TIME DELAY RELAYS

The largest selection of time delay relays known since 1968 for its reliable designs that provide long service lives with low maintenance costs. Versatile multifunction time delay relays give you the option of choosing among functions and time delay ranges to ensure that you receive the perfect timer to fit your needs. Electromechanical relay-output time delay relays are available with a number of different functions and assure isolation between input and output, as well as no voltage drop across output contact. Solid-state time delay relays have no moving parts to arc and wear out over time, giving them a lifespan of up to 100x that of a relay-output timer. In addition, all solid state time delay relays are fully encapsulated to protect against shock, vibration, humidity, etc.

Timer Function Guide ............................................................... 278

Multifunction
TRDU Series ................................................................. 279
TRU Series ................................................................. 282
ASQU / ASTU Series .................................................... 284
DSQU / DSTU Series .................................................... 286

Dedicated
On Delay
T10 SERIES ............................................................... 288

Delay-on-Make
ERDM Series ............................................................... 289
HRDM Series ............................................................... 291
KRDM Series ............................................................... 293
KRPS Series ............................................................... 295
KSD1 Series ............................................................... 298
KSDU Series ............................................................... 300
KSPS Series ............................................................... 302
MSM Series ............................................................... 305
ORM Series ............................................................... 307
PRLM Series ............................................................... 309
TDM / TDMH / TDML Series ........................................ 311
TDU / TDUH / TDUL Series ........................................ 313
TH1 Series ............................................................... 315
THD1B410.SS ............................................................ 317
TMV8000 / TSU2000 Series .......................................... 319
TRM Series ............................................................... 321
TS1 Series ............................................................... 323
TSD1 Series ............................................................... 325

Delay-on-Make, Normally Closed
TS441165 ........................................................................ 327

Delay-on-Break
HRDB Series ............................................................... 329
HRPS / HRIS Series ..................................................... 331
KRDB Series ............................................................... 333
KSDS Series ............................................................... 335
ORB Series ............................................................... 337
TDB / TDBH / TDBL Series ........................................... 339
TDBU Series ............................................................... 341
THDB Series ............................................................... 343
TRB Series ............................................................... 345
TSB Series ............................................................... 347
TSDB Series ............................................................... 349

Single Shot
HRDS Series ............................................................... 351
HSPZA22SL ............................................................... 353
KRD Series ............................................................... 355
KSDS Series ............................................................... 357
ORS Series ............................................................... 359
PRS65 ....................................................................... 361
TDS / TDSH / TDSL Series ........................................... 362
TDUS Series ............................................................... 364
THC / TSH Series ......................................................... 366
THDS Series ............................................................... 368
TRS Series ............................................................... 370
TSDS Series ............................................................... 372
TSS Series ............................................................... 374
## Time Delay Relays

### Interval
- ERDI Series ................................................................. 376
- HRDI Series ................................................................. 378
- KRD1 Series ................................................................. 380
- KSD2 Series ................................................................. 382
- KSPU Series ................................................................. 384
- TDI / TDIH / TDIL Series ............................................. 386
- TDU / TDUH / TDUIL Series .......................................... 388
- THD2 Series ................................................................. 390
- THD7 Series ................................................................. 392
- TS2 / TS6 Series ........................................................... 394
- TSD2 Series ................................................................. 396
- TSD6 Series ................................................................. 398
- TSD7 Series ................................................................. 400

### Retriggerable Single Shot
- KRD9 Series ................................................................. 402
- TSD94110SB ................................................................. 404

### Recyle
- ERD3425A ................................................................. 405
- ESDR Series ................................................................. 407
- HRDR Series ................................................................. 410
- KRD3 Series ................................................................. 412
- KRD3 Series ................................................................. 414
- KSD3 Series ................................................................. 416
- KSDR Series ................................................................. 418
- KSPD Series ................................................................. 420
- RS Series ................................................................. 422
- TDR Series ................................................................. 424
- THD3C42A0 ................................................................. 426
- TSD3411S ................................................................. 428
- TSDR Series ................................................................. 430

### Percentage
- PTHF4900DK ................................................................. 432

### Dual Function
- TDMB Series ................................................................. 434
- ESD52233 ................................................................. 436
- KRPD Series ................................................................. 438

### HVAC
- CT Series ................................................................. 440
- T2D120A15M ................................................................. 442
- TA Series ................................................................. 444
- TAC1 Series ................................................................. 446
- TL Series ................................................................. 448
- TSA141300 ................................................................. 450

### Coin Vending
- HRV Series ................................................................. 451

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For More Information... and to download our HVAC Timer Application Guide, visit Littelfuse.com/timedelayrelays
## Selecting a Timer’s Function

Selecting one of the five most common timing functions can be as easy as answering three questions on the chart below. If you have trouble answering these questions, try drawing a connection diagram that shows how the timer and load are connected.

Time diagrams and written descriptions of the five most popular functions, plus other common functions. Instantaneous contacts, accumulation, pause timing functions, and flashing LED’s are included in some units to expand the versatility of the timer. These expanded operations are explained on the product’s catalog page. Time diagrams are used on these pages along with text and international symbols for functions.

### Function Selection Guide

#### Selection Questions

1) The timing starts when the initiate (starting) contacts are:
   - A) Closed
   - B) Opened

2) What is the status of the output (or load) during timing?
   - A) On
   - B) Off
   - C) On/Off

3) Will the load de-energize (or remain de-energized) if the initiate (starting) contacts are opened during timing?
   - A) Yes
   - B) No

#### Understanding Time Diagrams

Time diagrams are used to show the relative operation of switches, controls, and loads as time progresses. Time begins at the first vertical boundary. There may be a line indicating the start of the operation or it may just begin with the transition of the device that starts the operation. Each row in the time diagram represents a separate component. These rows will be labeled with the name of the device or its terminal connection numbers. In a bistable or digital system, the switches, controls, or loads can only be ON or OFF. The time lines are drawn to represent these two possible conditions. Vertical lines are used to define important starting or ending points in the operation.

The example to the right is the most common type of time diagram in use in North America. It shows the energizing of loads, and the closing of switches and contacts by an ascending vertical transition of the time line. Opening switches or contacts or de-energizing loads are represented by descending vertical transitions.

#### International Timing Function Symbols

- \(\square\) = Delay-on-Make; ON-delay
- \(\square\) = Delay-on-Break; OFF-delay
- \(\square\) = Delay-on-Make and Break; ON and OFF-delay
- \(\text{Interval; Impulse-ON}\)
- \(\text{Interval; Impulse-OFF}\)
- \(\text{Single Shot; Pulse Former}\)
- \(\text{Flasher - ON Time First; Recycling Equal Times - ON First}\)

- \(\text{Flasher - OFF Time First; Recycling Equal Times - OFF First}\)
- \(\text{Recycling - Unequal Times; Pulse Generator}\)
- \(\text{Recycling - Unequal Times Starting with ON or OFF}\)
- \(\text{Delay-on-Make and Interval; Single Pulse Generator}\)
The TRDU Series is a versatile universal time delay relay with 21 selectable single and dual functions. The dual functions replace up to three timers required to accomplish the same function. Both the function and the timing range are selectable with switches located on the face of the unit. Two LED’s indicate input voltage and output status. This device offers full 10A isolated relay output contacts in either SPDT or DPDT. The TRDU replaces hundreds of part numbers, thereby, reducing your stock inventory requirements.

21 Functions
Five switches are provided to set one of 10 single or 11 dual modes of operation.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 timing functions</td>
<td>Replace hundreds of parts and reduce stocking requirements</td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/− 0.1%</td>
</tr>
<tr>
<td>User selectable</td>
<td>Timing settings are switch selectable 0.1s - 1,705h in eight ranges for added flexibility</td>
</tr>
<tr>
<td>time delay</td>
<td></td>
</tr>
<tr>
<td>Isolated 10A, SPDT or</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>DPDT output contacts</td>
<td></td>
</tr>
<tr>
<td>LED indicators</td>
<td>Provides visual indication of input voltage and relay status</td>
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Accessories

- **BZ1 Front Panel Mount Kit**: Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.
- **NDS-8 Octal 8-pin Socket**: 8-pin 35mm DIN rail or surface mount. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.
- **NDS-11 11-pin Socket**: 11-pin 35mm DIN rail or surface mount. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail. Uses PSC11 hold-down clips.
- **PSC8 or PSC11 Hold-down Clips**: Securely mounts plug-in controls in any position. Provides protection against vibration. Use PSC8 with NDS-8 Octal Socket or PSC11 with NDS-11 Socket. Sold in sets of two.
- **C103PM (AL) DIN Rail**: 35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

If you don’t find the part you need, call us for a custom product 800-843-8848

*Limited to 9 operating functions in 8-pin DPDT units.*
## Specifications

### Time Delay

**Type**
- Microcontroller

**Range: Switch Selectable**
- Single Functions: 0.1s to 1,705h in 8 ranges
- Dual Functions: 0.1s to 3,100m each in 8 ranges

**Adjustments**
- Multiplier: 3 position DIP switches select 0.1, 1, 10, or 100 in s or m

**Setting Accuracy**
- ±1% or 50ms, whichever is greater

**Repeat Accuracy**
- ±0.1% or 20ms, whichever is greater

**Timing Functions**
- Five switches are provided to set one of twenty-one single or dual functions

**Reset Time**
- ≤ 50ms

**Initiate Time**
- 120VAC: 75ms

**Time Delay vs Temp. & Voltage**
- ±1%

**Indication**
- Two LEDs indicate:
  1) Input voltage applied
  2) Output relay status

### Input

**Voltage**
- 12VDC, 24VAC/DC, 120VAC, or 230VAC

**Tolerance**
- 12VDC & 24VAC/DC: -15% to 20%
- 120 & 230VAC: -20% to 10%

**AC Line Frequency**
- 50/60Hz

**Power Consumption**
- 24 to 230V: ≤ 3W; 12VDC: ≤ 2W

### Output

**Type**
- Electromechanical relay

**Form**
- SPDT or DPDT

**Rating**
- 10A resistive @ 120/240VAC & 28 VDC;
- 1/3 hp @ 120/240VAC

**Life**
- Mechanical: 1 x 10⁷; Electrical: 1 x 10⁶

### Protection

**Isolation Voltage**
- ≥ 1500V RMS input to output

**Insulation Resistance**
- ≥ 100 MO

**Polarity**
- DC units are reverse polarity protected

**Mounting**
- Plug-in socket

**Dimensions**
- H: 76.7 mm (3.1”); W: 60.7 mm (2.39”); D: 45.2 mm (1.78”)

**Termination**
- Octal 8-pin plug-in or magnal 11-pin plug-in

**Weight**
- ≅ 5.8 oz (164 g)

**Indication**
- Two LEDs indicate:
  1) Input voltage applied
  2) Output relay status

**Adjustments**
- Multiplier: 3 position DIP switches select 0.1, 1, 10, or 100 in s or m

**Setting Accuracy**
- ±1% or 50ms, whichever is greater

**Repeat Accuracy**
- ±0.1% or 20ms, whichever is greater

**Timing Functions**
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**Initiate Time**
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**Time Delay vs Temp. & Voltage**
- ±1%

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- ≅ 5.8 oz (164 g)

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- Two LEDs indicate:
  1) Input voltage applied
  2) Output relay status

**Adjustments**
- Multiplier: 3 position DIP switches select 0.1, 1, 10, or 100 in s or m

**Setting Accuracy**
- ±1% or 50ms, whichever is greater

**Repeat Accuracy**
- ±0.1% or 20ms, whichever is greater

**Timing Functions**
- Five switches are provided to set one of twenty-one single or dual functions

**Reset Time**
- ≤ 50ms

**Initiate Time**
- 120VAC: 75ms

**Time Delay vs Temp. & Voltage**
- ±1%

**Indication**
- Two LEDs indicate:
  1) Input voltage applied
  2) Output relay status

### Function Diagrams

#### Single Functions

**Delay-on-Make (On-Delay)**

**Delay-on-Break**

**Recycle (On Time First, Equal Delays)**

**Single Shot**

#### Dual Functions

**Delay-on-Make/Delay-on-Break**

**Delay-on-Make / Recycle**

**Delay-on-Make / Interval**

**Delay-on-Make / Single Shot**

---

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Time Delay Relays
Multifunction

TRDU SERIES

Single Functions

Dual Functions

NOTE: The time delay range is the same for both functions when dual functions are selected.
Description
The TRU Series is a multifunction, knob adjustable, Universal Time Delay Relay. It includes six of the most popular timing functions selected by a slide switch. The time delay is knob adjustable and the time delay range is switch selectable. The repeat accuracy is + 0.1%. Both function and time range can be selected on the top face of the unit. In addition to multifunctioning and multiple time ranges, the TRU Series features universal input voltage; 19 to 264VAC and 19 to 30VDC and full 10A output relay. The TRU Series can directly replace up to 1000 competitive time delay relay models.

Operation
A six position slide switch selects delay-on-make, interval, single shot, recycling (ON time first, equal recycle delays), delay-on-break, and retrigerable single shot. 8-pin DPDT base wiring is limited to delay-on-make, interval, and recycling functions. All six functions are available in the 8-pin SPDT and 11-pin DPDT versions.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.1% or +/- 20ms, whichever is greater</td>
</tr>
<tr>
<td>6 time ranges (0.1s to 1,000m)</td>
<td>Broad range will satisfy most requirements</td>
</tr>
<tr>
<td>Knob adjustable time delay</td>
<td>Allows user to fine tune time delay based on application needs</td>
</tr>
<tr>
<td>Universal input voltage</td>
<td>Makes it versatile for use in most applications</td>
</tr>
<tr>
<td>Multifunction</td>
<td>Provides the most common standard timing functions</td>
</tr>
<tr>
<td>LED Indicators</td>
<td>Provide visual indication of input voltage and relay status</td>
</tr>
<tr>
<td>10A isolated output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
</tbody>
</table>

Wiring Diagram

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>BASE WIRING</th>
<th>FUNCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRU1</td>
<td>19 to 264VAC, 19 to 30VDC</td>
<td>8-pin DPDT</td>
<td>3</td>
</tr>
<tr>
<td>TRU2</td>
<td>19 to 264VAC, 19 to 30VDC</td>
<td>8-pin SPDT</td>
<td>6</td>
</tr>
<tr>
<td>TRU3</td>
<td>19 to 264VAC; 19 to 30VDC</td>
<td>11-pin DPDT</td>
<td>6</td>
</tr>
</tbody>
</table>

For dimensional drawing see: Appendix, page 512, Figure 21.

If you don't find the part you need, call us for a custom product 800-843-8848
Accessories

**BZ1 Front Panel Mount Kit**
Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

**NDS-8 Octal 8-pin Socket**
8-pin 35mm DIN rail or surface mount. Rated at 10A @ 300VAC. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

**NDS-11 11-pin Socket**
11-pin 35mm DIN rail or surface mount. Rated at 10A @ 300VAC. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC11 hold-down clips.

**PSC8 or PSC11 Hold-down Clips**
Securely mounts plug-in controls in any position. Provides protection against vibration. Use PSC8 with NDS-8 Octal Socket or PSC11 with NDS-11 Socket. Sold in pairs.

Function Diagram

```
V = Voltage
S1 = Initiate Switch
NO = Normally Open Contact
NC = Normally Closed Contact
= Incomplete Time Delay
TD = Time Delay
R = Reset
```

Specifications

**Time Delay**

- **Type**: Digital integrated circuitry
- **Range**: 0.1s - 1000m in 6 ranges:
  1) 0.1 - 10s
  2) 1 - 100s
  3) 10 - 1000s
  4) 0.1 - 10m
  5) 1 - 100m
  6) 10 - 1000m

**Adjustments**

- **Multiplier**: 4 position DIP switch selects x0.1, x1, x10, and sec. or min.
- **Time Setting**: Onboard knob adjustment with 1 - 100 reference dial
- **Two LEDs indicate**
  1) Input voltage applied
  2) Output relay status
- **Repeat Accuracy**: ±0.1% or ±20ms, whichever is greater
- **Reset Time**: ≤ 300ms
- **Time Delay vs Temp. & Voltage**: ±2%

**Input**

- **Voltage - Universal**: 19 to 264VAC and 19 to 30VDC
- **Input Range**: 50/60Hz

**AC Line Frequency**

- **Output Type**: Electromechanical relay
- **Form**: SPDT or DPDT, isolated
- **Rating**: 10A resistive @ 120/240VAC & 28VDC; 1/3 hp @ 120/240VAC
- **Mechanical**: 1 x 10⁷; Electrical - 1 x 10⁹
- **Protection**: 38 joules;
  - Isolated Voltage input to output
  - DC units are reversed polarity protected
- **Mounting**: Plug-in socket
- **Dimensions**: H 87.3 mm (3.44”); W 60.7 mm (2.39”); D 45.2 mm (1.78”)
- **Termination**: Octal 8-pin plug-in or magnal 11-pin plug-in
- **Environmental Operating/Storage Temperature**: -20° to 65°C / -30° to 85°C
- **Weight**: ≈ 6 oz (170 g)

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Description
The ASQU and ASTU Series of 17.5 mm, knob adjustable, universal solid-state timers offer multiple functions, voltages, and time delay ranges. Choose one of 5 functions and 4 time delay ranges via 4 selection switches located on face of the unit. Adjustment through the time range is accomplished by an onboard knob.

The ASQU Series has quick connect terminals and the ASTU Series has terminal blocks.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal AC or DC voltage</td>
<td>Choose from 24 to 240VAC or 9 to 110VDC models</td>
</tr>
<tr>
<td>Compact 17.5mm size</td>
<td>Allows for high rail density</td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 1%</td>
</tr>
<tr>
<td>Multifunction:</td>
<td>Reduce stocking requirements</td>
</tr>
<tr>
<td>5 timing functions</td>
<td>Field adjustable delay ranging from 0.1s - 100m</td>
</tr>
<tr>
<td>Knob Adjustable Time Delay</td>
<td></td>
</tr>
<tr>
<td>0.7A steady, 10A inrush</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>solid-state output</td>
<td></td>
</tr>
<tr>
<td>Mounting fasteners</td>
<td>Each unit ships with both surface and DIN rail quick mount adapters</td>
</tr>
<tr>
<td>included</td>
<td></td>
</tr>
<tr>
<td>Watchdog circuitry</td>
<td>Self monitoring and self correcting for improved performance</td>
</tr>
</tbody>
</table>

Accessories

**P1015-13** (AWG 10/12), **P1015-64** (AWG 14/16), **P1015-14** (AWG 18/22) Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**P0500-178 Surface Mount Adapter**
**P0500-179 DIN Rail Mount Adapter**
For use with the ASxx/DSxx Series timers.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>CONNECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASQUA3</td>
<td>24 to 240VAC</td>
<td>Quick Connects</td>
</tr>
<tr>
<td>ASQUD3</td>
<td>9 to 110VDC</td>
<td>Quick Connects</td>
</tr>
<tr>
<td>ASTUA3</td>
<td>24 to 240VAC</td>
<td>Terminal Blocks</td>
</tr>
<tr>
<td>ASTUD3</td>
<td>9 to 110VDC</td>
<td>Terminal Blocks</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
Specifications

**Time Delay**
- Type: Microcontroller based with ceramic resonator and watchdog circuitry
- Adjustment: Knob with dial; 2 switches select 1 of 4 multipliers
- Range*: 0.1 - 10s, 1 - 100s, 10 - 1000s, 1 - 100m
- Repeat Accuracy: ±1% or ±50ms, whichever is greater
- Tolerance (Factory Calibration): ±2% or ±50ms, whichever is greater
- Reset Time: ≤300ms
- Initiate Time: Single Shot & Delay-on-Break: ≤32ms
- Time Delay vs Temp. & Voltage: ±2%, or ±50ms, whichever is greater

**Input Voltage**
- AC: 24 to 240VAC; -20% - 10%
- DC: 9 to 110VDC; -0% - 20% @ -25°C
- 9.4 to 110VDC; -0% - 20% @ -40°C

**AC Line Frequency/DC Ripple**
- Output: Solid state
- Type: NO
- Rating: 0.7A steady state, 10A inrush
- Voltage Drop: AC ≅ 2.5V @ 0.7A; DC ≅ 1.5V @ 0.7A

**Protection**
- Surge: IEEE C62.41-1991 Level A
- Circuitry: Encapsulated
- Dielectric Breakdown: ≥2000V RMS terminals to mounting surface
- Polarity: DC units are reverse polarity protected

**Mechanical**
- Mounting: Two base adaptors are available
- DIN Rail: Snap on to 32 mm DIN 1 & 35 mm DIN 3 rail
- Surface: Two #6 (M3.5 x 0.6) screws or quick mount fasteners
- Dimensions: H 76.2 mm (3.0”); W 17.52 mm (0.69”); D 61.2 mm (2.41”)

**Termination**
- ASQU: 0.25 in. (6.35 mm) male quick connect terminals
- ASTU: 0.197 in. (5 mm) push-on terminal blocks for up to #14 AWG (2.5 mm²) wire

**Environmental**
- Operating/Storage Temperature: -40° to 60°C / -40° to 85°C
- Humidity: 95% relative, non-condensing
- Weight: ≅ 4 oz (113 g)

*For CE approved applications, power must be removed from the unit when a switch position is changed.
Description
The DSQU and DSTU Series of 17.5 mm, DIP switch adjustable, universal solid-state timers offer multiple functions, voltages, and time delay ranges. Choose one of 5 functions and 4 time delay ranges via 4 selection switches located on face of the unit. Six switches adjust the time delay through the selected range. The DSQU Series has quick connect terminals and the DSTU Series has terminal blocks.

Features & Benefits

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<td>Compact 17.5mm size</td>
<td>Allows for high rail density</td>
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<td>Microcontroller based</td>
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<td>Multifunction: 5 timing functions</td>
<td>Reduce stocking requirements</td>
</tr>
<tr>
<td>DIP switch adjustable time delay</td>
<td>Field adjustable delay ranging from 0.1s - 63m</td>
</tr>
<tr>
<td>0.7A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Mounting fasteners included</td>
<td>Each unit ships with both surface and DIN rail quick mount adapters</td>
</tr>
<tr>
<td>Watchdog circuitry</td>
<td>Self monitoring and self correcting for improved performance</td>
</tr>
</tbody>
</table>

Accessories

**P1015-13** (AWG 10/12), **P1015-64** (AWG 14/16), **P1015-14** (AWG 18/22) **Female Quick Connect**
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**P0500-178 Surface Mount Adapter**
**P0500-179 DIN Rail Mount Adapter**
For use with the ASxx/DSxx Series timers.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>CONNECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSQUA3</td>
<td>24 - 240VAC</td>
<td>Quick Connects</td>
</tr>
<tr>
<td>DSQUD3</td>
<td>9 - 110VDC</td>
<td>Quick Connects</td>
</tr>
<tr>
<td>DSTUA3</td>
<td>24 - 240VAC</td>
<td>Terminal Blocks</td>
</tr>
<tr>
<td>DSTUD3</td>
<td>9 - 110VDC</td>
<td>Terminal Blocks</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848

For dimensional drawing see: Appendix, page 512, Figure 22.
# Specifications

## Time Delay

### Type

Microcontroller based with ceramic resonator and watchdog circuitry

### Adjustment

6 switches adjust the time delay;
2 switches select 1 of 4 multipliers

### Range*

- $x0.1s = 0.1 - 6.3s$ in 0.1s increments
- $x1s = 1 - 63s$ in 1s increments
- $x10s = 10 - 630s$ in 10s increments
- $x1m = 1 - 63m$ in 1m increments

### Repeat Accuracy

±0.1% or ±20ms, whichever is greater

### Setting Accuracy

±2% or ±50ms, whichever is greater

### Reset Time

≤ 300ms

### Initiate Time

Single Shot & Delay-on-Break: ≤ 32ms

### Time Delay vs Temp. & Voltage

±2% or ±50ms, whichever is greater

## Input

### Voltage

- AC: 24 to 240VAC; -20% - 10%
- DC: 9 to 110VDC; -0% - 20% @ -25°C
- 9.4 to 110VDC; -0% - 20% @ -40°C

### AC Line Frequency/DC Ripple

50/60Hz / ≤ 10%

## Output

### Type

Solid state

### Form

NO

### Rating

0.7A steady state, 10A inrush

### Voltage Drop

AC ≅ 2.5V @ 0.7A; DC ≅ 1.5V @ 0.7A

## Protection

### Surge

IEEE C62.41-1991 Level A

### Circuitry

Encapsulated

### Dielectric Breakdown

≥ 2000V RMS terminals to mounting surface

### Polarity

DC units are reverse polarity protected

## Mechanical

### Mounting

Two base adaptors are available

### DIN Rail

Snap on to 32 mm DIN 1 & 35 mm DIN 3 rail

### Surface

Two #6 (M3.5 x 0.6) screws or quick mount fasteners

### Dimensions

- H: 76.2 mm (3.0”); W: 17.52 mm (0.69”);
- D: 61.2 mm (2.41”)

### Termination

- DSQU: 0.25 in. (6.35 mm) male quick connect terminals
- DSTU: 0.197 in. (5 mm) push-on terminal blocks for up to #14 AWG (2.5 mm²) wire

## Environmental

### Operating/Storage Temperature

-40°C to 60°C / -40°C to 85°C

### Humidity

95% relative, non-condensing

### Weight

≈ 4.2 oz (119 g)

---

*For CE approved applications, power must be removed from the unit when a switch position is changed.
The T10 Series on-delay timer is a solid-state electronic device that provides accurate and reliable timing for control circuits up to 460VAC. The T10 features a user-selectable time delay from 6 seconds to 10 minutes (0.5 to 12 seconds on the T10S400 model) and SPDT output contacts. When power is applied to the T10, it immediately begins its timing cycle. During this time, the indicator LED alternates between red and green and the output contacts remain inactive. When the timing cycle is complete, the indicator LED turns solid green and the output contacts are activated. The output contacts will remain activated until power is removed from the T10.

The SPDT contact ratings are 480V @ 240VAC on the 115V and 230V models, and 470VA @ 600VAC on the 460V model.

**Features & Benefits**
- Status LED
- 600V control relay on 460V models

**Specifications**

**Input Characteristics**
- Frequency: 50*/60Hz

**Functional Characteristics**
- Timing Range
  - T10100, T10200, T10400: 6 seconds to 10 minutes
  - T10S400: 0.5 seconds to 12 seconds
- Repeat Accuracy: ±1%
- Fixed Condition: ±1%

**Output Characteristics**
- Output Contact Rating (SPDT)
  - Pilot Duty:
    - T10100, T10200: 480VA @ 240VAC
    - T10400, T10S400: 470VA @ 600VAC

**General Characteristics**
- Maximum Input Power: 5 W
- Terminal
- Torque: 7 in.-lbs.
- Wire Size: 12-18AWG

**Safety Marks**
- UL: UL508 (File #E68520)

**Dimensions**
- H: 74.4 mm (2.93”); W: 133.9 mm (5.27”); D: 74.9 mm (2.95”)

**Weight**
- 0.94 lb. (15.04 oz., 426.38 g)

**Mounting Method**
- #8 screws

*Note: 50Hz will increase all delay timers by 20%.

For dimensional drawing see: Appendix page 509, Figure 6.
Description
The ERDM Series is a combination of digital electronics and a reliable electromechanical relay. These devices offer a DPDT relay output for relay logic circuits, and isolation of input to output voltages. Cost effective for OEM applications, such as random starting, sequencing ON, switch de-bouncing, anti-short cycling, and other common delay-on-make applications.

Operation (Delay-on-Make)
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital integrated circuitry with electromechanical relay</td>
<td>Repeat Accuracy +/- 0.5%</td>
</tr>
<tr>
<td>Isolated 10A, DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

- **P1004-16, P1004-16-XVersa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1015-64 (AWG 14/16) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERDM123</td>
<td>12VDC</td>
<td>Onboard knob</td>
<td>0.1 - 10s</td>
<td>ERDM422</td>
<td>120VAC</td>
<td>Onboard knob</td>
<td>0.1 - 5s</td>
</tr>
<tr>
<td>ERDM126</td>
<td>12VDC</td>
<td>Onboard knob</td>
<td>0.6 - 60s</td>
<td>ERDM423</td>
<td>120VAC</td>
<td>Onboard knob</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>ERDM128</td>
<td>12VDC</td>
<td>Onboard knob</td>
<td>0.1 - 10m</td>
<td>ERDM425</td>
<td>120VAC</td>
<td>Onboard knob</td>
<td>0.3 - 30s</td>
</tr>
<tr>
<td>ERDM222</td>
<td>24VAC</td>
<td>Onboard knob</td>
<td>0.1 - 5s</td>
<td>ERDM427</td>
<td>120VAC</td>
<td>Onboard knob</td>
<td>0.1 - 5m</td>
</tr>
<tr>
<td>ERDM4130S</td>
<td>120VAC</td>
<td>Fixed</td>
<td>30s</td>
<td>ERDM429</td>
<td>120VAC</td>
<td>Onboard knob</td>
<td>0.2 - 15m</td>
</tr>
<tr>
<td>ERDM4210</td>
<td>120VAC</td>
<td>Onboard knob</td>
<td>1 - 100m</td>
<td>ERDM4210</td>
<td>120VAC</td>
<td>Onboard knob</td>
<td>1 - 100m</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
Specifications

Time Delay

Type: Digital integrated circuitry
Range: 0.1s - 500m in 11 adjustable ranges or 0.1s - 1000m fixed
Adjustment: Fixed, onboard or external adjust
Repeat Accuracy: ±0.5%
Tolerance: (Factory Calibration) ≤ ±10%
Recycle Time: ≤ 150ms
Time Delay vs Temp. & Voltage: ≤ ±2%
Input Voltage: 12, 24, or 120VDC; 24, 120, or 230VAC
Tolerance: -15% - 20%
120VAC/DC & 230VAC -20% - 10%
AC Line Frequency: 50/60 Hz
Output Type: Isolated relay contacts
Form: DPDT
Rating: 10A resistive @ 120/240VAC & 28VDC;
1/3 hp @ 120/240VAC
Life: Mechanical - 1 x 10^7; Full Load - 1 x 10^6
Protection Isolation Voltage: ≥1500V RMS input to output
Insulation Resistance: ≥100 MΩ
Polarity: DC units are reverse polarity protected
Mechanical Mounting: Surface mount with two #6 (M3.5 x 0.6) screws
Dimensions: H 88.9 mm (3.5”); W 63.5 mm (2.5”);
D 43.2 mm (1.7”)
Termination: 0.25 in. (6.35 mm) male quick connect terminals
Environmental Operating/Storage Temperature: -40° to 65°C / -40° to 85°C
Weight: ≅ 5.7 oz (162 g)

Selection Guides

R_T Selection Chart

<table>
<thead>
<tr>
<th>Desired Time Delay*</th>
<th>R_T</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td>3</td>
<td>0.2</td>
</tr>
<tr>
<td>4</td>
<td>0.3</td>
</tr>
<tr>
<td>5</td>
<td>0.6</td>
</tr>
<tr>
<td>6</td>
<td>0.8</td>
</tr>
</tbody>
</table>

* When selecting an external R_T add at least 20% for tolerance of unit and the R_T.

R_T Selection Chart

<table>
<thead>
<tr>
<th>Desired Time Delay*</th>
<th>R_T</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>0.1</td>
</tr>
<tr>
<td>8</td>
<td>0.1</td>
</tr>
<tr>
<td>9</td>
<td>0.2</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

* When selecting an external R_T add at least 20% for tolerance of unit and the R_T.

Function Diagram

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset
= Undefined Time
The HRDM Series combines an electromechanical relay output with microcontroller timing circuitry. It offers 12 to 230V operation in five ranges and factory fixed, onboard, or external adjustable time delays with a repeat accuracy of ±0.5%. The output contact rating allows for direct operation of heavy loads, such as compressors, pumps, blower motors, heaters, etc. This series is ideal for OEM applications where cost is a factor.

**Operation (Delay-on-Make)**

Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output relay energizes and remains energized until input voltage is removed.

**Reset:** Removing input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy ±/ - 0.5%</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>Isolated, 30A, SPDT, NO output contacts</td>
<td>Allows direct operation of heavy loads:</td>
</tr>
<tr>
<td></td>
<td>compressors, pumps, blower motors, heaters.</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-95, P1004-95-X Versa-Pot**
  - Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  - The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  - Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16) Female Quick Connect**
  - These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  - Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  - 35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  - Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

---

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRDM120</td>
<td>12VDC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>HRDM312S</td>
<td>24VDC</td>
<td>Fixed</td>
<td>12s</td>
</tr>
<tr>
<td>HRDM413M</td>
<td>120VAC</td>
<td>Fixed</td>
<td>3m</td>
</tr>
<tr>
<td>HRDM415M</td>
<td>120VAC</td>
<td>Fixed</td>
<td>5m</td>
</tr>
</tbody>
</table>

For dimensional drawing see: Appendix, page 512, Figure 17.
External Resistance vs. Time Delay

In Secs. or Mins.

- Time Delay Ranges
- @ 20°C, ±2%
- Range 0.1s - 100m in 5 adjustable ranges or fixed
- Repeat Accuracy ±0.5% or 20 ms, whichever is greater
- Tolerance ±1%, ±5%
- Reset Time ≤ 150ms
- Time Delay vs Temp. & Voltage ±2%
- Input Voltage 12 or 24VDC; 24, 120, or 230VAC
- Tolerance 12VDC & 24VDC -15% - 20%
- 24 to 230VAC -20% - 10%
- AC Line Frequency 50/60 Hz
- Power Consumption AC ≤ 4VA; DC ≤ 2W
- Output Type Electromechanical relay
- Form Non-isolated, SPDT
- Ratings SPDT-NO SPDT-NC
- General Purpose 125/240VAC 30A 15A
- Resistive 125/240VAC 30A 15A
- 28VDC 20A 10A
- Motor Load 125VAC 1 hp* 1/4 hp**
- 240VAC 2 hp** 1 hp**
- Life Mechanical - 1 x 10⁶;
  Electrical - 1 x 10⁶; *3 x 10⁴; **6,000
- Protection Surge IEEE C62.41-1991 Level A
- Circuitry Encapsulated
- Dielectric Breakdown ≥ 2000V RMS terminals to mounting surface
- Insulation Resistance ≥ 100 MO
- Polarity DC units are reverse polarity protected
- Mechanical Mounting Surface mount with one #10 (M5 x 0.8) screw
- Dimensions 3 x 2 x 1.5 in. (76.7 x 51.3 x 38.1mm)
- Termination 0.25 in. (6.35 mm) male quick connect terminals
- Environmental Operating/Storage Temperature -40° to 60°C / -40° to 85°C
- Humidity 95% relative, non-condensing
- Weight 3.9 oz (111 g)
KRDM SERIES

Description
The KRDM Series is a compact time delay relay measuring only 2 in. (50.8 mm) square. Its solid-state timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The KRDM Series is a cost effective approach for OEM applications that require small size, isolation, reliability, and long life.

Operation (Delay-on-Make)
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output relay energizes and remains energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
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</tr>
<tr>
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<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

**P1004-95, P1004-95-X Versa-Pot**
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

**P1023-6 Mounting bracket**
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

**P0700-7 Versa-Knob**
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRDM110S</td>
<td>12VDC</td>
<td>Fixed</td>
<td>10s</td>
</tr>
<tr>
<td>KRDM130S</td>
<td>12VDC</td>
<td>Fixed</td>
<td>30s</td>
</tr>
<tr>
<td>KRDM120</td>
<td>12VDC</td>
<td>Onboard knob</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KRDM121</td>
<td>12VDC</td>
<td>Onboard knob</td>
<td>1 - 100s</td>
</tr>
<tr>
<td>KRDM2110M</td>
<td>24VAC/DC</td>
<td>Fixed</td>
<td>10m</td>
</tr>
<tr>
<td>KRDM215M</td>
<td>24VAC/DC</td>
<td>Fixed</td>
<td>5m</td>
</tr>
<tr>
<td>KRDM220</td>
<td>24VAC/DC</td>
<td>Onboard knob</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KRDM221</td>
<td>24VAC/DC</td>
<td>Onboard knob</td>
<td>1 - 100s</td>
</tr>
<tr>
<td>KRDM223</td>
<td>24VAC/DC</td>
<td>Onboard knob</td>
<td>0.1 - 10m</td>
</tr>
<tr>
<td>KRDM310.2S</td>
<td>24VDC</td>
<td>Fixed</td>
<td>0.2s</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
**Accessories**

**P1015-13 (AWG 10/12), P1015-64 (AWG 14/16) Female Quick Connect**
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**P1015-18 Quick Connect to Screw Adapter**
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**Specifications**

**Time Delay**
- **Range**: 0.1s - 100m in 5 adjustable ranges or fixed
- **Repeat Accuracy**: ±0.5% or 20ms, whichever is greater
- **Tolerance**: ≤ ±5%
- **Factory Calibration**: ≤ ±5%
- **Recycle Time**: ≤ 150ms
- **Time Delay vs Temp. & Voltage**: ≤ ±5%

**Input**
- **Voltage**
  - 12, 24 or 110VDC; 24, 120 or 230VAC
  - -15% to 20%
  - -20% to 10%
- **AC Line Frequency/DC Ripple**
  - 50/60 Hz / ≤ 10%
  - AC ≤ 2VA; DC ≤ 2W

**Output**
- **Type**: Isolated relay contacts
- **Form**: SPDT
- **Rating (at 40°C)**
  - 10A resistive @ 125VAC;
  - 5A resistive @ 230VAC & 28VDC;
  - 1/4 hp @ 125VAC
  - 250VAC

**Max. Switching Voltage**
- Mechanical - 1 x 10⁷; Electrical - 1 x 10⁵

**Protection**
- **Circuitry**: Encapsulated
- **Isolation Voltage**: ≥ 1500V RMS input to output
- **Insulation Resistance**: ≥ 100 MΩ
- **Polarity**: DC units are reverse polarity protected
- **Mechanical**
  - **Mounting**: Surface mount with one #10 (M5 x 0.8) screw
  - **Dimensions**
    - H 50.8 mm (2.0”);
    - W 50.8 mm (2.0”);
    - D 30.7 mm (1.21”)
  - **Termination**
    - 0.25 in. (6.35 mm) male quick connect terminals

**Environmental**
- **Operating/Storage Temperature**
  - -20° to 60°C / -40° to 85°C
- **Humidity**: 95% relative, non-condensing
- **Weight**: 2.6 oz (74 g)

**External Resistance vs. Time Delay**

In Secs. or Mins.

<table>
<thead>
<tr>
<th>Time Delay Ranges</th>
<th>External Timing Resistor in KOhms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>20 k</td>
</tr>
<tr>
<td>100</td>
<td>10 k</td>
</tr>
<tr>
<td>10</td>
<td>2.5 k</td>
</tr>
<tr>
<td>1</td>
<td>1 k</td>
</tr>
<tr>
<td>0.1</td>
<td>0.1 k</td>
</tr>
</tbody>
</table>

This chart applies to externally adjustable part numbers.
The time delay is adjustable over the time delay range selected by varying the resistance across the R1 terminals, as the time delay increases with the time delay increases.
When selecting an external R1, add the tolerances of the timer and the R1 for the full time range adjustment.
Examples: 1 to 50 s adjustable time delay, select time delay range 1 and a 50 K ohm R1. For 1 to 100 s use a 100 K ohm R1.

**Output Current/Ambient Temperature**

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40°C</td>
<td>10</td>
</tr>
<tr>
<td>50°C</td>
<td>9</td>
</tr>
<tr>
<td>60°C</td>
<td>8</td>
</tr>
<tr>
<td>70°C</td>
<td>7</td>
</tr>
</tbody>
</table>

**Function Diagram**

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset
= Undefined Time
KRPS SERIES

Description
The KRPS Series is a factory programmed time delay relay available with 1 of 15 functions and measures only 2 inches square. The KRPS offers a wide range of fixed, onboard, or externally adjustable time delays. The output relay contacts offer a full 10A rating with complete isolation. Its microcontroller timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The KRPS Series is a cost effective approach for OEM applications that require small size, isolation, accuracy, and long life. Special time ranges and functions are available.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/ - 0.5%</td>
</tr>
<tr>
<td>Compact design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>Isolated, SPDT, 10A output</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16)**
  Female Quick Connect
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUST.</th>
<th>TIME DELAY</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRPS4160MM</td>
<td>120VAC</td>
<td>Fixed</td>
<td>60m</td>
<td>Delay-on-Make</td>
</tr>
<tr>
<td>KRPS913MB</td>
<td>230VAC</td>
<td>Fixed</td>
<td>3m</td>
<td>Delay-on-Break</td>
</tr>
<tr>
<td>KRPSA10.1SFT</td>
<td>24 - 240VAC/DC</td>
<td>Fixed</td>
<td>0.1s</td>
<td>Alternating</td>
</tr>
<tr>
<td>KRPSA21RE</td>
<td>24 - 240VAC/DC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>Recycling, On Time First</td>
</tr>
<tr>
<td>KRPSA22B</td>
<td>24 - 240VAC/DC</td>
<td>Onboard</td>
<td>1 - 100s</td>
<td>Delay-on-Break</td>
</tr>
<tr>
<td>KRPSA24M</td>
<td>24 - 240VAC/DC</td>
<td>Onboard</td>
<td>0.1 - 10m</td>
<td>Delay-on-Make</td>
</tr>
<tr>
<td>KRPSD10.1SF</td>
<td>12 to 48VDC</td>
<td>Fixed</td>
<td>0.1s</td>
<td>Leading Edge Flip-Flop</td>
</tr>
<tr>
<td>KRPSD21B</td>
<td>12 to 48VDC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>Delay-on-Break</td>
</tr>
<tr>
<td>KRPSD21M</td>
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<td>0.1 - 10s</td>
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<td>KRPSD22M</td>
<td>12 to 48VDC</td>
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<td>1 - 100s</td>
<td>Delay-on-Make</td>
</tr>
<tr>
<td>KRPSD22S</td>
<td>12 to 48VDC</td>
<td>Onboard</td>
<td>1 - 100s</td>
<td>Single Shot</td>
</tr>
<tr>
<td>KRPSD25S</td>
<td>12 to 48VDC</td>
<td>Onboard</td>
<td>1 - 100m</td>
<td>Single Shot</td>
</tr>
</tbody>
</table>

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For more information, see Appendix, page 512, Figure 16.
**Specifications**

**Time Delay**
- Type: Microcontroller circuitry
- Range: 0.1s - 1000h in 9 adjustable ranges or fixed
- Repeat Accuracy: ±0.5% or 20ms, whichever is greater
- Tolerance (Factory Calibration): ≤ ±2%
- Reset Time: ≤ 150ms
- Initiate Time: ≤ 40ms; ≤ 750 operations per minute
- Time Delay vs Temp. & Voltage: ≤ ±2%
- Input Voltage: 12 to 48VDC; 24 to 240VAC/DC
- Tolerance: 12 to 48VDC -15% - 20%
- 24 to 240VAC/DC -20% - 10%
- AC Line Frequency/DC Ripple: 50/60Hz / ≤ 10%
- Power Consumption: AC ≤ 2VA; DC ≤ 2W
- Output Type: Isolated relay contacts
- Form: SPDT
- Rating (at 40°C): 10A resistive @ 125VAC
- 5A resistive @ 230VAC & 28VDC
- 1/4 hp @ 125VAC
- Max. Switching Voltage: 250VAC
- Life (Operations): Mechanical - 1 x 10^7; Electrical - 1 x 10^5

**Protection**
- Circuitry: Encapsulated
- Isolation Voltage: ≥ 1500V RMS input to output
- Insulation Resistance: ≥ 100 MΩ
- Polarity: DC units are reverse polarity protected

**Environmental**
- Mounting: Surface mt. with one #10 (M5 x 0.8) screw
- Dimensions: H 50.8 mm (2.0”); W 50.8 mm (2.0”); D 30.7 mm (1.21”)
- Termination: 0.25 in. (6.35 mm) male quick connects
- Operating/Storage Temperature: -40° to 60°C / -40° to 85°C
- Humidity: 95% relative, non-condensing
- Weight: ≅ 2.6 oz (74 g)

**Output Current/Ambient Temperature**

**Timer Functions**

**Operation (Delay-on-Make)**
Upon application of the input voltage, the dime delay begins. The output relay is de-energized before and during the time delay. At the end of the time delay, the put energizes and remains energized until input voltage is removed.

**Reset:** Removing input voltage resets the time delay and output.

**Operation (Delay-on-Break)**
Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output relay energizes. The time delay begins when the initiate switch is opened. The output remains energized during timing. At the end of the time delay, the output de-energizes. The output will energize if the initiate switch is closed when input voltage is applied.

**Reset:** Re-closing the initiate switch during timing resets the time delay. Removing input voltage resets the time delay and output.

**Operation (Recycling)**
Upon application of input voltage, the output relay energizes and the ON time begins. At the end of the ON time, the output de-energizes and the OFF time begins. At the end of the OFF time, the output energizes and the cycle repeats as long as input voltage is applied.

**Reset:** Removing input voltage resets the output and time delays, and returns the sequence to the first delay.
Operation (Alternating)
Input voltage must be applied at all times for proper operation. The operation begins with the output relay de-energized. Closing S1 enables the next alternating operation. When S1 opens (trailing edge triggered), the time delay begins. At the end of the time delay, the output energizes and remains energized until S1 is (re-closed and) re-opened. Then the output relay de-energizes and remains until S1 opens again. Each time S1 opens the time delay occurs and the output transfers.

Reset: Removing input voltage resets the output and the time delay.

Operation (Single Shot)
Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch, the output (relay or solid state) energizes and the time delay begins. At the end of the delay, the output de-energizes. Opening or re-closing the initiate switch during timing has no effect on the time delay. Note (for most single shot timers): If the initiate switch is closed when input voltage is applied, the output energizes and the time delay begins.

Reset: Reset occurs when the time delay is complete and the initiate switch is opened. Removing input voltage resets the time delay and output.

Operation (Retriggerable Single Shot, Motion Detector)
Input voltage must be applied prior to and during timing. The output relay is de-energized. When the initiate switch S1 closes momentarily or maintained, the output energizes and the time delay begins. Upon completion of the delay, the output de-energizes.

Reset: Re-closing S1 resets the time delay and restarts timing. Removing input voltage resets the time delay and output.

Operation (Trailing Edge Single Shot, Impulse-OFF)
Input voltage must be applied before and during timing. When the initiate switch S1 opens, the output relay energizes. At the end of the time delay, the output de-energizes. Re-closing and opening S1 during timing has no affect on the time delay. The output will not energize if S1 is open when input voltage is applied.

Reset: Reset occurs when the time delay is complete and S1 is closed. Removing input voltage resets the time delay and output.

**LEGEND**

- **V** = Voltage
- **R** = Reset
- **T1** = ON Time
- **T2** = OFF Time
- **S1** = Initiate Switch
- **NO** = Normally Open Contact
- **NC** = Normally Closed Contact
- **t** = Incomplete Time Delay
- **TD, TD1, TD2** = Time Delay
- **C** = Count
- **P** = Pulse Duration
- **I** = Undefined Time
KSD1 SERIES

Delay-on-Make Timer

Description

The KSD1 Series features two-terminal, series-connection with the load. The KSD1 Series is an ideal choice for delay-on-make timing applications. This series is designed for general purpose commercial and industrial applications where a small, cost effective, reliable solid-state timer is required. The factory calibration for fixed time delays is within 5% of the target time delay. The repeat accuracy, under stable conditions, is 0.5% of the selected time delay. This series is designed for popular AC and DC voltages. Time delays of 0.1 seconds to 1000 minutes are available in 6 ranges. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry.

Operation (Delay-on-Make)

Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5%, +/- 5% time delay accuracy</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A Steady solid-state output, 10A inrush</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AVG 14/16) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSD11120S</td>
<td>12VDC</td>
<td>Fixed</td>
<td>20s</td>
</tr>
<tr>
<td>KSD1123</td>
<td>12VDC</td>
<td>External</td>
<td>0.1 - 10m</td>
</tr>
<tr>
<td>KSD1230</td>
<td>24VAC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KSD1320</td>
<td>24VDC</td>
<td>External</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KSD1412S</td>
<td>120VAC</td>
<td>Fixed</td>
<td>2s</td>
</tr>
<tr>
<td>KSD14130S</td>
<td>120VAC</td>
<td>Fixed</td>
<td>30s</td>
</tr>
<tr>
<td>KSD1420</td>
<td>120VAC</td>
<td>External</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KSD16130S</td>
<td>230VAC</td>
<td>Fixed</td>
<td>30s</td>
</tr>
</tbody>
</table>

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**Accessories**

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

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**External Resistance vs. Time Delay**

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals; as the resistance increases the time delay increases.

When selecting an external RT, add the tolerances of the timer and the RT for the full time range adjustment.

**Examples:**
1 to 50 S adjustable time delay, select time delay range 1 and a 50 k ohm RT. For 1 to 100 S use a 100 k ohm RT.

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**Specifications**

**Time Delay**
- **Range:** 0.1s - 1000m in 6 adjustable ranges or fixed
- **Repeat Accuracy:** ±0.5% or 20ms, whichever is greater
- **Tolerance:** (Factory Calibration) ≤ ±5%
- **Recycle Time:** ≤ 150ms
- **Time Delay vs. Temperature & Voltage:** ≤ ±10%

**Input**
- **Voltage:** 24, 120, or 230VAC, 12 or 24VDC
- **Tolerance:** ±20%
- **AC Line Frequency:** 50/60 Hz

**Output**
- **Type:** Solid state
- **Form:** NO, open during timing
- **Maximum Load Current:** 1A steady state, 10A inrush at 60°C
- **Minimum Holding Current:** ≤ 40mA
- **OFF State Leakage Current:** ≅ 7mA @ 230VAC
- **Voltage Drop:** ≅ 2.5V @ 1A

**Protection**
- **Circuitry:** Encapsulated
- **Dielectric Breakdown:** ≥ 2000V RMS terminals to mounting surface
- **Insulation Resistance:** ≥ 100 MΩ
- **Polarity:** DC units are reverse polarity protected

**Mechanical**
- **Mounting:** Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions:** H 50.8 mm (2"), W 50.8 mm (2"), D 30.7 mm (1.21"
- **Termination:** 0.25 in. (6.35 mm) male quick connect terminals

**Environmental**
- **Operating/Storage Temperature:** -40° to 60°C / -40° to 85°C
- **Humidity:** 95% relative, non-condensing
- **Weight:** ≅ 2.4 oz (68 g)
Description
The KSDU Series are encapsulated solid-state, delay-on-make timers that combine digital timing circuitry with universal voltage operation. The KSDU Series is factory fixed from 0.1s to 10,230s and does not include the DIP switch. These series are excellent choices for process control systems and OEM equipment.

