7000 series

Industrial Electropneumatic Timing Relay

File E15631  File LR29186

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 confirm the product meets the requirements for a given application.

Consult factory for ordering information.

On-delay model 7012 (delay on pickup)

Applying continuous voltage to the coil (L1) the 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.

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

Off-delay model 7022 (delay on dropout)

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

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

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

Auxiliary Switch Options for On-Delay Instant Transfer (Auxiliary Switch Code L, maximum of 2 per relay.)

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

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

NOTE: Seismic & radiation tested E7000 models are available. Consult factory for detailed 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. Because of their simple attachment and adjustment features, they can be installed at the factory or in the field, by any competent mechanic. All auxiliary switches are SPDT with UL listings of 10A @ 125, 250, or 480 VAC. A maximum of one Code T or two Code L auxiliary switches may be added to each relay. The L or LL switch is available with on-delay relays only. The T switch is available with both the on-delay and off-delay relays.

**Auxiliary Switch Options for On-Delay**

- **Instant Transfer (Auxiliary Switch Code L, maximum of 2 per relay.)**
  1. Energizing coil begins time delay and transfers auxiliary switch.
  2. Main switch transfers after total preset delay.
  3. De-energizing coil resets both switches instantly.

- **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.

- **Instant Transfer (Auxiliary Switch Code L, maximum of 1 per relay.)**
  1. Energizing coil transfers main and auxiliary switches instantly.
  2. De-energizing coil resets auxiliary switch and begins time delay.
  3. Main switch transfers after total preset delay.

**Auxiliary Switch Options for Off-Delay**

- **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 resets auxiliary switch and begins time delay.
  3. Main switch transfers after total preset delay.

- **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 both switches instantly.
  3. Main switch transfers after total preset delay.

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**On-delay, off-delay model 7032 (double head)**

The Double Head model provides delayed switch transfer on energization of its coil, followed by delayed resetting upon coil de-energization. Each delay period is independently adjustable. In new circuit designs or the improvement of existing controls now using two or more conventional timers, the Double Head unit offers distinct advantages. Its compact design saves precious panel space, while the simplified wiring reduces costly interconnection.

**Four pole model 7014. 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 2:1 is recommended. Once adjusted at the factory, this ratio remains constant regardless of changes in dial settings. (Ex: If upper switch transfer is set on dial at 60 sec., minimum time on lower switch should be 40 sec.)
- This Series 7000 unit offers many of the performance features found in basic models - voltage ranges, timing and switch capacities are virtually identical.
- Four pole models add approximately 1-1/4" to the maximum height of the basic model, approximately 1/8" to the depth. They are designed for vertical operation only.

**Surge/transient protection option**

The Surge/Transient Protection Option protects electronic control circuits from transients and surges which are generated when the timer coil is activated. Built with a minimum of moving parts, the unit provides a fast response to rapidly rising back E.M.F. It consists of a specially modified coil case, varistor, varistor cover, terminal extensions and cup washers so that normal terminations can be used. The varistor will not affect the operating characteristics of the 7000 Timer. The varistor has bilateral and symmetrical voltage and current characteristics and therefore can be used in place of the back-to-back zener diodes. This characteristic also means that the coil will not be polarity sensitive.

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**Features**

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

All values shown are at nominal voltage and 25°C unless otherwise specified.

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

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

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

#### Linear Timing Ranges:

<table>
<thead>
<tr>
<th>Code</th>
<th>Models 7012, 7022, 7024</th>
<th>Models 7014, 7032</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.2 to 1.0 sec.</td>
<td>0.2 to 1.0 sec.</td>
</tr>
<tr>
<td>B</td>
<td>1.5 to 5.0 sec.</td>
<td>1.5 to 5.0 sec.</td>
</tr>
<tr>
<td>C</td>
<td>10 to 50 sec.</td>
<td>10 to 50 sec.</td>
</tr>
<tr>
<td>D</td>
<td>30 to 200 sec.</td>
<td>30 to 200 sec.</td>
</tr>
<tr>
<td>E</td>
<td>60 to 600 sec.</td>
<td>60 to 600 sec.</td>
</tr>
<tr>
<td>F</td>
<td>120 to 1,200 Cyc.</td>
<td>120 to 1,200 Cyc.</td>
</tr>
<tr>
<td>G</td>
<td>1,200 to 12,000 Cyc.</td>
<td>1,200 to 12,000 Cyc.</td>
</tr>
</tbody>
</table>

**Repeat Accuracy:**
For delays of 200 seconds or less:
- **Model 7012:** ±5%
- **Model 7014:** ±10%
- **Model 7032:** ±15%

For delays greater than 200 seconds:
- **Model 7012:** ±5%
- **Model 7014:** ±10%
- **Model 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 15% longer than subsequent delays due to coil temperature rise.

