seismic testing. The devices were operated at minimum and maximum voltage extremes: 85 and 120 percent of rated voltage for AC units, and 80 and 120 percent of rated voltage for DC units, with temperatures ranging from 40°F to 172°F at 95 percent relative humidity.

Figure 1. Model EGP, Response Spectrum, Non-Operate Mode

The SRS shape (at 5 percent damping), is defined by four points:
- point A = 1.0 Hz and an acceleration equal to 25 percent of the Zero Period Acceleration (ZPA)
- point D = 4.0 Hz and 250 percent of the ZPA
- point E = 16.0 Hz and 250 percent of the ZPA
- point G = 33.0 Hz and a level equal to the ZPA

Point A is chosen carefully so that the SRS goes through zero at a frequency of 0.707 ZPA

Specimen 13, 15 & 16 (EGP Series)

Relay State: Non-Operate Mode (De-ener.)
Test Run No. 318, 319, (205-206), (198-199)

Additional Seismic Response Curves are available on request.

Relay State: Non-Operate Mode (De-ener.)
Test Run No. 318, 319, (205-206), (198-199)
Operation

Series EGP
Power Relay

Applying a voltage to the coil (B1-B4) for more than 50 msec energizes the coil and instantaneously transfers the switch, breaking the normally closed contacts (M1-R1, M2-R2, M3-R3, M4-R4) and making the normally open contacts (M1-T1, M2-T2, M3-T3, M4-T4). The contacts remain in this transferred position until the coil is deenergized, at which time the switch instantaneously returns the contacts to their original position.

Series EML
Magnetic Latch

Application of a voltage to the latching input (B1-B4) will cause the relay to latch in (Make the N.O. Contacts, break the N.C. Contacts). When this voltage is removed, the relay will remain in this “Latched” condition. Application of a voltage to the unlatching input (B3-B4) will cause the relay to dropout (Break the N.O. Contacts, make the N.C. Contacts). When this voltage is removed, the relay will remain in this “Unlatched” condition.

Wiring Diagram (Wiring and Connections)

The ML Relay is not symmetrical due to its three coil connections. The relays are normally delivered polarized so that terminal B4 carries the negative voltage. To reverse the polarity, a deenergize/energize cycle should be carried out using a voltage 50% greater than the normal rating.

Series ETR
Time Delay Relay
(Delay on Energization)

Applying a voltage to the input terminals (B1-B4) for more than 50 msec starts a time delay lasting for the preset time period. During this period the normally closed contacts (Four M-R sets) remain closed. At the end of the delay period, the normally closed contacts break and the normally open contacts (Four M-T sets) make. The contacts remain in this position until the relay is deenergized, at which time the contacts instantaneously return to their normal position. Deenergizing the relay, either during or after the delay period will recycle the unit within .075 second. It will then provide a full delay period upon reenergization, regardless of how often the voltage is interrupted before the unit has been permitted to “time-out” to its full delay setting.

R-C Values

<table>
<thead>
<tr>
<th>Nominal Voltage VDC</th>
<th>R 5% Ohms</th>
<th>Watts</th>
<th>C UF</th>
<th>VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>62</td>
<td>2</td>
<td>5000</td>
<td>15</td>
</tr>
<tr>
<td>24</td>
<td>240</td>
<td>2</td>
<td>2000</td>
<td>50</td>
</tr>
<tr>
<td>48</td>
<td>1000</td>
<td>2</td>
<td>500</td>
<td>100</td>
</tr>
<tr>
<td>125</td>
<td>6200</td>
<td>2</td>
<td>150</td>
<td>150</td>
</tr>
</tbody>
</table>

Continuous Duty Wiring

Since the double wound coil does not have a continuous duty rating, voltage pulses to the coils should not exceed a ratio of 40% on, to 60% off, with maximum power-on periods not to exceed 10 minutes.

If continuous energizing only is available, a resistor/capacitor network should be connected as shown below. In this case the shortest time between two operations must not be less than 5 seconds.

The relay will always assume the energized position in the event of both windings being energized simultaneously.

It is advisable not to put another load in parallel with the windings of the ML relay.

ML Series Relay for DC Operation with a Resistor/Capacitor Network

Wiring Diagram (Wiring and Connections)

The ML relay has three terminals for the windings: latching winding between terminals B1 and B4, un-latching winding between terminals B3 and B4.
AGASTAT EGP/EML/ETR Series, Nuclear Qualified Control Relays (Continued)

Specifications

Contact Ratings — Series EGP/EML/ETR — Contact Capacity in Amperes (Resistive)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Min. 1,000,000 Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Vdc</td>
<td>10.0 Amps</td>
</tr>
<tr>
<td>125 Vdc</td>
<td>1.0 Amp</td>
</tr>
<tr>
<td>120 Vac, 60 Hz</td>
<td>10.0 Amps</td>
</tr>
<tr>
<td>240 Vac, 60 Hz</td>
<td>7.5 Amps</td>
</tr>
</tbody>
</table>

Contact Ratings, UL — Series EGP/EML Only — Contact ratings as Listed under the Underwriters Laboratory Component Recognition Program. (Two poles per load):
- 1/3 Horsepower, 120 Vac 10 Amps, General Purpose, 240 Vac 120 Vdc, 1.0 Amp

Mechanical Life — Series EGP/EML/ETR — 25,000 mechanical operations

Approximate Weight — Series EGP/EML/ETR — 1 lb.

Transient Protection — Series ETR Only — A 1500 volt transient of less than 100 microseconds, or 1000 volts of less than 1 millisecond will not affect timing accuracy

Timing Adjustment — Series ETR Only — Internal Fixed Internal Potentiometer

Time Ranges — Series ETR Only —
- A — .15 to 3 sec.
- B — .55 to 15 sec.
- C — 1 to 30 sec.
- D — 2 to 60 sec.
- E — 4 to 120 sec.
- F — 10 to 300 sec.
- I — 2 to 60 min.
- N — 1 to 30 min.

Repeat Accuracy — Series ETR Only — The repeat accuracy deviation ($A_R$) of a time-delay relay is a measure of the maximum deviation in the time-delay that will be experienced in five successive operations at any particular time setting of the relay and over the operating voltage and temperature range specified. Repeat accuracy is obtained from the following formula:

$$A_R = \pm 100 \left( \frac{T_1 - T_2}{T_1 + T_2} \right)$$

Where:
- $T_1$ = Maximum Time Delay
- $T_2$ = Minimum Time Delay

Note: Tyco Electronics Corporation does not recommend the use of its products in the containment areas of Nuclear Power Generating Stations.

REPLACEMENT SCHEDULE Series EGP/EML/ETR

The qualified life of these relays is 25,000 electrical operations or 10 years from the date of manufacture, whichever occurs first.

<table>
<thead>
<tr>
<th>Model</th>
<th>Coil</th>
<th>Serial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>125 VDC</td>
<td>781400028</td>
</tr>
</tbody>
</table>

The date of manufacture can be found in the first four (4) digits of the serial number on the nameplate.

First two digits indicate XX the year

Second two digits indicate the week.

Example: In the date code 7814 below: “78” indicates the year 1978; “14” indicates the 14th week (or April 3 through April 7).
### AGASTAT EGP/EML/ETR Series, Nuclear Qualified Control Relays

#### Operating Characteristics

**Environmental Conditions** (Qualified Life) — Series EGP/EML/ETR

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Normal</th>
<th>Min.</th>
<th>Max.</th>
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</thead>
<tbody>
<tr>
<td>Temperature (°F)</td>
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<td>40</td>
<td>156</td>
</tr>
<tr>
<td>Humidity (R.H. %)</td>
<td>40-60</td>
<td>10</td>
<td>95</td>
</tr>
<tr>
<td>Pressure</td>
<td>Atmospheric</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Radiation (rads)</td>
<td>—</td>
<td>—</td>
<td>2.0 x 10⁵ (Gamma)</td>
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**Operating Conditions, Normal Environment — Series EGP/EML/ETR**

<table>
<thead>
<tr>
<th>Normal Operating Specifications</th>
<th>EGP</th>
<th>EML</th>
<th>ETR</th>
<th>EGP</th>
<th>ETR</th>
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<tbody>
<tr>
<td><strong>ELECTRICAL SPECIFICATIONS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>As Spec.</td>
<td>As Spec.</td>
<td>As Spec.</td>
<td>As Spec.</td>
<td>As Spec.</td>
</tr>
<tr>
<td>Pull-in (% of rated value)</td>
<td>80% Min.</td>
<td>85% Min.</td>
<td>80% Min.</td>
<td>85% Min.</td>
<td>85% Min.</td>
</tr>
<tr>
<td>Drop-out (% of rated value)</td>
<td>5-45%</td>
<td>85% Min.</td>
<td>5-45%</td>
<td>5-45%</td>
<td>5-50%</td>
</tr>
<tr>
<td>Continuous (% of rated value)</td>
<td>110% Max.</td>
<td>N/A</td>
<td>110% Max.</td>
<td>110% Max.</td>
<td>110% Max.</td>
</tr>
<tr>
<td>Power (Watts at rated value)</td>
<td>N/A</td>
<td>15 Approx.</td>
<td>N/A</td>
<td>6 Approx.</td>
<td>N/A</td>
</tr>
<tr>
<td>Relay Operate Time</td>
<td>30 ms Max.</td>
<td>25 ms Max.</td>
<td>N/A</td>
<td>35 ms Max.</td>
<td>N/A</td>
</tr>
<tr>
<td>Relay Release (Recycle) Time</td>
<td>25 ms Max.</td>
<td>20 ms Max.</td>
<td>N/A</td>
<td>75 ms Max.</td>
<td>85 ms Max.</td>
</tr>
</tbody>
</table>

**Environmental Characteristics (Qualified Life) — Series EGP/EML/ETR**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min.</th>
<th>Normal</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°F)</td>
<td>40</td>
<td>70-104</td>
<td>156</td>
</tr>
<tr>
<td>Humidity (R.H. %)</td>
<td>10</td>
<td>40-60</td>
<td>95</td>
</tr>
<tr>
<td>Pressure</td>
<td>—</td>
<td>Atmospheric</td>
<td>—</td>
</tr>
<tr>
<td>Radiation (rads)</td>
<td>—</td>
<td>—</td>
<td>2.0 x 10⁵ (Gamma)</td>
</tr>
</tbody>
</table>

**Operating Conditions, Abnormal Environment — Series EGP/EML**

<table>
<thead>
<tr>
<th>Adverse Operating Specifications</th>
<th>Normal</th>
<th>DB “A”</th>
<th>DB “B”</th>
<th>DB “C”</th>
<th>DB “D”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°F)</td>
<td>70-104</td>
<td>40</td>
<td>120</td>
<td>145</td>
<td>156</td>
</tr>
<tr>
<td>Humidity (R.H. %)</td>
<td>40-60</td>
<td>10-95</td>
<td>10-95</td>
<td>10-95</td>
<td>10-95</td>
</tr>
<tr>
<td>Operating Voltage (% of rated)</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
</tr>
<tr>
<td>Continuous (% of rated value)</td>
<td>80-110</td>
<td>80-110</td>
<td>80-110</td>
<td>80-110</td>
<td>80-110</td>
</tr>
<tr>
<td>Continuous (% of rated value)</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
</tr>
<tr>
<td>Relay Operate Time (ms)</td>
<td>35 Max.</td>
<td>35 Max.</td>
<td>35 Max.</td>
<td>35 Max.</td>
<td>35 Max.</td>
</tr>
<tr>
<td>DC (Series EGP only)</td>
<td>30 Max.</td>
<td>25 Max.</td>
<td>37 Max.</td>
<td>40 Max.</td>
<td>40 Max.</td>
</tr>
</tbody>
</table>