Operation (Delay-on-Make)
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal Voltage</td>
<td>24 to 240VAC/DC in 2 ranges</td>
</tr>
<tr>
<td>Digital Integrated Circuitry</td>
<td>Repeat accuracy + / - 5%</td>
</tr>
<tr>
<td>1A Steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>2 terminal design</td>
<td>Provides series connection for easy installation</td>
</tr>
</tbody>
</table>

Accessories

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P1015-64 (AWG 14/16) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

Ordering Information

<table>
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<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSDU8120</td>
<td>24 to 120VAC/DC</td>
<td>Fixed</td>
<td>20s</td>
</tr>
<tr>
<td>KSDU811200</td>
<td>24 to 120VAC/DC</td>
<td>Fixed</td>
<td>1200s</td>
</tr>
</tbody>
</table>

For dimensional drawing see: Appendix, page 512, Figure 16.
## Specifications

<table>
<thead>
<tr>
<th><strong>Time Delay</strong></th>
<th><strong>Type</strong></th>
<th>Digital integrated circuitry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong></td>
<td><strong>Fixed</strong></td>
<td>Fixed from 0.1s - 10230s</td>
</tr>
<tr>
<td><strong>Repeat Accuracy</strong></td>
<td><strong>(Factory Calibration)</strong></td>
<td>±10%</td>
</tr>
<tr>
<td><strong>Recycle Time</strong></td>
<td></td>
<td>≤150ms</td>
</tr>
<tr>
<td><strong>Time Delay vs Temp. &amp; Voltage</strong></td>
<td></td>
<td>±5%</td>
</tr>
<tr>
<td><strong>Input</strong></td>
<td><strong>Voltage</strong></td>
<td>24 to 120VAC/DC; 100 to 240VAC/DC</td>
</tr>
<tr>
<td><strong>AC Line Frequency</strong></td>
<td><strong>Tolerance</strong></td>
<td>50/60 Hz ±20%</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td><strong>Type</strong></td>
<td>Solid state</td>
</tr>
<tr>
<td><strong>Form</strong></td>
<td><strong>NO, open during timing</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Maximum Load Current</strong></td>
<td></td>
<td>1A steady state, 10A inrush at 60°C</td>
</tr>
<tr>
<td><strong>Minimum Holding Current</strong></td>
<td></td>
<td>40mA</td>
</tr>
<tr>
<td><strong>Voltage Drop</strong></td>
<td></td>
<td>≅ 2.5V @ 1A</td>
</tr>
<tr>
<td><strong>Protection Circuitry</strong></td>
<td>Encapsulated</td>
<td></td>
</tr>
<tr>
<td><strong>Dielectric Breakdown</strong></td>
<td></td>
<td>≥ 2000V RMS terminals to mounting surface</td>
</tr>
<tr>
<td><strong>Insulation Resistance</strong></td>
<td></td>
<td>≥100 MΩ</td>
</tr>
<tr>
<td><strong>Mechanical Mounting</strong></td>
<td></td>
<td>Surface mount with one #10 (M5 x 0.8) screw</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td><strong>H</strong> 50.8 mm (2.0”); <strong>W</strong> 50.8 mm (2.0”); <strong>D</strong> 30.7 mm (1.21”)</td>
<td></td>
</tr>
<tr>
<td><strong>Termination</strong></td>
<td></td>
<td>0.25 in. (6.35 mm) male quick connect terminals</td>
</tr>
<tr>
<td><strong>Environmental Operating/Storage</strong></td>
<td><strong>Temperature</strong></td>
<td>-40° to 60°C / -40° to 85°C</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td></td>
<td>95% relative, non-condensing</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td></td>
<td>≅ 2.4 oz (68 g)</td>
</tr>
</tbody>
</table>

* For CE approved applications, power must be removed from the unit when a switch position is changed.
KSPS SERIES

Description
The KSPS Series is a factory programmed module available in any 1 of 14 standard functions. The KSPS Series offers a single, fixed, externally or onboard adjustable time delay. The 1A steady, 10A inrush rated solid-state output provides 100 million operations typical. Its microcontroller timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The KSPS Series is a cost effective approach for OEM applications that require small size and solid state reliability.

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  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

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<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSPS2180SB</td>
<td>24VAC</td>
<td>Fixed</td>
<td>80s</td>
<td>Delay-on-Break</td>
</tr>
<tr>
<td>KSPSA21FT</td>
<td>24 - 240VAC, positive switching</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>Recycling, On Time First</td>
</tr>
<tr>
<td>KSPSN13MI</td>
<td>12 - 120VDC, negative switching</td>
<td>Fixed</td>
<td>3m</td>
<td>Interval</td>
</tr>
<tr>
<td>KSPSN21B</td>
<td>12 - 120VDC, negative switching</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>Delay-on-Break</td>
</tr>
<tr>
<td>KSPSP145SM</td>
<td>12 - 120VDC, positive switching</td>
<td>Fixed</td>
<td>45s</td>
<td>Delay-on-Make</td>
</tr>
<tr>
<td>KSPSP22B</td>
<td>12 - 120VDC, positive switching</td>
<td>Onboard</td>
<td>1 - 100s</td>
<td>Delay-on-Break</td>
</tr>
<tr>
<td>KSPSP35PSD</td>
<td>12 - 120VDC, positive switching</td>
<td>External</td>
<td>1 - 100m</td>
<td>Retriggerable Single Shot</td>
</tr>
</tbody>
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For dimensional drawing see: Appendix, page 512, Figure 16.
Accessories

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

Specifications

Time Delay
Type: Microcontroller circuitry
Range: 0.1s - 1000h in 9 adjustable ranges or fixed
Repeat Accuracy: ±0.5% or 20ms, whichever is greater
Tolerance (Factory Calibration): ≤ ±2%
Reset Time: ≤ 150ms
Initiate Time: ≤ 20ms; ≤ 1500 operations per minute
Time Delay vs Temp. & Voltage: ≤ ±2%

Input
Voltage: 12 to 120VDC; 24 to 240VAC
Tolerance: ≤ ±15%
AC Line Frequency/DC Ripple: 50/60Hz / ≤ 10%
Power Consumption:
AC ≤ 2VA; DC ≤ 1W

Output
Type: Solid-state output
Rating: 1A steady, 10A inrush for 16ms
Voltage Drop: AC ≈ 2.5V @ 1A, DC ≈ 1V @ 1A
OFF State Leakage Current: AC ≈ 5mA @ 240VAC, DC = 1mA
Protection:
Circuitry: Encapsulated
Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
Insulation Resistance: ≥ 100 MΩ
Polarity: DC units are reverse polarity protected
Mechanical
Mounting: Surface mt. with one #10 (M5 x 0.8) screw
Dimensions:
H 50.8 mm (2.0”); W 50.8 mm (2.0”); D 30.7 mm (1.21”)
Termination:
0.25 in. (6.35 mm) male quick connects
Environmental
Operating/Storage:
Temperature: -40° to 60°C / -40° to 85°C
Humidity: 95% relative, non-condensing
Weight: ≈ 2.4 oz (68 g)

Timer Functions

Operation (Delay-on-Make)
Upon application of the input voltage, the time delay begins. The output relay is de-energized before and during the time delay. At the end of the time delay, the put energizes and remains energized until input voltage is removed.
Reset: Removing input voltage resets the time delay and output.

Operation (Delay-on-Break)
Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output relay energizes. The time delay begins when the initiate switch is opened. The output remains energized during timing. At the end of the time delay, the output de-energizes. The output will energize if the initiate switch is closed when input voltage is applied.
Reset: Re-closing the initiate switch during timing resets the time delay. Removing input voltage resets the time delay and output.

Operation (Recycling)
Upon application of input voltage, the output relay energizes and the ON time begins. At the end of the ON time, the output de-energizes and the OFF time begins. At the end of the OFF time, the output energizes and the cycle repeats as long as input voltage is applied.
Reset: Removing input voltage resets the output and time delays, and returns the sequence to the first delay.
Operation (Alternating)
Input voltage must be applied at all times for proper operation. The operation begins with the output relay de-energized. Closing S1 enables the next alternating operation. When S1 opens (trailing edge triggered), the time delay begins. At the end of the time delay, the output energizes and remains energized until S1 is (re-closed and) re-opened. Then the output relay de-energizes and remains until S1 opens again. Each time S1 opens the time delay occurs and the output transfers.

Reset: Removing input voltage resets the output and the time delay.

Operation (Single Shot)
Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch, the output (relay or solid state) energizes and the time delay begins. At the end of the delay, the output de-energizes. Opening or re-closing the initiate switch during timing has no effect on the time delay. Note (for most single shot timers): If the initiate switch is closed when input voltage is applied, the output energizes and the time delay begins.

Reset: Reset occurs when the time delay is complete and the initiate switch is opened. Removing input voltage resets the time delay and output.

Operation (Trailing Edge Single Shot, Impulse-OFF)
Input voltage must be applied before and during timing. When the initiate switch S1 opens, the output relay energizes. At the end of the time delay, the output de-energizes. Re-closing and opening S1 during timing has no affect on the time delay. The output will not energize if S1 is open when input voltage is applied.

Reset: Reset occurs when the time delay is complete and S1 is closed. Removing input voltage resets the time delay and output.

Operation (Inverted Single Shot)
Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch S1, the output relay de-energizes. At the end of the time delay, the output energizes. Opening or re-closing S1 during timing has no affect on the time delay. The output will remain de-energized if S1 is closed when input voltage is applied.

Reset: Reset occurs when the time delay is complete and S1 is open. Removing input voltage resets the time delay and output.

Operation (Interval)
Upon application of input voltage, the time delay begins. The output (relay or solid state) energizes during the time delay. At the end of time delay the output de-energizes and remains de-energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

**LEGEND**

- **V** = Voltage
- **R** = Reset
- **T1** = ON Time
- **T2** = OFF Time
- **S1** = Initiate Switch
- **NO** = Normally Open Contact
- **NC** = Normally Closed Contact
- **t** = Incomplete Time Delay
- **TD, TD1, TD2** = Time Delay
- **C** = Count
- **P** = Pulse Duration
- **= Undefined Time**

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MSM SERIES

Description

The MSM Series replaces bi-metal type timing with reliable solid-state circuitry. There are no moving parts to arc or wear. It is a cost effective solution for OEM designers. It is available for printed circuit board mounting or surface mounting with a removable bracket and wire leads. The MSM Series offers immediate reset on removal of power.

Operation (Delay-on-Make)

The time delay begins upon application of input voltage. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuitry</td>
<td>Repeat Accuracy +/ - 5%</td>
</tr>
<tr>
<td></td>
<td>Factory calibration +/ - 15%</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>Long life</td>
<td>No moving parts to arc or wear</td>
</tr>
<tr>
<td>PCB or wire harness</td>
<td>Offers design and installation flexibility</td>
</tr>
<tr>
<td>Immediate reset</td>
<td>Occurs on removal of power</td>
</tr>
<tr>
<td>Totally Encapsulated</td>
<td>Protects against shock, vibration and humidity</td>
</tr>
</tbody>
</table>

Wiring Diagram

For dimensional drawing see: Appendix, page 514, Figure 39.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>WIRE TYPE</th>
<th>WIRE LENGTH inches (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSM10.5W6</td>
<td>12VDC</td>
<td>Fixed</td>
<td>0.5s</td>
<td>Standard Lead</td>
<td>6.0 (152.4)</td>
</tr>
<tr>
<td>MSM10.7W6</td>
<td>12VDC</td>
<td>Fixed</td>
<td>0.7s</td>
<td>Standard Lead</td>
<td>6.0 (152.4)</td>
</tr>
<tr>
<td>MSM11W6</td>
<td>12VDC</td>
<td>Fixed</td>
<td>1s</td>
<td>Standard Lead</td>
<td>6.0 (152.4)</td>
</tr>
<tr>
<td>MSM110W6</td>
<td>12VDC</td>
<td>Fixed</td>
<td>10s</td>
<td>Standard Lead</td>
<td>6.0 (152.4)</td>
</tr>
<tr>
<td>MSM130W9</td>
<td>12VDC</td>
<td>Fixed</td>
<td>30s</td>
<td>Standard Lead</td>
<td>9.0 (228.6)</td>
</tr>
<tr>
<td>MSM190W6</td>
<td>12VDC</td>
<td>Fixed</td>
<td>90s</td>
<td>Standard Lead</td>
<td>6.0 (152.4)</td>
</tr>
<tr>
<td>MSM20.15W9</td>
<td>24VAC</td>
<td>Fixed</td>
<td>0.15s</td>
<td>Standard Lead</td>
<td>9.0 (228.6)</td>
</tr>
<tr>
<td>MSM210P3</td>
<td>24VAC</td>
<td>Fixed</td>
<td>10s</td>
<td>PC Mount</td>
<td>0.5 (12.7)</td>
</tr>
<tr>
<td>MSM25W9</td>
<td>24VAC</td>
<td>Fixed</td>
<td>5s</td>
<td>Standard Lead</td>
<td>9.0 (228.6)</td>
</tr>
<tr>
<td>MSM30.7W6</td>
<td>24VDC</td>
<td>Fixed</td>
<td>0.7s</td>
<td>Standard Lead</td>
<td>6.0 (152.4)</td>
</tr>
<tr>
<td>MSM42W6</td>
<td>120VAC</td>
<td>Fixed</td>
<td>2s</td>
<td>Standard Lead</td>
<td>6.0 (152.4)</td>
</tr>
<tr>
<td>MSM43W6</td>
<td>120VAC</td>
<td>Fixed</td>
<td>3s</td>
<td>Standard Lead</td>
<td>6.0 (152.4)</td>
</tr>
<tr>
<td>MSM420W6</td>
<td>120VAC</td>
<td>Fixed</td>
<td>20s</td>
<td>Standard Lead</td>
<td>6.0 (152.4)</td>
</tr>
<tr>
<td>MSM450W6</td>
<td>120VAC</td>
<td>Fixed</td>
<td>50s</td>
<td>Standard Lead</td>
<td>6.0 (152.4)</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
## Specifications

### Time Delay

<table>
<thead>
<tr>
<th>Type</th>
<th>Analog Circuitry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>0.05 - 180s fixed</td>
</tr>
<tr>
<td>Repeat Accuracy</td>
<td>±5%</td>
</tr>
<tr>
<td>Tolerance</td>
<td>±15%</td>
</tr>
<tr>
<td>(Factory Calibration)</td>
<td>≤ 75ms</td>
</tr>
<tr>
<td>Recycle Time</td>
<td>±15%</td>
</tr>
</tbody>
</table>

### Input

- **Voltage**: 12 or 24VDC; 24, 120, or 230VAC
- **Tolerance**: ±10%
- **AC Line Frequency**: 50/60 Hz

### Output

- **Type**: Solid State
- **Form**: NO, open during timing
- **Maximum Load Current**: 0.5A steady state 25°C; 0.25A steady state 60°C
- **Minimum Holding Current**: 40mA
- **Voltage Drop**: ≅ 2.5V @ 0.5A

### Protection

- Circuitry: Encapsulated
- Dielectric Breakdown: ≥ 2000V RMS input to mounting surface
- Insulation Resistance: ≥ 100 MΩ
- Polarity: DC units are reverse polarity protected

### Mechanical

- **Mounting**:
  - A.) PC mount 14 AWG (2.087 mm²) wires
    (Can be inserted in AMP Miniature Spring Socket #645980-1)
  - B.) Stranded 18 AWG wire leads (0.933 mm²) with mounting bracket

### Environmental

- **Operation/Storage**
  - **Temperature**: -20° to 60°C / -30° to 85°C
  - **Humidity**: 95% relative, non-condensing
- **Weight**:
  - P: ≅ 1.1 oz (31.2 g)
  - W: ≅ 1.2 oz (34 g)

---

### Function Diagram

**V = Voltage**
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD = Time Delay
- R = Reset

**Time**
- = Undefined

**Function Diagram**: DELAY-ON-MAKE (ON-DELAY)
ORM SERIES

Description
The ORM Series features open PC board construction for reduced cost. It has isolated, 10A, DPDT relay contacts and all connections are 0.25 in (6.35 mm) male quick connect terminals. The time delay may be ordered as factory fixed, onboard knob, or external adjustment. Time delays from 0.05 - 300 seconds.

Operation (Delay-on-Make)
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuitry with electromechanical relay</td>
<td>Repeat Accuracy +/- 2%</td>
</tr>
<tr>
<td>Isolated 10A, DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Open PCB construction</td>
<td>Reduces cost for OEM applications</td>
</tr>
</tbody>
</table>

Accessories

- **P1004-12, P1004-12-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16)**
  **Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Wiring Diagram

V = Voltage

Rₜ is used when external adjustment is ordered. Relay contacts are isolated.

For dimensional drawing see: Appendix, page 512, Figure 26.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORM120A17</td>
<td>120VAC</td>
<td>Fixed</td>
<td>7s</td>
</tr>
<tr>
<td>ORM120A25</td>
<td>120VAC</td>
<td>Onboard knob</td>
<td>3 - 300s</td>
</tr>
<tr>
<td>ORM230A17</td>
<td>230VAC</td>
<td>Fixed</td>
<td>7s</td>
</tr>
<tr>
<td>ORM24D13.5</td>
<td>24VDC/28VDC</td>
<td>Fixed</td>
<td>3.5s</td>
</tr>
<tr>
<td>ORM24D22</td>
<td>24VDC</td>
<td>Onboard knob</td>
<td>0.5 - 30s</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
Specifications

Time Delay
Type
Dedicated — Delay-on-Make
Analog circuitry
Range
0.05 - 300s in adjustable ranges or fixed
Repeat Accuracy
±2% or 20ms, whichever is greater
Tolerance
Adjustable: guaranteed range
Fixed: ±10%
Recycle Time
After timing - ≤ 16ms;
During timing - 0.1% of max. time delay or
75ms, whichever is greater
Time Delay vs Temp. & Voltage
≤ ±10%
Input
Voltage
24 or 110VDC; 24, 120, or 230VAC
Tolerance
24VDC/AC
-15% - 20%
110 to 230VAC/DC
-20% - 10%
AC Line Frequency
50/60 Hz
Power Consumption
2.25W
Output
Type
Electromechanical relay
Form
DPDT, Isolated
Rating
10A resistive @ 120/240VAC & 28VDC;
1/3 hp @ 120/240VAC
Mechanical - 1x10^7; Electrical - 1x10^6
Life
Mechanical - 1x10^7; Electrical - 1x10^6
Protection
Polarity
DC units are reverse polarity protected
Isolation Voltage
≥1500V RMS input to output
Mounting
Surface mount with four #6 (M3.5 x 0.6) screws
Dimensions
H 53.8 mm (2.12”); W 93.7 mm (3.69”);
D 47.8 mm (1.88”)
Termination
0.25 in. (6.35 mm) male quick connect terminals
Environmental
Operating/Storage
-20° to 65°C / -30° to 85°C
Weight
≈ 2.7 oz (77 g)

Selection Guide

<table>
<thead>
<tr>
<th>Desired Time Delay* (Seconds)</th>
<th>( R_T ) (Megaohm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.05</td>
</tr>
<tr>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td>4</td>
<td>0.8</td>
</tr>
<tr>
<td>5</td>
<td>1.2</td>
</tr>
<tr>
<td>6</td>
<td>2.0</td>
</tr>
<tr>
<td>7</td>
<td>2.5</td>
</tr>
<tr>
<td>8</td>
<td>3.0</td>
</tr>
</tbody>
</table>

* When selecting an external \( R_T \) add at least 20% for tolerance of unit and the \( R_T \)

Function Diagram

- \( V \) = Voltage
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD = Time Delay
- \( R \) = Reset
- = Undefined Time

[Function Diagram Image]
Description
The PRLM Series is designed for use in non-critical timing applications. It offers low cost, knob adjustable timing control, full 10A relay output, and onboard LED indication. The knob adjustment provides a guaranteed time range of up to 10 minutes in 6 ranges. The onboard LED indicates whether or not the unit is timing (flashing LED) as well as the status of the output.

Operation (Delay-on-Make)
The time delay is initiated when input voltage is applied. LED flashes during timing. At the end of the delay period, the output contacts energize. LED is on steady after the unit times out.

Reset: Reset is accomplished by removal of input voltage. There is no false output when reset during timing.

Features & Benefits
<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic circuitry with electromechanical relay</td>
<td>Repeat Accuracy + / - 2%</td>
</tr>
<tr>
<td>Knob adjustable time delay</td>
<td>Guaranteed time range of up to 10 mins in 6 ranges</td>
</tr>
<tr>
<td>Isolated 10A, DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>LED indication</td>
<td>Provides relay status both during and after timing</td>
</tr>
<tr>
<td>Industry standard octal plug connection</td>
<td>Eliminates need for special connectors</td>
</tr>
</tbody>
</table>

Accessories
- **BZ1 Front Panel Mount Kit**
  Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

- **NDS-8 Octal 8-pin Socket**
  8-pin 35mm DIN rail or surface mount. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

- **PSC8 Hold-down Clips**

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRLM41180</td>
<td>120VAC</td>
<td>Fixed</td>
<td>180s</td>
</tr>
<tr>
<td>PRLM423</td>
<td>120VAC</td>
<td>Adjustable</td>
<td>1 - 60s</td>
</tr>
</tbody>
</table>

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Wiring Diagram
8-pin octal DPDT

For dimensional drawing see: Appendix B, page 512, Figure 24
Specifications

Time Delay

Type
Analog circuitry

Range
0.05 - 600s in 6 adjustable ranges or fixed

Repeat Accuracy
±2% or 20ms, whichever is greater

Tolerance
Knob adjust: guaranteed range

Reset Time
≤ 50ms

Recycle Time
After timing: ≤ 20ms
During timing: 0.1% of max. time delay or 75ms, whichever is greater

Time Delay vs Temp. & Voltage
≤ ±10%

Input
Voltage
12, 24, or 110VDC; 24, 120, or 230VAC

Tolerance
12VDC & 24VDC/AC
-15% - 20%
110 to 240VAC/DC
-20% - 10%

AC Line Frequency
50/60 Hz

Power Consumption
≤ 2.25W

Output
Type
Electromechanical relay

Form
Isolated, DPDT

Rating
10A resistive @ 28VDC;
10A resistive @ 240VAC;
1/3 hp @ 120/240VAC

Mechanical
Mounting
Plug-in socket

Dimensions
H 91.6 mm (3.62”); W 60.7 mm (2.39”);
D 45.2 mm (1.78”)

Termination
Octal 8-pin plug-in

Environmental

Operating/Storage
Temperature
-20° to 65°C / -30° to 85°C

Weight
≈ 6 oz (170 g)

Protection
Surge
IEEE C62.41-1991 Level A

Isolation Voltage
≥ 1500V RMS input to output

Insulation Resistance
≥ 100 MΩ

Polarity
DC units are reverse polarity protected

Indication
Type
LED

Operation
During timing - flashing
Output energized - on steady

Function Diagram

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset

= Undefined

Time

12

TIME DELAY RELAYS
**Time Delay Relays**  
**Dedicated — Delay-on-Make**

---

**TDM / TDMH / TDML SERIES**

**Delay-on-Make Timer**

---

**Description**

The TDM/TDMH/TDML Series is a delay-on-make timer that combines accurate digital circuitry with isolated, DPDT relay contacts in an industry standard 8-pin plug-in package. DIP switch adjustment allows precise selection of the time delay over the full time delay range. The TDM/TDMH/TDML Series is the product of choice for custom control panel and OEM designers.

**Operation (Delay-on-Make)**

Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output relay energizes and remains energized until input voltage is removed.

**Reset:** Removing input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide delay range</td>
<td>User selectable via DIP switches for fine tuning to individual applications.</td>
</tr>
<tr>
<td>(0.1s to 2.8h)</td>
<td></td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.1%</td>
</tr>
<tr>
<td>DIP switch adjustment</td>
<td>Provides first time setting accuracy of +/-2%</td>
</tr>
<tr>
<td>Setting accuracy +/-2%</td>
<td>Provides flexibility for use in most applications</td>
</tr>
<tr>
<td>LED indication</td>
<td>Provides visual indication of time delay status</td>
</tr>
<tr>
<td>Isolated 10A, DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
</tbody>
</table>

**Accessories**

- **BZ1 Front Panel Mount Kit**
  Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

- **NDS-8 Octal 8-pin Socket**
  8-pin 35mm DIN rail or surface mount. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

- **PSC8 or PSC11 Hold-down Clips**
  Securely mounts plug-in controls in any position. Provides protection against vibration. Use PSC8 with NDS-8 Octal Socket or PSC11 with NDS-11 Socket. Sold in sets of two.

- **P1011-6 Octal Socket for UL listing**
  8-pin surface mount socket with binder head screw terminals. Rated 10A @ 600VAC.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

---

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>DELAY RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDM120AL</td>
<td>120VAC</td>
<td>1 - 1023s in 1s increments</td>
</tr>
<tr>
<td>TDM12DL</td>
<td>12VDC</td>
<td>1 - 1023s in 1s increments</td>
</tr>
<tr>
<td>TDM230AL</td>
<td>230VAC</td>
<td>1 - 1023s in 1s increments</td>
</tr>
<tr>
<td>TDM24AL</td>
<td>24VAC</td>
<td>1 - 1023s in 1s increments</td>
</tr>
<tr>
<td>TDM24DL</td>
<td>24VDC/28VDC</td>
<td>1 - 1023s in 1s increments</td>
</tr>
<tr>
<td>TDMH120AL</td>
<td>120VAC</td>
<td>10 - 10230s in 10s increments</td>
</tr>
<tr>
<td>TDMH24AL</td>
<td>24VAC</td>
<td>10 - 10230s in 10s increments</td>
</tr>
<tr>
<td>TDML110DL</td>
<td>110VDC</td>
<td>0.1 - 102.3s in 0.1s increments</td>
</tr>
<tr>
<td>TDML120AL</td>
<td>120VAC</td>
<td>0.1 - 102.3s in 0.1s increments</td>
</tr>
<tr>
<td>TDML12DL</td>
<td>12VDC</td>
<td>0.1 - 102.3s in 0.1s increments</td>
</tr>
<tr>
<td>TDML24DL</td>
<td>24VDC/28VDC</td>
<td>0.1 - 102.3s in 0.1s increments</td>
</tr>
</tbody>
</table>

---

*If you don't find the part you need, call us for a custom product 800-843-8848*

---

*8-pin models UL listed when used in combination with P1011-6 socket only.*
Specifications

Time Delay
- Type: Digital integrated circuitry
- Range:
  - 0.1 - 102.3s in 0.1s increments
  - 1 - 1023s in 1s increments
  - 10 - 10230s in 10s increments

Repeat Accuracy: ±0.1% or 20ms, whichever is greater
Setting Accuracy: ±2% or 50ms, whichever is greater
Reset Time: ≤ 50ms
Recycle Time:
  - During Timing - TDMH: ≤ 500ms
  - TDM, TDML: ≤ 300ms

Time Delay vs. Temperature & Voltage: ±2%
Indicator: LED glows during timing; relay is de-energized

Input
- Voltage: 12, 24, or 110 VDC; 24, 120, or 230VAC
- Tolerance:
  - 12VDC & 24VDC/AC: -15% - 20%
  - 110VAC/DC to 230VAC: -20% - 10%
- AC Line Frequency: 50/60 Hz
- Power Consumption: ≤ 2.25W

Output
- Type: Electromechanical relay
- Form: DPDT
- Rating:
  - 10A resistive @ 120/240VAC & 28VDC;
  - 1/3 hp @ 120/240VAC
  - Mechanical - 1 x 10^7; Electrical - 1 x 10^6

Protection
- Polarity: DC units are reverse polarity protected
- Isolation Voltage: ≥ 1500V RMS input to output

Mechanical
- Mounting: Plug-in socket
- Dimensions:
  - H 81.3 mm (3.2”);
  - W 60.7 mm (2.39”);
  - D 45.2 mm (1.78”)
- Termination: Octal 8-pin plug-in

Environmental
- Operating/Storage Temperature: -20° to 65°C / -30° to 85°C
- Weight: ≅ 6 oz (170 g)

*For CE approved applications, power must be removed from the unit when a switch position is changed.
Description
The TDU Series are encapsulated solid-state, delay-on-make timers that combine digital timing circuitry with universal voltage operation. The TDU offers DIP switch adjustment allowing accurate selection of the time delay over the full time delay range. This series is an excellent choice for process control systems and OEM equipment.

Operation (Delay-on-Make)
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal input voltage</td>
<td>Meets wide application needs</td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5% or 20ms, whichever is greater</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time, and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>3 time ranges available (0.1s to 2.8h)</td>
<td>Makes it versatile for use in many applications</td>
</tr>
<tr>
<td>DIP switch adjustment</td>
<td>Provides first time setting accuracy</td>
</tr>
</tbody>
</table>

Accessories

P1023-6 Mounting bracket
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

P1015-64 (AWG 14/16) Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>TIME RANGE (SEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDL3000A</td>
<td>24 to 120VAC/DC</td>
<td>0.1-102.3</td>
</tr>
<tr>
<td>TDL3001A</td>
<td>100 to 240VAC/DC</td>
<td>0.1-102.3</td>
</tr>
<tr>
<td>TDU3000A</td>
<td>24 to 120VAC/DC</td>
<td>1-1023</td>
</tr>
<tr>
<td>TDU3001A</td>
<td>100 to 240VAC/DC</td>
<td>1-1023</td>
</tr>
<tr>
<td>TDU3003A</td>
<td>120 to 277VAC/DC</td>
<td>1-1023</td>
</tr>
<tr>
<td>TDUH3000A</td>
<td>24 to 120VAC/DC</td>
<td>10-10230</td>
</tr>
<tr>
<td>TDUH3001A</td>
<td>100 to 240VAC/DC</td>
<td>10-10230</td>
</tr>
</tbody>
</table>

If you don't find the part you need, call us for a custom product 800-843-8848

For dimensional drawing see: Appendix, page 512, Figure 16.
## Specifications

<table>
<thead>
<tr>
<th>Time Delay</th>
<th>Digital integrated circuitry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>0.1 - 102.3s in 0.1s increments</td>
</tr>
<tr>
<td>Range*</td>
<td>1 - 1,023s in 1s increments</td>
</tr>
<tr>
<td></td>
<td>10 - 10,230s in 10s increments</td>
</tr>
<tr>
<td>Repeat Accuracy</td>
<td>±0.5% or 20ms, whichever is greater</td>
</tr>
<tr>
<td>Tolerance</td>
<td>(Factory Calibration)</td>
</tr>
<tr>
<td></td>
<td>±10%</td>
</tr>
<tr>
<td>Recycle Time</td>
<td>≤ 150ms</td>
</tr>
<tr>
<td>Time Delay vs Temp. &amp; Voltage</td>
<td>±5%</td>
</tr>
</tbody>
</table>

### Input

<table>
<thead>
<tr>
<th>Voltage</th>
<th>24 to 120VAC/DC, 100 to 240VAC/DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Line Frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Tolerance</td>
<td>±20%</td>
</tr>
</tbody>
</table>

### Output

<table>
<thead>
<tr>
<th>Type</th>
<th>Solid state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>NO, open during timing</td>
</tr>
<tr>
<td>Maximum Load Current</td>
<td>1A steady state, 10A inrush at 60°C</td>
</tr>
<tr>
<td>Minimum Holding Current</td>
<td>40mA</td>
</tr>
<tr>
<td>Voltage Drop</td>
<td>≅ 2.5V @ 1A</td>
</tr>
</tbody>
</table>

### Protection

<table>
<thead>
<tr>
<th>Circuitry</th>
<th>Encapsulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric Breakdown</td>
<td>≥ 2000V RMS terminals to mounting surface</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>≥ 100 MΩ</td>
</tr>
</tbody>
</table>

### Mechanical

<table>
<thead>
<tr>
<th>Mounting</th>
<th>Surface mount with one #10 (M5 x 0.8) screw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>H 50.8 mm (2”); W 50.8 mm (2”); D 30.7 mm (1.21”)</td>
</tr>
<tr>
<td>Termination</td>
<td>0.25 in. (6.35 mm) male quick connect terminals</td>
</tr>
</tbody>
</table>

### Environmental

<table>
<thead>
<tr>
<th>Operating/Storage Temperature</th>
<th>-40° to 60°C / -40° to 85°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidity</td>
<td>95% relative, non-condensing</td>
</tr>
<tr>
<td>Weight</td>
<td>≅ 2.4 oz (68 g)</td>
</tr>
</tbody>
</table>

---

### Binary Switch Operation

*For CE approved applications, power must be removed from the unit when a switch position is changed.

### Function Diagram

- `V` = Voltage
- `NO` = Normally Open Contact
- `NC` = Normally Closed Contact
- `TD` = Time Delay
- `R` = Reset
- `= Undefined Time`
Description
The TH1 Series is a solid-state relay and timer combined into one compact, easy-to-use control. This highly reliable device eliminates the need for a separate solid-state relay. When mounted to a metal surface, it can switch load currents up to 20A steady state, and 200A inrush.

Operation (Delay-on-Make)
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / - 2%, Factory calibration + / - 5%</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications and reduces labor and component costs</td>
</tr>
<tr>
<td>High load currents up to 20A, 200A inrush</td>
<td>Allows direct operation of motors, lamps, and heaters directly without a contactor</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Metalized mounting surface</td>
<td>Facilitates heat transfer for high current applications</td>
</tr>
</tbody>
</table>

Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16)**
  **Female Quick Connect**
  These 0.25 in (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>OUTPUT RATING</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH1B633</td>
<td>10A</td>
<td>230VAC</td>
<td>Onboard</td>
<td>2 - 180s</td>
</tr>
<tr>
<td>TH1C415</td>
<td>20A</td>
<td>120VAC</td>
<td>Fixed</td>
<td>5s</td>
</tr>
<tr>
<td>TH1C621</td>
<td>20A</td>
<td>230VAC</td>
<td>External</td>
<td>0.1 - 3s</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
Specifications

Time Delay
- Range: 0.1 - 600s in 4 adjustable ranges or fixed
- Repeat Accuracy: ±2% or 20ms, whichever is greater
- Tolerance: (Factory Calibration) ≤ ±5%
- Time Delay vs Temp. & Voltage: ≤ ±10%
- Recycle Time: ≤ 150ms
- Voltage: 24, 120, or 230VAC
- Tolerance: ≤ ±15%
- AC Line Frequency: 50/60 Hz
- Power Consumption: ≤ 2VA

Output
- Type: Solid state
- Form: NO, open during timing
- Maximum Load Currents: Output Steady State Inrush**
  - A: 6A 60A
  - B: 10A 100A
  - C: 20A 200A
  - Minimum Load Current: 100mA
  - Voltage Drop: ≅ 2.5V at rated current
  - OFF State Leakage Current: ≅ 5mA @ 230VAC

Protection
- Circuitry: Encapsulated
- Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
- Insulation Resistance: ≥ 100 MΩ

Mechanical
- Mounting**: Surface mount with one #10 (M5 x 0.8) screw
- Dimensions: H 50.8 mm (2.0”); W 50.8 mm (2.0”);
  - D 38.4 mm (1.51”)
- Termination: 0.25 in. (6.35 mm) male quick connect terminals

Environmental
- Operating/Storage Temperature: -20° to 60°C / -40° to 85°C
- Humidity: 95% relative, non-condensing
- Weight: ≅ 3.9 oz (111 g)

**Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.

Selection Guide

<table>
<thead>
<tr>
<th>Desired Time Delay*</th>
<th>RT</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.3</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.9</td>
<td>18</td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.2</td>
<td>24</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.5</td>
<td>30</td>
<td>20</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.8</td>
<td>36</td>
<td>30</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.1</td>
<td>42</td>
<td>40</td>
<td>30</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.4</td>
<td>48</td>
<td>48</td>
<td>40</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.7</td>
<td>54</td>
<td>54</td>
<td>50</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3.0</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset
= Undefined Time

Function Diagram

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset
= Undefined Time
**Description**
The THD1B410.5S combines accurate timing circuitry with high power solid-state switching. It can switch motors, lamps, and heaters directly without a contactor. You can reduce labor, component cost, and increase reliability with these small, easy-to-use, timers.

**Operation (Delay-on-Make)**
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

**Reset:** Removing input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / - 0.5%, Factory calibration + / - 1%</td>
</tr>
<tr>
<td>Compact, low cost design</td>
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</tr>
<tr>
<td>High load currents up to 20A, 200A inrush</td>
<td>Allows direct operation of motors, lamps, and heaters directly without a contactor</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Metalized mounting surface</td>
<td>Facilitates heat transfer for high current applications</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16)**
  **Female Quick Connect**
  These 0.25 in (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

---

**Time Delay Relays**

**THD1B410.5S**

**Description**
The THD1B410.5S combines accurate timing circuitry with high power solid-state switching. It can switch motors, lamps, and heaters directly without a contactor. You can reduce labor, component cost, and increase reliability with these small, easy-to-use, timers.

**Operation (Delay-on-Make)**
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

**Reset:** Removing input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / - 0.5%, Factory calibration + / - 1%</td>
</tr>
<tr>
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</tr>
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</tr>
<tr>
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<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Metalized mounting surface</td>
<td>Facilitates heat transfer for high current applications</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16)**
  **Female Quick Connect**
  These 0.25 in (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

---

**For dimensional drawing see:** Appendix, page 512, Figure 19.
Specifications

Time Delay
Range 0.1s - 1000m in 6 adjustable ranges or fixed
Repeat Accuracy ±0.5% or 20ms, whichever is greater
Tolerance (Factory Calibration) ≤ ±1%
Recycle Time ≤ 150ms
Time Delay vs Temp. & Voltage ≤ ±2%

Input
Voltage 24, 120, or 230VAC
Tolerance ±20%
Line Frequency 50/60 Hz
Power Consumption ≤ 2VA

Output
Type Solid state
Form NO, open during timing
Maximum Load Current
<table>
<thead>
<tr>
<th>Output</th>
<th>Steady State</th>
<th>Inrush**</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6A</td>
<td>60A</td>
</tr>
<tr>
<td>B</td>
<td>10A</td>
<td>100A</td>
</tr>
<tr>
<td>C</td>
<td>20A</td>
<td>200A</td>
</tr>
</tbody>
</table>

Minimum Load Current 100mA
Voltage Drop ≅ 2.5V @ rated current
OFF State Leakage Current ≅ 5mA @ 230VAC

Protection
Encapsulated
Dielectric Breakdown ≥ 2000V RMS terminals to mounting surface
Insulation Resistance ≥ 100 MΩ

Mechanical
Mounting ** Surface mount with one #10 (M5 x 0.8) screw
Dimensions H 50.8 mm (2.0”); W 50.8 mm (2.0”);
D 38.4 mm (1.51”)
Termination 0.25 in. (6.35 mm) male quick connect terminals

Environmental
Operating/Storage Temperature -40° to 60°C / -40° to 85°C
Humidity 95% relative, non-condensing
Weight ≅ 3.9 oz (111 g)

External Resistance vs. Time Delay

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm R_T. For 1 to 100 S use a 100 K-ohm R_T.

Function Diagram
Description
The TMV and TSU Series are universal voltage delay-on-make timers. Two models cover all the popular voltages and time delays. Available with knob or external adjust time delay. Its simple two terminals can easily be connected in series with a relay coil, contactor coil, solenoid, lamps, small motor, etc., to delay their energization, prevent short cycling or to sequence on various loads.

Operation (Delay-on-Make)
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

**FEATURES**

- Universal AC/DC operating voltage
- Totally solid-state and encapsulated
- Two terminal series connection with the load
- 1A steady, 10A inrush solid-state output

**BENEFITS**

- Provides flexibility for use in all systems
- No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
- Provides quick and easy installation for new or existing systems
- Provides 100 million operations in typical conditions

Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16) Female Quick Connect**
  These 0.25 in (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMV8000</td>
<td>24 to 240VAC/DC</td>
<td>Onboard</td>
<td>0.1 - 8m</td>
</tr>
<tr>
<td>TSU2000</td>
<td>24 to 240VAC/DC</td>
<td>External</td>
<td>5 - 480s</td>
</tr>
</tbody>
</table>

For dimensional drawing see: Appendix, page 512, Figure 16.

For dimensional drawing see: Appendix, page 512, Figure 16.

If you don't find the part you need, call us for a custom product 800-843-8848
Accessories

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

Selection Guide

<table>
<thead>
<tr>
<th>Time Delay*</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>0.0</td>
</tr>
<tr>
<td>85</td>
<td>0.5</td>
</tr>
<tr>
<td>163</td>
<td>1.0</td>
</tr>
<tr>
<td>240</td>
<td>1.5</td>
</tr>
<tr>
<td>320</td>
<td>2.0</td>
</tr>
<tr>
<td>400</td>
<td>2.5</td>
</tr>
<tr>
<td>480</td>
<td>3.0</td>
</tr>
</tbody>
</table>

* When selecting an external Ry add at least 20% for tolerance of unit and the RT

Function Diagram

DELAY-ON-MAKE (ON-DELAY)

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset
= Undefined Time

Specifications

<table>
<thead>
<tr>
<th>Time Delay</th>
<th>Type</th>
<th>Range</th>
<th>Repeat Accuracy</th>
<th>Tolerance (Factory Calibration)</th>
<th>Reset Time</th>
<th>Input Voltage</th>
<th>AC Line Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuitry</td>
<td>5 - 480s (TSU2000)</td>
<td>0.1 - 8m (TMV8000)</td>
<td>±2%</td>
<td>≤ ±10%</td>
<td>≤ 100ms</td>
<td>24 to 240VAC/DC ±20%</td>
<td>50/60 Hz</td>
</tr>
</tbody>
</table>

Output

Type: Solid State
Form: NO, open during timing
Maximum Load Current: 1A steady state, 10A inrush at 55°C
Minimum Holding Current: ≤ 40mA
Voltage Drop: ≅ 2.5V @ 1A
Protection: Encapsulated
Circuitry: ≥ 2000V RMS terminals to mounting surface
Dielectric Breakdown: ≥ 100 MΩ
Insulation Resistance: Surface mount with one #10 (M5 x 0.8) screw
Mounting: H 50.8 mm (2”); W 50.8 mm (2”);
Dimensions: D 30.7 mm (1.21”)
0.25 in. (6.35 mm) male quick connect terminals

Environmental

Operating/Storage Temperature: -20° to 70°C / -30° to 85°C
Humidity: 95% relative, non-condensing
Weight: 2.4 oz (68 g)
Time Delay Relays
Dedicated — Delay-on-Make

TRM SERIES

Description
The TRM Series is a combination of analog electronic circuitry and electromechanical relay output. It provides input to output isolation with a wide variety of input voltages and time ranges. Standard plug-in base wiring, fast reset, rugged enclosure, and good repeat accuracy make the TRM a select choice in any OEM application.

Operation (Delay-on-Make)
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output relay energizes and remains energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic circuitry with electromechanical relay</td>
<td>Repeat Accuracy +/- 2%</td>
</tr>
<tr>
<td>Isolated 10A, SPDT or DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages.</td>
</tr>
</tbody>
</table>

Accessories

- **BZ1 Front Panel Mount Kit**
  Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

- **NDS-8 Octal 8-pin Socket**
  8-pin 35mm DIN rail or surface mount. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

- **NDS-11 11-pin Socket**
  11-pin 35mm DIN rail or surface mount. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail. Uses PSC11 hold-down clips.

- **PSC8 or PSC11 Hold-down Clips**
  Securely mounts plug-in controls in any position. Provides protection against vibration. Use PSC8 with NDS-8 Octal Socket or PSC11 with NDS-11 Socket. Sold in sets of two.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>OUTPUT</th>
<th>TIME TOLERANCE</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRM120A2K30</td>
<td>120VAC</td>
<td>Knob</td>
<td>Octal, DPDT</td>
<td>+/- 20%</td>
<td>1 - 30s</td>
</tr>
<tr>
<td>TRM120A2Y120</td>
<td>120VAC</td>
<td>Knob</td>
<td>Octal, DPDT</td>
<td>+/- 10%</td>
<td>2 - 120s</td>
</tr>
<tr>
<td>TRM120A2Y180</td>
<td>120VAC</td>
<td>Knob</td>
<td>Octal, DPDT</td>
<td>+/- 10%</td>
<td>2 - 180s</td>
</tr>
<tr>
<td>TRM24A8Y5</td>
<td>24VAC</td>
<td>External</td>
<td>Octal, SPDT without potentiometer</td>
<td>+/- 10%</td>
<td>0.1 - 5s</td>
</tr>
<tr>
<td>TRM24D1X10</td>
<td>24VDC/28VDC</td>
<td>Fixed</td>
<td>Octal, DPDT</td>
<td>+/- 20%</td>
<td>10s</td>
</tr>
<tr>
<td>TRM24D1X2</td>
<td>24VDC/28VDC</td>
<td>Fixed</td>
<td>Octal, DPDT</td>
<td>+/- 20%</td>
<td>2s</td>
</tr>
</tbody>
</table>

If you don't find the part you need, call us for a custom product 800-843-8848

*8-pin models UL listed when used in combination with P1011-6 socket only.

For dimensional drawing see: Appendix, page 512, Figure 24.
Accessories

P1011-6 Octal Socket for UL listing
8-pin surface mount socket with binder head screw terminals. Rated 10A @ 600VAC.

P1004-13, P1004-13-X Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

Selection Guides

<table>
<thead>
<tr>
<th>Time Delay</th>
<th>R, M Ohm</th>
<th>External R, P/N Selection Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05...1</td>
<td>1.0</td>
<td>1M ohm P1004-16</td>
</tr>
<tr>
<td>0.05...2</td>
<td>2.0</td>
<td>1.5M ohm P1004-15</td>
</tr>
<tr>
<td>0.05...3</td>
<td>3.0</td>
<td>2M ohm P1004-14</td>
</tr>
<tr>
<td>0.1...10</td>
<td>5.0</td>
<td>3M ohm P1004-12</td>
</tr>
<tr>
<td>1...30</td>
<td>15.0</td>
<td>5M ohm P1004-13</td>
</tr>
<tr>
<td>1...60</td>
<td>30.0</td>
<td>1M ohm P1004-16-X</td>
</tr>
<tr>
<td>2...120</td>
<td>2.0</td>
<td>1.5M ohm P1004-15-X</td>
</tr>
<tr>
<td>2...360</td>
<td>30.0</td>
<td>2M ohm P1004-14-X</td>
</tr>
<tr>
<td>7...240</td>
<td>1.5</td>
<td>3M ohm P1004-12-X</td>
</tr>
<tr>
<td>7...360</td>
<td>2.0</td>
<td>5M ohm P1004-13-X</td>
</tr>
<tr>
<td>7...480</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>7...600</td>
<td>5.0</td>
<td></td>
</tr>
</tbody>
</table>

* When selecting an external R, add at least 15%..30% for tolerance of unit and the R.

Specifications

Time Delay
- Type: Analog circuitry
- Range: 50ms - 10m in 15 adjustable ranges or fixed
- Repeat Accuracy: ±2% or 20 ms, whichever is greater
- Fixed Time Tolerance & Setting Accuracy: ≤ ±5, 10, or 20%
- Reset Time: ≤ 50ms
- Recycle Time: After timing: ≤ 20ms; During timing: 0.1% of max. time delay or 75ms, whichever is greater

Time Delay vs Temp. & Voltage
- ≤ ±10%

Input
- Voltage Tolerance: 24VDC/AC -15% - 20%; 110 to 230VAC/DC -20% - 10%
- AC Line Frequency: 50/60 Hz
- Power Consumption: ≤ 2.25W

Output
- Type: Electromechanical relay
- Form: Isolated DPDT or SPDT
- Rating: 10A resistive @ 120/240VAC & 28VDC; 1/3 hp @ 120/240VAC
- Life: Mechanical - 1 x 10^7; Electrical - 1 x 10^6

Protection
- Isolation Voltage: ≥ 1500V RMS between input & output terminals
- Insulation Resistance: ≥ 100 MΩ
- Polarity: DC units are reverse polarity protected

Mechanical
- Mounting: Plug-in socket
- Dimensions: H 91.6 mm (3.62”); W 60.7 mm (2.39”); D 45.2 mm (1.78”)

Termination
- Environmental
- Operating/Storage
- Temperature: -20° to 65°C / -30° to 85°C
- Weight: ≅ 6 oz (170 g)

Function Diagram

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset
= Undefined Time
Description

The TS1 Series offers proven reliability and performance with years of use in OEM equipment and commercial applications. This encapsulated general use timing module is capable of controlling load currents ranging from 5mA to 1A. May be connected in series with contactors, relays, valves, solenoids, small motors, and lamps.

