<table>
<thead>
<tr>
<th>Table of Contents</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>VCA Series</td>
<td>12-33</td>
</tr>
<tr>
<td>VMA Series</td>
<td>12-34</td>
</tr>
<tr>
<td>SCB Series</td>
<td>12-35</td>
</tr>
<tr>
<td>SCC Series</td>
<td>12-36</td>
</tr>
<tr>
<td>SCE Series</td>
<td>12-37</td>
</tr>
<tr>
<td>SCF Series</td>
<td>12-38</td>
</tr>
<tr>
<td>SRC Series</td>
<td>12-39</td>
</tr>
<tr>
<td>SSC Series</td>
<td>12-40</td>
</tr>
<tr>
<td>SSF Series</td>
<td>12-41</td>
</tr>
<tr>
<td>SST Series</td>
<td>12-42</td>
</tr>
<tr>
<td>STA Series</td>
<td>12-43</td>
</tr>
<tr>
<td>VTM1 Series</td>
<td>12-44</td>
</tr>
<tr>
<td>VTM-1 Series</td>
<td>12-45</td>
</tr>
<tr>
<td>VTM2 Series</td>
<td>12-46</td>
</tr>
<tr>
<td>VTM3 Series</td>
<td>12-47</td>
</tr>
<tr>
<td>VTM4 Series</td>
<td>12-48</td>
</tr>
<tr>
<td>VTM7 Series</td>
<td>12-49</td>
</tr>
<tr>
<td>VTMA1 Series</td>
<td>12-50</td>
</tr>
</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
- Designed to withstand high impact shock per MIL-S-901

Specifications

Contact Data

- Arrangements — 4 Form C (4PDT) through 24 Form C (24PDT).

Contact Ratings

<table>
<thead>
<tr>
<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>
</tr>
<tr>
<td>3 A, 28 VDC</td>
<td>15 A, 115 VAC</td>
</tr>
<tr>
<td>0.8 A, 125 VDC</td>
<td>1.5 A, 125 VDC</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>50 (max.)</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]
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 Power* (Watts)</th>
<th>Breakdown (Volts RMS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Non-Latching</td>
<td>MDR-131-1</td>
<td>4PDT</td>
<td>115 VAC</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>5.1</td>
<td>1,880</td>
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<tr>
<td></td>
<td>MDR-135-1</td>
<td>4PDT</td>
<td>28 VDC</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>10.3</td>
<td>2,375</td>
</tr>
<tr>
<td></td>
<td>MDR-134-1</td>
<td>8PDT</td>
<td>115 VAC</td>
<td>6.5</td>
<td>1,230</td>
</tr>
<tr>
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<td>MDR-134-2</td>
<td>8PDT</td>
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<td>1,880</td>
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<tr>
<td></td>
<td>MDR-136-1</td>
<td>8PDT</td>
<td>28 VDC</td>
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<td>1,308</td>
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<td></td>
<td>MDR-138-8</td>
<td>8PDT</td>
<td>125 VDC</td>
<td>10.3</td>
<td>2,375</td>
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<tr>
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<td>MDR-163-1</td>
<td>12PDT</td>
<td>115 VAC</td>
<td>6.9</td>
<td>1,230</td>
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<tr>
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<td>MDR-163-2</td>
<td>12PDT</td>
<td>440 VAC</td>
<td>6.3</td>
<td>1,880</td>
</tr>
<tr>
<td>Medium Non-Latching</td>
<td>MDR-170-1</td>
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<td>115 VAC</td>
<td>17.0</td>
<td>1,230</td>
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<tr>
<td></td>
<td>MDR-170-2</td>
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<td>440 VAC</td>
<td>17.0</td>
<td>1,880</td>
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<tr>
<td></td>
<td>MDR-172-1</td>
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<td>28 VDC</td>
<td>18.7</td>
<td>1,308</td>
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<tr>
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<td>MDR-173-1</td>
<td>16PDT</td>
<td>125 VDC</td>
<td>16.0</td>
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<tr>
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<td>MDR-141-1</td>
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<td>115 VAC</td>
<td>17.0</td>
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<td>MDR-141-2</td>
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<td>17.0</td>
<td>1,880</td>
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<tr>
<td></td>
<td>MDR-167-1</td>
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<td>28 VDC</td>
<td>18.7</td>
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<td>MDR-142-1</td>
<td>24PDT</td>
<td>125 VDC</td>
<td>16.0</td>
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</tr>
<tr>
<td>Small Latching</td>
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<td>5.5</td>
<td>1,230</td>
</tr>
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<td>MDR-67-3</td>
<td>4PDT</td>
<td>440 VAC</td>
<td>3.0</td>
<td>1,880</td>
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<tr>
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<td>MDR-5060</td>
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<td>125 VDC</td>
<td>20.6</td>
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</tr>
<tr>
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<td>MDR-4076</td>
<td>8PDT</td>
<td>115 VAC</td>
<td>5.5</td>
<td>1,230</td>
</tr>
<tr>
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<td>MDR-4092</td>
<td>8PDT</td>
<td>440 VAC</td>
<td>3.0</td>
<td>1,880</td>
</tr>
<tr>
<td></td>
<td>MDR-5035</td>
<td>8PDT</td>
<td>28 VDC</td>
<td>21.8</td>
<td>1,308</td>
</tr>
<tr>
<td></td>
<td>MDR-5061</td>
<td>8PDT</td>
<td>125 VDC</td>
<td>20.6</td>
<td>2,375</td>
</tr>
<tr>
<td></td>
<td>MDR-5064</td>
<td>12PDT</td>
<td>115 VAC</td>
<td>12.0</td>
<td>1,230</td>
</tr>
<tr>
<td></td>
<td>MDR-6065</td>
<td>12PDT</td>
<td>440 VAC</td>
<td>5.7</td>
<td>1,880</td>
</tr>
<tr>
<td></td>
<td>MDR-7020</td>
<td>12PDT</td>
<td>28 VDC</td>
<td>8.8</td>
<td>1,308</td>
</tr>
<tr>
<td></td>
<td>MDR-7035</td>
<td>12PDT</td>
<td>125 VDC</td>
<td>10.4</td>
<td>2,375</td>
</tr>
<tr>
<td></td>
<td>MDR-66-4</td>
<td>16PDT</td>
<td>115 VAC</td>
<td>12.0</td>
<td>1,230</td>
</tr>
<tr>
<td></td>
<td>MDR-6066</td>
<td>16PDT</td>
<td>440 VAC</td>
<td>5.7</td>
<td>1,880</td>
</tr>
<tr>
<td></td>
<td>MDR-7025</td>
<td>16PDT</td>
<td>28 VDC</td>
<td>8.8</td>
<td>1,308</td>
</tr>
<tr>
<td></td>
<td>MDR-7036</td>
<td>16PDT</td>
<td>125 VDC</td>
<td>10.4</td>
<td>2,375</td>
</tr>
</tbody>
</table>