**Operating Conditions, Abnormal Environment — Series ETR**

<table>
<thead>
<tr>
<th>Adverse Operating Specifications</th>
<th>With DC Coils</th>
<th>With AC Coils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil Operating Voltage (rated)</td>
<td>As Spec.</td>
<td>As Spec.</td>
</tr>
<tr>
<td>Pull-in (% of rated value)</td>
<td>80% Min.</td>
<td>85% Min.</td>
</tr>
<tr>
<td>Continuous (% of rated value)</td>
<td>110% Max.</td>
<td>110% Max.</td>
</tr>
<tr>
<td>Power (Watts at rated value)</td>
<td>5-45%</td>
<td>5-50%</td>
</tr>
<tr>
<td>Relay Operate Time (ms)</td>
<td>75 ms Max.</td>
<td>75 ms Max.</td>
</tr>
<tr>
<td>Contact Ratings, Continuous</td>
<td>1.0 amp.</td>
<td>1.0 amp.</td>
</tr>
<tr>
<td>Resistive at 125 vdc</td>
<td>1.0 amp.</td>
<td>1.0 amp.</td>
</tr>
<tr>
<td>Repeat Accuracy</td>
<td>±10%</td>
<td>±10%</td>
</tr>
</tbody>
</table>

*All coils may be operated on intermittent duty cycles at voltages 10% above listed maximums (Intermittent Duty = Maximum 50% duty cycle and 30 minutes “ON” time.)*
Dimensions and Mounting

Qualification tested in the horizontal position, mounted in socket ECR0001-001 (captive clamp terminals) or in socket ECR0002-001 (screw terminals) with locking straps ECR0133.

Qualification tested in the horizontal position, mounted in socket ECR0095-001 (screw terminals) with locking strap ECR0155.

Series EGP, EML and ETR AGASTAT control relays must be mounted in the horizontal position; performance specifications of these units are valid only when they are mounted as indicated in either of the above drawings. All dimensions in inches.
**AGASTAT EGP/EML/ETR Series, Nuclear Qualified Control Relays** (Continued)

### Ordering Information

**Catalog Number Code — Series EGP and EML**

<table>
<thead>
<tr>
<th>Code</th>
<th>Nuclear Safety Related</th>
<th>AGASTAT Control Relay Model</th>
<th>Coil Voltage</th>
<th>Configuration Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td></td>
<td></td>
<td>A</td>
<td>004</td>
</tr>
</tbody>
</table>

**Configuration Code**

The Configuration Code is a suffix to the Model Number which provides a means of identification. When a significant product change is introduced, the Configuration code and specification sheets will be revised.

<table>
<thead>
<tr>
<th>Code</th>
<th>Coil Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>12 VDC</td>
</tr>
<tr>
<td>B</td>
<td>24 VDC</td>
</tr>
<tr>
<td>C</td>
<td>48 VDC</td>
</tr>
<tr>
<td>D</td>
<td>125 VDC</td>
</tr>
<tr>
<td>E</td>
<td>110 VDC</td>
</tr>
<tr>
<td>F</td>
<td>250 VDC (Series EGP Only)</td>
</tr>
<tr>
<td>G</td>
<td>24 VAC 60 Hz (Series EGP Only)</td>
</tr>
<tr>
<td>H</td>
<td>48 VAC 60 Hz (Series EGP Only)</td>
</tr>
<tr>
<td>I</td>
<td>120 VAC 60 Hz (Series EGP Only)</td>
</tr>
<tr>
<td>J</td>
<td>220 VAC 60 Hz (Series EGP Only)</td>
</tr>
</tbody>
</table>

---

*Configuration Code*

The Configuration Code is a suffix to the Model Number which provides a means of identification. When a significant product change is introduced, the Configuration code and specification sheets will be revised.

<table>
<thead>
<tr>
<th>Code</th>
<th>Configuration Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>004</td>
</tr>
</tbody>
</table>

---

**AGASTAT EGP/EML/ETR Series, Nuclear Qualified Control Relays** (Continued)

<table>
<thead>
<tr>
<th>Code</th>
<th>Operating Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>24 VDC</td>
</tr>
<tr>
<td>D</td>
<td>125 VDC</td>
</tr>
<tr>
<td>I</td>
<td>120 VAC 60 Hz</td>
</tr>
</tbody>
</table>

**Timing Adjustment Code**

<table>
<thead>
<tr>
<th>Code</th>
<th>Timing Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Internal Fixed</td>
</tr>
<tr>
<td>3</td>
<td>Internal Potentiometer</td>
</tr>
</tbody>
</table>

---

**Time Range**

<table>
<thead>
<tr>
<th>Code</th>
<th>Time Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>.15 to 3 sec.</td>
</tr>
<tr>
<td>B</td>
<td>.55 to 15 sec.</td>
</tr>
<tr>
<td>C</td>
<td>1 to 30 sec.</td>
</tr>
<tr>
<td>D</td>
<td>2 to 60 sec.</td>
</tr>
<tr>
<td>E</td>
<td>4 to 120 sec.</td>
</tr>
<tr>
<td>G</td>
<td>10 to 300 sec.</td>
</tr>
<tr>
<td>I</td>
<td>2 to 60 min.</td>
</tr>
<tr>
<td>N</td>
<td>1 to 30 min.</td>
</tr>
</tbody>
</table>

---

Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents. Specifications subject to change.
### AGASTAT EGP/EML/ETR Series, Nuclear Qualified Control Relays (Continued)

#### Relay Classifications Control Code Summary

##### Configuration Control

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ECR0001</td>
<td>Contains all materials present in original qualification testing.</td>
<td>June 1989 — Material change from NORYL N-225 std. black to NORYL SE-I-701AA black.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECR0002</td>
<td>Contains all materials present in original qualification testing.</td>
<td>June 1989 — Material change from NORYL N-225 std. black to NORYL SE-I-701AA black.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECR0095</td>
<td>Contains all materials present in original qualification testing.</td>
<td>June 1989 — Material change from NORYL N-225 std. black to NORYL SE-I-701AA black.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECR0133</td>
<td>Contains all materials present in original qualification testing.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECR0155</td>
<td>Contains all materials present in original qualification testing.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Configuration Code:** The Configuration code is a suffix to the Model Number which provides a means of identification. When a significant product change is introduced, the Configuration code and specification sheets will be revised. (001, 002, 003, 004, etc.)

---

GRILON is a trademark of EMS-Chemie AG.
NORYL is a trademark of SABIC Innovative Plastics.
RYNITE and ZYTEL are trademarks of E.I. du Pont de Nemours and Company.
AGASTAT GP/ML/TR Series, 10 Amp Control Relay, Non-latching, Latching & Timing Versions

GP/ML/TR Design Features
Among the advances AGASTAT control relays offer over existing designs is a unique contact operating mechanism. An articulated arm assembly amplifies the movement of the solenoid core, allowing the use of a short stroke coil to produce an extremely wide contact gap. The long support arms used in conventional relays are eliminated. Both current capacity and shock/vibration tolerance are greatly increased, as well as life expectancy.

Design/Construction
AGASTAT control relays are operated by a moving core electromagnet whose main gap is at the center of the coil. The coil provides a low mean turn length and also assists heat dissipation. Since the maximum travel of the electromagnet does not provide optimum contacts movement, an ingenious amplifying device has been designed.

This consists of a W-shaped mechanism, shown in Figure 1. When the center of the W is moved vertically the lower extremities move closer to each other as can be seen in the illustration. The center of the W mechanism is connected to the moving core of the electromagnet and the two lower points are connected to the moving contacts.

Two of these mechanisms are placed side-by-side to actuate the four contacts sets of the relay. These arms act as return springs for their corresponding contacts.

The mechanical amplification of the motion of the electromagnet permits a greater distance between the contacts, while the high efficiency of the electromagnet provides a nominal contact force in excess of 100 grams on the normally open contacts.

All the contacts are positioned well away from the cover and are well ventilated and separated from each other by insulating walls.

The absence of metal-to-metal friction, the symmetrical design of the contact arrangement and the lack of heavy impacts provides a mechanical life of 100,000,000 operations.

For use in AC circuits, the relay is supplied with a built-in rectification circuit, thus retaining the high DC efficiency of the electromagnet. The current peak on energizing is also eliminated and consequently the relay can operate with a resistance in series (e.g. for high voltages or for drop-out by shorting the coil). The use of the rectification circuit offers still other advantages. The same model can operated at frequencies ranging from 40 to 400 cycles. Operation of the relay is possible even with a low AC voltage.

The plastic dust cover has two windows to facilitate cooling and also to allow direct mounting of the relay.

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

Figure 1 — Illustration of Amplification

Note: Seismic & radiation tested EGP, EML and ETR models are available. Consult factory for detailed information.
AGASTAT GP/ML/TR Series, 10 Amp Control Relay, Non-latching, Latching & Timing Versions (Continued)

GP/ML Contact Data @ 25°C

Arrangements — 4 Form C (4PDT)

Material — Silver plated

Expected Life —
Mechanical — 100 million operations
Electrical — See chart and graph

Contact Ratings and Expected Life

<table>
<thead>
<tr>
<th>Voltage (VAC)</th>
<th>Current (Amps)</th>
<th>Power Factor</th>
<th>Number of Electrical Operations</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>540 VAC</td>
<td>3</td>
<td>COS Ø = 0.5</td>
<td>15,000</td>
<td>2 contacts in series</td>
</tr>
<tr>
<td>380 VAC</td>
<td>15</td>
<td>Resistive</td>
<td>10,000</td>
<td>2 contacts in parallel</td>
</tr>
<tr>
<td>380 VAC</td>
<td>10</td>
<td>Resistive</td>
<td>200,000</td>
<td></td>
</tr>
<tr>
<td>380 VAC</td>
<td>3 x 3.3</td>
<td>COS Ø = 0.8</td>
<td>200,000</td>
<td>3 hp motor</td>
</tr>
<tr>
<td>220 VAC</td>
<td>20</td>
<td>Resistive</td>
<td>20,000</td>
<td>2 contacts in parallel</td>
</tr>
<tr>
<td>220 VAC</td>
<td>15</td>
<td>COS Ø = 0.5</td>
<td>20,000</td>
<td>2 contacts in parallel</td>
</tr>
<tr>
<td>220 VAC</td>
<td>10</td>
<td>Resistive</td>
<td>400,000</td>
<td></td>
</tr>
<tr>
<td>220 VAC</td>
<td>3 x 6</td>
<td>COS Ø = 0.8</td>
<td>200,000</td>
<td>3 hp motor</td>
</tr>
<tr>
<td>220 VAC</td>
<td>5</td>
<td></td>
<td>1,500,000</td>
<td>Filament lamps</td>
</tr>
<tr>
<td>220 VAC</td>
<td>5</td>
<td>Resistive</td>
<td>3,000,000</td>
<td></td>
</tr>
<tr>
<td>220 VAC</td>
<td>2.5</td>
<td>COS Ø = 0.25</td>
<td>2,000,000</td>
<td></td>
</tr>
<tr>
<td>220 VAC</td>
<td>2</td>
<td>Resistive</td>
<td>15,000,000</td>
<td></td>
</tr>
<tr>
<td>220 VAC</td>
<td>1.25</td>
<td>Resistive</td>
<td>30,000,000</td>
<td></td>
</tr>
<tr>
<td>120 VDC</td>
<td>1.5</td>
<td>Resistive</td>
<td>20,000,000</td>
<td>with blow-out device</td>
</tr>
<tr>
<td>48 VDC</td>
<td>10</td>
<td>Resistive</td>
<td>1,000,000</td>
<td></td>
</tr>
<tr>
<td>48 VDC</td>
<td>1.5</td>
<td>5 ms</td>
<td>18,000,000</td>
<td></td>
</tr>
</tbody>
</table>