#### Operating Voltage Coil Data (for DPDT):

<table>
<thead>
<tr>
<th>Coil Part #</th>
<th>Code</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>7010</td>
<td>M</td>
<td>22.4-30.8</td>
<td>200-275</td>
<td>200-275</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>38.4-52.8</td>
<td>250-350</td>
<td>250-350</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O</td>
<td>26.4-32.6</td>
<td>200-275</td>
<td>200-275</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P</td>
<td>38.4-52.8</td>
<td>100-137.5</td>
<td>100-137.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q</td>
<td>12.5-19.1</td>
<td>8.6-13.2</td>
<td>8.6-13.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>12.5-19.1</td>
<td>6.8-10.6</td>
<td>6.8-10.6</td>
<td></td>
</tr>
<tr>
<td>DC</td>
<td>S</td>
<td>250-350</td>
<td>200-275</td>
<td>200-275</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>250-350</td>
<td>200-275</td>
<td>200-275</td>
<td></td>
</tr>
<tr>
<td></td>
<td>U</td>
<td>500-600</td>
<td>440-605</td>
<td>440-605</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V</td>
<td>25-35.2</td>
<td>20-29</td>
<td>20-29</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W</td>
<td>96-105.6</td>
<td>76.8-105.6</td>
<td>76.8-105.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td>6-8.6</td>
<td>5-8</td>
<td>5-8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Z</td>
<td>220-272</td>
<td>176-242</td>
<td>176-242</td>
<td></td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>Special DC Coils</td>
<td>(X1, X2, etc.)</td>
<td>Special DC Coils</td>
<td>(X1, X2, etc.)</td>
</tr>
</tbody>
</table>

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

See next column for more coil data.

### 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>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>

### 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):
  - Min. 10,000: 15.0
  - Min. 1,000,000: 15.0
- Voltage Operations:
  - 30 VDC: 10.0
  - 110 VDC: 1.0
  - 120 V 60Hz: 20.0
  - 240 V 60Hz: 20.0
  - 480 V 60Hz: 12.0
- 10 Amps Resistive, 240 VAC
- 1/4 Horsepower, 120 VAC/240VAC (per pole)
- 15 Amps 30 VDC (per pole)
- 5 Amps, General Purpose, 600VAC (per pole)

### Dielectric:
- Withstands 1500 volts RMS 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 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. A front mounting bracket is also supplied with each basic unit, for installation from the front of the panel. All units are calibrated for vertical operation. Basic models (7012, 7022) may also be horizontally mounted and will be adjusted accordingly when Accessory Y1 is specified in your order.

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

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

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

### Power Consumption:
- Approximately 8 watts power at rated voltage.

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

Weight may vary slightly with coil voltage.

Dimensions are shown for reference purposes only.
Outline Dimensions (Dimensions in inches).

Models 7012, 7022

Models 7014, 7024

Model 7032

Panel mount Option "X"

Surge/Transient Protection Option
Ordering Information

1. Basic Series: 70 = 7000 series electropneumatic timing relay

2. Operation:
   1 = On-delay
   2 = Off-delay
   3 = On-delay, off-delay (double head)

3. Contact Arrangement:
   2 = 2PDT (2 form C)
   **4 = 4PDT (4 form C)

4. Coil Voltage:

<table>
<thead>
<tr>
<th>AC Coils</th>
<th>DC Coils</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = 120VAC, 60 Hz.; 110VAC, 50Hz.</td>
<td>M = 28VDC</td>
</tr>
<tr>
<td>B = 240VAC, 60 Hz.; 220VAC, 50Hz.</td>
<td>N = 48VDC</td>
</tr>
<tr>
<td>C = 480VAC, 60 Hz.</td>
<td>O = 24VDC</td>
</tr>
<tr>
<td>D = 550VAC, 60 Hz.</td>
<td>P = 125VDC</td>
</tr>
<tr>
<td>E = 24VAC, 60 Hz.</td>
<td>Q = 12VDC</td>
</tr>
<tr>
<td>F = 127VAC, 50 Hz.</td>
<td>R = 60VDC</td>
</tr>
<tr>
<td>G = 240VAC, 50Hz.</td>
<td>S = 250VDC</td>
</tr>
<tr>
<td>H = 12VAC, 60 Hz.</td>
<td>T = 550VDC</td>
</tr>
<tr>
<td>K = Dual voltage (combines A &amp; B)</td>
<td>U = 16VDC</td>
</tr>
<tr>
<td>L = Special AC coils (L, L2, etc.)</td>
<td>V = 32VDC</td>
</tr>
<tr>
<td></td>
<td>W = 96VDC</td>
</tr>
<tr>
<td></td>
<td>Y = 6VDC</td>
</tr>
<tr>
<td></td>
<td>Z = 220VDC</td>
</tr>
<tr>
<td></td>
<td>X = Special DC coils (X1, X2, etc.)</td>
</tr>
</tbody>
</table>

