

## 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.

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For More Information...  
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## TIMER FUNCTION GUIDE

### Selecting a Timer's Function

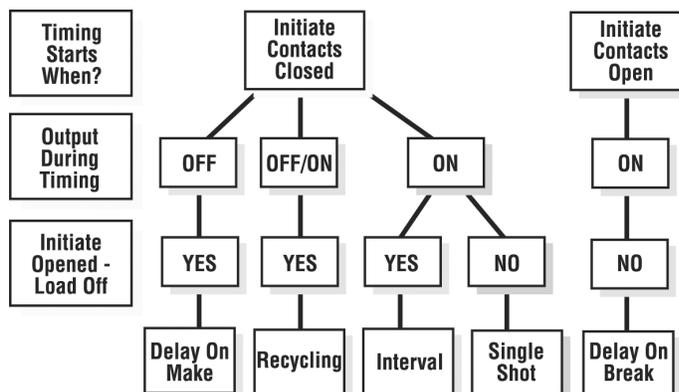
Selecting one of the five most common timing functions can be as easy as answering three questions on the chart below. If you have trouble answering these questions, try drawing a connection diagram that shows how the timer and load are connected. Time diagrams and written descriptions of the five most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

- The timing starts when the initiate (starting) contacts are:
  - A) Closed    B) Opened
- What is the status of the output (or load) during timing?
  - A) On    B) Off    C) On/Off
- Will the load de-energize (or remain de-energized) if the initiate (starting) contacts are opened during timing?
  - A) Yes    B) No

#### THE FIVE MOST USED FUNCTIONS

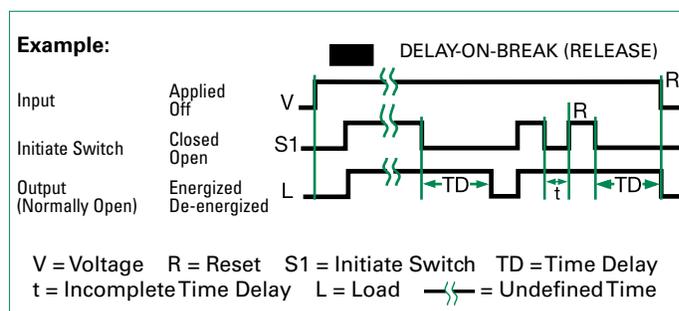


### Understanding Time Diagrams

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 de-energizing loads are represented by descending vertical transitions.

#### TIME DIAGRAM



### International Timing Function Symbols

- ☒ = Delay-on-Make; ON-delay
- = Delay-on-Break; OFF-delay
- ☒ ■ = Delay-on-Make and Break; ON and OFF-delay
- 1 □ = Interval; Impulse-ON
- 1 □ = Trailing Edge Interval; Impulse-OFF
- = Single Shot; Pulse Former
- = Flasher - ON Time First; Recycling Equal Times - ON First
- ■ = Flasher - OFF Time First; Recycling Equal Times - OFF First
- ☒ = Recycling - Unequal Times; Pulse Generator
- ■ = Recycling - Unequal Times Starting with ON or OFF
- ☒ = Delay-on-Make and Interval; Single Pulse Generator

# TRDU SERIES



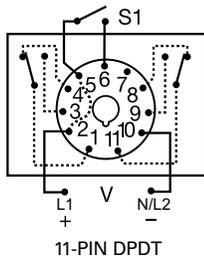
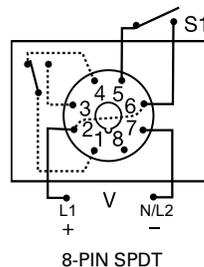
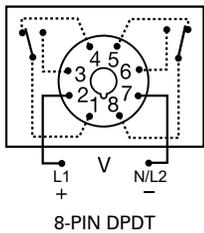
## Description

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.

## Wiring Diagram



V = Voltage  
S1 = Initiate Switch

## Features & Benefits

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

## 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.

For dimensional drawing see: Appendix, page 512, Figure 20.

## Ordering Information

MODEL	INPUT VOLTAGE	BASE CONNECTION
TRDU120A1	120VAC	8-pin, DPDT*
TRDU120A2	120VAC	8-pin, SPDT
TRDU120A3	120VAC	11-pin, DPDT
TRDU12D1	12VDC	8-pin, DPDT*
TRDU12D2	12VDC	8-pin, SPDT
TRDU230A2	230VAC	8-pin, SPDT
TRDU24A1	24VAC/DC	8-pin, DPDT*
TRDU24A2	24VAC/DC	8-pin, SPDT
TRDU24A3	24VAC/DC	11-pin, DPDT

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.

## TRDU SERIES

### Specifications

#### Time Delay

**Type** Microcontroller  
**Range: Switch Selectable\*\*** Single Functions: 0.1s - 1,705h in 8 ranges  
 Dual Functions: 0.1s - 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  
 ≤ 50ms  
 120VAC: 75ms

**Reset Time**  
**Initiate Time**  
**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** -15% - 20%  
 -20% - 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 10<sup>7</sup>; Electrical – 1 x 10<sup>6</sup>

#### Protection

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

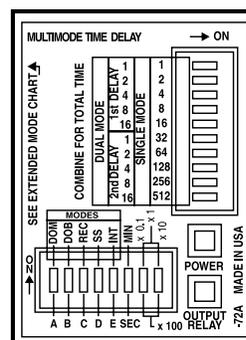
#### Mechanical

**Mounting Dimensions** Plug-in socket  
**H** 76.7 mm (3.1"); **W** 60.7 mm (2.39");  
**D** 45.2 mm (1.78")  
 Octal 8-pin plug-in or magnal 11-pin plug-in

#### Termination

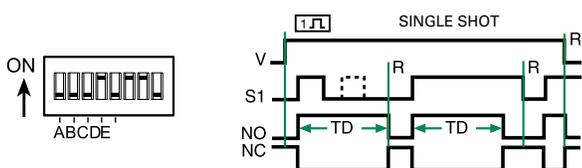
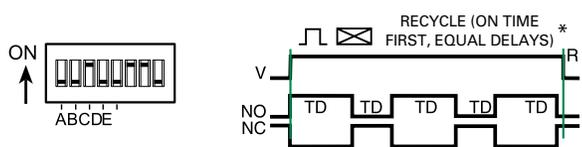
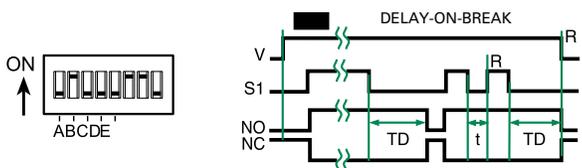
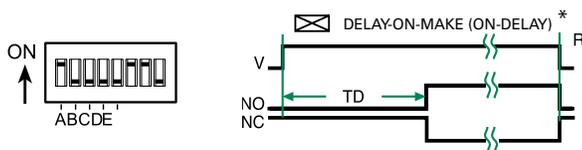
**Environmental**  
**Operating/Storage Temperature** -20° to 65°C / -40° to 85°C  
**Weight** ≈ 5.8 oz (164 g)

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

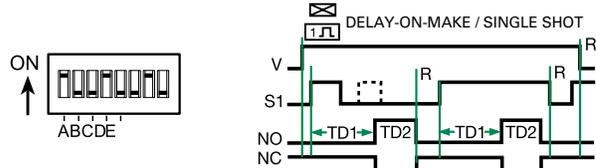
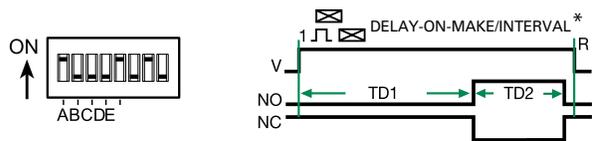
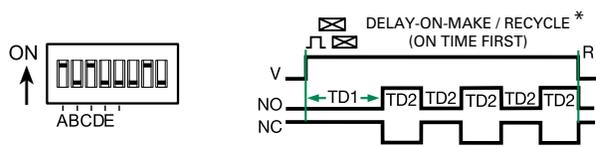
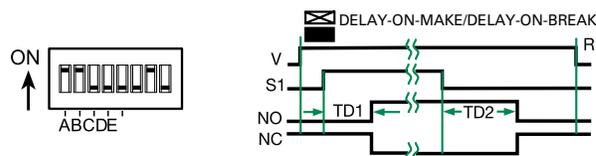


### Function Diagrams

#### Single Functions



#### Dual Functions

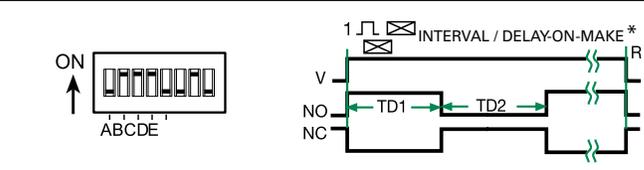
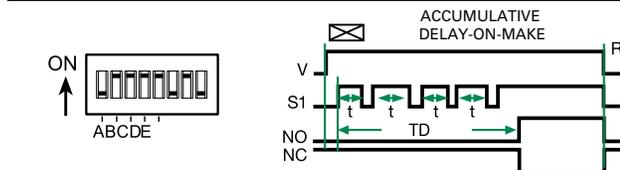
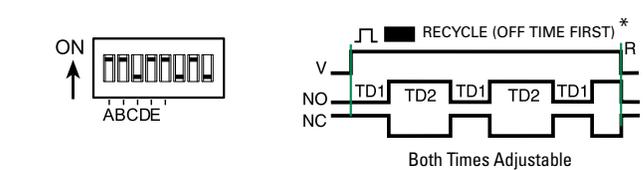
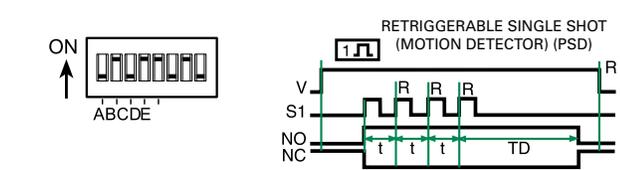
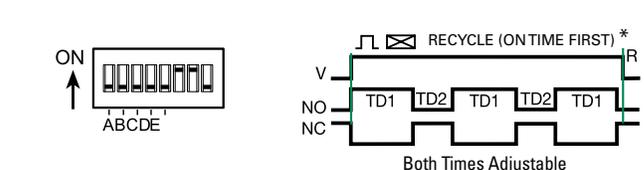
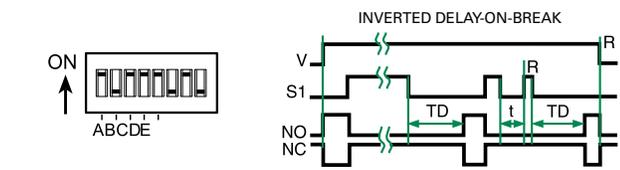
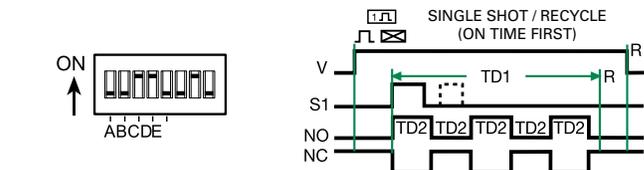
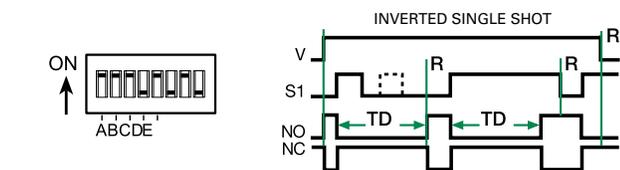
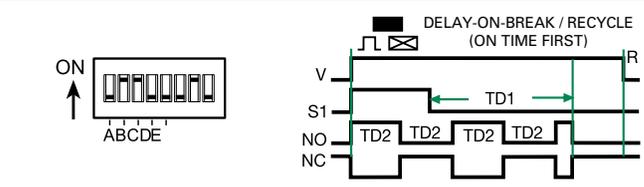
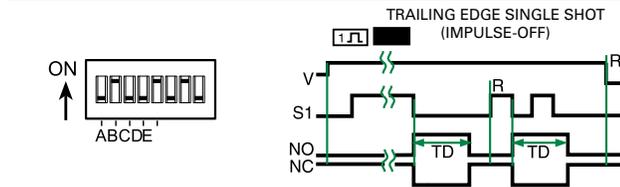
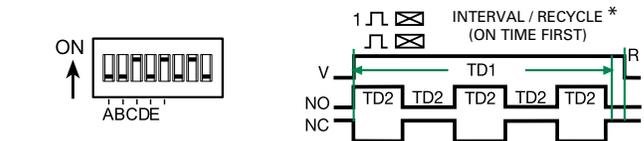
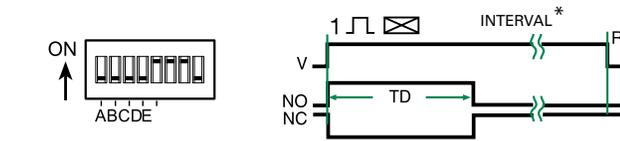


12 TIME DELAY RELAYS

# TRDU SERIES

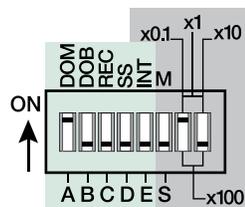
### Single Functions

### Dual Functions



### KEY

### LEGEND



- V = Voltage
- R = Reset
- S1 = Initiate Switch
- NO = Normally Open Contact
- NC = Normally Closed Contact
- TD, TD1, TD2 = Complete Time Delay
- t = Partial Time Delay
- DOM = Delay-on-Make
- DOB = Delay-on-Break
- REC = Recycle
- SS = Single Shot
- INT = Interval
- M = Minutes
- S = Seconds
- = Undefined time

- 5 Switches for Function Selection
- 3 Switches for Time Delay Range

\* 9 Functions included in the 8 pin DPDT models

NOTE: The time delay range is the same for both functions when dual functions are selected.

## TRU SERIES

### Knob Adjustable Universal Time Delay Relay



8-PIN



11-PIN

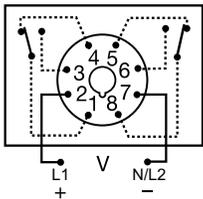
### Description

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.

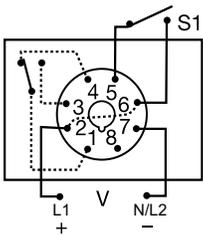
### Operation

A six position slide switch selects delay-on-make, interval, single shot, recycling (ON time first, equal recycle delays), delay-on-break, and retriggerable 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.

### Wiring Diagram



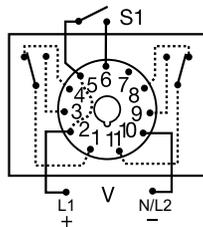
**8-PIN DPDT**  
Delay-on-Make  
Interval  
Recycling



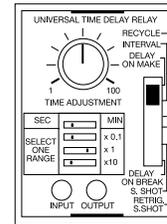
**8-PIN SPDT**  
Delay-on-Make  
Interval  
Single Shot  
Recycling  
(ON Time First, Equal  
Recycle Delays)  
Delay-on-Break  
Retriggerable Single Shot

V = Voltage  
S1 = Initiate Switch

Relay contacts  
are isolated



**11-PIN DPDT**  
Delay-on-Make  
Interval  
Single Shot  
Recycling  
(ON Time First, Equal  
Recycle Delays)  
Delay-on-Break  
Retriggerable Single Shot



### Features & Benefits

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

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

### Ordering Information

MODEL	INPUT VOLTAGE	BASE WIRING	FUNCTIONS
TRU1	19 to 264VAC; 19 to 30VDC	8-pin DPDT	3
TRU2	19 to 264VAC; 19 to 30VDC	8-pin SPDT	6
TRU3	19 to 264VAC; 19 to 30VDC	11-pin DPDT	6

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12 TIME DELAY RELAYS

## TRU 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.

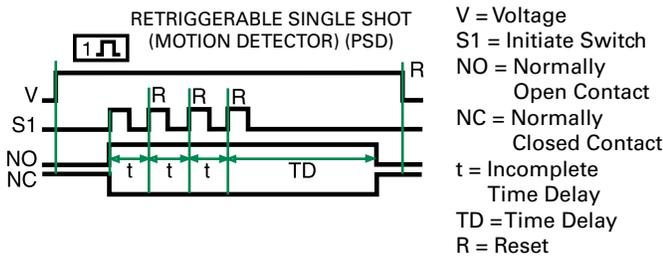


**NDS-11 11-pin Socket**  
11-pin 35mm DIN rail or surface mount. Rated at 10A @ 300VAC. Surface mounted with two #6 (M 3.5 x 0.6) screws or snaps onto a 35 mm DIN rail. Uses PSC11 hold-down clips.



**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.

### Function Diagram



### Specifications

#### Time Delay

Type  
Range  
Switch Selectable

Digital integrated circuitry

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

Input Range

19 to 264VAC and 19 to 30VDC

AC Line Frequency

50/60Hz

#### Output

Type

Electromechanical relay

Form

SPDT or DPDT, isolated

Rating

10A resistive @ 120/240VAC & 28VDC;  
1/3 hp @ 120/240VAC  
Mechanical -  $1 \times 10^7$ ; Electrical -  $1 \times 10^6$

#### Life

Protection

38 joules

Transient

≥ 1500V RMS input to output

Isolation Voltage

DC units are reversed polarity protected

Polarity

#### Mechanical

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

-20° to 65°C / -30° to 85°C

Temperature

Weight

≈ 6 oz (170 g)

**ASQU / ASTU SERIES**



**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.

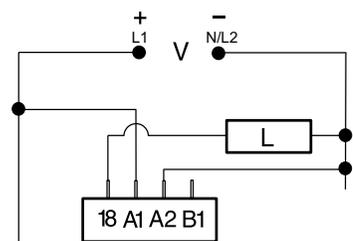
The ASQU Series has quick connect terminals and the ASTU Series has terminal blocks.

**Features & Benefits**

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

**Wiring & Adjustment Diagrams**

**DELAY-ON-MAKE & RECYCLING**

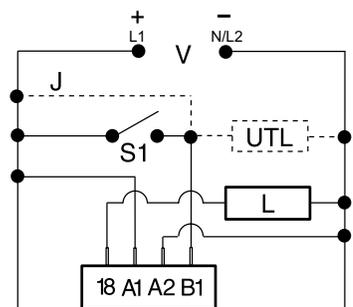


**ADJUSTMENTS**

DOM	A <input type="checkbox"/>	B <input type="checkbox"/>
SS	A <input type="checkbox"/>	B <input type="checkbox"/>
R	A <input type="checkbox"/>	B <input type="checkbox"/>
DOB	A <input type="checkbox"/>	B <input type="checkbox"/>

DOM = Delay-on-Make  
SS = Single Shot/Interval  
R = Recycling  
DOB = Delay-on-Break

**SINGLE SHOT, INTERVAL & DELAY-ON-BREAK**



R	M	S
0.1-10s	X1s	C <input type="checkbox"/> E D <input type="checkbox"/> F
1-100s	X10s	C <input type="checkbox"/> E D <input type="checkbox"/> F
10-1000s	X100s	C <input type="checkbox"/> E D <input type="checkbox"/> F
1-100m	X10m	C <input type="checkbox"/> E D <input type="checkbox"/> F

R = Range  
M = Multiplier  
S = Setting

V = Voltage  
L = Load  
J = Wire Required for Interval Operation  
S1 = Initiate Switch  
UTL = Optional Untimed Load

**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**

MODEL	INPUT VOLTAGE	CONNECTION
ASQUA3	24 to 240VAC	Quick Connects
ASQUD3	9 to 110VDC	Quick Connects
ASTUA3	24 to 240VAC	Terminal Blocks
ASTUD3	9 to 110VDC	Terminal Blocks

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12 TIME DELAY RELAYS

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

# ASQU / ASTU SERIES

## 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** 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

**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 mm<sup>2</sup>) wire

### Environmental

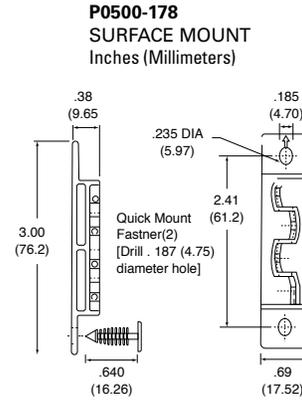
**Operating/Storage Temperature** -40° to 60°C / -40° to 85°C

**Humidity** 95% relative, non-condensing

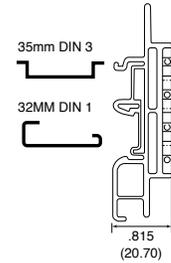
**Weight** ≈ 4 oz (113 g)

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

## Mounting Diagrams



**P0500-179**  
**DIN RAIL MOUNT**  
Inches (Millimeters)



## DSQU / DSTU SERIES



DSQU



DSTU

### 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.

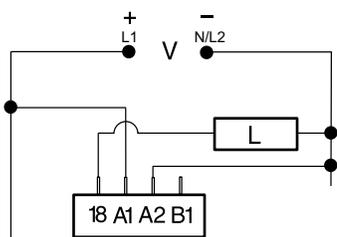
The DSQU Series has quick connect terminals and the DSTU Series has terminal blocks.