Coil Operating Voltage

<table>
<thead>
<tr>
<th>Voltage</th>
<th>DC</th>
<th>AC, 50/60Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Coil Voltage</td>
<td>12</td>
<td>24</td>
</tr>
</tbody>
</table>

Minimum Pick-up

| Voltage at 20°C | 9 | 18 | 36 | 94 | 187 | 19 | 92 | 175 |
| Minimum Pick-up | 9.5 | 19 | 38 | 100 | 200 | 20 | 102 | 188 |

Maximum voltage for continuous use

| 13.5 | 27 | 53 | 143 | 275 | 27 | 137 | 245 |

Coil Data

Voltage — 24, 120 & 220 VAC, 60 Hz; Add series resistor for 380-440VDC, 12, 24, 48, 125 & 250 VDC

Duty Cycle — Continuous

Nominal Coil Power — 6VA for AC coils; 6W for DC coils.

There is no surge current during operation.

Operate Data @ 20°C

Operate Time at Rated Voltage —
Between energizing and opening of normally closed contacts — less than 18 milliseconds on AC and less than 15 milliseconds on DC.

Release Time —
Between energizing and closing of normally open contacts — less than 35 milliseconds on AC and less than 30 milliseconds on DC.

Between de-energizing and opening of normally open contacts — less than 70 milliseconds on AC and less than 8 milliseconds on DC.

Between de-energizing and closing of normally closed contacts — less than 85 milliseconds on AC and less than 25 milliseconds on DC.

Environmental Data

Operating Temperature Range: 0°C to +60°C.

Vibration: Single axis fragility curve data are available on request at frequencies from 5 Hz. to 33 Hz.

Shock: The relay, when kept energized by means of one of its own contact sets, will withstand 40g shock load when operating on DC, and 150g shock load on AC.

Mechanical Data

Mounting Terminals —
16 flat base pins. Screw terminal sockets are available.

Wire Connection —
The 16 flat pins are arranged in four symmetrical rows of four pins; the pitch in both directions being .394". Connection may be made to the relay by soldering. Sockets are available with screw terminals.

The internal wiring of the relay is also symmetrical as shown in the adjacent figure, allowing the relay to be inserted into the socket in either of two positions. Terminals B2 and B3 are provided as extra connections for special applications.

Weight —
10.9 oz. (308g) approximately
AGASTAT GP/ML/TR Series, 10 Amp Control Relay, Non-latching, Latching & Timing Versions (Continued)

Ordering Information

<table>
<thead>
<tr>
<th>Typical Part No.</th>
<th>GP</th>
<th>I</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Basic Series:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GP = Non-latching Control Relay</td>
<td>ML = Magnetic Latching Control Relay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Coil Voltage:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A = 12VDC</td>
<td>G = 24VAC, 60 Hz.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B = 24VDC</td>
<td>I = 120VAC, 60 Hz.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C = 48VDC</td>
<td>J = 220VAC, 60 Hz.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D = 125VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F = 250VDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Options:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N = Magnetic Blow-out Device</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q = Light to indicate coil energization (GP only. 120VAC, 125VDC, 220VAC and 250VDC voltages only.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R = Internal diode to suppress coil de-energization transient. (GP only. When used on DC unit, relay release time increases to same value as AC unit.)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

GPD
GPDN

Outline Dimensions

Wiring Diagrams (Bottom Views)
AGASTAT GP/ML/TR Series, 10 Amp Control Relay, Non-latching, Latching & Timing Versions (Continued)

TR Series

Product Facts

- 8 timing ranges
- 4 SPDT contacts
- Magnetic blowout device option increases DC current carrying ability approximately ten times for both N.O. and N.C. contacts. In both AC and DC operation, the addition of the device will normally double the contact life, due to reduced arcing.

TR Design/Construction

Couples an advanced electromechanical design with a field-proven solid-state timing network, an adaptation of the circuit used in the AGASTAT premium grade SSC Timer. This unique circuit also eliminates the need for supplementary temperature-compensation components, affording unusual stability over a realistically broad operating temperature range. It also provides transient protection and protection against premature switching of the output contacts due to power interruption during timing.

Timing Specifications

Operating Mode — On-Delay (Delay on energization)

Timing Adjustment — Internal fixed or internal potentiometer

Timing Ranges —
- .15 to 3 sec.
- .55 to 15 sec.
- 1 to 30 sec.
- 2 to 60 sec.
- 4 to 120 sec.
- 10 to 300 sec.
- 1 to 30 min.
- 2 to 60 min.

Accuracy —
- Repeat — ±2% as fixed temperature and voltage
- Overall — ±5% over combined rated extremes of temperature and voltage

Reset Time — 75ms.

Contact Data @ 25°C

Arrangements — 4 Form C (4PDT)

Nominal Rating — 10A @ 120VAC

Contact Pressure —
- Between movable and normally closed contacts — 30 g, typical.
- Between movable and normally open contacts — 100 g, typical.

Expected Life —
- Mechanical — 100 million operations
- Electrical — See load/life graph

Initial Dielectric Strength —
- Between terminals and case — 2,000VAC
- Between non-connected terminals — 109 ohms at 500VDC
- Between non-connected terminals & relay yoke — 109 ohms at 500VDC

Coil Data

Voltage — 120VAC, 50-60 Hz.; 24 & 125VDC

Transient Protection —
- 1,500 volt transient of less than 100 microseconds, or 1,000 volts or less

Environmental Data

Operating Temperature Range —
- 0°C to +50°C

Mechanical Data

Mounting Terminals —
- 16 flat base pins. Screw terminal sockets are available.

Weight — 11 oz. (311g) approximately.

Ordering Information

Typical Part No. ➤ TR 14B1AN

1. Basic Series:
   TR = Timing control relay

2. Operation:
   1 = On-delay

3. Output:
   4 = 4PDT (4 form C)

4. Operating Voltage:
   B = 24VDC  D = 215VDC  I = 120VAC, 50/60 Hz.

5. Timing Adjustment:
   1 = Internal fixed.
   3 = Internal potentiometer.

6. Timing Range:
   A = .15 to 3 sec.
   C = 1 to 30 sec.
   E = 4 to 120 sec.
   I = 2 to 60 min.
   B = .55 to 15 sec.
   D = 2 to 60 sec.
   G = 10 to 300 sec.
   N = 1 to 30 min.

7. Options:
   N = Magnetic blow-out device.

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

None at present.

For Outline Dimensions see page 12-30

12-31
AGASTAT GP/ML/TR Series, 10 Amp Control Relay, 
Non-latching, Latching & Timing Versions (Continued)

Accessories for GP/ML/TR Series Control Relays

Front Connected Sockets

- **Cat. No. CR0001**
  With captive clamp terminals

- **Cat. No. CR0002**
  With (#6) binding head screws

- **Cat. No. CR0095**
  With (#6) screw terminals

- **Cat. No. CR0067**
  With (#6) screw terminals

Hold Down (Locking) Springs

- **Cat. No. CR0069**
  For socket: CR0067

- **Cat. No. CR0070**
  For socket: CR0095

- **Cat. No. CR0111**
  For sockets: CR0001 & CR0002

Heavy-duty Hold Down (Locking) Straps

- **Cat. No. CR0133**
  For socket: CR0001 & CR0002

- **Cat. No. CR0155**
  For socket: CR0095

* Catalog number includes strap, strap plate and necessary brackets.

Magnetic Blowout Device

- **Cat. No. CR0190**
  Reduces arcing on the relay contacts when they make or break contact, either upon energizing or de-energizing, resulting in less contact degradation.
  Extends the life of the contact.

Extracting Handle

- **Cat. No. CR0179**
  Used to remove GP, ML and TR units from mounting bases.
PMA/PMB Series, Three Phase, Power Quality Monitor

**Product Facts**
- Monitors deviation from nominal system voltage, phase imbalance, phase sequence and phase loss
- Locking potentiometer prevents tampering (PMA only)
- Start-up delay permits staggered restarting (PMB only)
- Four LEDs show nature of temporary/sustained faults
- 3-wire wye or delta connections for simple installation
- Calibrated nominal voltage potentiometer assures precise monitoring
- Superior transient immunity per ANSI C37.40
- Not fooled by back EMF
- 8 user-selectable thresholds – 4 undervoltage and 4 phase imbalance – match protection to load.
- Manual or automatic reset for application flexibility
- Suitable for commonly used grounded or ungrounded three-phase systems
- File E60363, File LR29186

**Function**
Three phase power quality monitor.

**Monitoring Specifications**
- Threshold Accuracy — ±0.2% of the average of 10 consecutive measurements of the threshold point at any fixed temperature within the operating temperature range.
- ±2% of the average of 10 consecutive measurements of the threshold point over the operating temperature range.
- Response Time — Phase loss and phase reversal — 2 line cycles +5 ms.
- Undervoltage and phase imbalance — See Figures 1 and 2 on the next page.

**Input Data**
- **Nominal Voltage** — 110 to 120VAC, 208 to 240VAC, 380 to 440VAC, 440 to 480VAC, 550 to 600VAC.
- **Maximum Voltage** — 132VAC for the 110 to 120VAC model; 264VAC for the 208 to 240VAC model; 484VAC for the 380 to 440VAC model; 528VAC for the 440 to 480VAC model; 650VAC for the 550 to 600VAC model.
- **Frequency** — 50/60 Hz.
- **Power Requirement** — 750mW.

**Output Data**
- **Arrangement** — 1 Form A (SPST-NO) + 1 Form B (SPST-NC).
- **Rating** — 8A @ 250VAC, resistive; 3A @ 30VDC, resistive; 1/4 HP @ 125/250VAC, 275VAC pilot duty.
- **Expected Mechanical Life** — 10,000,000 operations.
- **Expected Electrical Life** — 100,000 operations at rated resistive load.

**Initial Dielectric Strength**
Between Input Terminals and Case or Active Circuitry — 2,200VAC.
Between Relay Contacts and Active Circuitry — 2,200VAC.
Between Input Terminals and Case or Active Circuitry — 750mW.

**Environmental Data**
- **Temperature Range** — Storage — -40°C to +75°C.
- **Operating** — -10°C to +60°C.

**Mechanical Data**
- **Mounting** — Can be mounted on a flat surface with two screws or snapped on/off a furnished adapter plate which has been pre-mounted on a flat surface. Can also be mounted on a 300-volt machine tool relay channel using the adapter plate. Direct mounting (no adapter plate used) on a symmetrical DIN track is also possible.
- **Termination** — Screw terminals.
- **Connections** — 3 wire wye or delta.
- **Vibration** — Chatterless operation 5 to 80 Hz, 0.030 in.(0.762 mm) amplitude, 1 minute sweep.
- **Status Indication** — “Contacts Transferred” LED plus four additional LEDs to designate the specific fault that released the relay.
- **Weight** — 24 oz. (625g) approximately.