Operation (Delay-on-Make)

Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuitry</td>
<td>Repeat Accuracy +/- 2%</td>
</tr>
<tr>
<td>Fixed or external adjustable time delay</td>
<td>External time delay settings are adjustable from 0.05s - 10m in 8 ranges for added flexibility</td>
</tr>
<tr>
<td>5mA to 1A load current range</td>
<td>Minimum holding current of 5mA ensures proper operation with the lightest of loads</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Two terminal series load connections</td>
<td>Allows connection in series with contactors, relays, valves, solenoids, small motors and lamps. Provides quick and easy installation for new or existing systems</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS1211.5</td>
<td>24VAC</td>
<td>Fixed</td>
<td>1.5s</td>
</tr>
<tr>
<td>TS121150</td>
<td>24VAC</td>
<td>Fixed</td>
<td>150s</td>
</tr>
<tr>
<td>TS12130</td>
<td>24VAC</td>
<td>Fixed</td>
<td>30s</td>
</tr>
<tr>
<td>TS1214</td>
<td>24VAC</td>
<td>Fixed</td>
<td>4s</td>
</tr>
<tr>
<td>TS12190</td>
<td>24VAC</td>
<td>Fixed</td>
<td>90s</td>
</tr>
<tr>
<td>TS1221</td>
<td>24VAC</td>
<td>External</td>
<td>0.05 - 3s</td>
</tr>
<tr>
<td>TS1222</td>
<td>24VAC</td>
<td>External</td>
<td>0.5 - 60s</td>
</tr>
<tr>
<td>TS1224</td>
<td>24VAC</td>
<td>External</td>
<td>5 - 600s</td>
</tr>
<tr>
<td>TS13115</td>
<td>24VDC</td>
<td>Fixed</td>
<td>15s</td>
</tr>
<tr>
<td>TS1321</td>
<td>24VDC</td>
<td>Fixed</td>
<td>0.05 - 3s</td>
</tr>
<tr>
<td>TS1410.25</td>
<td>120VAC</td>
<td>Fixed</td>
<td>0.25s</td>
</tr>
<tr>
<td>TS14110</td>
<td>120VAC</td>
<td>Fixed</td>
<td>10s</td>
</tr>
<tr>
<td>TS141180</td>
<td>120VAC</td>
<td>Fixed</td>
<td>180s</td>
</tr>
<tr>
<td>TS1412</td>
<td>120VAC</td>
<td>Fixed</td>
<td>2s</td>
</tr>
<tr>
<td>TS14120</td>
<td>120VAC</td>
<td>Fixed</td>
<td>20s</td>
</tr>
<tr>
<td>TS14130</td>
<td>120VAC</td>
<td>Fixed</td>
<td>30s</td>
</tr>
<tr>
<td>TS1415</td>
<td>120VAC</td>
<td>Fixed</td>
<td>5s</td>
</tr>
<tr>
<td>TS1416</td>
<td>120VAC</td>
<td>Fixed</td>
<td>6s</td>
</tr>
<tr>
<td>TS1421</td>
<td>120VAC</td>
<td>External</td>
<td>0.05 - 3s</td>
</tr>
<tr>
<td>TS1422</td>
<td>120VAC</td>
<td>External</td>
<td>0.5 - 60s</td>
</tr>
<tr>
<td>TS1423</td>
<td>120VAC</td>
<td>External</td>
<td>2 - 180s</td>
</tr>
<tr>
<td>TS1424</td>
<td>120VAC</td>
<td>External</td>
<td>5 - 600s</td>
</tr>
<tr>
<td>TS1612</td>
<td>230VAC</td>
<td>Fixed</td>
<td>2s</td>
</tr>
<tr>
<td>TS1615</td>
<td>230VAC</td>
<td>Fixed</td>
<td>5s</td>
</tr>
<tr>
<td>TS1621</td>
<td>230VAC</td>
<td>External</td>
<td>0.05 - 3s</td>
</tr>
<tr>
<td>TS1622</td>
<td>230VAC</td>
<td>External</td>
<td>0.5 - 60s</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848

For dimensional drawing see: Appendix, page 512, Figure 16.
Time Delay Relays
Dedicated — Delay-on-Make

Accessories

P1004-XX, P1004-XX-X Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P1023-6 Mounting bracket
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

P1015-64 (AWG 14/16)
Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

VTP(X)(X) Plug-on Adjustment Module
Mounts on modules with in-line adjustment terminals. Rated at 0.25W at 55°C. Available in resistance values from 5KΩ to 5MΩ.

Selection Table for VTP Plug-on Adjustment Accessory

<table>
<thead>
<tr>
<th>All Other Voltages</th>
<th>12VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Delay</td>
<td>VTP P/N</td>
</tr>
<tr>
<td>1 - 0.05-3s</td>
<td>VTP4B</td>
</tr>
<tr>
<td>2 - 0.5-60s</td>
<td>VTP4F</td>
</tr>
<tr>
<td>3 - 2-180s</td>
<td>VTP4J</td>
</tr>
<tr>
<td>4 - 5-600s</td>
<td>VTP5N</td>
</tr>
</tbody>
</table>

Specifications

Time Delay
Type: Analog circuitry
Range: 12VDC
0.05 - 120s in 4 adjustable ranges or fixed (1 MΩ max. R<sub>T</sub>)
Other Voltages: 0.05 - 600s in 4 adjustable ranges or fixed
Repeat Accuracy: ±2% or 20ms, whichever is greater
Tolerance: ≤ ±10%
(Factory Calibration)
Recycle Time: After timing – ≤ 16ms
During timing – 0.1% of time delay or 75ms, whichever is greater
Time Delay vs. Temperature
≤ ±10%
& Voltage

Input
Voltage: 12, 24 or 120VDC; 24, 120, or 230VAC
Tolerance: ±20%
AC Line Frequency: 50/60 Hz
Output
Type: Solid state
Form: NO, open during timing
Maximum Load Current: 1A steady state, 10A inrush at 60°C
Minimum Holding Current: 5mA
Voltage Drop: ≅ 2.5V @ 1A
Protection
Circuitry: Encapsulated
Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
Insulation Resistance: ≥ 100 MΩ
Polarity: DC units are reverse polarity protected
Mechanical
Mounting: Surface mount with one #10 (M5 x 0.8) screw
Dimensions: H 50.8 mm (2”); W 50.8 mm (2”); D 30.7 mm (1.21”)
Termination: 0.25 in. (6.35 mm) male quick connect terminals

Environmental
Operating/Storage
Temperature: -40° to 80°C / -40° to 85°C
Humidity: 95% relative, non-condensing
Weight: ≅ 2.4 oz (68 g)

Selection Chart

Function Diagram

R<sub>T</sub> Selection Chart

<table>
<thead>
<tr>
<th>Desired Time Delay*</th>
<th>R&lt;sub&gt;T&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>0.0</td>
</tr>
<tr>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>5.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

* When selecting an external R<sub>T</sub> add at least 20% for tolerance of unit and the R<sub>T</sub>
† 1 Megohm max for 12 VDC Units
TSD1 SERIES

Delay-on-Make Timer

Time Delay Relays
Dedicated — Delay-on-Make

Description
The TSD1 Series is designed for more demanding commercial and industrial applications where small size and accurate performance is required. The factory calibration for fixed time delays is within 1% of the target time delay. The repeat accuracy, under stable conditions, is 0.1% of the time delay. The TSD1 Series is rated to operate over an extended temperature range. Time delays of 0.1 seconds to 100 hours are available. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry.

Operation (Delay-on-Make)
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.1%, +/- 1% time delay accuracy</td>
</tr>
<tr>
<td>Extended temperature range</td>
<td>Rated to 75°C operating temperature to withstand high heat applications.</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A Steady solid-state output, 10A inrush</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16)**
  **Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSD1311.2S</td>
<td>24VDC</td>
<td>Fixed</td>
<td>1.2s</td>
</tr>
<tr>
<td>TSD1321</td>
<td>24VDC</td>
<td>External</td>
<td>1 - 100s</td>
</tr>
<tr>
<td>TSD1424</td>
<td>120VAC</td>
<td>External</td>
<td>1 - 100m</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848

For dimensional drawing see: Appendix, page 512, Figure 16.
### Time Delay Relays
**Dedicated — Delay-on-Make**

#### Accessories
- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

#### External Resistance vs. Time Delay

<table>
<thead>
<tr>
<th>Time Delay (Seconds)</th>
<th>Resistance (KΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>50</td>
<td>7.5</td>
</tr>
<tr>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the R terminals, as the resistance increases the time delay increases.

**Examples:**
- For 1 to 50 S adjustable time delay, select time delay range 1 and a 25 K ohm R.
- For 1 to 100 S use a 100 K ohm R.

#### Specifications

- **Time Delay**
  - Range: 0.1s - 100h in 7 adjustable ranges or fixed
  - Repeat Accuracy: ±0.1% or 20ms, whichever is greater
  - Tolerance (Factory Calibration): ≤ ±1%
  - Recycle Time: ≤ 150ms
  - Time Delay vs. Temperature & Voltage: ≤ ±1%

- **Input**
  - Voltage: 12, 24, 120VDC; 24, 120, 230VAC
  - Tolerance: ±20%
  - AC Line Frequency: 50/60 Hz

- **Output**
  - Type: Solid state
  - Form: NO, open during timing
  - Maximum Load Current: 1A steady state, 10A inrush at 60°C
  - Minimum Holding Current: ≤ 40mA
  - Off State Leakage Current: ≅ 7mA @ 230VAC
  - Voltage Drop: ≅ 2.5V @ 1A

- **Protection**
  - Circuitry: Encapsulated
  - Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
  - Insulation Resistance: ≥ 100 MΩ
  - Polarity: DC units are reverse polarity protected

- **Mechanical**
  - Mounting: Surface mount with one #10 (M5 x 0.8) screw
  - Dimensions:
    - H: 50.8 mm (2"); W: 50.8 mm (2""); D: 30.7 mm (1.21")
  - Termination: 0.25 in. (6.35 mm) male quick connect terminals

- **Environmental**
  - Operating/Storage Temperature: -40° to 75°C / -40° to 85°C
  - Humidity: 95% relative, non-condensing
  - Weight: ≅ 2.4 oz (68 g)

---

**Function Diagram**

- **V = Voltage**
- **NO = Normally Open Contact**
- **NC = Normally Closed Contact**
- **TD = Time Delay**
- **R = Reset**
- **= Undefined Time**
Time Delay Relays
Dedicated — Delay-on-Make, Normally Closed

TS441165

Description
The TS441165 is an analog delay-on-make timer with a normally closed solid-state output. Unlike an interval timer, the load is energized prior to and during the time delay period. It can be used as a faster starting interval time delay when S1 is closed upon application of input voltage.

Operation (Delay-on-Make NC)
Upon application of input voltage, the load is energized immediately. When the initiate switch is closed, the time delay begins. At the end of the time delay, the load de-energizes.
Reset: When the initiate switch is reopened, the load again energizes and the time delay is reset. Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuitry</td>
<td>Repeat Accuracy +/- 2%</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Load energized prior to and during time delay</td>
<td>Faster operation</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Normally closed output</td>
<td>Can be used as a faster starting interval time delay</td>
</tr>
</tbody>
</table>

Accessories

P1004-XX, P1004-XX-X Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P1023-6 Mounting bracket
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

P1015-64 (AWG 14/16) Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.
Time Delay Relays
Dedicated — Delay-on-Make, Normally Closed

**Accessories**

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**VTP(X)(X) Plug-on Adjustment Module**
Mounts on modules with in-line adjustment terminals. Rated at 0.25W at 55°C. Available in resistance values from 5KΩ to 5MΩ.

**Selection Table for VTP Plug-on Adjustment Accessory**

<table>
<thead>
<tr>
<th>Time Delay</th>
<th>VTP P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 0.05-3s</td>
<td>VTP4B</td>
</tr>
<tr>
<td>2 - 0.5-60s</td>
<td>VTP4F</td>
</tr>
<tr>
<td>3 - 2-180s</td>
<td>VTP4J</td>
</tr>
<tr>
<td>4 - 5-600s</td>
<td>VTP5N</td>
</tr>
</tbody>
</table>

**Selection Guide**

<table>
<thead>
<tr>
<th>Desired Time Delay*</th>
<th>R_T Selection Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seconds</td>
<td></td>
</tr>
<tr>
<td>0.05</td>
<td>0.0</td>
</tr>
<tr>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>5.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

* When selecting an external \( R_T \), add at least 20% for tolerance of unit and the \( R_T \).

**Specifications**

**Time Delay**
- **Type**: Analog circuitry
- **Range**: 165s
- **Adjustment**: Fixed
- **Repeat Accuracy**: ±2% or 20ms, whichever is greater; under fixed conditions
- **Tolerance (Factory Calibration)**: ≤ ±10%
- **Time Delay vs Temp. & Voltage**: ≤ ±10%
- **Recycle Time**: ≤ 150ms
- **Input**
  - **Voltage**: 120VAC
  - **Tolerance**: ±20%
  - **AC Line Frequency**: 50/60 Hz
- **Output**
  - **Type**: Solid state
  - **Form**: NC, closed during timing
  - **Maximum Load Current**: 1A steady state, 10A inrush at 60°C
  - **Voltage Drop**: ≅ 2.5V @ 1A
  - **Protection**
    - **Circuitry**: Encapsulated
    - **Dielectric Breakdown**: ≥ 2000V RMS terminals to mounting surface
    - **Insulation Resistance**: ≥ 100 MΩ
  - **Mechanical**
    - **Mounting**: Surface mount with one #10 (M5 x 0.8) screw
    - **Dimensions**:
      - H 50.8 mm (2.0")
      - W 50.8 mm (2.0")
      - D 30.7 mm (1.21")
    - **Termination**: 0.25 in. (6.35 mm) male quick connect terminals
  - **Environmental**
    - **Operating/Storage**:
      - Temperature: -40° to 75°C / -40° to 85°C
      - Humidity: 95% relative, non-condensing
      - Weight: ≅ 2.4 oz (68 g)

**Function Diagram**

![Function Diagram](image-url)
Description

The HRDB Series combines an electromechanical, relay output with microcontroller timing circuitry. The HRDB offers 12 to 230V operation in five options and factory fixed, external, or onboard adjustable time delays with a repeat accuracy of ±0.5%. The isolated output contact rating allows for direct operation of heavy loads, such as compressors, pumps, blower motors, heaters, etc. The HRDB is ideal for OEM applications where cost is a factor.

Operation (Delay-on-Break)

Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output relay energizes. The time delay begins when the initiate switch is opened. The output remains energized during timing. At the end of the time delay, the output de-energizes. The output will energize if the initiate switch is closed when input voltage is applied.

Reset: Reclosing the initiate switch during timing resets the time delay. Loss of input voltage resets the time delay and output.

Features & Benefits

**FEATURES**

<table>
<thead>
<tr>
<th>Microcontroller based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat Accuracy + / - 0.5%</td>
</tr>
</tbody>
</table>

**BENEFITS**

<table>
<thead>
<tr>
<th>Compact, low cost design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allows flexibility for OEM applications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Isolated, 30A, SPDT, NO output contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allows direct operation of heavy loads: compressors, pumps, blower motors, heaters.</td>
</tr>
</tbody>
</table>

Accessories

**P1004-95, P1004-95-X Versa-Pot**

Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

**P1023-6 Mounting bracket**

The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

**P0700-7 Versa-Knob**

Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME TOLERANCE</th>
<th>TIME DELAY</th>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME TOLERANCE</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRDB1110M</td>
<td>12VDC</td>
<td>Fixed</td>
<td>+ / -5%</td>
<td>10m</td>
<td>HRDB223</td>
<td>24VAC</td>
<td>Onboard</td>
<td>+ / -5%</td>
<td>0.1 - 10m</td>
</tr>
<tr>
<td>HRDB117S</td>
<td>12VDC</td>
<td>Fixed</td>
<td>+ / -5%</td>
<td>7s</td>
<td>HRDB321</td>
<td>24VDC</td>
<td>Onboard</td>
<td>+ / -5%</td>
<td>1 - 100s</td>
</tr>
<tr>
<td>HRDB120</td>
<td>12VDC</td>
<td>Onboard</td>
<td>+ / -5%</td>
<td>0.1 - 10s</td>
<td>HRDB324</td>
<td>24VDC</td>
<td>Onboard</td>
<td>+ / -5%</td>
<td>1 - 100m</td>
</tr>
<tr>
<td>HRDB121</td>
<td>12VDC</td>
<td>Onboard</td>
<td>+ / -5%</td>
<td>1 - 100s</td>
<td>HRDB423</td>
<td>120VAC</td>
<td>Onboard</td>
<td>+ / -5%</td>
<td>0.1 - 10m</td>
</tr>
<tr>
<td>HRDB124</td>
<td>12VDC</td>
<td>Onboard</td>
<td>+ / -5%</td>
<td>1 - 100m</td>
<td>HRDB623</td>
<td>230VAC</td>
<td>Onboard</td>
<td>+ / -5%</td>
<td>0.1 - 10m</td>
</tr>
<tr>
<td>HRDB21A65M</td>
<td>24VAC</td>
<td>Fixed</td>
<td>+ / -1%</td>
<td>65m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Specifications**

**Time Delay**
- **Type**: Microcontroller circuitry
- **Range**: 0.1s - 100m in 5 adjustable ranges or fixed
- **Repeat Accuracy**: ±0.5 % or 20ms, whichever is greater
- **Tolerance** (Factory Calibration): ±1%, ±5%
- **Reset Time**: ≤ 150ms
- **Initiate Time**: ≤ 20ms
- **Time Delay vs Temp. & Voltage**: ±2%

**Input**
- **Voltage**
  - 12 or 24VDC: 12VDC & 24VDC
  - 24 to 230VAC: 24 to 230VAC
- **Tolerance**
  - 12VDC & 24VDC: -15% - 20%
  - 24 to 230VAC: -20% - 10%
- **AC Line Frequency**: 50/60 Hz
- **Power Consumption**: AC ≤ 4VA; DC ≤ 2W

**Output**
- **Type**: Electromechanical relay
- **Form**: Isolated, SPDT
- **Ratings**
  - **General Purpose**
    - SPDT-NO: 125/240VAC 30A 15A
    - SPDT-NC: 28VDC 20A 10A
  - **Resistive**
    - SPDT-NO: 125/240VAC 30A 15A
    - SPDT-NC: 28VDC 20A 10A
  - **Motor Load**
    - SPDT-NO: 125VAC 1 hp* 1/4 hp**
    - SPDT-NC: 240VAC 2 hp** 1 hp**
- **Life**
  - Mechanical: 1 x 10^6;
  - Electrical: 1 x 10^6, *3 x 10^6, **6,000

**Protection**
- **Surge**: IEEE C62.41-1991 Level A
- **Circuitry**: Encapsulated
- **Dielectric Breakdown**: ≥ 2000V RMS terminals to mounting surface
- **Insulation Resistance**: ≥ 100 MΩ
- **Polarity**: DC units are reverse polarity protected

**Mechanical**
- **Mounting**: Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**
- **Termination**: Female Quick Connect
- **Environmental**
  - **Operating/Storage**
    - Temperature: -40° to 60°C / -40° to 85°C
    - Humidity: 95% relative, non-condensing
  - **Weight**: 3.9 oz (111 g)

**Function Diagram**

- V = Voltage
- S1 = Initiate Switch
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD = Time Delay
- t = Incomplete Time Delay
- R = Reset
- = Undefined Time

**Accessories**

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16)**
  - Female Quick Connect
  - These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  - Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  - 35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  - Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**External Resistance vs. Time Delay**

This chart applies to externally adjustable part numbers.

The time delay is adjustable over the time delay range selected by varying the resistance across the "R" terminals, so the resistance increases the time delay increases.

When selecting an external R, add the tolerances of the timer and the R for the full time range adjustment.

Examples:
- 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm R.
- For 1 to 100 S use a 100 K ohm R.
Time Delay Relays
Dedicated — Delay-on-Break

HRPS / HRIS SERIES

Description
The HRPS/HRIS Series combines an electromechanical relay output with microcontroller timing circuitry. It is a factory programmed module available in any 1 of 13 standard functions. It offers 12 to 240V operation in two universal ranges and factory fixed, onboard, or external adjustable time delays with a repeat accuracy of ±0.5%. The output contact rating allows for direct operation of heavy loads, such as compressors, pumps, blower motors, heaters, etc. This series is ideal for OEM applications where cost is a factor. The HRPS has non-isolated SPDT relay contacts, and the HRIS has isolated SPDT relay contacts. Both offer the most popular timer functions in the industry.

Operation (Interval)
Upon application of input voltage, the time delay begins. The output (relay or solid state) energizes during the time delay. At the end of time delay the output de-energizes and remains de-energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/ - 0.5%, factory calibration +/- 2%</td>
</tr>
<tr>
<td>Compact design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>30A, SPDT, Normally Open</td>
<td>Allows for direct operation of heavy loads</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUST.</th>
<th>TIME DELAY</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRISW21FT</td>
<td>24 - 240VAC/24 - 110VDC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>Alternating</td>
</tr>
<tr>
<td>HRISW27I</td>
<td>24 - 240VAC/24 - 110VDC</td>
<td>Onboard</td>
<td>0.1 - 10h</td>
<td>Interval</td>
</tr>
<tr>
<td>HRPSD12HI</td>
<td>12 - 48VDC</td>
<td>Fixed</td>
<td>2h</td>
<td>Interval</td>
</tr>
<tr>
<td>HRISW25B</td>
<td>24 - 240VAC/24 - 110VDC</td>
<td>Onboard</td>
<td>1 - 100m</td>
<td>Delay on break</td>
</tr>
</tbody>
</table>

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For dimensional drawing see: Appendix, page 512, Figure 17.
Time Delay Relays
Dedicated — Delay-on-Break

Accessories

**P1004-95, P1004-95-X Versa-Pot**
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

**P1023-6 Mounting bracket**
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

**P0700-7 Versa-Knob**
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

**P1015-64 (AWG 14/16), P1015-13 (AWG 10/12)**
Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**P1015-18 Quick Connect to Screw Adapter**
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

### Function Diagrams

**INTERVAL (IMPULSE-ON)**

- **V** = Voltage
- **NO** = Normally Open Contact
- **NC** = Normally Closed Contact
- **TD** = Time Delay
- **R** = Reset

**ALTERNATING RELAY**

- **V** = Voltage
- **S1** = Initiate Switch
- **NO** = Normally Open Contact
- **NC** = Normally Closed Contact
- **TD** = Time Delay
- **R** = Reset
- **= Undefined Time**

### Specifications

#### Time Delay

- **Type**: Microcontroller circuitry
- **Range**: 0.1s - 1000h in 9 adjustable ranges or fixed
- **Repeat Accuracy**
  - Factory Calibration: ±2%
  - Time Delay vs Temp. & Voltage: ±2%
- **Tolerance**: ±0.5% or 20ms, whichever is greater
- **Reset Time**: ≤ 150ms
- **Initiate Time**: ≤ 20ms
- **Input**:
  - Voltage: 12 to 48VDC; 24 to 240VAC/24 to 110VDC
    - Tolerance:
      - 12 to 48VDC: -15% to 20%
      - 24 to 110VDC/240VAC: -20% to 10%
    - AC Line Frequency: 50/60Hz
  - Power Consumption:
    - AC: ≤ 4VA
    - DC: ≤ 2W
- **Output**:
  - Type: Electromechanical relay
  - Form: SPDT
  - Ratings:
    - General Purpose: SPDT-NO, 30A; SPDT-NC, 15A
    - Resistive: SPDT-NO, 30A; SPDT-NC, 15A
    - 28VDC: SPDT-NO, 20A; SPDT-NC, 10A
    - Motor Load: SPDT-NO, 1 hp*; SPDT-NC, 1/4 hp**
      - 125VAC: 1 hp*
      - 240VAC: 1/4 hp**
      - 28VDC: 2 hp**
      - 240VAC: 1 hp**
- **Life**
  - Mechanical: 1 x 10^6
  - Electrical: 1 x 10^6, 3 x 10^4, 6,000
- **Protection**
  - Surge: IEEE C62.41-1991 Level A
  - Circuitry: Encapsulated
  - Isolation Voltage: ≥ 1500V RMS input to output; isolated units
  - Insulation Resistance: ≥ 100 MΩ
  - Polarity: DC units are reverse polarity protected
  - Mechanical: Surface mt. with one #10 (M5 x 0.8) screw
  - Dimensions: H 76.2 mm (3.0”), W 50.8 mm (2.0”);
  - Termination: 0.25 in. (6.35 mm) male quick connects
  - Environmental: Operating/Storage: -40° to 60°C / -40° to 85°C
  - Humidity: 95% relative, non-condensing
  - Weight: 3.9 oz (111 g)
KRDB SERIES

Description
The KRDB Series is a compact time delay relay measuring only 2 in. (50.8 mm) square. Its microcontroller timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The KRDB Series is a cost effective approach for OEM applications that require small size, isolation, reliability, and long life.

Operation (Delay-on-Break)
Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output relay energizes. The time delay begins when the initiate switch is opened. The output remains energized during timing. At the end of the time delay, the output de-energizes. The output will energize if the initiate switch is closed when input voltage is applied.

Reset: Reclosing the initiate switch during timing resets the time delay. Loss of input voltage resets the time delay and output.

Features & Benefits

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<thead>
<tr>
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<th>BENEFITS</th>
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<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat accuracy + / - 0.5%, Factory calibration + / - 5%</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>To protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Compact, low cost design measuring 2 in. (50.8mm) square</td>
<td>Allows flexibility for OEM applications</td>
</tr>
</tbody>
</table>

Accessories

P1004-95, P1004-95-X Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P1023-6 Mounting bracket
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

Ordering Information

<table>
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<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRDB110.1S</td>
<td>12VDC</td>
<td>Fixed</td>
<td>0.1s</td>
</tr>
<tr>
<td>KRDB112.5S</td>
<td>12VDC</td>
<td>Fixed</td>
<td>2.5s</td>
</tr>
<tr>
<td>KRDB1120M</td>
<td>12VDC</td>
<td>Fixed</td>
<td>5m</td>
</tr>
<tr>
<td>KRDB115M</td>
<td>12VDC</td>
<td>Fixed</td>
<td>1 - 100m</td>
</tr>
<tr>
<td>KRDB120</td>
<td>12VDC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KRDB124</td>
<td>12VDC</td>
<td>Onboard</td>
<td>10 - 1000s</td>
</tr>
<tr>
<td>KRDB21180S</td>
<td>24VAC/DC</td>
<td>Fixed</td>
<td>180s</td>
</tr>
<tr>
<td>KRDB217S</td>
<td>24VAC/DC</td>
<td>Fixed</td>
<td>7s</td>
</tr>
<tr>
<td>KRDB213S</td>
<td>24VAC/DC</td>
<td>Fixed</td>
<td>0.1 - 10m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRDB31120S</td>
<td>24VDC</td>
<td>Fixed</td>
<td>20s</td>
</tr>
<tr>
<td>KRDB415S</td>
<td>120VDC</td>
<td>Fixed</td>
<td>5s</td>
</tr>
<tr>
<td>KRDB4160S</td>
<td>120VAC</td>
<td>Fixed</td>
<td>60s</td>
</tr>
<tr>
<td>KRDB420</td>
<td>120VAC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KRDB421</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100s</td>
</tr>
<tr>
<td>KRDB422</td>
<td>120VAC</td>
<td>Onboard</td>
<td>10 - 1000s</td>
</tr>
<tr>
<td>KRDB423</td>
<td>120VAC</td>
<td>Onboard</td>
<td>0.1 - 10m</td>
</tr>
<tr>
<td>KRDB424</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100m</td>
</tr>
</tbody>
</table>

For dimensional drawing see: Appendix, page 512, Figure 16.
**Accessories**

- **P1015-64** (AWG 14/16) Female Quick Connect
  
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18** Quick Connect to Screw Adapter
  
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20** DIN Rail Adapter
  
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**Specifications**

<table>
<thead>
<tr>
<th>Time Delay</th>
<th>Microcontroller with watchdog circuitry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>0.1s - 1000m in 6 adjustable ranges or fixed</td>
</tr>
<tr>
<td>Range</td>
<td>±0.5% or 20ms, whichever is greater</td>
</tr>
<tr>
<td>Repeat Accuracy</td>
<td>±≤5%</td>
</tr>
<tr>
<td>Tolerance (Factory Calibration)</td>
<td>±≤5%</td>
</tr>
<tr>
<td>Recycle Time</td>
<td>≤150ms</td>
</tr>
<tr>
<td>Initiate Time</td>
<td>≤40ms</td>
</tr>
<tr>
<td>Time Delay vs Temp. &amp; Voltage</td>
<td>≤≤5%</td>
</tr>
</tbody>
</table>

**Input**

- **Voltage**
  
  12, 24, 110VDC, 24, 120 or 230VAC

- **Tolerance**
  
  -15% - 20% for 12VDC & 24VDC/AC
  -20% - 10% for 110VDC, 120 or 230VAC

- **AC Line Frequency/DC Ripple**
  
  50/60 Hz / ≤ 10%

- **Power Consumption**
  
  AC ≤ 2VA; DC ≤ 2W

**Output**

- **Type** Isolated relay contacts
- **Form** SPDT
- **Rating (at 40°C)**
  
  10A resistive @ 125VAC; 5A resistive @ 230VAC & 28VDC; 1/4 hp @ 125VAC

**Max. Switching Voltage**

- 250VAC

**Life (Operations)**

Mechanical - 1 x 10^6; Electrical - 1 x 10^5

**Protection**

- **Circuitry** Encapsulated
- **Isolation Voltage** ≥ 1500V RMS input to output
- **Insulation Resistance** ≥ 100 MΩ
- **Polarity** DC units are reverse polarity protected
- **Mechanical**
  
  Surface mount with one #10 (M5 x 0.8) screw
  
  **Dimensions**
  
  H 50.8 mm (2.0”); W 50.8 mm (2.0”); D 30.7 mm (1.21”)

**Environmental**

- **Temperature**
  
  -40° to 60°C / -40° to 85°C
- **Humidity**
  
  95% relative, non-condensing
- **Weight**
  
  ≅ 2.6 oz (74 g)

**Function Diagram**

**External Resistance vs. Time Delay**

In Secs. or Mins.

<table>
<thead>
<tr>
<th>Time Delay (s)</th>
<th>0</th>
<th>25</th>
<th>50</th>
<th>75</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Ms.</td>
<td>10</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

- **R_T = External Timing Resistor in Kiloohms**

- **Examples:**
  
  1 to 50 S adjustable time delay, select time delay range 1 and a 50 k ohm R_T. For 1 to 100 S use a 100 K ohm R_T.

**Output Current/Ambient Temperature**

<table>
<thead>
<tr>
<th>Temp. °C</th>
<th>40</th>
<th>50</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10</td>
<td>9</td>
<td>8</td>
</tr>
</tbody>
</table>

| V = Voltage
| S1 = Initiate Switch
| NO = Normally Open Contact
| NC = Normally Closed Contact
| TD = Time Delay
| t = Incomplete Time Delay
| R = Reset
| = Undefined Time

**This chart applies to externally adjustable part numbers.**

The time delay is adjustable over the time delay range selected by varying the resistance across the R_T terminals; as the resistance increases the time delay increases.

When selecting an external R_T, add the tolerances of the timer and the R_T for the full time range adjustment.

**Examples:**

1 to 50 S adjustable time delay, select time delay range 1 and a 50 k ohm R_T. For 1 to 100 S use a 100 K ohm R_T.
**KSDB SERIES**

**Description**

The KSDB Series is designed for general purpose commercial and industrial applications where a small, cost effective, reliable solid-state timer is required. The factory calibration for fixed time delays is within 5% of the target time delay. The repeat accuracy, under stable conditions, is 0.5% of the selected time delay. This series is designed for popular AC and DC voltages. Time delays of 0.1 seconds to 1000 minutes are available in 6 ranges. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry.

**Operation (Delay-on-Break)**

Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output energizes. The time delay begins when the initiate switch is opened. The output remains energized during timing. At the end of the time delay, the output de-energizes. The output energizes if the initiate switch is closed when input voltage is applied.

**Reset:** Reclosing the initiate switch during timing resets the time delay. Loss of input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat accuracy + / - 0.5%, Factory calibration + / - 5%</td>
</tr>
<tr>
<td>1A Steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
</tbody>
</table>

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>SWITCHING MODE</th>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>SWITCHING MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSDB1110MP</td>
<td>12VDC</td>
<td>Fixed</td>
<td>10m</td>
<td>Positive</td>
<td>KSDB314SP</td>
<td>24VDC</td>
<td>Fixed</td>
<td>4s</td>
<td>Positive</td>
</tr>
<tr>
<td>KSDB1115SP</td>
<td>12VDC</td>
<td>Fixed</td>
<td>15s</td>
<td>Positive</td>
<td>KSDB315SP</td>
<td>24VDC</td>
<td>Fixed</td>
<td>5s</td>
<td>Positive</td>
</tr>
<tr>
<td>KSDB120SP</td>
<td>12VDC</td>
<td>Fixed</td>
<td>20s</td>
<td>Positive</td>
<td>KSDB324N</td>
<td>24VDC</td>
<td>External</td>
<td>1 - 100m</td>
<td>Negative</td>
</tr>
<tr>
<td>KSDB113MP</td>
<td>12VDC</td>
<td>Fixed</td>
<td>3s</td>
<td>Positive</td>
<td>KSDB330N</td>
<td>24VDC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>Negative</td>
</tr>
<tr>
<td>KSDB113SP</td>
<td>12VDC</td>
<td>Fixed</td>
<td>3s</td>
<td>Positive</td>
<td>KSDB4120M</td>
<td>120VAC</td>
<td>Fixed</td>
<td>20m</td>
<td>n/a</td>
</tr>
<tr>
<td>KSDB120P</td>
<td>12VDC</td>
<td>External</td>
<td>0.1 - 10s</td>
<td>Positive</td>
<td>KSDB4160S</td>
<td>120VAC</td>
<td>Fixed</td>
<td>60s</td>
<td>n/a</td>
</tr>
<tr>
<td>KSDB134P</td>
<td>12VDC</td>
<td>Onboard</td>
<td>1 - 100m</td>
<td>Positive</td>
<td>KSDB4190M</td>
<td>120VAC</td>
<td>Fixed</td>
<td>90m</td>
<td>n/a</td>
</tr>
<tr>
<td>KSDB2115S</td>
<td>24VAC</td>
<td>Fixed</td>
<td>15s</td>
<td>n/a</td>
<td>KSDB431</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100s</td>
<td>n/a</td>
</tr>
<tr>
<td>KSDB220</td>
<td>24VAC</td>
<td>External</td>
<td>0.1 - 10s</td>
<td>n/a</td>
<td>KSDB61150S</td>
<td>230VAC</td>
<td>Fixed</td>
<td>150s</td>
<td>n/a</td>
</tr>
<tr>
<td>KSDB231</td>
<td>24VAC</td>
<td>Onboard</td>
<td>1 - 100s</td>
<td>n/a</td>
<td>KSDB631</td>
<td>230VAC</td>
<td>Onboard</td>
<td>1 - 100s</td>
<td>n/a</td>
</tr>
</tbody>
</table>

If you don't find the part you need, call us for a custom product 800-843-8848
**KSDB SERIES**

### Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16), P1015-14 (AWG 18/22) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

### External Resistance vs. Time Delay

<table>
<thead>
<tr>
<th>Time Delay Ranges</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>4</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Secs. or Mins.</td>
<td>10</td>
<td>100</td>
<td>750</td>
<td>500</td>
<td>250</td>
</tr>
<tr>
<td>RT = External Timing Resistor in Kilohms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals; as the resistance increases the time delay increases. When selecting an external RT, add the tolerances of the timer and the RT for the full time range adjustment.

**Examples:** 1 to 50 S adjustable time delay, select time delay range 1 and a 50 kΩ in RT; For 1 to 100 S use a 100 kΩ in RT.

### Specifications

**Time Delay**
- **Range:** 0.1s - 1000m in 6 adjustable ranges or fixed
- **Repeat Accuracy:** ±0.5 % or 20ms, whichever is greater
- **Tolerance:** ≤ ±5%
- **Reset Time:** ≤ 150ms
- **Initiate Time:** ≤ 20ms
- **Time Delay vs Temp. & Voltage**
  - **Input Voltage:** 12, 24, or 120VDC; 24, 120, or 230VAC
  - **Tolerance:** ±20%
- **Power Consumption:** AC ≤ 2VA; DC ≤ 2W
- **AC Line Frequency/DC Ripple:** 50/60 Hz / ≤ 10 %

**Output**
- **Type:** Solid state
- **Form:** NO, closed before & during timing
- **Maximum Load Current:** 1A steady state, 10A inrush at 60°C
- **OFF State Leakage Current:** AC ≅ 5mA @ 230VAC; DC ≅ 1mA
- **Voltage Drop:** AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A
- **DC Operation:** Positive or negative switching
- **Protection**
  - **Circuitry:** Encapsulated
  - **Dielectric Breakdown:** ≥ 2000V RMS terminals to mounting surface
  - **Insulation Resistance:** ≥ 100 MΩ
  - **Polarity:** DC units are reverse polarity protected
- **Mechanical**
  - **Mounting:** Surface mount with one #10 (M5 x 0.8) screw
  - **Dimensions:**
    - H 50.8 mm (2.0”);
    - W 50.8 mm (2.0”);
    - D 30.7 mm (1.21”)
  - **Termination:** 0.25 in. (6.35 mm) male quick connect terminals

**Environmental**
- **Operating/Storage Temperature:** -40° to 60°C / -40° to 80°C
- **Humidity:** 95% relative, non-condensing
- **Weight:** ≅ 2.4 oz (68 g)

### Function Diagram

- **V = Voltage**
- **S1 = Initiate Switch**
- **NO = Normally Open Contact**
- **NC = Normally Closed Contact**
- **R = Reset**
- **TD = Time Delay**
- **t = Incomplete Time Delay**

**Time Delay Relays**
- **Dedicated — Delay-on-Break**

Littelfuse.com/ksdb
Time Delay Relays
Dedicated — Delay-on-Break

ORB SERIES

Description
The ORB Series’ open PCB construction offers the user good economy without sacrificing performance and reliability. The output relay is available in isolated, 10A, DPDT or SPDT forms. The time delay may be ordered as factory fixed, onboard knob, or external adjustment. All connections are 0.25 in. (6.35 mm) male quick connect terminals.

Operation (Delay-on-Break)
Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output relay energizes. The time delay begins when the initiate switch is opened (trailing edge triggered). The output remains energized during timing. At the end of the time delay, the output de-energizes. The output will energize if the initiate switch is closed when input voltage is applied.

Reset: Reclosing the initiate switch during timing resets the time delay. Loss of input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open PCB construction</td>
<td>Reduces cost for OEM applications</td>
</tr>
<tr>
<td>Analog circuitry</td>
<td>Repeat accuracy + / - 2%, Factory calibration + / - 10%</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT or DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Line voltage initiation</td>
<td>Separate control voltage is not required for operation</td>
</tr>
</tbody>
</table>

Accessories

P1004-12, P1004-12-X Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

P1015-64 (AWG 14/16)
Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>OUTPUT FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORB120A180</td>
<td>120VAC</td>
<td>Fixed</td>
<td>60s</td>
<td>SPDT</td>
</tr>
<tr>
<td>ORB120A25</td>
<td>120VAC</td>
<td>Onboard</td>
<td>3 - 300s</td>
<td>SPDT</td>
</tr>
<tr>
<td>ORB24A11D</td>
<td>24VAC</td>
<td>Fixed</td>
<td>1s</td>
<td>DPDT</td>
</tr>
<tr>
<td>ORB24A21D</td>
<td>24VAC</td>
<td>Onboard</td>
<td>0.05 - 3s</td>
<td>DPDT</td>
</tr>
<tr>
<td>ORB24A25</td>
<td>24VAC</td>
<td>Onboard</td>
<td>3 - 300s</td>
<td>SPDT</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848

For dimensional drawing see: Appendix, page 512, Figure 26.
Specifications

**Time Delay**

- **Type**: Analog circuitry
- **Range**: 0.05 - 300s in 5 adjustable ranges or fixed
- **Repeat Accuracy**: ±2% or 20ms, whichever is greater
- **Tolerance** (Factory Calibration): Adjustable: guaranteed range
- **Reset Time**: ≤ 50ms
- **Initiate Time**: ≤ 70ms
- **Time Delay vs Temp. & Voltage**: ≤ ±10%

**Input**

- **Voltage**: 24, 120, or 230VAC
- **Tolerance**
  - 24VAC: -15% - 20%
  - 120 & 230VAC: -20% - 10%

**AC Line Frequency**: 50/60 Hz

**Output**

- **Type**: Electromechanical relay
- **Form**: Isolated, SPDT or DPDT
- **Rating**
  - 10A resistive @ 120/240VAC & 28VDC;
  - 1/3 hp @ 120/240VAC
- **Life**
  - Mechanical: 1x10^7
  - Electrical: 1x10^6
- **Protection**
  - Isolation Voltage: ≥1500V RMS input to output
- **Mounting**: Surface mount with four #6 (M3.5 x 0.6) screws
- **Dimensions**
  - H: 53.8 mm (2.12”); W: 93.7 mm (3.69”); D: 47.8 mm (1.88”)
- **Termination**: 0.25 in. (6.35 mm) male quick connect terminals
- **Environmental**
  - **Temperature**: -20° to 65°C / -30° to 85°C
  - **Weight**: 2.7 oz (77 g)

**Selection Guides**

<table>
<thead>
<tr>
<th>Desired Time Delay* (Seconds)</th>
<th>( R_T ) Selection Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>0.05</td>
<td>0.5</td>
</tr>
<tr>
<td>0.5</td>
<td>5.0</td>
</tr>
<tr>
<td>1.0</td>
<td>10</td>
</tr>
<tr>
<td>1.5</td>
<td>15</td>
</tr>
<tr>
<td>2.0</td>
<td>20</td>
</tr>
<tr>
<td>2.5</td>
<td>25</td>
</tr>
<tr>
<td>3.0</td>
<td>30</td>
</tr>
</tbody>
</table>

*When selecting an external \( R_T \) add at least 20% for tolerance of unit and the \( R_T \).

**Function Diagram**

- **V** = Voltage
- **S1** = Initiate Switch
- **NO** = Normally Open Contact
- **NC** = Normally Closed Contact
- **TD** = Time Delay
- **t** = Incomplete Time Delay
- **R** = Reset

1. V = Voltage
2. S1 = Initiate Switch
3. NO = Normally Open Contact
4. NC = Normally Closed Contact
5. TD = Time Delay
6. t = Incomplete Time Delay
7. R = Reset
8. = Undefined Time
**Description**

The TDB Series combines accurate digital circuitry with isolated, 10A, DPDT or SPDT contacts in an 8-pin or 11-pin plug-in package. The TDB Series features DIP switch selectable time delays ranging from 0.1-10,230 seconds in three ranges. The TDB Series is the product of choice for custom control panel and OEM designers.

**Operation (Delay-on-Break)**

Input voltage must be applied to the input before and during timing. Upon closure of the initiate switch, the output relay is energized. The time delay begins when the initiate switch is opened (trailing edge triggered). The output remains energized during timing. At the end of the time delay, the output de-energizes. The output will energize if the initiate switch is closed when input voltage is applied.

**Reset**: Reclosing the initiate switch during timing resets the time delay. Loss of input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 time ranges available</td>
<td>Makes it versatile for use in many applications</td>
</tr>
<tr>
<td>(0.1s to 2.8h)</td>
<td></td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.1% or 20ms, whichever is greater; Setting Accuracy +/- 2% or 50ms, whichever is greater</td>
</tr>
<tr>
<td>LED indication (select models)</td>
<td>Provides visual indication of relay status</td>
</tr>
<tr>
<td>DIP switch adjustment</td>
<td>Provides first time setting accuracy</td>
</tr>
<tr>
<td>Isolated output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
</tbody>
</table>

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>DELAY RANGE (SEC)</th>
<th>LED</th>
<th>TYPE PLUG/OUTPUT FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDB120AL</td>
<td>120VAC</td>
<td>1-1023 in 1s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDB120ALD</td>
<td>120VAC</td>
<td>1-1023 in 1s increments</td>
<td>X</td>
<td>11-pin plug, DPDT</td>
</tr>
<tr>
<td>TDB12D</td>
<td>12VDC</td>
<td>1-1023 in 1s increments</td>
<td></td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDB230AL</td>
<td>230VAC</td>
<td>1-1023 in 1s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDB24AL</td>
<td>24VAC</td>
<td>1-1023 in 1s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDB24DL</td>
<td>24VDC/28VDC</td>
<td>1-1023 in 1s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDBH120AL</td>
<td>120VAC</td>
<td>10-10230 in 10s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDBH120ALD</td>
<td>120VAC</td>
<td>10-10230 in 10s increments</td>
<td>X</td>
<td>11-pin plug, DPDT</td>
</tr>
<tr>
<td>TDBL120AL</td>
<td>120VAC</td>
<td>0.1-102.3 in 0.1s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDBL120ALD</td>
<td>120VAC</td>
<td>0.1-102.3 in 0.1s increments</td>
<td>X</td>
<td>11-pin plug, DPDT</td>
</tr>
<tr>
<td>TDBL24DL</td>
<td>24VDC/28VDC</td>
<td>0.1-102.3 in 0.1s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848

For dimensional drawing see: Appendix, page 512, Figure 23.
TDB / TDBH / TDBL SERIES

Accessories

**BZ1 Front Panel Mount Kit**
Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

**NDS-8 Octal 8-pin Socket**
8-pin 35mm DIN rail or surface mount. Rated at 10A @ 300VAC. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

**NDS-11 11-pin Socket**
11-pin 35mm DIN rail or surface mount. Rated at 10A @ 300VAC. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC11 hold-down clips.

**PSC8 or PSC11 Hold-down Clips**
Securely mounts plug-in controls in any position. Provides protection against vibration. Use PSC8 with NDS-8 Octal Socket or PSC11 with NDS-11 Socket. Sold in pairs.

**PSCRB8 Hold-down Brackets**
Designed for use with P1011-6 socket. Securely mounts 8-pin plug-in controls in any position, and provides protection against vibration. Sold in pairs.

**P1011-6 Octal Socket for UL listing**
8-pin surface mount socket with binder head screw terminals. Rated 10A @ 600VAC. Combination is UL Listed when used with TDB Series timers. Use PSCRB8 Hold-down brackets.

Digi-Set Binary Switch Operation

<table>
<thead>
<tr>
<th>0.1...102.3</th>
<th>1...1023</th>
<th>10...10,230</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF**ON</td>
<td>OFF**ON</td>
<td>OFF**ON</td>
</tr>
</tbody>
</table>

** Specifications **

**Time Delay**
- **Type**: Digital integrated circuitry
- **Range**: 0.1 - 102.3s in 0.1s increments, 1 - 1023s in 1s increments, 10 - 10,230s in 10s increments
- **Repeat Accuracy**: ±0.1% or 20ms, whichever is greater
- **Setting Accuracy**: ±2% or 50ms, whichever is greater
- **Reset Time**: ≤ 50ms
- **Recycle Time**: ≤ 150ms
- **Time Delay vs Temp. & Voltage**: ±5%
- **Indicator**: LED indicates relay is energized
- **Initiate Time**: ≤ 60ms

**Input**
- **Voltage**: 12, 24/28, or 110VDC, 24, 120, or 230VAC
- **Tolerance**: 12VDC & 24VDC/AC -15% - 20%
  110 to 230VAC/DC -20% - 10%

**Output**
- **Type**: Electromechanical relay
- **Form**: SPDT or DPDT
- **Rating**: 10A resistive @ 120/240VAC & 28VDC,
  1/3 hp @ 120/240VAC
  Mechanical - 1 x 10⁶; Electrical - 1 x 10⁷
- **Life**: ≥ 1500V RMS input to output
- **Protection**: DC units reverse polarity protected
- **Isolation Voltage**: Plug-in socket
- **Mechanical Mounting**: H 81.3 mm (3.2”), W 60.7 mm (2.4”), D 45.2 mm (1.8”)
- **Operating/Storage**
  - **Temperature**: -20° to 65°C / -30° to 85°C
  - **Weight**: ≅ 6 oz (170 g)

**Function Diagram**

**V** = Voltage
**S1** = Initiate Switch
**NO** = Normally Open Contact
**NC** = Normally Closed Contact
**TD** = Time Delay
**t** = Incomplete Time Delay
**R** = Reset

**Notes:**
- **For CE approved applications, power must be removed from the unit when a switch position is changed.**
**TDUB SERIES**

**Delay-on-Break Timer**

**Description**

The TDUB Series combines digital timing circuitry with universal voltage operation. Voltages of 24 to 240VAC and 12 to 24VDC are available in three ranges. The TDUB Series offers DIP switch selectable time delays ranging from 0.1 seconds to 102.3 minutes in three ranges. Its 1A rated output, ability to operate on multiple voltages, and wide range of switch selectable time delays make the TDUB Series an excellent choice for process control systems and OEM equipment.

**Operation (Delay-on-Break)**

Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output energizes. The time delay begins when the initiate switch is opened (trailing edge triggered). The output remains energized during timing. At the end of the time delay, the output de-energizes. The output will energize if the initiate switch is closed when input voltage is applied.

**Reset:** Reclosing the initiate switch during timing resets the time delay. Loss of input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIP switch timing adjustment</td>
<td>Provides setting accuracy of +/-2%</td>
</tr>
<tr>
<td>User selectable time delay</td>
<td>Timing settings are switch selectable 0.1s - 102.3m in three ranges for added flexibility</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity.</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16), P1015-14 (AWG 18/22)** Female Quick Connect
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE RANGE</th>
<th>TIME RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDUB3000A</td>
<td>24 to 120VAC</td>
<td>1-1023s</td>
</tr>
<tr>
<td>TDUB3002A</td>
<td>12 to 24VDC</td>
<td>1-1023s</td>
</tr>
<tr>
<td>TDUBH3002A</td>
<td>12 to 24VDC</td>
<td>0.1-102.3m</td>
</tr>
<tr>
<td>TDUBH3001A</td>
<td>100 to 240VAC</td>
<td>0.1-102.3m</td>
</tr>
<tr>
<td>TDUBL3002A</td>
<td>12 to 24VDC</td>
<td>0.1-102.3s</td>
</tr>
</tbody>
</table>

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For dimensional drawing see: Appendix, page 512, Figure 16.
Specifications

Time Delay
Range*
0.1 - 102.3s in 0.1s increments
0.1 - 1023s in 1s increments
0.1 - 102.3m in 0.1m increments

Repeat Accuracy
±0.5% or 20ms, whichever is greater

Setting Accuracy
≤ ±2% or 20ms, whichever is greater

Reset Time
≤ 150ms

Initiate Time
≤ 20ms

Time Delay vs. Temperature & Voltage
≤ 5%

Input
Voltage/Tolerance
24 to 240VAC, 12 to 24VDC /±20%

AC Line Frequency/DC Ripple
50/60 Hz / ≤ 10%

Power Consumption
AC ≤ 2VA; DC ≤ 1W

Output
Type
Solid state

Form
NO, closed before and during timing

Rating
1A steady state, 10A inrush at 60°C

Voltage Drop
AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A

Off State Leakage Current
AC ≅ 5mA @ 230VAC; DC ≅ 1mA

Protection
Circuitry
Encapsulated

Dielectric Breakdown
≥ 2000V RMS terminals to mounting surface

Insulation Resistance
≥ 100 MΩ

Polarity
DC units are reverse polarity protected

Mechanical
Mounting
Surface mount with one #10 (M5 x 0.8) screw

Dimensions
H 50.8 mm (2”); W 50.8 mm (2”);
D 30.7 mm (1.21”)

Termination
0.25 in. (6.35 mm) male quick connect terminals

Environmental
Operating/Storage Temperature
-40° to 60°C / -40° to 85°C

Humidity
95% relative, non-condensing

Weight
≈ 2.4 oz (68 g)

*For CE approved applications, power must be removed from the unit when a switch position is changed.