### Features & Benefits

FEATURES	BENEFITS
<b>Universal AC or DC voltage</b>	Choose from 24 to 240VAC or 9 to 110VDC models
<b>Compact 17.5mm size</b>	Allows for high rail density
<b>Microcontroller based</b>	Repeat Accuracy +/- 1%
<b>Multifunction: 5 timing functions</b>	Reduce stocking requirements
<b>DIP switch adjustable time delay</b>	Field adjustable delay ranging from 0.1s - 63m
<b>0.7A steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions.
<b>Mounting fasteners included</b>	Each unit ships with both surface and DIN rail quick mount adapters
<b>Watchdog circuitry</b>	Self monitoring and self correcting for improved performance

### Wiring & Adjustment Diagrams

#### DELAY-ON-MAKE & RECYCLING

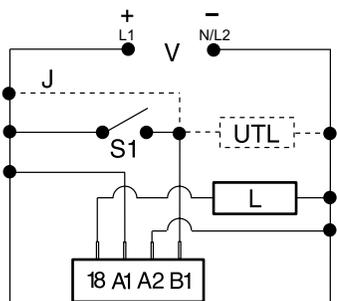


#### ADJUSTMENTS

DOM	A <input type="checkbox"/>	B <input type="checkbox"/>
SS	A <input type="checkbox"/>	B <input type="checkbox"/>
R	A <input type="checkbox"/>	B <input type="checkbox"/>
DOB	A <input type="checkbox"/>	B <input type="checkbox"/>

DOM = Delay-on-Make  
SS = Single Shot/Interval  
R = Recycling  
DOB = Delay-on-Break

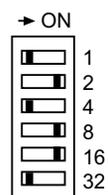
#### SINGLE SHOT, INTERVAL & DELAY-ON-BREAK



V = Voltage  
L = Load  
J = Wire Required for Interval Operation  
S1 = Initiate Switch  
UTL = Optional Untimed Load

R	M	S	I
0.1-6.3s	X0.1s	C <input type="checkbox"/> E <input type="checkbox"/> D <input type="checkbox"/> F <input type="checkbox"/>	0.1s
1-63s	X1s	C <input type="checkbox"/> E <input type="checkbox"/> D <input type="checkbox"/> F <input type="checkbox"/>	1s
10-630s	X10s	C <input type="checkbox"/> E <input type="checkbox"/> D <input type="checkbox"/> F <input type="checkbox"/>	10s
1-63m	X1m	C <input type="checkbox"/> E <input type="checkbox"/> D <input type="checkbox"/> F <input type="checkbox"/>	1m

R = Range  
M = Multiplier  
S = Setting  
I = Increments of time



Add switches in ON position  
TD = 2+8+16=26

### 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

MODEL	INPUT VOLTAGE	CONNECTION
DSQUA3	24 - 240VAC	Quick Connects
DSQUD3	9 - 110VDC	Quick Connects
DSTUA3	24 - 240VAC	Terminal Blocks
DSTUD3	9 - 110VDC	Terminal Blocks

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# DSQU / DSTU SERIES

## 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.

±2% or ±50ms, whichever is greater

#### & Voltage

### 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 mm<sup>2</sup>) wire

### Environmental

#### Operating/Storage

#### Temperature

-40° to 60°C / -40° to 85°C

#### Humidity

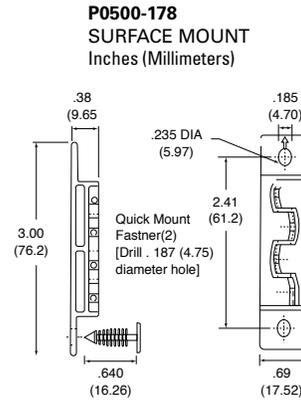
95% relative, non-condensing

#### Weight

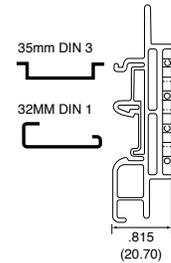
≅ 4.2 oz (119 g)

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

## Mounting Diagrams



**P0500-179**  
DIN RAIL MOUNT  
Inches (Millimeters)



# T10 SERIES

## Solid-State On-Delay Timer



### Description

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

**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");

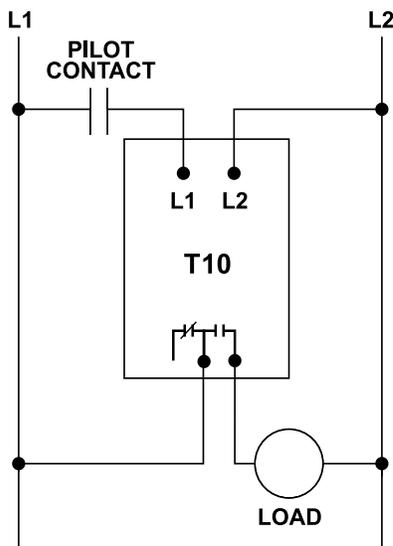
**D** 74.9 mm (2.95")

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

**Mounting Method** #8 screws

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

### Wiring Diagram



For dimensional drawing see: Appendix page 509, Figure 6.

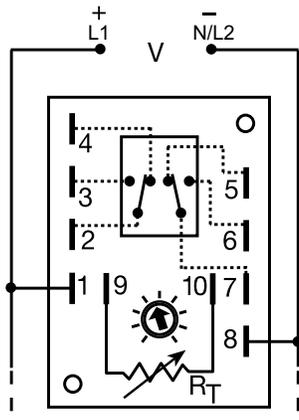
### Ordering Information

MODEL	LINE VOLTAGE	DESCRIPTION
T10120	115VAC	0.1 to 10 minute range, 240 VAC rated output contacts
T10200	230VAC	0.1 to 10 minute range, 240 VAC rated output contacts
T10400	460VAC	0.1 to 10 minute range, 600 VAC rated output contacts
T10S400	460VAC	0.5 to 12 second range, 600 VAC rated output contacts

# ERDM SERIES



## Wiring Diagram



V = Voltage

A knob, or terminals 9 & 10 are only included on adjustable units. Relay contacts are isolated.

R<sub>T</sub> is used when external adjustment is ordered.

For dimensional drawing see: Appendix, page 512, Figure 25.

## 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

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

## 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

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

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# ERDM SERIES

## 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

**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** Mechanical - 1 x 10<sup>7</sup>; Full Load - 1 x 10<sup>6</sup>

### 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

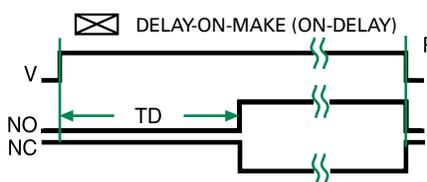
R <sub>T</sub> Selection Chart							R <sub>T</sub> Megohm
Desired Time Delay*							
Seconds							
1	2	3	4	5	6		
0.1	0.1	0.1	0.2	0.3	0.6	0.0	
0.19	0.6	1	1.7	3	6	0.1	
0.28	1.1	2	3.2	6	12	0.2	
0.37	1.6	3	4.7	9	18	0.3	
0.46	2.1	4	6.2	12	24	0.4	
0.55	2.6	5	7.7	15	30	0.5	
0.64	3.0	6	9.2	18	36	0.6	
0.73	3.5	7	10.7	21	42	0.7	
0.82	4.0	8	12.2	24	48	0.8	
0.91	4.5	9	13.7	27	54	0.9	
1.0	5.0	10	15	30	60	1.0	

\* 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						R <sub>T</sub> Megohm
Desired Time Delay*						
Minutes						
7	8	9	10	11		
0.1	0.1	0.2	1	10	0.0	
0.6	1	1.7	10	50	0.1	
1.1	2	3.2	20	100	0.2	
1.6	3	4.7	30	150	0.3	
2.1	4	6.2	40	200	0.4	
2.6	5	7.7	50	250	0.5	
3.0	6	9.2	60	300	0.6	
3.5	7	10.7	70	350	0.7	
4.0	8	12.2	80	400	0.8	
4.5	9	13.7	90	450	0.9	
5.0	10	15	100	500	1.0	

\* When selecting an external R<sub>T</sub> add at least 20% for tolerance of unit and the R<sub>T</sub>.

## Function Diagram



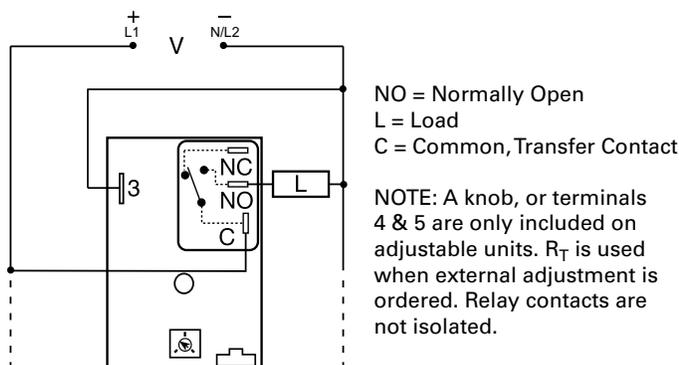
V = Voltage  
NO = Normally Open Contact  
NC = Normally Closed Contact  
TD = Time Delay  
R = Reset  
—||— = Undefined Time

# HRDM SERIES

## Delay-on-Make Timer



### Wiring Diagram



For dimensional drawing see: Appendix, page 512, Figure 17.

### Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
HRDM120	12VDC	Onboard	0.1 - 10s
HRDM3112S	24VDC	Fixed	12s
HRDM413M	120VAC	Fixed	3m
HRDM415M	120VAC	Fixed	5m

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### Description

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  $\pm 0.5\%$ . 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

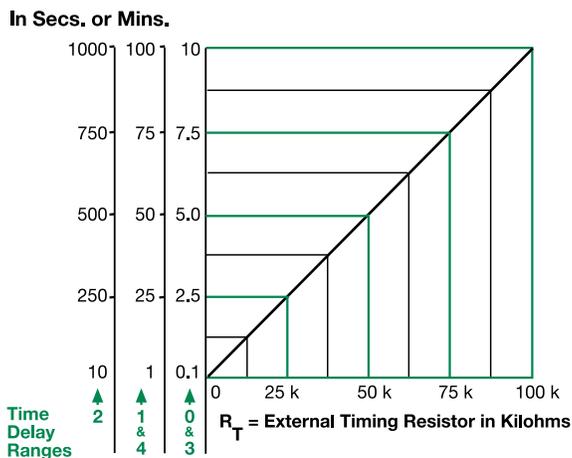
FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy + / - 0.5%
<b>Compact, low cost design</b>	Allows flexibility for OEM applications
<b>Isolated, 30A, SPDT, NO output contacts</b>	Allows direct operation of heavy loads: compressors, pumps, blower motors, heaters.
<b>Encapsulated</b>	Protects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

### 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.

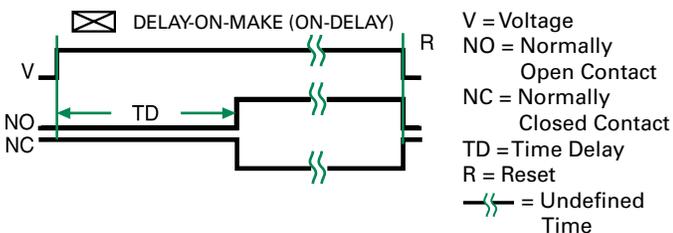
# HRDM SERIES

## 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



## Specifications

### Time Delay

**Type** Microcontroller circuitry  
**Range** 0.1s - 100m in 5 adjustable ranges or fixed  
**Repeat Accuracy** ±0.5% or 20 ms, whichever is greater  
**Tolerance (Factory Calibration)** ±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
<b>General Purpose</b>	125/240VAC	125/240VAC
<b>Resistive</b>	30A	15A
	28VDC	15A
	20A	10A
<b>Motor Load</b>	1 hp*	1/4 hp**
	2 hp**	1 hp**

### Life

Mechanical - 1 x 10<sup>6</sup>;  
Electrical - 1 x 10<sup>5</sup>, \*3 x 10<sup>4</sup>, \*\*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** 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)

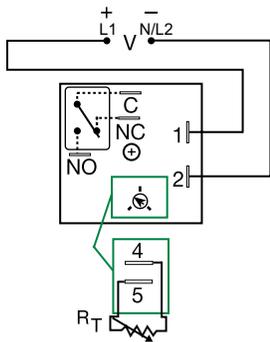
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output relay energizes and remains energized until input voltage is removed.

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

## Features & Benefits

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy +/- 0.5%
<b>Compact, low cost design</b>	Allows flexibility for OEM applications
<b>Isolated, 10A, SPDT output contacts</b>	Allows control of loads for AC or DC voltages
<b>Encapsulated</b>	Protects against shock, vibration, and humidity

## Wiring Diagram



V = Voltage  
C = Common, Transfer Contact  
NO = Normally Open  
NC = Normally Closed

A knob is supplied for adjustable units, or  $R_T$  terminals 4 & 5 for external adjust. See external adjustment vs time delay chart. Relay contacts are isolated.

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.

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
KRDM1110S	12VDC	Fixed	10s	KRDM4110M	120VAC	Fixed	10m
KRDM1130S	12VDC	Fixed	30s	KRDM4110S	120VAC	Fixed	10s
KRDM120	12VDC	Onboard knob	0.1 - 10s	KRDM4145S	120VAC	Fixed	45s
KRDM121	12VDC	Onboard knob	1 - 100s	KRDM420	120VAC	Onboard knob	0.1 - 10s
KRDM2110M	24VAC/DC	Fixed	10m	KRDM421	120VAC	Onboard knob	1 - 100s
KRDM215M	24VAC/DC	Fixed	5m	KRDM424	120VAC	Onboard knob	1 - 100m
KRDM220	24VAC/DC	Onboard knob	0.1 - 10s	KRDM430	120VAC	External	0.1 - 10s
KRDM221	24VAC/DC	Onboard knob	1 - 100s	KRDM433	120VAC	External	0.1 - 10m
KRDM223	24VAC/DC	Onboard knob	0.1 - 10m	KRDM6115M	230VAC	Fixed	15m
KRDM310.2S	24VDC	Fixed	0.2s				

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# KRDM SERIES

## 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.

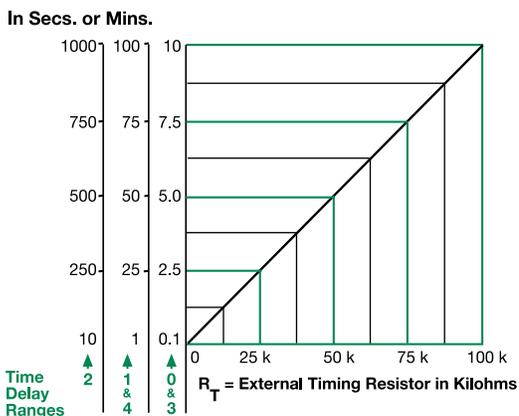


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



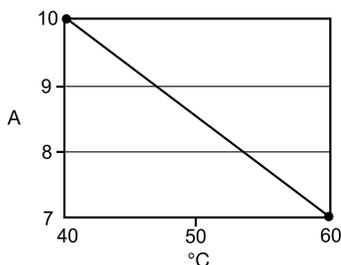
**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

## 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  $R_T$  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  $R_T$ .

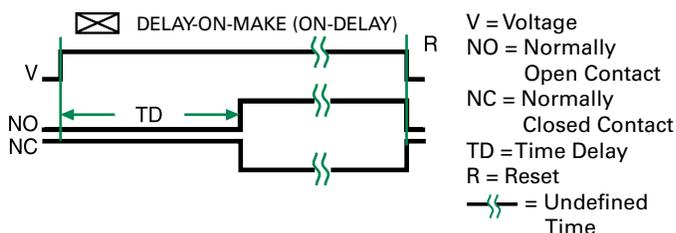
## Output Current / Ambient Temperature



## Specifications

<b>Time Delay Range</b>	0.1s - 100ms in 5 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ±5%
<b>Recycle Time</b>	≤ 150ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±5%
<b>Input Voltage</b>	12, 24 or 110VDC; 24, 120 or 230VAC
<b>Tolerance</b>	
<b>12VDC &amp; 24VAC/DC</b>	-15% - 20%
<b>110VDC 120 &amp; 230VAC</b>	-20% - 10%
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 2W
<b>Output Type</b>	Isolated relay contacts
<b>Form</b>	SPDT
<b>Rating (at 40°C)</b>	10A resistive @ 125VAC; 5A resistive @ 230VAC & 28VDC; 1/4 hp @ 125VAC
<b>Max. Switching Voltage</b>	250VAC
<b>Life (Operations)</b>	Mechanical - 1 x 10 <sup>7</sup> ; Electrical - 1 x 10 <sup>5</sup>
<b>Protection</b>	
<b>Circuitry</b>	Encapsulated
<b>Isolation Voltage</b>	≥ 1500V RMS input to output
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reverse polarity protected
<b>Mechanical</b>	
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2.0"); <b>W</b> 50.8 mm (2.0"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-20° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≈ 2.6 oz (74 g)

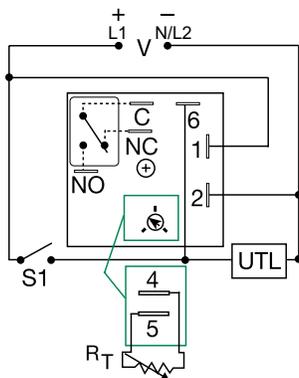
## Function Diagram



# KRPS SERIES



## Wiring Diagram



V = Voltage  
C = Common, Transfer Contact  
NC = Normally Closed  
NO = Normally Open  
S1 = Initiate Switch  
UTL = Untimed Load

A knob is supplied for adjustable units, or  $R_T$  terminals 4 & 5 for external adjust. See external adjustment vs. time delay chart. The untimed load is optional. S1 is not used for some functions.

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

## Ordering Information

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

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## 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

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

## 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.

# KRPS SERIES

## 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<sup>7</sup>; Electrical - 1 x 10<sup>5</sup>

### Protection

**Circuitry** Encapsulated

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

**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")

0.25 in. (6.35 mm) male quick connects

### Termination

### Environmental

### Operating/Storage

### Temperature

-40° to 60°C / -40° to 85°C

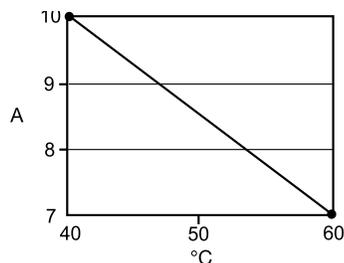
### Humidity

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 time delay begins. The output relay 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.

### Operation (Delay-on-Break)

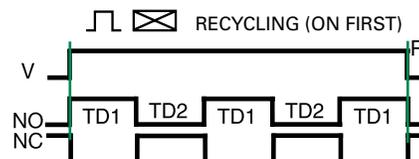
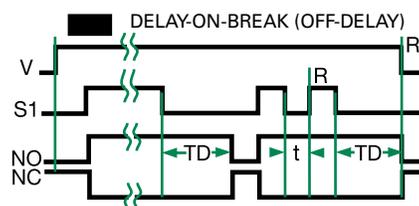
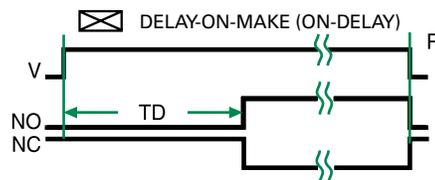
Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output relay energizes. The time delay begins when the initiate switch is opened. The output remains energized during timing. At the end of the time delay, the output de-energizes. The output will energize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



## KRPS SERIES

### 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)

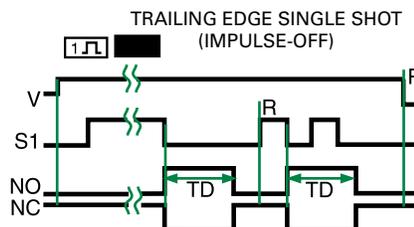
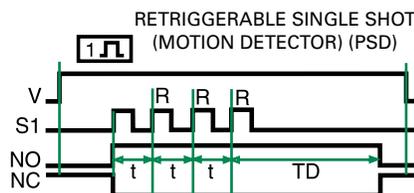
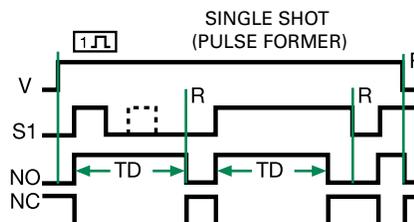
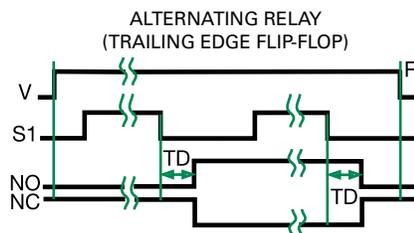
Input voltage must be applied prior to and during timing. The output relay is de-energized. When the initiate switch S1 closes momentarily or maintained, the output energizes and the time delay begins. Upon completion of the delay, the output de-energizes.

**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 effect 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  
— = Undefined Time

# KSD1 SERIES

## Delay-on-Make Timer



### Description

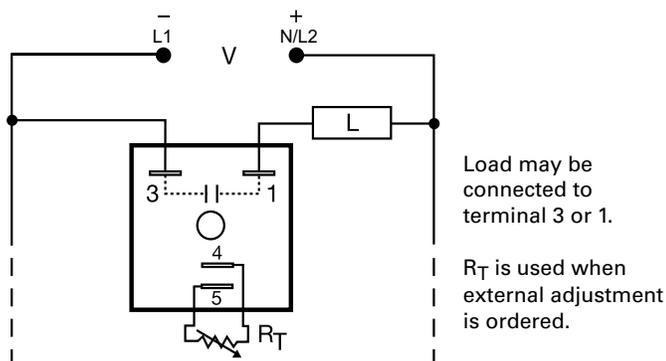
The KSD1 Series features two-terminal, series-connection with the load. The KSD1 Series is an ideal choice for delay-on-make timing applications. This series is designed for general purpose commercial and industrial applications where a small, cost effective, reliable solid-state timer is required. The 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.