**Ordering Information**

**PMA**
- **Series** — PMA = Power Quality Monitor with Locking Potentiometer
- **Nominal Operating Voltage** — LA = 110 to 120VAC, 50/60 Hz.
- **Phase Imbalance Threshold** — L = Low (2-4%) H = High (5-10%)
- **Status Indicators** — S = “Contacts Transferred” and four fault status indicators

**LB**
- **Nominal Operating Voltage** — LB = 208 to 240VAC, 50/60 Hz.
- **Phase Imbalance Threshold** — L = Low (2-4%) H = High (5-10%)

**S**
- **Phase Imbalance Threshold** — L = Low (2-4%) H = High (5-10%)

**L**
- **Phase Imbalance Threshold** — L = Low (2-4%) H = High (5-10%)

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

**Dimensions**
- Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.
- Dimensions are shown for reference purposes only. Specifications subject to change.
- USA: 1-800-522-6752
- Canada: 1-905-470-4425
- Mexico: 01-800-733-8926
- C. America: 52-65-1106-0803
- South America: 55-11-2103-6000
- Hong Kong: 852-2735-1628
- Japan: 81-44-844-8013
- UK: 44-8706-080-208
PMA/PMB Series, Three Phase, Power Quality Monitor (Continued)

Operation

Monitor Operation — When the input voltage parameters are normal, the "Contacts Transferred" LED will be on and relay is energized. Once the unit has responded to a fault by releasing the output relay and simultaneously extinguishing the "Contacts Transferred" LED, the nature of the fault that caused the release will be identified by one of the four fault status indicators. In the automatic reset mode, the status indicator will extinguish and the "Contacts Transferred" LED will re-light once all faults are corrected and restart delay period has expired. In the manual reset mode, the fault indicator will flash when all faults have been corrected, thus indicating that the unit is ready for manual reset. When manually reset, the flashing fault status indicator will extinguish and the "Contacts Transferred" LED will re-light. Series PMA has a fixed start-up delay of approximately 10 seconds. Series PMB has a start-up delay adjustable from 0 to 5 minutes, which permits staggered restarting of motors, etc., affected by a common power outage. If the unit is wired for manual reset, the external reset switch must also be opened.

The output relay will remain in the transferred state until one of the fault conditions occur. (See Figures 1 and 2)

Phase Loss Condition — If the voltage of any phase drops below 68% of the nominal voltage setting for more than two line cycles, the output relay will release. If back EMF accompanies the loss of a phase, the unit will sense the loss as a phase imbalance and the relay will drop out.

Phase Reversal Condition — If any two phases become reversed for more than two line cycles, the output relay will release.

Undervoltage Condition — By strapping, the user can select one of four undervoltage thresholds: 10%, 14%, 17% or 20% below the nominal voltage, which is entered by means of a calibrated potentiometer located on the front panel. When the average voltage drops below the selected threshold, a time delay shown in Fig. 1 is initiated. The unit then continues to monitor the severity of the fault and modifies the time delay accordingly. If the undervoltage condition persists, the time delay will expire and the output relay will release.

Phase Imbalance Condition — The unit continuously averages the three phase voltages and recognizes individual deviations from the average. By strapping, the user can select one of four imbalance thresholds: Either 2.0%, 3.0%, 3.5%, 4.0%, or 5.0%, 7.0%, 8.5%, 10.0% depending on model. When any phase voltage deviates more than the selected percentage from the three phase average, a time delay as shown in Fig. 2 is initiated. The unit then continues to monitor the severity of the fault and modifies the time delay accordingly. If the phase imbalance condition persists, the time delay will expire and the output relay will release.

Typical Connection Diagram

FIGURE 1

FIGURE 2

Strapping Diagrams

Undervoltage Threshold

Low Phase Imbalance Threshold

High Phase Imbalance Threshold
VCA Series, Single Phase, Undervoltage Relay

**Function**
Single phase undervoltage relay

**Sensing Specifications**

**Voltage Set-Point Adjustment**
Internal potentiometer (screwdriver adjustable) with linear calibrated dial

**Response Time**
Depending on severity of undervoltage: 0.1 - 1 sec.

**Accuracy**
- Repeat Accuracy: ±0.2%
- Overall Accuracy: ±1%

**Output Data**

**Arrangement**
1 Form C (SPDT)

**Rating**
- 7A @ 250VAC, 1/6 HP @ 250VAC, 300VA @ 120/240VAC,
- 3A @ 30VDC

**Expected Mechanical Life**
10,000,000 operations

**Expected Electrical Life**
100,000 operations at rated resistive load

**Initial Dielectric Strength**
- Between Terminals and Case — 1,480V
- Between Relay Contacts and Active Circuitry — 1,480V

**Input Data**

**Voltage**
- 120VAC, 240VAC

**Power Requirement**
- 4W max.

**Transient Protection**
- 120VAC: 30 joules
- 240VDC: 30 joules
- 120VAC: 10 joules
- 120VDC: 10 joules

**Environmental Data**

**Temperature Range**
- Storage: -40°C to +85°C
- Operating: -23°C to +55°C

**Mechanical Data**

**Mounting**
Panel mount with one #8 screw

**Termination**
0.250 in (6.35) quick connect terminals

**Status Indication**
LED indicates normal voltage condition

**Weight**
3.2 oz. (90.7g) approximately

**Ordering Information**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Operating Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCA A</td>
<td>120VAC</td>
</tr>
<tr>
<td>VCA B</td>
<td>240VAC</td>
</tr>
</tbody>
</table>

Authorized distributors are likely to stock the following:
None at present.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek the pertinent approvals and review them to ensure the product meets the requirements for a given application.
**VMA series, Single Phase, Plug-in, Undervoltage Relay**

**Function**
Single phase undervoltage relay

**Sensing Specifications**

**Voltage Set-Point Adjustment** — Locking potentiometer with calibrated dial

**Response Time** — Standard 0.5 sec. delay on dropout

**Accuracy** — Repeat Accuracy — ±0.5% under fixed conditions

**Overall Accuracy** — ±1%

**Temperature Coefficient** — ±0.02%/°C (Max.)

**Output Data**

**Arrangement** — 2 Form C (DPDT)

**Rating** — 7A @ 250VAC, 1/6 HP @ 250VAC, 300VA @ 120/240VAC, 3A @ 30VDC

**Expected Mechanical Life** — 10,000,000 operations

**Expected Electrical Life** — 100,000 operations at rated resistive load

**Initial Dielectric Strength** — Between Terminals and Case — 1,480V

Between Relay Contacts and Active Circuitry — 1,480V

**Input Data**

**Voltage** — See ordering information.

**Power Requirement** — 4W max.

**Transient Protection** —

24VAC . . . . . . . . . . 1.5 joules

24VDC . . . . . . . . . . 10 joules

48VDC . . . . . . . . . . 10 joules

120VAC . . . . . . . . . 10 joules

125VDC . . . . . . . . . 10 joules

240VDC . . . . . . . . . 20 joules

**Reverse Polarity Protection** — On DC models

**Environmental Data**

**Temperature Range** —

Storage — -30°C to +60°C

Operating — -10°C to +55°C

**Mechanical Data**

**Mounting** — Octal plug. Fits 27E122 or 27E991 (snap-on) screw terminal socket. Order socket separately.

**Enclosure** — Nylon cover protects against particles.

**Status Indication** — LED indicates normal voltage condition.

**Weight** — 6 oz. (168g) approximately.

**Product Facts**

- Automatic reset minimizes equipment downtime
- Fixed pickup point prevents low voltage start-up
- Adjustable dropout point protects against undervoltage operation
- Locking potentiometer maintains selected set point
- Delayed dropout prevents nuisance tripping
- Plug-in mounting for easier installation
- Built-in protection against polarity reversal
- LED indicates normal voltage condition
- File E60363

**Ordering Information**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Nominal Voltage</th>
<th>Pick-Up (V)</th>
<th>Drop-Out Range (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMAXEA</td>
<td>24VAC</td>
<td>21</td>
<td>15 to 20</td>
</tr>
<tr>
<td>VMAXAA</td>
<td>120VAC</td>
<td>104</td>
<td>78 to 99</td>
</tr>
<tr>
<td>VMAXBA</td>
<td>240VAC</td>
<td>209</td>
<td>156 to 199</td>
</tr>
<tr>
<td>VMAXOA</td>
<td>24VDC</td>
<td>21</td>
<td>15 to 20</td>
</tr>
<tr>
<td>VMAXNA</td>
<td>48VDC</td>
<td>42</td>
<td>31 to 40</td>
</tr>
<tr>
<td>VMAXPA</td>
<td>125VDC</td>
<td>109</td>
<td>81 to 103</td>
</tr>
</tbody>
</table>

Authorized distributors are likely to stock the following:

None at present.

---

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.
SCB/SCC Series, Specification Grade Discrete Plug-in, Time Delay Relay

Product Facts
- On-Delay, Off-Delay and Interval timing modes
- 13 timing ranges from 0.1 sec. to 60 min.
- 10A DPDT output contacts
- Knob, fixed or external timing adjustment.
- Rated for pilot duty
- Premium components
- File 3520, File E60363, File LR51332, File E60363 (SCC only)

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

Contact Data @ 25°C
Arrangements — 2 Form C (DPDT)
Rating — 10A @ 28VDC or 120VAC, resistive; 1/3 HP @ 120/240VAC; 345VA. Same polarity.
Expected Mechanical Life — 10 million operations.
Expected Electrical Life — 500,000 operations, min., at rated resistive load
Initial Dielectric Strength — Between Terminals and Case — 1,000VAC plus twice the nominal voltage for one minute.
Input Data @ 25°C
Voltage — See Ordering Information section for details.
Power Requirement — 3W, max.
Transient Protection: Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

Environmental Data
Temperature Range —
Storage — SCB and SCC — -40°C to +85°C
Operating —
SCB — -30°C to +85°C
SCC — -30°C to +50°C

Mechanical Data
Mounting/Termination — SCB — UL recognized. Optional 8- or 11-pin octal-type sockets may be ordered separately.
SCC — 8- or 11-pin octal type sockets supplied with timer. (Must be used to qualify as "UL Listed" device.)
Weight — SCB: 2.0 oz. (57 g) approx.; SCC: 2.5 oz. (74 g) approx.