Medium Latching

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Number</th>
<th>Contacts</th>
<th>Coil Voltage (60 Hz for AC)</th>
<th>Coil Power* (Watts)</th>
<th>Breakdown (Volts RMS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDR-6064</td>
<td>12PDT</td>
<td>115 VAC</td>
<td>12.0</td>
<td>1,230</td>
<td></td>
</tr>
<tr>
<td>MDR-6065</td>
<td>12PDT</td>
<td>440 VAC</td>
<td>5.7</td>
<td>1,880</td>
<td></td>
</tr>
<tr>
<td>MDR-7020</td>
<td>12PDT</td>
<td>28 VDC</td>
<td>8.8</td>
<td>1,308</td>
<td></td>
</tr>
<tr>
<td>MDR-7035</td>
<td>12PDT</td>
<td>125 VDC</td>
<td>10.4</td>
<td>2,375</td>
<td></td>
</tr>
<tr>
<td>MDR-66-4</td>
<td>16PDT</td>
<td>115 VAC</td>
<td>12.0</td>
<td>1,230</td>
<td></td>
</tr>
<tr>
<td>MDR-6066</td>
<td>16PDT</td>
<td>440 VAC</td>
<td>5.7</td>
<td>1,880</td>
<td></td>
</tr>
<tr>
<td>MDR-7025</td>
<td>16PDT</td>
<td>28 VDC</td>
<td>8.8</td>
<td>1,308</td>
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</tr>
<tr>
<td>MDR-7036</td>
<td>16PDT</td>
<td>125 VDC</td>
<td>10.4</td>
<td>2,375</td>
<td></td>
</tr>
</tbody>
</table>

Note: All values are for reference, specific values may be different and subject to environmental factors such as temperature, humidity, pressure or variations in voltage.

Outline Dimensions

Tolerances: Decimals ± .010 (±.25) Unless Otherwise Specified.

Small Models

Medium Models

Coil and Contact Terminal Screws #5-40 Supplied.

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

**Product Facts**
- High Repeat Accuracy over voltage and temperature extremes
- Hermetically sealed units are designed for high shock and vibration applications
- Instant recycling — easy linear adjustment
- Exclusive Dial Head adjustment — no needle valves
- Delay ranges from milliseconds to 3 minutes
- DPDT contacts

**Design & Construction**
Sealed patented timing head — circulates air under controlled pressure through a variable orifice to provide adjustable timing. Circular-path Dial Head principle replaces traditional needle valve.

Snap-action switch assembly — provides sustained contact pressure during timing cycles. Specially designed over center mechanism assures flutter-free load transfer after extended delay periods.

Precision-wound solenoid assembly — supplies the basic motive force when the control circuit is closed. These assemblies are mounted in a rigid self-supporting framework within a steel enclosure. This rugged construction assures permanent alignment of all operating members, the key to this unit’s long trouble-free operation.

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

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

**Repeat Accuracy** — NORMAL VERTICAL POSITION ±5% at 25°C, ±7% at 85°C, ±8% at -55°C.

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

**Position Sensitivity** —
- HORIZONTAL POSITION — Approximately 5% increase from the initial time in the vertical position.
- INVERTED POSITION — Approximately 10% increase from the initial time in the vertical position.

**Reset Time** — 2112 Series: 25 msec.; 2122 Series: 5 msec.

**Relay Release Time** — 25 msec. (2112 Series)

**Relay Operate Time** — 75 msec. (2122 Series)

**Operating Voltage** — Coil Data

<table>
<thead>
<tr>
<th>Code</th>
<th>Nominal Operating Voltage</th>
<th>Resistance ±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>B</td>
<td>120V 60 Hz</td>
<td>285 (2122 Series)</td>
</tr>
<tr>
<td>T</td>
<td>240V 60 Hz</td>
<td>765</td>
</tr>
<tr>
<td>U</td>
<td>115V 400 Hz</td>
<td>2600</td>
</tr>
<tr>
<td>Y</td>
<td>125VDC</td>
<td>3380</td>
</tr>
</tbody>
</table>

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

**Contact Rating (DPDT Contacts)**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Inductive (Amps)</th>
<th>Resistive (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30V DC</td>
<td>2 .75</td>
<td>10</td>
</tr>
<tr>
<td>110V DC</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>120V 60Hz</td>
<td>2.2</td>
<td>5</td>
</tr>
<tr>
<td>120V 400Hz</td>
<td>1.5</td>
<td>0</td>
</tr>
<tr>
<td>240V 60Hz</td>
<td>1.5</td>
<td>0</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).

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.

<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>
<tr>
<td>L</td>
<td>3.0 to 120.0 cycles</td>
</tr>
</tbody>
</table>

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>
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<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>21 = 2100</td>
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</tr>
<tr>
<td>timing relay</td>
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<tr>
<td>2. Operation:</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>1 = On-delay</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 = Off-delay</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>7. Timing Range:</td>
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<td>K = 1.5 to 30.0 cycles</td>
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<td>L = 3.0 to 120.0 cycles</td>
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</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.)
Ordering Information for Hermetically Sealed & Unsealed Models

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<thead>
<tr>
<th>Typical Part No.</th>
<th>21</th>
<th>1</th>
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<th>D</th>
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<th>N</th>
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<td>H1</td>
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<td>S = 120VAC, 50/60 Hz.</td>
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<td>U = 115VAC, 400 Hz.</td>
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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

Design & Construction
There are three main components of Series 7000 Timing Relays:

**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.
- Total sealing without external leads eliminates moisture problems, gives maximum insulation value.

**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.

**Snubber**
- Self-contained units assembled at the factory with the other two to afford a wide choice of operating types, coil voltages, and timing ranges.
- The designed shape with front terminals and rear mounting permits the grouping of Series 70000 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.

**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 adjustment knobs, serrated with high-resolution markings visible from all angles makes the timer easy to set timers
- Inherent transient immunity
- Standard voltages from 6-550VAC and 12-550VDC (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

**On-delay model 7012 (delay on pickup)**
- 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 close. 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 returns to its original position.
- De-energizing the coil, either during or after the delay period, will recycle the unit within 50 msec.

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

**Note:** 7032 types and certain models with accessories are not agency approved.

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

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 SPDT with UL listings of 10A @ 125, 250, or 480 VAC. A maximum of one Code T or two Code L auxiliary switches may be added to each relay. The L or LL switch is available with on-delay relays only. The T switch is available with both the on-delay and off-delay relays.

Auxiliary Switch Options for On-Delay

Instant Transfer (Auxiliary Switch Code L, maximum of 2 per relay.)
1. Energizing coil begins time delay and transfers auxiliary switch.
2. Main switch transfers after total preset delay.
3. 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. Main switch transfers after total preset delay.
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.

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.

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

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

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, E, and K, instantaneous operation (no time delay) will occur. All other ranges produce an infinite time delay when the dial is set in this zone.

Models 7014 and 7032 are available with letter 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>Models 7012, 7022, 7024</th>
<th>Models 7014, 7032</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>.1 to 1 Sec.</td>
<td>.2 to 2 Sec.</td>
</tr>
<tr>
<td>B</td>
<td>.5 to 5 Sec.</td>
<td>.7 to 7 Sec.</td>
</tr>
<tr>
<td>C</td>
<td>1.5 to 15 Sec.</td>
<td>2 to 20 Sec.</td>
</tr>
<tr>
<td>D</td>
<td>5 to 50 Sec.</td>
<td>10 to 100 Sec.</td>
</tr>
<tr>
<td>E</td>
<td>20 to 200 Sec.</td>
<td>30 to 300 Sec.</td>
</tr>
<tr>
<td>F</td>
<td>1 to 10 Min.</td>
<td>1.5 to 15 Min.</td>
</tr>
<tr>
<td>H</td>
<td>3 to 30 Min.</td>
<td>3 to 30 Min.</td>
</tr>
<tr>
<td>I</td>
<td>6 to 60 Min.</td>
<td>Not Avail.</td>
</tr>
<tr>
<td>J</td>
<td>3 to 120 Cyc.</td>
<td>Not Avail.</td>
</tr>
<tr>
<td>K</td>
<td>1 to 300 Sec.</td>
<td>Not Avail.</td>
</tr>
</tbody>
</table>