### Wiring Diagram



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

### Features & Benefits

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

### 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

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
KSD11120S	12VDC	Fixed	20s
KSD1123	12VDC	External	0.1 - 10m
KSD1230	24VAC	Onboard	0.1 - 10s
KSD1320	24VDC	External	0.1 - 10s
KSD1412S	120VAC	Fixed	2s
KSD14130S	120VAC	Fixed	30s
KSD1420	120VAC	External	0.1 - 10s
KSD16130S	230VAC	Fixed	30s

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## KSD1 SERIES

### Accessories

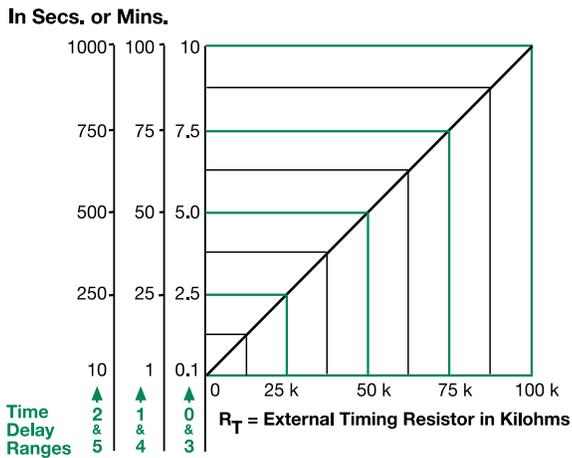


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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

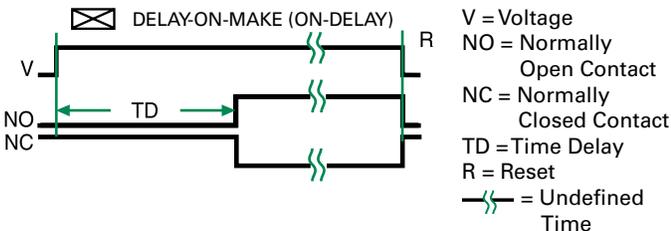


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the time delay increases.

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



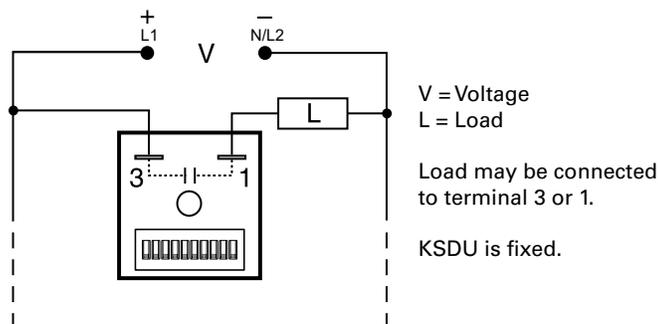
### Specifications

<b>Time Delay Range</b>	0.1s - 1000ms in 6 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ±5%
<b>Recycle Time</b>	≤ 150ms
<b>Time Delay vs. Temperature &amp; Voltage</b>	≤ ±10%
<b>Input Voltage</b>	24, 120, or 230VAC; 12 or 24VDC
<b>Tolerance</b>	±20%
<b>AC Line Frequency</b>	50/60 Hz
<b>Output Type</b>	Solid state
<b>Form</b>	NO, open during timing
<b>Maximum Load Current</b>	1A steady state, 10A inrush at 60°C
<b>Minimum Holding Current</b>	≤ 40mA
<b>OFF State Leakage Current</b>	≅ 7mA @ 230VAC
<b>Voltage Drop</b>	≅ 2.5V @ 1A
<b>Protection Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reverse polarity protected
<b>Mechanical Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≅ 2.4 oz (68 g)

# KSDU SERIES



## Wiring Diagram



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

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
KSDU8120	24 to 120VAC/DC	Fixed	20s
KSDU811200	24 to 120VAC/DC	Fixed	1200s

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## 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

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

## 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.

# KSDU SERIES

## Specifications

### Time Delay

<b>Type</b>	Digital integrated circuitry
<b>Range*</b>	Fixed from 0.1s - 10230s
<b>Fixed</b>	
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater
<b>Tolerance</b>	
<b>(Factory Calibration)</b>	±10%
<b>Recycle Time</b>	≤150ms
<b>Time Delay vs Temp. &amp; Voltage</b>	±5%

### Input

<b>Voltage</b>	24 to 120VAC/DC; 100 to 240VAC/DC
<b>AC Line Frequency</b>	50/60 Hz
<b>Tolerance</b>	±20%

### Output

<b>Type</b>	Solid state
<b>Form</b>	NO, open during timing
<b>Maximum Load Current</b>	1A steady state, 10A inrush at 60°C
<b>Minimum Holding Current</b>	40mA
<b>Voltage Drop</b>	≈ 2.5V @ 1A

### Protection

<b>Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥100 MΩ

### Mechanical

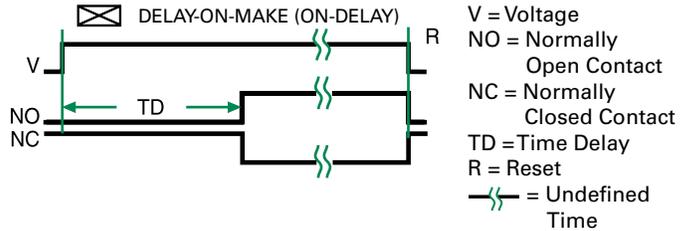
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2.0"); <b>W</b> 50.8 mm (2.0"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals

### Environmental

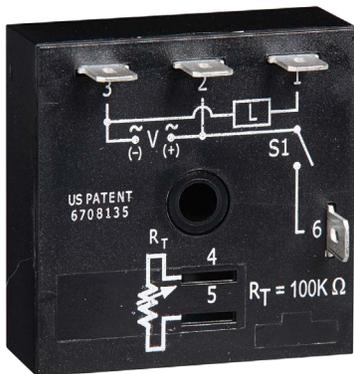
<b>Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≈ 2.4 oz (68 g)

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

## Function Diagram



**KSPS SERIES**



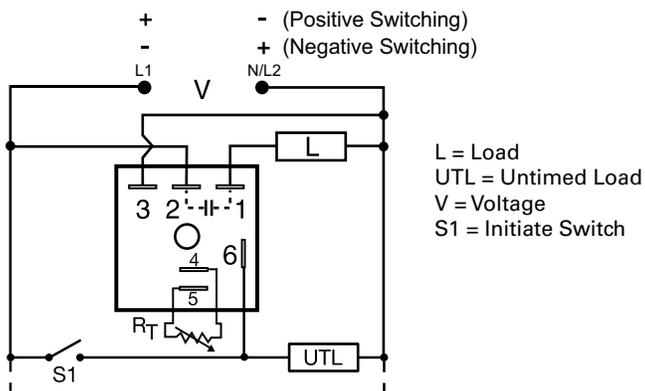
**Description**

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.

**Features & Benefits**

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy + / - 0.5%
<b>Compact design</b>	Allows flexibility for OEM applications
<b>1A steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions.
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity

**Wiring Diagram**



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.



**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**

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	FUNCTION
KSPS2180SB	24VAC	Fixed	80s	Delay-on-Break
KSPSA21FT	24 - 240VAC, positive switching	Onboard	0.1 - 10s	Recycling, On Time First
KSPSN13MI	12 - 120VDC, negative switching	Fixed	3m	Interval
KSPSN21B	12 - 120VDC, negative switching	Onboard	0.1 - 10s	Delay-on-Break
KSPSP145SM	12 - 120VDC, positive switching	Fixed	45s	Delay-on-Make
KSPSP22B	12 - 120VDC, positive switching	Onboard	1 - 100s	Delay-on-Break
KSPSP35PSD	12 - 120VDC, positive switching	External	1 - 100m	Retriggerable Single Shot

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## KSPS SERIES

### Accessories



**P103PM (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

<b>Type</b>	Microcontroller circuitry
<b>Range</b>	0.1s - 1000h in 9 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ±2%
<b>Reset Time</b>	≤ 150ms
<b>Initiate Time</b>	≤ 20ms; ≤ 1500 operations per minute
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±2%
<b>Input Voltage</b>	12 to 120VDC; 24 to 240VAC
<b>Tolerance</b>	≤ ±15%
<b>AC Line Frequency/DC Ripple</b>	50/60Hz / ≤ 10%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 1W

#### Output

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

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

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

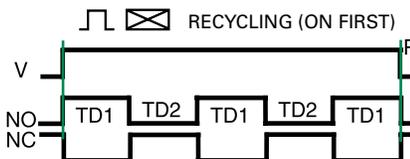
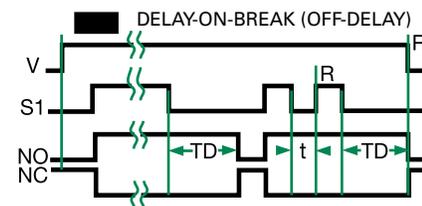
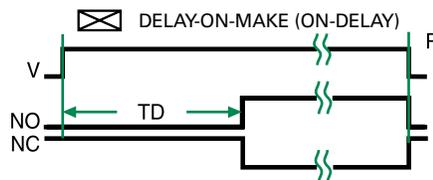
Input voltage must be applied before and during timing. Upon closure of the initiate switch, the output relay energizes. The time delay begins when the initiate switch is opened. The output remains energized during timing. At the end of the time delay, the output de-energizes. The output will energize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



# KSPS SERIES

## 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 effect 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)

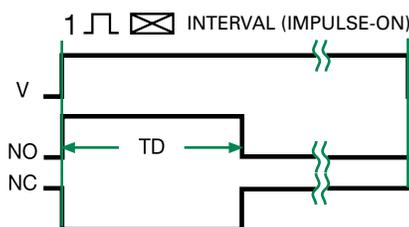
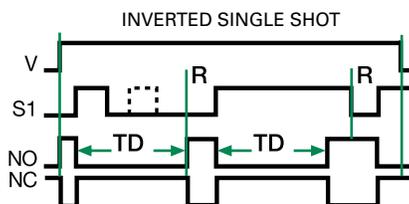
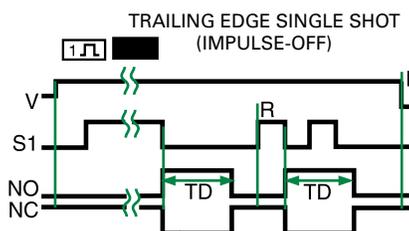
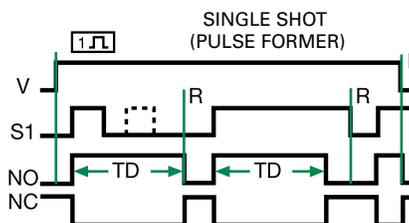
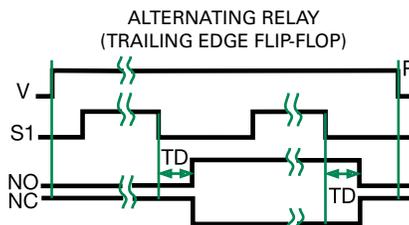
Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch S1, the output relay de-energizes. At the end of the time delay, the output energizes. Opening or re-closing S1 during timing has no effect on the time delay. The output will remain de-energized 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

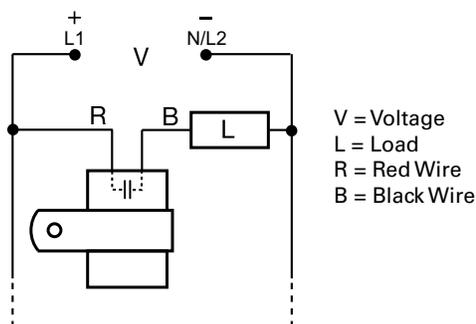
**NC** = Normally Closed Contact  
**t** = Incomplete Time Delay  
**TD, TD1, TD2** = Time Delay

**C** = Count  
**P** = Pulse Duration  
— = Undefined Time

## MSM SERIES



### Wiring Diagram



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

### 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

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

### Ordering Information

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

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# MSM SERIES

## Specifications

### Time Delay

<b>Type</b>	Analog Circuitry
<b>Range</b>	0.05 - 180s fixed
<b>Repeat Accuracy</b>	±5%
<b>Tolerance</b>	
<b>(Factory Calibration)</b>	±15%
<b>Recycle Time</b>	≤ 75ms
<b>Time Delay vs Temp. &amp; Voltage</b>	±15%

### Input

<b>Voltage</b>	12 or 24VDC; 24, 120, or 230VAC
<b>Tolerance</b>	±10%
<b>AC Line Frequency</b>	50/60 Hz

### Output

<b>Type</b>	Solid State
<b>Form</b>	NO, open during timing
<b>Maximum Load Current</b>	0.5A steady state 25°C; 0.25A steady state 60°C

### Minimum Holding Current

<b>Voltage Drop</b>	≈ 2.5V @ 0.5A
---------------------	---------------

### Protection

<b>Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS input to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reverse polarity protected

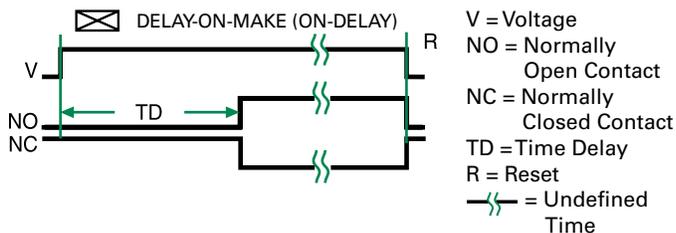
### Mechanical

<b>Mounting</b>	<b>A.)</b> PC mount 14 AWG (2.087mm <sup>2</sup> ) wires (Can be inserted in AMP Miniature Spring Socket #645980-1) <b>B.)</b> Stranded 18 AWG wire leads (0.933 mm <sup>2</sup> ) with mounting bracket
-----------------	---

### Environmental

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

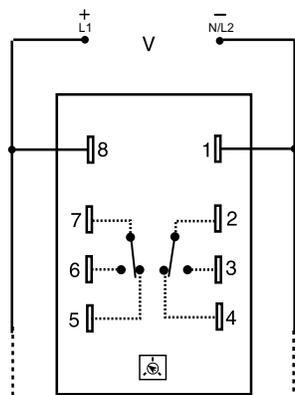
## Function Diagram



# ORM SERIES



## Wiring Diagram



V = Voltage

$R_T$  is used when external adjustment is ordered. Relay contacts are isolated.

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

## 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

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

## 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

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
ORM120A17	120VAC	Fixed	7s
ORM120A25	120VAC	Onboard knob	3 - 300s
ORM230A17	230VAC	Fixed	7s
ORM24D13.5	24VDC/28VDC	Fixed	3.5s
ORM24D22	24VDC	Onboard knob	0.5 - 30s

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# ORM SERIES

## 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** 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

**Life** Mechanical - 1x10<sup>7</sup>; Electrical - 1x10<sup>6</sup>

### Protection

**Polarity** DC units are reverse polarity protected

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

### Mechanical

**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 Temperature** -20° to 65°C / -30° to 85°C

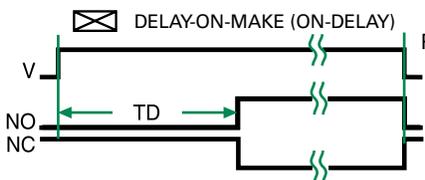
**Weight** ≈ 2.7 oz (77 g)

## Selection Guide

R <sub>T</sub> Selection Chart					
Desired Time Delay*					R <sub>T</sub>
Seconds					
1	2	3	4	5	Megohm
0.05	0.5	0.6	1.2	3.0	0.0
0.5	5.0	10	20	50	0.5
1.0	10	20	40	100	1.0
1.5	15	30	60	150	1.5
2.0	20	40	80	200	2.0
2.5	25	50	100	250	2.5
3.0	30	60	120	300	3.0

\* When selecting an external R<sub>T</sub> add at least 20% for tolerance of unit and the R<sub>T</sub>.

## Function Diagram

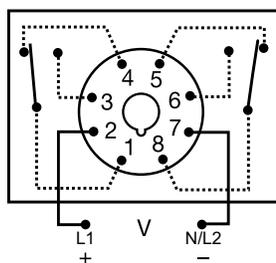


V = Voltage  
 NO = Normally Open Contact  
 NC = Normally Closed Contact  
 TD = Time Delay  
 R = Reset  
 = Undefined Time

# PRLM SERIES



## Wiring Diagram



8-pin octal DPDT

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

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
PRLM41180	120 V ac	Fixed	180 s
PRLM423	120 V ac	Adjustable	1–60 s

## Description

The PRLM series is designed for use in non-critical timing applications. It offers low cost, knob adjustable timing control, full 10 A 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

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

## Accessories



### OT08PC 8-pin Octal Socket for UL listing\*

Octal Socket for plug-in units. 8-pin surface & DIN-rail mountable. Rated for 10 A @ 600 V ac



### P1011-6 Octal Socket for UL listing\*

8-pin surface mount socket with binder head screw terminals. Rate 10 A @ 600 V ac.



### C103PM (AL) DIN Rail

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

# PRLM SERIES

## Specifications

### Time Delay

<b>Type</b>	Digital circuitry
<b>Range</b>	See "Ordering Information" table
<b>Repeat Accuracy</b>	±2 %
<b>Fixed Time Tolerance &amp; Setting Accuracy</b>	+/- 5 %
<b>Reset Time</b>	≤ 50 ms
<b>Recycle Time</b>	After timing: ≤ 20 ms During timing: 0.1% of max. time delay or 75 ms, whichever is greater

### Time Delay vs Temp. & Voltage

≤ ± 5 %

### Input

<b>Voltage</b>	120 V ac
<b>Tolerance</b>	
<b>120 V ac</b>	-20 %–10 %
<b>AC Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	≤ 3.25W

### Output

<b>Type</b>	Electromechanical relay
<b>Form</b>	Isolated, DPDT
<b>Rating</b>	10 A resistive @ 240 V ac; 1/3 hp @ 120/240 V ac
<b>Life</b>	Mechanical - 1x10 <sup>7</sup> ; Electrical - 1x10 <sup>6</sup>

### Protection

<b>Surge</b>	IEEE C62.41-1991 Level A
<b>Isolation Voltage</b>	≥ 1500 V RMS input to output
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	Dc units are reverse polarity protected
<b>Indication</b>	
<b>Type</b>	LED
<b>Operation</b>	During timing - flashing Output energized - on steady

### Mechanical

<b>Mounting</b>	Plug-in socket
<b>Dimensions</b>	<b>H</b> 44.45 mm (1.75"); <b>W</b> 60.33 mm (2.38"); <b>D</b> (with socket) 104.78 mm (4.13")
<b>Termination</b>	Octal 8-pin plug-in

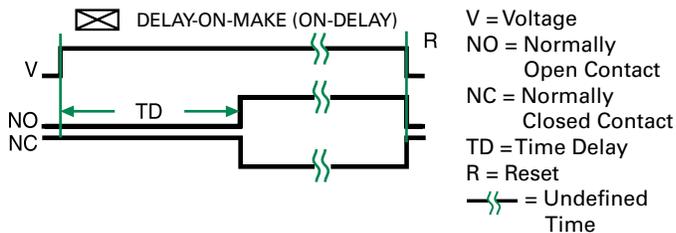
### Environmental

<b>Operating/Storage Temperature</b>	-20° to 65 °C / -30° to 85 °C
<b>Weight</b>	≈ 4 oz (113 g)
<b>Safety Marks</b>	
<b>UL (socket required)*</b>	UL 508 (E57310)

\*UL Listed when used with Part Number OT08-PC or RB08-PC manufactured by Custom Connector Corp.

**Note:** Manufacturer's recommended screw terminal torque for the OT series sockets is 12 in-lbs.

## Function Diagram



12 TIME DELAY RELAYS

# TDM / TDMH / TDML SERIES

## Delay-on-Make Timer



### Description

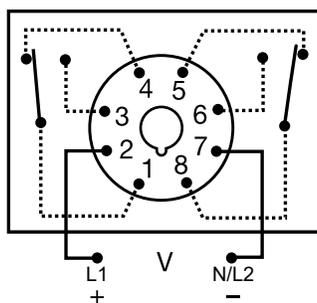
The TDM/TDMH/TDML series is a delay-on-make timer that combines accurate digital circuitry with isolated, DPDT relay contacts in an industry standard 8-pin plug-in package. DIP switch adjustment allows precise selection of the time delay over the full time delay range. The TDM/TDMH/TDML series is the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

### Wiring Diagram



Relay contacts are isolated.

For dimensional drawing see: Appendix, page 512, Figure 23.