Ordering Information (All "Xs" must be included to complete part number)

<table>
<thead>
<tr>
<th>SCB</th>
<th>RX</th>
<th>01</th>
<th>2XX</th>
<th>A</th>
<th>A</th>
<th>XA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series SCB</td>
<td>Series SCC</td>
<td>Discrete Industrial Timer</td>
<td>Operating Mode</td>
<td>01 = On-Delay</td>
<td>02 = Off-Delay</td>
<td>03 = Interval</td>
</tr>
<tr>
<td>Mounting Series SCB</td>
<td>RX = B- or 11-pin socket (order separately)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting Series SCC</td>
<td>LA = 8-pin socket p/n BCSA085C for operating mode 01 or 03 with knob adjust or fixed time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC = 11-pin socket p/n BCSA115C for operating mode 02, 01 or 03 with external potentiometer or resistor.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Operating Voltage (+10%, −15%)
A = 120VAC, 50/60 Hz. / 120VDC
B = 240VAC, 50/60 Hz. / 24VDC
E = 24VAC, 50/60 Hz. / 24VDC
F = 48VAC, 50/60 Hz. / 48VDC
Q = 12VDC

Timing Adjustment
XA = Knob Adjust
XB = External Potentiometer or resistor
XF = Fixed Times — Specify time delay in seconds per the following examples:
XF9.000 = 9 sec.
XF99.0 = 99 sec.
XF999.0 = 999 sec.
XF1000 = 1000 sec.

Authorized distributors are likely to stock the following:
None at present.
SCE Series, Specification Grade Discrete Plug-in, True Off-Delay Time Delay Relay

CAUTION: If unit has not been energized for several months, apply operating voltage for 20 minutes prior to initial time delay.

Timing Specifications

Timing Modes — True Off-Delay — Upon application of operating voltage (min. 100ms), output relay contacts transfer. When operating voltage is removed, the time delay period is initiated. At the end of the delay period, output relay contacts release. If operating voltage is reapplied prior to expiration of the delay period, the delay will be cancelled and output relay contacts will remain transferred.

Timing Ranges — 0.1 to 3 / 0.5 to 15 / 1 to 30 / 4 to 120 / 10 to 300 sec.; 0.33 to 10 min.

Timing Adjustment — Knob adjustment — Internal potentiometer with external knob adjustment.

Maximum time calibrated with +10%, – 0% of values shown below at rated voltage, at 68°F.

Fixed time — internal fixed resistor.

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

Ordering Information

<table>
<thead>
<tr>
<th>SCE</th>
<th>R</th>
<th>X</th>
<th>2</th>
<th>2</th>
<th>A</th>
<th>C</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series SCE</td>
<td>Output Rating</td>
<td>Output</td>
<td>Operating Mode</td>
<td>Operating Voltage (&lt;10%, –15%)</td>
<td>Timing Range</td>
<td>Timing Adjustment</td>
<td></td>
</tr>
<tr>
<td>True Off-delay Timer</td>
<td>W = 10A (SPDT)</td>
<td>1 = SPDT (W)</td>
<td>2 = True Off-Delay</td>
<td>A = 120VAC, 50/60 Hz. / 125VDC</td>
<td>A = 0.1 to 3 sec.</td>
<td>A = Knob Adjust</td>
<td></td>
</tr>
<tr>
<td></td>
<td>X = 5A (DPDT)</td>
<td>2 = DPDT (W)</td>
<td>E = 24VAC, 50/60 Hz. / 24VDC</td>
<td>B = 0.5 to 15 sec.</td>
<td>F = Fixed Times — Specify time delay in seconds per the following examples:</td>
<td>F = Fixed Times – Specify</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C = 1 to 30 sec.</td>
<td>XF9.000 = 9 sec.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>XF99.00 = 99 sec.</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>XF999.0 = 9999 sec.</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>XF1000 = 10000 sec.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Authorized distributors are likely to stock the following:

None at present.
### SCF Series, Programmable, Time Delay Relay

#### Timing Modes
Modes are user selectable via screwdriver adjustment of recessed 4-position selector dial. Modes offered are: On-Delay, Off-Delay, Interval and Latching Interval.

#### Timing Specifications
- **Timing Ranges** — 0.1 to 3 / 0.33 to 10 / 1 to 30 / 4 to 120 sec.; 0.33 to 10 / 1 to 30 / 60 min.; 0.33 to 10 hr.
- **Timing Range Selection** — Screwdriver select via recessed 8-position selector dial.
- **Timing Adjustment** — External knob potentiometer adjustment with reference calibrations.
- **Accuracy** — Repeat Accuracy ± ±1% ±0.01 sec. Overall Accuracy ± ±3% ±0.01 sec.
- **Reset Time** — 30 ms.
- **Relay Operate Time** — On-Delay and Interval mode: 55 ms.
- **Relay Release Time** — Off-Delay, Interval and Latching Interval: 40 ms.

#### Contact Data @ 25°C
- **Arrangements** — 2 Form C (DPDT).
- **Rating** — 10A @ 28VDC or 120VAC, resistive; 1/3 HP @ 120/240VAC; 345VA.
- **Expected Mechanical Life** — 10 million operations.
- **Expected Electrical Life** — 500,000 operations, min., at rated resistive load.
- **Initial Dielectric Strength** — Between Terminals and Case — 1,000VAC plus twice the nominal voltage for one minute.

#### Input Data @ 25°C
- **Voltage** — See Ordering Information section for details.

#### Operating Voltage
- **Series: 12VDC** — 1.000V
- **Series: 24VAC/VDC** — 1.000V, 240V
- **Series: 48VAC/VDC** — 1.000V, 480V
- **Series: 120 VAC** — 3.000V, 240V
- **Series: 240VAC/VDC** — 3.000V, 2500V

#### Environmental Data
- **Temperature Range** — Storage — -40°C to +85°C.
- **Operating** — -30°C to +65°C.

#### Mechanical Data
- **Mounting/Termination** — 11-pin octal-type plug for use with mating socket. Mount relay in horizontal position (pins horizontal, knob down, LEDs up).
- **Status Indication** — Power On LED and Output Contacts LED.
- **Weight** — Relay: 3.5 oz. (156g) approx.; Socket: 1.7 oz. (48.3g) approx.

### Outline Dimensions

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

#### Wiring Diagram (Bottom View)

**Wiring Diagram**

- **Output**
  - 2 = DPDT Relay
  - **Operating Voltage** (+10%, -15%)
    - A = 120VAC, 50/60 Hz / 125VDC
    - B = 240VAC, 50/60 Hz
    - E = 24VAC, 50/60 Hz / 24VDC
    - F = 48VAC, 50/60 Hz / 24VDC
    - Q = 12VDC

- **Output Rating**
  - A = 10 Amp
  - B = 5 Amp

#### Authorized distributors are likely to stock the following:
None at present.
SRC Series, Specification Grade Repeat Cycle, Plug-in Time Delay Relay

**Timing Specifications**

**Timing Modes**
Repeat Cycle: Application of line voltage starts the pre-set OFF-time period. Upon expiration of the period, the output relay is energized, its contacts transfer, and the pre-set ON-time period begins. At the end of this period the output relay is deenergized, and a new cycle begins. The OFF and ON cycles continue until power is removed. To reset the timer, input voltage must be removed for at least 25 ms.

**Timing Ranges**
OFF time and ON time ranges need not be the same. 6 to 180 cycles; 0.1 to 3 / 10 to 0.5 to 15 / 1 to 30 / 2 to 60 / 4 to 120 / 6 to 180 / 10 to 300 sec.; 0.33 to 10 / 0.5 to 15 / 1 to 30 / 2 to 60 min. (All are +10%, -1% of maximum values).

**Timing Adjustment**
Two internal potentiometers with external knobs.

**Accuracy**
Repeat Accuracy — ±1% ±0.004 sec.
Overall Accuracy — ±2.25% max.

**Reset Time**
25 ms. max. (between deenergization and reenergization without affecting accuracy.)

**Relay Operate Time**
20 ms.

**Relay Release Time**
15 ms.

**Contact Data @ 25°C**

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>&lt;0.1 ms</th>
<th>&lt;1 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>12VDC</td>
<td>1,000V</td>
<td>2,400V</td>
</tr>
<tr>
<td>24VAC/VDC</td>
<td>1,000V</td>
<td>2,400V</td>
</tr>
<tr>
<td>48VAC/VDC</td>
<td>1,000V</td>
<td>2,400V</td>
</tr>
<tr>
<td>120VAC/VDC</td>
<td>3,000V</td>
<td>5,000V</td>
</tr>
<tr>
<td>240VAC</td>
<td>3,000V</td>
<td>5,000V</td>
</tr>
</tbody>
</table>

*Minimum source impedance of 100 ohm*

**Environmental Data**

**Temperature Range**
Storage — -40°C to +85°C
Operating — -30°C to +65°C

**Mechanical Data**

**Mounting/Termination**
Quick connect terminals fit either 27E121 or 27E893 (snap-on) socket (order separately)

**Weight**
5.3 oz. (149g) approximately

**Ordering Information**

<table>
<thead>
<tr>
<th>SRC</th>
<th>7</th>
<th>2</th>
<th>A</th>
<th>C</th>
<th>C</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series SRC</td>
<td>Output</td>
<td>Timing Range</td>
<td>Off-Time</td>
<td>Timing Adjustment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeat Cycle</td>
<td>2 = DPDT Relay</td>
<td>A = 0.1 to 3 sec.</td>
<td>A = Dual Knob Adjust</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Operating Voltage**
(+10%, -15%)
A = 120VAC, 50/60 Hz / 120VDC
B = 240VAC, 50/60 Hz
E = 24VAC, 50/60 Hz / 24VDC
F = 48VAC, 50/60 Hz / 48VDC
Q = 12VDC

**Expected Mechanical Life**
10 million operations

**Expected Electrical Life**
500,000 operations, min., at rated resistive load.

**Initial Diellctric Strength**
Between Terminals & Case and Mutually Isolated Contacts — 1,480VAC.

**Input Voltage**
See Ordering Information section for details.

**Operating Voltage**
3W max.

**Power Requirement**
10A @ 28VDC or 120VAC, resistive; 1/3 HP @ 120/240VAC.

**Transient Protection**
Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

**Expected Mechanical Life**
10 million operations

**Expected Electrical Life**
500,000 operations, min., at rated resistive load.

**Initial Diellctric Strength**
Between Terminals & Case and Mutually Isolated Contacts — 1,480VAC.

**Environmental Data**

**Temperature Range**
Storage — -40°C to +85°C
Operating — -30°C to +65°C

**Mechanical Data**

**Mounting/Termination**
Quick connect terminals fit either 27E121 or 27E893 (snap-on) socket (order separately)

**Weight**
5.3 oz. (149g) approximately

**Ordering Information**

Authorized distributors are likely to stock the following:
None at present.
**SSC Series, Specification Grade Discrete Plug-in, Time Delay Relay**

**Timing Specifications**

**Timing Modes**
- On-Delay, Off-Delay and Interval.

**Timing Ranges**
- 6 to 180 cycles; 0.1 to 10 / 0.5 to 10 / 1 to 30
- 4 to 120 sec.; 0.3 to 10 / 1 to 30 / 2 to 60 min.; 0.3 to 10 hr. (All are +10%, –1% of maximum values).

**Timing Adjustment**
- Knob or fixed time (internal fixed resistor) – all models; customer supplied external potentiometer or resistor – On-Delay and Interval models only.

**Accuracy**
- Repeat Accuracy — ±1% ±0.004 sec. at any combination of operating temperature and voltage. Overall Accuracy — ±5.25% throughout operating temperature and voltage ranges.

**Reset Time**
- 25 ms. (minimum deenergized interval for on-delay or off-delay models, or minimum required closure interval for interval models without affecting accuracy.)