Adjustment Switch Operation

Add the value of switches in the ON position for the total time delay.

Function Diagram

V = Voltage
S1 = Initiate Switch
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset
t = Incomplete Time Delay

V
S1
NO
NC
TD
R

DELAY-ON-BREAK (OFF-DELAY)
**Time Delay Relays**
**Dedicated — Delay-on-Break**

**THDB SERIES**

**Description**
The THDB Series combines accurate timing circuitry with high power, solid-state switching. It can switch motors, lamps, and heaters directly without a contactor. You can reduce labor, component cost, and increase reliability with these small, easy-to-use, timers.

**Operation (Delay-on-Break)**
Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output energizes. The time delay begins when the initiate switch is opened. The output remains energized during timing. At the end of the time delay, the output de-energizes. The output energizes if the initiate switch is closed when input voltage is applied.

**Reset:** Reclosing the initiate switch during timing resets the time delay. Loss of input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat accuracy + / - 0.5%, Factory calibration + / - 1%</td>
</tr>
<tr>
<td>High load currents up to 20A, 200A inrush</td>
<td>Allows direct operation of motors, lamps and heaters without a contactor</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Metalized mounting surface</td>
<td>Facilitates heat transfer in high current applications</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications and reduces labor and components costs</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16)**
  Female Quick Connect
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>OUTPUT RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>THDB421A</td>
<td>120VAC</td>
<td>External</td>
<td>1 - 100s</td>
<td>6A</td>
</tr>
<tr>
<td>THDB434C</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100m</td>
<td>20A</td>
</tr>
</tbody>
</table>

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### Specifications

**Time Delay**
- Range: 0.1s - 1000m in 6 adjustable ranges or fixed
- Repeat Accuracy: ±0.5% or 20ms, whichever is greater
- Tolerance: ±1%
- Reset Time: ≤ 150ms
- Initiate Time: ≤ 20ms
- Time Delay vs Temp. & Voltage: ≤ ±2%
- Input:
  - Voltage: 24, 120, or 230VAC
  - Tolerance: ±20%
- AC Line Frequency: 50/60 Hz
- Power Consumption: ≤ 2VA

**Output**
- Type: Solid state
- Form: NO, closed before & during timing
- Maximum Load Current: Steady State
  - A: 6A 60A
  - B: 10A 100A
  - C: 20A 200A
- Minimum Load Current: 100mA
- Voltage Drop: ≅ 2.5V @ rated current
- Off State Leakage Current: ≅ 5mA @ 230VAC
- Protection:
  - Circuitry: Encapsulated
  - Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
  - Insulation Resistance: ≥ 100 MΩ
- Mechanical
  - Mounting: Surface mount with one #10 (M5 x 0.8) screw
  - Dimensions:
    - H: 50.8 mm (2.0”);
    - W: 50.8 mm (2.0”);
    - D: 38.4 mm (1.51”)
  - Termination: 0.25 in. (6.35 mm) male quick connect terminals
- Environmental
  - Operating/Storage:
    - Temperature: -40° to 60°C / -40° to 85°C
    - Humidity: 95% relative, non-condensing
  - Weight: 3.9 oz (111 g)

**External Resistance vs. Time Delay**

This chart applies to externally adjustable part numbers.
- The time delay is adjustable over the time-delay range selected by varying the resistance across the RT terminals; as the resistance increases the time delay increases.
- When selecting an external RT, add the tolerances of the timer and the RT for the full time range adjustment.
- Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm RT. For 1 to 100 S use a 100 K ohm RT.

**Function Diagram**

- V = Voltage
- S1 = Initiate Switch
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD = Time Delay
- t = Incomplete Time Delay
- R = Reset
- ** = Undefined Time

**Notes**
- Must be bolted to a metal surface using the included heat sink compound. The maximum surface temperature is 90°C. Inrush: Non-repetitive for 16ms.
**Description**

The TRB Series combines an isolated, 10A electromechanical relay output with analog timing circuitry. False trigger of the TRB by a transient is unlikely because of the complete isolation of the circuit from the line prior to initiation. The initiate contact is common to one side of the line and may be utilized to operate other loads. Installation is easy due to the TRB’s industry standard 8- or 11-pin plug-in base wiring.

**Operation (Delay-on-Break)**

Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output relay energizes. The time delay begins when the initiate switch is opened (trailing edge triggered). The output remains energized during timing. At the end of the time delay, the output de-energizes. The output will energize if the initiate switch is closed when input voltage is applied.

**Reset:** Reclosing the initiate switch during timing resets the time delay. Loss of input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete isolation of circuit from line</td>
<td>No false trip due to transients</td>
</tr>
<tr>
<td>Industry standard 8 or 11-pin connection</td>
<td>Provides easy installation and field replacement</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT or DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Analog circuitry</td>
<td>Repeat accuracy + /- 2%</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-XX, P1004-XX-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **BZ1 Front Panel Mount Kit**
  Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>OUTPUT FORM</th>
<th>TIME TOLERANCE</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRB120A2Y30</td>
<td>120VAC</td>
<td>Onboard</td>
<td>Octal, SPDT (AC only)</td>
<td>+/- 10%</td>
<td>1 - 30s</td>
</tr>
<tr>
<td>TRB120A3X600</td>
<td>120VAC</td>
<td>Lock shaft</td>
<td>Octal, SPDT (AC only)</td>
<td>+/- 20%</td>
<td>7 - 600s</td>
</tr>
<tr>
<td>TRB120A4Y120</td>
<td>120VAC</td>
<td>Onboard</td>
<td>11-pin, DPDT</td>
<td>+/- 10%</td>
<td>2 - 120s</td>
</tr>
<tr>
<td>TRB24D10Y10</td>
<td>24VDC/28VDC</td>
<td>Fixed</td>
<td>11-pin, DPDT</td>
<td>+/- 10%</td>
<td>10s</td>
</tr>
</tbody>
</table>

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Time Delay Relays
Dedicated — Delay-on-Break

Accessories

NDS-8 Octal 8-pin Socket
8-pin 35mm DIN rail or surface mount. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

NDS-11 11-pin Socket
11-pin 35mm DIN rail or surface mount. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail. Uses PSC11 hold-down clips.

P1011-6 Octal Socket for UL listing*
8-pin surface mount socket with binder head screw terminals. Rated 10A @ 600VAC.

Specifications

Time Delay
Type
Analog circuitry

Range
50ms - 10m in 15 adjustable ranges or fixed

Repeat Accuracy
±2% or 20ms, whichever is greater

Fixed Time Tolerance
& Setting Accuracy
±10%

Initiate Time
≤ 70ms

Reset Time
≤ 75ms

Recycle Time
≤ 250ms

Time Delay vs Temp. & Voltage
±5, 10, or 20%

Input
Voltage
24/28 or 110VDC; 24, 120, or 230VAC

(DC voltages on DPDT output models only)

Tolerance
24VDC/AC
-15% - 20%

10 to 230VAC/DC
-20% - 10%

AC Line Frequency
50/60 Hz

Power Consumption
≤ 3.25W

Output
Type
Electromechanical relay

Form
Isolated SPDT or DPDT

Rating
10A resistive @ 120/240VAC & 28VDC;
1/3 hp @ 120/240VAC

Life
Mechanical - 1 x 10^7; Electrical - 1 x 10^6

Protection
Insulation Resistance
≥ 100 MΩ

Isolation Voltage
≥ 1500V RMS between input to output

Polarity
DC units are reverse polarity protected

Mounting
Plug-in socket

Dimensions
H 91.6 mm (3.62”); W 60.7 mm (2.39”);
D 45.2 mm (1.78”)

Termination
Octal 8-pin plug-in or 11-pin plug-in

Environmental
Operating/Storage
-20° to 65°C / -30° to 85°C

Weight
6 oz (170 g)

Selection Guides

External R, P/N Selection Table

<table>
<thead>
<tr>
<th>VALUE</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1M ohm</td>
<td>P1004-16</td>
</tr>
<tr>
<td>1.5M ohm</td>
<td>P1004-15</td>
</tr>
<tr>
<td>2M ohm</td>
<td>P1004-14</td>
</tr>
<tr>
<td>3M ohm</td>
<td>P1004-12</td>
</tr>
<tr>
<td>5M ohm</td>
<td>P1004-13</td>
</tr>
<tr>
<td>1M ohm</td>
<td>P1004-16-X</td>
</tr>
<tr>
<td>1.5M ohm</td>
<td>P1004-15-X</td>
</tr>
<tr>
<td>2M ohm</td>
<td>P1004-14-X</td>
</tr>
<tr>
<td>3M ohm</td>
<td>P1004-12-X</td>
</tr>
<tr>
<td>5M ohm</td>
<td>P1004-13-X</td>
</tr>
</tbody>
</table>

R_T Selection Chart

<table>
<thead>
<tr>
<th>Range</th>
<th>R_T Selection*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Delay</td>
<td></td>
</tr>
<tr>
<td>Seconds</td>
<td>Megohms</td>
</tr>
<tr>
<td>0.05...1</td>
<td>1.0</td>
</tr>
<tr>
<td>0.05...2</td>
<td>2.0</td>
</tr>
<tr>
<td>0.05...3</td>
<td>3.0</td>
</tr>
<tr>
<td>0.1...5</td>
<td>5.0</td>
</tr>
<tr>
<td>0...10</td>
<td>3.0</td>
</tr>
<tr>
<td>1...30</td>
<td>1.5</td>
</tr>
<tr>
<td>1...60</td>
<td>3.0</td>
</tr>
<tr>
<td>2...120</td>
<td>2.0</td>
</tr>
<tr>
<td>2...180</td>
<td>3.0</td>
</tr>
<tr>
<td>7...240</td>
<td>1.5</td>
</tr>
<tr>
<td>7...300</td>
<td>2.0</td>
</tr>
<tr>
<td>7...360</td>
<td>2.0</td>
</tr>
<tr>
<td>7...420</td>
<td>3.0</td>
</tr>
<tr>
<td>7...480</td>
<td>3.0</td>
</tr>
<tr>
<td>7...600</td>
<td>5.0</td>
</tr>
</tbody>
</table>

* When selecting an external R_T add at least 15...30% for tolerance of unit and the R_T.

Function Diagram

V = Voltage
S1 = Initiate Switch
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset

DELAY-ON-BREAK (OFF-DELAY)

12
TIME DELAY RELAYS

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### Description

The TSB Series is a totally solid-state, delay-on-break timing module. The TSB Series is available with a fixed, external, or onboard adjustable time delay. Time Delays from 0.05 to 600 seconds, in 4 standard ranges, cover over 90% of all OEM and commercial appliance timing applications. The repeat accuracy is ±2%. Operating voltages of 24, 120, or 230VAC are available. The TSB’s 1A steady state, 10A rated, solid-state output is perfect for direct control of solenoids, contactors, relays, lamps, buzzers, and small heaters. The TSB Series can be surface mounted with a single screw, or snapped on a 35 mm DIN rail using the P1023-20 adaptor.

#### Operation (Delay-on-Break)

Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output energizes. The time delay begins when the initiate switch opens. The output remains energized during timing. At the end of the time delay, the output de-energizes. The output will energize if the initiate switch is closed when input voltage is applied.

**Reset:** Reclosing the initiate switch during timing resets the time delay. Loss of input voltage resets the output and the time delay.

### Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuitry</td>
<td>Repeat accuracy + / - 2%, Factory calibration + / - 5%</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Wide time delay range</td>
<td>Meets almost all OEM and commercial appliance timing applications</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid state output</td>
<td>Provides 100 million operations in typical conditions</td>
</tr>
</tbody>
</table>

### Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

### Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSB2190</td>
<td>24VAC</td>
<td>Fixed</td>
<td>90s</td>
</tr>
<tr>
<td>TSB222</td>
<td>24VAC</td>
<td>External</td>
<td>0.5 - 60s</td>
</tr>
<tr>
<td>TSB41300</td>
<td>120VAC</td>
<td>Fixed</td>
<td>300s</td>
</tr>
<tr>
<td>TSB422</td>
<td>120VAC</td>
<td>External</td>
<td>0.5 - 60s</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSB434</td>
<td>120VAC</td>
<td>Onboard</td>
<td>5 - 600s</td>
</tr>
<tr>
<td>TSB632</td>
<td>230VAC</td>
<td>Onboard</td>
<td>0.5 - 60s</td>
</tr>
<tr>
<td>TSB634</td>
<td>230VAC</td>
<td>Onboard</td>
<td>5 - 600s</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
Time Delay Relays
Dedicated — Delay-on-Break

**Accessories**

**P0700-7 Versa-Knob**
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

**P1015-64 (AWG 14/16) Female Quick Connect**
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**P1015-18 Quick Connect to Screw Adapter**
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**Selection Guide**

<table>
<thead>
<tr>
<th>Desired Time Delay* (Seconds)</th>
<th>R_T Selection Chart</th>
<th>R_T (Kohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>1 0.5 2 5 0</td>
<td>0</td>
</tr>
<tr>
<td>0.3</td>
<td>3 6 20 60 10</td>
<td>10</td>
</tr>
<tr>
<td>0.6</td>
<td>6 12 38 120 20</td>
<td>20</td>
</tr>
<tr>
<td>0.9</td>
<td>18 55 180 30</td>
<td>30</td>
</tr>
<tr>
<td>1.2</td>
<td>24 73 240 40</td>
<td>40</td>
</tr>
<tr>
<td>1.5</td>
<td>30 90 300 50</td>
<td>50</td>
</tr>
<tr>
<td>1.8</td>
<td>36 108 360 60</td>
<td>60</td>
</tr>
<tr>
<td>2.1</td>
<td>42 126 420 70</td>
<td>70</td>
</tr>
<tr>
<td>2.4</td>
<td>48 144 480 80</td>
<td>80</td>
</tr>
<tr>
<td>2.7</td>
<td>54 162 540 90</td>
<td>90</td>
</tr>
<tr>
<td>3.0</td>
<td>60 180 600 100</td>
<td>100</td>
</tr>
</tbody>
</table>

* When selecting an external R_T add at least 20% for tolerance of unit and the R_T.

**Specifications**

**Time Delay**
- **Range**: 0.05s - 600s in 4 adjustable ranges or fixed
- **Repeat Accuracy**: ±2% or 20ms, whichever is greater
- **Tolerance**
  - **Factory Calibration**: ≤ ±5%
  - **Time Delay vs Temp. & Voltage**: ≤ ±10%
  - **Reset Time**: ≤ 150ms
- **Input**
  - **Voltage**: 24, 120, or 230VAC
  - **Tolerance**: ±20%
  - **AC Line Frequency**: 50/60 Hz
  - **Power Consumption**: ≤ 2VA
- **Output**
  - **Type**: Solid state
  - **Form**: NO, closed before & during timing
  - **Maximum Load Current**: 1A steady state, 10A inrush at 60°C
  - **Off State Leakage Current**: ≅ 5mA @ 230VAC
  - **Voltage Drop**: ≅ 2.5V @ 1A
- **Protection**
  - **Circuitry**: Encapsulated
  - **Dielectric Breakdown**: ≥ 2000V RMS terminals to mounting surface
  - **Insulation Resistance**: ≥ 100 MΩ
- **Mechanical**
  - **Mounting**: Surface mount with one #10 (M5 x 0.8) screw
  - **Dimensions**:
    - H 50.8 mm (2.0”)
    - W 50.8 mm (2.0”)
    - D 30.7 mm (1.21”)
  - **Termination**: 0.25 in. (6.35 mm) male quick connect terminals
- **Environmental**
  - **Operating/Storage Temperature**: -40° to 75°C / -40° to 85°C
  - **Humidity**: 95% relative, non-condensing
  - **Weight**: ≅ 2.4 oz (68 g)

**Function Diagram**

**DELAY-ON-BREAK (OFF-DELAY)**

- V = Voltage
- S1 = Initiate Switch
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD = Time Delay
- t = Time Delay
- R = Reset
- --- = Undefined Time
**Description**

The TSDB Series is designed for more demanding commercial and industrial applications where small size, and accurate performance are required. The factory calibration for fixed time delays is within 1% of the target time delay. The repeat accuracy, under stable conditions, is 0.5% of the time delay.

The TSDB Series is rated to operate over an extended temperature range. Time delays of 0.1 seconds to 1000 minutes are available. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry.

**Operation (Delay-on-Break)**

Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output energizes. The time delay begins when the initiate switch is opened. The output remains energized during timing. At the end of the time delay, the output de-energizes. The output will energize if the initiate switch is closed when input voltage is applied.

**Reset:** Reclosing the initiate switch during timing resets the time delay. Loss of input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat accuracy + / - 0.5%, Factory calibration + / - 1%</td>
</tr>
<tr>
<td>Compact design</td>
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<tr>
<td>1A Steady, 10A inrush</td>
<td>Provides 100 million operations in typical conditions.</td>
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<td>solid-state output</td>
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<td>Reliable in demanding commercial and industrial applications</td>
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<td>Wide temperature range</td>
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</tr>
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**Accessories**

- **P1004-13, P1004-13-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16)**
  **Female Quick Connect**
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**Reset:** Reclosing the initiate switch during timing resets the time delay. Loss of input voltage resets the time delay and output.

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Time Delay Relays
Dedicated — Delay-on-Break

TSDB SERIES

Accessories

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

External Resistance vs. Time Delay

<table>
<thead>
<tr>
<th>Time Delay Ranges</th>
<th>0.1s</th>
<th>1s</th>
<th>10s</th>
<th>0.1s</th>
<th>1s</th>
<th>10s</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 k</td>
<td>10</td>
<td>1</td>
<td>0.1</td>
<td>10</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>0.5 k</td>
<td>7.5</td>
<td>0.75</td>
<td>0.075</td>
<td>7.5</td>
<td>0.75</td>
<td>0.075</td>
</tr>
<tr>
<td>1 k</td>
<td>5</td>
<td>0.5</td>
<td>0.05</td>
<td>5</td>
<td>0.5</td>
<td>0.05</td>
</tr>
<tr>
<td>2.5 k</td>
<td>2.5</td>
<td>0.25</td>
<td>0.025</td>
<td>2.5</td>
<td>0.25</td>
<td>0.025</td>
</tr>
<tr>
<td>5 k</td>
<td>5</td>
<td>0.5</td>
<td>0.05</td>
<td>5</td>
<td>0.5</td>
<td>0.05</td>
</tr>
<tr>
<td>7.5 k</td>
<td>7.5</td>
<td>0.75</td>
<td>0.075</td>
<td>7.5</td>
<td>0.75</td>
<td>0.075</td>
</tr>
<tr>
<td>10 k</td>
<td>10</td>
<td>1</td>
<td>0.1</td>
<td>10</td>
<td>1</td>
<td>0.1</td>
</tr>
</tbody>
</table>

R_T = External Timing Resistor in Kilohms

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the R_T terminals; as the resistance increases the tie delay increases.

When selecting an external R_T, add the tolerances of the timer and the R_T for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm R_T. For 1 to 100 S use a 100 K ohm R_T.

Specifications

<table>
<thead>
<tr>
<th>Time Delay Range</th>
<th>0.1s - 1000m in 6 adjustable ranges or fixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat Accuracy</td>
<td>±0.5 % or 20ms, whichever is greater</td>
</tr>
<tr>
<td>Absolute Tolerance (Factory Calibration)</td>
<td>≤ ±1%</td>
</tr>
<tr>
<td>Reset Time</td>
<td>≤ 150ms</td>
</tr>
<tr>
<td>Initiate Time</td>
<td>≤ 20ms</td>
</tr>
<tr>
<td>Time Delay &amp; Voltage</td>
<td>≤ ±2%</td>
</tr>
</tbody>
</table>

Input

<table>
<thead>
<tr>
<th>Voltage</th>
<th>12 or 24VDC; 24, 120, or 230VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tolerance</td>
<td>±15%</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>AC ≤ 2VA; DC ≤ 1W</td>
</tr>
<tr>
<td>AC Line Frequency/DC Ripple</td>
<td>50/60Hz / ≤ 10 %</td>
</tr>
</tbody>
</table>

Output

<table>
<thead>
<tr>
<th>Type</th>
<th>Solid state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>NO, closed before &amp; during timing</td>
</tr>
<tr>
<td>Maximum Load Current</td>
<td>1A steady state, 10A inrush at 60°C</td>
</tr>
<tr>
<td>Off State Leakage Current</td>
<td>≤ 5mA @ 230VAC; DC ≤ 1mA</td>
</tr>
<tr>
<td>Voltage Drop</td>
<td>AC = 2.5V @ 1A; DC = 1V @ 1A</td>
</tr>
<tr>
<td>DC Operation</td>
<td>Positive or negative switching</td>
</tr>
</tbody>
</table>

Protection

<table>
<thead>
<tr>
<th>Circuitry</th>
<th>Encapsulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric Breakdown</td>
<td>≥ 2000V RMS terminals to mounting surface</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>≥ 100 MΩ</td>
</tr>
<tr>
<td>Polarity</td>
<td>DC units are reverse polarity protected</td>
</tr>
</tbody>
</table>

Mechanical

| Mounting | Surface mount with one #10 (M5 x 0.8) screw |

Dimensions

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>H: 50.8 mm (2.0”); W: 50.8 mm (2.0”); D: 30.7 mm (1.21”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Termination</td>
<td>0.25 in. (6.35 mm) male quick connect terminals</td>
</tr>
</tbody>
</table>

Environmental

<table>
<thead>
<tr>
<th>Operating/Storage Temperature</th>
<th>-40° to 75°F / -40° to 85°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidity</td>
<td>95% relative, non-condensing</td>
</tr>
<tr>
<td>Weight</td>
<td>2.4 oz (68 g)</td>
</tr>
</tbody>
</table>

Function Diagram

- **DELAY-ON-BREAK (OFF-DELAY)**
- **V** = Voltage
- **S1** = Initiate Switch
- **NO** = Normally Open Contact
- **NC** = Normally Closed Contact
- **TD** = Time Delay
- **t** = Incomplete Time Delay
- **R** = Reset
- **= Undefined Time**

Littelfuse.com/tsdb
**HRDS SERIES**

**Single Shot Timer**

**Description**

The HRDS Series combines an electromechanical relay output with microcontroller timing circuitry. It offers 12 to 230V operation in five options and factory fixed, onboard or external adjustable time delays with a repeat accuracy of ±0.5%. The output contact rating allows for direct operation of heavy loads, such as compressors, pumps, blower motors, heaters, etc. This series is ideal for OEM applications where cost is a factor.

**Operation (Single Shot)**

Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch, the output relay energizes for a measured interval of time. At the end of the delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no affect on the time delay. The output will energize if the initiate switch is closed when input voltage is applied.

**Reset:** Reset occurs when the time delay is complete and the initiate switch is opened. Loss of input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5%</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>Isolated, 30A, SPDT, NO output contacts</td>
<td>Allows direct operation of heavy loads: compressors, pumps, blower motors, heaters.</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16)**
  **Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRDS120</td>
<td>12VDC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>HRDS313M</td>
<td>24VDC</td>
<td>Fixed</td>
<td>3m</td>
</tr>
<tr>
<td>HRDS321</td>
<td>24VDC</td>
<td>Onboard</td>
<td>1 - 100s</td>
</tr>
<tr>
<td>HRDS421</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100s</td>
</tr>
<tr>
<td>HRDS430</td>
<td>120VAC</td>
<td>External</td>
<td>0.1 - 10s</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
HRDS SERIES

Time Delay Relays
Dedicated — Single Shot

Accessories

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

External Resistance vs. Time Delay

![Graph showing external resistance vs. time delay](image)

**In Secs, or Mins.**

<table>
<thead>
<tr>
<th>Time Delay Ranges</th>
<th>10000</th>
<th>1000</th>
<th>100</th>
<th>10</th>
<th>25 k</th>
<th>50 k</th>
<th>75 k</th>
<th>100 k</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>50</td>
<td>1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
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<td>75</td>
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<td>0.1</td>
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<td>0.1</td>
</tr>
<tr>
<td>100</td>
<td>1</td>
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<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
</tbody>
</table>

`R = External Timing Resistor in Kilohms`

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the R terminals, as the resistance increases, the time delay increases.

**Examples:**
- 1 to 50 S adjustable time delay, select time delay range 1 and a 50 k ohm R.
- For 1 to 100 S use a 100 k ohm R.

Specifications

**Time Delay**

<table>
<thead>
<tr>
<th>Type</th>
<th>Microcontroller circuitry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>0.1s - 100m in 5 adjustable ranges or fixed</td>
</tr>
<tr>
<td>Repeat Accuracy</td>
<td>±0.5% or 20 ms, whichever is greater</td>
</tr>
<tr>
<td>Tolerance</td>
<td>±1%, ±5%</td>
</tr>
<tr>
<td>(Factory Calibration)</td>
<td>≤ 150ms</td>
</tr>
<tr>
<td>Reset Time</td>
<td>≤ 20ms</td>
</tr>
<tr>
<td>Initiate Time</td>
<td>≤ 20ms</td>
</tr>
<tr>
<td>Time Delay vs Temp. &amp; Voltage</td>
<td>±2%</td>
</tr>
</tbody>
</table>

**Input**

- **Voltage**
  - 12 or 24VDC, 24, 120, or 230VAC
- **Tolerance**
  - 12VDC & 24VDC: -15% - 20%
  - 24 to 230VAC: -20% - 10%
- **AC Line Frequency**
  - 50/60 Hz
- **Power Consumption**
  - AC ≤ 4VA; DC ≤ 2W

**Output**

- **Type**
  - Electromechanical relay
- **Form**
  - SPDT, non-isolated
- **Ratings**
  - SPDT-NO: 30A, 15A
  - SPDT-NC: 30A, 15A

**Motor Load**

- **125VAC**
  - 1 hp*, 1/4 hp**
  - 2 hp**, 1 hp**
- **240VAC**
  - 2 hp**, 1 hp**

**Protection**

- **Surge**
  - IEEE C62.41-1991 Level A
- **Circuitry**
  - Encapsulated
- **Dielectric Breakdown**
  - ≥ 2000V RMS terminals to mounting surface
- **Insulation Resistance**
  - ≥ 100 MΩ
- **Polarity**
  - DC units are reverse polarity protected

**Mechanical**

- **Mounting**
  - Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**
  - H 76.7 mm (3”); W 51.3 mm (2”); D 38.1 mm (1.5”)
- **Termination**
  - 0.25 in. (6.35 mm) male quick connect terminals
- **Environmental**
  - Temperature: -40° to 60°C/ -40° to 85°C
  - Humidity: 95% relative, non-condensing
  - Weight: 3.9 oz (111 g)

Function Diagram

**SINGLE SHOT (PULSE FORMER)**

- V = Voltage
- S1 = Initiate Switch
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD = Time Delay
- R = Reset

Littelfuse.com/hrds

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Description
The HSPZA22SL is a factory programmed module available in any 1 of 13 standard functions. The HSPZA22SL offers dual switch adjustable timer or counter functions. Switch adjustment allows accurate selection of the time delay or number of counts the first time and every time. The 1A steady, 10A inrush rated solid-state output provides 100 million operations, typical. Its microcontroller timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The HSPZA22SL is a cost effective approach for OEM applications that require small size, solid state reliability, and accurate switch adjustment.

Operation (Single Shot Lockout)
Upon application of input voltage and momentary or maintained closure of S1, the output relay energizes and TD1 single shot time delay begins. The output relay de-energizes at the end of TD1 and the TD2 lockout time delay begins. During TD2 (and TD1) closing switch S1 has no effect on the operation. After TD2 is complete, closing S1 starts another operation. If S1 is closed when input voltage is applied, the output energizes and the TD1 time delay begins.

Reset: Removing input voltage resets the time delays and the output and returns the cycle to the first delay.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.1%</td>
</tr>
<tr>
<td>User selectable time delay</td>
<td>Timing settings are switch selectable 0.1s - 1023h in a dual switch timer function for added flexibility</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid-state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

**P1015-18 Quick Connect to Screw Adapter**
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.
Switch Adjustment

<table>
<thead>
<tr>
<th>Adjustment Switch Operation</th>
<th>Time Delay</th>
<th>Time Delay and Counter</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>0.1</td>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td>25.6</td>
<td>51.2</td>
<td>63</td>
</tr>
</tbody>
</table>

Function Diagrams

V = Voltage
S1 = Initiate Switch
NO = Normally Open Contact
NC = Normally Closed Contact
TD1, TD2 = Time Delay
R = Reset

Specifications

Time Delay
Type: Microcontroller circuitry
Range: 1-1023s, m or h in 1s, m or h increments
Repeat Accuracy: ±0.1% or 20ms, whichever is greater
Setting Accuracy: ≤ ±1% or 20ms, whichever is greater
Reset Time: ≤ 150ms
Initiate Time: ≤ 20ms
Time Delay vs Temp. & Voltage: ≤ ±2%
Count Range: 1 - 1023 in 2 ranges
Count Rate: ≤ 25 counts per second
Input
Voltage: 24 to 240VAC
Tolerance: ≤ ±15%
AC Line Frequency/DC Ripple: 50/60Hz / ≤ 10%
Power Consumption
AC ≤ 2VA; DC ≤ 1W
Output
Type: Solid-state output
Rating: 1A steady, 10A inrush for 16ms
Voltage Drop: AC = 2.5V @ 1A; DC = 1V @ 1A
OFF State Leakage Current: AC = 5mA @ 240VAC; DC = 1mA
Counter Output: Output pulse width: 300ms ±20%
Protection
Circuitry: Encapsulated
Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
Insulation Resistance: ≥ 100 MΩ
Polarity: DC units are reverse polarity protected
Mechanical
Mounting: Surface mount with one #10 (M5 x 0.8) screw
Dimensions: H 76.2 mm (3.0”); W 50.8 mm (2.0”); D 38.1 mm (1.5”)
Termination: 0.25 in. (6.35 mm) male quick connects
Environmental
Operating/Storage
Temperature: -40° to 60°C / -40° to 85°C
Humidity: 95% relative, non-condensing
Weight: 3.9 oz (111 g)
KRDS SERIES

Single Shot

Description
The KRDS Series is a compact time delay relay measuring only 2 in. (50.8 mm) square. Its microcontroller timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The KRDS Series is a cost effective approach for OEM applications that require small size, isolation, reliability, and long life.

Operation (Single Shot)
Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch, the output relay energizes for a measured interval of time. At the end of the delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no affect on the time delay. The output will energize if the initiate switch is closed when input voltage is applied.

Reset: Reset occurs when the time delay is complete and the initiate switch is opened. Loss of input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact, low cost design measuring 2 in.</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>(50.8mm) square</td>
<td></td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5%, Factory calibration</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>To protect against shock, vibration, and</td>
</tr>
<tr>
<td></td>
<td>humidity</td>
</tr>
</tbody>
</table>

Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in. (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16)**
  Female Quick Connect
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRDS1135M</td>
<td>12VDC</td>
<td>Fixed</td>
<td>35m</td>
</tr>
<tr>
<td>KRDS120</td>
<td>12VDC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KRDS221</td>
<td>24VAC/DC</td>
<td>Onboard</td>
<td>1 - 100s</td>
</tr>
<tr>
<td>KRDS420</td>
<td>120VAC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KRDS421</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100s</td>
</tr>
<tr>
<td>KRDS424</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100m</td>
</tr>
<tr>
<td>KRDS430</td>
<td>120VAC</td>
<td>External</td>
<td>0.1 - 10s</td>
</tr>
</tbody>
</table>

If desired part number is not listed, please call us to see if it is technically possible to build.
KRDS SERIES

Time Delay Relays
Dedicated — Single Shot

Accessories

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

External Resistance vs. Time Delay

This chart applies to externally adjustable part numbers.
The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals, as the resistance increases the time delay increases.

When selecting an external RT, add the tolerances of the timer and the RT for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm RT. For 1 to 100 S use a 100 K ohm RT.

Output Current/Ambient Temperature

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>50</td>
<td>9</td>
</tr>
<tr>
<td>60</td>
<td>8</td>
</tr>
<tr>
<td>70</td>
<td>7</td>
</tr>
</tbody>
</table>

Function Diagram

**V** = Voltage
S1 = Initiate Switch
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset

Specifications

**Time Delay**

- **Type**: Microcontroller with watchdog circuitry
- **Range**: 0.1s - 1000m in 6 adjustable ranges or fixed
- **Repeat Accuracy**: ±0.5% or 20ms, whichever is greater
- **Tolerance (Factory Calibration)**: ≤ ±5%
- **Reset Time**: ≤ 150ms
- **Initiate Time**: ≤ 40ms
- **Time Delay vs Temp. & Voltage**: ≤ ±5%

**Input**

- **Voltage**: 12, 24 or 110VDC; 24, 120 or 230VAC
- **Tolerance**: -15% - 20% for 12VDC & 24VDC/AC, -20% - 10% for 110VDC, 120VAC or 230VAC

**Power Consumption**

- **AC**: ≤ 2VA; **DC**: ≤ 2W

**Output**

- **Type**: Isolated relay contacts
- **Form**: SPDT
- **Rating (at 40°C)**: 1A resistive @ 125VAC, 5A resistive @ 230VAC & 28VDC, 1/4 hp @ 125VAC
- **Mechanical Life (Operations)**: Mechanical - 1 x 10^7; Electrical - 1 x 10^5

**Protection**

- **Circuitry**: Encapsulated
- **Isolation Voltage**: ≥ 1500V RMS input to output
- **Insulation Resistance**: ≥ 100 MΩ
- **Polarity**: DC units are reverse polarity protected

**Environmental**

- **Operating/Storage Temperature**: -40° to 60°C/-40° to 85°C
- **Humidity**: 95% relative, non-condensing
- **Weight**: ≈ 2.6 oz (74 g)
Description
The KSDS Series is ideal for applications that require momentary start interval timing including dispensing, exposure timing, or pulse shaping. This series is available for both AC and DC voltages. This series is designed for general purpose commercial and industrial applications where a small, cost effective, reliable solid-state timer is required. The factory calibration for fixed time delays is within 5% of the target time delay. The repeat accuracy, under stable conditions, is 0.5% of the selected time delay. Time delays of 0.1 seconds to 1000 minutes are available in 6 ranges. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry.

Operation (Single Shot)
Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch (leading edge triggered), the output energizes for a measured interval of time. At the end of the delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no affect on the time delay. The output will not energize if the initiate switch is closed when input voltage is applied.

Reset: Reset occurs when the time delay is complete and the initiate switch is opened. Loss of input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5%, Factory calibration +/- 5%</td>
</tr>
<tr>
<td>1A Steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
</tbody>
</table>

Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>SWITCHING MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSDS1115SP</td>
<td>12VDC</td>
<td>Fixed</td>
<td>15s</td>
<td>Positive</td>
</tr>
<tr>
<td>KSDS230</td>
<td>24VAC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>n/a</td>
</tr>
<tr>
<td>KSDS320P</td>
<td>24VAC</td>
<td>External</td>
<td>0.1 - 10s</td>
<td>Positive</td>
</tr>
<tr>
<td>KSDS415M</td>
<td>120VAC</td>
<td>Fixed</td>
<td>5m</td>
<td>n/a</td>
</tr>
<tr>
<td>KSDS420</td>
<td>120VAC</td>
<td>External</td>
<td>0.1 - 10s</td>
<td>n/a</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
**Accessories**

**P1015-18 Quick Connect to Screw Adapter**
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

---

**External Resistance vs. Time Delay**

<table>
<thead>
<tr>
<th>In Secs. or Mins.</th>
<th>1000</th>
<th>100</th>
<th>75</th>
<th>50</th>
<th>25</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.1</td>
<td>0.5</td>
<td>2.5</td>
<td>5</td>
<td>7.5</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>2.5</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>25</td>
<td>20</td>
<td>15</td>
</tr>
</tbody>
</table>

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals; as the resistance increases the time delay increases.

When selecting an external RT, add the tolerances of the timer and the RT for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm RT. For 1 to 100 S use a 100 K ohm RT.

---

**Specifications**

**Time Delay**

- Range: 0.1s - 1000m in 6 adjustable ranges or fixed
- Repeat Accuracy: ±0.5 % or 20ms, whichever is greater
- Tolerance: ≤ ±5%
- Reset Time: ≤ 150ms
- Initiate Time: ≤ 20ms
- Time Delay vs Temp. & Voltage: ≤ ±10%

**Input**

- Voltage: 12 or 24VDC; 24, 120, or 230VAC
- AC Line Frequency/DC Ripple: ≤ ±20%

**AC Line Frequency/DC Ripple**

- Voltage Drop: AC = 2.5V @ 1A; DC = 1V @ 1A
- Power Consumption: AC ≤ 2VA; DC ≤ 1W

**Function Diagram**

**External Resistance vs. Time Delay**

- Voltage (V) = Voltage
- S1 = Initiate Switch
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD = Time Delay
- R = Reset

---

**Environmental**

- Operating/Storage Temperature: -40° to 60°C / -40° to 85°C
- Humidity: 95% relative, non-condensing
- Weight: ≈ 2.4 oz (68 g)
**Description**

The ORS Series’ open PCB construction offers the user good economy without sacrificing performance and reliability. The output relay is available in isolated, 10A, DPDT or SPDT forms. The time delay may be ordered as factory fixed, onboard knob, or external adjustment. All connections are 0.25 in. (6.35 mm) male quick connect terminals.

**Operation (Single Shot)**

Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch (leading edge triggered), the output relay energizes for a measured interval of time. At the end of the time delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no affect on the time delay. The output will energize if the initiate switch is closed when input voltage is applied.

**Reset:** Reset occurs when the time delay is complete and the initiate switch is opened. Loss of input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open PCB construction</td>
<td>Reduces cost without sacrificing performance and reliability</td>
</tr>
<tr>
<td>Analog circuitry</td>
<td>Repeat accuracy + / -2%, Factory calibration + / -10%</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT or DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Line voltage initiation</td>
<td>Separate control voltage is not required for operation</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-12, P1004-12-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16)**
  **Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>OUTPUT FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORS120A150SD</td>
<td>120VAC</td>
<td>Fixed</td>
<td>50s</td>
<td>DPDT</td>
</tr>
<tr>
<td>ORS230A150SD</td>
<td>230VAC</td>
<td>Fixed</td>
<td>50s</td>
<td>DPDT</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
**Selection Guide**

<table>
<thead>
<tr>
<th>Desired Time Delay* (Seconds)</th>
<th>R_T (Megohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td>4</td>
<td>1.2</td>
</tr>
<tr>
<td>5</td>
<td>3.0</td>
</tr>
<tr>
<td>0.05</td>
<td>0.5</td>
</tr>
<tr>
<td>0.5</td>
<td>5.0</td>
</tr>
<tr>
<td>1.0</td>
<td>10</td>
</tr>
<tr>
<td>1.5</td>
<td>15</td>
</tr>
<tr>
<td>2.0</td>
<td>20</td>
</tr>
<tr>
<td>2.5</td>
<td>25</td>
</tr>
<tr>
<td>3.0</td>
<td>30</td>
</tr>
<tr>
<td>3.0</td>
<td>60</td>
</tr>
<tr>
<td>60</td>
<td>120</td>
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<tr>
<td>150</td>
<td>150</td>
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<tr>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>300</td>
<td>300</td>
</tr>
</tbody>
</table>

*When selecting an external R_T add at least 20% for tolerance of unit and the R_T.*

**Specifications**

- **Time Delay**
  - Type: Analog circuitry
  - Range: 0.05 - 300s in 5 adjustable ranges or fixed
  - Repeat Accuracy: ±2% or 20ms, whichever is greater
  - Tolerance (Factory Calibration): Adjustable; guaranteed range
    - Fixed: ±10%
  - Reset Time: ≤ 50ms
  - Initiate Time: ≤ 70ms
  - Time Delay vs Temp. & Voltage: ≤ ±10%

- **Input**
  - Voltage: 24, 120, or 230VAC
  - Tolerance:
    - 24VAC: -15% to 20%
    - 120 & 230VAC: -20% to 10%
  - AC Line Frequency: 50/60 Hz

- **Output**
  - Type: Electromechanical relay
  - Form: Isolated, SPDT or DPDT
  - Rating:
    - 10A resistive @ 120/240VAC & 28VDC
    - 1/3 hp @ 120/240VAC
  - Life:
    - Mechanical: 1x10^7
    - Electrical: 1x10^6

- **Protection**
  - Isolation Voltage: ≥1500V RMS input to output

- **Mechanical**
  - Mounting: Surface mount with four #6 (M3.5 x 0.6) screws
  - Dimensions:
    - Height (H): 53.8 mm (2.12”)
    - Width (W): 93.7 mm (3.69”)
    - Depth (D): 47.8 mm (1.88”)
  - Termination: 0.25 in. (6.35 mm) male quick connect terminals

- **Environmental**
  - Operating/Storage Temperature: -20°C to 65°C / -30°C to 85°C
  - Weight: 2.7 oz (77 g)
**Description**

The PRS65 is a single shot time delay relay for use on non-critical timing applications. The knob adjustable time delay carries a guaranteed time range of up to 8 minutes.

**Operation**

Power must be applied to the input at all times prior to and during timing. Upon closure of the initiate switch (momentary or maintained) the output contacts transfer and the time delay is initiated. At the end of the delay interval, the output contacts revert to their original position. If the initiate switch is reclosed during timing, the time delay will not be affected.

**Features & Benefits**

- Electronic Circuit with Electromechanical Relay
- Popular Operating Voltages
- Octal Plug-in
- Hold Down Clamps Available

**Accessories**

- **BZ1 Front Panel Mount Kit**
  Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

- **NDS-8 Octal 8-pin Socket**
  8-pin 35mm DIN rail or surface mount. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

---

**Specifications**

- **Time Delay**
  - **Type**: Analog circuitry
  - **Range**: 7 to 480 seconds
  - **Repeat Accuracy**: ±2% under fixed conditions
  - **Tolerance**: Knob adjustable: guaranteed range
  - **Reset Time**: 80ms max.
  - **Recycle Time**: 16ms max.
  - **After Timing**: 0.1% of max. time delay or 75ms, whichever is greater
  - **Time Delay vs. Temp. & Voltage**: 15% max.

- **Input**
  - **Voltage**: 230VAC, nominal
  - **Tolerance**: ±15% of nominal
  - **AC Line Frequency**: 50/60 Hz

- **Output**
  - **Type**: Relay
  - **Form**: Single Pole, Double Throw
  - **Rating**: 10 amperes resistive at 240VAC

- **Protection**
  - **Transient**: ±1500 volts for 150 microseconds
  - **Dielectric Breakdown**: ≥1500 V rms min. at 60 Hz between input and output terminals

- **Mechanical**
  - **Mounting**: Plug in (hold-down clips for panel mounting also available)
  - **Termination**: Standard Octal Plug-in
  - **Dimensions**:
    - **H**: 92.2 mm (3.63”); **W**: 60.45 mm (2.38”);
    - **D**: 44.45 mm (1.75”)

- **Environmental**
  - **Operating/Storage Temperature**: -20° to 65°C / -30° to 85°C
  - **Humidity**: 95% relative, non-condensing
  - **Weight**: Approx. 6 oz (170 g)

---

For dimensional drawing see: Appendix, page 515, Figure 48.
**Description**
The TDS Series combines accurate digital circuitry with isolated, 10A rated, DPDT or SPDT relay contacts in an 8-pin or 11-pin plug-in package. The TDS Series features DIP switch selectable time delays ranging from 0.1s to 10,230s in three ranges. The TDS Series is the product of choice for custom control panel and OEM designers.

**Operation (Single Shot)**
Input voltage must be applied to the input before and during timing. Upon momentary or maintained closure of the initiate switch (leading edge triggered), the output relay energizes for a measured interval of time. At the end of the delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no affect on the time delay. The output will energize if the initiate switch is closed when input voltage is applied.

**Reset:** Reset occurs when the time delay is complete and the initiate switch is opened. Loss of input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 time ranges available (0.1s to 2.8h)</td>
<td>Makes it versatile for use in many applications</td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.1% or 20ms, whichever is greater; Setting Accuracy +/- 2% or 50ms, whichever is greater</td>
</tr>
<tr>
<td>LED indication (select models)</td>
<td>Provides visual indication of relay status</td>
</tr>
<tr>
<td>DIP switch adjustment</td>
<td>Provides first time setting accuracy</td>
</tr>
<tr>
<td>Isolated output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
</tbody>
</table>

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>DELAY RANGE (SEC)</th>
<th>LED</th>
<th>PLUG TYPE/OUTPUT FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDS120AL</td>
<td>120VAC</td>
<td>1-1023 in 1s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDS120ALD</td>
<td>120VAC</td>
<td>1-1023 in 1s increments</td>
<td>X</td>
<td>11-pin plug, DPDT</td>
</tr>
<tr>
<td>TDS12D</td>
<td>12VDC</td>
<td>1-1023 in 1s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDS230AL</td>
<td>230VAC</td>
<td>1-1023 in 1s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDS24AL</td>
<td>24VAC</td>
<td>1-1023 in 1s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDSH120AL</td>
<td>120VAC</td>
<td>10-10230 in 10s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDSL120AL</td>
<td>120VAC</td>
<td>0.1-102.3 in 0.1s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
<tr>
<td>TDSL12D</td>
<td>12VDC</td>
<td>0.1-102.3 in 0.1s increments</td>
<td>X</td>
<td>Octal (8-pin) plug, SPDT</td>
</tr>
</tbody>
</table>

*8-pin models UL listed when used in combination with P1011-6 socket only.*

For dimensional drawing see: Appendix, page 512, Figure 23.

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## Accessories

**BZ1 Front Panel Mount Kit**
Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

**NDS-8 Octal 8-pin Socket**
8-pin 35mm DIN rail or surface mount. Rated at 10A @ 300VAC. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

**NDS-11 11-pin Socket**
11-pin 35mm DIN rail or surface mount. Rated at 10A @ 300VAC. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC11 hold-down clips.

**PSC8 or PSC11 Hold-down Clips**
Securely mounts plug-in controls in any position. Provides protection against vibration. Use PSC8 with NDS-8 Octal Socket or PSC11 with NDS-11 Socket. Sold in pairs.

**PSCRB8 Hold-down Brackets**
Designed for use with P1011-6 socket. Securely mounts 8-pin plug-in controls in any position, and provides protection against vibration. Sold in pairs.

**P1011-6 Octal Socket for UL listing**
8-pin surface mount socket with binder head screw terminals. Rated 10A @ 600VAC. Uses PSCBR8 Hold-down Brackets.

*8-pin models UL listed when used in combination with P1011-6 socket only.

## Digi-Set Binary Switch Operation

*For CE approved applications, power must be removed from the unit when a switch position is changed.

## Specifications

**Time Delay**
- **Type**: Digital integrated circuitry
- **Range**: 0.1 - 102.3s in 0.1s increments
  - 1 - 1023s in 1s increments
  - 10 - 10,230s in 10s increments
- **Repeat Accuracy**: ±0.1% or 20ms, whichever is greater
- **Setting Accuracy**: ±2% or 50ms, whichever is greater
- **Reset Time**: ≤ 50ms
- **Recycle Time**: ≤ 150ms
- **Time Delay vs Temp. & Voltage**: ±5%
- **Indicator**: LED glows during timing; relay is energized ≤ 60ms

**Input**
- **Voltage**: 12, 24/28, or 110VDC; 24, 120, or 230VAC
  - **Tolerance**: 12VDC & 24VDC/AC -15% - 20%
  - 110 to 230VAC/DC -20% - 10%
- **AC Line Frequency**: 50/60 Hz
- **Power Consumption**: ≤ 3.25W

**Output**
- **Type**: Electromechanical relay
- **Form**: SPDT or DPDT
- **Rating**: 10A resistive @ 120/240VAC & 28VDC; 1/3 hp @ 120/240VAC
- **Mechanical - 1 x 10⁷; Electrical - 1 x 10⁴**
- **Isolation Voltage**: ≥ 1500V RMS input to output
- **Polarity**: DC units are reverse polarity protected

**Environmental**
- **Operating/Storage Temperature**: -20° to 65°C/-30° to 85°C
- **Weight**: ≈ 6 oz (170 g)

## Function Diagram

**SINGLE SHOT**
- **V**: Voltage
- **S1**: Initiate Switch
- **NO**: Normally Open Contact
- **NC**: Normally Closed Contact
- **TD**: Time Delay
- **R**: Reset
Time Delay Relays
Dedicated — Single Shot

TDUS SERIES

Single Shot Timer

Description
The TDUS Series combines digital timing circuitry with universal voltage operation. Voltages of 24 to 240VAC and 12 to 24VDC are available in three ranges. The TDUS Series offers DIP switch selectable time delays ranging from 0.1 seconds to 102.3 minutes in three ranges. Its 1A rated output, ability to operate on multiple voltages, and wide range of switch selectable time delays make the TDUS Series an excellent choice for process control systems and OEM equipment.

Operation (Single Shot)
Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch (leading edge triggered), the output energizes for a measured interval of time. At the end of the delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no affect on the time delay. The output will energize if the initiate switch is closed when input voltage is applied.

Reset: Reset occurs when the time delay is complete and the initiate switch is opened. Loss of input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / - 0.1%</td>
</tr>
<tr>
<td>Compact design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16)**
  Female Quick Connect
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

For dimensional drawing see: Appendix, page 512, Figure 16.