### Ordering Information

MODEL	INPUT VOLTAGE	DELAY RANGE
TDM120AL	120 V ac	1–1023 s in 1 s increments
TDM12DL	12 V dc	1–1023 s in 1 s increments
TDM230AL	230 V ac	1–1023 s in 1 s increments
TDM24AL	24 V ac	1–1023 s in 1 s increments
TDM24DL	24 V dc/28 V dc	1–1023 s in 1 s increments
TDMH120AL	120 V ac	10 –10230 s in 10 s increments
TDMH24AL	24 V ac	10 –10230 s in 10 s increments
TDML110DL	110 V dc	0.1 –102.3 s in 0.1 s increments
TDML120AL	120 V ac	0.1 –102.3 s in 0.1 s increments
TDML12DL	12 V dc	0.1 –102.3 s in 0.1 s increments
TDML24DL	24 V dc/28 V dc	0.1 –102.3 s in 0.1 s increments

### Features & Benefits

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

### Accessories



**OT08PC 8-pin Octal Socket for UL listing\***  
Octal Socket for plug-in units. 8-pin surface & DIN-rail mountable. Rated for 10 A @ 600 V ac



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



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

# TDM / TDMH / TDML SERIES

## Specifications

### Time Delay

<b>Type</b>	Digital integrated circuitry
<b>Range</b>	0.1–102.3 s in 0.1 s increments 1–1023 s in 1 s increments 10–10,230 s in 10 s increments
<b>Repeat Accuracy</b>	±0.1 %
<b>Setting Accuracy</b>	±2 %
<b>Reset Time</b>	≤ 150 ms
<b>Time Delay vs. Temperature &amp; Voltage</b>	±5 %
<b>Indicator</b>	LED glows during timing; relay is de-energized

### Input

<b>Voltage</b>	12, 24, or 110 V dc; 24, 120, or 230 V ac
<b>Tolerance</b>	
<b>12 V dc &amp; 24 Vdc/ac</b>	-15 %–20 %
<b>110 V ac/dc to 230 V ac</b>	-20 %–10 %
<b>Ac Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	≤ 3.25W

### Output

<b>Type</b>	Electromechanical relay
<b>Form</b>	DPDT
<b>Rating</b>	10 A resistive @ 120/240 V ac; 1/3 hp @ 120/240 V ac
<b>Life</b>	Mechanical - 1 x 10 <sup>7</sup> ; Electrical - 1 x 10 <sup>6</sup>

### Protection

<b>Polarity</b>	Dc units are reverse polarity protected
<b>Isolation Voltage</b>	≥ 1500 V RMS input to output

### Mechanical

<b>Mounting</b>	Plug-in socket
<b>Dimensions</b>	<b>H</b> 44.45 mm (1.75"); <b>W</b> 60.33 mm (2.38"); <b>D</b> (with socket) 104.78 mm (4.13")
<b>Termination</b>	Octal 8-pin plug-in

### Environmental

<b>Operating/Storage</b>	
<b>Temperature</b>	-20 °C to 65 °C / -30 °C to 85 °C
<b>Weight</b>	≈ 4 oz (113 g)

### Safety Marks

<b>UL (socket required)*</b>	UL 508 (E57310)
------------------------------	-----------------

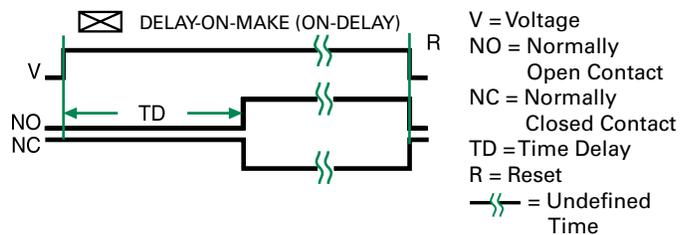
\*UL Listed when used with Part Number OT08-PC or RB08-PC manufactured by Custom Connector Corp.

**Note:** Manufacturer's recommended screw terminal torque for the OT Series sockets is 12 in-lbs.

## Binary Switch Operation

0.1...102.3	1...1023	10...10,230
OFF ▶ ON	OFF ▶ ON	OFF ▶ ON
0.1	1	10
0.2	2	20
0.4	4	40
0.8	8	80
1.6	16	160
3.2	32	320
6.4	64	640
12.8	128	1280
25.6	256	2560
51.2	512	5120
6.3 S	544 S	3000 S

## Function Diagram

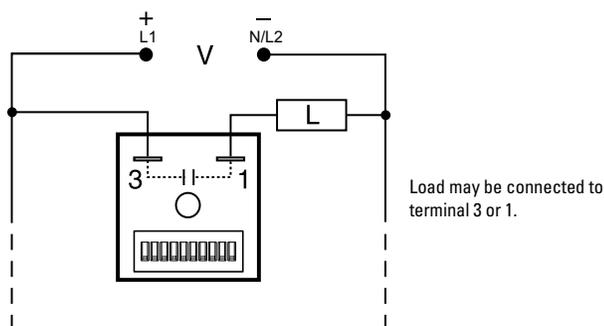


# TDU / TDUH / TDUL SERIES

Encapsulated Solid-State,  
Delay-on-Make Timers



## Wiring Diagram



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

## Ordering Information

MODEL	INPUT VOLTAGE	TIME RANGE (SEC)
TDUL3000A	24 to 120VAC/DC	0.1-102.3
TDUL3001A	100 to 240VAC/DC	0.1-102.3
TDU3000A	24 to 120VAC/DC	1-1023
TDU3001A	100 to 240VAC/DC	1-1023
TDU3003A	120 to 277VAC/DC	1-1023
TDUH3000A	24 to 120VAC/DC	10-10230
TDUH3001A	100 to 240VAC/DC	10-10230

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## 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

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

## 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.

# TDU / TDUH / TDUL SERIES

## Specifications

### Time Delay

**Type** Digital integrated circuitry  
**Range\*** 0.1 - 102.3s in 0.1s increments  
 1 - 1,023s in 1s increments  
 10 - 10,230s in 10s increments  
**Repeat Accuracy** ±0.5% or 20ms, whichever is greater

**Tolerance (Factory Calibration)** ±10%

**Recycle Time** ≤ 150ms

**Time Delay vs Temp. & Voltage** ±5%

### Input

**Voltage** 24 to 120VAC/DC; 100 to 240VAC/DC

**AC Line Frequency** 50/60 Hz

**Tolerance** ±20%

### Output

**Type** Solid state

**Form** NO, open during timing

**Maximum Load Current** 1A steady state, 10A inrush at 60°C

**Minimum Holding Current** 40mA

**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

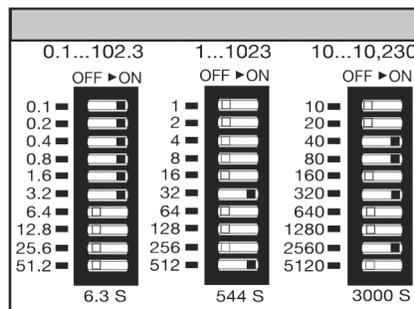
**Operating/Storage**

**Temperature** -40° to 60°C / -40° to 85°C

**Humidity** 95% relative, non-condensing

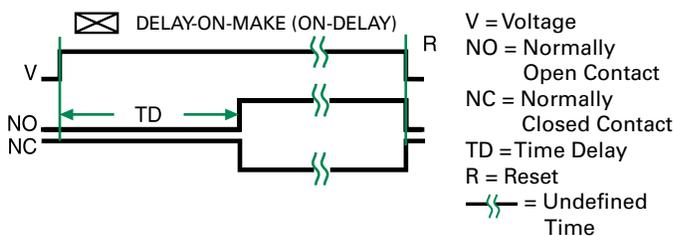
**Weight** ≈ 2.4 oz (68 g)

## Binary Switch Operation

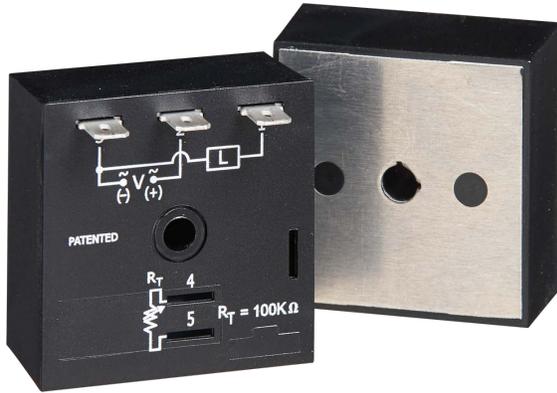


\*For CE approved applications, power must be removed from the unit when a switch position is changed.

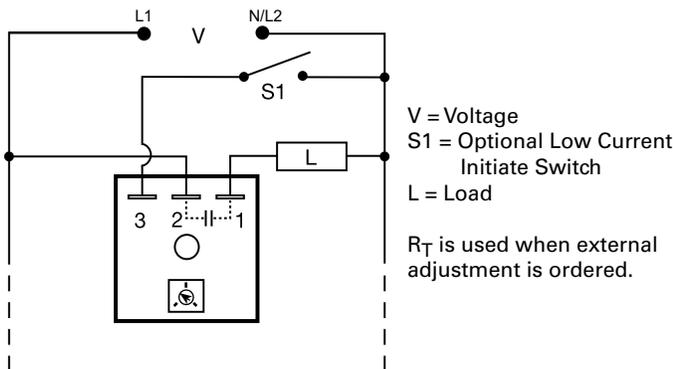
## Function Diagram



# TH1 SERIES



## Wiring Diagram



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

## Ordering Information

MODEL	OUTPUT RATING	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
TH1B633	10A	230VAC	Onboard	2 - 180s
TH1C415	20A	120VAC	Fixed	5s
TH1C621	20A	230VAC	External	0.1 - 3s

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## 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

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

## 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.

## TH1 SERIES

### 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

#### Input

**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)

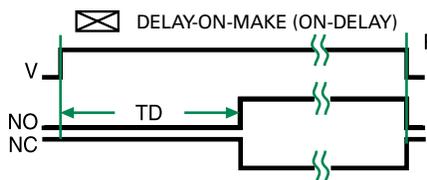
\*\*Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.

### Selection Guide

RT Selection Chart				
Desired Time Delay*				RT
Seconds				
1	2	3	4	Kohms
0.1	0.5	2	5	0
0.3	6	20	60	10
0.6	12	38	120	20
0.9	18	55	180	30
1.2	24	73	240	40
1.5	30	90	300	50
1.8	36	108	360	60
2.1	42	126	420	70
2.4	48	144	480	80
2.7	54	162	540	90
3.0	60	180	600	100

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

### Function Diagram



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

# 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)

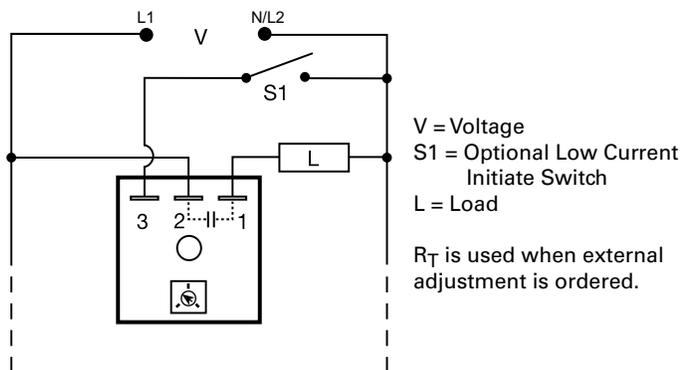
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

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

## Features & Benefits

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

## Wiring Diagram



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

## 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.

# THD1B410.5S

## 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	Output		Inrush**
	Output	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

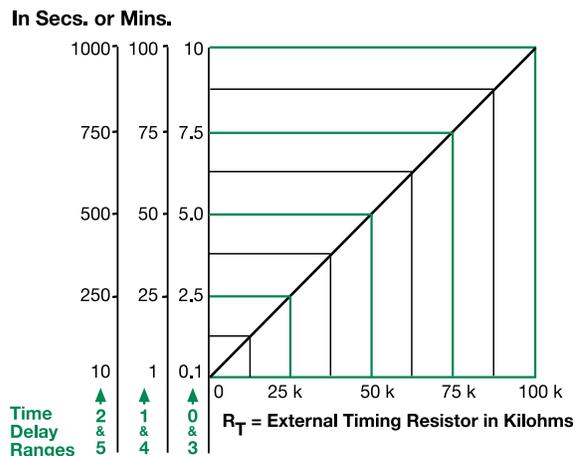
**Operating/Storage**

**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

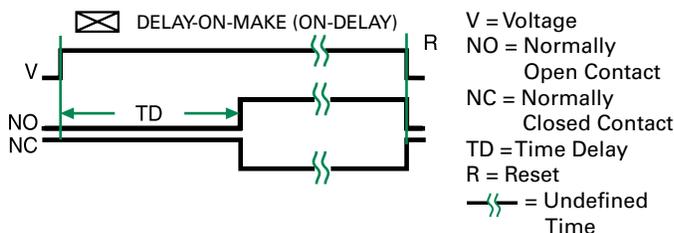


**This chart applies to externally adjustable part numbers.** The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals; as the resistance increases the tie delay increases.

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.

## Function Diagram



\*\*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.

# TMV8000 / TSU2000 SERIES

## Universal Voltage Delay-on-Make Timer



TMV8000



TSU2000

### Description

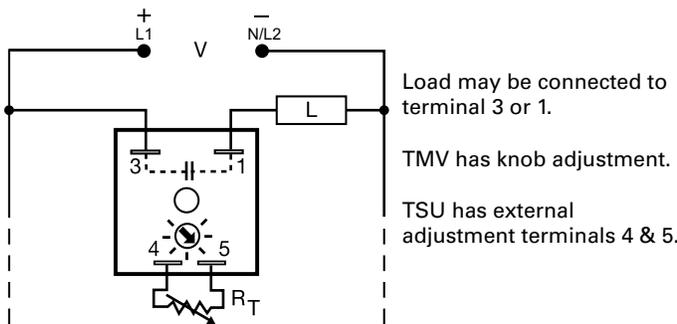
The TMV and TSU Series are universal voltage delay-on-make timers. Two models cover all the popular voltages and time delays. Available with knob or external adjust time delay. Its simple two terminals can easily be connected in series with a relay coil, contactor coil, solenoid, lamps, small motor, 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.

### Wiring Diagram



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

### Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
TMV8000	24 to 240VAC/DC	Onboard	0.1 - 8m
TSU2000	24 to 240VAC/DC	External	5 - 480s

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

### Features & Benefits

FEATURES	BENEFITS
<b>Universal AC/DC operating voltage</b>	Provides flexibility for use in all systems
<b>Totally solid-state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>Two terminal series connection with the load</b>	Provides quick and easy installation for new or existing systems
<b>1A steady, 10A inrush solid-state output</b>	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.

# TMV8000 / TSU2000 SERIES

## Accessories



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



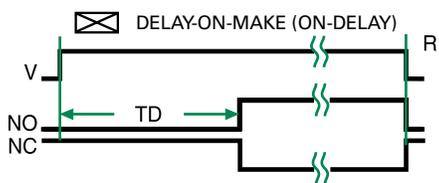
**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

## Selection Guide

R <sub>T</sub> Selection Chart	
Time Delay*	
Seconds	R <sub>T</sub> Megohm
5	0.0
85	0.5
163	1.0
240	1.5
320	2.0
400	2.5
480	3.0

\* 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  
TD = Time Delay  
R = Reset  
—||— = Undefined Time

## Specifications

### Time Delay

**Type** Analog circuitry  
**Range** 5 - 480s (TSU2000)  
0.1 - 8m (TMV8000)

**Repeat Accuracy** ±2%  
**Tolerance (Factory Calibration)** ≤ ±10%  
**Reset Time** ≤ 100ms

**Input**  
**Voltage** 24 to 240VAC/DC ±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 55°C  
**Minimum Holding Current** ≤ 40mA  
**Voltage Drop** ≈ 2.5V @ 1A

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

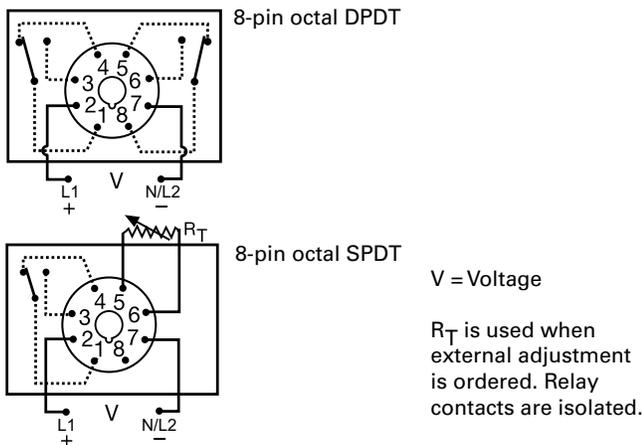
**Mechanical**  
**Mounting** Surface mount with one #10 (M5 x 0.8) screw  
**Dimensions** **H** 50.8 mm (2"); **W** 50.8 mm (2");  
**D** 30.7 mm (1.21")  
**Termination** 0.25 in. (6.35 mm) male quick connect terminals

**Environmental**  
**Operating/Storage Temperature** -20° to 70°C / -30° to 85°C  
**Humidity** 95% relative, non-condensing  
**Weight** ≈ 2.4 oz (68 g)

# TRM SERIES



## Wiring Diagram



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

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	OUTPUT	TIME TOLERANCE	TIME DELAY
TRM120A2X30	120 V ac	Knob	Octal, DPDT	+/- 20%	1–30 s
TRM120A2Y120	120 V ac	Knob	Octal, DPDT	+/- 10%	2–120 s
TRM120A2Y180	120 V ac	Knob	Octal, DPDT	+/- 10%	2–180 s
TRM24A8Y5	24 V ac	External	Octal, SPDT without potentiometer	+/- 10%	0.1–5 s
TRM24D1X10	24 V dc/28 V dc	Fixed	Octal, DPDT	+/- 20%	10 s
TRM24D1X2	24 V dc/28 V dc	Fixed	Octal, DPDT	+/- 20%	2 s

## Description

The TRM series is a combination of digital 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

FEATURES	BENEFITS
<b>Electronic circuitry with electromechanical relay</b>	Repeat Accuracy +/- 2 %
<b>Isolated 10 A, SPDT or DPDT output contacts</b>	Allows control of loads for ac or dc voltages.

## TRM SERIES

### Accessories



**OT08PC 8-pin Octal Socket for UL listing\***  
Octal Socket for plug-in units. 8-pin surface & DIN-rail mountable. Rated for 10 A @ 600 V ac.



**OT11PC Octal Socket for UL listing\***  
11-pin surface & DIN rail mountable. Rated for 10 A @ 300 V ac



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



**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.



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

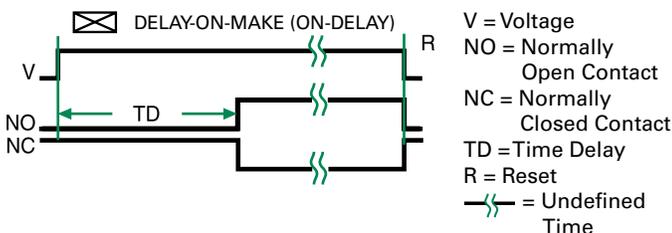
### Selection Guides

External R<sub>T</sub> P/N Selection Table

VALUE	PART NUMBER*
100K ohm	P1004-95
100K ohm	P1004-95-X

\*Externally adjustable potentiometers. Numbers with additional "-X" include two pre-soldered 8" wire leads with 1/4" female quick-connect terminals (for clockwise increase).

### Function Diagram



### Specifications

#### Time Delay

<b>Type</b>	Digital circuitry
<b>Range</b>	See "Ordering Information" table
<b>Repeat Accuracy</b>	± 2 %
<b>Fixed Time Tolerance &amp; Setting Accuracy</b>	± 5, 10, or 20 %
<b>Reset Time</b>	≤ 50 ms
<b>Recycle Time</b>	After timing: ≤ 20 ms During timing: 0.1 % of max. time delay or 75 ms, whichever is greater

#### Time Delay vs Temp. & Voltage

<b>Indicator</b>	≤ ± 5 % LED glows after time delay; relay is energized
------------------	---

#### Input

<b>Voltage</b>	24 V dc; 24, 120 V ac
<b>Tolerance</b>	
<b>24 V dc/ac</b>	-15 %–20 %
<b>120 V ac</b>	-20 %–10 %
<b>AC Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	≤ 3.25W

#### Output

<b>Type</b>	Electromechanical relay
<b>Form</b>	Isolated DPDT or SPDT
<b>Rating</b>	10 A resistive @ 120/240 V ac; 1/3 hp @ 120/240 V ac
<b>Life</b>	Mechanical - 1 x 10 <sup>7</sup> ; Electrical - 1 x 10 <sup>6</sup>

#### Protection

<b>Isolation Voltage</b>	≥ 1500 V RMS between input & output terminals
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#### Insulation Resistance

<b>Polarity</b>	≥ 100 MΩ
-----------------	----------

#### Mechanical

<b>Mounting</b>	Plug-in socket
<b>Dimensions</b>	<b>H</b> 44.45 mm (1.75"); <b>W</b> 60.33 mm (2.38"); <b>D</b> (with socket) 104.78 mm (4.13") Octal 8-pin or 11-pin plug-in

#### Termination

#### Environmental

<b>Operating/Storage Temperature</b>	-20 °C to 65 °C / -30 °C to 85 °C
<b>Weight</b>	≈ 4 oz (113 g)

#### Safety Marks

<b>UL (socket required)*</b>	UL 508 (E57310)
------------------------------	-----------------

\*UL Listed when used with Part Number OT08-PC, RB08-PC, OT11-PC, or RB11-PC manufactured by Custom Connector Corp.

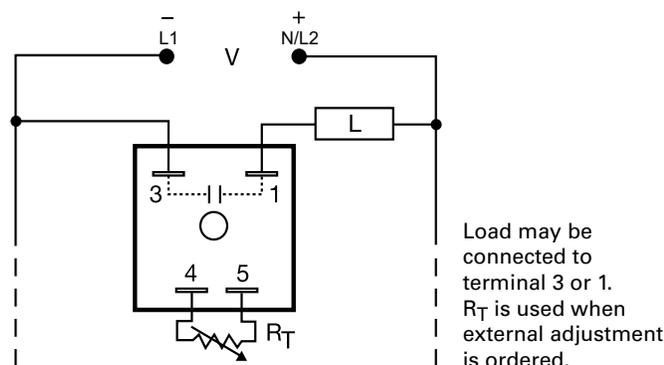
**Note:** Manufacturer's recommended screw terminal torque for the OT series sockets is 12 in.-lbs.