**Relay Operate Time**
- Off-Delay mode only: 25 ms.

**Relay Release Time**
- Off-Delay mode only: 20 ms.

**Contact Data @ 25°C**
- Arrangements — 2 Form C (DPDT).
- Rating — 10A @ 28VDC or 120VAC, resistive; 1/3 HP @ 120/240VAC.
- Expected Mechanical Life — 10 million operations.
- Expected Electrical Life — 500,000 operations, min., at rated resistive load.

**Initial Dielectric Strength**
- Between Terminals and Case — 1,000VAC plus twice the nominal voltage for one minute.

**Input Data @ 25°C**
- Voltage — See Ordering Information section for details.
- Power Requirement — 3W max.
- Transient Protection — Non-repetitive transients of the following magnitudes will not cause spurious operation of actuator function and accuracy.  

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>&lt;0.1 ms</th>
<th>&lt;1 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>12VDC</td>
<td>1,000V</td>
<td>240V*</td>
</tr>
<tr>
<td>12VDC</td>
<td>1,000V</td>
<td>240V*</td>
</tr>
<tr>
<td>24VAC/VDC</td>
<td>1,000V</td>
<td>240V*</td>
</tr>
<tr>
<td>48VAC/VDC</td>
<td>1,000V</td>
<td>480V*</td>
</tr>
<tr>
<td>120VAC/VDC</td>
<td>3,000V</td>
<td>2,500V*</td>
</tr>
<tr>
<td>240VAC</td>
<td>3,000V</td>
<td>2,500V*</td>
</tr>
</tbody>
</table>

*Minimum source impedance of 100 ohm

**Environmental Data**
- Temperature Range
  - Storage — -40°C to +85°C
  - Operating — -30°C to +65°C

**Mechanical Data**
- Mounting/Terminal
  - 8- or 11-pin octal type plug; 8-pin types fit either 27E122 or 27E891, while 11-pin types fit 27E123 or 27E892.
- Weight — 4 oz. (112g) approximately

**Ordering Information**

<table>
<thead>
<tr>
<th>SSC Series SSC</th>
<th>Discrete Industrial Timer</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Output 2 = DPDT Relay</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A</th>
<th>A</th>
<th>A</th>
</tr>
</thead>
</table>
| Timing Range
  - A = 0 to 3 sec.
  - B = 0.5 to 15 sec.
  - C = 1 to 30 sec.
  - D = 2 to 60 sec.
  - E = 4 to 120 sec.
  - F = 6 to 180 sec.
  - G = 10 to 300 sec.
  - I = 2 to 60 min.
  - K = 3 to 180 cycles
  - L = 0.33 to 10 min.
  - M = 0.5 to 15 min.
  - N = 1 to 30 min.
  - P = 0.1 to 10 min. |

<table>
<thead>
<tr>
<th>A</th>
<th>A</th>
<th>A</th>
</tr>
</thead>
</table>
| Operating Voltage (+10%, –15%)
  - A = 120VAC, 50/60 Hz / 120VDC
  - B = 240VAC, 50/60 Hz
  - C = 24VAC, 50/60 Hz / 24VDC
  - D = 48VAC, 50/60 Hz / 48VDC
  - E = 12VDC (+10%) |

<table>
<thead>
<tr>
<th>A</th>
<th>A</th>
</tr>
</thead>
</table>
| Timing Adjustment
  - A = Knob Adjust
  - B = External Potentiometer or resistor (Operating modes 1 and 3 only).
  - F = Fixed Times — Specify time delay in seconds per the following examples: F9.000 = 9 sec.
  - F99.00 = 99 sec.
  - F9999.0 = 9999 sec.
  - F10000 = 10000 sec. |

**Authorized distributors are likely to stock the following:**

<table>
<thead>
<tr>
<th>SSC12AAA</th>
<th>SSC12ACA</th>
<th>SSC12AGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSC12ABA</td>
<td>SSC12ADA</td>
<td>SSC12ALA</td>
</tr>
</tbody>
</table>

**Product Facts**

- **On-Delay, Off-Delay and Interval timing modes**
- **13 timing ranges from 0.1 sec. to 60 min.**
- **10A DPDT output contacts**
- **Excellent repeatability of ±1% or better.**
- **Exceptional immunity to transients and noise.**
- **Wide operating temperature range.**

**File 3520, File LR29186**

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

**Tyco Electronics**

**Specialty Relays**

Catalog 5-1773450-5
Revised 9-08
www.tycoelectronics.com

Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 01-800-733-8926
C. America: 52-55-1106-0803

South America: 55-11-2103-6000
Hong Kong: 852-2735-1628
Japan: 81-44-844-8013
UK: 44-4706-080-208

BELDEN is a trademark of Belden Technologies, Inc.

**Wiring Diagrams (Bottom Views)**

**Outline Dimensions**

Insulated, shielded two-conductor cable similar to BELDEN #719, 8720 or 8769 required for leads longer than 6 inches. Max. permissible length is 50 feet.

BELDEN is a trademark of Belden Technologies, Inc.
SSF Series, Programmable Time Delay Relay

Product Facts
- 4 user-programmable timing modes
- 0.1 sec. to 10 hr. programmable timing range
- Parameters set with recessed screwdriver dials
- Universal voltage (plug-in relay dependent)
- 10A DPDT replaceable output relay minimizes downtime
- Front screw terminals
- DIN-rail, panel or machine tool track mount
- File E15631, File LR29186

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

Timing Specifications
- Timing Modes — Modes are user selectable via screwdriver adjustment of recessed 4-position selector dial.
- Timing Ranges — 0.1 to 3 / 0.33 to 10 / 1 to 30 / 4 to 120 sec.; 0.33 to 10 / 1 to 30 / 2 to 60 min.; 0.33 to 10 hr.

Contact Data @ 25°C
- Arrangements — 2 Form C (DPDT).
- Rating — 10A @ 28VDC or 120VAC, resistive; 1/3 HP @ 120/240VAC 345VA.
- Expected Mechanical Life — 10 million operations (with factory-installed relay).
- Expected Electrical Life — 500,000 operations, min., at rated resistive load (with factory-installed relay).

Initial Dielectric Strength — Between Coil/Control Switch and Contacts — 1,500VAC for one minute.

Input Data @ 25°C
- Voltage — See Ordering Information section for details.

Power Requirement — 2W max.

Outline Dimensions

Ordering Information

Authorized distributors are likely to stock the following:
SSF90A
SSF90X
Users should thoroughly review the technical data before selecting a product. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.

**Product Facts**
- On-Delay, Off-Delay, Interval, One Shot & Repeat modes
- Time delays to 120 min.
- Fast setting with time calibrated knobs
- Superior transient protection
- Rugged construction with 8- or 11-pin plug
- Flame retardant housing
- File E15631, File LR33434

**Ordering Information**

**SST1 – On Delay Types**

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Time Range</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST12AAA</td>
</tr>
<tr>
<td></td>
<td>0.6 - 60 sec.</td>
<td>SST12ACA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST12AEA</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST12EA2A</td>
</tr>
<tr>
<td></td>
<td>18 sec. - 30 min.</td>
<td>SST12EA2A</td>
</tr>
<tr>
<td></td>
<td>36 sec. - 60 min.</td>
<td>SST12EA2A</td>
</tr>
<tr>
<td>24 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST12AEE</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST12E2A</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST12EA3A</td>
</tr>
<tr>
<td>24 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST12DAA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST12D2A</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST12D2A</td>
</tr>
<tr>
<td>12 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST12QAA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST12Q2A</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST12Q2A</td>
</tr>
</tbody>
</table>

**SST2 – Off Delay Types**

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Time Range</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST22AAA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST22ADA</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST22E2A</td>
</tr>
<tr>
<td></td>
<td>18 sec. - 30 min.</td>
<td>SST22E2A</td>
</tr>
<tr>
<td></td>
<td>36 sec. - 60 min.</td>
<td>SST22E2A</td>
</tr>
<tr>
<td>24 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST22EA2</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST22E2A</td>
</tr>
<tr>
<td></td>
<td>24 VDC</td>
<td>1.8 - 180 sec.</td>
</tr>
<tr>
<td>12 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST22QAA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST22Q2A</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST22Q2A</td>
</tr>
</tbody>
</table>

**SST3 – Interval Types**

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Time Range</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 VAC</td>
<td>0.1 - 10 sec.</td>
<td>SST32AAA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST32Q2A</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST32Q2A</td>
</tr>
<tr>
<td>24 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST32EA2</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST32E2A</td>
</tr>
<tr>
<td>12 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST32Q2A</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST32Q2A</td>
</tr>
</tbody>
</table>

**SST4 – One Shot* Types**

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Time Range</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST42AAA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST42ADA</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST42E2A</td>
</tr>
<tr>
<td></td>
<td>18 sec. - 30 min.</td>
<td>SST42E2A</td>
</tr>
<tr>
<td></td>
<td>36 sec. - 60 min.</td>
<td>SST42E2A</td>
</tr>
<tr>
<td>24 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST42EA2</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST42E2A</td>
</tr>
<tr>
<td></td>
<td>0.1 - 10 sec.</td>
<td>SST42AAA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST42Q2A</td>
</tr>
</tbody>
</table>

**SST7 – Repeat Cycle Types**

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Time Range</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST72AAA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST72ADA</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST72E2A</td>
</tr>
<tr>
<td></td>
<td>36 sec. - 60 min.</td>
<td>SST72E2A</td>
</tr>
<tr>
<td>24 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST72EA2</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST72EA2</td>
</tr>
<tr>
<td></td>
<td>0.1 - 10 sec.</td>
<td>SST72AAA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST72Q2A</td>
</tr>
</tbody>
</table>

**Expected Mechanical Life**
- 10 million operations

**Expected Electrical Life**
- 500,000 operations, min., at rated resistive load

**Initial Dielectric Strength**
- Between Contacts, Line Inputs and Control Circuits: 1,500V RMS, minimum, at 60 Hz

**Input Data @ 25°C**
- Voltage: See Ordering Information section for details

**Power Requirement**
- 3W max.

**Transient Protection**
- Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

**Environmental Data**
- Temperature Range: Storage: -23°C to +71°C
- Operating: -23°C to +54°C

**Mechanical Data**
- Mounting/Termination: Off-Delay, Interval and Repeat types have 8-pin octal plug that fits either 27E122 or 27E91 socket. Off-Delay and One Shot types have 11-pin octal-type plug that fits 27E123 or 27E892. Sockets must be ordered separately.

**Weight**
- 4 oz. (112g) approximately

Authorized distributors are likely to stock the following:

None at present.
STA Series, Specification Grade Discrete Plug-in, Time Delay Relay With QC Terminals

Timing Specifications
Timing Modes — On-Delay, Off-Delay, Interval and Accumulating On-Delay.
Timing Ranges — 6 to 180 cycles; 0.1 to 3 / 0.5 to 15 / 1 to 30 / 2 to 60 / 4 to 120 / 6 to 180 / 10 to 300 sec.; 0.33 to 10 / 0.5 to 15 / 1 to 30 min.; 1 to 6 / 2 to 48 hr. (All are +5%, -0% of maximum values).
Timing Adjustment — Knob or fixed time (internal fixed resistor) — all models; customer supplied external potentiometer or resistor — On-Delay and Interval models only.