Wiring Diagram

For dimensional drawing see: Appendix, page 512, Figure 16.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>TIME RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDUS3000A</td>
<td>24 to 120VAC</td>
<td>1 - 1023s</td>
</tr>
<tr>
<td>TDUS3001A</td>
<td>100 to 240VAC</td>
<td>1 - 1023s</td>
</tr>
<tr>
<td>TDUS3002A</td>
<td>12 to 24VDC</td>
<td>1 - 1023s</td>
</tr>
<tr>
<td>TDUSH3001A</td>
<td>100 to 240VAC</td>
<td>0.1 - 102.3m</td>
</tr>
<tr>
<td>TDUSL3000A</td>
<td>24 to 120VAC</td>
<td>0.1 - 102.3s</td>
</tr>
</tbody>
</table>

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**Specifications**

**Time Delay**

- **Range**
  - 0.1 - 102.3s in 0.1s increments
  - 1 - 1023s in 1s increments
  - 0.1 - 102.3m in 0.1m increments

- **Repeat Accuracy** ≤ ±5%
- **Setting Accuracy** ≤ ±5%
- **Reset Time** ≤ 150ms
- **Initiate Time** ≤ 20ms
- **Time Delay vs. Temperature & Voltage** ≤ ±5%

**Input**

- **Voltage/Tolerance**
  - 24 to 240VAC, 12 to 24VDC /±20%
- **AC Line Frequency/DC Ripple**
  - 50/60 Hz / ≤ 10%
- **Power Consumption**
  - AC ≤ 2VA; DC ≤ 1W

**Output**

- **Type**
  - Solid state
- **Form**
  - NO, closed during timing
- **Rating**
  - 1A steady state, 10A inrush at 60°C
- **Voltage Drop**
  - AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A
- **Off State Leakage Current**
  - AC ≅ 5mA @ 230VAC; DC ≅ 1mA

**Protection**

- **Circuitry**
  - Encapsulated
- **Dielectric Breakdown**
  - ≥ 2000V RMS terminals to mounting surface
- **Insulation Resistance**
  - ≥ 100 MΩ
- **Polarity**
  - DC units are reverse polarity protected

**Mechanical**

- **Mounting**
  - Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**
  - H 50.8 mm (2”); W 50.8 mm (2”);
  - D 30.7 mm (1.21”)
- **Termination**
  - 0.25 in. (6.35 mm) male quick connect terminals

**Environmental**

- **Operating/Storage Temperature**
  - -40° to 60°C / -40° to 85°C
- **Humidity**
  - 95% relative, non-condensing
- **Weight** ≅ 2.4 oz (68 g)

*For CE approved applications, power must be removed from the unit when a switch position is changed.

**Adjustment Switch Operation**

<table>
<thead>
<tr>
<th>TIME DELAY</th>
<th>0.1…102.3</th>
<th>1…1023</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>0.2</td>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td>1.6</td>
<td>16</td>
<td>3.2</td>
</tr>
<tr>
<td>12.8</td>
<td>128</td>
<td>25.6</td>
</tr>
</tbody>
</table>

**Function Diagram**

- V = Voltage
- S1 = Initiate Switch
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD = Time Delay
- R = Reset
Description

The THC/THS Series is a solid-state relay and timer combined into one compact, easy-to-use control. When mounted to a metal surface, the THC/THS Series may be used to directly control lamp or heater loads of up to 20A steady, 200A inrush. Its single shot function can perform dispensing and pulse shaping operations. The initiate switch can be a momentary or maintained type of switch. Time delays can be selected from 0.1 - 600 seconds in 4 ranges. The THC/THS Series is used for coin vending applications where fast initiate response is required.

Operation (Single Shot)

Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch (leading edge triggered), the output energizes for a measured interval of time. At the end of the delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no affect on the time delay. The output will energize if the initiate switch is closed when input voltage is applied.

Reset: Reset occurs when the time delay is complete and the initiate switch opens. Loss of input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuitry</td>
<td>Repeat accuracy + / - 2%, Factory calibration + / - 5%</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications and reduces labor and component costs</td>
</tr>
<tr>
<td>High load currents up to 20A, 200A inrush</td>
<td>Allows direct operation of motors, lamps, and heaters directly without a contactor</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Metalized mounting surface</td>
<td>Facilitates heat transfer in high current applications</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>OUTPUT RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>THC421C</td>
<td>120VAC</td>
<td>External</td>
<td>0.1 - 3s</td>
<td>20A</td>
</tr>
<tr>
<td>THS422B</td>
<td>120VAC</td>
<td>External</td>
<td>0.5 - 60s</td>
<td>10A</td>
</tr>
<tr>
<td>THS422C</td>
<td>120VAC</td>
<td>External</td>
<td>0.5 - 60s</td>
<td>20A</td>
</tr>
</tbody>
</table>

Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.
Selection Guide

<table>
<thead>
<tr>
<th>Desired Time Delay* (Seconds)</th>
<th>RT (Kohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0</td>
</tr>
<tr>
<td>0.3</td>
<td>2</td>
</tr>
<tr>
<td>0.5</td>
<td>5</td>
</tr>
<tr>
<td>1.0</td>
<td>10</td>
</tr>
<tr>
<td>1.2</td>
<td>20</td>
</tr>
<tr>
<td>1.5</td>
<td>30</td>
</tr>
<tr>
<td>1.8</td>
<td>50</td>
</tr>
<tr>
<td>2.1</td>
<td>80</td>
</tr>
<tr>
<td>2.4</td>
<td>100</td>
</tr>
<tr>
<td>2.7</td>
<td>120</td>
</tr>
<tr>
<td>3.0</td>
<td>150</td>
</tr>
</tbody>
</table>

* When selecting an external RT, add at least 20% for tolerance of unit and the RT.

Function Diagram

V = Voltage
S1 = Initiate Switch
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset

Specifications

**Time Delay**
- Range: 0.1 - 600s in 4 adjustable ranges or fixed
- Repeat Accuracy: ±2% or 20ms, whichever is greater
- Tolerance (Factory Calibration): ±5%
- Reset Time: ≤ 150ms
- Initiate Time: ≤ 20ms
- Time Delay vs Temp. & Voltage: ≤ ±10%

**Input**
- Voltage: 24, 120, or 230VAC
- Tolerance: ±15%
- AC Line Frequency: 50/60 Hz
- Power Consumption: ≤ 2VA

**Output**
- Type: Solid state
- Form: NO, closed during timing
- Maximum Load Currents:
  - Output Steady State: A 6A, B 10A, C 20A
  - Inrush: 100mA
- Minimum Load Current: 0mA (2.5V at rated current)
- OFF State Leakage Current: 5mA @ 230VAC

**Protection**
- Circuitry: Encapsulated
- Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
- Insulation Resistance: ≥ 100 MΩ
- Mechanical
  - Mounting: Surface mount with one #10 (M5 x 0.8) screw
  - Dimensions: H 50.8 mm (2.0”), W 50.8 mm (2.0”), D 38.4 mm (1.51”)
  - Termination: 0.25 in. (6.35 mm) male quick connect terminals
- Environmental
  - Operating/Storage
    - Temperature: -20°C to 60°C / -40°C to 85°C
    - Humidity: 95% relative, non-condensing
  - Weight: 3.9 oz (111 g)

**Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.**
**Description**

The THDS Series combines accurate timing circuitry with high power solid-state switching. It can switch motors, lamps, and heaters directly without a contactor. You can reduce labor, component cost, and increase reliability with these small, easy-to-use, timers.

**Operation (Single Shot)**

Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch, the output energizes for a measured interval of time. At the end of the delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no affect on the time delay. The output energizes if the initiate switch is closed when input voltage is applied.

**Reset:** Reset occurs when the time delay is complete and the initiate switch is opened. Loss of input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5%, Factory calibration +/- 1%</td>
</tr>
<tr>
<td>High load currents up to 20A, 200A inrush</td>
<td>Allows direct operation of motors, lamps and heaters without a contactor</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Metalized mounting surface</td>
<td>Facilitates heat transfer in high current applications</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications and reduces labor and component costs</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16)**
  **Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**Wiring Diagram**

For dimensional drawing see: Appendix, page 512, Figure 19.

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>OUTPUT RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>THDS410.25SA</td>
<td>120VAC</td>
<td>Fixed</td>
<td>0.25s</td>
<td>6A</td>
</tr>
<tr>
<td>THDS431C</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100s</td>
<td>20A</td>
</tr>
<tr>
<td>THDS610.25SA</td>
<td>230VAC</td>
<td>Fixed</td>
<td>0.25s</td>
<td>6A</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
**External Resistance vs. Time Delay**

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals, as the resistance increases the time delay increases. When selecting an external RT, add the tolerances of the timer and the RT for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm RT. For 1 to 100 S use a 100 K ohm RT.

**Function Diagram**

- V = Voltage
- S1 = Initiate Switch
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD = Time Delay
- R = Reset

- **Specifications**
  - **Time Delay Range**: 0.1s - 1000m in 6 adjustable ranges or fixed
  - **Repeat Accuracy**: ±0.5% or 20ms, whichever is greater
  - **Tolerance** (Factory Calibration): ≤±1%
  - **Reset Time**: ≤150ms
  - **Initiate Time**: ≤20ms
  - **Time Delay vs Temp. & Voltage**: ≤±2%
  - **Input Voltage**: 24, 120, or 230VAC
  - **Tolerance**: ±20%
  - **AC Line Frequency**: 50/60 Hz
  - **Power Consumption**: ≤2VA
  - **Output Type**: Solid state
  - **Form**: NO, closed during timing
  - **Maximum Load Current Output Steady State Inrush**
    - A 6A 60A
    - B 10A 100A
    - C 20A 200A
  - **Voltage Drop**: $\leq 2.5V$ @ rated current
  - **Off State Leakage Current**: $\leq 5mA$ @ 230VAC
  - **Minimum Load Current**: 100mA
  - **Protection**
    - Circuitry: Encapsulated
    - Dielectric Breakdown: $\geq 2000V$ RMS terminals to mounting surface
    - Insulation Resistance: $\geq 100$ MΩ
    - Surface mount with one #10 (M5 x 0.8) screw
    - H 50.8 mm (2.0”); W 50.8 mm (2.0”);
    - D 38.4 mm (1.51”)
    - 0.25 in. (6.35 mm) male quick connect terminals
  - **Environmental Operating/Storage**
    - Temperature: -40° to 60°C / -40° to 85°C
    - Humidity: 95% relative, non-condensing
    - Weight: $\leq 3.9$ oz (111 g)

**Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.**
**Description**

The TRS Series combines an isolated, 10A electromechanical, relay output with analog timing circuitry. False trigger of the TRS Series by a transient is unlikely because of the complete isolation of the circuit from the line prior to initiation. The initiate contact is common to one side of the line and may be utilized to operate other loads. Installation is easy due to the TRS’s industry standard 8 or 11-pin plug-in base wiring.

**Operation (Single Shot)**

Input voltage must be applied to the input before and during timing. Upon momentary or maintained closure of the initiate switch (leading edge triggered), the output energizes for a measured interval of time. At the end of the delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no affect on the time delay. Applying input voltage with the initiate switch closed will energize the load and begin the time delay.

**Reset:** Reset occurs when the time delay is complete and the initiate switch is opened. Loss of input voltage resets the time delay and output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete isolation of circuit from line</td>
<td>No false trip due to transients</td>
</tr>
<tr>
<td>Industry standard octal plug connection</td>
<td>Eliminates need for special connectors</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT or DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Analog circuitry</td>
<td>Repeat accuracy +/− 2%</td>
</tr>
</tbody>
</table>

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>OUTPUT FORM</th>
<th>TIME TOLERANCE</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRS120A2X300</td>
<td>120VAC</td>
<td>Knob</td>
<td>8-Pin, Octal, SPDT</td>
<td>+/− 20%</td>
<td>7 - 300s</td>
</tr>
<tr>
<td>TRS120A2Y10</td>
<td>120VAC</td>
<td>Knob</td>
<td>8-Pin, Octal, SPDT</td>
<td>+/− 10%</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>TRS24D7Z10</td>
<td>24VDC/28VDC</td>
<td>External</td>
<td>11-Pin, SPDT no potentiometer</td>
<td>+/− 5%</td>
<td>0.1 - 10s</td>
</tr>
</tbody>
</table>

If you don't find the part you need, call us for a custom product 800-843-8848
Time Delay Relays
Dedicated — Single Shot

TRS SERIES

Accessories

BZ1 Front Panel Mount Kit
Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

NDS-8 Octal 8-pin Socket
8-pin 35mm DIN rail or surface mount. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

NDS-11 11-pin Socket
11-pin 35mm DIN rail or surface mount. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail. Uses PSC11 hold-down clips.

PSC8 or PSC11 Hold-down Clips
Securely mounts plug-in controls in any position. Provides protection against vibration. Use PSC8 with NDS-8 Octal Socket or PSC11 with NDS-11 Socket. Sold in sets of two.

P1011-6 Octal Socket for UL listing*
8-pin surface mount socket with binder head screw terminals. Rated 10A @ 600VAC.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

*8-pin models UL listed when used in combination with P1011-6 socket only.

Selection Guides

<table>
<thead>
<tr>
<th>R_T</th>
<th>Selection Chart</th>
<th>External R, P/N Selection Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Delay Chart</td>
<td>VALUE</td>
<td>PART NUMBER*</td>
</tr>
<tr>
<td>Range</td>
<td>R_T</td>
<td>Megohm</td>
</tr>
<tr>
<td>0.05...1</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>0.05...2</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>0.05...3</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>0.1...5</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>0.1...10</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>1...30</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>1...60</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>2...120</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>2...180</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>7...240</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>7...300</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>7...360</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>7...420</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>7...480</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>7...600</td>
<td>5.0</td>
<td></td>
</tr>
</tbody>
</table>

* When selecting an external R_T add at least 15...30% for tolerance of unit and the R_T.

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

Specifications

Time Delay

- Analog circuitry
- Type
- Range
- Repeat Accuracy
- Fixed Time Tolerance & Setting Accuracy
- Initiate Time
- Reset Time
- Recycle Time
- Time Delay vs Temp. & Voltage
- Input
- Tolerance
- 24VDC/AC
- 110 to 230VAC/DC
- AC Line Frequency
- Power Consumption
- Output
- Type
- Form
- Rating
- Life
- Protection
- Insulation Resistance
- Isolation Voltage
- Polarity
- Mechanical
- Mounting
- Termination
- Dimensions

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuitry</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0.05s - 10m in 15 adjustable ranges or fixed</td>
</tr>
<tr>
<td>Repeat Accuracy</td>
<td>±2% or 20ms, whichever is greater</td>
</tr>
<tr>
<td>Fixed Time Tolerance &amp; Setting Accuracy</td>
<td>±5, 10, or 20%</td>
</tr>
<tr>
<td>Initiate Time</td>
<td>≤ 70ms</td>
</tr>
<tr>
<td>Reset Time</td>
<td>≤ 75ms</td>
</tr>
<tr>
<td>Recycle Time</td>
<td>≤ 250ms</td>
</tr>
<tr>
<td>Time Delay vs Temp. &amp; Voltage</td>
<td>≤±10%</td>
</tr>
<tr>
<td>Input</td>
<td>24/28 or 110VDC; 24, 120, or 230VAC</td>
</tr>
<tr>
<td>Tolerance</td>
<td>-15% - 20%</td>
</tr>
<tr>
<td>24VDC/AC</td>
<td>-20% - 10%</td>
</tr>
<tr>
<td>110 to 230VAC/DC</td>
<td></td>
</tr>
<tr>
<td>AC Line Frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>≤ 3.25W</td>
</tr>
<tr>
<td>Output</td>
<td>Electromechanical relay</td>
</tr>
<tr>
<td>Type</td>
<td>Isolated SPDT or DPDT</td>
</tr>
<tr>
<td>Form</td>
<td>10A resistive @ 120/240VAC &amp; 28VDC; 1/3 hp @ 120/240VAC</td>
</tr>
<tr>
<td>Rating</td>
<td>Mechanical - 1 x 10^7; Electrical - 1 x 10^6</td>
</tr>
<tr>
<td>Life</td>
<td>DC units are reverse polarity protected</td>
</tr>
<tr>
<td>Protection</td>
<td>≥ 100 MΩ</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>≥ 1500V RMS between input &amp; output terminals</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td></td>
</tr>
<tr>
<td>Polarity</td>
<td></td>
</tr>
<tr>
<td>Mechanical</td>
<td>Plug-in socket</td>
</tr>
<tr>
<td>Mounting</td>
<td>Octal 8-pin plug-in or 11-pin plug-in</td>
</tr>
<tr>
<td>Termination</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>H 60.7 mm (2.39”); W 45.2 mm (1.78”); D 91.6 mm (3.62”)</td>
</tr>
<tr>
<td>Environmental</td>
<td></td>
</tr>
<tr>
<td>Operating/Storage</td>
<td>-20° to 65°C/-30° to 85°C</td>
</tr>
<tr>
<td>Temperature</td>
<td>Weight</td>
</tr>
<tr>
<td>Weight</td>
<td></td>
</tr>
</tbody>
</table>

* Externally adjustable potentiometers. Numbers with additional “-X” include two pre-soldered 8” wire leads with 1/4” female quick-connect terminals (for clockwise increase).
Description

The TSDS Series is designed for more demanding commercial and industrial applications where small size and accurate performance are required. The factory calibration for fixed time delays is within 1% of the target time delay. The repeat accuracy, under stable conditions, is 0.5% of the time delay. The TSDS Series is rated to operate over an extended temperature range. Time delays of 0.1 seconds to 1000 minutes are available. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry. This product is suitable for many applications, including dispensing, welding, and exposure timing.

Operation (Single Shot)

Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch, the output energizes for a measured interval of time. At the end of the delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no affect on the time delay. The output will not energize if the initiate switch is closed when input voltage is applied.

Reset: Reset occurs when the time delay is complete and the initiate switch is opened. Loss of input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact, low cost design measuring 2 in. (50.8mm) square</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5%, Factory calibration +/- 1%</td>
</tr>
<tr>
<td>1A Steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Wide temperature range: -40° to 75°C</td>
<td>Reliable in demanding commercial and industrial applications</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>SWITCHING MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSDS2110S</td>
<td>24VAC</td>
<td>Fixed</td>
<td>10s</td>
<td>n/a</td>
</tr>
<tr>
<td>TSDS320N</td>
<td>24VDC</td>
<td>External</td>
<td>0.1 - 10s</td>
<td>Negative</td>
</tr>
<tr>
<td>TSDS321P</td>
<td>24VDC</td>
<td>External</td>
<td>1 - 100s</td>
<td>Positive</td>
</tr>
<tr>
<td>TSDS421</td>
<td>120VAC</td>
<td>External</td>
<td>1 - 100s</td>
<td>n/a</td>
</tr>
</tbody>
</table>

If you don't find the part you need, call us for a custom product 800-843-8848

Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.
Accessories

P1015-64 (AWG 14/16)
Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

External Resistance vs. Time Delay

This chart applies to externally adjustable part numbers.
The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals; as the resistance increases the time delay increases.

When selecting an external RT, add the tolerances of the timer and the RT for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm RT. For 1 to 100 S use a 100 K ohm RT.

Function Diagram

V = Voltage
S1 = Initiate Switch
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset

Specifications

Time Delay
- Range: 0.1s - 1000m in 6 adjustable ranges or fixed
- Repeat Accuracy: ±0.5% or 20ms, whichever is greater
- Tolerance: ±1%
- Reset Time: ≤ 150ms
- Time Delay vs Temp. & Voltage: ≤ ±2%

Input
- Voltage: 12 or 24VDC; 24, 120, or 230VAC
- Tolerance: ±15%

Power Consumption
- AC: ≤ 2VA
- DC: ≤ 1W

AC Line Frequency/DC Ripple
- AC: 50/60 Hz
- DC: ≤ 10%

Output
- Type: Solid state
- Form: NO, closed during timing
- Maximum Load Current: 1A steady state, 10A inrush at 60°C
- Voltage Drop: AC: 2.5V @ 1A; DC: 1V @ 1A
- Off State Leakage Current: AC: 5mA @ 230VAC; DC: 1mA
- DC Operation: Positive or negative switching

Protection
- Circuitry: Encapsulated
- Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
- Insulation Resistance: ≥ 100 MΩ
- DC units are reverse polarity protected

Mechanical
- Mounting: Surface mount with one #10 (M5 x 0.8) screw
- Dimensions: H 50.8 mm (2.0”); W 50.8 mm (2.0”); D 30.7 mm (1.21”)
- Termination: 0.25 in. (6.35 mm) male quick connect terminals

Environmental
- Operating/Storage
  - Temperature: -40° to 75°C / -40° to 85°C
  - Humidity: 95% relative, non-condensing
- Weight: ≅ 2.4 oz (68 g)
Description
The TSS Series is a totally solid-state timing module. Its 1A rated, solid-state output provides an excellent method of time control for exposures, dispensing, or for increasing or decreasing a switch closure. Time delays from 0.05 to 600 seconds, in 4 ranges, cover 90% of all OEM applications. Factory calibration of fixed delays is ±5% and the repeat accuracy is ±2%. The TSS Series can be surface mounted with a single screw, or snapped on a 35mm DIN rail using the P1023-20 accessory adaptor.

Operation (Single Shot)
Voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch, the output energizes for a measured interval of time. At the end of the delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no affect on the time delay. The output will energize if the initiate switch is closed when input voltage is applied.

Reset: Reset occurs when the time delay is complete and the initiate switch opens. Loss of input voltage resets the time delay and output.

Features & Benefits
<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuitry</td>
<td>Repeat accuracy +/- 2%,</td>
</tr>
<tr>
<td></td>
<td>Factory calibration +/- 5%</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Surface or DIN rail mounting</td>
<td>Provides flexibility for installation</td>
</tr>
</tbody>
</table>

Accessories
- **P1004-95, P1004-95-X Versa-Pot**  
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.
- **P1023-6 Mounting bracket**  
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.
- **P0700-7 Versa-Knob**  
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.
- **P1015-64 (AWG 14/16)**  
  Female Quick Connect  
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

Ordering Information
<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSS410.5</td>
<td>120VAC</td>
<td>Fixed</td>
<td>0.5s</td>
</tr>
<tr>
<td>TSS421</td>
<td>120VAC</td>
<td>External</td>
<td>0.05 - 3s</td>
</tr>
<tr>
<td>TSS422</td>
<td>120VAC</td>
<td>External</td>
<td>0.5 - 60s</td>
</tr>
<tr>
<td>TSS424</td>
<td>120VAC</td>
<td>External</td>
<td>5 - 600s</td>
</tr>
<tr>
<td>TSS622</td>
<td>230VAC</td>
<td>External</td>
<td>0.5 - 60s</td>
</tr>
<tr>
<td>TSS624</td>
<td>230VAC</td>
<td>External</td>
<td>5 - 600s</td>
</tr>
</tbody>
</table>

If desired part number is not listed, please call us to see if it is technically possible to build.
**Time Delay Relays**

**TSS SERIES**

**Accessories**

**P1015-18 Quick Connect to Screw Adapter**
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**Specifications**

**Time Delay**
- Range: 0.05s - 600s in 4 adjustable ranges or fixed
- Repeat Accuracy: ±2% or 20ms, whichever is greater
- Tolerance (Factory Calibration): ≤ ±5%
- Reset Time: ≤ 150ms
- Initiate Time: ≤ 20ms
- Time Delay vs Temp. & Voltage: ≤ ±10%

**Input**
- Voltage: 24, 120, or 230VAC
- Tolerance: ±20%
- AC Line Frequency: 50/60 Hz
- Power Consumption: ≤ 2VA

**Output**
- Type: Solid state
- Form: NO, closed during timing
- Maximum Load Current: 1A steady state, 10A inrush at 60°C
- Off State Leakage Current: ≅ 5mA @ 230VAC
- Voltage Drop: ≅ 2.5V @ 1A

**Protection**
- Circuitry: Encapsulated
- Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
- Insulation Resistance: ≥ 100 MΩ

**Mechanical**
- Mounting: Surface mount with one #10 (M5 x 0.8) screw
- Dimensions: H 50.8 mm (2.0”); W 50.8 mm (2.0”); D 30.7 mm (1.21”)
- Termination: 0.25 in. (6.35 mm) male quick connect terminals

**Environmental**
- Operating/Storage Temperature: -40° to 75°C / -40° to 85°C
- Humidity: 95% relative, non-condensing
- Weight: 2.4 oz (68 g)

**Selection Guide**

<table>
<thead>
<tr>
<th>Desired Time Delay* (Seconds)</th>
<th>R&lt;sub&gt;T&lt;/sub&gt; (Kohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>2</td>
</tr>
<tr>
<td>0.3</td>
<td>6</td>
</tr>
<tr>
<td>0.6</td>
<td>12</td>
</tr>
<tr>
<td>0.9</td>
<td>18</td>
</tr>
<tr>
<td>1.2</td>
<td>24</td>
</tr>
<tr>
<td>1.5</td>
<td>30</td>
</tr>
<tr>
<td>1.8</td>
<td>36</td>
</tr>
<tr>
<td>2.1</td>
<td>42</td>
</tr>
<tr>
<td>2.4</td>
<td>48</td>
</tr>
<tr>
<td>2.7</td>
<td>54</td>
</tr>
<tr>
<td>3.0</td>
<td>60</td>
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<tr>
<td>3.6</td>
<td>72</td>
</tr>
<tr>
<td>4.0</td>
<td>80</td>
</tr>
<tr>
<td>4.5</td>
<td>90</td>
</tr>
<tr>
<td>5.0</td>
<td>100</td>
</tr>
</tbody>
</table>

* When selecting an external R<sub>T</sub> add at least 20% for tolerance of unit and the R<sub>T</sub>.

**Function Diagram**

- V = Voltage
- S1 = Initiate Switch
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD = Time Delay
- R = Reset

- **1FL**

- **PULSE FORMER**
Description
Econo-Timers are a combination of digital electronics and an electromechanical relay. DPDT relay output for relay logic circuits, and isolation of input to output voltages. For applications, such as interval on, pulse shaping, minimum run time, etc. The ERD Series is encapsulated to protect the circuitry from shock, vibration and humidity.

Operation (Interval)
Upon application of input voltage, time delay begins, and output relay energizes. At the end of time delay, output de-energizes until input voltage is removed.

Reset: Removing input voltage resets the time delay and the output.

Operation (Single Shot)
Input voltage must be applied before and during timing. Upon momentary or maintained closure of initiate switch, output relay energizes for time delay. At the end of the delay, output de-energizes. Opening or reclosing initiate switch during timing has no affect on time delay. Output will energize if initiate switch is closed when input voltage is applied.

Reset: Reset occurs when time delay is complete & initiate switch is opened. Loss of input voltage resets time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital integrated circuitry</td>
<td>Repeat Accuracy +/- 0.5%, Factory calibration +/- 10%</td>
</tr>
<tr>
<td>Isolated, 10A, DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

P1004-16, P1004-16-X Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

P1015-64 (AWG 14/16)
Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERDI436</td>
<td>120VAC</td>
<td>External</td>
<td>0.6 - 60s</td>
</tr>
<tr>
<td>ERDI6210</td>
<td>230VAC</td>
<td>Onboard</td>
<td>1 - 100m</td>
</tr>
</tbody>
</table>

If you don't find the part you need, call us for a custom product 800-843-8848

For dimensional drawing see: Appendix, page 512, Figure 25.
Selection Guides

### Rₜ Selection Chart

<table>
<thead>
<tr>
<th>Desired Time Delay*</th>
<th>Rₜ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seconds</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>2</td>
<td>0.19</td>
</tr>
<tr>
<td>3</td>
<td>0.28</td>
</tr>
<tr>
<td>4</td>
<td>0.37</td>
</tr>
<tr>
<td>5</td>
<td>0.45</td>
</tr>
<tr>
<td>6</td>
<td>0.55</td>
</tr>
<tr>
<td>7</td>
<td>0.64</td>
</tr>
<tr>
<td>8</td>
<td>0.73</td>
</tr>
<tr>
<td>9</td>
<td>0.82</td>
</tr>
<tr>
<td>10</td>
<td>0.91</td>
</tr>
<tr>
<td>11</td>
<td>1.0</td>
</tr>
</tbody>
</table>

*When selecting an external Rₜ add at least 20% for tolerance of unit and the Rₜ.

### Rₜ Selection Chart

<table>
<thead>
<tr>
<th>Desired Time Delay*</th>
<th>Rₜ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.1</td>
</tr>
<tr>
<td>8</td>
<td>0.6</td>
</tr>
<tr>
<td>9</td>
<td>1.1</td>
</tr>
<tr>
<td>10</td>
<td>1.6</td>
</tr>
<tr>
<td>11</td>
<td>2.1</td>
</tr>
<tr>
<td>12</td>
<td>2.6</td>
</tr>
<tr>
<td>13</td>
<td>3.0</td>
</tr>
<tr>
<td>14</td>
<td>3.5</td>
</tr>
<tr>
<td>15</td>
<td>4.0</td>
</tr>
<tr>
<td>16</td>
<td>4.5</td>
</tr>
<tr>
<td>17</td>
<td>5.0</td>
</tr>
</tbody>
</table>

*When selecting an external Rₜ add at least 20% for tolerance of unit and the Rₜ.

Specifications

### Time Delay

- **Type**: Digital integrated circuitry
- **Range**: 0.1s - 500m in 11 adjustable ranges, 0.1s - 1000m fixed
- **Adjustment**: External adjust or onboard
- **Repeat Accuracy**: ±0.5%
- **Tolerance**: (Factory Calibration) ≤ ±10%
- **Reset Time**: ≤ 150ms
- **Time Delay vs Temp. & Voltage**: ≤ ±2%

### Input

- **Voltage**: 120VAC or 230VAC
- **Tolerance**: 120VDC/AC & 230VAC -20% - 10%
- **AC Line Frequency**: 50/60 Hz

### Output

- **Type**: Isolated relay contacts
- **Form**: DPDT
- **Rating**: 10A resistive @ 120/240VAC & 28VDC, 1/3 hp @ 120/240VAC
- **Life**: Mechanical - 1 x 10⁷; Electrical - 1 x 10⁶
- **Protection**: Isolation Voltage ≥ 1500V RMS input to output
- **Insulation Resistance**: ≥ 100 MΩ
- **Polarity**: DC units are reverse polarity protected

### Mechanical

- **Mounting**: Surface mount with two #6 (M3.5 x 0.6) screws
- **Dimensions**: H 88.9 mm (3.5”); W 63.5 mm (2.5”); D 43.2 mm (1.7”)
- **Termination terminals**: 0.25 in. (6.35 mm) male quick connect

### Environmental

- **Temperature**: -40° to 65°C / -40° to 85°C
- **Weight**: 5.7 oz (162 g)

Function Diagrams

**INTERVAL (IMPULSE-ON)**

- **V** = Voltage
- **NO** = Normally Open Contact
- **NC** = Normally Closed Contact
- **TD** = Time Delay
- **R** = Reset
- **= Undefined Time**

**SINGLE SHOT (PULSE FORMER)**

- **V** = Voltage
- **S1** = Initiate Switch
- **NO** = Normally Open Contact
- **NC** = Normally Closed Contact
- **TD** = Time Delay
- **R** = Reset

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Description
The HRDI Series combines an electromechanical relay output with microcontroller timing circuitry. It offers 12 to 230V operation in five ranges and factory fixed, external, or onboard adjustable time delays with a repeat accuracy of ±0.5%. The output contact rating allows for direct operation of heavy loads, such as compressors, pumps, blower motors, heaters, etc. This series is ideal for OEM applications where cost is a factor.

Operation (Interval)
Upon application of input voltage, the time delay begins. The output relay is energized during the time delay. At the end of the time delay, the output de-energizes and remains de-energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and the output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5%</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>Isolated, 30A, SPDT, NO output contacts</td>
<td>Allows direct operation of heavy loads: compressors, pumps, blower motors, heaters.</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity.</td>
</tr>
</tbody>
</table>

Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

For dimensional drawing see: Appendix, page 512, Figure 17.
**External Resistance vs. Time Delay**

<table>
<thead>
<tr>
<th>In Secs. or Mins.</th>
<th>1000</th>
<th>100</th>
<th>10</th>
<th>750</th>
<th>75</th>
<th>7.5</th>
<th>500</th>
<th>50</th>
<th>5.0</th>
<th>250</th>
<th>25</th>
<th>2.5</th>
<th>100</th>
<th>10</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Delay Ranges</td>
<td>1/4</td>
<td>1/4</td>
<td>1/4</td>
<td>1/4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This chart applies to externally adjustable part numbers.
The time delay is adjustable over the time delay range selected by varying the resistance across the R<sub>t</sub> terminals; as the resistance increases the time delay increases.
When selecting an external R<sub>t</sub>, add the tolerances of the timer and the R<sub>t</sub> for the full time range adjustment.
Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm R<sub>t</sub>. For 1 to 100 S use a 100 K ohm R<sub>t</sub>.

**Function Diagram**

1. INTERVAL (IMPULSE-ON)
2. V = Voltage
   - NO = Normally Open Contact
   - NC = Normally Closed Contact
3. TD = Time Delay
4. R = Reset
5. = Undefined Time

**Specifications**

**Time Delay**
- **Type**: Microcontroller circuitry
- **Range**: 0.1 s - 100 m in 5 adjustable ranges or fixed
- **Repeat Accuracy**: ±0.5 % or 20 ms, whichever is greater
- **Tolerance** (Factory Calibration): ±1%, ±5%
- **Recycle Time**: ≤ 150 ms
- **Time Delay vs Temp. & Voltage**: ±2%

**Input**
- **Voltage**
  - 12 or 24VDC, 24, 120, or 230VAC
- **Tolerance**
  - 12VDC & 24VDC: -15% - 20%
  - 24 to 230VAC: -20% - 10%

**AC Line Frequency**
- 50/60 Hz

**Power Consumption**
- AC ≤ 4 VA
- DC ≤ 2 W

**Output**
- **Type**: Electromechanical relay
- **Form**: SPDT, non-isolated

<table>
<thead>
<tr>
<th>Ratings</th>
<th>SPDT-NO</th>
<th>SPDT-NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose</td>
<td>125/240VAC</td>
<td>30A</td>
</tr>
<tr>
<td>Resistive</td>
<td>125/240VAC</td>
<td>28VDC</td>
</tr>
<tr>
<td>Motor Load</td>
<td>125VAC</td>
<td>1 hp*</td>
</tr>
<tr>
<td>Life</td>
<td>240VAC</td>
<td>2 hp**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surge</td>
</tr>
<tr>
<td>Circuitry</td>
</tr>
<tr>
<td>Dielectric Breakdown</td>
</tr>
<tr>
<td>Insulation Resistance</td>
</tr>
<tr>
<td>Polarity</td>
</tr>
<tr>
<td>Mechanical</td>
</tr>
</tbody>
</table>

**Environmental**
- **Operating/Storage Temperature**: -40° to 60°C / -40° to 85°C
- **Humidity**: 95% relative, non-condensing
- **Weight**: ≈ 3.9 oz (111 g)
Description
The KRDI Series is a compact time-delay relay measuring only 2 in. (50.8 mm) square. Its solid-state timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The KRDI Series is a cost effective approach for OEM applications that require small size, isolation, reliability, and long life.

Operation (Interval)
Upon application of input voltage, the time delay begins. The output relay energizes during the time delay. At the end of the time delay, the output de-energizes and remains de-energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and the output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact, low cost design measuring 2 in. (50.8mm) square</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5%, Factory calibration +/- 5%</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

P1004-95, P1004-95-X Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P1023-6 Mounting bracket
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

P1015-13 (AWG 10/12), P1015-64 (AWG 14/16) Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRDI120</td>
<td>12VDC</td>
<td>Onboard knob</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KRDI121</td>
<td>12VDC</td>
<td>Onboard knob</td>
<td>1 - 100s</td>
</tr>
<tr>
<td>KRDI122</td>
<td>12VDC</td>
<td>Onboard knob</td>
<td>10 - 1000s</td>
</tr>
<tr>
<td>KRDI1210S</td>
<td>24VAC/VDC</td>
<td>Fixed</td>
<td>10s</td>
</tr>
<tr>
<td>KRDI160S</td>
<td>24VAC/VDC</td>
<td>Fixed</td>
<td>60s</td>
</tr>
<tr>
<td>KRDI220</td>
<td>24VAC/VDC</td>
<td>Onboard knob</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KRDI320</td>
<td>24VDC</td>
<td>Onboard knob</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KRDI420</td>
<td>120VAC</td>
<td>Onboard knob</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KRDI424</td>
<td>120VAC</td>
<td>Onboard knob</td>
<td>1 - 100m</td>
</tr>
</tbody>
</table>

For dimensional drawing see: Appendix, page 512, Figure 16.

If you don't find the part you need, call us for a custom product 800-843-8848
## Accessories

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

## Specifications

### Time Delay
- **Range** 0.1s - 100m in 5 adjustable ranges or fixed
- **Repeat Accuracy** ±0.5% or 20ms, whichever is greater
- **Tolerance** (Factory Calibration) ≤ ±5%
- **Reset Time** ≤ 150ms
- **Time Delay vs Temp. & Voltage** ≤ ±5%

### Input
- **Voltage**
  - 12, 24 or 110VDC, 24, 120 or 230VAC
- **Tolerance**
  - 12VDC & 24VDC/AC
    - -15% - 20%
  - 110VDC, 120VAC or 230VAC
    - -20% - 10%
- **AC Line Frequency/DC Ripple**
  - 50/60 Hz / ≤ 10%

### Power Consumption
- **AC** ≤ 2VA; **DC** ≤ 2W

### Output
- **Type** Isolated relay contacts
- **Form** SPDT
- **Rating (at 40°C)**
  - 10A resistive @ 125VAC;
  - 5A resistive @ 230VAC & 28VDC;
  - 1/4 hp @ 125VAC
- **Max. Switching Voltage**
  - 250VAC
- **Life (Operations)**
  - Mechanical - 1 x 10⁷; Electrical - 1 x 10⁵

### Protection
- **Circuitry** Encapsulated
- **Isolation Voltage**
  - ≤ 1500V RMS input to output
- **Insulation Resistance** ≥ 100 MΩ
- **Polarity** DC units are reverse polarity protected

### Mechanical
- **Mounting** Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**
  - H 50.8 mm (2”);
  - W 50.8 mm (2”);
  - D 30.7 mm (1.21”)
- **Termination**
  - 0.25 in. (6.35 mm) male quick connect terminals
- **Environmental**
  - Operating/Storage: -20° to 60°C / -40° to 85°C
  - Humidity: 95% relative, non-condensing
  - Weight: ≈ 2.6 oz (74 g)

### External Resistance vs. Time Delay

![Graph showing the relationship between external resistance and time delay.](image)

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the Rₜ terminals, as the resistance increases the time delay increases. When selecting an external Rₜ, add the tolerances of the timer and the Rₜ for the full time range adjustment. Examples: 1 to 20 s adjustable time delay, select time delay range 1 and a 50 K ohm Rₜ; For 1 to 100 S use a 100 K ohm Rₜ.

### Output Current/Ambient Temperature

![Graph showing the relationship between output current and ambient temperature.](image)

### Function Diagram

![Diagram showing the function of KRDI series time delay relays.](image)

V = Voltage  
NO = Normally Open Contact  
NC = Normally Closed Contact  
Rₜ = External Timing Resistor in Kilohms  
TD = Time Delay  
R = Reset  
Undefined Time
**KSD2 SERIES**

**Interval Timer**

**Description**

The KSD2 Series is designed for general purpose commercial and industrial applications where a small, cost effective, reliable, solid-state timer is required. The factory calibration for fixed time delays is within 5% of the target time delay. The repeat accuracy, under stable conditions, is 0.5% of the selected time delay. This series is designed for input voltages of 24, 120 or 230VAC. Time delays of 0.1 seconds to 1000 minutes are available in 6 ranges. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry. An excellent choice for most OEM pulse shaping, maximum run time, and other process control applications.

**Operation (Interval)**

Upon application of input voltage, the time delay begins. The output energizes during the time delay. At the end of the time delay, the output de-energizes and remains de-energized until input voltage is removed.

**Reset:** Removing input voltage resets the time delay and the output.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / - 0.5%, + / - 5% time delay accuracy</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A Steady solid-state output, 10A inrush</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16)**
  Female Quick Connect
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE VAC</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSD2221</td>
<td>24</td>
<td>External</td>
<td>1 - 100s</td>
</tr>
<tr>
<td>KSD2413M</td>
<td>120</td>
<td>Fixed</td>
<td>3m</td>
</tr>
<tr>
<td>KSD2420</td>
<td>120</td>
<td>External</td>
<td>0.1 - 10s</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8849
**Accessories**

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**Specifications**

**Time Delay**
- Range: 0.1s - 1000m in 6 adjustable ranges or fixed
- Repeat Accuracy: ±0.5% or 20ms, whichever is greater
- Tolerance: (Factory Calibration) ≤ ±5%
- Reset Time: ≤ 150ms
- Time Delay vs. Temperature & Voltage: ≤ ±10%

**Input**
- Voltage: 24, 120, or 230VAC
- Tolerance: ±20%
- AC Line Frequency: 50/60 Hz
- Power Consumption: ≤ 2VA

**Output**
- Type: Solid state
- Form: NO, closed during timing
- Maximum Load Current: 1A steady state, 10A inrush at 60°C
- OFF State Leakage Current: ≤ 5mA @ 230VAC
- Voltage Drop: ≤ 2.5V @ 1A

**Protection**
- Circuitry: Encapsulated
- Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
- Insulation Resistance: ≥ 100 MΩ

**Mechanical**
- Mounting: Surface mount with one #10 (M5 x 0.8) screw
- Dimensions: H 50.8 mm (2”), W 50.8 mm (2”); D 30.7 mm (1.21”)
- Termination: 0.25 in. (6.35 mm) male quick connect terminals

**Environmental**
- Operating/Storage Temperature: -40° to 60°C / -40° to 85°C
- Humidity: 95% relative, non-condensing
- Weight: ≅ 2.4 oz (68 g)

**External Resistance vs. Time Delay**

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the $R_T$ terminals, as the resistance increases the time delay increases.

When selecting an external $R_T$, add the tolerances of the timer and the $R_T$ for the full time range adjustment.

**Examples:** 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm $R_T$. For 1 to 100 S use a 100 K ohm $R_T$.

**Function Diagram**

- V = Voltage
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD = Time Delay
- R = Reset
- _ = Undefined Time

---

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**Description**

The KSPU Series is a factory programmed module available in any 1 of 14 standard functions. The KSPU offers a single adjustable timer or counter function. Switch adjustment allows accurate selection of the time delay or number of counts the first time and every time. The 1A steady, 10A inrush rated solid-state output provides 100 million operations, typical. Its microcontroller timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The KSPU Series is a cost effective approach for OEM applications that require small size, solid state reliability, and accurate switch adjustment.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / - 0.1%</td>
</tr>
<tr>
<td>Compact design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1015-64** (AWG 14/16), **P1015-14** (AWG 18/22) *Female Quick Connect*
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**Wiring Diagram**

![Wiring Diagram](image)

*V = Voltage  
S1 = Initiate Switch  
L = Load  
UTL = Untimed Load*

For dimensional drawing see: Appendix, page 512, Figure 16.

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>TIME DELAY/COUNTS</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSPUA2I</td>
<td>24 to 240VAC</td>
<td>1 - 1023s</td>
<td>Interval</td>
</tr>
<tr>
<td>KSPUABC</td>
<td>24 to 240VAC</td>
<td>1 - 1023 counts (binary) with pulsed output</td>
<td>Counter with pulsed output</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
Specifications

Time Delay

Range*  
0.1 - 102.3s, m or h in 0.1s, m or h increments  
1 - 1023s, m or h in 1s, m or h increments  
1 - 63s or m in 1s or m increments

Repeat Accuracy  
±0.1% or 20 ms, whichever is greater

Setting Accuracy  
±1% or 20 ms, whichever is greater

Reset Time  
≤ 150ms

Initiate Time  
≤ 20ms

Time Delay vs. Temperature & Voltage  
≤ ±2%

Input

Voltage/Tolerance  
24 to 240VAC, 12 to 120VDC/≤ ±15%

AC Line Frequency/DC Ripple  
50/60 Hz/≤ 10%

Power Consumption  
AC ≤ 2VA; DC ≤ 1W

Output

Type  
Solid state

Form  
NO, SPST-NO

Rating  
1A steady state, 10A inrush for 16ms

Voltage Drop  
AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A

Off State Leakage Current  
AC ≅ 5mA @ 240VAC; DC ≅ 1mA

Counter Output  
Output pulse width: 300ms ±20%

Time Delay/Counts Variable 7 & 8

Protection

Circuitry  
Encapsulated

Dielectric Breakdown  
≥ 2000V RMS terminals to mounting surface

Insulation Resistance  
≥ 100 MΩ

Polarity  
DC units are reverse polarity protected

Mechanical

Mounting  
Surface mount with one #10 (M5 x 0.8) screw

Dimensions  
H 50.8 mm (2”); W 50.8 mm (2”);  
D 30.7 mm (1.21”)

Termination

Environmental

Operating/Storage Temperature  
-40° to 60°C / -40° to 85°C

Humidity  
95% relative, non-condensing

Weight  
≈ 2.4 oz (68 g)

*For CE approved applications, power must be removed from the unit when a switch position is changed.

Adjustment Switch Operation

<table>
<thead>
<tr>
<th>TIME DELAY</th>
<th>COUNTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1…102.3</td>
<td>1…165</td>
</tr>
<tr>
<td>1…63</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Function Diagrams

**Delay-on-Make (On-Delay)**

V = Voltage

NO = Normally Open Contact

NC = Normally Closed Contact

TD = Time Delay

R = Reset

**Interval (Impulse-On)**

V = Voltage

NO = Normally Open Contact

NC = Normally Closed Contact

TD = Time Delay

R = Reset

-= Undefined Time
TDI / TDIH / TDIL SERIES

Description
The TDI Series is an interval timer that combines accurate digital circuitry with isolated, 10A rated, DPDT relay contacts in an 8-pin plug-in package. The TDI Series features DIP switch selectable time delays ranging from 0.1 to 10,230 seconds in three ranges. The TDI Series is the product of choice for custom control panel and OEM designers.

Operation (Interval)
Upon application of input voltage, the time delay begins. The output relay is energized during the time delay. At the end of the time delay, the output de-energizes and remains de-energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and the output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital circuitry</td>
<td>Repeat Accuracy +/- 0.1%, Setting accuracy +/- 2%</td>
</tr>
<tr>
<td>Isolated, 10A, DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>DIP switch adjustment</td>
<td>Provides first time setting accuracy</td>
</tr>
<tr>
<td>Industry standard octal plug connection</td>
<td>Eliminates need for special connectors</td>
</tr>
<tr>
<td>LED indication</td>
<td>Provides visual indication of timing and output status</td>
</tr>
</tbody>
</table>

Accessories

- **BZ1 Front Panel Mount Kit**
  Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

- **NDS-8 Octal 8-pin Socket**
  8-pin 35mm DIN rail or surface mount. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

- **PSC8 Hold-down Clips**

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>TIME DELAY</th>
<th>LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDI120AL</td>
<td>120VAC</td>
<td>1 - 1023s in 1s increments</td>
<td>Yes</td>
</tr>
<tr>
<td>TDI12D</td>
<td>12VDC</td>
<td>1 - 1023s in 1s increments</td>
<td>No</td>
</tr>
<tr>
<td>TDIH24AL</td>
<td>24VAC</td>
<td>10 - 10,230s in 10s increments</td>
<td>Yes</td>
</tr>
<tr>
<td>TDIL120AL</td>
<td>120VAC</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>Yes</td>
</tr>
<tr>
<td>TDIL24DL</td>
<td>24VDC</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>Yes</td>
</tr>
</tbody>
</table>

For dimensional drawing see: Appendix, page 512, Figure 23.

If you don’t find the part you need, call us for a custom product 800-843-8848
Specifications

Time Delay
Type: Digital integrated circuitry
Range**: 0.1 - 102.3s in 0.1s increments
1 - 1023s in 1s increments
10 - 10,230s in 10s increments
Repeat Accuracy: ±0.1% or 20ms, whichever is greater
Setting Accuracy: ±2% or 50ms, whichever is greater
Reset Time: ≤ 50ms
Recycle Time: ≤ 150ms
Time Delay vs Temp. & Voltage: ±2%
Indicator: LED glows during timing; relay is energized
Input Voltage: 12, 24, or 110VDC; 24, 120, or 230VAC
Tolerance: 12VDC & 24VDC/AC
-15% - +20%
110 to 230VAC/DC
-20% - +10%
AC Line Frequency: 50/60 Hz
Power Consumption: ≤ 3.25W
Output Type: Electromechanical relay
Form: DPDT
Rating: 10A resistive @ 120/240VAC & 28VDC;
1/3 hp @ 120/240VAC
Life: Mechanical - 1 x10⁷; Electrical - 1 x 10⁶
Protection
Polarity: DC units are reverse polarity protected
Isolation Voltage: ≥ 1500V RMS input to output
Mechanical
Mounting: Plug-in socket
Dimensions: H 81.3 mm (3.2”); W 60.7 mm (2.4”);
D 45.2 mm (1.8”)
Termination: Octal 8-pin plug-in
Environmental
Operating/Storage Temperature: -20° to 65°C / -30° to 85°C
Weight: ≅ 6 oz (170 g)

** For CE approved applications, power must be removed from the unit when a switch position is changed.

Digi-Set Binary Switch Operation

Function Diagram

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset
= Undefined Time

Time Delay Relays
Dedicated — Interval

TDI / TDIH / TDIL SERIES

Littelfuse.com/tdi-tdih-tdil

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# TDUI / TDUIH / TDUIL SERIES

## Description

The TDUI Series combines digital timing circuitry with universal voltage operation. Voltages of 24 to 240VAC and 12 to 24VDC are available in three ranges. The TDUI Series offers DIP switch selectable time delays ranging from 0.1 seconds to 102.3 minutes in three ranges. Its 1A rated output, ability to operate on multiple voltages, and wide range of switch selectable time delays make the TDUI Series an excellent choice for process control systems and OEM equipment.

### Operation (Interval)

Upon application of input voltage, the time delay begins. The output energizes during the time delay. At the end of the time delay, the output de-energizes and remains de-energized until input voltage is removed.