# TS1 SERIES

## Delay-on-Make Timer



### Wiring Diagram



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

### 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

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

### Ordering Information

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

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## TS1 SERIES

### 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

All Other Voltages		12VDC	
Time Delay	VTP P/N	Time Delay	VTP P/N
1 - 0.05-3s	VTP4B	1 - 0.05-1s	VTP2A
2 - 0.5-60s	VTP4F	2 - 0.5-20s	VTP2E
3 - 2-180s	VTP4J	3 - 2-60s	VTP2F
4 - 5-600s	VTP5N	4 - 5-120s	VTP2H

### Specifications

#### Time Delay

**Type** Analog circuitry  
**Range** 0.05 - 120s in 4 adjustable ranges or fixed (1 MΩ max.  $R_T$ )  
**12VDC** 0.05 - 600s in 4 adjustable ranges or fixed

**Other Voltages** 0.05 - 600s in 4 adjustable ranges or fixed  
**Repeat Accuracy** ±2% or 20ms, whichever is greater

**Tolerance (Factory Calibration)** ≤ ±10%  
**Recycle Time** After timing – ≤ 16ms  
During timing – 0.1% of time delay or 75ms, whichever is greater

#### Time Delay vs. Temperature & Voltage

≤ ±10%

#### 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)

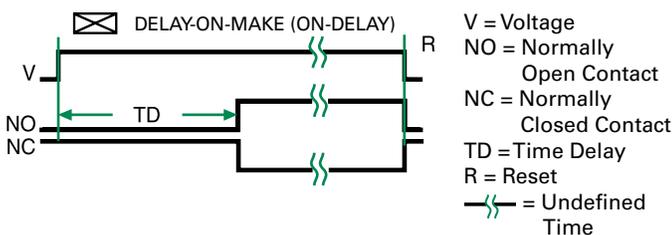
### Selection Chart

$R_T$ Selection Chart				
Desired Time Delay*				$R_T$
Seconds				
1	2	3	4	Megohm
0.05	0.5	2	5	0.0
0.5	10	30	60	0.5
1.0	20	60	120	1.0
▼ 24VDC or AC ONLY† ▼				
1.5	30	90	180	1.5
2.0	40	120	240	2.0
2.5	50	150	300	2.5
3.0	60	180	360	3.0
			420	3.5
			480	4.0
			540	4.5
			600	5.0

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

† 1 Megohm max for 12 VDC Units

### Function Diagram

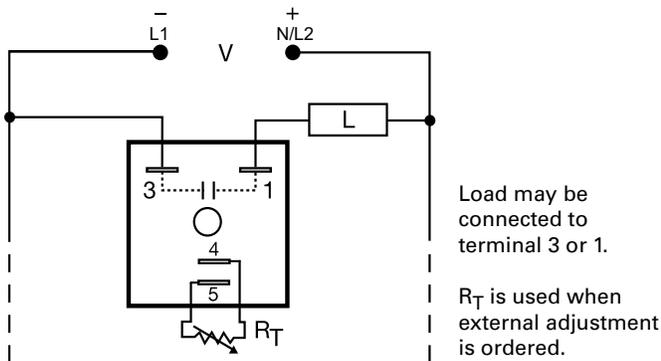


# TSD1 SERIES

## Delay-on-Make Timer



### Wiring Diagram



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

### Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
TSD1311.2S	24VDC	Fixed	1.2s
TSD1321	24VDC	External	1 - 100s
TSD1424	120VAC	External	1 - 100m

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### 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

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

### 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.

# TSD1 SERIES

## Accessories

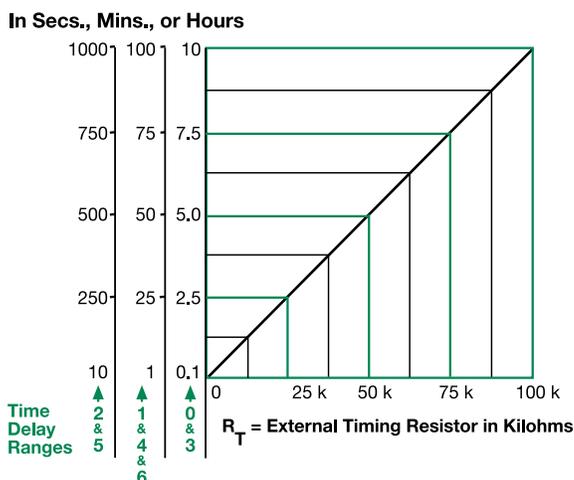


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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



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 - 100h in 7 adjustable ranges or fixed  
**Repeat Accuracy**  $\pm 0.1\%$  or 20ms, whichever is greater

### Tolerance

**(Factory Calibration)**  $\leq \pm 1\%$

**Recycle Time**  $\leq 150\text{ms}$

### Time Delay vs. Temperature

**& Voltage**  $\leq \pm 1\%$

### Input

**Voltage** 12, 24, 120VDC; 24, 120, 230VAC

**Tolerance**  $\pm 20\%$

**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**  $\leq 40\text{mA}$

**Off State Leakage Current**  $\approx 7\text{mA}$  @ 230VAC

**Voltage Drop**  $\approx 2.5\text{V}$  @ 1A

### Protection

**Circuitry** Encapsulated

**Dielectric Breakdown**  $\geq 2000\text{V RMS}$  terminals to mounting surface

**Insulation Resistance**  $\geq 100\text{M}\Omega$

**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

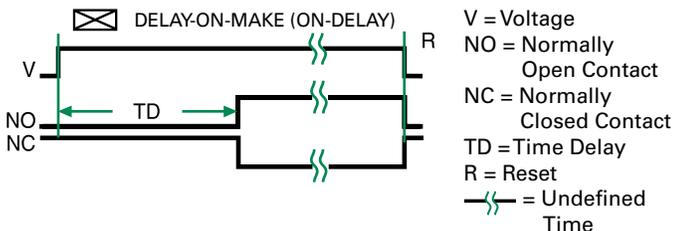
#### Operating/Storage

**Temperature** -40° to 75°C / -40° to 85°C

**Humidity** 95% relative, non-condensing

**Weight**  $\approx 2.4\text{ oz}$  (68 g)

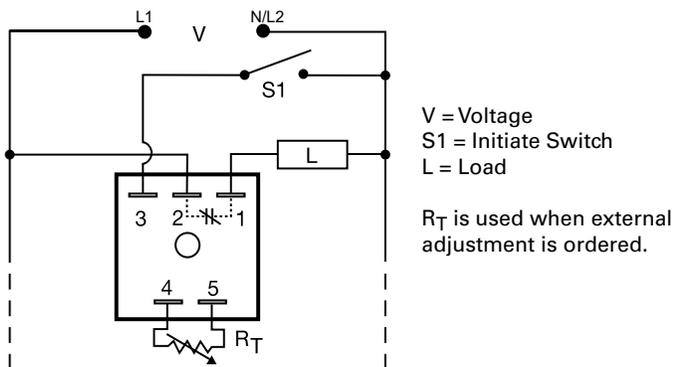
## Function Diagram



# TS441165



## Wiring Diagram



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

## 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

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

## 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.

## TS441165

### 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**

Time Delay	VTP P/N
1 - 0.05-3s	VTP4B
2 - 0.5-60s	VTP4F
3 - 2-180s	VTP4J
4 - 5-600s	VTP5N

### Selection Guide

RT Selection Chart				
Desired Time Delay*				RT
Seconds				
1	2	3	4	Megohm
0.05	0.5	2	5	0.0
0.5	10	30	60	0.5
1.0	20	60	120	1.0
1.5	30	90	180	1.5
2.0	40	120	240	2.0
2.5	50	150	300	2.5
3.0	60	180	360	3.0
			420	3.5
			480	4.0
			540	4.5
			600	5.0

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

### 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

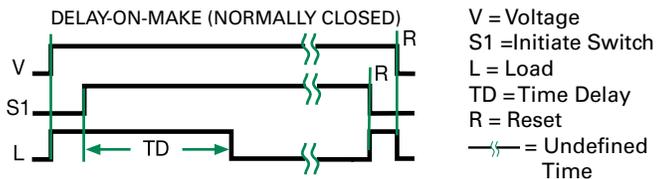
##### Humidity

95% relative, non-condensing

##### Weight

≈ 2.4 oz (68 g)

### Function Diagram

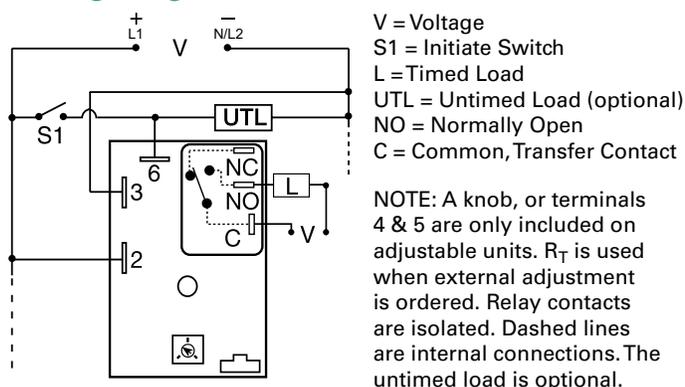


# HRDB SERIES

## Delay-on-Break Timer



### Wiring Diagram



For dimensional drawing see: Appendix, page 512, Figure 17.

### 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  $\pm 0.5\%$ . 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	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy $\pm 0.5\%$
<b>Compact, low cost design</b>	Allows flexibility for OEM applications
<b>Isolated, 30A, SPDT, NO output contacts</b>	Allows direct operation of heavy loads: compressors, pumps, blower motors, heaters.

### 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

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME TOLERANCE	TIME DELAY	MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME TOLERANCE	TIME DELAY
HRDB1110M	12VDC	Fixed	$\pm 5\%$	10m	HRDB223	24VAC	Onboard	$\pm 5\%$	0.1 - 10m
HRDB117S	12VDC	Fixed	$\pm 5\%$	7s	HRDB321	24VDC	Onboard	$\pm 5\%$	1 - 100s
HRDB120	12VDC	Onboard	$\pm 5\%$	0.1 - 10s	HRDB324	24VDC	Onboard	$\pm 5\%$	1 - 100m
HRDB121	12VDC	Onboard	$\pm 5\%$	1 - 100s	HRDB423	120VAC	Onboard	$\pm 5\%$	0.1 - 10m
HRDB124	12VDC	Onboard	$\pm 5\%$	1 - 100m	HRDB623	230VAC	Onboard	$\pm 5\%$	0.1 - 10m
HRDB21A65M	24VAC	Fixed	$\pm 1\%$	65m					

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# HRDB SERIES

## 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.

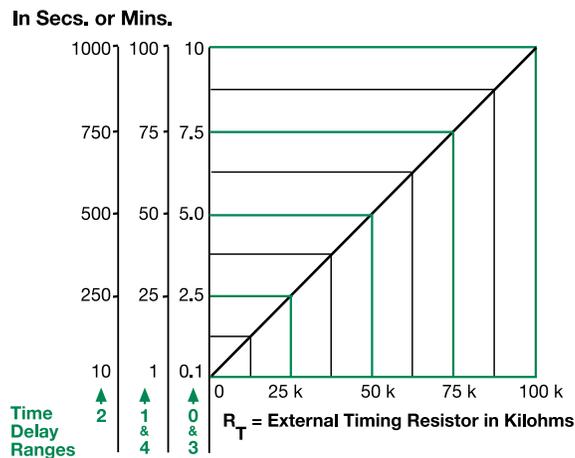


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



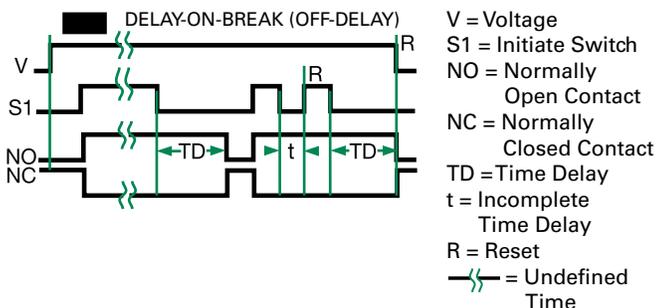
**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

## 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  $R_T$  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



## 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** ±1%, ±5%  
**(Factory Calibration)**

**Reset Time** ≤ 150ms

**Initiate Time** ≤ 20ms

**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** Isolated, SPDT

### Ratings

	SPDT-NO	SPDT-NC
<b>General Purpose Resistive</b>	125/240VAC 30A	15A
	125/240VAC 30A	15A
	28VDC 20A	10A

### Motor Load

125VAC 1 hp\*

240VAC 2 hp\*\* 1/4 hp\*\* 1 hp\*\*

### Life

Mechanical - 1 x 10<sup>6</sup>;

Electrical - 1 x 10<sup>5</sup>, \*3 x 10<sup>4</sup>, \*\*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

**H** 50.8 mm (2"); **W** 50.8 mm (2");

**D** 38.1 mm (1.51")

0.25 in. (6.35 mm) male quick connect terminals

### Termination

### Environmental

### Operating/Storage

### Temperature

-40° to 60°C / -40° to 85°C

### Humidity

95% relative, non-condensing

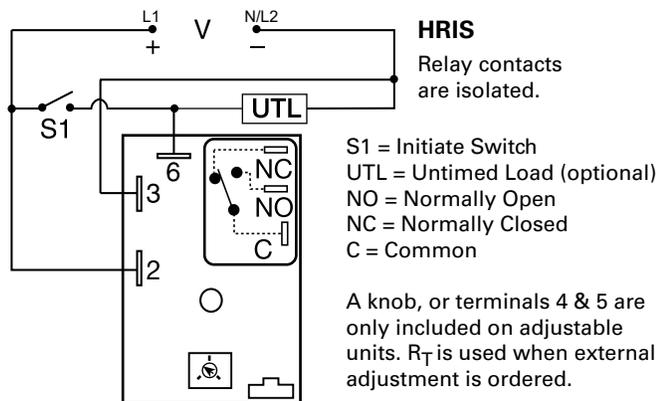
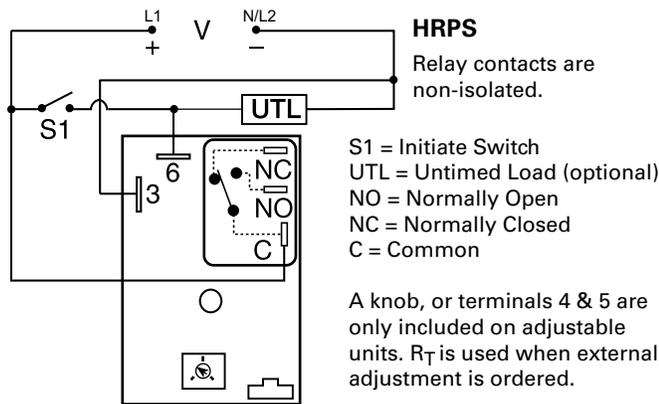
### Weight

≈ 3.9 oz (111 g)

# HRPS / HRIS SERIES



## Wiring Diagram



For dimensional drawing see: Appendix, page 512, Figure 17.

## 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  $\pm 0.5\%$ . 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

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy $\pm 0.5\%$ , factory calibration $\pm 2\%$
<b>Compact design</b>	Allows flexibility for OEM applications
<b>30A, SPDT, Normally Open output contacts</b>	Allows for direct operation of heavy loads
<b>Encapsulated</b>	Protects against shock, vibration, and humidity

## Ordering Information

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

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# HRPS / HRIS 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), P1015-13 (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.

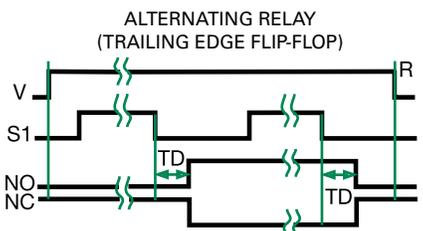
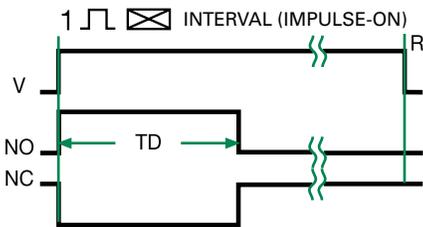


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



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

## Function Diagrams



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** ±0.5% or 20ms, whichever is greater

**Tolerance (Factory Calibration)** ±2%

**Reset Time** ≤ 150ms

**Initiate Time** ≤ 20ms

**Time Delay vs Temp. & Voltage** ±2%

**Input Voltage** 12 to 48VDC; 24 to 240VAC/24 to 110VDC

**Tolerance** 12 to 48VDC -15% - 20%

24 to 110VDC/240VAC -20% - 10%

**AC Line Frequency** 50/60Hz

**Power Consumption** AC ≤ 4VA; DC ≤ 2W

### Output

**Type** Electromechanical relay

**Form** SPDT

Ratings	SPDT-NO	SPDT-NC
<b>General Purpose</b>		
125/240VAC	30A	15A
<b>Resistive</b>		
125/240VAC	30A	15A
28VDC	20A	10A
<b>Motor Load</b>		
125VAC	1 hp*	1/4 hp**
240VAC	2 hp**	1 hp**

**General Purpose**

125/240VAC

**Resistive**

125/240VAC

28VDC

**Motor Load**

125VAC

240VAC

**Life**

Mechanical - 1 x 10<sup>6</sup>  
Electrical - 1 x 10<sup>5</sup>, \*3 x 10<sup>4</sup>, \*\*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

**Mounting** Surface mt. 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")

0.25 in. (6.35 mm) male quick connects

### Termination

### Environmental

### Operating/Storage

### Temperature

-40° to 60°C / -40° to 85°C

**Humidity** 95% relative, non-condensing

≅ 3.9 oz (111 g)

### Weight

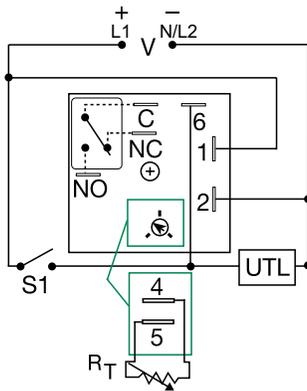
12

TIME DELAY RELAYS

# KRDB SERIES



## Wiring Diagram



V = Voltage  
S1 = Initiate Switch  
C = Common, Transfer Contact  
NO = Normally Open  
NC = Normally Closed  
UTL = Untimed Load (optional)

A knob is supplied for adjustable units. The untimed load is optional. Relay contacts are isolated.

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

## 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

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

## 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

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
KRDB110.1S	12VDC	Fixed	0.1s	KRDB31120S	24VDC	Fixed	20s
KRDB112.5S	12VDC	Fixed	2.5s	KRDB415S	120VAC	Fixed	5s
KRDB1120M	12VDC	Fixed	20m	KRDB4160S	120VAC	Fixed	60s
KRDB115M	12VDC	Fixed	5m	KRDB420	120VAC	Onboard	0.1 - 10s
KRDB120	12VDC	Onboard	0.1 - 10s	KRDB421	120VAC	Onboard	1 - 100s
KRDB124	12VDC	Onboard	1 - 100m	KRDB422	120VAC	Onboard	10 - 1000s
KRDB21180S	24VAC/DC	Fixed	180s	KRDB423	120VAC	Onboard	0.1 - 10m
KRDB217S	24VAC/DC	Fixed	7s	KRDB424	120VAC	Onboard	1 - 100m

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# KRDB SERIES

## 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.



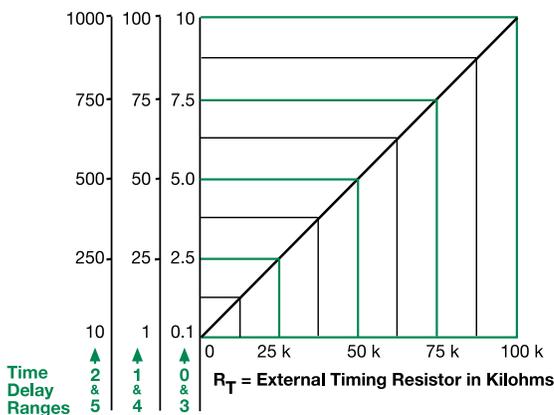
**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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

In Secs. or Mins.

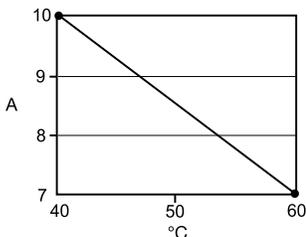


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the time delay increases.