Accuracy — Repeat Accuracy — ±5% ±0.004 sec. Overall Accuracy — ±2% throughout operating temperature and voltage ranges.
Reset Time — 30 ms. min. (between deenergization and reenergization without affecting accuracy).
Relay Operate Time — Off-Delay model: 35 ms.; Interval model — 20 ms.
Relay Release Time — On-Delay and Accumulating On-Delay modes — 20 ms.

Contact Data @ 25°C
Arrangements — 2 Form C (DPDT).
Rating — 10A @ 28VDC or 120VAC; resistive; 1/3 HP @ 120/240VAC; 345VA. Same polarity.
Expected Mechanical Life — 10 million operations.
Expected Electrical Life — 500,000 operations, min., at rated resistive load.
Initial Dielectric Strength — 1,000VAC plus twice the nominal voltage for one minute.

Input Data @ 25°C
Voltage — See Ordering Information section for details.
Power Requirement — 3W max.
Transient Protection — Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

Operating
Voltage
.01 sec. <1 ms
12 & 24
3,000V 2,500
12 & 24
Consult Factory

Environmental Data
Temperature Range — Storage — -40°C to +85°C Operating — -30°C to +45°C

Mechanical Data
Mounting/Termination — Quick connect terminals fit either 27E121 or 27E893 (snap-on) socket (order separately).
Status Indication — Power On LED and Output Contacts LED (optional).
Weight — 4.2 oz. (119g) approximately.

Ordering Information
(All "X's" must be included to complete part number)

<table>
<thead>
<tr>
<th>STA</th>
<th>RX</th>
<th>01</th>
<th>2X</th>
<th>S</th>
<th>A</th>
<th>A</th>
<th>XA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series STA</td>
<td>Discrete Industrial Timer With Tab-type Terms.</td>
<td>Operating Mode</td>
<td>Status Indication</td>
<td>Timing Range</td>
<td>Operating Voltage (±10%, –15%)</td>
<td>Timing Adjustment</td>
<td></td>
</tr>
<tr>
<td>01 = On-Delay</td>
<td>02 = Off-Delay</td>
<td>03 = Interval</td>
<td>09 = Accumulating On-Delay</td>
<td>— A = 0.1 to 3 sec.</td>
<td>— A = External Potentiometer or resistor (Operating modes 1 and 3 only).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>— B = 0.5 to 15 sec.</td>
<td>— C = 1 to 30 sec.</td>
<td>— D = 2 to 60 sec.</td>
<td>— E = 4 to 120 sec.</td>
<td>— F = 6 to 180 sec.</td>
<td>— X = Knob Adjust</td>
<td></td>
<td></td>
</tr>
<tr>
<td>— G = 10 to 300 sec.</td>
<td>— I = 2 to 60 min.</td>
<td>— J = 1 to 6 hr.</td>
<td>— K = 3 to 180 cycles</td>
<td>— L = 0.33 to 10 min.</td>
<td>— XA = Knob Adjust</td>
<td></td>
<td></td>
</tr>
<tr>
<td>— M = 0.5 to 15 min.</td>
<td>— N = 1 to 30 min.</td>
<td>— R = 2 to 48 hr.</td>
<td>— XA999 = 9 sec.</td>
<td>— XF999 = 999 sec.</td>
<td>— XF1000 = 1000 sec.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Authorized distributors are likely to stock the following:
None at present.

Product Facts
- On-Delay, Off-Delay, Interval and Accumulating On-Delay timing modes
- 13 timing ranges from 0.1 sec. to 48 hr.
- 10A DPDT output contacts
- Knob, fixed or external timing adjustment
- QC plug-in terminals save space, two LEDs show status
- File 3520, File E60363, File LR51332

File LR51332

Outline Dimensions

Wiring Diagrams (Bottom Views)
VTM1 Series, On-Delay, Timing Module

Timing Specifications
Timing Mode — On-Delay
Timing Ranges — 0.5 to 10 / 3 to 60 sec.; 0.5 to 10 / 3 to 60 min.
Timing Range Selection — Screwdriver select via recessed 8-position selection dial.
Timing Adjustment — External resistor or potentiometer. An external resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:

\[ R_t = \frac{(T_{req} - T_{min}) \times 1,000,000 \text{ ohms}}{T_{MAX} - T_{MIN}} \]

Accuracy —
- Repeat Accuracy — ±1%
- Overall Accuracy — ±2% at R = 1 megohm
Reset Time — 100 ms, max., before time-out; 10 ms, max., after time-out.

Output Switch Data
Arrangement — Solid state 1 Form A (SPST-NO)
Rating — 1A, inductive, at nominal operating voltage.

Expected Electrical Life — 10,000,000 operations at rated load.
Initial Dielectric Strength — Between Terminals and Mounting — 3,000VAC rms.
Between Input and Output — 1,500VAC rms.

Input Data @ 25°C
Voltage — 12 VAC/VDC, 24VAC/VDC, 120 VAC/VDC.
Power Requirement — 3W max.

Transistor Protection — Non-repetitive transients of the following magnitudes will not cause spurious operation and affect function and accuracy.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Operating Voltage</th>
<th>&lt;0.1 ms</th>
<th>&lt;1 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V</td>
<td>Voltage &lt;0.1 ms &lt;1 ms 12, 24 VAC/VDC</td>
<td>&lt;208V* 860V</td>
<td></td>
</tr>
<tr>
<td>120 V</td>
<td>Voltage &lt;0.1 ms &lt;1 ms 120 VAC/VDC</td>
<td>&lt;2,150V* 2,580V</td>
<td></td>
</tr>
</tbody>
</table>

* Min. source impedance of 100 ohm.

Environmental Data
Temperature Range —
- Storage — -40°C to +85°C
- Operating — -40°C to +65°C

Mechanical Data
Mounting — Panel mount with one #8 screw.
Termination — 0.250 in (6.35) quick connect terminals.
Weight — 3 oz. (84g) approximately

Outline Dimensions

An external resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:

\[ R_t = \frac{(T_{req} - T_{min}) \times 1,000,000 \text{ ohms}}{T_{MAX} - T_{MIN}} \]

Wiring Diagram

Ordering Information

VTM1 A CD

<table>
<thead>
<tr>
<th>Series VTM1</th>
<th>Input Voltage</th>
<th>Time Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-Delay</td>
<td>A = 120VAC/VDC</td>
<td>CD = 0.5 - 10 sec.</td>
</tr>
<tr>
<td>Timing Module</td>
<td>E = 24VAC/VDC</td>
<td>DD = 3 - 60 sec.</td>
</tr>
<tr>
<td></td>
<td>Q = 12VAC/VDC</td>
<td>FD = 0.5 - 10 min.</td>
</tr>
</tbody>
</table>

Authorized distributors are likely to stock the following:
VTM1ECD
VTM1EDD
VTM-1 Series, Specification Grade, On-Delay, Timing Module

Timing Specifications
Timing Mode — On-Delay — VTM-1 in-line timing module is wired in series with the load circuit. Time delay is initiated when power is applied to the series network. Connecting a resistor across the center terminals provides tamper-proof setting of time delay from 1-1000 sec.
Timing Ranges — 1 to 1000 sec.
Timing Adjustment — Time delay is set by connecting an appropriately rated resistor or potentiometer between the center two terminals. As supplied, the unit provides a nominal 1 second delay. Add 10k ohm of resistance for every additional second of delay required. For example: 5 seconds = 40k ohms; 10 seconds = 90k ohms.
Accuracy — Repeat Accuracy ±2%
Reset Time — 100 ms, max., in the timing or time-out condition.

Output Switch Data
Arrangement — 1 Form A (SPST-NO)
Rating — 5A, inductive, at nominal operating voltage.
Inrush — Not to exceed 10A for one cycle.
Max. Leakage Current — 4mA rms
Expected Electrical Life — 10,000,000 operations at rated load.
Initial Dielectric Strength — Between Active Terminals and Outside of Case — 1,480VAC for one min.

Input Data @ 25°C
Current — 2mA (max.) required to operate timer regardless of output state.
Power Requirement — 3W max.
Transient Protection — MOV across input 2,000V for 11µs on line side of load.

Environmental Data
Temperature Range
Storage — -40°C to +85°C
Operating — -30°C to +65°C

Mechanical Data
Mounting — Screw mount in horizontal or vertical position through built-in mounting ears.
Termination — 0.250 in (6.35) quick connect terminals for input line, load output and timing resistor connection.
Weight — 3 oz. (84g) approximately

Wiring Diagram

Notes:
1. Do not operate timer without connecting load in series with line voltage.
2. For a time delay of 1 second, connect a jumper across the center two terminals.

Authorized distributors are likely to stock the following:
VTM-1
VTM2 Series, Off-Delay, Timing Module

Timing Specifications
Timing Mode — Off-Delay
Timing Ranges — 0.5 to 10 / 3 to 60 sec.; 3 to 60 min.
Timing Adjustment — External resistor or potentiometer. An external resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:

\[ R_T = \frac{(T_{REQ} - T_{MIN}) \times 1,000,000 \text{ ohms}}{T_{MAX} - T_{MIN}} \]

Accuracy —
Repeat Accuracy — ±1%
Overall Accuracy — ±2% at
\[ R = 1 \text{ megohm} \]
Reset Time — 50 ms, max.

Output Switch Data
Arrangement — Solid state 1 Form A (SPST-NO)
Rating — 1A, inductive, at nominal operating voltage.
Expected Electrical Life — 10,000,000 operations at rated load.
Initial Dielectric Strength — Between Terminals and Mounting — 3,000VAC rms.
Between Input and Output — 1,500VAC rms.

Ordering Information

<table>
<thead>
<tr>
<th>VTM2</th>
<th>A</th>
<th>CD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series VTM2 Off-Delay Timing Module</td>
<td>Input Voltage A = 120VAC/VDC E = 24VAC/VDC Q = 12VAC/VDC</td>
<td>Time Range CD = 0.5 - 10 sec. DD = 3 - 60 sec.</td>
</tr>
</tbody>
</table>

Authorized distributors are likely to stock the following:
None at present.
VTM3 Series, Interval, Timing Module

Timing Specifications
Timing Mode — Interval
Timing Ranges — 0.5 to 10 / 3 to 60 sec.; 3 to 60 min.
Timing Adjustment — External resistor or potentiometer. An external resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:
\[ R_T = \frac{(T_{REQ} - T_{MIN})}{T_{MAX} - T_{MIN}} \times 1,000,000 \text{ ohms} \]

Accuracy —
- Repeat Accuracy — ±1%
- Overall Accuracy — ±2% at R = 1 megohm

Reset Time — 50 ms, max.

Output Switch Data
Arrangement — Solid state 1 Form A (SPST-N0)
Rating — 1A, inductive, at nominal operating voltage.

Expected Electrical Life — 10,000,000 operations at rated load.
Initial Dielectric Strength — Between Terminals and Mounting — 3,000VAC rms.
- Between Input and Output — 1,500VAC rms.

Input Data @ 25°C
- Voltage (±10%) — 12 VAC/VDC, 24VAC/VDC, 120 VAC/VDC.
- Power Requirement — 4W with rated load

Transient Protection —
Non-repetitive transients of the following magnitudes will not cause spurious operation or affect function and accuracy.

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>&lt;0.1 ms</th>
<th>&lt;1 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 VAC/VDC</td>
<td>860V*</td>
<td>208V*</td>
</tr>
<tr>
<td>120 VAC/VDC</td>
<td>2,580V*</td>
<td>2,150V*</td>
</tr>
</tbody>
</table>

* Min. source impedance of 100 ohms.