**Reset:** Removing input voltage resets the time delay and the output.

## Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / - 0.5%, Setting accuracy + / - 2%</td>
</tr>
<tr>
<td>Compact design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Wide voltage ranges</td>
<td>Flexibility to handle multiple voltages found in control systems and OEM applications</td>
</tr>
<tr>
<td>DIP switch Adjustment</td>
<td>Provides first time setting accuracy</td>
</tr>
</tbody>
</table>

## Accessories

- **P1015-13** (AWG 10/12), **P1015-64** (AWG 14/16), **P1015-14** (AWG 18/22) Female Quick Connect
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18** Quick Connect to Screw Adapter
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

## Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDUI3000A</td>
<td>24 to 120VAC</td>
<td>1 - 1023s</td>
</tr>
<tr>
<td>TDUIH3002A</td>
<td>12 to 24VDC</td>
<td>0.1 - 102.3m</td>
</tr>
<tr>
<td>TDUIL3001A</td>
<td>100 to 240VAC</td>
<td>0.1 - 102.3s</td>
</tr>
<tr>
<td>TDUIL3002A</td>
<td>12 to 24VDC</td>
<td>0.1 - 102.3s</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848

---

**Wiring Diagram**

V = Voltage  
L = Load

For dimensional drawing see: Appendix, page 512, Figure 16.
Specifications

**Time Delay**

**Range***

0.1 - 102.3s in 0.1s increments
1 - 1023s in 1s increments
0.1 - 102.3m in 0.1m increments

**Repeat Accuracy**

±0.5% or 20ms, whichever is greater

**Setting Accuracy**

≤ ±2% or 20ms, whichever is greater

**Reset Time**

≤ 150ms

**Time Delay vs Temp. & Voltage**

≤ ±5%

**Input**

**Voltage**

24 to 240VAC, 12 to 24VDC ±20%

**AC Line Frequency**

50/60 Hz

**Power Consumption**

AC ≤ 2VA; DC ≤ 1W

**DC Ripple**

≤ 10%

**Output**

**Type**

Solid state

**Form**

NO, closed during timing

**Rating**

1A steady state, 10A inrush at 60°C

**Voltage Drop**

AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A

**OFF State Leakage Current**

AC ≅ 5mA @ 230VAC; DC ≅ 1mA

**Protection**

**Circuitry**

Encapsulated

**Dielectric Breakdown**

≥ 2000V RMS terminals to mounting surface

**Insulation Resistance**

≥ 100 MΩ

**Polarity**

DC units are reverse polarity protected

**Mechanical**

Surface mount with one #10 (M5 x 0.8) screw

**Dimensions**

H 50.8 mm (2”); W 50.8 mm (2”);

D 30.7 mm (1.21”)

**Termination**

0.25 in. (6.35 mm) male quick connect terminals

**Environmental**

**Operating/Storage Temperature**

-40° to 60°C / -40° to 85°C

**Humidity**

95% relative, non-condensing

**Weight**

≈ 2.4 oz (68 g)

*For CE approved applications, power must be removed from the unit when a switch position is changed.

Switch Operation

<table>
<thead>
<tr>
<th>Adjustment Switch Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIME DELAY</td>
</tr>
<tr>
<td>0.1...102.3</td>
</tr>
<tr>
<td>OFF</td>
</tr>
<tr>
<td>0.1</td>
</tr>
<tr>
<td>0.2</td>
</tr>
<tr>
<td>0.4</td>
</tr>
<tr>
<td>0.8</td>
</tr>
<tr>
<td>1.6</td>
</tr>
<tr>
<td>3.2</td>
</tr>
<tr>
<td>6.4</td>
</tr>
<tr>
<td>12.8</td>
</tr>
<tr>
<td>25.6</td>
</tr>
<tr>
<td>51.2</td>
</tr>
</tbody>
</table>

Function Diagram

V = Voltage

NO = Normally Open Contact

NC = Normally Closed Contact

TD = Time Delay

R = Reset

= Undefined Time

INTERVAL (IMPULSE-ON)
Description
The THD2 Series combines accurate timing circuitry with high power solid-state switching. It can switch motors, lamps, and heaters directly without a contactor. You can reduce labor, component cost, and increase reliability with these small, easy-to-use, Digi-Power timers.

Operation (Interval)
Upon application of input voltage, the time delay begins. The output energizes during the time delay. At the end of the time delay, the output de-energizes and remains de-energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and the output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5%, Factory calibration +/- 1%</td>
</tr>
<tr>
<td>High load currents up to 20A</td>
<td>Allows direct control of motors, lamps and heaters without a contactor</td>
</tr>
<tr>
<td>and inrush</td>
<td></td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Metalized mounting surface</td>
<td>Facilitates heat transfer in high current applications</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications and reduces labor and components costs</td>
</tr>
</tbody>
</table>

Accessories

P1004-95, P1004-95-X Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

P1015-13 (AWG 10/12), P1015-64 (AWG 14/16) Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>OUTPUT RATING</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>THD2C420</td>
<td>20A</td>
<td>120VAC</td>
<td>External</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>THD2C423</td>
<td>20A</td>
<td>120VAC</td>
<td>External</td>
<td>0.1 - 10m</td>
</tr>
<tr>
<td>THD2C433</td>
<td>20A</td>
<td>120VAC</td>
<td>Onboard</td>
<td>0.1 - 10m</td>
</tr>
<tr>
<td>THD2C620</td>
<td>20A</td>
<td>230VAC</td>
<td>External</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>THD2C633</td>
<td>20A</td>
<td>230VAC</td>
<td>Onboard</td>
<td>0.1 - 10m</td>
</tr>
</tbody>
</table>

For dimensional drawing see: Appendix, page 512, Figure 19.

V = Voltage
L = Load
S1 = Optional Low Current Initiate Switch
Rt is used when external adjustment is ordered.

If you don’t find the part you need, call us for a custom product 800-843-8848
External Resistance vs. Time Delay

This chart applies to externally adjustable part numbers.
The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals; as the resistance increases the time delay increases.
When selecting an external RT, add the tolerances of the timer and the RT for the full time range adjustment.
Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm RT. For 1 to 100 S use a 100 K ohm RT.

Function Diagram

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset

Specifications

- Time Delay Range: 0.1s - 1000m in 6 adjustable ranges or fixed
- Repeat Accuracy: ±0.5% or 20ms, whichever is greater
- Tolerance: ≤ ±1%
- Reset Time: ≤ 150ms
- Time Delay vs Temp. & Voltage: ≤ ±2%
- Input Voltage: 24, 120, or 230VAC
- Tolerance: ±20%
- AC Line Frequency: 50/60 Hz

Output
- Type: Solid state
- Form: NO, closed during timing
- Maximum Load Current:
  - Output: A = 6A, B = 10A, C = 20A
  - Steady State: 60A, 100A, 200A
  - Inrush: 2.5V at rated current

- Minimum Load Current: 100mA
- OFF State Leakage Current: 5mA @ 230VAC

Protection
- Circuitry: Encapsulated
- Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
- Insulation Resistance: ≥ 100 MΩ

Mechanical
- Mounting: Surface mount with one #10 (M5 x 0.8) screw
- Dimensions:
  - H: 50.8 mm (2")
  - W: 50.8 mm (2")
  - D: 38.4 mm (1.51")
- Termination: 0.25 in. (6.35 mm) male quick connect terminals

Environmental
- Operating/Storage Temperature: -40° to 60°C / -40° to 85°C
- Humidity: 95% relative, non-condensing
- Weight: 3.9 oz (111 g)

**Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.
### Description

The THD7 Series utilizes only two terminals connected in series with the load. Interval timing mode is achieved by using a small portion of the AC sine wave allowing sufficient voltage for circuit operation. The THD7 Series can be used for interval or delay-on-break timing. It is designed to operate large loads directly, such as motors, heater elements, and motor starters.

**Operation (Interval)**

Upon application of input voltage, the output energizes and the time delay begins. The output remains energized throughout the time delay. At the end of the time delay the output de-energizes and remains de-energized until power is removed.

**Reset:** Removing input voltage resets the time delay and the output.

**Operation (Delay-on-Break)**

Upon closure of SW1, the load energizes and the timer is reset (zero voltage across its input terminals). Opening SW1 re-applies input voltage to the timer, the load remains energized and the time delay begins. At the end of the time delay the output de-energizes. If SW1 is open when power is applied, the load will energize for the time delay then de-energize.

**Reset:** Reclosing SW1 resets the timer.

### Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital integrated circuitry</td>
<td>Repeat Accuracy +/- 0.5%</td>
</tr>
<tr>
<td>High load currents up to 20A, 200A inrush</td>
<td>Allows direct operation of motors, lamps and heaters without a contactor</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration and humidity</td>
</tr>
<tr>
<td>Metalized mounting surface</td>
<td>Facilitates heat transfer in high current applications</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications and reduces labor and component costs</td>
</tr>
</tbody>
</table>

### Accessories

- **P1004-13, P1004-13-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

### Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>OUTPUT RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>THD7421A</td>
<td>120VAC</td>
<td>External</td>
<td>1 - 100s</td>
<td>6A</td>
</tr>
<tr>
<td>THD7621C</td>
<td>230VAC</td>
<td>External</td>
<td>1 - 100s</td>
<td>20A</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848

For dimensional drawing see: Appendix, page 512, Figure 19.
Accessories

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

VTP(X)(X) Plug-on Adjustment Module
Mounts on modules with in-line adjustment terminals. Rated at 0.25W at 55°C. Available in resistance values from 5KΩ to 5MΩ.

Selection Table for VTP Plug-on Adjustment Accessory

<table>
<thead>
<tr>
<th>Time Delay</th>
<th>VTP P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 1-100s</td>
<td>VTP5G</td>
</tr>
<tr>
<td>2 - 10-1000s</td>
<td>VTP5K</td>
</tr>
<tr>
<td>3 - 0.1-10m</td>
<td>VTP5N</td>
</tr>
<tr>
<td>4 - 1-100m</td>
<td>VTP5P</td>
</tr>
<tr>
<td>5 - 10-1000m</td>
<td>VTP5R</td>
</tr>
</tbody>
</table>

Selection Guide

<table>
<thead>
<tr>
<th>RT Selection Chart</th>
<th>Desired Time Delay*</th>
<th>RT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seconds</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>0.1</td>
</tr>
<tr>
<td>10</td>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>200</td>
<td>2</td>
</tr>
<tr>
<td>30</td>
<td>300</td>
<td>3</td>
</tr>
<tr>
<td>40</td>
<td>400</td>
<td>4</td>
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<tr>
<td>50</td>
<td>500</td>
<td>5</td>
</tr>
<tr>
<td>60</td>
<td>600</td>
<td>6</td>
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<tr>
<td>70</td>
<td>700</td>
<td>7</td>
</tr>
<tr>
<td>80</td>
<td>800</td>
<td>8</td>
</tr>
<tr>
<td>90</td>
<td>900</td>
<td>9</td>
</tr>
<tr>
<td>100</td>
<td>1000</td>
<td>10</td>
</tr>
</tbody>
</table>

* When selecting an external RT, add at least 20% of tolerance for unit and the RT:

Specifications

Time Delay
Type Digital integrated circuitry
Range 1s - 1000m in 5 adjustable ranges or fixed
Repeat Accuracy ±0.5% or 20ms, whichever is greater
Tolerance (Factory Calibration) ≤ ±10%
Recycle Time After timing: ≤150ms; During timing: ≤ 350ms
Time Delay vs Temp. & Voltage ≤ ±2%
Input Voltage 24, 120, or 230VAC
Tolerance ±20%
AC Line Frequency 50/60 Hz
Output Type Solid state
Form NO, closed during timing
Rating Output Steady State Inrush**
| A | 6A | 60A |
| B | 10A | 100A |
| C | 20A | 200A |

Effective Voltage Drop (VLine-VLoad)
Input 24VAC ≤ 3V
120VAC ≤ 3V
230VAC ≤ 5V
100mA

Minimum Load Current
Input 100mA

Protection
Dielectric Breakdown ≥ 2000V RMS terminals to mounting surface
Insulation Resistance ≥ 100 MΩ

Mechanical
Mounting ** Surface mount with one #10 (M5 x 0.8) screw
Dimensions H 50.8 mm (2”); W 50.8 mm (2”);
D 38.4 mm (1.51”)
Termination 0.25 in. (6.35 mm) male quick connect terminals

Environmental
Operating/Storage Temperature -40° to 60°C / -40° to 85°C
Humidity 95% relative, non-condensing
Weight ≅ 3.9 oz (111 g)

**Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.

Function Diagrams

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset
= Undefined Time
Description

The TS2 Series is designed for 24, 120 or 230VAC and the TS6 Series is designed for 12 or 24VDC. These series are capable of controlling load currents of up to 1A steady state, 10A inrush. Encapsulated circuitry and the reliability of a ±2% repeat accuracy make the TS2 and TS6 ideal for cost sensitive applications.

Operation (Interval)

Upon application of input voltage, the time delay begins. The output energizes during the time delay. At the end of the time delay, the output de-energizes and remains de-energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and the output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuitry</td>
<td>Repeat accuracy +/− 2%, Factory calibration +/− 10%</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions</td>
</tr>
<tr>
<td>Rated for operation up to 75°C</td>
<td>Can be used in the harshest environments</td>
</tr>
</tbody>
</table>

Accessories

P1004-XX (fig. A), P1004-XX-X (fig. B) Versa-Pot
- Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P1023-6 Mounting bracket
- The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

P0700-7 Versa-Knob
- Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>SWITCHING MODE</th>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>SWITCHING MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS2210</td>
<td>24VAC</td>
<td>Fixed</td>
<td>20s</td>
<td>n/a</td>
<td>TS2424</td>
<td>120VAC</td>
<td>External</td>
<td>5 - 600s</td>
<td>n/a</td>
</tr>
<tr>
<td>TS2223</td>
<td>24VAC</td>
<td>External</td>
<td>2 - 180s</td>
<td>n/a</td>
<td>TS6116P</td>
<td>12VDC</td>
<td>Fixed</td>
<td>6s</td>
<td>Positive</td>
</tr>
<tr>
<td>TS2412</td>
<td>120VAC</td>
<td>Fixed</td>
<td>2s</td>
<td>n/a</td>
<td>TS6122P</td>
<td>12VDC</td>
<td>External</td>
<td>0.5 - 20s</td>
<td>Positive</td>
</tr>
<tr>
<td>TS24130</td>
<td>120VAC</td>
<td>Fixed</td>
<td>30s</td>
<td>n/a</td>
<td>TS6123P</td>
<td>12VDC</td>
<td>External</td>
<td>2 - 60s</td>
<td>Positive</td>
</tr>
<tr>
<td>TS2421</td>
<td>120VAC</td>
<td>External</td>
<td>0.05 - 3s</td>
<td>n/a</td>
<td>TS6321P</td>
<td>24VDC</td>
<td>External</td>
<td>0.05 - 3s</td>
<td>Positive</td>
</tr>
<tr>
<td>TS2422</td>
<td>120VAC</td>
<td>External</td>
<td>0.5 - 60s</td>
<td>n/a</td>
<td>TS6323P</td>
<td>24VDC</td>
<td>External</td>
<td>2 - 180s</td>
<td>Positive</td>
</tr>
<tr>
<td>TS2423</td>
<td>120VAC</td>
<td>External</td>
<td>2 - 180s</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
**Accessories**

**P1015-64 (AWG 14/16)**  
**Female Quick Connect**  
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**P1015-18 Quick Connect to Screw Adapter**  
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**VTP(X)(X) Plug-on Adjustment Module**  
Mounts on modules with in-line adjustment terminals. Rated at 0.25W at 55°C. Available in resistance values from 5KΩ to 5MΩ.

### Selection Table for VTP Plug-on Adjustment Accessory

<table>
<thead>
<tr>
<th>TS6 12VDC</th>
<th>Time Delay</th>
<th>VTP P/N</th>
<th>Versa-Pot (potentiometer)</th>
<th>Fig. A P/N</th>
<th>Fig. B P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 0.05s-1s</td>
<td>VTP2A</td>
<td>P1004-16</td>
<td>P1004-16-X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - 0.5-20s</td>
<td>VTP2E</td>
<td>P1004-16</td>
<td>P1004-16-X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 - 2-60s</td>
<td>VTP2F</td>
<td>P1004-16</td>
<td>P1004-16-X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 - 5-120s</td>
<td>VTP2H</td>
<td>P1004-16</td>
<td>P1004-16-X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TS2 &amp; TS6 All Other Voltages</th>
<th>Time Delay</th>
<th>VTP P/N</th>
<th>Versa-Pot (potentiometer)</th>
<th>Fig. A P/N</th>
<th>Fig. B P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 0.05s-3s</td>
<td>VTP4B</td>
<td>P1004-12</td>
<td>P1004-12-X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - 0.5-60s</td>
<td>VTP4F</td>
<td>P1004-12</td>
<td>P1004-12-X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 - 2-180s</td>
<td>VTP4J</td>
<td>P1004-12</td>
<td>P1004-12-X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 - 5-600s</td>
<td>VTP5N</td>
<td>P1004-13</td>
<td>P1004-13-X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Selection Guide

<table>
<thead>
<tr>
<th>Rₜ Selection Chart</th>
<th>Desired Time Delay*</th>
<th>Rₜ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seconds</td>
<td>1 2 3 4</td>
<td></td>
</tr>
<tr>
<td>0.05</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>3.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

* When selecting an external Rₜ add at least 20% for tolerance of unit and the Rₜ 1 Mégohm max for 12 VDC Units

### Specifications

**Time Delay**

<table>
<thead>
<tr>
<th>Type</th>
<th>Analog circuitry</th>
</tr>
</thead>
<tbody>
<tr>
<td>12VDC</td>
<td>0.05 - 120s in 4 adjustable ranges or fixed (1 MΩ max. Rₜ )</td>
</tr>
<tr>
<td>Other Voltages</td>
<td>0.05 - 600s in 4 adjustable ranges or fixed</td>
</tr>
<tr>
<td>Repeat Accuracy</td>
<td>±2% or 20ms, whichever is greater</td>
</tr>
<tr>
<td>Tolerance (Factory Calibration)</td>
<td>≤ ±10%</td>
</tr>
<tr>
<td>Time Delay vs Temp. &amp; Voltage</td>
<td>≤ ±10%</td>
</tr>
<tr>
<td>Reset Time</td>
<td>≤ 150ms</td>
</tr>
<tr>
<td>Input</td>
<td>Voltage 12 or 24VDC, 24 or 20VAC</td>
</tr>
<tr>
<td>DC Ripple</td>
<td>10%</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>DC ≤ 1W; AC ≤ 2VA</td>
</tr>
</tbody>
</table>

**Output**

<table>
<thead>
<tr>
<th>Type</th>
<th>Solid state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>NO, closed during timing</td>
</tr>
<tr>
<td>Maximum Load Current</td>
<td>1A steady state, 10A inrush at 60°C</td>
</tr>
<tr>
<td>Voltage Drop</td>
<td>DC = 1.0V @ 1A; AC = 2.5V @ 1A</td>
</tr>
</tbody>
</table>

**Protection**

<table>
<thead>
<tr>
<th>Circuitry</th>
<th>Encapsulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polarity</td>
<td>TS6 is not reverse polarity protected</td>
</tr>
<tr>
<td>Dielectric Breakdown</td>
<td>≥ 2000V RMS terminals to mounting surface ≥ 100 MΩ</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>Mechanical</td>
</tr>
<tr>
<td>Mounting</td>
<td>Surface mount with one #10 (M5 x 0.8) screw</td>
</tr>
<tr>
<td>Dimensions</td>
<td>H 50.8 mm (2&quot;) W 50.8 mm (2&quot;)</td>
</tr>
<tr>
<td>D 30.7 mm (1.21&quot;)</td>
<td>0.25 in. (6.35 mm) male quick connect terminals</td>
</tr>
<tr>
<td>Termination</td>
<td>Environmental</td>
</tr>
<tr>
<td>Operating/Storage</td>
<td>-40° to 75°C / -40° to 85°C</td>
</tr>
<tr>
<td>Temperature</td>
<td>Humidity 95% relative, non-condensing</td>
</tr>
<tr>
<td>Weight</td>
<td>2.4 oz (68 g)</td>
</tr>
</tbody>
</table>

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Littelfuse.com/ts2-ts6
TSD2 SERIES
Interval Timer

Description
The TSD2 Series is designed for more demanding commercial and industrial applications where small size and accurate performance are required. The factory calibration for fixed time delays is within 1% of the target time delay. The repeat accuracy, under stable conditions, is 0.1% of the time delay. The TSD Series is rated to operate over an extended temperature range. Time delays of 0.1 seconds to 100 hours are available. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry.

Operation (Interval)
Upon application of input voltage, the time delay begins. The output is energized during the time delay. At the end of the time delay, the output de-energizes and remains de-energized until input voltage is removed.

Reset: Removing input voltage resets the time delay and output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.1%, +/- 1% time delay accuracy</td>
</tr>
<tr>
<td>Extended temperature range</td>
<td>Rated to 75°C operating temperature to withstand high heat applications.</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A Steady solid-state output, 10A inrush</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

- P1004-95, P1004-95-X Versa-Pot
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- P1023-6 Mounting bracket
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- P0700-7 Versa-Knob
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- P1015-64 (AWG 14/16) Female Quick Connect
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- P1015-18 Quick Connect to Screw Adapter
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSD2411S</td>
<td>120VAC</td>
<td>Fixed</td>
<td>1s</td>
</tr>
<tr>
<td>TSD2414SS</td>
<td>120VAC</td>
<td>Fixed</td>
<td>45s</td>
</tr>
<tr>
<td>TSD241600S</td>
<td>120VAC</td>
<td>Fixed</td>
<td>600s</td>
</tr>
<tr>
<td>TSD2434</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100m</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848

For dimensional drawing see: Appendix, page 512, Figure 16.
## Time Delay Relays
### Dedicated — Interval

### TSD2 SERIES

#### Accessories
- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.
- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

#### External Resistance vs. Time Delay

**In Secs., Mins., or Hours**

```
<table>
<thead>
<tr>
<th>Time Delay Ranges</th>
<th>0.1s</th>
<th>1s</th>
<th>10s</th>
<th>100s</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
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<td>5</td>
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<td>10</td>
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<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
```

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the R\_t terminals; as the resistance increases the time delay increases. When selecting an external R\_t add the tolerances of the timer and the R\_t for the full range adjustment.

**Examples:**
- 1 to 60 S adjustable time delay, select time delay range 1 and a 60 K ohm R\_t. For 1 to 100 S use a 100 K ohm R\_t.
- 1 to 600 S adjustable time delay, select time delay range 6 and a 600 K ohm R\_t. For 1 to 1000 S use a 1000 K ohm R\_t.

#### Function Diagram

```
1 + INTERVAL (IMPULSE-ON) R
V
NO TD NC
```

- V = Voltage
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD = Time Delay
- R = Reset

```
V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset
```

#### Specifications

**Time Delay**
- **Range:** 0.1s - 100h in 7 adjustable ranges or fixed
- **Repeat Accuracy:** ±0.1% or 20ms, whichever is greater
- **Tolerance:** (Factory Calibration) ≤ ±1%
- **Reset Time:** ≤ 150ms
- **Time Delay vs. Temperature & Voltage:** ≤ ±1%

**Input**
- **Voltage:** 24, 120, or 230VAC
- **Tolerance:** ±20%
- **AC Line Frequency:** 50/60 Hz
- **Power Consumption:** ≤ 2VA

**Output**
- **Type:** Solid state
- **Form:** NO, closed during timing
- **Maximum Load Current:** 1A steady state, 10A inrush at 60°C
- **Off State Leakage Current:** ≅ 5mA @ 230VAC
- **Voltage Drop:** ≅ 2.5V @ 1A
- **Protection Circuitry:** Encapsulated
- **Dielectric Breakdown:** ≥ 2000V RMS terminals to mounting surface
- **Insulation Resistance:** ≥ 100 MΩ
- **Mechanical Mounting:** Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions:**
  - H: 50.8 mm (2”);
  - W: 50.8 mm (2”);
  - D: 30.7 mm (1.21”)
- **Termination:** 0.25 in. (6.35 mm) male quick connect terminals
- **Environmental**
  - **Operating/Storage Temperature:** -40° to 75°C / -40° to 85°C
  - **Humidity:** 95% relative, non-condensing
- **Weight:** ≅ 2.4 oz (68 g)
Interval Timer

Description
The TSD6 Series offers total solid-state, interval timing for 12 or 24VDC applications. This series provides either negative or positive switching. The TSD6 Series is designed for more demanding commercial and industrial applications where small size and accurate performance is required. The factory calibration for fixed time delays is within 1% of the target time delay. The repeat accuracy, under stable conditions, is 0.1% of the time delay. The TSD6 Series is rated to operate over an extended temperature range. Time delays of 0.1 seconds to 100 hours are available. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry.

Operation (Interval)
Upon application of input voltage, the time delay begins. The output energizes during the time delay. At the end of the time delay, the output de-energizes and remains de-energized until input voltage is removed.
Reset: Removing input voltage resets the time delay and the output.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / - 0.1%, + / -1% time delay accuracy</td>
</tr>
<tr>
<td>Extended temperature range</td>
<td>Rated to 75°C operating temperature to withstand high heat applications.</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A Steady solid-state output, 10A inrush</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

P1004-95, P1004-95-X Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P1023-6 Mounting bracket
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

P1015-64 (AWG 14/16)
Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>SWITCHING MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSD6113SP</td>
<td>12VDC</td>
<td>Fixed</td>
<td>3s</td>
<td>Positive</td>
</tr>
<tr>
<td>TSD61115SP</td>
<td>12VDC</td>
<td>Fixed</td>
<td>15s</td>
<td>Positive</td>
</tr>
<tr>
<td>TSD6113SN</td>
<td>12VDC</td>
<td>Fixed</td>
<td>3s</td>
<td>Negative</td>
</tr>
<tr>
<td>TSD6310.8SN</td>
<td>24VDC</td>
<td>Fixed</td>
<td>0.8s</td>
<td>Negative</td>
</tr>
<tr>
<td>TSD631380SP</td>
<td>24VDC</td>
<td>Fixed</td>
<td>380s</td>
<td>Positive</td>
</tr>
<tr>
<td>TSD6320P</td>
<td>24VDC</td>
<td>External</td>
<td>0.1 - 10s</td>
<td>Positive</td>
</tr>
</tbody>
</table>

If you don't find the part you need, call us for a custom product 800-843-8848

For dimensional drawing see: Appendix, page 512, Figure 16.
**Accessories**

P1015-18 Quick Connect to Screw Adapter  
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**Specifications**

**Time Delay**
- Range: 0.1s - 100h in 7 adjustable ranges or fixed
- Repeat Accuracy: ±0.1% or 20ms, whichever is greater
- Tolerance: (Factory Calibration) ≤ ±1%
- Reset Time: ≤ 150ms
- Time Delay vs. Temperature & Voltage: ≤ ±1%

**Input**
- Voltage: 12 or 24VDC
- Tolerance: ±15%
- DC Ripple: ±10%
- Power Consumption: ≤ 1W

**Output**
- Type: Solid state, positive or negative switching
- Form: NO, closed during timing
- Maximum Load Current: 1A steady state, 10A inrush at 60°C
- Off State Leakage Current: ≅ 1mA
- Voltage Drop: ≅ 1.0V @ 1A

**Circuitry**
- Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
- Insulation Resistance: ≥ 100 MΩ

**Mechanical**
- Mounting: Surface mount with one #10 (M5 x 0.8) screw
- Dimensions: H 50.8 mm (2”); W 50.8 mm (2”); D 30.7 mm (1.21”)

**Environmental**
- Operating/Storage Temperature: -40° to 75°C / -40° to 85°C
- Humidity: 95% relative, non-condensing
- Weight: ≅ 2.4 oz (68 g)

**External Resistance vs. Time Delay**

<table>
<thead>
<tr>
<th>Time Delay Ranges</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>8</th>
<th>16</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistor Values</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>32</td>
</tr>
</tbody>
</table>

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the R₁ terminals, as the resistance increases the time delay increases.

When selecting an external R₁, add the tolerances of the timer and the R₁ for the full-time range adjustment. For example: 1 to 60 S adjustable time delay, select time delay range 1 and a 50 k ohm R₁. For 1 to 100 S use a 100 k ohm R₁.

**Function Diagram**

V = Voltage  
NO = Normally Open Contact  
NC = Normally Closed Contact  
TD = Time Delay  
R = Reset  
= Undefined Time

1 INTERVAL (IMPULSE-ON) 

© 2020 Littelfuse, Inc.
**TSD7 SERIES**

**Interval/Delay-on-Break Timer**

---

**Description**

The TSD7 Series utilizes only two terminals connected in series with the load. Interval timing mode period is achieved by using a small portion of the AC sine wave allowing sufficient voltage for circuit operation. It can be used as an interval timer to control or pulse shape the operation of contactors, solenoids, relays, and lamp loads. The TSD7 Series can be wired to delay on the break of a switch for energy saving fan delays.

**Operation (Interval)**

Upon application of input voltage, the output energizes and the time delay begins. The output remains energized throughout the time delay. At the end of the time delay, the output de-energizes and remains de-energized until power is removed.

**Reset:** Removing input voltage resets the time delay and the output.

**Operation (Delay-on-Break)**

Upon closure of SW1, the load is energized and the timer is reset (zero volts across its input terminals). Opening SW1 re-applies input voltage to the timer, the load remains energized and the time delay begins. At the end of the time delay, the output de-energizes. If SW1 is open when power is applied, the load will energize for the time delay then de-energize.

**Reset:** Reclosing SW1 resets the timer.

---

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / - 0.5%, + / -1% time delay accuracy</td>
</tr>
<tr>
<td>Extended temperature range</td>
<td>Rated to 75°C operating temperature to withstand high heat applications</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A steady solid-state output, 10A inrush</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Two terminal series load connections</td>
<td>Provides quick and easy installation for new or existing systems</td>
</tr>
</tbody>
</table>

---

**Wiring Diagram**

- **Interval**
  - V = Voltage
  - L = Load
  - S1 = Initiate Switch
  - RT is used when external adjustment is ordered.

- **Delay-on-Break**
  - V = Voltage
  - L = Load
  - S1 = Initiate Switch

---

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSD7412S</td>
<td>120VAC</td>
<td>Fixed</td>
<td>2s</td>
</tr>
<tr>
<td>TSD7414M</td>
<td>120VAC</td>
<td>Fixed</td>
<td>4m</td>
</tr>
<tr>
<td>TSD7421</td>
<td>120VAC</td>
<td>External</td>
<td>1 - 100s</td>
</tr>
<tr>
<td>TSD7423</td>
<td>120VAC</td>
<td>External</td>
<td>0.1 - 10m</td>
</tr>
<tr>
<td>TSD7424</td>
<td>120VAC</td>
<td>External</td>
<td>1 - 100m</td>
</tr>
<tr>
<td>TSD76112S</td>
<td>230VAC</td>
<td>Fixed</td>
<td>120s</td>
</tr>
<tr>
<td>TSD76118S</td>
<td>230VAC</td>
<td>Fixed</td>
<td>180s</td>
</tr>
<tr>
<td>TSD7611S</td>
<td>230VAC</td>
<td>Fixed</td>
<td>1s</td>
</tr>
<tr>
<td>TSD7621</td>
<td>230VAC</td>
<td>External</td>
<td>1 - 100s</td>
</tr>
</tbody>
</table>

---

For dimensional drawing see: Appendix, page 512, Figure 16.

If you don’t find the part you need, call us for a custom product 800-843-8848
**Time Delay Relays**  
**Dedicated — Interval**

**TSD7 SERIES**

---

### Accessories

**P1004-13, P1004-13-X Versa-Pot**  
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

**P1023-6 Mounting Bracket**  
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

**P0700-7 Versa-Knob**  
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

**P1015-64 (AWG 14/16) Female Quick Connect**  
These 0.25 in (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**P1015-18 Quick Connect to Screw Adapter**  
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**VTP(X)(X) Plug-on Adjustment Module**  
Mounts on modules with in-line adjustment terminals. Rated at 0.25V at 55°C. Available in resistance values from 5KΩ to 5MΩ.

<table>
<thead>
<tr>
<th>Selection Table for VTP Plug-on Adjustment Accessory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Delay</td>
</tr>
<tr>
<td>1 - 1-100s</td>
</tr>
<tr>
<td>2 - 10-1000s</td>
</tr>
<tr>
<td>3 - 0.1-10m</td>
</tr>
</tbody>
</table>

### Selection Guide

**R_T Selection Chart**

<table>
<thead>
<tr>
<th>Desired Time Delay*</th>
<th>R_T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seconds</td>
<td>Minutes</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>100</td>
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<tr>
<td>20</td>
<td>200</td>
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<td>80</td>
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<tr>
<td>90</td>
<td>900</td>
</tr>
<tr>
<td>100</td>
<td>1000</td>
</tr>
</tbody>
</table>

* When selecting an external R_T, add at least 20% for tolerance of unit and the R_T.

### Specifications

**Time Delay**

- **Type**: Digital integrated circuitry
- **Range**: 1s - 1000m in 5 adjustable ranges or fixed
- **Repeat Accuracy**: ±0.5% or 20ms, whichever is greater
- **Tolerance**: ±10%
- **Recycle Time**: ≤ 400ms
- **Time Delay vs Temp. & Voltage**: ≤ ±2%
- **Input Voltage**: 24, 120, or 230VAC
- **Tolerance**: ±20%
- **AC Line Frequency**: 50/60 Hz
- **Output Type**: Solid state
- **Form**: NO, closed during timing
- **Maximum Load Current**: 1A steady state, 10A inrush at 45°C
- **Minimum Load Current**: 40mA
- **Effective Voltage Drop (VLine-VLoad)**
  - Input: 24VAC 3V
  - Input: 120VAC 4V
  - Input: 230VAC 6V

**Protection**

- **Circuitry**: Encapsulated
- **Dielectric Breakdown**: ≥ 2000V RMS terminals to mounting surface
- **Insulation Resistance**: ≥ 100 MΩ

**Mechanical**

- **Mounting**: Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**: H 50.8 mm (2”); W 50.8 mm (2”); D 30.7 mm (1.21”)
- **Termination**: 0.25 in. (6.35 mm) male quick connect terminals
- **Environmental**
  - **Operating/Storage Temperature**: -40° to 75°C / -40° to 85°C
  - **Humidity**: 95% relative, non-condensing
- **Weight**: 2.4 oz (68 g)

### Function Diagrams

- **INTERVAL (IMPULSE-ON)**  
  - V = Voltage
  - S1 = Initiate Switch
  - NO = Normally Open Contact
  - NC = Normally Closed Contact
  - O = Output
  - L = Load
  - TD = Time Delay
  - R = Reset
  - Undefined Time
Description
The KRD9 Series microcontroller timing circuit provides excellent repeat accuracy and stability. Cost effective approach for OEM applications that require small size, isolation, reliability, and long life.

Operation (Retriggerable Single Shot)
Function Type A (Output Initially De-energized): Input voltage must be applied prior to and during timing. When the initiate switch is closed, (momentary or maintained) the output energizes and the time delay starts. On completion of the delay, the output de-energizes. The unit will time out if S1 remains in the open or closed position for the full time delay. Reclosing the initiate switch resets the time delay and restarts timing; the output remains energized. The output will not energize if the initiate switch is closed when input voltage is applied.

Function Type B (Output Initially Energized): Upon application of input voltage, the output energizes and the time delay starts. At the end of the time delay, the load de-energizes. The unit will time out if S1 remains in the open or closed position for the full time delay. Closing (re-closing) the initiate switch resets the time delay and restarts timing; the output remains energized.

Reset: The time delay and the output are reset when input voltage is removed.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5%, Factory calibration +/- 5%</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications and reduces labor and component costs</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Encapsulated circuitry</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.
Time Delay Relays
Dedicated — Retriggerable Single Shot

KRD9 SERIES

Accessories

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

External Resistance vs. Time Delay

This chart applies to externally adjustable part numbers.

The time delay is adjustable over the time delay range selected by varying the resistance across the $R_T$ terminals; as the resistance increases the time delay increases.

When selecting an external $R_T$, add the tolerances of the timer and the $R_T$ for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm $R_T$. For 1 to 100 S use a 100 K ohm $R_T$.

Output Current/Ambient Temperature

Specifications

Time Delay

Type
Microcontroller based with watchdog circuitry

Range
0.1s - 1000m in 6 adjustable ranges or fixed

Repeat Accuracy
±0.5% or 20ms, whichever is greater

Tolerance
(Factory Calibration)

Reset Time
≤ 150ms

Initiate Time
≤ 40ms; ≤ 750 operations per minute

Time Delay vs Temp. & Voltage
≤ ±5%

Input

Voltage
12, 24 or 110VDC; 24, 120 or 230VAC

Tolerance
-15% - +20%

110VDC, 120 or 230VAC
-20% - +10%

AC Line Frequency/DC Ripple
50/60 Hz / ≤ 10%

Power Consumption
AC ≤ 2VA; DC ≤ 2W

Output

Type
Isolated relay contacts

Form
SPDT

Rating (at 40°C)
10A resistive @ 125VAC;
5A resistive @ 230VAC & 28VDC;
1/4 hp @ 125VAC

Max. Switching Voltage
250VAC

Life (Operations)
Mechanical - 1 x 10^7; Electrical - 1 x 10^5

Protection
Circuitry
Encapsulated

Isolation Voltage
≥ 1500V RMS input to output

Insulation Resistance
≥ 100 MΩ

Polarity
DC units are reversed polarity protected

Mechanical
Mounting
Surface mount with one #10 (M5 x 0.8) screw

Dimensions
H 50.8 mm (2.0”); W 50.8 mm (2.0”); D 30.7 mm (1.21”)

Termination
0.25 in. (6.35 mm) male quick connect terminals

Environmental
Operating/Storage
-40°C to 60°C / -40° to 85°C

Humidity
95% relative, non-condensing

Weight
≈ 2.6 oz (74 g)

Function Diagram

V = Voltage
S1 = Initiate Switch
NO = Normally Open Contact
NC = Normally Closed Contact
t = Incomplete Time Delay
TD = Time Delay
R = Reset
Retriggerable Single-Shot Timer

Description
The TSD94110SB retriggerable single-shot timer is designed for a variety of applications. Its digital circuit provides long or short delays with accuracy and stability over a wide voltage and temperature range. It is the ideal timer for pulse-train monitoring of programmable controllers, or any system requiring motion detection.

Operation A Type
Power must be applied to input at all times prior to and during timing. Upon closure of initiate switch (momentary or maintained) the load is energized and the time delay is started. On completion of the delay period the load is de-energized. Should the initiate switch be reclosed during timing, the delay will be reset to zero and restarted.

Operation B Type
Upon application of input power, the load is energized and a time delay is started. At the end of the time delay, the load is de-energized. Should the initiate switch be closed or reclosed during timing, the delay is reset to zero and restarted.

Features & Benefits
- Excellent Pulse Train Monitor
- Totally Solid State and Encapsulated
- Microcontroller Circuitry
- Fast Reset to Zero During Timing
- Excellent Accuracy and Reliability
- DC Units are Reverse Polarity Protected

Specifications

Time Delay
- Type: Microcontroller circuitry
- Range: Factory fixed 10s
- Repeat Accuracy: ±0.5%
- Tolerance (Factory Calibration): ±1%
- Recycle Time: 300ms max.
- Time Delay vs. Temp. & Voltage: ±2%
- Initiate Timing: 16ms max. AC
- Input Operating Voltage: 120 volts AC
- Tolerance: ±15%
- Output Type: Solid State
- Form: Normally open
- Rating: 1 ampere steady state, 10 amperes inrush at 55°C
- Voltage Drop: AC 2.5 volts typical at 1 ampere
- Transient Protection: Protected
- Dielectric Insulation Resistance: 1500 volts RMS
- Insulation Resistance: 100 megohms minimum 4.4

Mechanical
- Mounting: Surface mount with one #8 or #10 screw
- Termination: 0.25 in. (6.35 mm) male quick connect terminals
- Package: Molded housing with encapsulated circuitry
- Dimensions: H 50.80 mm (2.00"), W 50.80 mm (2.00"), D 30.70 mm (1.21")
- Environmental Operating/Storage Temperature: -40°C to 60°C / -40°C to 85°C
- Humidity: 95% relative, non-condensing
- Weight: Approx. 2.4 oz (68 g)

Function Diagram
Description
Econo-Timers are a combination of digital electronics and a reliable electromechanical relay. DPDT relay output for relay logic circuits, and isolation of input to output voltages. Cost effective for OEM applications, such as duty cycling, drying, washing, signaling, and flashing.

Operation (Recycling - ON Time First)
Upon application of input voltage, the output relay energizes and the T1 ON time begins. At the end of the ON time, the output de-energizes and the T2 OFF time begins. At the end of the OFF time, the output relay energizes and the cycle repeats as long as input voltage is applied.

Reset: Removing input voltage resets the output and time delays, and returns the sequence to the first delay.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital integrated circuitry</td>
<td>Repeat Accuracy + / - 0.5%, Factory calibration + / - 10%</td>
</tr>
<tr>
<td>Isolated, 10A, DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

- **P1004-16, P1004-16-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16)**
  Female Quick Connect
  These 0.25 in (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Wiring Diagram

A knob, or terminals 9 & 10 are only included on adjustable units.

Relay contacts are isolated.

R_T is used when external adjustment is ordered.

For dimensional drawing see: Appendix, page 512, Figure 25.
Time Delay Relays
Dedicated — Recycle

Specifications

Time Delay
Type: Digital integrated circuitry
Range: 0.1s - 500m in 11 adjustable ranges
0.1s - 1000m fixed
Adjustment: Knob, external adjust, or fixed
Repeat Accuracy: ±0.5%
Tolerance: (Factory Calibration) ≤ ±10%
Reset Time: ≤ 150ms
Time Delay vs Temp. & Voltage: ≤ ±2%

Input
Voltage: 12, 24, or 120VDC; 24, 120, or 230VAC
Tolerance: 12VDC & 24VDC/AC
-15% - 20%
120VAC/DC & 230VAC
-20% - 10%
AC Line Frequency: 50/60 Hz

Output
Type: Isolated relay contacts
Form: DPDT
Rating: 10A resistive @ 120/240VAC & 28VDC;
1/3 hp @ 120/240VAC
Life Protection: Mechanical - 1 x 10^7; Electrical - 1 x 10^6
Isolation Voltage: ≥ 1500V RMS input to output
Insulation Resistance: ≥ 100 MΩ
Polarity: DC units are reverse polarity protected

Mechanical
Mounting: Surface mount with two #6 (M3.5 x 0.6) screws
Dimensions: H 88.9 mm (3.5”); W 63.5 mm (2.5”);
D 43.2 mm (1.7”)
Termination: 0.25 in. (6.35 mm) male quick connect terminals

Environmental
Operating/Storage: -40° to 65°C / -40° to 85°C
Weight: ≅ 5.7 oz (162 g)

Selection Guides

**R<sub>T</sub> Selection Chart**

<table>
<thead>
<tr>
<th>Desired Time Delay* (Seconds)</th>
<th>R&lt;sub&gt;T&lt;/sub&gt; Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1, 0.1</td>
</tr>
<tr>
<td>2</td>
<td>0.1, 0.1, 0.2, 0.3</td>
</tr>
<tr>
<td>3</td>
<td>0.1, 0.1, 0.2, 0.3</td>
</tr>
<tr>
<td>4</td>
<td>0.1, 0.1, 0.2, 0.3</td>
</tr>
<tr>
<td>5</td>
<td>0.1, 0.1, 0.2, 0.3</td>
</tr>
<tr>
<td>6</td>
<td>0.1, 0.1, 0.2, 0.3</td>
</tr>
</tbody>
</table>

*When selecting an external R<sub>T</sub> add at least 20% for tolerance of unit and the R<sub>T</sub>.

**R<sub>T</sub> Selection Chart**

<table>
<thead>
<tr>
<th>Desired Time Delay* (Minutes)</th>
<th>R&lt;sub&gt;T&lt;/sub&gt; Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>0.1, 0.1</td>
</tr>
<tr>
<td>8</td>
<td>0.1, 0.1, 0.2, 0.3</td>
</tr>
<tr>
<td>9</td>
<td>0.1, 0.1, 0.2, 0.3</td>
</tr>
<tr>
<td>10</td>
<td>0.1, 0.1, 0.2, 0.3</td>
</tr>
<tr>
<td>11</td>
<td>0.1, 0.1, 0.2, 0.3</td>
</tr>
</tbody>
</table>

*When selecting an external R<sub>T</sub> add at least 20% for tolerance of unit and the R<sub>T</sub>.

Function Diagram

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD1, TD2 = Time Delay
R = Reset

V [ RECYCLING (ON FIRST) ]

NO

TD1

TD2

TD1

TD2

R

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Description

The ESDR Series offers independent time adjustment of both delay periods. Adjustment options include fixed, onboard or external adjust. The ESDR is recommended for air drying, automatic oiling, life testing, chemical metering and automatic duty cycling. This series is designed for general purpose commercial and industrial applications where a small, cost effective, reliable, solid-state timer is required. The factory calibration for fixed time delays is ±5%. The repeat accuracy, under stable conditions, is 0.1% of the selected time delay. This series is designed for input voltages of 12VDC to 230VAC in five ranges. Time delays of 0.1 seconds to 1000 minutes are available in six ranges. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry.

Operation (Recycling - ON Time First)

Upon application of input voltage, the output energizes and the T1, ON time begins. At the end of the ON time, the output de-energizes and the T2, OFF time begins. At the end of the OFF time, the output energizes and the cycle repeats as long as input voltage is applied.

Reset: Removing input voltage resets the output and time delays, and returns the sequence to the first delay.

Operation (Recycling - OFF Time First)

Upon application of input voltage, the T2 OFF time begins. At the end of the OFF time, the output energizes and the T1 ON time begins. At the end of the ON time, the output de-energizes and the cycle repeats as long as input voltage is applied.

Reset: Removing input voltage resets the output and time delays, and returns the sequence to the first delay.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/-0.1%, Factory calibration +/-5%</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>ON/OFF recycling with independent adjustment of both time periods</td>
<td>Separate on and off timing settings are knob adjustable for added flexibility</td>
</tr>
<tr>
<td>Compact, low cost design measuring 2 in. (50.8mm) square</td>
<td>Allows flexibility for OEM applications</td>
</tr>
</tbody>
</table>

Ordering Information

See next page.
## Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>T1 ON TIME</th>
<th>FIRST DELAY</th>
<th>T2 OFF TIME</th>
<th>SWITCHING MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESDR120A0P</td>
<td>12VDC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>On time</td>
<td>0.1 - 10s</td>
<td>Positive</td>
</tr>
<tr>
<td>ESDR120B3P</td>
<td>12VDC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>Off time</td>
<td>0.1 - 10m</td>
<td>Positive</td>
</tr>
<tr>
<td>ESDR123B4P</td>
<td>12VDC</td>
<td>Onboard</td>
<td>0.1 - 10m</td>
<td>Off time</td>
<td>1 - 100m</td>
<td>Positive</td>
</tr>
<tr>
<td>ESDR125A5P</td>
<td>12VDC</td>
<td>Onboard</td>
<td>10 - 1000m</td>
<td>On time</td>
<td>10 - 1000m</td>
<td>Positive</td>
</tr>
<tr>
<td>ESDR221A2</td>
<td>24VAC</td>
<td>Onboard</td>
<td>1 - 100s</td>
<td>On time</td>
<td>10 - 1000s</td>
<td>n/a</td>
</tr>
<tr>
<td>ESDR320A0P</td>
<td>24VDC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>On time</td>
<td>0.1 - 10m</td>
<td>Positive</td>
</tr>
<tr>
<td>ESDR320A3P</td>
<td>24VDC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>Off time</td>
<td>0.1 - 10m</td>
<td>Positive</td>
</tr>
<tr>
<td>ESDR420A0</td>
<td>120VAC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>On time</td>
<td>0.1 - 10s</td>
<td>n/a</td>
</tr>
<tr>
<td>ESDR420A1</td>
<td>120VAC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>Off time</td>
<td>1 - 100s</td>
<td>n/a</td>
</tr>
<tr>
<td>ESDR420A4</td>
<td>120VAC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>Off time</td>
<td>1 - 100m</td>
<td>n/a</td>
</tr>
<tr>
<td>ESDR421A1</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100s</td>
<td>On time</td>
<td>1 - 100s</td>
<td>n/a</td>
</tr>
<tr>
<td>ESDR421A4</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100s</td>
<td>On time</td>
<td>1 - 100m</td>
<td>n/a</td>
</tr>
<tr>
<td>ESDR423A3</td>
<td>120VAC</td>
<td>Onboard</td>
<td>0.1 - 10m</td>
<td>On time</td>
<td>0.1 - 10m</td>
<td>n/a</td>
</tr>
<tr>
<td>ESDR423A4</td>
<td>120VAC</td>
<td>Onboard</td>
<td>0.1 - 10m</td>
<td>On time</td>
<td>1 - 100m</td>
<td>n/a</td>
</tr>
<tr>
<td>ESDR424A1</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100m</td>
<td>On time</td>
<td>1 - 100s</td>
<td>n/a</td>
</tr>
<tr>
<td>ESDR424A4</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100m</td>
<td>On time</td>
<td>1 - 100s</td>
<td>n/a</td>
</tr>
<tr>
<td>ESDR424A1</td>
<td>120VAC</td>
<td>Onboard</td>
<td>1 - 100s</td>
<td>On time</td>
<td>1 - 100s</td>
<td>n/a</td>
</tr>
<tr>
<td>ESDR450A1</td>
<td>120VAC</td>
<td>External</td>
<td>0.1 - 10s</td>
<td>On time</td>
<td>1 - 100s</td>
<td>n/a</td>
</tr>
</tbody>
</table>

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## External Resistance vs. Time Delay

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals; as the resistance increases the time delay increases. When selecting an external R_T add the tolerances of the timer and the R_T for the full time range adjustment.

**Examples:** 1 to 50 S adjustable time delay, select time delay range 1 and a 50 k ohm R_T. For 1 to 100 S use a 100 K ohm R_T.