Repeat Accuracy —
For delays of 200 seconds or less: 7012*, 7022, 7024: ±5% 7014*: ±10% 7032: ±15%
For delays greater than 200 seconds: 7012*, 7022, 7014*, 7024: ±10% 7032: ±15%

* 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)

Operating Voltage Coil Data (for DPDT)

<table>
<thead>
<tr>
<th>Coil</th>
<th>Part #</th>
<th>Code Letter</th>
<th>Rated Voltage</th>
<th>Operating Voltage Range @ 60Hz</th>
<th>Rated Voltage</th>
<th>Operating Voltage Range @ 50Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>7000</td>
<td>A</td>
<td>120</td>
<td>102-132</td>
<td>110</td>
<td>93.5-121</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>240</td>
<td>204-264</td>
<td>220</td>
<td>187-242</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>480</td>
<td>408-528</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>550</td>
<td>468-605</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>24</td>
<td>20.5-26.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td>F</td>
<td>127</td>
<td>108-140</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>240</td>
<td>204-264</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>12</td>
<td>10.2-13.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>6</td>
<td>5.1-6.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>208</td>
<td>178-229</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>K</td>
<td>Special AC Coils (L1, L2, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7010</td>
<td>M</td>
<td>28</td>
<td>22.4-30.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>48</td>
<td>38.4-52.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>O</td>
<td>24</td>
<td>19.2-26.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>125</td>
<td>100-137.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q</td>
<td>12</td>
<td>9.6-13.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>60</td>
<td>48-66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DC</td>
<td>S</td>
<td>250</td>
<td>200-275</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>550</td>
<td>440-605</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>U</td>
<td>16</td>
<td>12.8-17.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>V</td>
<td>32</td>
<td>25.8-35.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>96</td>
<td>76.8-105.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td>6</td>
<td>4.8-6.6</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Z</td>
<td>220</td>
<td>176-242</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>Special DC Coils (X1, X2, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Four pole Models: Operational voltage range 90% to 110% for AC units; 85% to 110% for DC units.

See next page for more coil data.
Minim imum operating voltages are based on vertically mounted 7012 units. 7012 hori zontally mounted or 7022 vertically or horizontally mounted units will operate sat isfactory at minimum voltages approximately 5% lower than those listed.

AC units drop out at approximately 50% of rated voltage. DC units drop out at approxi mately 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 tested 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 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** —

<table>
<thead>
<tr>
<th>Models</th>
<th>2 lbs. 4 ozs.</th>
<th>2 lbs. 10 ozs.</th>
<th>3 lbs. 5 ozs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7012, 7022</td>
<td>7014, 7024</td>
<td>7032</td>
<td></td>
</tr>
</tbody>
</table>

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

Outline Dimensions (Dimensions in inches)

Models 7012, 7022

- Panel Mount Option “X”
- Surge/Transient Protection Option

Models 7014, 7024

- Panel Mount Option “X”
- Surge/Transient Protection Option

Model 7032

- Panel Mount Option “X”
- Surge/Transient Protection Option
### 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><strong>1. Basic Series:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70 = 7000 series electropneumatic timing relay</td>
<td></td>
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</tr>
<tr>
<td><strong>2. Operation:</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1 = On-delay</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>
</tr>
<tr>
<td>3 = On-delay, off-delay (double head)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>3. Contact Arrangement:</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2 = 2PDT (2 form C)</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>4 = 4PDT (4 form C)</td>
<td></td>
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</tr>
<tr>
<td><strong>4. Coil Voltage:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC Coils</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A = 120VAC, 60 Hz.; 110VAC, 50Hz.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B = 240VAC, 60 Hz.; 220VAC, 50Hz.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C = 480VAC, 60 Hz.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>D = 550VAC, 60 Hz.</td>
<td></td>
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<tr>
<td>E = 24VAC, 60 Hz.</td>
<td></td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>F = 127VAC, 50 Hz.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>G = 240VAC, 50Hz.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>H = 12VAC, 60 Hz.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>K = Dual voltage (combines A &amp; B)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L = Special AC coils (L1, L2, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5. Timing Range:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Models 7012, 7022 &amp; 7024</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>†Models 7014 &amp; 7032</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>A = .1 to 1 sec.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>B = .5 to 5 sec.</td>
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</tr>
<tr>
<td>C = 1.5 to 15 sec.</td>
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</tr>
<tr>
<td>D = 6 to 50 sec.</td>
<td></td>
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<tr>
<td>E = 20 to 200 sec.</td>
<td></td>
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</tr>
<tr>
<td>F = 1 to 10 min.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>G = 2 to 20 min.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>H = 3 to 30 min.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>I = 6 to 60 min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J = 1 to 120 cyc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K = 1 to 300 sec.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6. Options:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1 = Single quick-connect terminals (note 4)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>A2 = Double quick-connect terminals (note 4)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>B = Plug-in connectors (note 4)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>GZ = Enclosure with bottom knockouts (note 1)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>H2 = Hermetically sealed enclosure, 8 pin solder (notes 1 &amp; 4)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>H3 = Hermetically sealed enclosure, 8 pin octal (notes 1 &amp; 4)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>H4 = Hermetically sealed enclosure, 8 screw terminal block (notes 1 &amp; 4)</td>
<td></td>
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</tr>
<tr>
<td>*H6 = Hermetically sealed enclosure, 11 pin solder (notes 1 &amp; 4)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>*H7 = Hermetically sealed enclosure, 11 pin octal (notes 1 &amp; 4)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>*H8 = Hermetically sealed enclosure, 11 screw terminal block (notes 1 &amp; 4)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>I1 = Tamper-proof Cap, opaque black (Cannot be combined with Option X).</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>I2 = Tamper-proof Cap, transparent (Cannot be combined with Option X).</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>L = Auxiliary Switch, instant transfer. 7012 only (notes 2 &amp; 6).</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>LL = Two Aux. Switches, instant transfer. On Model 7014 Factory Installed Only. (notes 2 &amp; 6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M = Dust-tight Gasketing (notes 4 &amp; 5).</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>P = Octal Plug Adapter. Can be combined only with options H1, H2, M, S, X, or Y1. (note 4).</td>
<td></td>
<td></td>
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<tr>
<td>S = Dial Stops.</td>
<td></td>
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</tr>
<tr>
<td>T = Auxiliary Switch, two-step timing (notes 2 &amp; 6).</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>V = Transient/Surge Protection (for DC coil voltage only).</td>
<td></td>
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</tr>
<tr>
<td>X = Panelmount includes hardware and adjustment for horizontal operation (note 4)</td>
<td></td>
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</tr>
<tr>
<td>Y1 = Horizontal testing, for horizontal operation without panel mounting (note 4).</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Y2 = Horizontal testing, with Compensating Spring for vertical operation (note 4).</td>
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<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. Cannot be combined with B, P or X Options
2. Cannot be combined with B, P or Y2 Options
3. Cannot be combined with GZ, H, I1, I2, K, W or Y1 Options
4. Not Avail. on 4-Pole Models
5. Not Available with L, T or LL options.
6. Not Available on hermetically sealed units.
7. * Sized to accommodate one L or T Auxiliary Switch
8. ** Not available on 7032 model.
9. † Available with letter graduated dials only. Upper end of time range may be twice the value shown
10. †† 120 cycles = 2 sec.