Mechanical Data
Mounting — Panel mount with one #8 screw.

Termination — 0.250 in (6.35) quick connect terminals.

Weight — 4 oz. (112g) approximately

Ordering Information

<table>
<thead>
<tr>
<th>VTM3</th>
<th>A</th>
<th>CD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series VTM3</td>
<td>Input Voltage</td>
<td>Time Range</td>
</tr>
<tr>
<td>Internal Timing Module</td>
<td>A = 120VAC/VDC</td>
<td>CD = 0.5 - 10 sec.</td>
</tr>
<tr>
<td></td>
<td>E = 24VAC/VDC</td>
<td>DD = 3 - 60 sec.</td>
</tr>
<tr>
<td></td>
<td>Q = 12VAC/VDC</td>
<td>GD = 3 - 60 min.</td>
</tr>
</tbody>
</table>

Authorized distributors are likely to stock the following:
None at present.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that users also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.
**VTM4 Series, One Shot (Latching Interval), Timing Module**

**Timing Specifications**
- **Timing Mode** — One Shot (Latching Interval)
- **Timing Ranges** — 0.5 to 10 / 3 to 60 sec., 0.5 to 10 / 3 to 60 min.
- **Timing Adjustment** — External resistor or potentiometer. An external resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:
  \[ R_T = \left( \frac{T_{REQ} - T_{MIN}}{T_{MAX} - T_{MIN}} \right) \times 1,000,000 \text{ ohms} \]
- **Accuracy**
  - **Repeat Accuracy** — ±1%
  - **Overall Accuracy** — ±2% at R = 1 megohm
- **Reset Time** — 50 ms, max.

**Output Switch Data**
- **Arrangement** — Solid state 1 Form A (SPST-NO)
- **Rating** — 1A, inductive, at nominal operating voltage.

**Input Data @ 25°C**
- **Voltage (±10%)** — 12 VAC/VDC, 24VAC/VDC, 120 VAC/VDC.
- **Power Requirement** — 4W with rated load.
- **Transient Protection** — Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.
<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>&lt;0.1 ms</th>
<th>&lt;1 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 VAC/VDC</td>
<td>860V*</td>
<td>208V*</td>
</tr>
<tr>
<td>24 VAC/VDC</td>
<td>1280V*</td>
<td>2150V*</td>
</tr>
</tbody>
</table>
  * Min. source impedance of 100 ohms.

**Environmental Data**
- **Temperature Range**
  - **Storage** — -40°C to +85°C
  - **Operating** — -40°C to +65°C
- **Mechanical Data**
  - **Mounting** — Panel mount with one #8 screw.
  - **Termination** — 0.250 in (6.35) quick connect terminals.
  - **Weight** — 4 oz. (112g) approximately

**Outline Dimensions**

![Outline Diagram](image)

**Wiring Diagram**

An external resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:

\[ R_T = \left( \frac{T_{REQ} - T_{MIN}}{T_{MAX} - T_{MIN}} \right) \times 1,000,000 \text{ ohms} \]

**Ordering Information**

<table>
<thead>
<tr>
<th>VTM4</th>
<th>A</th>
<th>CD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Series VTM4</strong></td>
<td><strong>Input Voltage</strong></td>
<td><strong>Time Range</strong></td>
</tr>
<tr>
<td>One Shot (Latching Interval)</td>
<td>A = 120VAC/VDC</td>
<td>CD = 0.5 - 10 sec.</td>
</tr>
<tr>
<td>Timing Module</td>
<td>E = 24VAC/VDC</td>
<td>DD = 3 - 60 sec.</td>
</tr>
<tr>
<td></td>
<td>Q = 12VAC/VDC</td>
<td>FD = 0.5 - 10 min.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GD = 3 - 60 min.</td>
</tr>
</tbody>
</table>

**Authorized distributors are likely to stock the following:**

None at present.

---

Users should thoroughly review the technical data before selecting a product part number. It is recommended that user also seek out the pertinent approvals files of the agencies/laboratories and review them to ensure the product meets the requirements for a given application.
VTM7 Series, Repeat Cycle, Timing Module

Timing Specifications
Timing Mode — Repeat Cycle
Timing Ranges — 0.5 to 10 / 3 to 60 sec., 3 to 60 min.
Timing Adjustment — External resistor or potentiometer. An external resistance of 1 megohm is required to obtain the maximum time for all ranges. To determine the actual resistance needed to obtain the required time delay, use the following formula:

\[ R_T = \frac{(T_{REQ} - T_{MIN})}{T_{MAX} - T_{MIN}} \times 1,000,000 \text{ ohms} \]

Accuracy —
Repeat Accuracy — ±1%
Overall Accuracy — ±2% at
R = 1 megohm
Reset Time — 500 ms

Output Switch Data
Arrangement — Solid state 1 Form A (SPST-NO)
Rating — 1A, inductive, at nominal operating voltage.
Expected Electrical Life — 10,000,000 operations at rated load.
Initial Dielectric Strength — Between Terminals and Mounting — 3,000VAC rms.
Between Input and Output — 1,500VAC rms.

Input Data @ 25°C
Voltage (±10%) — 12 VAC/VDC, 24VAC/VDC, 120 VAC/VDC.
Power Requirement — 4W with rated load
Transient Protection — Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>&lt;0.1 ms</th>
<th>&lt;1 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 VAC/VDC</td>
<td>860V*</td>
<td>208V*</td>
</tr>
<tr>
<td>120 VAC/VDC</td>
<td>2,580V*</td>
<td>2,150V*</td>
</tr>
</tbody>
</table>

* Min. source impedance of 100 ohms.
Current Drain — Less than 5mA.

Environmental Data
Temperature Range —
Storage — -40°C to +85°C
Operating — -40°C to +65°C

Mechanical Data
Mounting — Panel mount with one #8 screw.
Termination — 0.250 in (6.35) quick connect terminals.
Weight — 4 oz. (112g) approximately

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

Authorized distributors are likely to stock the following:
None at present.

Ordering Information

<table>
<thead>
<tr>
<th>VTM7 A CD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series VTM7</td>
</tr>
<tr>
<td>Repeat Cycle Timing Module</td>
</tr>
<tr>
<td>E = 24VAC/VDC</td>
</tr>
<tr>
<td>Q = 12VAC/VDC</td>
</tr>
</tbody>
</table>

Authorized distributors are likely to stock the following:
None at present.

Product Facts
- Repeat cycle timing mode
- Independently adjustable On and Off times
- Reliable solid state timing circuitry
- Excellent transient protection
- Compact design
- Flame retardant, solvent resistant housing
- File E60363, File LR33434

Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.
VTMA1 Series, On-Delay Timing Module, With Internal Potentiometer

Timing Specifications
Timing Mode — On-Delay  
Timing Ranges —  
VTMA1ULA only — 24 to 480 sec.  
All others — 0.5 to 10 / 3 to 60 / 15 to 300 sec.; 3 to 60 min.  
Timing Adjustment — 
Internal potentiometer  
Accuracy — 
Repeat Accuracy — ±5%  
Overall Accuracy — 
Max. Time: -0%, +10%.  
Min. Time: -30%, +10%.  
Reset Time — 250 ms, max., before time-out; 10 ms, max., after time-out.

Output Switch Data
Arrangement — Solid state 1 Form A (SPST-NO)  
Rating — 1A, inductive, at nominal operating voltage.  
Expected Electrical Life — 10,000,000 operations at rated load.  
Initial Dielectric Strength —  
Between Terminals and Mounting — 3,000VAC rms.  
Between Input and Output — 1,500VAC rms.

Input Data @ 25°C
Voltage (±10%) — 120VAC/VDC (unfiltered DC must be full-wave rectified) or 24 to 240 VAC/VDC.  
Power Requirement — 250mW during timing; 3W, max. after time out.  
Transient Protection —  
Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.  
* Min. source impedance of 100 ohms.

Environmental Data
Temperature Range —  
Storage — -40°C to +85°C  
Operating — -40°C to +65°C

Mechanical Data
Mounting — Panel mount with one #8 screw.  
Termination — 0.250 in (6.35) quick connect terminals.  
Weight — 4 oz. (112g) approximately

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Time Range</th>
<th>Input Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTMA1ACA</td>
<td>0.5 to 10 sec.</td>
<td>120VAC or VDC</td>
</tr>
<tr>
<td>VTMA1ADA</td>
<td>3 to 60 sec.</td>
<td>24 to 240VAC or VDC</td>
</tr>
<tr>
<td>VTMA1ACA</td>
<td>24 to 480 sec.</td>
<td>24-240VAC or VDC</td>
</tr>
</tbody>
</table>

Authorized distributors are likely to stock the following:  
None at present.
VTMR1 Series, On-Delay Timing Module, With Internal Potentiometer, Relay Output

**Timing Specifications**
- **Timing Mode** — On-Delay
- **Timing Ranges** — 15 to 300 sec.
- **Timing Adjustment** — Internal potentiometer
- **Accuracy** —
  - Repeat Accuracy — ±5% max. (0.25% typ.)
  - Overall Accuracy —
    - Max. Time: −0%, +10%.
    - Min. Time: −30%, +10%.
- **Reset Time** — 250 ms, max.

**Output Switch Data**
- **Arrangement** — 1 Form C (SPDT)
- **Rating** — 8A, resistive, at nominal operating voltage.
- **Expected Mechanical Life** — 10,000,000 operations
- **Expected Electrical Life** — 100,000 operations
- **Initial Dielectric Strength** — Between Terminals and Mounting — 3,000VAC ms.
  - Between Input and Output — 1,500VAC ms.

**Timing Specifications**
- **Operating Voltage**
  - Voltage (±10%) — 120VAC/VDC
  - Power Requirement — 3.5VA max. during timing; 3W, max. after timeout.
- **Transistor Protection**
  - Non-repetitive transients of the following magnitudes will not cause spurious operation or affect function and accuracy.
  - Operating Voltage
    - 120 VAC/VDC
    - ≤0.1 ms: ≤2,580V
    - ≤1 ms: ≤2,150V
    - *Min. source impedance of 100 ohms.
- **Current Drain** — 30mA, Max.

**Environmental Data**
- **Temperature Range**
  - Storage — −40°C to +70°C
  - Operating — −40°C to +70°C

**Mechanical Data**
- **Mounting** — Panel mount with one #8 screw.
- **Termination** — 0.250 in (6.35) quick connect terminals.
- **Weight** — 4 oz. (112g) approximately

**Product Facts**
- On-delay timing mode
- 8A SPDT relay output
- Internal potentiometer for timing adjustment
- Reliable solid state timing circuitry
- Excellent transient protection
- Flame retardant, solvent resistant housing
- File E60363, File LR33434

**Ordering Information**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Time Range</th>
<th>Input Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTMR1AEA</td>
<td>15 to 300 sec.</td>
<td>120VAC</td>
</tr>
</tbody>
</table>

**Input Data @ 25°C**

<table>
<thead>
<tr>
<th>Voltage (±10%)</th>
<th>120VAC/VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Requirement</td>
<td>3.5VA max. during timing; 3W, max. after timeout.</td>
</tr>
</tbody>
</table>

**Outline Dimensions and Wiring Diagram**

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

Authorized distributors are likely to stock the following:
None at present.