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

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

### Input

<b>Voltage</b>	12, 24, 110VDC; 24, 120 or 230VAC
<b>Tolerance</b>	
<b>12VDC &amp; 24VDC/AC</b>	-15% - 20%
<b>110VDC, 120 or 230VAC</b>	-20% - 10%
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 2W

### Output

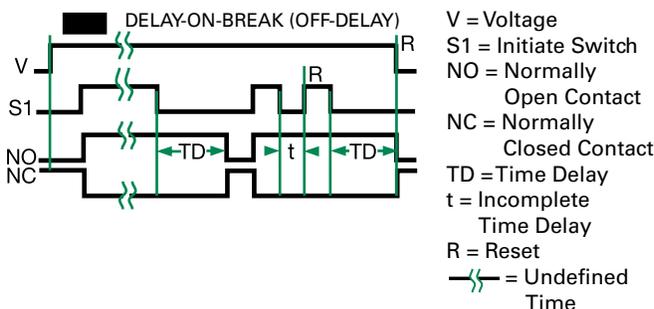
<b>Type</b>	Isolated relay contacts
<b>Form</b>	SPDT
<b>Rating (at 40°C)</b>	10A resistive @ 125VAC; 5A resistive @ 230VAC & 28VDC; 1/4 hp @ 125VAC
<b>Max. Switching Voltage</b>	250VAC
<b>Life (Operations)</b>	Mechanical - $1 \times 10^7$ ; Electrical - $1 \times 10^5$
<b>Protection</b>	
<b>Circuitry</b>	Encapsulated
<b>Isolation Voltage</b>	≥ 1500V RMS input to output
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reverse polarity protected
<b>Mechanical</b>	
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2.0"); <b>W</b> 50.8 mm (2.0"); <b>D</b> 30.7 mm (1.21") 0.25 in. (6.35 mm) male quick connect terminals

### Termination

### Environmental

<b>Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≈ 2.6 oz (74 g)

## Function Diagram

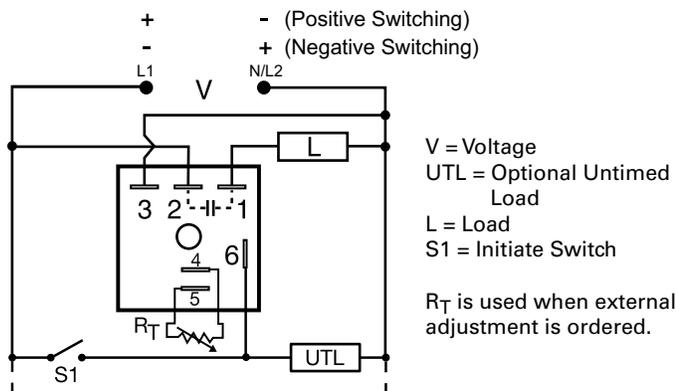


12 TIME DELAY RELAYS

# KSDB SERIES



## Wiring Diagram



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

## 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

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

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	SWITCHING MODE	MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	SWITCHING MODE
KSDB1110MP	12VDC	Fixed	10m	Positive	KSDB314SP	24VDC	Fixed	4s	Positive
KSDB1115SP	12VDC	Fixed	15s	Positive	KSDB315SP	24VDC	Fixed	5s	Positive
KSDB1120SP	12VDC	Fixed	20s	Positive	KSDB324N	24VDC	External	1 - 100m	Negative
KSDB113MP	12VDC	Fixed	3m	Positive	KSDB330N	24VDC	Onboard	0.1 - 10s	Negative
KSDB113SP	12VDC	Fixed	3s	Positive	KSDB4120M	120VAC	Fixed	20m	n/a
KSDB120P	12VDC	External	0.1 - 10s	Positive	KSDB4160S	120VAC	Fixed	60s	n/a
KSDB134P	12VDC	Onboard	1 - 100m	Positive	KSDB4190M	120VAC	Fixed	90m	n/a
KSDB2115S	24VAC	Fixed	15s	n/a	KSDB431	120VAC	Onboard	1 - 100s	n/a
KSDB220	24VAC	External	0.1 - 10s	n/a	KSDB61150S	230VAC	Fixed	150s	n/a
KSDB231	24VAC	Onboard	1 - 100s	n/a	KSDB631	230VAC	Onboard	1 - 100s	n/a

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# 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.



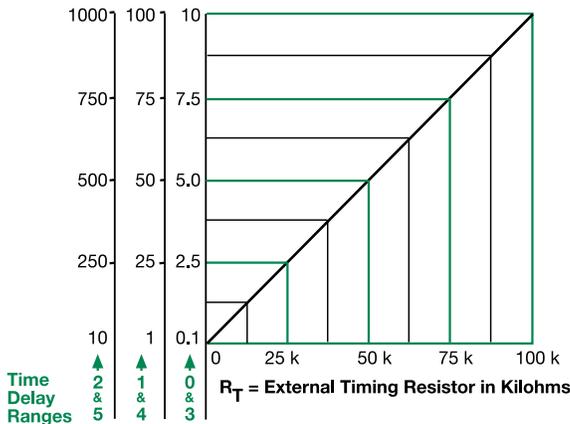
**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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

In Secs. or Mins.



**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.

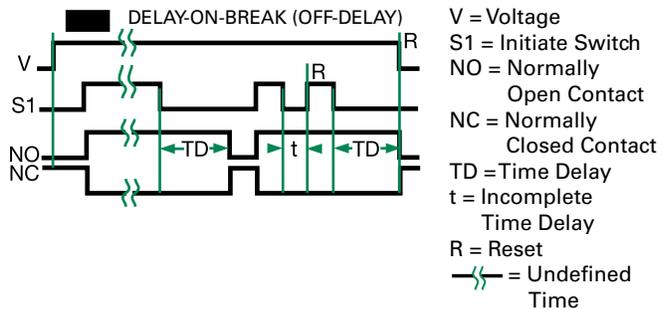
When selecting an external  $R_T$ , add the tolerances of the timer and the  $R_T$  for the full time range adjustment.

**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

<b>Time Delay Range</b>	0.1s - 1000m in 6 adjustable ranges or fixed
<b>Repeat Accuracy Tolerance (Factory Calibration)</b>	$\pm 0.5\%$ or 20ms, whichever is greater
<b>Reset Time</b>	$\leq 150\text{ms}$
<b>Initiate Time</b>	$\leq 20\text{ms}$
<b>Time Delay vs Temp. &amp; Voltage</b>	$\leq \pm 10\%$
<b>Input Voltage</b>	12, 24, or 120VDC; 24, 120, or 230VAC
<b>Tolerance</b>	$\pm 20\%$
<b>Power Consumption</b>	AC $\leq 2\text{VA}$ ; DC $\leq 2\text{W}$
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / $\leq 10\%$
<b>Output Type</b>	Solid state
<b>Form</b>	NO, closed before & during timing
<b>Maximum Load Current</b>	1A steady state, 10A inrush at 60°C
<b>OFF State Leakage Current</b>	AC $\approx 5\text{mA}$ @ 230VAC; DC $\approx 1\text{mA}$
<b>Voltage Drop</b>	AC $\approx 2.5\text{V}$ @ 1A; DC $\approx 1\text{V}$ @ 1A
<b>DC Operation</b>	Positive or negative switching
<b>Protection</b>	
<b>Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	$\geq 2000\text{V RMS}$ terminals to mounting surface
<b>Insulation Resistance</b>	$\geq 100\text{M}\Omega$
<b>Polarity</b>	DC units are reverse polarity protected
<b>Mechanical Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2.0"); <b>W</b> 50.8 mm (2.0"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-40° to 60°C / -40° to 80°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	$\approx 2.4\text{ oz}$ (68 g)

## Function Diagram

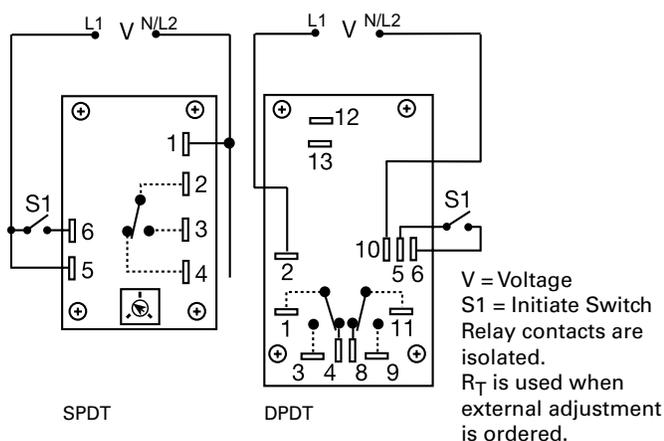


12 TIME DELAY RELAYS

# ORB SERIES



## Wiring Diagram



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

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	OUTPUT FORM
ORB120A160	120VAC	Fixed	60s	SPDT
ORB120A25	120VAC	Onboard	3 - 300s	SPDT
ORB24A11D	24VAC	Fixed	1s	DPDT
ORB24A21D	24VAC	Onboard	0.05 - 3s	DPDT
ORB24A25	24VAC	Onboard	3 - 300s	SPDT

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## 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

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

## 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.

# ORB SERIES

## 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% - 20%

**120 & 230VAC** -20% - 10%

**AC Line Frequency** 50/60 Hz

**Power Consumption** 2.25W

**Output Type** Electromechanical relay  
**Form** Isolated, SPDT or DPDT  
**Rating** 10A resistive @ 120/240VAC & 28VDC;  
1/3 hp @ 120/240VAC

**Life** Mechanical - 1x10<sup>7</sup>; Electrical - 1x10<sup>6</sup>

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

**Mechanical Mounting Dimensions** Surface mount with four #6 (M3.5 x 0.6) screws  
**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 Temperature** -20° to 65°C / -30° to 85°C

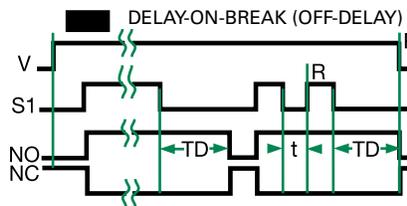
**Weight** ≈ 2.7 oz (77 g)

## Selection Guides

R <sub>T</sub> Selection Chart					
Desired Time Delay*					R <sub>T</sub> Megohm
Seconds					
1	2	3	4	5	
0.05	0.5	0.6	1.2	3.0	0.0
0.5	5.0	10	20	50	0.5
1.0	10	20	40	100	1.0
1.5	15	30	60	150	1.5
2.0	20	40	80	200	2.0
2.5	25	50	100	250	2.5
3.0	30	60	120	300	3.0

\* 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  
t = Incomplete Time Delay  
R = Reset  
— = Undefined Time

# TDB / TDBH / TDBL SERIES

## Relay Output, Delay-on-Break



### Description

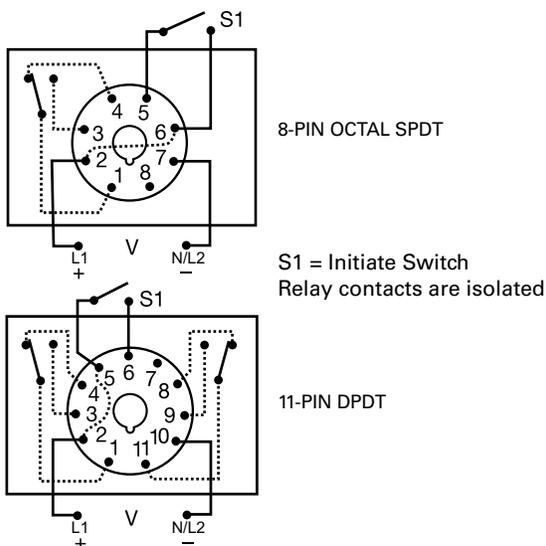
The TDB series combines accurate digital circuitry with isolated, 10 A, DPDT or SPDT contacts in an 8-pin or 11-pin plug-in package. The TDB series features DIP switch selectable time delays ranging from 0.1–10,230 seconds in three ranges. The TDB series is the product of choice for custom control panel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

### Wiring Diagram



### Features & Benefits

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

For dimensional drawing see: Appendix, page 512, Figure 23.

### Ordering Information

MODEL	INPUT VOLTAGE	DELAY RANGE (SEC)	LED	TYPE PLUG/OUTPUT FORM
TDB120AL	120 V ac	1–1023 in 1 s increments	X	Octal (8-pin) plug, SPDT
TDB120ALD	120 V ac	1–1023 in 1 s increments	X	11-pin plug, DPDT
TDB12D	12 V dc	1–1023 in 1 s increments		Octal (8-pin) plug, SPDT
TDB230AL	230 V ac	1–1023 in 1 s increments	X	Octal (8-pin) plug, SPDT
TDB24AL	24 V ac	1–1023 in 1 s increments	X	Octal (8-pin) plug, SPDT
TDB24DL	24 V dc/ 28 V dc	1–1023 in 1 s increments	X	Octal (8-pin) plug, SPDT
TDBH120AL	120 V ac	10–10230 in 10 s increments	X	Octal (8-pin) plug, SPDT
TDBH120ALD	120 V ac	10–10230 in 10 s increments	X	11-pin plug, DPDT
TDBL120AL	120 V ac	0.1–102.3 in 0.1 s increments	X	Octal (8-pin) plug, SPDT
TDBL120ALD	120 V ac	0.1–102.3 in 0.1 s increments	X	11-pin plug, DPDT
TDBL24DL	24 V dc/ 28 V dc	0.1–102.3 in 0.1 s increments	X	Octal (8-pin) plug, SPDT

# TDB / TDBH / TDBL SERIES

## Accessories



**OT08PC 8-pin Octal Socket for UL listing\***  
Octal Socket for plug-in units. 8-pin surface & DIN-rail mountable. Rated for 10 A @ 600 V ac.



**OT11PC Octal Socket for UL listing\***  
11-pin surface & DIN-rail mountable. Rated for 10 A @ 300 V ac

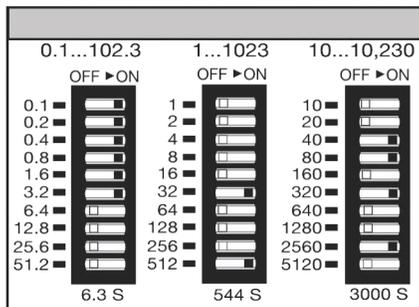


**P1011-6 Octal Socket for UL listing**  
8-pin surface mount socket with binder head screw terminals. Rated 10 A @ 600 V ac.



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

## Digi-Set Binary Switch Operation



## Specifications

### Time Delay

**Type** Digital integrated circuitry  
**Range** 0.1–102.3 s in 0.1 s increments  
1–1023 s in 1 s increments  
10–10,230 s in 10 s increments

**Repeat Accuracy** ±0.1 %  
**Setting Accuracy** ±2 %  
**Reset Time** ≤ 150 ms

**Time Delay vs Temp. & Voltage** ±5 %  
**Indicator** LED indicates relay is energized  
**Initiate Time** ≤ 60 ms

**Input Voltage** 12, 24/28 V dc; 24, 120, or 230 V ac

**Tolerance**  
**12 V dc & 24 V dc/ac** -15 %–20 %  
**120 to 230 V ac/dc** -20 %–10 %

**AC Line Frequency** 50/60 Hz  
**Power Consumption** ≤ 3.25W

### Output

**Type** Electromechanical relay  
**Form** SPDT or DPDT  
**Rating** 10 A resistive @ 120/240 V ac;  
1/3 hp @ 120/240 V ac  
Mechanical - 1 x 10<sup>7</sup>; Electrical - 1 x 10<sup>6</sup>

### Life

**Protection** ≥ 1500 V RMS input to output  
**Isolation Voltage** Dc units reverse polarity protected

### Polarity

### Mechanical

**Mounting** Plug-in socket  
**Dimensions** **H** 44.45 mm (1.75"); **W** 60.33 mm (2.38");  
**D** (with socket) 104.78 mm (4.13")  
Octal 8-pin plug-in or 11-pin plug-in

### Termination

### Environmental

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

**Weight** ≈ 4 oz (113 g)

### Safety Marks

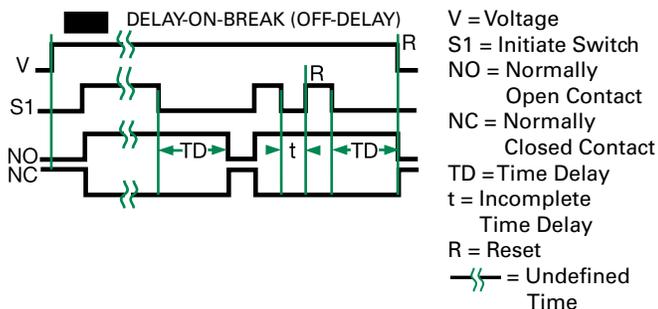
**UL (socket required)\*** UL 508 (E57310)

\*UL Listed when used with Part Number OT08-PC or RB08-PC manufactured by Custom Connector Corp.

**Note:** Manufacturer's recommended screw terminal torque for the OT series sockets is 12 in.-lbs.

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## Function Diagram



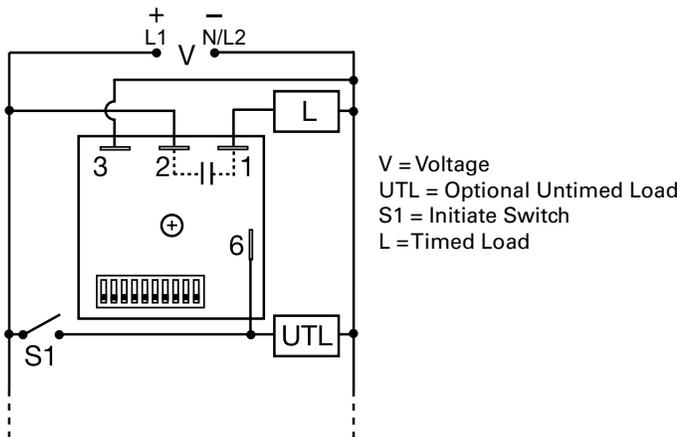
TIME DELAY RELAYS

# TDUB SERIES

## Delay-on-Break Timer



### Wiring Diagram



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

### Ordering Information

MODEL	INPUT VOLTAGE RANGE	TIME RANGE
TDUB3000A	24 to 120VAC	1-1023s
TDUB3002A	12 to 24VDC	1-1023s
TDUBH3002A	12 to 24VDC	0.1-102.3m
TDUBH3001A	100 to 240VAC	0.1-102.3m
TDUBL3002A	12 to 24VDC	0.1-102.3s

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

### 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

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

### 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.

# TDUB SERIES

## Specifications

### Time Delay

<b>Range*</b>	0.1 - 102.3s in 0.1s increments 1 - 1023s in 1s increments 0.1 - 102.3m in 0.1m increments
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater
<b>Setting Accuracy</b>	±2% or 20ms, whichever is greater
<b>Reset Time</b>	≤ 150ms
<b>Initiate Time</b>	≤ 20ms
<b>Time Delay vs. Temperature &amp; Voltage</b>	≤ ±5%

### Input

<b>Voltage/Tolerance</b>	24 to 240VAC, 12 to 24VDC /±20%
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 1W

### Output

<b>Type</b>	Solid state
<b>Form</b>	NO, closed before and during timing
<b>Rating</b>	1A steady state, 10A inrush at 60°C
<b>Voltage Drop</b>	AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A
<b>Off State Leakage Current</b>	AC ≅ 5mA @ 230VAC; DC ≅ 1mA

### Protection

<b>Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reverse polarity protected

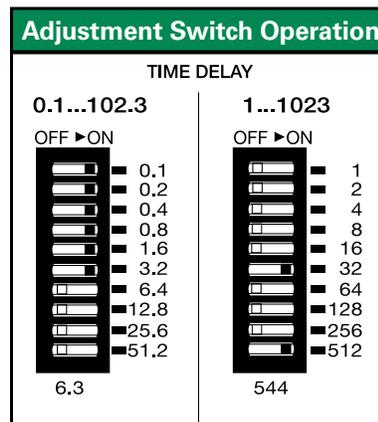
### Mechanical

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

### Environmental

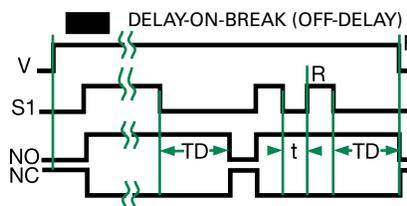
<b>Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≅ 2.4 oz (68 g)

## Adjustment Switch Operation



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

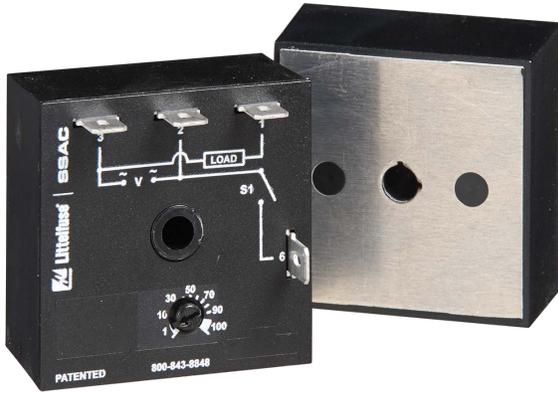
## Function Diagram



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

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

# THDB SERIES



## Description

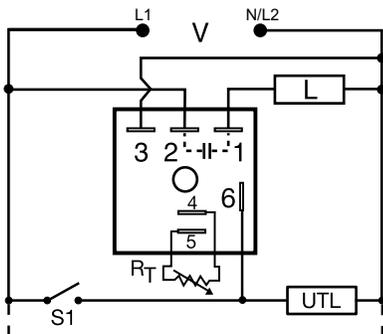
The THDB Series combines accurate timing circuitry with high power, solid-state switching. It can switch motors, lamps, and heaters directly without a contactor. You can reduce labor, component cost, and increase reliability with these small, easy-to-use, timers.

### 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.

## Wiring Diagram



V = Voltage  
UTL = Optional Untimed Load  
L = Timed Load  
S1 = Initiate Switch

$R_T$  is used when external adjustment is ordered.