---

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

<table>
<thead>
<tr>
<th>7012AA</th>
<th>7012AE</th>
<th>7012ACL</th>
<th>7012PB</th>
<th>7012PJ</th>
<th>7022AA</th>
<th>7022AE</th>
<th>7022AJ</th>
<th>7022PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>7012AB</td>
<td>7012AF</td>
<td>7012BC</td>
<td>7012PC</td>
<td>7012PK</td>
<td>7022AB</td>
<td>7022AF</td>
<td>7022AKT</td>
<td>7022PB</td>
</tr>
<tr>
<td>7012AC</td>
<td>7012AH</td>
<td>7012NC</td>
<td>7012PD</td>
<td>7012PKX</td>
<td>7022AC</td>
<td>7022AH</td>
<td>7022BC</td>
<td>7022PC</td>
</tr>
<tr>
<td>7012AD</td>
<td>7012AK</td>
<td>7012PA</td>
<td>7012PF</td>
<td>7012PJX</td>
<td>7022AD</td>
<td>7022AI</td>
<td>7022BK</td>
<td>7022PK</td>
</tr>
</tbody>
</table>

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Catalog 5-1773450-5
Revised 3-13
www.te.com

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

AGASTAT 7000 Series, Industrial Electropneumatic Timing Relay (Continued)

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

<table>
<thead>
<tr>
<th>A1 – Single Quick-Connect Terminals</th>
<th>A2 – Double Quick-Connect Terminals</th>
<th>B – Plug-In Connectors</th>
<th>GZ – Metal Enclosure</th>
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</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td>Use with Accessory “C” or “D” below.</td>
<td>With knockouts for bottom connection. 3.16” W x 3.84” D x 7.63”H</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>H – Hermetically Sealed Enclosure</th>
<th>I – Tamper-Proof Cover</th>
<th>L – Auxiliary Switch</th>
<th>LL – Auxiliary Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>M – Dust tight</th>
<th>P – Octal Plug Adapter</th>
<th>S – Dial Stops</th>
<th>T – Auxiliary Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
<td><img src="image9.png" alt="Image" /></td>
<td><img src="image10.png" alt="Image" /></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>V – Transient/Surge Protection</th>
<th>X – Panelmount Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image11.png" alt="Image" /></td>
<td><img src="image12.png" alt="Image" /></td>
</tr>
</tbody>
</table>

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 delay adjustment to as long as 60 minutes.

Test Procedure

AGASTAT timing relay Models E7012, E7022, E7014 and E7024 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 timing 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)
- Repeatability (percent)
- 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.

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.

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 transition modes.

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 transition 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.

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)

![On-Delay Diagram](image)

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 0.05 seconds. 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.

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

![Off-Delay Diagram](image)

Applying voltage to the coil (for at least 0.50 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 in linear increments covering the range selected. (See “Catalog Number Code”). In addition, 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:

*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 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:

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

Where —

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

*NEMA part ICS 2-218.02
Repeat accuracy at any fixed temperature is ± 10% of setting.

The first time delay afforded by units with H (3 to 30 minutes) and I (6 to 60 minutes) time ranges may be up to 15% longer than subsequent delays, due to coil temperature rise.

Dial position error is not included in the repeat accuracy specification above.

Delay Setting
Dial graduations 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-graduated 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.

Because of the variety of environments in which time delay relays are applied, we recommend a re-check of the time delay after approximately three hours of operation. If any change from the initial time setting is apparent, the relay should be reset to the desired delay. The time delay accuracy should then be monitored on a monthly basis for several months, and if no substantial change in time delay has taken place, the frequency of checking may be reduced. It is recommended that this procedure be incorporated in the Operating Instructions for your equipment.

Contact Ratings — Nuclear
Resistive at 125 VDC .......... 1.0 Amp
Resistive at 120 VAC 60 Hz . . . 10.0 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>30 VDC</td>
<td>15.0</td>
</tr>
<tr>
<td>110 VDC</td>
<td>1.0</td>
</tr>
<tr>
<td>120 V 60Hz</td>
<td>20.0</td>
</tr>
<tr>
<td>240 V 60 Hz</td>
<td>20.0</td>
</tr>
<tr>
<td>480 V 60 Hz</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 graduated 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 graduated, 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 (Continued)

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 10^6 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
    (Resistive at 120 Vac, 60 Hz) —
    10.0 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>
</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>Coil Operating Voltage * (% of Rated)</td>
<td></td>
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<tr>
<td>Model E7012 (AC)</td>
<td>85-110</td>
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<td>90-110</td>
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<tr>
<td>Model E7022 (AC)</td>
<td>85-110</td>
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<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.)

Contact ratings as listed under the UL Component Recognition Program for 100,000 operations (Per pole) —
  10 Amps, resistive, 240 VAC;
  1/4 horse power, 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.)

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: TE Connectivity 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.

REPLACEMENT SCHEDULE
The qualified life of this unit is 25,000 operations or 10 years from the date of manufacture, whichever occurs first.
Dimensions and Mounting

MODEL E7012, E7022

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

MODEL E7014, E7024

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 (Continued)

#### Ordering Information

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

#### Voltage Codes

- **A**: 120V 60 Hz
- **B**: 110V 50 Hz
- **C**: 240V 60 Hz
- **D**: 220V 50 Hz
- **E**: 480V 60 Hz
- **F**: 550V 60 Hz
- **G**: 24V 60 Hz
- **H**: 12V 60 Hz
- **I**: 6V 60 Hz
- **J**: 208V 60 Hz

#### Time Range

- **E7012, E7022**
  - **A**: .1 to 1 sec.
  - **B**: .5 to 5 sec.
  - **C**: 1.5 to 15 sec.
  - **D**: 5 to 50 sec.
  - **E**: 20 to 200 sec.

- **E7014**
  - **A**: .2 to 2 sec.
  - **B**: .7 to 7 sec.
  - **C**: 2 to 20 sec.
  - **D**: 10 to 100 sec.
  - **E**: 30 to 300 sec.

- **E7024**
  - **A**: .1 to 1 sec.
  - **B**: .5 to 5 sec.
  - **C**: 1.5 to 15 sec.
  - **D**: 5 to 50 sec.
  - **E**: 20 to 200 sec.

#### Configuration Code

- **004**: 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.).

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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

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.

Radiation Aging
Relays were subjected to a radiation dosage of 2.0 x 10^7 Rads, which is considered to exceed adverse plant operational requirements. 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.

Temperature Aging
This test subjected the relays to a temperature of 100°F 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.

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 (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

Specimen 13, 15 & 16 (EGP Series)
Relay State: Non-Operate Mode (De-ener.)
Test Run No. 318, 319, (205-206), (198-199)

Contact Bounce (milliseconds)

Contact Resistance (millohm at 28VDC, 1 amp)

Recycle Time (milliseconds)

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 (millohm at 28VDC, 1 amp)

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

Catalog 5-1773450-5
Revised 3-13
www.te.com

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

Dimensions are in millimeters unless otherwise specified.

USA: +1 800 522 6752
Asia Pacific: +86 0 400 820 6015
UK: +44 800 267 666
For additional support numbers please visit www.te.com

Cat

12–21

Specialty Relays
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.

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.

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.

R-C Values

<table>
<thead>
<tr>
<th>Nominal Voltage VDC</th>
<th>Nominal Ohms ±5%</th>
<th>Nominal Watts</th>
<th>Nominal uf</th>
<th>Nominal 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>

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 0.075 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.
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.
G — 10 to 300 sec.
I — 2 to 60 min.
N — 1 to 30 min.