### Function Diagrams

- **RECYCLING (ON FIRST)**
  - V = Voltage
  - NO = Normally Open Contact
  - NC = Normally Closed Contact
  - TD1, TD2 = Time Delay
  - R = Reset

- **RECYCLE (OFFTIME FIRST)**
  - V = Voltage
  - NO = Normally Open Contact
  - NC = Normally Closed Contact
  - TD1, TD2 = Time Delay
  - R = Reset
## Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time Delay</strong></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0.1s - 1000m in 6 adjustable ranges or fixed</td>
</tr>
<tr>
<td>Repeat Accuracy</td>
<td>±0.1% or 20ms, whichever is greater</td>
</tr>
<tr>
<td>Tolerance (Factory Calibration)</td>
<td>≤ ±5%</td>
</tr>
<tr>
<td>Time Delay vs Temp. &amp; Voltage</td>
<td>≤ ±2%</td>
</tr>
<tr>
<td>Reset Time</td>
<td>≤ 150ms</td>
</tr>
<tr>
<td><strong>Input Voltage</strong></td>
<td>12 or 24VDC; 24, 120, or 230VAC</td>
</tr>
<tr>
<td>Tolerance</td>
<td>±20%</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>AC ≤ 2VA; DC ≤ 1W</td>
</tr>
<tr>
<td>AC Line Frequency/DC Ripple</td>
<td>50/60 Hz / ≤ 10%</td>
</tr>
<tr>
<td><strong>Output Type</strong></td>
<td>Solid state</td>
</tr>
<tr>
<td>Maximum Load Current</td>
<td>1A steady state, 10A inrush at 60°C</td>
</tr>
<tr>
<td>OFF State Leakage Current</td>
<td>AC ≅ 5mA @ 230VAC; DC ≅ 1mA</td>
</tr>
<tr>
<td>Voltage Drop</td>
<td>AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A</td>
</tr>
<tr>
<td><strong>Protection</strong></td>
<td></td>
</tr>
<tr>
<td>Circuitry</td>
<td>Encapsulated</td>
</tr>
<tr>
<td>Dielectric Breakdown</td>
<td>≥ 2000V RMS terminals to mounting surface</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>≥ 100 MΩ</td>
</tr>
<tr>
<td>Polarity</td>
<td>DC units are reverse polarity protected</td>
</tr>
<tr>
<td><strong>Mechanical</strong></td>
<td></td>
</tr>
<tr>
<td>Mounting</td>
<td>Surface mount with one #10 (M5 x 0.8) screw</td>
</tr>
<tr>
<td>Dimensions</td>
<td>H 50.8 mm (2&quot;), W 50.8 mm (2&quot;), D 30.7 mm (1.21&quot;&quot;)</td>
</tr>
<tr>
<td>Termination</td>
<td>0.25 in. (6.35 mm) male quick connect terminals</td>
</tr>
<tr>
<td>Operating/Storage</td>
<td>-40° to 75°C / -40° to 85°C</td>
</tr>
<tr>
<td>Temperature</td>
<td>95% relative, non-condensing</td>
</tr>
<tr>
<td>Humidity</td>
<td>≅ 2.4 oz (68 g)</td>
</tr>
</tbody>
</table>
Description

The HRDR Series combines an electromechanical relay and microcontroller timing circuitry. It offers 12 to 230V operation in five ranges and factory fixed, onboard or externally adjustable time delays with a repeat accuracy of ±0.5%. The high switching capacity of the output contacts allow for direct control of heavy loads like compressors, pumps, motors, heaters and lighting. A bypass/reset switch option allows operator to interrupt normal recycling sequence and energize output relay. An excellent choice for OEM applications.

Operation (Recycling with Reset Switch)

Upon application of input voltage, the ON time T1 begins and output relay energizes. At the end of the ON time, the output relay de-energizes and the OFF time T2 begins. At the end of the OFF time, the output relay energizes and the cycle repeats as long as input voltage is applied. Some recycling timers have the OFF time as the first delay.

Reset: Removing input voltage resets output and time delays, and returns sequence to the first delay.

Bypass/Reset Switch: Closing the normally open bypass/reset switch energizes the output relay and resets the time delays. Opening the switch restarts recycling operation with the first delay.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy ± 0.5%</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>Isolated, 30A, SPDT, NO output contacts</td>
<td>Allows direct operation of heavy loads: compressors, pumps, blower motors, heaters.</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Independent adjustment of On and Off delays</td>
<td>Provides greater flexibility of timing options</td>
</tr>
<tr>
<td>Bypass/Reset switch option</td>
<td>Allows operator to interrupt the timing sequence and energize the output relay</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>EXTERNAL ADJUSTMENT</th>
<th>T1 ON TIME</th>
<th>OPERATING SEQUENCE</th>
<th>T2 OFF TIME</th>
<th>BYPASS / RESET OPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRDR121A4R</td>
<td>12VDC</td>
<td>Both time onboard adj</td>
<td>1 - 100s</td>
<td>On time first</td>
<td>1 - 100m</td>
<td>Yes</td>
</tr>
<tr>
<td>HRDR321A4R</td>
<td>24VDC</td>
<td>Both time onboard adj</td>
<td>1 - 100s</td>
<td>On time first</td>
<td>1 - 100m</td>
<td>Yes</td>
</tr>
<tr>
<td>HRDR322B2R</td>
<td>24VDC</td>
<td>Both time onboard adj</td>
<td>10 - 1000s</td>
<td>Off time first</td>
<td>10 - 1000S</td>
<td>Yes</td>
</tr>
<tr>
<td>HRDR330A0R</td>
<td>24VDC</td>
<td>Both time external adj</td>
<td>0.1 - 10s</td>
<td>On time first</td>
<td>0.1 - 10s</td>
<td>Yes</td>
</tr>
<tr>
<td>HRDR331A1</td>
<td>24VDC</td>
<td>Both time external adj</td>
<td>1 - 100s</td>
<td>On time first</td>
<td>1 - 100s</td>
<td>No</td>
</tr>
<tr>
<td>HRDR411SB30MR</td>
<td>120VAC</td>
<td>Both times fixed</td>
<td>1s</td>
<td>Off time first</td>
<td>30s</td>
<td>Yes</td>
</tr>
<tr>
<td>HRDR431A1R</td>
<td>120VAC</td>
<td>Both times external adj</td>
<td>0.1 - 100s</td>
<td>On time first</td>
<td>0.1 - 100s</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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Accessories

P1004-95, P1004-95-X Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P1023-6 Mounting bracket
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

P1015-13 (AWG 10/12), P1015-64 (AWG 14/16) Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

Specifications

<table>
<thead>
<tr>
<th>Time Delay Range</th>
<th>100ms - 1000m in 6 adjustable ranges or fixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat Accuracy</td>
<td>±0.5% or 20ms, whichever is greater</td>
</tr>
<tr>
<td>Tolerance</td>
<td>±5%</td>
</tr>
<tr>
<td>(Factory Calibration)</td>
<td></td>
</tr>
<tr>
<td>Reset Time</td>
<td>≤ 150ms</td>
</tr>
<tr>
<td>Time Delay vs Temp. &amp; Voltage</td>
<td>≤ ±2%</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>12 or 24VDC</td>
</tr>
<tr>
<td>Tolerance</td>
<td>12VDC &amp; 24VDC</td>
</tr>
<tr>
<td>12VDC &amp; 24VDC</td>
<td>-15% - 20%</td>
</tr>
<tr>
<td>24 to 230VAC</td>
<td>-20% - 10%</td>
</tr>
<tr>
<td>AC Line Frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>AC ≤ 4VA; DC ≤ 2W</td>
</tr>
<tr>
<td>Output Type</td>
<td>Electromechanical relay</td>
</tr>
<tr>
<td>Form</td>
<td>SPDT, non-isolated</td>
</tr>
<tr>
<td>Ratings General Purpose</td>
<td>125/240VAC</td>
</tr>
<tr>
<td>Resistive</td>
<td>125/240VAC</td>
</tr>
<tr>
<td>28VDC</td>
<td>20A</td>
</tr>
<tr>
<td>Motor Load</td>
<td>125VAC</td>
</tr>
<tr>
<td>240VAC</td>
<td>2 hp**</td>
</tr>
<tr>
<td>Life</td>
<td>Mechanical - 1 x 10⁶; Electrical - 1 x 10⁵, *3 x 10⁴; **6,000</td>
</tr>
<tr>
<td>Protection Surge</td>
<td>IEEE C62.41-1991 Level A</td>
</tr>
<tr>
<td>Circuitry</td>
<td>Encapsulated</td>
</tr>
<tr>
<td>Dielectric Breakdown</td>
<td>≥ 2000V RMS terminals to mounting surface</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>≥ 100 MΩ</td>
</tr>
<tr>
<td>Polarity</td>
<td>DC units are reverse polarity protected</td>
</tr>
<tr>
<td>Mechanical</td>
<td>Surface mount with one #10 (M5 x 0.8) screw</td>
</tr>
<tr>
<td>Dimensions</td>
<td>H 76.7 mm (3”); W 51.3 mm (2”)</td>
</tr>
<tr>
<td></td>
<td>D 38.1 mm (1.5”)</td>
</tr>
<tr>
<td>Termination</td>
<td>0.25 in. (6.35 mm) male quick connect terminals</td>
</tr>
<tr>
<td>Environmental</td>
<td>-40⁰ to 60⁰C / -40⁰ to 85⁰C</td>
</tr>
<tr>
<td>Operating/Storage</td>
<td>95% relative non-condensing</td>
</tr>
<tr>
<td>Humidity</td>
<td>Weight</td>
</tr>
<tr>
<td></td>
<td>≅ 3.9 oz (111 g)</td>
</tr>
</tbody>
</table>

External Resistance vs. Time Delay

<table>
<thead>
<tr>
<th>Time Delay Ranges</th>
<th>1000</th>
<th>100</th>
<th>10</th>
<th>1</th>
<th>0.1</th>
<th>0</th>
<th>25</th>
<th>50</th>
<th>75</th>
<th>100</th>
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<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0.1</td>
<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0.1</td>
<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
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<td>1</td>
<td>0.1</td>
<td>0</td>
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<td>50</td>
<td>75</td>
<td>100</td>
</tr>
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<td>5</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1.0</td>
<td>0</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
</tr>
</tbody>
</table>

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the Rt terminals as the resistance increases the time delay increases.

When selecting an external R, add the tolerances of the timer and the R for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 60 k ohm R, For 1 to 100 S use a 100 k ohm R.
**KRD3 SERIES**

**Description**

The KRD3 Series measures only 2 in. (50.8 mm) square. Its solid-state timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The KRD3 Series is a cost effective approach for OEM applications that require small size, isolation, reliability, and long life.

**Operation (Recycling Flasher - ON Time First)**

Upon application of input voltage, the output energizes and the T1 ON time begins. At the end of the ON time, the output de-energizes and the T2 OFF time begins. At the end of the OFF time, the output energizes and the cycle repeats as long as input voltage is applied.

**Reset:** Removing input voltage resets the output and time delays, and returns the sequence to T1 ON time.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact, low cost design measuring 2 in. (50.8mm) square</td>
<td>Provides greater flexibility for OEM applications and reduces component and labor costs</td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / -0.5%, Factory calibration + / - 5%</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16)**
  **Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>OPERATING SEQUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRD3420A</td>
<td>120VAC</td>
<td>Onboard knob</td>
<td>0.1 - 10s</td>
<td>On time first</td>
</tr>
<tr>
<td>KRD3421A</td>
<td>120VAC</td>
<td>Onboard knob</td>
<td>1 - 100s</td>
<td>On time first</td>
</tr>
<tr>
<td>KRD3434A</td>
<td>120VAC</td>
<td>External</td>
<td>1 - 100m</td>
<td>On time first</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
**External Resistance vs. Time Delay**

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the R₉ terminals, as the resistance increases the time delay increases.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 k ohm R₉, For 1 to 100 S use a 100 k ohm R₉.

**Specifications**

- **Time Delay**
  - Range: 0.1s - 100m in 5 adjustable ranges or fixed
  - Repeat Accuracy: ±0.5% or 20ms, whichever is greater
  - Tolerance: ±5%
  - (Factory Calibration)
  - Reset Time: ≤ 150ms
  - Time Delay vs Temp. & Voltage: ±5%

- **Input**
  - Voltage: 12, 24 or 110VDC; 24, 120, or 230VAC
  - Tolerance:
    - 12VDC & 24VDC/AC: -15% - 20%
    - 110VDC, 120 or 230VAC: -20% - 10%
  - AC Line Frequency/DC Ripple: 50/60 Hz / ≤ 10%

- **Power Consumption**
  - AC: ≤ 2VA; DC: ≤ 2W

- **Output**
  - Type: Isolated relay contacts
  - Form: SPDT
  - Rating (at 40°C):
    - 10A resistive @ 125VAC;
    - 5A resistive @ 230VAC & 28VDC;
    - 1/4 hp @ 125VAC
  - 250VAC
  - Max. Switching Voltage: 250VAC
  - Life (Operations): Mechanical - 1 x 10⁷; Electrical - 1 x 10⁶

- **Protection**
  - Circuitry: Encapsulated
  - Isolation Voltage: ≥ 1500V RMS input to output
  - Insulation Resistance: ≥ 100 MΩ
  - Polarity: DC units are reverse polarity protected
  - Mechanical:
    - Mounting: Surface mount with one #10 (M5 x 0.8) screw
    - Dimensions:
      - H 50.8 mm (2”);
      - W 50.8 mm (2”);
      - D 30.7 mm (1.21”)
  - Termination:
    - Environmental:
      - Operating/Storage Temperature:
        - -20°C to 60°C / -40°C to 85°C
      - Humidity: 95% relative, non-condensing
      - Weight: 2.6 oz (74 g)
Description

The KRDR Series is a compact time-delay relay measuring only 2 in. (50.8 mm) square. Its solid-state timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The KRDR Series is a cost effective recycling timer for OEM applications that require small size, isolation, reliability, and long life.

Operation (Recycling - ON Time First)
Upon application of input voltage, the output relay energizes and the T2 ON time begins. At the end of the ON time, the output de-energizes and the T1 OFF time begins. At the end of the OFF time, the output relay energizes and the cycle repeats as long as input voltage is applied.

Reset: Removing input voltage resets the output and the time delays, and returns the sequence to the ON time.

Operation (Recycling - OFF Time First)
Upon application of input voltage, the T1 OFF time begins. At the end of the OFF time, the T2 ON time begins and the load energizes. At the end of the ON time the load de-energizes, and the cycle repeats until input voltage is removed.

Reset: Removing input voltage resets the output and the sequence to the OFF time.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact design and independent adjustment of ON and OFF times</td>
<td>Provides greater flexibility for OEM applications and reduces component and labor costs</td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / - 0.5%, Factory calibration + / - 5%</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16)**
  Female Quick Connect
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.
### KRDR Series Specifications

**Time Delay**
- **Range**: 0.1s - 1000m in 6 adjustable ranges or fixed
- **Repeat Accuracy**: ±0.5 % or 20ms, whichever is greater
- **Tolerance**: (Factory Calibration) ≤ ±5%
- **Reset Time**: ≤ 150ms
- **Time Delay vs Temp. & Voltage**: ≤ ±5%

**Input**
- **Voltage**: 12, 24 or 110VDC; 24, 120 or 230VAC
- **Tolerance**:
  - 12VDC & 24VDC/AC: -15% - 20%
  - 110VDC & 120 or 230VAC: -20% - 10%
- **AC Line Frequency/DC Ripple**: 50/60 Hz / ≤ 10%

**Output**
- **Type**: Isolated relay contacts
- **Rating (at 40°C)**:
  - 10A resistive @ 125VAC;
  - 5A resistive @ 230VAC & 28VDC;
  - 1/4 hp @ 125VAC
  - 250VAC

**Max. Switching Voltage**
- DC units are reverse polarity protected

**Life (Operations)**
- Mechanical - 1 x 10⁷, Electrical - 1 x 10⁴

**Protection**
- **Circuitry**: Encapsulated
- **Isolation Voltage**: ≥ 1500V RMS input to output
- **Insulation Resistance**: ≥ 100 MΩ
- **Polarity**: DC units are reverse polarity protected

**Mechanical**
- **Mounting**: Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**:
  - H: 50.8 mm (2”);
  - W: 50.8 mm (2”);
  - D: 30.7 mm (1.21”)
- **Termination**: 0.25 in. (6.35 mm) male quick connect terminals

**Environmental**
- **Operating/Storage Temperature**: -20° to 60°C / -40° to 85°C
- **Humidity**: 95% relative, non-condensing
- **Weight**: 2.6 oz (74 g)

---

### Function Diagrams

**Output Current/Ambient Temperature**

![Graph showing output current vs ambient temperature]

**Time Delay Relays**

Dedicated — Recycle

Littelfuse.com/krdr
KSD3 SERIES

Recycling Flasher

Description
The KSD3 Series Digi-Timer is a cost effective approach for ON/OFF recycling applications. The on time is equal to the off time. An adjustment of the $R_T$ will change the time delays of both on and off times. This series is designed for general purpose commercial and industrial applications where a small, cost effective, reliable, solid-state timer is required. The factory calibration for fixed time delays is within 5% of the target time delay. The repeat accuracy, under stable conditions, is 0.5% of the selected time delay. This series is designed for popular AC and DC voltages. Time delays of 0.1 seconds to 1000 minutes are available in 6 ranges. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry.

Operation (Recycling Flasher - ON Time First)
Upon application of input voltage, the output energizes and the T1, ON time begins. At the end of the ON time, the output de-energizes and the T2 OFF time begins. At the end of the OFF time, the output energizes and the cycle repeats as long as input voltage is applied.

Reset: Removing input voltage resets the output and time delays, and returns the sequence to the ON time.

Operation (Recycling Flasher - OFF Time First)
Upon application of input voltage, the T2 OFF time begins. At the end of the OFF time, the T1 ON time begins and the load energizes. At the end of the ON time, the load de-energizes, and the cycle repeats until input voltage is removed.

Reset: Removing input voltage resets the output and time delays and the sequence to the OFF time.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy $\pm / - 0.5%$, $\pm / - 5%$ time delay accuracy</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A Steady solid-state output, 10A inrush</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

Accessories

<table>
<thead>
<tr>
<th>P1004-95, P1004-95-X Versa-Pot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel mountable, industrial potentiometer recommended for remote time delay adjustment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P1023-6 Mounting bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>The 90° orientation of mounting slots makes installation/removal of modules quick and easy.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P0700-7 Versa-Knob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
<th>OPERATING SEQUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSD3120A</td>
<td>12VDC</td>
<td>External</td>
<td>0.1 - 10s</td>
<td>ON time first</td>
</tr>
<tr>
<td>KSD3310.1SA</td>
<td>24VDC</td>
<td>Fixed</td>
<td>0.1s</td>
<td>ON time first</td>
</tr>
<tr>
<td>KSD3415MA</td>
<td>120VAC</td>
<td>Fixed</td>
<td>5m</td>
<td>ON time first</td>
</tr>
<tr>
<td>KSD3432A</td>
<td>120VAC</td>
<td>Onboard</td>
<td>10 - 1000s</td>
<td>ON time first</td>
</tr>
</tbody>
</table>

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For dimensional drawing see: Appendix, page 512, Figure 16.

Wiring Diagram

$V =$ Voltage  
$L =$ Load  
$R_T$ is used when external adjustment is ordered.

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416
Accessories

P1015-64 (AVG 14/16)
Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

External Resistance vs. Time Delay

<table>
<thead>
<tr>
<th>In Secs. or Mins.</th>
<th>0</th>
<th>0.1</th>
<th>1</th>
<th>2</th>
<th>5</th>
<th>10</th>
<th>25k</th>
<th>50k</th>
<th>75k</th>
<th>100k</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>10</td>
<td>7.5</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td>750</td>
<td>10</td>
<td>7.5</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td>500</td>
<td>10</td>
<td>7.5</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
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<tr>
<td>250</td>
<td>10</td>
<td>7.5</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
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<tr>
<td>100</td>
<td>10</td>
<td>7.5</td>
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<td>7</td>
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<tr>
<td>20</td>
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<td>7</td>
<td>7</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
</tr>
</tbody>
</table>

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the R_T terminals, as the resistance increases the time delay increases.

When selecting an external R_T, add the tolerances of the timer and the R_T for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm R_T. For 1 to 100 S use a 100 K ohm R_T.

Specifications

Time Delay

Range 0.1s - 1000m in 6 adjustable ranges or fixed
Repeat Accuracy ±0.5% or 20ms, whichever is greater
Tolerance (Factory Calibration) ≤ ±5%
Reset Time ≤ 150ms
Time Delay vs. Temperature & Voltage ≤ ±10%
Input Voltage 24 or 120VAC; 12 or 24VDC
Tolerance ≤ ±20%
AC Line Frequency 50/60 Hz
Power Consumption AC ≤ 2VA; DC ≤ 1W
Output Type Solid state
Maximum Load Current 1A steady state, 10A inrush at 60°C
OFF State Leakage Current AC ≤ 5mA @ 230VAC; DC ≤ 1mA
Voltage Drop AC ≤ 2.5V @ 1A; DC ≤ 1V @ 1A
DC Operation Negative switching only
Protection Circuitry Encapsulated
Dielectric Breakdown ≥ 2000V RMS terminals to mounting surface
Insulation Resistance ≥ 100 MΩ
Polarity DC units are reverse polarity protected
Mechanical Mounting Surface mount with one #10 (M5 x 0.8) screw
Dimensions H 50.8 mm (2”); W 50.8 mm (2”);
D 30.7 mm (1.21”)
Termination 0.25 in. (6.35 mm) male quick connect terminals

Environmental Operating/Storage Temperature -40° to 60°C / -40° to 85°C
Humidity 95% relative, non-condensing
Weight ≅ 2.4 oz (68 g)

Function Diagrams

FLASHER (ON FIRST)

V
L
T1
T2
T1
T2
T1

V = Voltage
L = Load
T1 = ON Time
T2 = OFF Time
R = Reset

ON time plus OFF time equals one complete flash.
Description
The KSDR Series offers independent time adjustment of both delay periods. The KSDR Series is recommended for air drying, automatic oiling, life testing, chemical metering, and automatic duty cycling. This series is designed for general purpose commercial and industrial applications where a small, cost effective, reliable, solid-state timer is required. The factory calibration for fixed time delays is within ± 5% of the target delay. The repeat accuracy, under stable conditions, is 0.5% of the selected time delay. This series is designed for input voltages of 24, 120 or 230VAC. Time delays of 0.1 seconds to 1000 minutes are available in 6 ranges. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry.

Operation (Recycling - ON Time First)
Upon application of input voltage, the output energizes and the T1, ON time begins. At the end of the ON time, the output de-energizes and the T2, OFF time begins. At the end of the OFF time, the output energizes and the cycle repeats as long as input voltage is applied.

Reset: Removing input voltage resets the output and time delays, and returns the sequence to T1 ON time.

Operation (Recycling - OFF Time First)
Upon application of input voltage, the T2 OFF time begins. At the end of the OFF time, the T1 ON time begins and the load energizes. At the end of T1, T2 begins and the load de-energizes. This cycle repeats until input voltage is removed.

Reset: Removing input voltage resets the output and the sequence to T2 OFF time.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / -0.5%, Factory calibration + / - 5%</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Wide operating temperature range: -40° to 75°C</td>
<td>Reliable in demanding commercial and industrial applications</td>
</tr>
<tr>
<td>Compact, low cost design measuring 2 in. (50.8mm) square</td>
<td>Allows flexibility for OEM applications</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>T1 ON TIME</th>
<th>FIRST DELAY</th>
<th>T2 OFF TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSDR40A0</td>
<td>120VAC</td>
<td>0.1 - 10s</td>
<td>On time</td>
<td>0.1 - 10s</td>
</tr>
<tr>
<td>KSDR42A4</td>
<td>120VAC</td>
<td>10 - 1000s</td>
<td>On time</td>
<td>1 - 100m</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
KSDR SERIES

Accessories

P1004-95, P1004-95-X Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P1023-6 Mounting bracket
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

P1015-13 (AWG 10/12), P1015-64 (AWG 14/16), P1015-14 (AWG 18/22) Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

External Resistance vs. Time Delay

<table>
<thead>
<tr>
<th>In Secs. or Mins.</th>
<th>10000</th>
<th>1000</th>
<th>100</th>
<th>10</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>250</td>
<td>5</td>
<td>7.5</td>
<td>5.0</td>
<td>2.5</td>
<td>1</td>
</tr>
<tr>
<td>500</td>
<td>5</td>
<td>7.5</td>
<td>5.0</td>
<td>2.5</td>
<td>1</td>
</tr>
<tr>
<td>750</td>
<td>2</td>
<td>5</td>
<td>2.5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1000</td>
<td>2</td>
<td>5</td>
<td>2.5</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

\[ R_T = \text{External Timing Resistor in Kiloohms} \]

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the \( R_T \) terminals, as the resistance increases the time delay increases.

When selecting an external \( R_T \), add the tolerances of the timer and the \( R_T \) for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm \( R_T \); For 1 to 100 S use a 100 K ohm \( R_T \).

Function Diagrams

Specifications

Time Delay
- Range: 0.1s - 1000m in 6 ranges
- Repeat Accuracy: ±0.5% or 20ms, whichever is greater
- Tolerance: (Factory Calibration) ≤ ±5%
- Reset Time: ≤ 150ms
- Time Delay vs Temp. & Voltage: ≤ ±10%

Input
- Voltage: 24, 120, or 230VAC
- Tolerance: ±20%
- AC Line Frequency: 50/60 Hz
- Power Consumption: ≤ 2VA

Output
- Type: Solid state
- Rating: 1A steady state, 10A inrush at 60°C
- Voltage Drop: ≅ 2.5V @ 1A
- OFF State Leakage Current: ≅ 5mA @ 230VAC

Protection
- Circuitry: Encapsulated
- Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
- Insulation Resistance: ≥ 100 MΩ

Mechanical
- Mounting: Surface mount with one #10 (M5 x 0.8) screw
- Dimensions: H 50.8 mm (2"), W 50.8 mm (2""); D 30.7 mm (1.21")
- Termination: 0.25 in. (6.35 mm) male quick connect terminals

Environmental
- Operating/Storage
  - Temperature: -40° to 75°C / -40° to 85°C
  - Humidity: 95% relative, non-condensing
  - Weight: ≅ 2.4 oz (68 g)
**KSPD SERIES**

**Solid State Timer**

**Description**

The KSPD Series is a factory programmed module available with 1 of 12 standard dual functions. The time delays can be factory fixed, externally or onboard adjustable, or a combination of fixed and adjustable. The 1A steady, 10A inrush rated solid-state output provides 100 million operations, typical. Its microcontroller timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The KSPD Series is a cost effective approach for OEM applications that require small size and long life.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microcontroller based</strong></td>
<td>Repeat Accuracy +/- 0.5%</td>
</tr>
<tr>
<td><strong>Compact design</strong></td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td><strong>1A steady, 10A inrush solid-state output</strong></td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td><strong>Totally solid state and encapsulated</strong></td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT</th>
<th>ADJUSTMENT 1</th>
<th>TIME DELAY 1</th>
<th>ADJUSTMENT 2</th>
<th>TIME DELAY 2</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSPDA2222RXE</td>
<td>24 to 240VAC</td>
<td>Onboard</td>
<td>1-100s</td>
<td>Onboard</td>
<td>1-100s</td>
<td>Recycling/On Time First</td>
</tr>
<tr>
<td>KSPDP110M18SRXE</td>
<td>12 to 120VDC, positive switching</td>
<td>Fixed</td>
<td>10 mins</td>
<td>Fixed</td>
<td>8s</td>
<td>Recycling/On Time First</td>
</tr>
</tbody>
</table>

If you don't find the part you need, call us for a custom product 800-843-8848
**Specifications**

**Time Delay**
- **Type**: Microcontroller circuitry
- **Range**: 0.1s - 1000h in 9 adjustable ranges or fixed (to 999)
- **Repeat Accuracy**: ±0.5% or 20ms, whichever is greater
- **Tolerance**: ≤ ±2%
- **Reset Time**: ≤ 150ms
- **Initiate Time**: ≤ 20ms; ≤ 1500 operations per minute
- **Time Delay vs Temp. & Voltage**: ≤ ±2%

**Input**
- **Voltage**: 12 to 120VDC; 24 to 240VAC
- **Tolerance**: ≤ ±15%
- **AC Line Frequency/DC Ripple**: 50/60Hz / ≤ 10%
- **Power Consumption**: AC ≤ 2VA; DC ≤ 1W

**Output**
- **Type**: Solid-state output
- **Rating**: 1A steady, 10A inrush for 16ms
- **Voltage Drop**: AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A
- **OFF State Leakage Current**: AC ≅ 5mA @ 230VAC; DC ≅ 1mA

**Protection**
- **Circuitry**: Encapsulated
- **Dielectric Breakdown**: ≥ 2000V rms terminals to mounting surface
- **Insulation Resistance**: ≥ 100 MΩ
- **Polarity**: DC units are reverse polarity protected

**Mechanical**
- **Mounting**: Surface mt. with one #10 (M5 x 0.8) screw
- **Dimensions**: H 50.8 mm (2”); W 50.8 mm (2”);
  D 30.7 mm (1.21”)
- **Termination**: 0.25 in. (6.35 mm) male quick connects

**Environmental**
- **Operating/Storage**: -40° to 60°C / -40° to 85°C
- **Humidity**: 95% relative, non-condensing
- **Weight**: ≅ 2.4 oz (68 g)
**RS SERIES**

**Description**

The RS Series is a solid-state, encapsulated, recycling timer designed for tough industrial environments. It is used by many testing labs as a life cycle tester; by others as a cycle controller. The RS Series has separate DIP switch adjustments for the on delay and the off delay. These make accurate adjustment possible the first time, every time. Time delays of 0.1 seconds to 1023 hours are available in 4 ranges.

**Operation (Recycling - ON Time First)**

Upon application of input voltage, the output energizes and the T1 ON time begins. At the end of the ON time, the output de-energizes and the T2 OFF time begins. At the end of the OFF time, the output energizes and the cycle repeats as long as input voltage is applied.

**Reset:** Removing input voltage resets the output and time delays, and returns the sequence to the ON time.

**Operation (Recycling - OFF Time First)**

Upon application of input voltage, the T2 OFF time begins. At the end of the OFF time, the output energizes and the T1 ON time begins. At the end of the ON time, the output de-energizes and the cycle repeats as long as input voltage is applied.

**Reset:** Removing input voltage resets the output and time delays, and returns the sequence to the OFF time.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/ -0.1%, Setting accuracy +/ -2%</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>ON and OFF time delay settings</td>
<td>Independent adjustment provides greater timing flexibility</td>
</tr>
<tr>
<td>DIP switch adjustment</td>
<td>Provides first time setting accuracy</td>
</tr>
</tbody>
</table>

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>FIRST DELAY</th>
<th>T1 ON TIME</th>
<th>T2 OFF TIME</th>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>FIRST DELAY</th>
<th>T1 ON TIME</th>
<th>T2 OFF TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS1A11</td>
<td>12VDC</td>
<td>On time</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>RS4A22</td>
<td>120VAC</td>
<td>On time</td>
<td>0.1 - 102.3m in 0.1m increments</td>
<td>0.1 - 102.3m in 0.1m increments</td>
</tr>
<tr>
<td>RS2A44</td>
<td>24VAC</td>
<td>Off time</td>
<td>1 - 1023h in 1h increments</td>
<td>1 - 1023h in 1h increments</td>
<td>RS4A24</td>
<td>120VAC</td>
<td>On time</td>
<td>0.1 - 102.3m in 0.1m increments</td>
<td>1 - 1023h in 1h increments</td>
</tr>
<tr>
<td>RS4A11</td>
<td>120VAC</td>
<td>On time</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>RS4A33</td>
<td>120VAC</td>
<td>On time</td>
<td>1 - 1023m in 1m increments</td>
<td>1 - 1023m in 1m increments</td>
</tr>
<tr>
<td>RS4A12</td>
<td>120VAC</td>
<td>On time</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>0.1 - 102.3m in 0.1m increments</td>
<td>RS4B12</td>
<td>120VAC</td>
<td>Off time</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>0.1 - 102.3m in 0.1m increments</td>
</tr>
<tr>
<td>RS4A13</td>
<td>120VAC</td>
<td>On time</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>1 - 1023m in 1m increments</td>
<td>RS6A13</td>
<td>230VAC</td>
<td>On time</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>1 - 1023m in 1m increments</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848

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For dimensional drawing see: Appendix, page 512, Figure 17.
Accessories

**P1023-6 Mounting bracket**
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

**P1015-64 (AWG 14/16) Female Quick Connect**
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**P1015-18 Quick Connect to Screw Adapter**
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

Adjustment Switch Operation

<table>
<thead>
<tr>
<th>Adjustment Switch Operation</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.1...102.3</td>
</tr>
<tr>
<td>OFF</td>
<td>0.1</td>
</tr>
<tr>
<td>ON</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>6.4</td>
</tr>
<tr>
<td></td>
<td>12.8</td>
</tr>
<tr>
<td></td>
<td>25.6</td>
</tr>
<tr>
<td></td>
<td>51.2</td>
</tr>
</tbody>
</table>

Specifications

**Time Delay Range**
- 0.1 - 102.3s in 0.1s increments
- 0.1 - 102.3m in 0.1m increments
- 1 - 1023m in 1m increments
- 1 - 1023h in 1h increments

**Repeat Accuracy**
±0.1% or 20ms, whichever is greater

**Setting Accuracy**
≤ ±2% or 20ms, whichever is greater

**Reset Time**
≤ 150ms

**Time Delay vs Temp. & Voltage**
≤ ±2%

**Input**

- **Voltage**: 12, or 24VDC; 24, 120, or 230VAC
- **Tolerance**: ±20%
- **AC Line Frequency/DC Ripple**: 50/60 Hz / ≤ ±10%

**Output**

- **Type**: Solid state
- **Maximum Load Current**: 1A steady state, 10A inrush at 60°C
- **OFF State Leakage Current**
  - AC: ≅ 5mA @ 230VAC
  - DC: ≅ 1mA
- **Voltage Drop**
  - AC: ≅ 2.5V @ 1A
  - DC: ≅ 1V @ 1A

**Circuitry**
Encapsulated

**Dielectric Breakdown**
≥ 2000V RMS terminals to mounting surface

**Insulation Resistance**
≥ 100 MΩ

**Polarity**
DC units are reverse polarity protected

**Mechanical**

- **Mounting**: Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**
  - H: 76.7 mm (3”)
  - W: 50.8 mm (2”)
  - D: 38.1 mm (1.5”)
- **Termination**
  - 0.25 in. (6.35 mm) male quick connect terminals

**Environmental**

- **Operating/Storage Temperature**: -40° to 75°C / -40° to 85°C
- **Humidity**: 95% relative, non-condensing
- **Weight**: ≅ 3.9 oz (111 g)

*For CE approved applications, power must be removed from the unit when a switch position is changed.

Function Diagrams

- **RECYCLING (ON FIRST)**
  - **V** = Voltage
  - **NO** = Normally Open
  - **NC** = Normally Closed
  - **TD1, TD2** = Time Delay
  - **R** = Reset

- **RECYCLE (OFF TIME FIRST)**
  - **V** = Voltage
  - **NO** = Normally Open
  - **NC** = Normally Closed
  - **TD1, TD2** = Time Delay
  - **R** = Reset

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Time Delay Relays
Dedicated — Recycle

Description
The TDR Series of time-delay relays are comprised of digital circuitry and an isolated, 10A relay output. The ON and OFF delays are selected by means of two, ten position binary switches, which allow the setting of the desired delay to be precise every time.

Operation (Recycling - ON Time First)
Upon application of input voltage, the green LED glows, the output relay is energized, the red LED glows, and the T1 ON time begins. At the end of the ON time, the output de-energizes, the red LED turns OFF and the T2, OFF time begins. At the end of the OFF time, the output relay energizes and the cycle repeats as long as input voltage is applied.

Reset: Removing input voltage resets the output and time delays, and returns the sequence to the first delay.

Operation (Recycling - OFF Time First)
Upon application of input voltage, the green LED glows, the T1 OFF time begins, the load is OFF. At the end of the OFF time, the T2 ON time begins, the load energizes, and the red LED glows. At the end of the ON time the load de-energizes and the red LED turns OFF. The cycle repeats until input voltage is removed.

Reset: Removing input voltage resets the output and the sequence to the OFF time.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON &amp; OFF time delay settings</td>
<td>Independent adjustment allows for greater flexibility</td>
</tr>
<tr>
<td>3 Time Ranges Available (0.1s to 2.8h)</td>
<td>Makes it versatile for use in many applications</td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.1% or 20 ms, whichever is greater; Setting Accuracy +/- 2% or 50 ms, whichever is greater</td>
</tr>
<tr>
<td>DIP switch adjustment</td>
<td>Provides first time setting accuracy</td>
</tr>
<tr>
<td>Isolated output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>LED indication (select models)</td>
<td>Provides visual indication of relay status</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>LED</th>
<th>SEQUENCE</th>
<th>ON TIME (SEC)</th>
<th>OFF TIME (SEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDR1A22</td>
<td>12VDC</td>
<td></td>
<td>ON time first</td>
<td>1-1023 in 1s increments</td>
<td>1-1023 in 1s increments</td>
</tr>
<tr>
<td>TDR2A23</td>
<td>24VAC</td>
<td>X</td>
<td>ON time first</td>
<td>1-1023 in 1s increments</td>
<td>10-1023 in 10s increments</td>
</tr>
<tr>
<td>TDR4A11</td>
<td>120VAC</td>
<td>X</td>
<td>ON time first</td>
<td>0.1-102.3 in 0.1s increments</td>
<td>0.1-102.3 in 0.1s increments</td>
</tr>
<tr>
<td>TDR4A12</td>
<td>120VAC</td>
<td>X</td>
<td>ON time first</td>
<td>0.1-102.3 in 0.1s increments</td>
<td>1-1023 in 1s increments</td>
</tr>
<tr>
<td>TDR4A13</td>
<td>120VAC</td>
<td>X</td>
<td>ON time first</td>
<td>0.1-102.3 in 0.1s increments</td>
<td>10-1023 in 10s increments</td>
</tr>
<tr>
<td>TDR4A22</td>
<td>120VAC</td>
<td>X</td>
<td>ON time first</td>
<td>1-1023 in 1s increments</td>
<td>1-1023 in 1s increments</td>
</tr>
<tr>
<td>TDR4A23</td>
<td>120VAC</td>
<td>X</td>
<td>ON time first</td>
<td>1-1023 in 1s increments</td>
<td>10-1023 in 10s increments</td>
</tr>
<tr>
<td>TDR4A33</td>
<td>120VAC</td>
<td>X</td>
<td>ON time first</td>
<td>10-1023 in 10s increments</td>
<td>10-1023 in 10s increments</td>
</tr>
<tr>
<td>TDR4B22</td>
<td>120VAC</td>
<td>X</td>
<td>OFF time first</td>
<td>1-1023 in 1s increments</td>
<td>1-1023 in 1s increments</td>
</tr>
<tr>
<td>TDR4B23</td>
<td>120VAC</td>
<td>X</td>
<td>OFF time first</td>
<td>1-1023 in 1s increments</td>
<td>10-1023 in 10s increments</td>
</tr>
<tr>
<td>TDR6A22</td>
<td>230VAC</td>
<td>X</td>
<td>ON time first</td>
<td>1-1023 in 1s increments</td>
<td>1-1023 in 1s increments</td>
</tr>
</tbody>
</table>

If you don't find the part you need, call us for a custom product 800-843-8848
**Accessories**

**BZ1 Front Panel Mount Kit**
Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

**NDS-8 Octal 8-pin Socket**
8-pin 35mm DIN rail or surface mount. Rated at 10A @ 300VAC. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

**PSC8 Hold-down Clips**

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**Binary Switch Operation**

**Specifications**

**Time Delay**
- **Type**: Digital integrated circuitry
- **Range**:
  - 0.1 - 102.3s in 0.1s increments
  - 1 - 1023s in 1s increments
  - 10 - 10,230s in 10s increments
- **Repeat Accuracy**: ±0.1% or 20ms, whichever is greater
- **Setting Accuracy**: ±2% or 50ms, whichever is greater
- **Reset Time**: ≤ 50ms
- **Recycle Time**: ≤ 150ms
- **Time Delay vs Temp. & Voltage**: ±5%

**Input Voltage**
- 12, 24/28, or 110VDC; 24, 120, or 230VAC
- Tolerance:
  - 12VDC & 24VDC/AC: -15% - 20%
  - 110 to 230VAC/DC: -20% - 10%
- **AC Line Frequency/DC Ripple**: 50/60 Hz/≤10%
- **Power Consumption**: ≤ 3.25W
- **Input LED Indicator**: Green; on when input voltage is applied

**Output Type**
- Electromechanical relay
- **Form**: DPDT
- **Rating**: 10A resistive @ 120/240VAC & 28VDC; 1/3 hp @ 120/240VAC
- **Mechanical Life**: 1 x 10⁷; **Electrical Life**: 1 x 10⁶
- **250VAC**: Red; ON when output relay energizes

**Relay LED Indicator**
- **Protection**:
  - Isolation Voltage: ≥ 1500V RMS input to output
  - Insulation Resistance: ≥ 100 MΩ
  - Polarity: DC units reverse polarity protected

**Mechanical Mounting**
- Plug-in socket
- **Dimensions**:
  - **H**: 81.3 mm (3.2”); **W**: 60.7 mm (2.39”); **D**: 45.2 mm (1.78”)
  - Octal 8-pin plug-in

**Termination**
- **Environmental**:
  - Operating/Storage Temperature: -20° to 65°C/30° to 85°C
  - Weight: ≅ 6 oz (170 g)

**Function Diagram**

```
V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD1, TD2 = Time Delay
R = Reset

V

NO

NC

TD1

TD2

RECICLING (ON FIRST)
```

**For CE approved applications, power must be removed from the unit when a switch position is changed.
**Description**

The THD3C42A0 combines accurate timing circuitry with high power, solid-state switching. It can switch motors, lamps, and heaters directly without a contactor. The THD3C42A0 has equal on and off time delays. A single $R_T$ sets both time delays. You can reduce labor, component cost, and increase reliability with these small, easy-to-use, Digi-Power timers.

**Operation (Recycling Flasher - ON Time First)**

Upon application of input voltage, the output energizes and the T1 ON time begins. At the end of the ON time, the output de-energizes and the T2 OFF time begins. At the end of the OFF time, the output energizes and the cycle repeats as long as input voltage is applied.

**Reset:** Removing input voltage resets the output and time delays, and returns the sequence to T1 ON time.

**Operation (Recycling Flasher - OFF Time First)**

Upon application of input voltage, the T2 OFF time begins. At the end of the OFF time, the T1 ON time begins and the load energizes. At the end of T1, T2 begins and the load de-energizes. This cycle repeats until input voltage is removed.

**Reset:** Removing input voltage resets the output and the sequence to T2 OFF time.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5%, Factory calibration +/- 1%</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications and reduces labor and component costs</td>
</tr>
<tr>
<td>High load currents up to 20A, 200A inrush</td>
<td>Allows direct operation of motors, lamps, and heaters without a contactor</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Metalized mounting surface</td>
<td>Facilitates heat transfer in high current applications</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16)**
  Female Quick Connect
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.
Time Delay Relays
Dedicated — Recycle

THD3C42A0

External Resistance vs. Time Delay

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals, as the resistance increases the time delay increases.

When selecting an external RT, add the tolerances of the timer and the RT for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm RT. For 1 to 100 S use a 100 K ohm RT.

Specifications

Time Delay
Range 0.1s - 1000m in 6 adjustable ranges or fixed
Adjustment Single variable resistor changes both the on & off times equally
Repeat Accuracy ±0.5% or 20ms, whichever is greater
Tolerance (Factory Calibration) ≤ ±1%
Reset Time ≤ 150ms
Time Delay vs Temp. & Voltage ≤ ±2%
Input Voltage 24, 120, or 230VAC
Tolerance ±20%
AC Line Frequency 50/60 Hz
Power Consumption ≤ 2VA
Output Type Solid state
Maximum Load Current Steady State Inrush**
Minimum Load Current 20A 200A
100mA
Voltage Drop ≅ 2.5V at rated current
OFF State Leakage Current ≅ 5mA @ 230VAC
Protection Circuitry Encapsulated
Dielectric Breakdown ≥ 2000V RMS terminals to mounting surface
Insulation Resistance ≥ 100 MΩ
Mechanical Mounting ** Surface mount with one #10 (M5 x 0.8) screw
Dimensions H 50.8 mm (2"), W 50.8 mm (2""); D 38.4 mm (1.51"")
Termination 0.25 in. (6.35 mm) male quick connect terminals
Environmental Operating/Storage Temperature -40° to 60°C / -40° to 85°C
Humidity 95% relative, non-condensing
Weight ≅ 3.9 oz (111 g)

**Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.

Function Diagrams

RECYCLING (ON FIRST)

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD1, TD2 = Time Delay
R = Reset

RECYCLE (OFF TIME FIRST)

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD1, TD2 = Time Delay
R = Reset

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The TSD3411S is a solid-state ON/OFF recycling timer with the on time always equal to the off time. When time delay is changed by the $R_T$, both the ON and the OFF periods are changed. The TSD Series is designed for more demanding commercial and industrial applications where small size, and accurate performance is required. The factory calibration for fixed time delays is within 1% of the target time delay. The repeat accuracy, under stable conditions, is 0.1% of the time delay. The TSD3411S is rated to operate over an extended temperature range. Time delays of 0.1 seconds to 100 hours are available. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry.

**Operation (Recycling Flasher - ON Time First)**
Upon application of input voltage, the output energizes and the T1, ON time begins. At the end of the ON time, the output de-energizes and the T2 OFF time begins. At the end of the OFF time, the output energizes and the cycle repeats as long as input voltage is applied.

**Reset:** Removing input voltage resets the output and time delays, and returns the sequence to the T1 ON time.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy + / - 0.1%, + / -1% time delay accuracy</td>
</tr>
<tr>
<td>Extended temperature range</td>
<td>Rated to 75°C operating temperature to withstand high heat applications.</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A Steady solid-state output, 10A inrush</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.
**External Resistance vs. Time Delay**

In Secs., Mins., or Hours

<table>
<thead>
<tr>
<th>Time Delay Ranges</th>
<th>1000s</th>
<th>100s</th>
<th>750s</th>
<th>75s</th>
<th>500s</th>
<th>50s</th>
<th>250s</th>
<th>25s</th>
<th>100s</th>
<th>10s</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>10</td>
<td>7.5</td>
<td>7.0</td>
<td>5.0</td>
<td>6.0</td>
<td>4.5</td>
<td>3.0</td>
<td>2.5</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>25</td>
<td>22.5</td>
<td>20.0</td>
<td>15.0</td>
<td>13.7</td>
<td>11.2</td>
<td>9.0</td>
<td>7.5</td>
<td>15.0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>7.5</td>
<td>7.0</td>
<td>5.0</td>
<td>6.0</td>
<td>4.5</td>
<td>3.0</td>
<td>2.5</td>
<td>5.0</td>
<td></td>
</tr>
</tbody>
</table>

This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the Rₚ terminals; as the resistance increases the time delay increases.

When selecting an external Rₚ, add the tolerances of the timer and the Rₚ for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 60 K ohm Rₚ. For 1 to 100 S use a 100 K ohm Rₚ.

**Function Diagram**

[Diagram showing FLASHER (ON FIRST) connection with V = Voltage, L = Load, T₁, T₂ = ON Time, OFF Time, R = Reset]

ON time plus OFF time equals one complete flash.

**Specifications**

- **Time Delay**
  - Range: 0.1s - 100h in 7 adjustable ranges

- **Repeat Accuracy**
  - ±0.1% or 20ms, whichever is greater

- **Tolerance**
  - (Factory Calibration): ≤ ±1%
  - Reset Time: ≤ 150ms
  - Time Delay vs. Temperature & Voltage: ≤ ±1%

- **Input**
  - Voltage: 24, 120, or 230VAC
  - Tolerance: ±20%
  - AC Line Frequency: 50/60 Hz
  - Power Consumption: ≤ 2VA

- **Output**
  - Type: Solid state
  - Maximum Load Current: 1A steady state, 10A inrush at 60°C
  - Off State Leakage Current: ≅ 5mA @ 230VAC
  - Voltage Drop: ≅ 2.5V @ 1A
  - Protection Circuitry: Encapsulated
  - Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
  - Insulation Resistance: ≥ 100 MΩ
  - Mounting: Surface mount with one #10 (M5 x 0.8) screw
  - Dimensions: H 50.8 mm (2"), W 50.8 mm (2”); D 30.7 mm (1.21”)
  - Termination: 0.25 in. (6.35 mm) male quick connect terminals
  - Environmental Operating/Storage: -40° to 75°C / -40° to 85°C
  - Humidity: 95% relative, non-condensing
  - Weight: ≅ 2.4 oz (68 g)
Description

The TSDR Series is an ON/OFF or OFF/ON recycling timing module designed to control metering pumps, chemical valves, flash lamps, or use in energy saving or duty cycling applications. The TSDR Series is designed for more demanding commercial and industrial applications where small size and accurate performance are required. The factory calibration for fixed time delays is $< \pm 5\%$. The repeat accuracy, under stable conditions, is 0.5% of the time delay. The TSDR Series is rated to operate over an extended temperature range. Time delays of 0.1 seconds to 1000 minutes are available. The output is rated 1A steady and 10A inrush. The modules are totally solid state and encapsulated to protect the electronic circuitry.

Operation (Recycling - ON Time First)

Upon application of input voltage, the output energizes and the T1, ON time begins. At the end of the ON time, the output de-energizes and the T2, OFF time begins. At the end of the OFF time, the output energizes and the cycle repeats as long as input voltage is applied.

Reset: Removing input voltage resets the output and time delays, and returns the sequence to the T1 ON time.

Operation (Recycling - OFF Time First)

Upon application of input voltage, the T2 OFF time begins. At the end of the OFF time, the T1 ON time begins and the load energizes. At the end of the T1, T2 begins and the load de-energizes. This cycle repeats until input voltage is removed.

Reset: Removing input voltage resets the output and the sequence to T2 OFF time.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat accuracy +/- 0.5%, Factory calibration +/- 5%</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Wide operating temperature range: -40° to 75°C</td>
<td>Reliable in demanding commercial and industrial applications</td>
</tr>
<tr>
<td>Compact, low cost design measuring 2 in. (50.8mm) square</td>
<td>Allows flexibility for OEM applications</td>
</tr>
</tbody>
</table>

Accessories

**P1004-95, P1004-95-X Versa-Pot**
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

**P1023-6 Mounting bracket**
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

For dimensional drawing see: Appendix, page 512, Figure 16.
Time Delay Relays
Dedicated — Recycle

TSDR SERIES

Accessories

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

P1015-13 (AWG 10/12), P1015-64 (AWG 14/16), P1015-14 (AWG 18/22) Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

Function Diagrams

External Resistance vs. Time Delay

In Secs. or Mins.

<table>
<thead>
<tr>
<th>Time Delay Ranges</th>
<th>5</th>
<th>4</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>750</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td>500</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>250</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>1</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>R_T = External Timing Resistor in Kilohms</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This chart applies to externally adjustable part numbers.
The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals, as the resistance increases the time delay increases.