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

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	OUTPUT RATING
THDB421A	120VAC	External	1 - 100s	6A
THDB434C	120VAC	Onboard	1 - 100m	20A

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

## Features & Benefits

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

## 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.

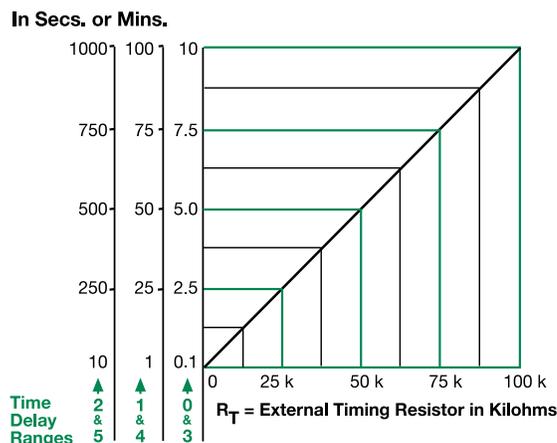


### P1015-18 Quick Connect to Screw Adapter

Screw adapter terminal designed for use with all modules with 0.25 in. (6.35 mm) male quick connect terminals.

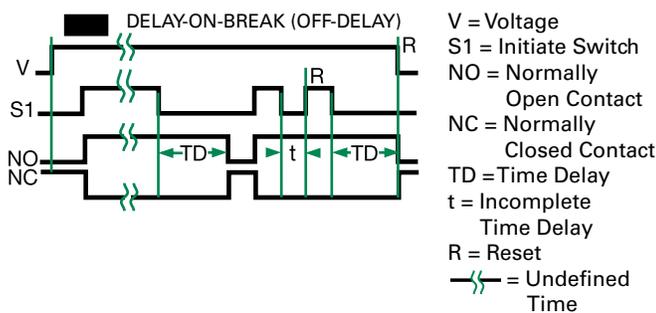
# THDB SERIES

## 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 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  $R_T$ .

## Function Diagram



## Specifications

<b>Time Delay Range</b>	0.1s - 1000m in 6 adjustable ranges or fixed		
<b>Repeat Accuracy Tolerance (Factory Calibration)</b>	±0.5% or 20ms, whichever is greater		
<b>Reset Time</b>	≤ 150ms		
<b>Initiate Time</b>	≤ 20ms		
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±2%		
<b>Input Voltage</b>	24, 120, or 230VAC		
<b>Tolerance</b>	±20%		
<b>AC Line Frequency</b>	50/60 Hz		
<b>Power Consumption</b>	≤ 2VA		
<b>Output Type</b>	Solid state		
<b>Form</b>	NO, closed before & during timing		
<b>Maximum Load Current</b>	<b>Output</b>	<b>Steady State</b>	<b>Inrush**</b>
	A	6A	60A
	B	10A	100A
	C	20A	200A
<b>Voltage Drop</b>	≈ 2.5V @ rated current		
<b>Off State Leakage Current</b>	≈ 5mA @ 230VAC		
<b>Minimum Load Current</b>	100mA		
<b>Protection Circuitry</b>	Encapsulated		
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface		
<b>Insulation Resistance</b>	≥ 100 MΩ		
<b>Mechanical Mounting **</b>	Surface mount with one #10 (M5 x 0.8) screw		
<b>Dimensions</b>	<b>H</b> 50.8 mm (2.0"); <b>W</b> 50.8 mm (2.0"); <b>D</b> 38.4 mm (1.51")		
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals		
<b>Environmental Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C		
<b>Humidity</b>	95% relative, non-condensing		
<b>Weight</b>	≈ 3.9 oz (111 g)		

\*\*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.

# TRB SERIES



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



## Description

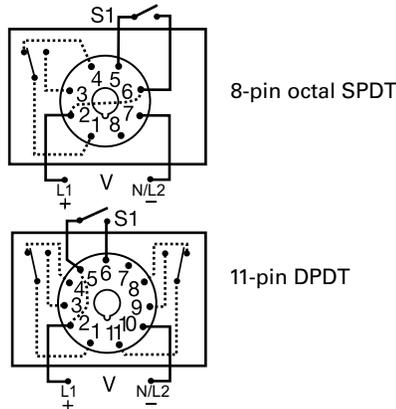
The TRB series combines an isolated, 10 A electromechanical relay output with digital timing circuitry. False trigger of the TRB by a transient is unlikely because of the complete isolation of the circuit from the line prior to initiation. The initiate contact is common to one side of the line and may 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.

## Wiring Diagram



## Features & Benefits

FEATURES	BENEFITS
<b>Complete isolation of circuit from line</b>	No false trip due to transients
<b>Industry standard 8 or 11-pin connection</b>	Provides easy installation and field replacement
<b>Isolated, 10 A, SPDT or DPDT output contacts</b>	Allows control of loads for ac or dc voltages
<b>Digital circuitry</b>	Repeat accuracy +/- 2 %

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

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	OUTPUT FORM	TIME TOLERANCE	TIME DELAY
TRB120A2Y30	120 V ac	Onboard	Octal, SPDT	+/- 10 %	1–30 s
TRB120A3X600	120 V ac	Lock shaft	Octal, SPDT	+/- 20 %	7–600 s
TRB120A4Y120	120 V ac	Onboard	11-pin, DPDT	+/- 10 %	2–120 s
TRB24D10Y10	24 V dc/28 V dc	Fixed	11-pin, DPDT	+/- 10 %	10 s

## TRB SERIES

### Accessories



**OT08PC 8-pin Octal Socket for UL listing\***  
Octal Socket for plug-in units. 8-pin surface & DIN rail mountable. Rated for 10 A @ 600 V ac.



**OT11PC Octal Socket for UL listing\***  
11-pin surface & DIN rail mountable. Rated for 10 A @ 300 V ac

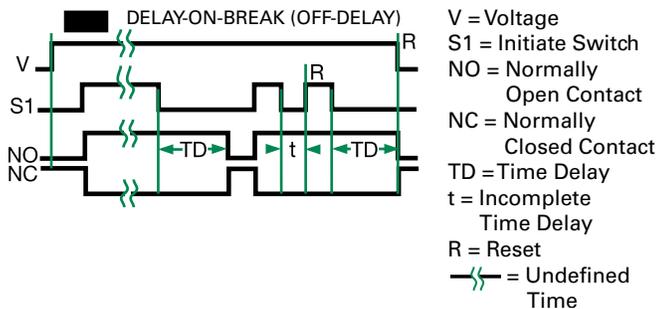


**P1011-6 Octal Socket for UL listing\***  
8-pin surface mount socket with binder head screw terminals. Rated 10 A @ 600 V ac.



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

### Function Diagram



### Specifications

#### Time Delay

<b>Type</b>	Digital circuitry
<b>Range</b>	See "Ordering Information" table
<b>Repeat Accuracy</b>	±2 %
<b>Fixed Time Tolerance &amp; Setting Accuracy</b>	±5, 10, or 20 %
<b>Initiate Time</b>	≤ 70 ms
<b>Reset Time</b>	≤ 75 ms
<b>Recycle Time</b>	≤ 250 ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤±5 %

#### Input

<b>Voltage</b>	24/28 V dc; 120 V ac
<b>Indicator</b>	LED indicates relay is energized
<b>Tolerance</b>	
<b>24V dc/ac</b>	-15 %–20 %
<b>120 V ac</b>	-20 %–10 %
<b>AC Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	≤ 3.25W

#### Output

<b>Type</b>	Electromechanical relay
<b>Form</b>	Isolated SPDT or DPDT
<b>Rating</b>	10 A resistive @ 120/240 V ac 1/3 hp @ 120/240 V ac Mechanical - 1 x 10 <sup>7</sup> ; Electrical - 1 x 10 <sup>6</sup>

#### Life

<b>Protection</b>	
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Isolation Voltage</b>	≥ 1500 V RMS between input to output
<b>Polarity</b>	Dc units are reverse polarity protected

#### Mechanical

<b>Mounting</b>	Plug-in socket
<b>Dimensions</b>	<b>H</b> 44.45 mm (1.75"); <b>W</b> 60.33 mm (2.38"); <b>D</b> (with socket) 104.78 mm (4.13") Octal 8-pin plug-in or 11-pin plug-in

#### Termination

<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-20 °C to 65 °C / -30 °C to 85 °C
<b>Weight</b>	≈ 4 oz (113 g)
<b>Safety Marks</b>	
<b>UL (socket required)*</b>	UL 508 (E57310)

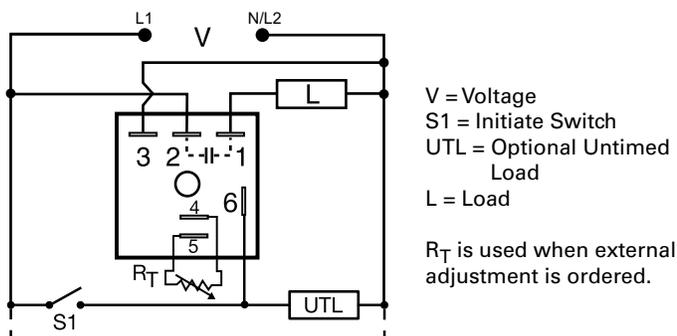
\*UL Listed when used with Part Number OT08-PC, RB08-PC, OT11-PC, or RB11-PC manufactured by Custom Connector Corp.

**Note:** Manufacturer's recommended screw terminal torque for the OT series sockets is 12 in.-lbs.

# TSB SERIES



## Wiring Diagram



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

## 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  $\pm 2\%$ . 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

FEATURES	BENEFITS
<b>Analog circuitry</b>	Repeat accuracy $\pm 2\%$ , Factory calibration $\pm 5\%$
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>Wide time delay range</b>	Meets almost all OEM and commercial appliance timing applications
<b>1A steady, 10A inrush solid state output</b>	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.

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
TSB2190	24VAC	Fixed	90s	TSB434	120VAC	Onboard	5 - 600s
TSB222	24VAC	External	0.5 - 60s	TSB632	230VAC	Onboard	0.5 - 60s
TSB41300	120VAC	Fixed	300s	TSB634	230VAC	Onboard	5 - 600s
TSB422	120VAC	External	0.5 - 60s				

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# TSB SERIES

## 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.



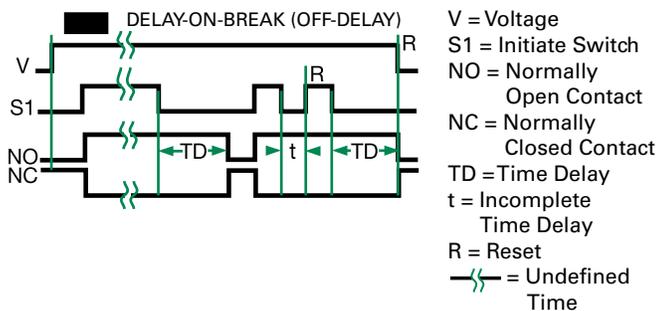
**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

## Selection Guide

RT Selection Chart				
Desired Time Delay*				RT
Seconds				
1	2	3	4	Kohms
0.05	0.5	2	5	0
0.3	6	20	60	10
0.6	12	38	120	20
0.9	18	55	180	30
1.2	24	73	240	40
1.5	30	90	300	50
1.8	36	108	360	60
2.1	42	126	420	70
2.4	48	144	480	80
2.7	54	162	540	90
3.0	60	180	600	100

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

## Function Diagram



## 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

-40° to 75°C / -40° to 85°C

#### Temperature

95% relative, non-condensing

#### Humidity

≅ 2.4 oz (68 g)

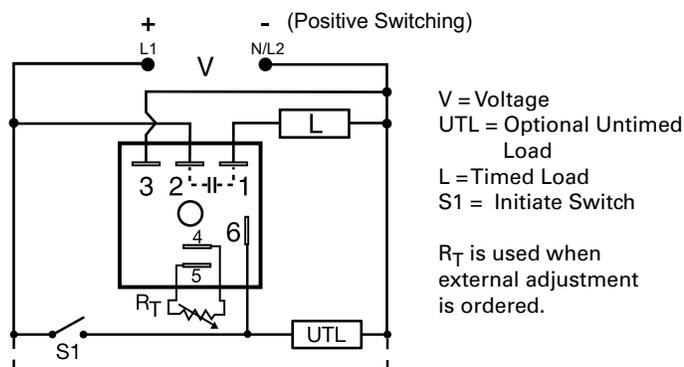
#### Weight

≅ 2.4 oz (68 g)

# TSDB SERIES



## Wiring Diagram



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

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	SWITCHING MODE
TSDB320P	24VDC	External	0.1 - 10s	Positive
TSDB421	120VAC	External	1 - 100s	n/a
TSDB431	120VAC	Onboard	1 - 100s	n/a

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## 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

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat accuracy +/- 0.5%, Factory calibration +/- 1%
<b>Compact design</b>	Allows flexibility for OEM applications
<b>1A Steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions.
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>Wide temperature range: -40° to 75°C</b>	Reliable in demanding commercial and industrial applications

## 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.

# 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.

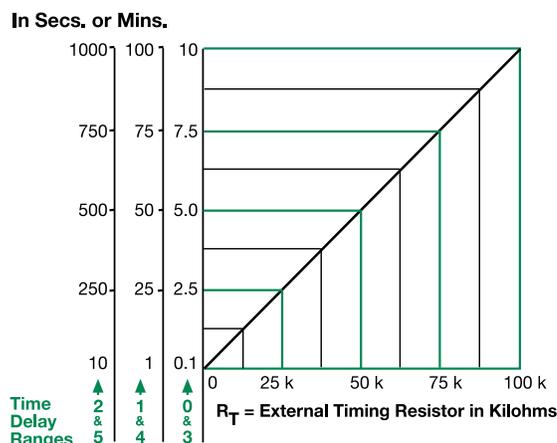


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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

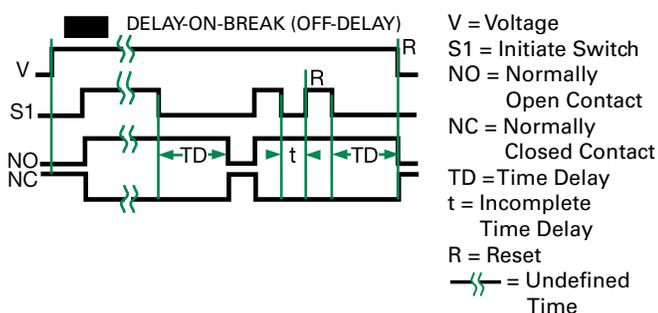


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the tie delay increases.

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  $R_T$ .

## Function Diagram



## Specifications

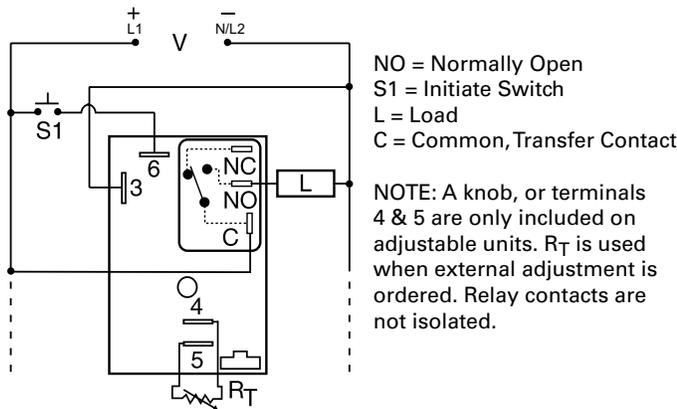
<b>Time Delay Range</b>	0.1s - 1000m in 6 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.5 % or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ±1%
<b>Reset Time</b>	≤ 150ms
<b>Initiate Time</b>	≤ 20ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±2%
<b>Input Voltage</b>	12 or 24VDC; 24, 120, or 230VAC
<b>Tolerance</b>	±15%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 1W
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10 %
<b>Output Type</b>	Solid state
<b>Form</b>	NO, closed before & during timing
<b>Maximum Load Current</b>	1A steady state, 10A inrush at 60°C
<b>Off State Leakage Current</b>	≈ 5mA @ 230VAC; DC ≈ 1mA
<b>Voltage Drop</b>	AC ≈ 2.5V @ 1A; DC ≈ 1V @ 1A
<b>DC Operation</b>	Positive or negative switching
<b>Protection</b>	
<b>Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reverse polarity protected
<b>Mechanical</b>	
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2.0"); <b>W</b> 50.8 mm (2.0"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-40° to 75°F / -40° to 85°F
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≈ 2.4 oz (68 g)

# HRDS SERIES

## Single Shot Timer



### Wiring Diagram



For dimensional drawing see: Appendix, page 512, Figure 17.

### Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
HRDS120	12VDC	Onboard	0.1 - 10s
HRDS313M	24VDC	Fixed	3m
HRDS321	24VDC	Onboard	1 - 100s
HRDS421	120VAC	Onboard	1 - 100s
HRDS430	120VAC	External	0.1 - 10s

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### 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  $\pm 0.5\%$ . 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 effect 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

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy $\pm 0.5\%$
<b>Compact, low cost design</b>	Allows flexibility for OEM applications
<b>Isolated, 30A, SPDT, NO output contacts</b>	Allows direct operation of heavy loads: compressors, pumps, blower motors, heaters.
<b>Encapsulated</b>	Protects against shock, vibration, and humidity

### 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.

# HRDS SERIES

## Accessories

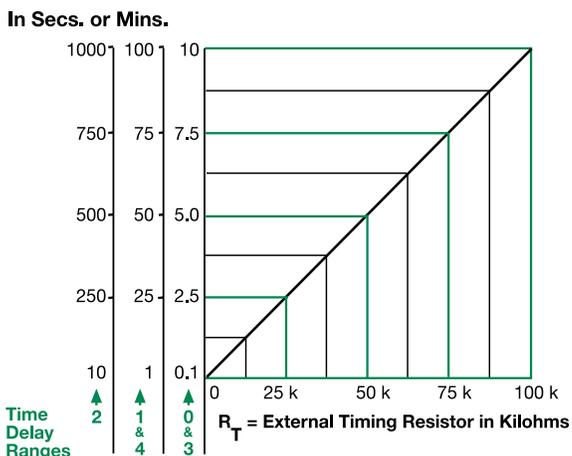


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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



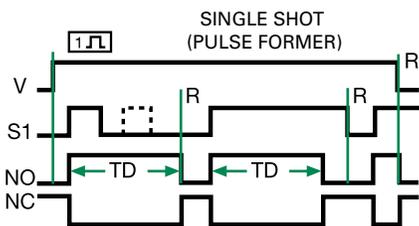
This chart applies to externally adjustable part numbers.

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

## Specifications

### Time Delay

**Type** Microcontroller circuitry  
**Range** 0.1s - 100m in 5 adjustable ranges or fixed  
**Repeat Accuracy** ±0.5% or 20 ms, whichever is greater  
**Tolerance** ±1%, ±5%  
**(Factory Calibration)**  
**Reset Time** ≤ 150ms  
**Initiate Time** ≤ 20ms  
**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** SPDT, non-isolated  
**Ratings**  

	SPDT-NO	SPDT-NC
<b>General Purpose</b>	30A	15A
<b>Resistive</b>	30A	15A
	20A	10A
<b>Motor Load</b>	1 hp*	1/4 hp**
	2 hp**	1 hp**

**Life** Mechanical - 1 x 10<sup>6</sup>;  
Electrical - 1 x 10<sup>5</sup>, \*3 x 10<sup>4</sup>, \*\*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** **H** 76.7 mm (3"); **W** 51.3 mm (2");  
**D** 38.1 mm (1.5")  
0.25 in. (6.35 mm) male quick connect terminals

### Termination

### Environmental

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

# HSPZA22SL



## Description

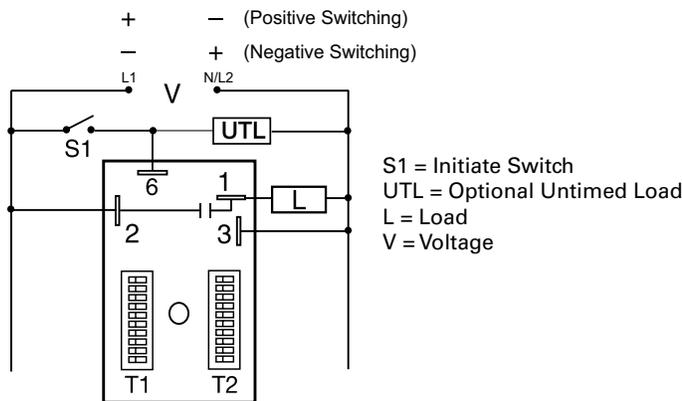
The HSPZA22SL is a factory programmed module available in any 1 of 13 standard functions. The HSPZA22SL offers dual switch adjustable timer or counter functions. Switch adjustment allows accurate selection of the time delay or number of counts the first time and every time. The 1A steady, 10A inrush 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.

## Wiring Diagram



For dimensional drawing see: Appendix, page 512, Figure 18.

## Features & Benefits

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

## 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.



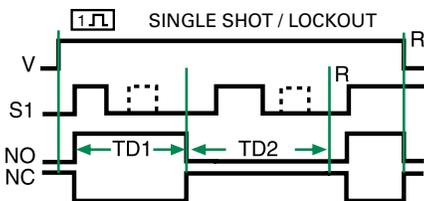
**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

# HSPZA22SL

## Switch Adjustment

Adjustment Switch Operation			
TIME DELAY		TIME DELAY and COUNTER	
0.1...102.3	1...512	1...1023	1...165
OFF ▶ ON	OFF ▶ ON	OFF ▶ ON	OFF ▶ ON
0.1 0.2 0.4 0.8 1.6 3.2 6.4 12.8 25.6 51.2	1 2 4 8 16 32 64 128 256 M	1 2 4 8 16 32 64 128 256 512	1 2 3 4 5 10 20 30 40 50
6.3	300 s Delay	544	57 counts

## 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.

≤ ±2%

#### & 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

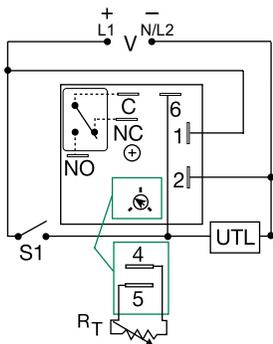
≈ 3.9 oz (111 g)

# KRDS SERIES

## Single Shot



### Wiring Diagram



V = Voltage  
S1 = Initiate Switch  
C = Common, Transfer Contact  
NO = Normally Open  
NC = Normally Closed  
UTL = Untimed Load

R<sub>T</sub> is used when external adjustment is ordered. A knob is supplied for adjustable units. The untimed load is optional. Relay contacts are isolated.