Repeat Accuracy —
Series ETR Only —
The repeat accuracy deviation (AR) 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:

AR = ± 100 \( \frac{(T_1 - T_2)}{T_1 + T_2} \)

Where —
T1 = Maximum Time Delay
T2 = Minimum Time Delay

Note: TE 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.

Model
Coil 125 VDC
Serial 781400028

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

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).

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

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).
### Operating Characteristics

#### Environmental Conditions (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 10^5 (Gamma)</td>
</tr>
</tbody>
</table>

#### Operating Conditions, Normal Environment – Series EGP/EML/ETR

**Normal Operating Specifications**

<table>
<thead>
<tr>
<th></th>
<th>EGP</th>
<th>EML</th>
<th>ETR</th>
<th>EGP</th>
<th>ETR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coil Operating Voltage (Nominal (rated)*</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>5-45%</td>
<td>5-45%</td>
<td>5-50%</td>
<td></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>6 Approx.</td>
<td>15 Approx.</td>
<td>6 Approx.</td>
<td>6 Approx.</td>
<td>6 Approx.</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>75 ms Max.</td>
<td>85 ms Max.</td>
<td>75 ms Max.</td>
</tr>
</tbody>
</table>

**Contact Ratings, Continuous**

<table>
<thead>
<tr>
<th></th>
<th>1.0 amp.</th>
<th>1.0 amp.</th>
<th>1.0 amp.</th>
<th>1.0 amp.</th>
<th>1.0 amp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistive at 125 vdc</td>
<td>1.0 amp.</td>
<td>1.0 amp.</td>
<td>1.0 amp.</td>
<td>1.0 amp.</td>
<td>1.0 amp.</td>
</tr>
<tr>
<td>Resistive at 120 vac, 60 Hz</td>
<td>10.0 amp.</td>
<td>10.0 amp.</td>
<td>10.0 amp.</td>
<td>10.0 amp.</td>
<td>10.0 amp.</td>
</tr>
<tr>
<td>Insulation Resistance (in megohms at 500 vdc)</td>
<td>500 Min.</td>
<td>500 Min.</td>
<td>500 Min.</td>
<td>500 Min.</td>
<td>500 Min.</td>
</tr>
<tr>
<td>Dielectric (vrms, 60 Hz)</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
</tr>
<tr>
<td>Between Terminals and Ground</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
</tr>
<tr>
<td>Between Non-connected Terminals</td>
<td>N/A</td>
<td>N/A</td>
<td>±5%</td>
<td>N/A</td>
<td>±5%</td>
</tr>
</tbody>
</table>

**Adverse Operating Specifications**

<table>
<thead>
<tr>
<th></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>Coil 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>AC (Series EGP only)</td>
<td>80-110</td>
<td>80-110</td>
<td>80-110</td>
<td>80-110</td>
<td>80-110</td>
</tr>
<tr>
<td>DC (Series EGP only)</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
<td>85-110</td>
</tr>
<tr>
<td>AC (Series EGP only)</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, Series EML)</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></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>6 Approx.</td>
<td>6 Approx.</td>
</tr>
<tr>
<td>Relay Release (Recycle) Time</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>Resistive at 120 vac, 60 Hz</td>
<td>10.0 amp.</td>
<td>10.0 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

**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.

### Nuclear Safety Related Code

- **E**
  - Nuclear Safety Related

### AGASTAT Control Relay Model Code

- **GP**
  - AGASTAT Control Relay Model
  - Code:
    - **E**
    - **GP**
    - **ML**

### Coil Voltage Code

- **A**
  - Coil Voltage
  - Code:
    - **A** – 12 VDC
    - **B** – 24 VDC
    - **C** – 48 VDC
    - **D** – 125 VDC
    - **E** – 110 VDC
    - **F** – 250 VDC (Series EGP Only)
    - **G** – 24 VAC 60 Hz (Series EGP Only)
    - **H** – 48 VAC 60 Hz (Series EGP Only)
    - **I** – 120 VAC 60 Hz (Series EGP Only)
    - **J** – 220 VAC 60 Hz (Series EGP Only)

### Configuration Code

- **004**
  - Configuration Code
  - Code:
    - **004**

---

**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.

### Nuclear Safety Related Code

- **E**
  - Nuclear Safety Related

### AGASTAT Control Relay Model Code

- **TR14**
  - AGASTAT Control Relay Model
  - Code:
    - **E**
    - **TR14**

### Operating Voltage Code

- **B**
  - Operating Voltage
  - Code:
    - **B** – 24 VDC
    - **D** – 125 VDC
    - **AC** – 120 VAC 60Hz

### Timing Adjustment Code

- **1**
  - Timing Adjustment
  - Code:
    - **1** – Internal
    - **3** – Internal Potentiometer

### Time Range Code

- **A**
  - Time Range
  - Code:
    - **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.
    - **G** – 10 to 300 sec.
    - **I** – 2 to 60 min.
    - **N** – 1 to 30 min.

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* Dimensions are shown for reference purposes only. Specifications subject to change.*
### Relay Classifications Control Code Summary

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

<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.)
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.

AGASTAT control relays are 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.

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.
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</th>
<th>Current (Amps)</th>
<th>Power Factor or Constant</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>3hp 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>3hp 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></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>

Initial Dielectric Strength —
Between non-connected terminals — 2,000V rms, 60 Hz
Between non-connected terminals & relay yoke — 2,000V rms, 60 Hz

Initial Insulation Resistance —
Between non-connected terminals — 109 ohms at 500VDC
Between non-connected terminals & relay yoke — 109 ohms at 500VDC

Coil Data
Voltage — 24, 120 & 220VAC, 60 Hz;
Add series resistor for 380-440VDC;
12, 24, 48, 125 & 250VDC
Duty Cycle — Continuous
Nominal Coil Power —
6VA for AC coils; 6W for DC coils.
There is no surge current during operation.

Coil Operating Voltage

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Nominal Coil Voltage</th>
<th>DC</th>
<th>AC, 50/60Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>24</td>
<td>48</td>
<td>125</td>
</tr>
<tr>
<td>250</td>
<td>24</td>
<td>120</td>
<td>220</td>
</tr>
</tbody>
</table>

Minimum Pick-up
Voltage at 20°C 9 18 36 94 187 19 92 175
Minimum Pick-up
Voltage at 40°C 9.5 19 38 100 200 20 102 188
Maximum voltage for continuous use 13.5 27 53 143 275 27 137 245

For 380VAC – Use 6800 ohms 4 watt resistor in series with 220VAC relay.
For 440VAC – Use 8200 ohms 6 watt resistor in series with 220VAC relay.
Drop-out voltage is between 10% and 40% of the nominal voltages for both DC and AC.

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

12 – 29

Catalog 5-1773450-5
Revised 3-13
www.te.com

Dimensions are shown for reference purposes only. Specifications subject to change.
Dimensions are in millimeters unless otherwise specified.
USA: +1 800 522 6752
Asia Pacific: +86 0 400 820 6015
UK: +44 800 267 666
For additional support numbers please visit www.te.com
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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ML = Magnetic Latching Control Relay</td>
<td></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.
5.5 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 and between mutually-isolated contacts — 2,000VAC

Initial Insulation Resistance —
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 —
1,000 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 1 4 B 1 A N
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.
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

*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.

Catalog 5-1773450-5
Revised 3-13

www.te.com

Dimensions are shown for reference purposes only. Specifications subject to change. Dimensions are in millimeters unless otherwise specified.