5. Timing Range:

<table>
<thead>
<tr>
<th>Models 7012, 7022 &amp; 7024</th>
<th>Models 7014 &amp; 7032</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = .1 to 1 sec.</td>
<td>1 = Timers only (notes 2 &amp; 6)</td>
</tr>
<tr>
<td>B = 5 to 5 sec.</td>
<td>range code for each head. Example: AB.</td>
</tr>
<tr>
<td>C = 1.5 to 15 sec.</td>
<td>Any two ranges may be selected.</td>
</tr>
<tr>
<td>D = 5 to 50 sec.</td>
<td></td>
</tr>
<tr>
<td>E = 20 to 200 sec.</td>
<td>A = 2 to 2 sec.</td>
</tr>
<tr>
<td>F = 1 to 10 min.</td>
<td>B = .7 to 7 sec.</td>
</tr>
<tr>
<td>H = 3 to 30 min.</td>
<td>C = 2 to 20 sec.</td>
</tr>
<tr>
<td>I = 6 to 60 min.</td>
<td>D = 10 to 100 sec.</td>
</tr>
<tr>
<td>J = 3 to 120 cyc.</td>
<td>E = 30 to 300 sec.</td>
</tr>
<tr>
<td>K = 1 to 300 sec.</td>
<td>F = 1.5 to 15 min.</td>
</tr>
</tbody>
</table>

6. Options:

   A1 = Single quick-connect terminals (note 4).
   A2 = Double quick-connect terminals (note 4).
   B = Plug-in connectors (note 4).
   GZ = Enclosure with bottom knockouts (note 1).
   H2 = Hermetically sealed enclosure, 8 pin octal (note 1 & 4).
   H3 = Hermetically sealed enclosure, 8 pin octal (note 1 & 4).
   H4 = Hermetically sealed enclosure, 8 screw terminal block (note 1 & 4).
   *H6 = Hermetically sealed enclosure, 11 pin solder (note 1 & 4).
   *H7 = Hermetically sealed enclosure, 11 pin octal (note 1 & 4).
   *H8 = Hermetically sealed enclosure, 11 screw terminal block (note 1 & 4).
   I1 = Tamper-proof Cap, opaque black (Cannot be combined with Option X).
   I2 = Tamper-proof Cap, transparent (Cannot be combined with Option X).

   K = Explosion-proof Enclosure (note 1).
   L = Auxiliary Switch, instant transfer. 7012 only (notes 2 & 6).
   M = Dust-tight Gasketing (notes 4 & 5).
   O = Octal Plug Adapter. Can be combined only with options I1, I2, M, S, X, or Y1. (note 4).
   S = Dial Stops.
   T = Auxiliary Switch, two-step timing (notes 2 & 6).
   V = Transient/Surge Protection for DC coil voltage only.
   W = Watertight Enclosure (note 1).
   X = Panelmount includes hardware and adjustment for horizontal operation (note 4).
   Y1 = Horizontal calibration, for horizontal operation without panelmounting (note 4).
   Y2 = Horizontal calibration, with Compensating Spring for vertical operation (note 4).

Notes:

1. Cannot be combined with B, P or X Options.
2. Cannot be combined with B, P or Y2 Options.
3. Cannot be combined with GZ, H, I1, I2, K, W or Y1 Options.
4. Not Avail. on 4-Pole Models.
5. Not Available with L, T or LL options.
6. Not Available on hermetically sealed units.

* Sized to accommodate one L or T Auxiliary Switch
** Not available on On-Delay, Off-Delay (Double Head) model.
† Available with letter calibrated dials only. Upper end of time range may be twice the value shown.
†† 120 cycles = 2 sec.

Our authorized distributors are more likely to maintain the following items in stock for immediate delivery..
Ordering options – can only be ordered as factory installed options. [Dimensions, where shown, are in inches.]

A1 – Single Quick-Connect Terminals
A2 – Double Quick-Connect Terminals
B – Plug-In Connectors

GZ – Total Enclosure
H – Hermetically Sealed Enclosure

K – Explosion proof Enclosure
L – Auxiliary Switch

M – Dustight
P – Octal Plug Adapter

T – Auxiliary Switch
V – Transient/Surge Protection

W – Watertight Enclosure (NEMA-4)

X – Panelmount Kit

Accessories (Not available for 7032 models)
Plug-In Receptacle (Accessory C)
Plug-In Receptacle (Accessory D)

Ordering options can only be ordered as factory installed options.