When selecting an external R_T, add the tolerances of the timer and the R_T for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm R_T. For 1 to 100 S use a 100 K ohm R_T.

Specifications

Time Delay
Range 0.1s - 1000m in 6 adjustable ranges or fixed
Repeat Accuracy ±0.5% or 20ms, whichever is greater
Tolerance (Factory Calibration) ≤ ±5%
Reset Time ≤ 150ms
Time Delay vs Temp. & Voltage ≤ ±5%

Input Voltage 24, 120, or 230VAC
Tolerance ±20%
AC Line Frequency 50/60 Hz
Power Consumption ≤ 2VA

Output Type Solid state
Maximum Load Current 1A steady state, 10A inrush at 60°C
Off State Leakage Current ≅ 5mA @ 230VAC
Voltage Drop ≅ 2.5V @ 1A

Protection Circuitry Encapsulated
Dielectric Breakdown ≥ 2000V RMS terminals to mounting surface
Insulation Resistance ≥ 100 MΩ

Mechanical Mounting Surface mount with one #10 (M5 x 0.8) screw
Dimensions H 50.8 mm (2”); W 50.8 mm (2”);
D 30.7 mm (1.21”)
Termination 0.25 in. (6.35 mm) male quick connect terminals

Environmental Operating/Storage Temperature -40° to 75°C / -40° to 85°C
Humidity 95% relative, non-condensing
Weight ≅ 2.4 oz (68 g)
Description
The PTHF4900DK can be used for a variety of applications from chemical metering, to temperature regulating, to energy management. The infinite adjustability from 1 to 99% provides accurate percentage on control over a wide factory fixed cycle period. When mounted on a metal surface, it can be used to drive solenoids, contactors, relays, or lamps, up to 20A steady, 200A inrush. The PTHF4900DK is the suggested replacement for the PT Series.

Operation (Percentage)
Upon application of input voltage, the output energizes and the T1 ON time begins. At the end of the ON time, the output de-energizes and the T2 OFF time begins. At the end of the OFF time, the output energizes and the cycle repeats as long as input voltage is applied. Increasing the ON time decreases the OFF time. The total cycle period is equal to the ON time plus the OFF time. The total cycle period is factory fixed. ON time range is 1 to 99 percent of cycle period.

Reset: Removing input voltage resets the output and time delays, and returns the sequence to the T1 ON time.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat accuracy + / -0.5%, Factory calibration + / - 5%</td>
</tr>
<tr>
<td>ON/OFF recycling percentage control 1 to 99%</td>
<td>Accurate control over a wide factory fixed cycle period</td>
</tr>
<tr>
<td>Compact, low cost design</td>
<td>Allows flexibility for OEM applications and reduces component and labor costs</td>
</tr>
<tr>
<td>High load currents up to 20A, 200A inrush</td>
<td>Allows direct operation of motors, lamps, and heaters without a contactor</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Metalized mounting surface</td>
<td>Facilitates heat transfer in high current applications</td>
</tr>
</tbody>
</table>

For dimensional drawing see: Appendix, page 512, Figure 19.
## Specifications

**Time Delay**
- **Type**: External or onboard knob
- **Range/External Adjustment Resistance**: Adjustable from 1 - 99% / \( R_T = 100 \, k\Omega \)
- **Cycle Period**: Fixed from 10s - 1000ms
- **±0.5% or 20ms, whichever is greater**
- **Cycle Period Tolerance (Factory Calibration)**: ≤ ± 5%
- **Reset Time**: ≤ 150ms
- **Time Delay vs Temp. & Voltage**: ≤ ±10%

**Input**
- **Voltage**: 120 or 230VAC
- **Tolerance**: ±20%
- **AC Line Frequency**: 50/60 Hz
- **Power Consumption**: ≤ 2VA

**Output**
- **Type**: Solid state
- **Maximum Load Currents Steady State Inrush**: 1A 10A
- **Voltage Drop**: ≅ 2.5V at rated current
- **OFF State Leakage Current**: ≅ 5mA @ 230VAC

**Protection**
- **Circuitry**: Encapsulated
- **Dielectric Breakdown**: ≥ 2000V RMS terminals to mounting surface
- **Insulation Resistance**: ≥ 100 MΩ

**Environmental**
- **Operating/Storage Temperature**: -40° to 60°C / -40° to 85°C
- **Humidity**: 95% relative, non-condensing
- **6, 10, 20A units**: ≅ 3.9 oz (111 g)

*Units rated ≥ 6A must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.*

### Function Diagram

- **V**: Input Voltage
- **CP**: Cycle Period
- **L**: Load
- **T1**: ON Time
- **T2**: OFF Time
- **R**: Reset

**Mechanical**
- **Mounting**: Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**
  - **H**: 50.8 mm (2”)
  - **W**: 50.8 mm (2”)
  - **D**: 38.4 mm (1.51”)
  - **0.25 in. (6.35 mm) male quick connect terminals**

**Termination**
- **Encapsulated**
Description
The TDMB combines both delay-on-make and delay-on-break functions into one plug-in package. Selection of the time period is accomplished with dual switches, one for the on delay and the other for the off delay. SPDT or DPDT output options provide isolated, 10A switching capability.

Operation (Delay-on-Make/Delay-on-Break)
Input voltage must be applied at all times. The output relay is de-energized. Upon closure of the initiate switch, the green LED glows and the delay-on-make time delay (T1) begins. At the end of T1, the output relay energizes and the red LED glows. When the initiate switch opens, the green LED turns OFF and the delay-on-break time delay (T2) begins. At the end of T2, the output relay de-energizes and the red LED turns OFF.

Reset: Removing input voltage resets time delay and output. Opening the initiate switch during the delay-on-make delay, resets T1. Closing the initiate switch during the delay-on-break delay, resets T2.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital circuitry</td>
<td>Repeat Accuracy +/- 0.1%, Setting accuracy +/- 2%</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT or DPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>User selectable Delay-on-Make and Delay-on-Break time delay</td>
<td>Timing settings are independently adjustable for added flexibility</td>
</tr>
<tr>
<td>Industry standard octal plug connection</td>
<td>Eliminates need for special connectors</td>
</tr>
<tr>
<td>LED Indication</td>
<td>Provides visual indication of initiate, timing, and relay output status</td>
</tr>
<tr>
<td>DIP switch adjustment</td>
<td>Provides first time setting accuracy</td>
</tr>
</tbody>
</table>

Accessories

**BZ1 Front Panel Mount Kit**
Provides an easy method of through-the-panel mounting of 8- or 11-pin plug-in timers, flashers, and other controls.

**NDS-8 Octal 8-pin Socket**
8-pin 35mm DIN rail or surface mount. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail. Uses PSC8 hold-down clips.

**NDS-11 11-pin Socket**
11-pin 35mm DIN rail or surface mount. Surface mounted with two #6 screws or snaps onto a 35 mm DIN rail. Uses PSC11 hold-down clips.

**PSC8 or PSC11 Hold-down Clips**
Securely mounts plug-in controls in any position. Provides protection against vibration. Use PSC8 with NDS-8 Octal Socket or PSC11 with NDS-11 Socket. Sold in sets of two.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>DELAY-ON-Make</th>
<th>DELAY-ON-Break</th>
<th>PLUG TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDMB411</td>
<td>120VAC</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>Octal (8-pin) SPDT</td>
</tr>
<tr>
<td>TDMB413D</td>
<td>120VAC</td>
<td>0.1 - 102.3s in 0.1s increments</td>
<td>10 - 10230s in 10s increments</td>
<td>11-pin DPDT</td>
</tr>
<tr>
<td>TDMB422</td>
<td>120VAC</td>
<td>1 - 1023s in 1s increments</td>
<td>1 - 1023s in 1s increments</td>
<td>Octal (8-pin) SPDT</td>
</tr>
<tr>
<td>TDMB422D</td>
<td>120VAC</td>
<td>1 - 1023s in 1s increments</td>
<td>1 - 1023s in 1s increments</td>
<td>11-pin DPDT</td>
</tr>
<tr>
<td>TDMB622</td>
<td>230VAC</td>
<td>1 - 1023s in 1s increments</td>
<td>1 - 1023s in 1s increments</td>
<td>Octal (8-pin) SPDT</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848

For dimensional drawing see: Appendix, page 512, Figure 23.
# Time Delay Relays

## TDMB SERIES

### Specifications

**Time Delay**

- **Type**: Microcontroller circuitry
- **Range**:
  - 0.1 - 102.3s in 0.1s increments
  - 1 - 1023s in 1s increments
  - 10 - 10,230s in 10s increments

- **Repeat Accuracy**: ±0.1% or 20ms, whichever is greater
- **Setting Accuracy**: ≤ ±2% or 50ms, whichever is greater
- **Reset Time**: ≤ 150ms
- **Time Delay vs Temp. & Voltage**: ≤ ±2%
- **Control LED Indicator**: Green, on when the initiate switch is closed

**Input**

- **Voltage**: 12 or 24VDC; 24, 120, or 230VAC; 24 to 240VAC/DC; 12 to 48VDC

**Tolerance**

- **12VDC & 24VDC/AC**: -15% - 20%
- **110 to 230VAC/DC**: -20% - 10%

**AC Line Frequency/DC Ripple**

- 50/60 Hz / ≤ 10%

**Power Consumption**

- AC ≤ 2VA; DC ≤ 2W

**Output**

- **Type**: Electromechanical relay
- **Form**: SPDT or DPDT
- **Rating**: 10A resistive @ 120/240VAC & 28VDC; 1/3 hp @ 230VAC
- **Life**: Mechanical - 1 x 10⁷; Electrical - 1 x 10⁵
- **Max. Switching Voltage**: 250VAC
- **Relay LED Indicator**: Red; on when output relay energizes (not included on 12VDC units)

**Protection**

- **Insulation Resistance**: ≥ 100M
- **Polarity**: DC units are reverse polarity protected
- **Isolation Voltage**: ≥ 1500V RMS input to output

**Mechanical**

- **Mounting**: Plug-in socket
- **Dimensions**:
  - **H**: 81.3 mm (3.2”)
  - **W**: 60.7 mm (2.4”)
  - **D**: 45.2 mm (1.8”)
- **Termination**: Octal 8-pin plug-in, magnal 11-pin plug-in

**Environmental**

- **Operating/Storage Temperature**: -20° to 60°C / -30° to 85°C
- **Weight**: ≈ 6 oz (170 g)

---

**Digi-Set Binary Switch Operation**

<table>
<thead>
<tr>
<th>Time Delay</th>
<th>Mode</th>
<th>Setting Accuracy</th>
<th>Reset Time</th>
<th>Time Delay vs Temp. &amp; Voltage</th>
<th>Control LED Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1...102.3s</td>
<td>OFF</td>
<td>≤ ±0.1% or 20ms</td>
<td>≤ 150ms</td>
<td>≤ ±2%</td>
<td>Green, on when the initiate switch is closed</td>
</tr>
<tr>
<td>1...1023s</td>
<td>ON</td>
<td>≤ ±2% or 50ms</td>
<td>≤ 150ms</td>
<td>≤ ±2%</td>
<td>Green, on when the initiate switch is closed</td>
</tr>
<tr>
<td>10...10,230s</td>
<td>OFF</td>
<td>≤ ±2% or 50ms</td>
<td>≤ 150ms</td>
<td>≤ ±2%</td>
<td>Green, on when the initiate switch is closed</td>
</tr>
</tbody>
</table>

**Function Diagram**

- **V**: Voltage
- **S1**: Initiate Switch
- **NO**: Normally Open Contact
- **NC**: Normally Closed Contact
- **TD1, TD2**: Time Delay
- **R**: Reset
- **- Undefined Time**

---

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Description

The ESD5 Series is an accurate, solid-state, delayed interval timer. It offers a 1A steady, 10A inrush output and is available with adjustable or fixed time delays of 0.1 seconds to 1000 minutes in six ranges. Input voltages of 24, 120, or 230VAC are available. Encapsulation offers protection against shock and vibration. Adjustment options are factory fixed, onboard or externally adjustable. The repeat accuracy, under stable conditions, is 0.1%. The factory calibration of the time delay is ±5%.

Operation (Delayed Interval)

Upon application of input voltage, the T1 delay-on-make time delay begins and the output remains de-energized. At the end of this delay, the output energizes and the T2 interval delay begins. At the end of the interval delay period, the output de-energizes.

Reset: Removing input voltage resets the output and the time delays, and returns the sequence to the first delay.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compact, low cost design measuring 2 in.</td>
<td>Allows flexibility for OEM applications and reduces component and labor costs</td>
</tr>
<tr>
<td>(50.8mm) square</td>
<td></td>
</tr>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.1%, Factory calibration +/- 5%</td>
</tr>
<tr>
<td>1A steady, 10A inrush solid-state output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

For dimensional drawing see: Appendix, page 512, Figure 16.

Accessories

P1004-95, P1004-95-X Versa-Pot
Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

P1023-6 Mounting bracket
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

P0700-7 Versa-Knob
Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

P1015-64 (AWG 14/16)
Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.
External Resistance vs. Time Delay

In Secs. or Mins.

<table>
<thead>
<tr>
<th>Time Delay Ranges</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>750</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>500</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>250</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

This chart applies to externally adjustable part numbers.
The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals; as the resistance increases the tie delay increases.

When selecting an external RT, add the tolerances of the timer and the RT for the full time range adjustment.

Examples: 1 to 50 S adjustable time delay, select time delay range 1 and a 50 K ohm RT. For 1 to 100 S use a 100 K ohm RT.

Specifications

<table>
<thead>
<tr>
<th>Time Delay Range</th>
<th>0.1s - 1000m in 6 adjustable ranges or fixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat Accuracy</td>
<td>±0.1% or 20ms, whichever is greater</td>
</tr>
<tr>
<td>Tolerance</td>
<td>≤ ±5%</td>
</tr>
<tr>
<td>(Factory Calibration)</td>
<td></td>
</tr>
<tr>
<td>Reset Time</td>
<td>≤ 150ms</td>
</tr>
<tr>
<td>Time Delay vs Temp. &amp; Voltage</td>
<td>≤ ±2%</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>24VAC</td>
</tr>
<tr>
<td>Tolerance</td>
<td>±20%</td>
</tr>
<tr>
<td>AC Line Frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>≤ 2VA</td>
</tr>
<tr>
<td>Output Type</td>
<td>Solid state</td>
</tr>
<tr>
<td>Rating</td>
<td>1A steady state, 10A inrush at 60°C</td>
</tr>
<tr>
<td>OFF State Leakage Current</td>
<td>5mA @ 230VAC</td>
</tr>
<tr>
<td>Voltage Drop</td>
<td>2.5V @ 1A</td>
</tr>
<tr>
<td>Circuitry</td>
<td>Encapsulated</td>
</tr>
<tr>
<td>Dielectric Breakdown</td>
<td>≥ 2000V RMS terminals to mounting surface</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>≥ 100 MΩ</td>
</tr>
<tr>
<td>Mechanical</td>
<td>Surface mount with one #10 (M5 x 0.8) screw</td>
</tr>
<tr>
<td>Mounting</td>
<td>H 50.8 mm (2&quot;); W 50.8 mm (2&quot;); D 30.7 mm (1.21&quot;)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>0.25 in. (6.35 mm) male quick connect terminals</td>
</tr>
<tr>
<td>Termination</td>
<td>V = Voltage</td>
</tr>
<tr>
<td>Environmental</td>
<td>NO = Normally Open Contact</td>
</tr>
<tr>
<td>Operating/Storage</td>
<td>NC = Normally Closed Contact</td>
</tr>
<tr>
<td>Temperature</td>
<td>TD1, TD2 = Time Delay</td>
</tr>
<tr>
<td>Humidity</td>
<td>R = Reset</td>
</tr>
<tr>
<td>Weight</td>
<td>-40° to 75°C / -40° to 85°C</td>
</tr>
<tr>
<td></td>
<td>95% relative, non-condensing</td>
</tr>
<tr>
<td></td>
<td>≅ 2.4 oz (68g)</td>
</tr>
</tbody>
</table>
**Description**

The KRPD Series is a factory programmed time delay relay available with 1 of 12 standard dual functions. The time delays can be factory fixed, onboard or externally adjustable or a combination of fixed and adjustable. The SPDT output relay contacts offer a full 10A rating with complete isolation. Its microcontroller timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The KRPD Series is a cost effective approach for OEM applications that require small size, isolation, accuracy and long life.

**Features & Benefits**

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat Accuracy +/- 0.5%</td>
</tr>
<tr>
<td>Compact design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>Isolated, 10A, SPDT output contacts</td>
<td>Allows control of loads for AC or DC voltages</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Encapsulated to protect against shock, vibration, and humidity</td>
</tr>
</tbody>
</table>

**Accessories**

- **P1004-95, P1004-95-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

**Ordering Information**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT</th>
<th>ADJUSTMENT 1</th>
<th>TIME DELAY 1</th>
<th>ADJUSTMENT 2</th>
<th>TIME DELAY 2</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRPD215S190SMB</td>
<td>24VAC</td>
<td>Fixed</td>
<td>5s</td>
<td>Fixed</td>
<td>90s</td>
<td>Delay-on-Make/Delay-on-Break</td>
</tr>
<tr>
<td>KRPD417M113MRXD</td>
<td>120VAC</td>
<td>Fixed</td>
<td>7m</td>
<td>Fixed</td>
<td>13m</td>
<td>Recycling/Off Time First</td>
</tr>
<tr>
<td>KRPDA175S130SMI</td>
<td>24 to 240VAC/DC</td>
<td>Fixed</td>
<td>75s</td>
<td>Fixed</td>
<td>30s</td>
<td>Delay-on-Make/Interval</td>
</tr>
<tr>
<td>KRPDA2123RXE</td>
<td>24 to 240VAC/DC</td>
<td>Onboard</td>
<td>0.1 - 10s</td>
<td>Onboard</td>
<td>10 - 1000h</td>
<td>Recycling</td>
</tr>
<tr>
<td>KRPDD2121MB</td>
<td>12 to 48VDC</td>
<td>Onboard</td>
<td>0.1-10s</td>
<td>Onboard</td>
<td>0.1-10s</td>
<td>Delay-on-Make/Delay-on-Break</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848
**Output Current/Ambient Temperature**

![Graph showing the relationship between output current and ambient temperature.]

**Function Diagrams**

- **Delay-on-Make / Delay-on-Break**
  - **V** = Voltage
  - **S1** = Initiate Switch
  - **NO** = Normally Open Contact
  - **NC** = Normally Closed Contact
  - **TD1, TD2** = Time Delay
  - **R** = Reset

- **Delay-on-Make / Interval**
  - **V** = Voltage
  - **NO** = Normally Open Contact
  - **NC** = Normally Closed Contact
  - **TD1, TD2** = Time Delay
  - **R** = Reset

- **Recycle (Off Time First)**
  - **V** = Voltage
  - **NO** = Normally Open Contact
  - **NC** = Normally Closed Contact
  - **TD1, TD2** = Time Delay
  - **R** = Reset

- **Recycling (On First)**
  - **V** = Voltage
  - **NO** = Normally Open Contact
  - **NC** = Normally Closed Contact
  - **TD1, TD2** = Time Delay
  - **R** = Reset

- **Accumulative Delay-on-Make / Interval**
  - **V** = Voltage
  - **S1** = Initiate Switch
  - **NO** = Normally Open Contact
  - **NC** = Normally Closed Contact
  - **TD1, TD2** = Time Delay

**Specifications**

**Time Delay**
- **Type**: Microcontroller circuitry
- **Range**: 0.1s - 1000h in 9 adjustable ranges or fixed (to 999)
- **Repeat Accuracy**: ±0.5% or 20ms, whichever is greater
- **Tolerance**: (Factory Calibration) ≤ ±2%
- **Reset Time**: ≤ 150ms
- **Initiate Time**: ≤ 40ms; 750 operations per minute
- **Time Delay vs. Temperature & Voltage**: ≤ ±2%

**Input**
- **Voltage**: 12 to 48VDC; 24 to 240VAC/DC
- **Tolerance**: 12 to 48VDC -15% - 20%
  - 24 to 240VAC/DC -20% - 10%
- **AC Line Frequency/DC Ripple**: 50/60 Hz / ≤ 10%
- **Power Consumption**: AC ≤ 2VA; DC ≤ 2W

**Output**
- **Type**: Isolated relay contacts
- **Form**: SPDT
- **Rating (at 40°C)**:
  - 10A resistive @ 125VAC
  - 5A resistive @ 230VAC & 28VDC
  - 1/4 hp @ 125VAC
  - 250VAC
- **Max. Switching Voltage**: 250VAC
- **Life (Operations)**:
  - Mechanical - 1 x 10⁷; Electrical - 1 x 10⁵

**Protection**
- **Circuitry**: Encapsulated
- **Isolation Voltage**: ≥ 1500V RMS input to output
- **Insulation Resistance**: ≥ 100 MΩ
- **Polarity**: DC units are reverse polarity protected

**Mechanical**
- **Mounting**: Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**:
  - **H**: 50.8 mm (2”)
  - **W**: 50.8 mm (2”)
  - **D**: 30.7 mm (1.21”)

**Termination**
- **Environmental**
- **Operating/Storage**
  - **Temperature**: -40° to 60°C / -40° to 85°C
  - **Humidity**: 95% relative, non-condensing
  - **Weight**: 2.6 oz (74 g)
CT SERIES

Time Delay Relays
Dedicated — HVAC

Delay-on-Make/Delay-on-Break Timer

Description
The CT Series combines a delay-on-make and delay-on-break time delay into one unit and may be used to control fan delays in heating and/or cooling equipment. The CT includes bypass circuitry to allow it to operate with cooling anticipators ≥ 3000 ohms. It is designed to operate in 24VAC control circuits. Several CT modules may be combined to provide sequencing of any number of loads and sequencing off of the same loads, such as electric heating elements.

Operation (Delay-on-Make/Delay-on-Break)
Forced Air Heating or Air Conditioning (as shown): When the thermostat closes, the compressor relay is immediately energized. At the end of a fixed delay-on-make delay (T₁), the fan relay is energized. When the thermostat opens, the compressor relay is de-energized and the delay-on-break delay is initiated. On completion of the fixed delay-on-break delay (T₂) the fan relay is de-energized. If the thermostat is reclosed during the delay-on-break delay, the delay-on-break delay is reset and the fan relay remains energized. If the thermostat is closed when input voltage is applied, the delay-on-make delay (T₁) begins as normal.

Reset: Removing input voltage resets the output and time delays.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay-on-Make and Delay-on-Break in one unit</td>
<td>Simplifies wiring and installation, and optimizes efficiency of heating and cooling systems</td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>Interconnectability with other CT modules</td>
<td>Combine modules to provide sequencing on of a number of loads and sequencing off of the same loads</td>
</tr>
</tbody>
</table>

Accessories

- **P1015-64 (AWG 14/16) Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DELAY-ON-MAKE (FIXED SECONDS)</th>
<th>DELAY-ON-BREAK (FIXED SECONDS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT1S30</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>CT1S45</td>
<td>1</td>
<td>45</td>
</tr>
<tr>
<td>CT1S8</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>CT1S90</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>CT30S1</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>CT45S45</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>CT5S300</td>
<td>5</td>
<td>300</td>
</tr>
</tbody>
</table>

If you don’t find the part you need, call us for a custom product 800-843-8848

For dimensional drawing see: Appendix, page 512, Figure 16.
Accessories

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

Function Diagram

```
V = Voltage
FS = Fan Switch
FR = Fan Relay
T1 = Delay-on-Make
T2 = Delay-on-Break
R = Reset
- - - = Undefined Time
```

Specifications

**Time Delay**

- **Type**: Microcontroller
- **Range**: 1 - 600s
- **Repeat Accuracy**: ±5%
- **Tolerance**: (Factory Calibration) ±20%
- **Recycle Time**: ≤ 300ms

**Input**

- **Voltage**: 24VAC
- **Tolerance**: ±15%
- **AC Line Frequency**: 50/60 Hz

**Output**

- **Type**: Solid state
- **Form**: NO
- **Rating**: 0.75A steady state, 5A inrush at 55°C
- **Voltage Drop**: ≈ 1.25V
- **Protection**: Encapsulated
- **Dielectric Breakdown**: ≥ 2000V rms terminals to mounting surface
- **Insulation Resistance**: ≥ 100 MΩ
- **Circuitry**: Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**:
  - H: 50.8 mm (2")
  - W: 50.8 mm (2")
  - D: 30.7 mm (1.21")
- **Termination**: 0.25 in. (6.35 mm) male quick connect terminals
- **Environmental**
  - **Operating/Storage Temperature**: -40° to 70°C / -40° to 85°C
  - **Humidity**: 95% relative, non-condensing
  - **Weight**: ≈ 2.4 oz (68 g)
  - **Thermostat**: Anticipator Resistor: ≥ 3000 Ω
T2D120A15M

Lockout

Description
The T2D provides protection against short cycling of compressors and other motors. At the end of each operation, a lockout delay prevents restarting the compressor or motor until the delay is completed. 24VAC models can be used with thermostats that include a cooling anticipator resistor. It can be connected in series with the load for delay-on-make operation.

Operation (Lockout with Random Start)
Connection #1: Upon application of input voltage, a random start time delay begins. At the end of this time delay, the output is energized.

Lockout Delay: Input voltage must be applied prior to and during timing. When the thermostat or initiate switch opens, the output de-energizes and the lockout time delay begins. At the end of the lockout delay, the output is energized allowing the load to immediately energize when the initiate switch or thermostat closes.

Connection #2: Upon application of input voltage and closure of initiate switch, the time delay begins. At the end of the time delay, the output is energized and remains energized until power is removed.

Reset: Removing power resets the output and the time delay.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lockout delay</td>
<td>Prevents rapid cycling of compressor</td>
</tr>
<tr>
<td>Random start delay</td>
<td>Prevents low voltage starting</td>
</tr>
<tr>
<td>Analog circuitry</td>
<td>Repeat Accuracy + / - 1%</td>
</tr>
<tr>
<td>Compact design</td>
<td>Allows flexibility for OEM applications</td>
</tr>
<tr>
<td>1A steady, 10A inrush output</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Totally solid state and fully encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration and humidity</td>
</tr>
</tbody>
</table>

Accessories

**P1023-6 Mounting bracket**
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

**P1015-64 (AWG 14/16) Female Quick Connect**
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

**P1015-18 Quick Connect to Screw Adapter**
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

**C103PM (AL) DIN Rail**
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

**P1023-20 DIN Rail Adapter**
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.
Specifications

**Input**
- **Voltage**: 120/230VAC in 2 ranges
- **Tolerance**: ±20%
- **AC Line Frequency**: 50/60 Hz

**Output**
- **Minimum Load Current**: 24VAC - 100mA; 120/230VAC - 40mA
- **Rating**: 1A steady state, 10A inrush at 60°C
- **Voltage Drop**: ≅ 2.5V @ 1A
- **Time Delay**
  - **Initiate Time**: After timing - 16ms
  - **Type**: Analog circuitry
  - **Lockout & Random Start Delays**: 1s - 100m in 4 adjustable ranges or fixed
    - Note: The lockout & random start delays are the same length.
    - **Tolerance**: Adjustable: ±30%; factory fixed: ±30%
  - **Repeat Accuracy**: ±1% or 20ms, whichever is greater
  - **Reset Time**: After timing - ≤ 16ms; During timing - ≤ 200ms

**Protection**
- **Dielectric Breakdown**: ≥ 2000V RMS terminals to mounting surface
- **Insulation Resistance**: ≥ 100 MΩ

**Mechanical**
- **Mounting**: Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**: H 50.8 mm (2"), W 50.8 mm (2"), D 30.7 mm (1.21")
- **Termination**: 0.25 in. (6.35 mm) male quick connect terminals

**Environmental**
- **Operating/Storage Temperature**: -20°C to 60°C / -40°C to 85°C
- **Humidity**: 95% relative, non-condensing
- **Weight**: ≅ 2.4 oz (68 g)
- **Cooling Anticipator**: (24VAC Units Only)
  - **Minimum Cooling Anticipator**: ≥ 3,000 Ω

---

Function Diagram

- **V** = Voltage
- **S1** = Initiate Switch
- **L** = Load (CR)
- **E** = Ready
- **TD** = Time Delay
- **R** = Reset
Description
The TA Series prevents rapid recycling of a compressor. A lockout delay is started when the thermostat opens, or input voltage is lost. Eliminates tripped circuit breakers or blown fuses caused by a locked rotor during short cycling. The TA will not allow the compressor to start when the line voltage is low. Chatter of the compressor relay is eliminated. Because of the fast initiate time, bounce of the thermostat will not be transmitted to the compressor relay coil. A 30 second delay provides anti-reversing protection for scroll compressors.

Operation (Lockout)
On initial closure of the S1, the compressor relay energizes immediately. When S1 opens or input voltage is interrupted, a lockout time delay is initiated. During this lockout time delay, the compressor relay cannot be energized. The low voltage (brownout) protection prevents energization of the compressor when the line voltage is low.

Reset: The lockout time delay cannot be reset. After the time delay is completed, the unit automatically resets.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lockout delay</td>
<td>Prevents rapid cycling of compressor and eliminates nuisance service calls due to blown fuse or tripped breaker by locked rotor during short cycling</td>
</tr>
<tr>
<td>Anti-reversing protection for scroll compressors</td>
<td>Extends life of equipment</td>
</tr>
<tr>
<td>Brownout protection</td>
<td>Timer will not allow the compressor to start during low line voltage conditions</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
<tr>
<td>1A solid state output</td>
<td>No moving parts to arc and wear out. Provides up to 100 million operations under typical conditions</td>
</tr>
</tbody>
</table>

Accessories

P1023-6 Mounting bracket
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

P1015-64 (AWG 14/16) Female Quick Connect
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

P1015-18 Quick Connect to Screw Adapter
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TA12D1</td>
<td>12VDC</td>
<td>1m</td>
</tr>
<tr>
<td>TA12D2</td>
<td>12VDC</td>
<td>2m</td>
</tr>
<tr>
<td>TA24A0.5</td>
<td>24VAC</td>
<td>30s</td>
</tr>
<tr>
<td>TA24A3</td>
<td>24VAC</td>
<td>3m</td>
</tr>
<tr>
<td>TA24A5</td>
<td>24VAC</td>
<td>5m</td>
</tr>
</tbody>
</table>

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V = Voltage
S1 = Initiate Switch, Contact, or Thermostat
CR = Compressor Relay (Load)
CA = Optional Cooling Anticipator

For dimensional drawing see: Appendix, page 512, Figure 16.
## Specifications

<table>
<thead>
<tr>
<th>Input</th>
<th>12 or 24VDC; 24VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>AC Line Frequency</td>
<td>450 Ω (anticipator by-pass)</td>
</tr>
<tr>
<td>Impedance</td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td></td>
</tr>
<tr>
<td>Minimum Load Current</td>
<td>75mA</td>
</tr>
<tr>
<td>Maximum Load Current</td>
<td>1A at 60°C</td>
</tr>
<tr>
<td>Voltage Drop</td>
<td>≤ 1.25V</td>
</tr>
<tr>
<td>Time Delay</td>
<td>≅ 16ms</td>
</tr>
<tr>
<td>Initiate Time</td>
<td>Fixed 0.5, 1, 2, 3, or 5m</td>
</tr>
<tr>
<td>Lockout Time</td>
<td>-15% - 35%</td>
</tr>
<tr>
<td>Tolerance</td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td></td>
</tr>
<tr>
<td>Circuitry</td>
<td></td>
</tr>
<tr>
<td>Low Voltage Protection</td>
<td>= 20V: 24VAC/DC; = 9V: 12VDC</td>
</tr>
<tr>
<td>Dielectric Breakdown</td>
<td>≥ 2000V RMS terminals to mounting surface</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>≥ 100 MΩ</td>
</tr>
</tbody>
</table>

## Mechanical

<table>
<thead>
<tr>
<th>Mounting</th>
<th>Surface mount with one #10 (M5 x 0.8) screw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>H 50.8 mm (2”); W 50.8 mm (2”); D 30.7 mm (1.21”)</td>
</tr>
<tr>
<td>Termination</td>
<td>0.25 in. (6.35 mm) male quick connect terminals</td>
</tr>
<tr>
<td>Operating/Storage</td>
<td>-40° to 70°C / -40° to 85°C</td>
</tr>
<tr>
<td>Temperature</td>
<td>95% relative, non-condensing</td>
</tr>
<tr>
<td>Humidity</td>
<td>≅ 2.4 oz (68 g)</td>
</tr>
<tr>
<td>Weight</td>
<td>≥ 1800 Ω</td>
</tr>
</tbody>
</table>

## Function Diagram

```
V = Voltage
S1 = Initiate Switch
L = Load (CR)
E = Ready
TD = Time Delay
R = Reset
```

### Notes

- Encapsulated
- Circuitry
- Low Voltage Protection
- Dielectric Breakdown
- Insulation Resistance
### Description
The TAC1 Series was designed to delay the operation of a compressor relay. It eliminates the possibility of relay chatter due to half-wave failure of the output. It connects in series with the load relay coil and provides a delay-on-make time delay each time input voltage is applied. It can be used for random start, anti-short cycling, sequencing, and many other applications. It is an excellent choice for all air conditioning and refrigeration equipment.

### Operation (Delay-on-Make)
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

### Reset:
Removing input voltage resets the time delay and output.

### Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog circuitry</td>
<td>Repeat accuracy +/- 2%, Factory calibration +/- 20%</td>
</tr>
<tr>
<td>0.5A steady state, 10A inrush</td>
<td>Provides 100 million operations in typical conditions.</td>
</tr>
<tr>
<td>Connects in series with load relay coil</td>
<td>Fail-safe design eliminates contactor chatter</td>
</tr>
<tr>
<td>Meets UL 873</td>
<td>UL Recognized for air conditioning and refrigeration equipment</td>
</tr>
<tr>
<td>Fully encapsulated</td>
<td>Protects against shock, vibration and humidity</td>
</tr>
</tbody>
</table>

### Accessories

- **P1004-XX, P1004-XX-X Versa-Pot**
  Panel mountable, industrial potentiometer recommended for remote time delay adjustment.

- **P1023-6 Mounting bracket**
  The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P0700-7 Versa-Knob**
  Designed for 0.25 in (6.35 mm) shaft of Versa-Pot. Semi-gloss industrial black finish.

- **P1015-64 (AWG 14/16)**
  **Female Quick Connect**
  These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

### Wiring Diagram

![Wiring Diagram](image)

- V = Voltage
- L = Load
- Load may be connected to terminals 3 or 1. RT is used when external adjustment is ordered.

### Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>ADJUSTMENT</th>
<th>TIME DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAC1223</td>
<td>24VAC</td>
<td>External</td>
<td>2 - 180s</td>
</tr>
<tr>
<td>TAC1411</td>
<td>120VAC</td>
<td>Fixed</td>
<td>1s</td>
</tr>
<tr>
<td>TAC1412</td>
<td>120VAC</td>
<td>Fixed</td>
<td>2s</td>
</tr>
<tr>
<td>TAC1413</td>
<td>120VAC</td>
<td>Fixed</td>
<td>3s</td>
</tr>
<tr>
<td>TAC14164</td>
<td>120VAC</td>
<td>Fixed</td>
<td>64s</td>
</tr>
</tbody>
</table>

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For dimensional drawing see: Appendix, page 512, Figure 16.
Time Delay Relays
Dedicated — HVAC

TAC1 SERIES

Accessories

C103PM (AL) DIN Rail
35 mm aluminum DIN rail available in a 36 in.
(91.4 cm) length.

P1023-20 DIN Rail Adapter
Allows module to be mounted on a 35 mm DIN
type rail with two #10 screws.

VTP(X)(X) Plug-on Adjustment Module
Mounts on modules with in-line adjustment
terminals. Rated at 0.25W at 55°C. Available in
resistance values from 5KΩ to 5MΩ.

Selection Table for VTP Plug-on Adjustment Accessory

<table>
<thead>
<tr>
<th>Time Delay (s)</th>
<th>VTP P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 0.05-3s</td>
<td>VTP4B</td>
</tr>
<tr>
<td>2 - 0.5-60s</td>
<td>VTP4F</td>
</tr>
<tr>
<td>3 - 2-180s</td>
<td>VTP4J</td>
</tr>
<tr>
<td>4 - 5-600s</td>
<td>VTP5N</td>
</tr>
</tbody>
</table>

Specifications

Time Delay
Type: Analog circuitry
Range: 0.05 - 600s in 4 adjustable ranges or fixed
Repeat Accuracy: ±2%
Tolerance: ±20%
(Factory Calibration)
Recycle Time: ≤ 20ms after timing, during timing - 0.1%
of time delay or 75ms, whichever is greater

Time Delay vs Temp. & Voltage
Input
Voltage: 24, 120, or 230VAC
Tolerance: ±20%
AC Line Frequency: 50/60 Hz

Output
Type: Solid state
Form: NO, open during timing
Rating: 0.5A steady state, 10A inrush at 60°C
Voltage Drop: 120 & 230VAC: ≅ 4.2V @ 0.5A
24VAC: ≅ 2.5V @ 0.5A

Protection
Circuitry: Encapsulated
Dielectric Breakdown: ≥ 2000V RMS terminals to mounting surface
Insulation Resistance: ≥ 100 MΩ

Mechanical
Mounting: Surface mount with one #10 (M5 x 0.8) screw
Dimensions: H 50.8 mm (2”); W 50.8 mm (2”);
D 30.7 mm (1.21”)
Termination: 0.25 in. (6.35 mm) male quick connect terminals

Environmental
Operating/Storage
Temperature: -40° to 80°C / -40° to 85°C
Humidity: 95% relative, non-condensing
Weight: 2.4 oz (68 g)

Selection Guide

<table>
<thead>
<tr>
<th>Desired Time Delay* (s)</th>
<th>R_T (MΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>0.0</td>
</tr>
<tr>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>5.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

*When selecting an external R_T add at least
30% for tolerance of unit and the R_T.

Function Diagram

V = Voltage
NO = Normally Open Contact
NC = Normally Closed Contact
TD = Time Delay
R = Reset
~ = Undefined

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Description
The TL Series provides protection against short cycling of a compressor. At the end of each operation, or whenever power is lost, a lockout delay is initiated. This lockout delay prevents restarting of the compressor until the head pressure has equalized. Compressor relay chatter due to thermostat bounce is eliminated by use of optional one second delay-on-make. The TL Series should not be used with cooling anticipator resistors or solid-state switches. (See the TA Series).

Operation (Lockout)
Lockout: On initial closure of S1, the compressor relay energizes immediately (or after an optional 1s delay). When the S1 opens or input voltage is interrupted, the output opens and remains open for the lockout time delay. During this lockout time delay period, the compressor relay cannot be re-energized.

Reset: The lockout time delay cannot be reset. After the time delay is completed, the unit automatically resets.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lockout delay</td>
<td>Prevents rapid cycling of compressor and eliminates nuisance service calls due to blown fuse or tripped breaker by locked rotor during short cycling.</td>
</tr>
<tr>
<td>One second Delay-on-Make</td>
<td>Eliminates contactor chatter due to thermostat bounce</td>
</tr>
<tr>
<td>(models ending in T)</td>
<td></td>
</tr>
<tr>
<td>Totally solid state and encapsulated</td>
<td>No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity</td>
</tr>
<tr>
<td>1A steady, 10A inrush, solid state output</td>
<td>Provides 100 million operations in typical conditions</td>
</tr>
</tbody>
</table>

Accessories

- **P1023-6 Mounting bracket**  
The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P1015-64 (AWG 14/16) Female Quick Connect**  
These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**  
Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>LOCKOUT TIME</th>
<th>DELAY-ON-MAKE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TL120A5T</td>
<td>120VAC</td>
<td>5m</td>
<td>1s</td>
</tr>
<tr>
<td>TL230A5</td>
<td>230VAC</td>
<td>5m</td>
<td>No delay</td>
</tr>
<tr>
<td>TL24A5T</td>
<td>24VAC</td>
<td>5m</td>
<td>1s</td>
</tr>
</tbody>
</table>

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## Specifications

**Input**
- **Voltage**: 24, 120, or 230VAC
- **AC Line Frequency**: 50/60 Hz
- **Tolerance**: ±20%

**Output**
- **Minimum Load Current**: ≤ 40mA
- **Maximum Load Current**: 1A @ 24VAC; 0.5A @ 120 & 230VAC at 60°C
  - 10A at 60°C
- **Voltage Drop**: 24VAC - 2.5V @ 1A
  - 120 & 230VAC - 4.2V @ 0.5A

**Time Delay**
- **Initiate Time**: ≅ 8ms
- **Lockout Time***: Fixed 2, 3, or 5m
  - Tolerance: -15% - 35%
- **Option**: 1s delay-on-make eliminates contactor chatter due to thermostat bounce

**Protection**
- **Circuitry**: Encapsulated
- **Dielectric Breakdown**: ≥ 2000V RMS terminals to mounting surface
- **Insulation Resistance**: ≥ 100 MΩ

**Mechanical**
- **Mounting**: Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**: H 50.8 mm (2’’); W 50.8 mm (2’’); D 30.7 mm (1.21’’)
- **Termination**: 0.25 in. (6.35 mm) male quick connect terminals

**Environmental**
- **Operating/Storage Temperature**: -40° to 70°C / -40° to 85°C
- **Humidity**: 95% relative, non-condensing
- **Weight**: ≅ 2.4 oz (68 g)

*Power must be applied for at least 15 s to achieve a full lockout delay. Less than 15 s will result in proportionally shorter delay periods.

**NOTE:** Cooling anticipator resistor or leakage may cause erratic operation. See TA Series for use with 24VAC systems that include anticipator resistors or use solid-state switches.

## Function Diagram

- **V** = Voltage
- **S1** = Initiate Switch
- **L** = Load (CR)
- **E** = Ready
- **TD** = Time Delay
- **R** = Reset

![Function Diagram](image)
TSA141300

Anti-Short Cycle, Solid State Timer

Description
The TSA141300 utilizes unique circuitry to provide random start and lockout delay in one small, rugged, inexpensive package. When connected as shown, the TSA141300 in a multiple unit situation, prevents all units from starting at one time with its random start feature. The TSA141300 also prevents the compressor from recycling rapidly which could result in a lock rotor condition. This lockout delay is initiated at the end of each operation of the compressor. A momentary loss of power would also initiate the lockout delay.

Operation
Random Start: With the thermostat closed, when line voltage is applied to system, a time delay is initiated. At the end of this delay, the compressor relay will be energized. (Random Start delay is equal to lockout delay.)

Anti-Short Cycle: At the end of each cycle, when the thermostat opens, a lockout delay is initiated which prevents re-energization of the compressor relay during this period. If the thermostat is closed after the time delay is completed, the compressor relay will energize immediately.

Loss of Power: If there is a momentary loss of power, the lockout will again be initiated preventing the compressor relay from energizing for the duration of the delay.

Features & Benefits
- Lockout Delay—prevents rapid recycling of compressor in air conditioning, refrigeration, and heat pump equipment
- Random Start Delay—provides staggered start up of multiple units
- Fast response time
- All Solid State with Encapsulated Circuitry

Specifications

<table>
<thead>
<tr>
<th>Time Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Repeat Accuracy</td>
</tr>
<tr>
<td>Tolerance</td>
</tr>
<tr>
<td>Time Delay vs. Temperature</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
</tr>
<tr>
<td>Tolerance</td>
</tr>
<tr>
<td>AC Line Frequency</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
<tr>
<td>Maximum Load Current</td>
</tr>
<tr>
<td>Voltage Drop</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transient</td>
</tr>
<tr>
<td>Dielectric Breakdown</td>
</tr>
<tr>
<td>Insulation Resistance</td>
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</table>

<table>
<thead>
<tr>
<th>Mechanical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
</tr>
<tr>
<td>Package</td>
</tr>
<tr>
<td>Termination</td>
</tr>
<tr>
<td>Dimensions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating/Storage</td>
</tr>
<tr>
<td>Temperature</td>
</tr>
<tr>
<td>Humidity</td>
</tr>
</tbody>
</table>

Function Diagram

For dimensional drawing see: Appendix, page 512, Figure 16.
HRV SERIES

Coin Counter

Description

The HRV combines the accuracy of microcontroller based circuitry with an electromechanical relay output. The HRV’s switching capacity allows direct control of loads like compressors, pumps, motors, heaters, and lighting. The HRV “S” version provides a vend time after the selected number of initiate switch closures to start is reached. The HRV “A” version includes all of the “S” features and allows the total vend time to be extended for each additional initiate switch closure. The HRV is ideal for cost sensitive single coin or token vending machines. The electronic circuitry is encapsulated to protect against humidity and vibration.

Operation

Coin Totalizer & Vending Timer (“S” Version):
Input voltage must be applied prior to & during operation. When the total number of S1 initiate switch closures equals the number to start set on the lower 3 DIP switches, the load energizes and the vending time set on the upper 7 DIP switches begins. At the end of the vending time, the load de-energizes and the vending time is reset. Closing the initiate switch during vend timing will have no affect on vend time delay.

Accumulating Vending Timer (“A” Version):
Input voltage must be applied prior to and during operation. When the total number of S1 initiate switch closures equals the number to start set on the lower 3 DIP switches, the load energizes and the vending time starts. For every initiate switch closure, the HRV unit adds one time per coin period, as set on the upper 7 DIP switches, to the total vending time.

Operation Note: If S1 is closed when input voltage is applied, the output remains de-energized and the S1 counter remains at zero closures. At least one “vend time” and one “closures to start” DIP switch must be in the “ON” position for proper operation.

Reset:
Removing input voltage resets the vend time delay, the S1 closure counter, and de-energizes the output relay.

Features & Benefits

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcontroller based</td>
<td>Repeat accuracy + / - 0.1%, Setting accuracy 0 - 2%, or 50ms</td>
</tr>
<tr>
<td>Encapsulated</td>
<td>Protects against shock, vibration, and humidity</td>
</tr>
<tr>
<td>30A , 1Hp at 125VAC, normally open contacts</td>
<td>Allows direct control of loads like compressors, pumps, motors, and heaters without a contactor</td>
</tr>
<tr>
<td>Switch selectable coin start</td>
<td>Allows user flexibility to select the number of coins to start vending cycle</td>
</tr>
<tr>
<td>Coin switch can be connected to a counter</td>
<td>Provides user with accurate count of total number of coins collected</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>MODEL</th>
<th>INPUT VOLTAGE</th>
<th>VEND TIME</th>
<th>MODE OF OPERATION</th>
<th>OUTPUT FORM &amp; RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRV11SC</td>
<td>12VDC</td>
<td>1 - 127s</td>
<td>Coin totalizer</td>
<td>30A SPDT, NO (isolated)</td>
</tr>
<tr>
<td>HRV24AC</td>
<td>24VAC</td>
<td>0.25 - 31.75m</td>
<td>Accumulating</td>
<td>30A SPDT, NO (isolated)</td>
</tr>
<tr>
<td>HRV41AE</td>
<td>120VAC</td>
<td>1 - 127s</td>
<td>Accumulating</td>
<td>30A SPDT, NO (isolated)</td>
</tr>
<tr>
<td>HRV41SE</td>
<td>120VAC</td>
<td>1 - 127s</td>
<td>Coin totalizer</td>
<td>30A SPDT, NO (isolated)</td>
</tr>
<tr>
<td>HRV42SE</td>
<td>120VAC</td>
<td>5 - 635s</td>
<td>Coin totalizer</td>
<td>30A SPDT, NO (isolated)</td>
</tr>
<tr>
<td>HRV43AE</td>
<td>120VAC</td>
<td>0.1 - 12.7m</td>
<td>Accumulating</td>
<td>30A SPDT, NO (isolated)</td>
</tr>
<tr>
<td>HRV43AN</td>
<td>120VAC</td>
<td>0.1 - 12.7m</td>
<td>Accumulating</td>
<td>30A SPDT, NO (non-isolated)</td>
</tr>
<tr>
<td>HRV43SE</td>
<td>120VAC</td>
<td>0.1 - 12.7m</td>
<td>Coin totalizer</td>
<td>30A SPDT, NO (isolated)</td>
</tr>
</tbody>
</table>

If you don't find the part you need, call us for a custom product 800-843-8848

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**Switch Adjustment**

Combine upper seven switches in “ON” position for vend time in minutes.

Combine lower three switches in “ON” position for number of closures to start.

**Function Diagram**

**Accumulating Vending Timer**

- **V** = Voltage
- **S1** = Initiate Switch
- **L** = Load
- **R** = Reset
- **TD** = Time Delay

**Specifications**

**Type**

Electromechanical relay

**Form**

Isolated, SPDT or non-isolated, SPDT

**Ratings**

- **General Purpose**
  - 125/240VAC: 30A, 15A
  - 125/240VAC: 30A, 15A
  - 28VDC: 20A, 10A
- **Resistive**
  - 125/240VAC: 1 hp*, 1/4 hp**
  - 240VAC: 2 hp**, 1 hp**

**Protection**

- **Surge**
  - IEEE C62.41-1991 Level A
- **Circuitry**
  - Encapsulated
- **Dielectric Breakdown**
  - ≥ 1500V RMS input to output on isolated units
- **Insulation Resistance**
  - ≥ 100 MΩ

**Mechanical**

- **Mounting**
  - Surface mount with one #10 (M5 x 0.8) screw
- **Dimensions**
  - H 76.7 mm (3”); W 50.8 mm (2”);
  - D 38.1 mm (1.5”)
- **Termination**
  - 0.25 in. (6.35 mm) male quick connect terminals

**Environmental**

- **Operating/Storage**
  - Temperature: -40° to 70°C / -40° to 85°C
  - Humidity: 95% relative, non-condensing
  - Weight: 3.9 oz (111 g)

**Accessories**

- **P1023-6 Mounting bracket**
  - The 90° orientation of mounting slots makes installation/removal of modules quick and easy.

- **P1015-13 (AWG 10/12), P1015-64 (AWG 14/16)**
  - Female Quick Connect
  - These 0.25 in. (6.35 mm) female terminals are constructed with an insulator barrel to provide strain relief.

- **P1015-18 Quick Connect to Screw Adapter**
  - Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

- **C103PM (AL) DIN Rail**
  - 35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

- **P1023-20 DIN Rail Adapter**
  - Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

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***For CE approved applications, voltage must be removed when a switch position is changed.