USA: +1 800 522 6752
Asia Pacific: +86 0 400 820 6015
UK: +44 800 267 666

For additional support numbers please visit www.te.com
User 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.
VMA series, Single Phase, Plug-in, Undervoltage Relay

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

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, 1/8 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

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.

Wiring Diagram

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.
### 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 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**
- On-Delay, Off-Delay and Interval

**Timing Ranges**
- 6 to 180 cycles; 0.1 to 3 / 0.1 to 10 / 0.33 to 10 / 1 to 30 / 4 to 120 sec.; 0.33 to 10 / 1 to 30 / 2 to 60 min.; 0.33 to 10 hr. (All are +5%, – 0% of maximum values).

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

**Accuracy**
- Repeat Accuracy — ±0.5% ±0.004 sec.
- Overall Accuracy — ±2% max.

**Reset Time** — 25 ms.

**Relay Operate Time**
- Off-Delay mode — 30 ms; Interval mode — 20 ms.

**Relay Release Time** — On-Delay mode only — 15 ms.

#### Contact Data @ 25°C

- **Arrangements** — 2 Form C (DPDT)
- **Rating** — 10A @ 28VDC or 120VAC; 1/3 HP @ 120/240VAC; 345VA. Same polarity.

**Expected Mechanical Life** — 10 million operations

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

**Environmental Data**

- **Temperature Range**
  - Storage: SCB and SCC — -40°C to +85°C
  - Operating: SCB: -30°C to +65°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: 5.3 oz. (149g) approx.; SCC: 7.5 oz. (210g) approx.

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

<table>
<thead>
<tr>
<th>Series</th>
<th>SCB RX</th>
<th>01</th>
<th>2XX</th>
<th>A</th>
<th>A</th>
<th>XA</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCB 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>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>2XX = DPDT Relay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timing Range</td>
<td>A = -0.1 to 3 sec.</td>
<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>
</tr>
<tr>
<td>Operating Voltage</td>
<td>(+10%, –15%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>120VAC, 50/60 Hz / 120VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>240VAC, 50/60 Hz / 240VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>24VAC, 50/60 Hz / 24VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>48VAC, 50/60 Hz / 48VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>12VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Specifications

- **Timers** — 3.25□ (50)
- **Outline Dimensions** — 1.97□ (50)
- **Wiring Diagrams (Bottom Views)**
- **External Control Switch** ON-CONTACT
- **Input** — 2□ (83)
- **Input 2** — 1□ (83)
- **External Potentiometer or Resistor**

Belden is a trademark of Belden Technologies, Inc.

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1. **Specifications subject to change.**
2. **Dimensions are shown for reference purposes only.**
3. **Dimensions are in millimeters unless otherwise specified.**
4. **USA: +1 800 522 6752**
5. **Asia Pacific: +86 0 400 820 6015**
6. **UK: +44 800 267 666**
7. **For additional support numbers please visit www.te.com**
**SCE Series, Specification Grade Discrete Plug-in, True Off-Delay Time Delay Relay**

**Product Facts**
- True Off-Delay timing modes
- Six time delays from 0.1 sec. to 10 min.
- 10A SPDT or 5A DPDT output contacts
- Excellent repeat accuracy — typically better than ±1%
- 8-pin octal plug.
- File E15631, File LR51332

**Accuracy**
- Repeat Accuracy — ±1
- Overall Accuracy — ±5%

**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 R X 2 2 A C A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series SCE</td>
</tr>
<tr>
<td>R</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>C</td>
</tr>
</tbody>
</table>

### Timing Adjustment
- **A = Knob Adjust**
- **F = Fixed Times** — Specify time delay in seconds per the following examples:
  - XF9.000 = 9 sec.
  - XF99.00 = 99 sec.
  - XF999.0 = 9999 sec.
  - XF1000 = 1000 sec.

**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 / 2 to 60 min.; 0.33 to 10 hr.
Timing Range Selection — Screwdriver selector 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 — 1,000V plus twice the nominal voltage for one minute.
Input Data @ 25°C
Voltage — See Ordering Information section for details.
Power Requirement — 2W, max.
Transient Protection — Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

Operating Voltage
12VDC 1,000V 120VAC 1,000V 240VAC 1,000V 240VAC 1,000V
24VAC/VDC 1,000V 240VAC 1,000V 48VAC/VDC 1,000V 480V*
240VAC/VDC 3,000V 2,500V*

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.

Ordering Information
(All “X”s must be included to complete part number)

<table>
<thead>
<tr>
<th>SCF Series SCF Plug-In Programmable Timer</th>
<th>RX</th>
<th>90</th>
<th>2</th>
<th>A</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>Operating Mode</td>
<td>Output</td>
<td>Operating Voltage (+10%, -15%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 = DPDT Relay</td>
<td>A = 10 Amp</td>
<td>B = 5 Amp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RX = Without Socket</td>
<td>On-Delay</td>
<td>Off-Delay</td>
<td>Interval</td>
<td>Latching Interval</td>
<td></td>
</tr>
<tr>
<td>RF = With Socket</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 deenergized, 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 10 / 0.5 to 15 / 1 to 30 / 2 to 60 / 4 to 120 / 6 to 180 / 10 to 300 sec; 0.33 to 10 / 0.5 to 15 / 1 to 30 / 2 to 60 min. (All are +10%, –1% of maximum values).

**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**

**Arrangements**
- 2 Form C (DPDT).

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

**Expected Mechanical Life**
- 10 million operations.

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

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

**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 — –40°C to +65°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

---

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.
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 3 / 0.1 to 10 / 0.33 to 10 / 1 to 30 / 4 to 120 sec.; 0.33 to 10 / 1 to 30 / 2 to 60 min.; 0.33 to 10 hr. (All are +10%, –1% of maximum values).

Timing Adjustment — Knob or fixed time (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: 35 ms.
Relay Release Time — On-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 affect function and accuracy.

Operating Voltage

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>12VDC</td>
<td>1,000V*</td>
</tr>
<tr>
<td>12VDC</td>
<td>1,000V*</td>
</tr>
<tr>
<td>24VAC/VDC</td>
<td>1,000V*</td>
</tr>
<tr>
<td>48VAC/VDC</td>
<td>1,000V*</td>
</tr>
<tr>
<td>120VAC/VDC</td>
<td>2,500V*</td>
</tr>
<tr>
<td>240VAC</td>
<td>3,000V*</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/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>Series</th>
<th>SSC 01</th>
<th>2</th>
<th>A</th>
<th>A</th>
<th>A</th>
</tr>
</thead>
</table>
| SSC 12AAA | 35 | 2 = DPDT Relay | Operating Mode | On-Delay mode only: 35 ms.
| SSC 12ACA | 35 | 2 = DPDT Relay | Relay Release Time — Off-Delay mode only: 20 ms.
| SSC 12AGA | 35 | 2 = DPDT Relay |

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.

Power Requirement

- 3W max.

Transient Protection

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

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>12VDC</td>
<td>1,000V*</td>
</tr>
<tr>
<td>12VDC</td>
<td>1,000V*</td>
</tr>
<tr>
<td>24VAC/VDC</td>
<td>1,000V*</td>
</tr>
<tr>
<td>48VAC/VDC</td>
<td>1,000V*</td>
</tr>
<tr>
<td>120VAC/VDC</td>
<td>2,500V*</td>
</tr>
<tr>
<td>240VAC</td>
<td>3,000V*</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/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>Series</th>
<th>SSC 01</th>
<th>2</th>
<th>A</th>
<th>A</th>
<th>A</th>
</tr>
</thead>
</table>
| SSC 12AAA | 35 | 2 = DPDT Relay | Operating Mode | On-Delay mode only: 35 ms.
| SSC 12ACA | 35 | 2 = DPDT Relay | Relay Release Time — Off-Delay mode only: 20 ms.
| SSC 12AGA | 35 | 2 = DPDT Relay |

Authorized distributors are likely to stock the following:

- SSC12AAA
- SSC12ACA
- SSC12AGA
- SSC12ABA
- SSC12ADA
- SSC12ALA

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Technologies, Inc.

Users should thoroughly review the technical data before selecting a product part number. It is recommended that the 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.
SSF Series, Programmable Time Delay Relay

Timing Specifications

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 Ranges
- 0.1 to 3 / 0.33 to 10 / 1 to 30 / 4 to 120 sec.; 0.33 to 10 / 1 to 30 / 2 to 60 min.; 0.33 to 10 hr.

Timing Range Selection
- Screwdriver select via recessed 8-position selector dial.

Timing Adjustment
- Recessed potentiometer adjustment with reference calibrations.

Accuracy
- Repeat Accuracy — ±1% ±0.01 sec.
- Overall Accuracy — ±3% ±0.01 sec.

Reset Time
- 30 ms.

Relay Operate Time
- On-Delay and Interval mode: 30 ms.

Relay Release Time
- Off-Delay, Interval and Latching Interval: 30 ms. (with factory-installed relay).

Contact Data @ 25°C
- 2 Form C (DPDT).
- 10A DPDT replaceable output relay minimizes downtime.

Power Requirement
- 2W max.

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

Operating Voltage
- <0.1 ms <1 ms
- 24, 48 VAC/VDC 1,000V 480V
- 120, 240VAC/VDC 3,000V 2500V*

* Min. source impedance of 100 ohms/120/240VAC, 3000V < 0.1 , sec.

Environmental Data

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

Mechanical Data

Mounting/Terminal
- Panel, DIN-rail, Machine Tool mounting track mounting case with screw terminal.
- Weight — 5.5 oz. (156g) approximately.

Ordering Information

SSFR90A
SSFR90X

Authorized distributors are likely to stock the following:
Specialty Relays

SST Series, Industrial Grade Discrete Plug-in, Time Delay Relay

Timing Specifications

Timing Modes — On-Delay, Off-Delay, Interval, One Shot (Latching Interval) or Repeat Cycle.

Timing Ranges — Nine ranges spanning 0.1 sec. to 120 min.

Timing Adjustment — Knob adjust.

Accuracy —
- Repeat Accuracy — ±1%
- Overall Accuracy — ±5%

Reset Time — 50 ms., max., (25 ms typ.) for on-delay and interval; 300 ms., max., for off-delay and one shot; 500 ms., max., for repeat type.

Relay Operate Time — 50 ms.

Relay Release Time — 30 ms.

Contact Data @ 25°C — 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.

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.

Environmental Data

Temperature Range — Storage — -23°C to +71°C
- Operating — -23°C to +54°C

Mechanical Data

Mounting/Termination — On-Delay, Interval and Repeat types have 8-pin octal-type plug that fits either 27E122 or 27E901 socket. Off-Delay and One Shot types have 11-pin octal-type plug that fits 27E123 or 27E902. Sockets must be ordered separately.

Weight — 4 oz. (112g) approximately

Ordering Information

SST1 – On Delay Types

<table>
<thead>
<tr>
<th>Input</th>
<th>Time Range</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 VAC</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>SST12EAA</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST12EAE</td>
</tr>
<tr>
<td></td>
<td>18 sec. - 30 min.</td>
<td>SST12EAG</td>
</tr>
<tr>
<td></td>
<td>36 sec. - 60 min.</td>
<td>SST12EAH</td>
</tr>
<tr>
<td>24 VAC</td>
<td>0.1 - 10 sec.</td>
<td>SST12AAE</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST12DAE</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST12DEA</td>
</tr>
<tr>
<td>24 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST12DAQ</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST12DDA</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST12DEA</td>
</tr>
<tr>
<td>12 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST12DDA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST12DEA</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST12DEA</td>
</tr>
</tbody>
</table>

SST2 – Off Delay Types

<table>
<thead>
<tr>
<th>Input</th>
<th>Time Range</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 VAC</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>SST22EAE</td>
</tr>
<tr>
<td></td>
<td>18 sec. - 30 min.</td>
<td>SST22EAG</td>
</tr>
<tr>
<td></td>
<td>36 sec. - 60 min.</td>
<td>SST22EAH</td>
</tr>
<tr>
<td>24 VAC</td>
<td>0.1 - 10 sec.</td>
<td>SST22AAE</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST22DAE</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST22DEA</td>
</tr>
<tr>
<td>24 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST22DAQ</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST22DDA</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST22DEA</td>
</tr>
<tr>
<td>12 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST22DDA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST22DEA</td>
</tr>
</tbody>
</table>

SST3 – Interval Types

<table>
<thead>
<tr>
<th>Input</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>SST32ADA</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST32EAE</td>
</tr>
<tr>
<td></td>
<td>36 sec. - 60 min.</td>
<td>SST32EAH</td>
</tr>
<tr>
<td>24 VAC</td>
<td>0.1 - 10 sec.</td>
<td>SST32AAE</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST32DAE</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST32DEA</td>
</tr>
<tr>
<td>24 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST32DAQ</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST32DDA</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST32DEA</td>
</tr>
</tbody>
</table>

SST4 – One Shot* Types

<table>
<thead>
<tr>
<th>Input</th>
<th>Time Range</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 VAC</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>SST42EAE</td>
</tr>
<tr>
<td></td>
<td>18 sec. - 30 min.</td>
<td>SST42EAG</td>
</tr>
<tr>
<td></td>
<td>36 sec. - 60 min.</td>
<td>SST42EAH</td>
</tr>
<tr>
<td>24 VAC</td>
<td>0.1 - 10 sec.</td>
<td>SST42AAE</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST42DAE</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST42DEA</td>
</tr>
<tr>
<td>24 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST42DAQ</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST42DDA</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST42DEA</td>
</tr>
<tr>
<td>12 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST42DDA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST42DEA</td>
</tr>
</tbody>
</table>

SST7 – Repeat Cycle Types

<table>
<thead>
<tr>
<th>Input</th>
<th>Time Range</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 VAC</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>SST72EAE</td>
</tr>
<tr>
<td></td>
<td>18 sec. - 30 min.</td>
<td>SST72EAG</td>
</tr>
<tr>
<td></td>
<td>36 sec. - 60 min.</td>
<td>SST72EAH</td>
</tr>
<tr>
<td>24 VAC</td>
<td>0.1 - 10 sec.</td>
<td>SST72AAE</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST72DAE</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST72DEA</td>
</tr>
<tr>
<td>24 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST72DAQ</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST72DDA</td>
</tr>
<tr>
<td></td>
<td>3 - 300 sec.</td>
<td>SST72DEA</td>
</tr>
<tr>
<td>12 VDC</td>
<td>0.1 - 10 sec.</td>
<td>SST72DDA</td>
</tr>
<tr>
<td></td>
<td>1.8 - 180 sec.</td>
<td>SST72DEA</td>
</tr>
</tbody>
</table>

* Also known as Latching Interval

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.

Catalog 5-1773450-5
Revised 3-13
www.te.com

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

For additional support numbers please visit www.te.com

USA: +1 800 502 6752
Asia Pacific: +86 0 400 820 6015
UK: +44 800 267 666

Dimensions are in millimeters unless otherwise specified.
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 6 / 2 to 48 hr.; 0.3 to 10 / 0.5 to 15 / 1 / 30 to 60 / 4 to 120 / 6 to 180 / 10 to 300 sec.; 0.33 to 10 / 0.5 to 15 / 1 / 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 mode: 35 ms.; Interval mode — 20 ms.

Relay Release Time — On-Delay and Accumulating On-Delay modes — 20 ms

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

Contact Data @ 25°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

Voltage Range:

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>0.1 ms</th>
<th>&lt;1 ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>All except 12 &amp; 24</td>
<td>3,000V</td>
<td>2,500</td>
</tr>
<tr>
<td>12 &amp; 24</td>
<td>Consult Factory</td>
<td></td>
</tr>
</tbody>
</table>

Environmental Data

Temperature Range —

Storage: -40°C to +85°C

Operating: -30°C to +65°C

Mechanical Data

Mounting/Terminal — 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)

Series STA

Discrete Industrial Timer With Tab-type Terms.

Operating Mode

<table>
<thead>
<tr>
<th>Operating Mode</th>
<th>01 = On-Delay</th>
<th>02 = Off-Delay</th>
<th>03 = Interval</th>
<th>09 = Accumulating On-Delay</th>
</tr>
</thead>
</table>

Status Indication

<table>
<thead>
<tr>
<th>Status Indication</th>
<th>S = LEDs</th>
<th>X = No LEDs</th>
</tr>
</thead>
</table>

Output

<table>
<thead>
<tr>
<th>Output</th>
<th>2X = DPDT Relay</th>
</tr>
</thead>
</table>

Mounting Series

RX = 11-pin tab-type header (order socket separately)

Timing Range

<table>
<thead>
<tr>
<th>Timing Range</th>
<th>A = 0.1 to 3 sec.</th>
<th>B = 0.5 to 15 sec.</th>
<th>C = 1 to 30 sec.</th>
<th>D = 2 to 60 sec.</th>
<th>E = 4 to 120 sec.</th>
<th>F = 6 to 180 sec.</th>
<th>G = 10 to 300 sec.</th>
<th>I = 2 to 60 min.</th>
<th>J = 1 to 6 hr.</th>
<th>K = 3 to 180 cycles</th>
<th>L = 0.33 to 10 min.</th>
<th>M = 0.5 to 15 min.</th>
<th>N = 1 to 30 min.</th>
<th>R = 2 to 48 hr.</th>
</tr>
</thead>
</table>

Operating Voltage

<table>
<thead>
<tr>
<th>Operating Voltage (+10%, –15%)</th>
<th>A = 120VAC, 50/60 Hz / 120VDC</th>
<th>E = 24VAC, 50/60 Hz</th>
<th>F = 48VAC, 50/60 Hz / 48VDC</th>
<th>Q = 12VDC</th>
</tr>
</thead>
</table>

Timing Adjustment

| Timing Adjustment | XA = Knob Adjust | XB = External Potentiometer or resistor (Operating modes 1 and 3 only). | XF = Fixed Times — Specify time delay in seconds per the following examples: XF5,000 = 9 sec. XF59,000 = 99 sec. XF5999,0 = 9999 sec. XF1000 = 10000 sec. |
|-------------------|-----------------|-----------------|----------------|-----------------|

Authorized distributors are likely to stock the following:

None at present.

REvised 3-13 Reference: purposes only. Unless otherwise specified. Asia Pacific: +86 0 400 820 6015 UK: +44 800 267 666 For additional support numbers please visit www.te.com

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

USA: +1 800 522 6752

www.te.com

BELDEN is a trademark of Belden Technologies, Inc.

Catalog 5-1773450-5 Revised 3-13
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:

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

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

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.

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:

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

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

Authorized distributors are likely to stock the following:
VTM1ECD
VTM1EDD

Ordering Information

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

Users should thoroughly review the technical data before selecting a product 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.

Product Facts
- On-delay timing mode
- Reliable solid state timing circuitry
- Excellent transient protection
- Compact design
- Flame retardant, solvent resistant housing

File E60363, File LR33434
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 1,000 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 ohms 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.
Terminals — 0.250 in (6.35) quick connect terminals for input line, load output and timing resistor connection.
Weight — 3 oz. (84g) approximately

Authorized distributors are likely to stock the following:
VTM-1

Ordering Information
Part Number Mode Input Voltage

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

Product Facts
- Off-delay timing mode
- Reliable solid state timing circuitry
- Excellent transient protection
- Compact design
- Flame retardant, solvent resistant housing
- File E60363, File LR33434

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:

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

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-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.

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

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:

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

Ordering Information

VTM2 A CD
Series VTM2 Off-Delay Timing Module Input Voltage Time Range
- VTM2
- A
- CD
- E = 24VAC/VDC
- Q = 12VAC/VDC
- Time Range
- CD = 0.5 - 10 sec.
- DD = 3 - 60 sec.
- DD = 3 - 60 min.

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.
Specialty Relays

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:

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

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 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, 24 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>
<tr>
<td>* Min. source impedance of 100 ohms.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Product Facts
- Interval timing mode
- Reliable solid state timing circuitry
- Excellent transient protection
- Compact design
- Flame retardant, solvent resistant housing
- File E60363, File LR33434

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

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

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>

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.
Authorized distributors are likely to stock the following:

None at present.

### Product Facts
- One shot (latching interval) timing mode
- Reliable solid state timing circuitry
- Excellent transient protection
- Compact design
- Flame retardant, solvent resistant housing
- File E60363, File LR33434

### 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:

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

**Accuracy**
- Repeat Accuracy — ±1%
- Overall Accuracy — ±2% at 1 megohm
- Reset Time — 50 ms, max.

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

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

### 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 and Wiring Diagram

### 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>
</tbody>
</table>

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.

For additional support numbers please visit www.te.com
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:

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

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, 24 VAC/VDC, 120 VAC/VDC.
Power Requirement — 4W with rated load.
Transistor Protection — Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.

- Operating Voltage
  - 12 VAC/VDC: 860V*
  - 24 VAC/VDC: 208V*
  - 120 VAC/VDC: 2,150V*

* 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

Ordering Information

<table>
<thead>
<tr>
<th>VTM7</th>
<th>A</th>
<th>CD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series VTM7</td>
<td>Input Voltage</td>
<td>Time Range</td>
</tr>
<tr>
<td>Repeat Cycle 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.
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.

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>Input Voltage</th>
<th>Operating Voltage</th>
<th>Input Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VAC/VDC</td>
<td>860V*</td>
<td>208V*</td>
<td></td>
</tr>
<tr>
<td>120 VAC/VDC</td>
<td>2,580V</td>
<td>2,150V*</td>
<td></td>
</tr>
</tbody>
</table>

* Min. source impedance of 100 ohms.

Current Drain — 2mA, Max.

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 and Wiring Diagram

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>120VAC or VDC</td>
</tr>
<tr>
<td>VTMA1ULA</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 mts.
Between Input and Output — 1,500VAC mts.

Input Data @ 25°C
Voltage (±10%) — 120VAC/VDC
Power Requirement — 3.5VA max. during timing; 3W, max. after time out.
Transient Protection — Non-repetitive transients of the following magnitudes will not cause spurious operation of affect function and accuracy.
Operating Voltage — <0.1 ms <1 ms
120 VAC/VDC 2.580V 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

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>

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.