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

### Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
KRDS1135M	12VDC	Fixed	35m
KRDS120	12VDC	Onboard	0.1 - 10s
KRDS221	24VAC/DC	Onboard	1 - 100s
KRDS420	120VAC	Onboard	0.1 - 10s
KRDS421	120VAC	Onboard	1 - 100s
KRDS424	120VAC	Onboard	1 - 100m
KRDS430	120VAC	External	0.1 - 10s

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

### 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 effect 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

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

### 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.

# KRDS SERIES

## Accessories

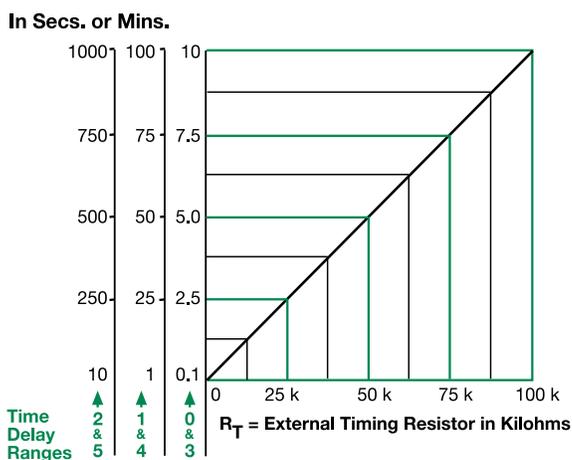


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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

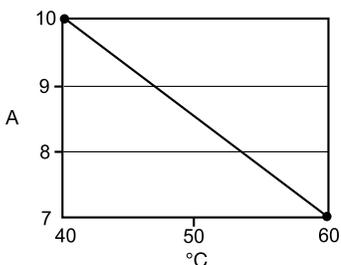


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the time delay increases.

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

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

Mechanical -  $1 \times 10^7$ ; Electrical -  $1 \times 10^5$

### Life (Operations)

### Protection

Encapsulated

### Circuitry

≥ 1500V RMS input to output

### Isolation Voltage

≥ 100 MΩ

### Insulation Resistance

### 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 85°C

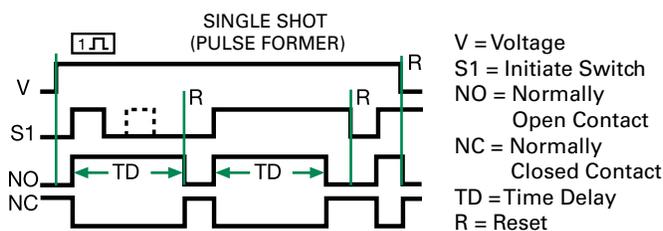
##### Humidity

95% relative, non-condensing

##### Weight

≈ 2.6 oz (74 g)

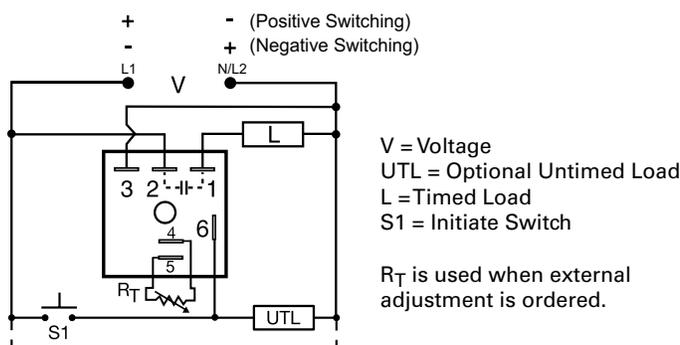
## Function Diagram



# KSDS SERIES



## Wiring Diagram



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

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	SWITCHING MODE
KSDS1115SP	12VDC	Fixed	15s	Positive
KSDS230	24VAC	Onboard	0.1 - 10s	n/a
KSDS320P	24VAC	External	0.1 - 10s	Positive
KSDS415M	120VAC	Fixed	5m	n/a
KSDS420	120VAC	External	0.1 - 10s	n/a

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## 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 effect 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

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

## 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.

# KSIDS 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.

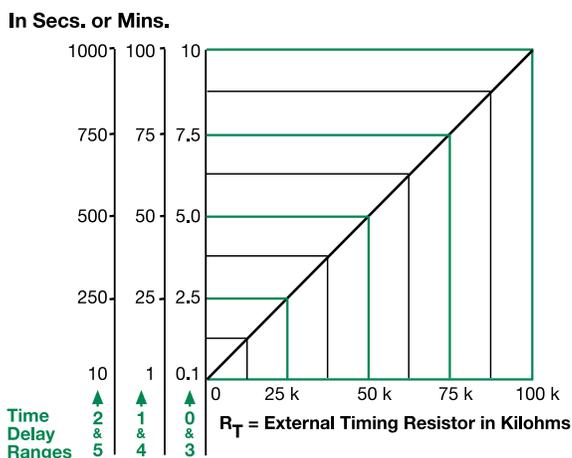


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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

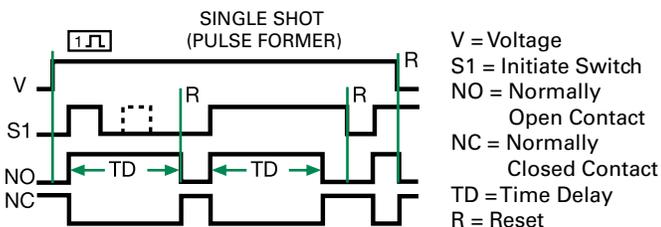


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the time delay increases.

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  $R_T$ .

## Function Diagram



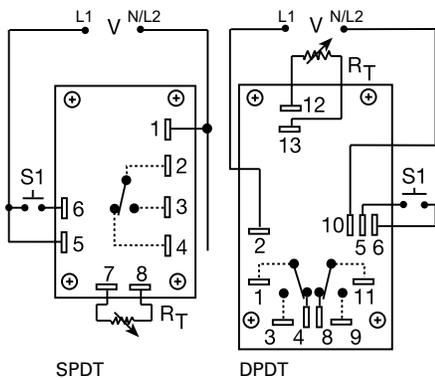
## Specifications

<b>Time Delay Range</b>	0.1s - 1000ms in 6 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.5 % or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ±5%
<b>Reset Time</b>	≤ 150ms
<b>Initiate Time</b>	≤ 20ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±10%
<b>Input Voltage</b>	12 or 24VDC; 24, 120, or 230VAC
<b>Voltage Tolerance</b>	±20%
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10 %
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 1W
<b>Output Type</b>	Solid state
<b>Form</b>	NO, closed during timing
<b>Maximum Load Current</b>	1A steady state, 10A inrush at 60°C
<b>OFF State Leakage Current</b>	AC ≅ 5mA @ 230VAC; DC ≅ 1mA
<b>Voltage Drop</b>	AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A
<b>DC Operation</b>	Positive or negative switching
<b>Protection</b>	
<b>Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reverse polarity protected
<b>Mechanical</b>	
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2.0"); <b>W</b> 50.8 mm (2.0"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≅ 2.4 oz (68 g)

# ORS SERIES



## Wiring Diagram



V = Voltage  
S1 = Initiate Switch

Relay contacts are isolated.

$R_T$  is used when external adjustment is ordered.

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

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	OUTPUT FORM
ORS120A150SD	120VAC	Fixed	50s	DPDT
ORS230A150SD	230VAC	Fixed	50s	DPDT

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## 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 effect 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

FEATURES	BENEFITS
<b>Open PCB construction</b>	Reduces cost without sacrificing performance and reliability
<b>Analog circuitry</b>	Repeat accuracy +/- 2%, Factory calibration +/- 10%
<b>Isolated, 10A, SPDT or DPDT output contacts</b>	Allows control of loads for AC or DC voltages
<b>Line voltage initiation</b>	Separate control voltage is not required for operation

## 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.

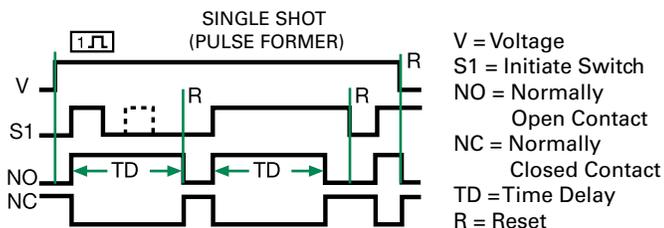
# ORS SERIES

## Selection Guide

RT Selection Chart					
Desired Time Delay*					RT Megohm
Seconds					
1	2	3	4	5	
0.05	0.5	0.6	1.2	3.0	0.0
0.5	5.0	10	20	50	0.5
1.0	10	20	40	100	1.0
1.5	15	30	60	150	1.5
2.0	20	40	80	200	2.0
2.5	25	50	100	250	2.5
3.0	30	60	120	300	3.0

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

## Function Diagram



## 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.

≤ ±10%

#### & Voltage

### Input

#### Voltage

24, 120, or 230VAC

#### Tolerance

##### 24VAC

-15% - 20%

##### 120 & 230VAC

-20% - 10%

#### AC Line Frequency

50/60 Hz

#### Power Consumption

2.25W

### Output

#### Type

Electromechanical relay

#### Form

Isolated, SPDT or DPDT

#### Rating

10A resistive @ 120/240VAC & 28VDC;

1/3 hp @ 120/240VAC

Mechanical - 1x10<sup>7</sup>; Electrical - 1x10<sup>6</sup>

### Life

### Protection

#### Isolation Voltage

≥1500V RMS input to output

### Mechanical

#### 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")

0.25 in. (6.35 mm) male quick connect terminals

#### Termination

### Environmental

#### Operating/Storage

#### Temperature

-20° to 65°C / -30° to 85°C

#### Weight

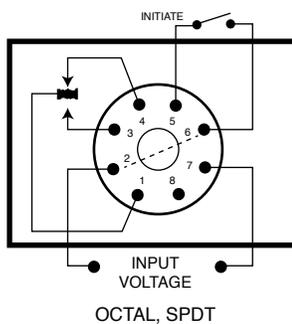
≈ 2.7 oz (77 g)

# PRS65

## Single Shot Timer



### Wiring Diagram



For dimensional drawing see: Appendix, page 515, Figure 48.

### 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

<b>Type</b>	Analog circuitry
<b>Range</b>	7 to 480 seconds
<b>Repeat Accuracy</b>	±2% under fixed conditions
<b>Tolerance</b>	Knob adjustable: guaranteed range
<b>Reset Time</b>	80ms max.
<b>Recycle Time</b>	16ms max.
<b>After Timing</b>	0.1% of max. time delay or 75ms, whichever is greater
<b>During Timing</b>	

### Time Delay vs. Temp. & Voltage

15% max.

### Input

<b>Voltage</b>	230VAC, nominal
<b>Tolerance</b>	±15% of nominal
<b>AC Line Frequency</b>	50/60 Hz

### Output

<b>Type</b>	Relay
<b>Form</b>	Single Pole, Double Throw
<b>Rating</b>	10 amperes resistive at 240VAC

### Protection

<b>Transient</b>	±1500 volts for 150 microseconds
<b>Dielectric Breakdown</b>	≥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 Dimensions

Standard Octal Plug-in  
**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)

# TDS / TDSH / TDSL SERIES

## Relay Output, Single Shot Time Delay Relay



### Description

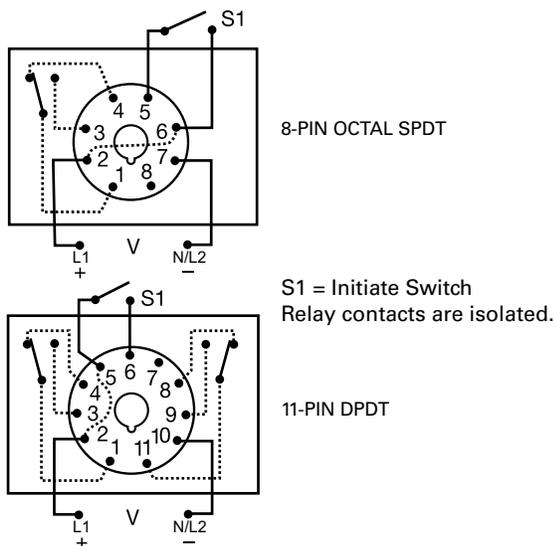
The TDS series combines accurate digital circuitry with isolated, 10 A rated, DPDT or SPDT relay contacts in an 8-pin or 11-pin plug-in package. The TDS series features DIP switch selectable time delays ranging from 0.1 s to 10,230 s in three ranges. The TDS series is the product of choice for custom 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 effect 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.

### Wiring Diagram



### Features & Benefits

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

For dimensional drawing see: Appendix, page 512, Figure 23.

### Ordering Information

MODEL	INPUT VOLTAGE	DELAY RANGE (SEC)	LED	PLUG TYPE/OUTPUT FORM
TDS120AL	120 V ac	1–1023 in 1 s increments	X	Octal (8-pin) plug, SPDT
TDS120ALD	120 V ac	1–1023 in 1 s increments	X	11-pin plug, DPDT
TDS12D	12 V dc	1–1023 in 1 s increments		Octal (8-pin) plug, SPDT
TDS230AL	230 V ac	1–1023 in 1 s increments	X	Octal (8-pin) plug, SPDT
TDS24AL	24 V ac	1–1023 in 1 s increments	X	Octal (8-pin) plug, SPDT
TDSH120AL	120 V ac	10–10230 in 10 s increments	X	Octal (8-pin) plug, SPDT
TDSL120AL	120 V ac	0.1–102.3 in 0.1 s increments	X	Octal (8-pin) plug, SPDT

# TDS / TDSH / TDSL SERIES

## Accessories



**OT08PC 8-pin Octal Socket for UL listing\***  
Octal Socket for plug-in units. 8-pin surface & DIN rail mountable. Rated for 10 A @ 600 V ac.

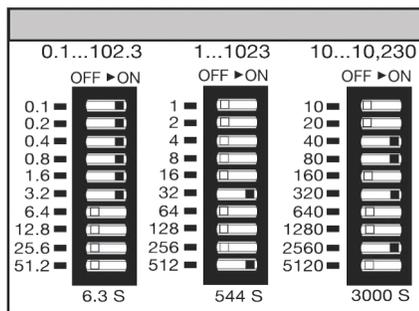


**OT11PC Octal Socket for UL listing\***  
11-pin surface & DIN rail mountable. Rated for 10 A @ 300 V ac

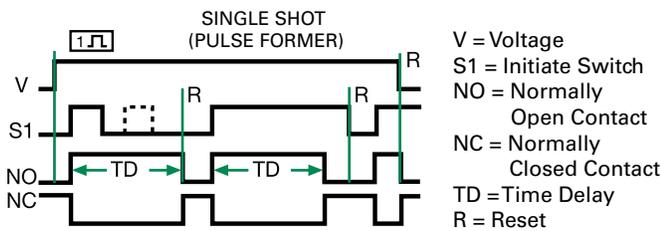


**P1011-6 Octal Socket for UL listing\***  
8-pin surface mount socket with binder head screw terminals. Rated 10 A @ 600 V ac.

## Digi-Set Binary Switch Operation



## Function Diagram



## Specifications

**Time Delay**  
**Type**  
**Range**

Digital integrated circuitry  
0.1–102.3 s in 0.1 s increments  
1–1023 s in 1 s increments  
10–10,230 s in 10 s increments

**Repeat Accuracy**  
**Setting Accuracy**  
**Reset Time**  
**Time Delay vs Temp. & Voltage**

± 0.1 %  
± 2 %  
≤ 150 ms  
± 5 %  
LED glows during timing; relay is energized

**Indicator**  
**Initiate Time**  
**Input**

≤ 60 ms

**Voltage**  
**Tolerance**  
**12 V dc & 24 V dc/ac**  
**110 to 230 V dc/ac**  
**AC Line Frequency**  
**Power Consumption**

12 V dc; 24, 120, or 230 V ac  
-15 %–20 %  
-20 %–10 %  
50/60 Hz  
≤ 3.25W

**Output**  
**Type**  
**Form**  
**Rating**

Electromechanical relay  
SPDT or DPDT  
10 A resistive @ 120/240 V ac  
1/3 hp @ 120/240 V ac  
Mechanical - 1 x 10<sup>7</sup>; Electrical - 1 x 10<sup>6</sup>

**Life**  
**Protection**  
**Isolation Voltage**  
**Polarity**  
**Mechanical**  
**Mounting**  
**Termination**  
**Dimensions**

≥ 1500 V RMS input to output  
Dc units are reverse polarity protected  
Plug-in socket  
Octal 8-pin plug-in or 11-pin plug-in  
**H** 44.45 mm (1.75"); **W** 60.33 mm (2.38");  
**D** (with socket) 104.78 mm (4.13")

**Environmental**  
**Operating/Storage**  
**Temperature**  
**Weight**  
**Safety Marks**  
**UL (socket required)\***

-20 °C to 65 °C/-30 °C to 85 °C  
≈ 4 oz (113 g)  
UL 508 (E57310)

\*UL Listed when used with Part Number OT08-PC, RB08-PC, OT11-PC, or RB11-PC manufactured by Custom Connector Corp.

**Note:** Manufacturer's recommended screw terminal torque for the OT Series sockets is 12 in-lbs.

# TDUS SERIES

## Single Shot Timer



### Description

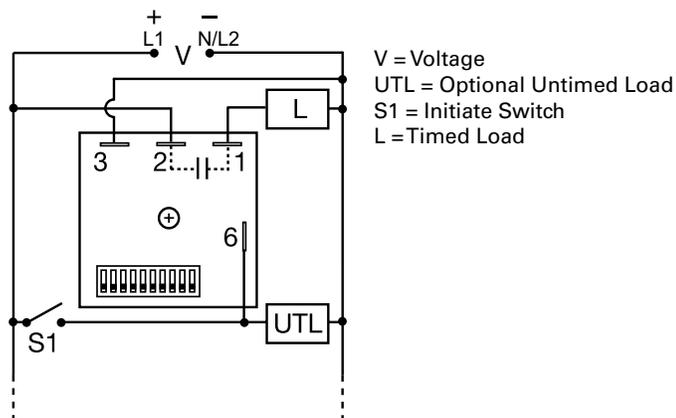
The TDUS Series combines digital timing circuitry with universal voltage operation. Voltages of 24 to 240VAC and 12 to 24VDC are available in three ranges. The TDUS Series offers DIP switch selectable time delays ranging from 0.1 seconds to 102.3 minutes in three ranges. Its 1A rated output, ability 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 effect 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.

### Wiring Diagram



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

### Features & Benefits

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy +/- 0.1%
<b>Compact design</b>	Allows flexibility for OEM applications
<b>1A steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions.
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity

### 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.



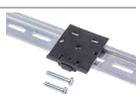
#### P1015-18 Quick Connect to Screw Adapter

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.

### Ordering Information

MODEL	INPUT VOLTAGE	TIME RANGE
TDUS3000A	24 to 120VAC	1 - 1023s
TDUS3001A	100 to 240VAC	1 - 1023s
TDUS3002A	12 to 24VDC	1 - 1023s
TDUSH3001A	100 to 240VAC	0.1 - 102.3m
TDUSL3000A	24 to 120VAC	0.1 - 102.3s

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# TDUS SERIES

## Specifications

### Time Delay

<b>Range*</b>	0.1 - 102.3s in 0.1s increments 1 - 1023s in 1s increments 0.1 - 102.3m in 0.1m increments
<b>Repeat Accuracy</b>	±0.5% or 20 ms, whichever is greater
<b>Setting Accuracy</b>	≤ ±2% or 20 ms, whichever is greater
<b>Reset Time</b>	≤ 150ms
<b>Initiate Time</b>	≤ 20ms

### Time Delay vs. Temperature & Voltage

≤ ±5%

### Input

<b>Voltage/Tolerance</b>	24 to 240VAC, 12 to 24VDC / ±20%
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 1W

### Output

<b>Type</b>	Solid state
<b>Form</b>	NO, closed during timing
<b>Rating</b>	1A steady state, 10A inrush at 60°C
<b>Voltage Drop</b>	AC ≈ 2.5V @ 1A; DC ≈ 1V @ 1A
<b>Off State Leakage Current</b>	AC ≈ 5mA @ 230VAC; DC ≈ 1 mA

### Protection

<b>Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reverse polarity protected

### Mechanical

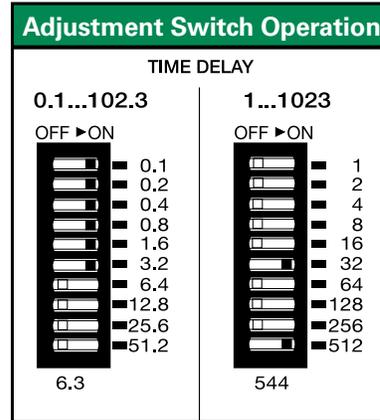
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals

### Environmental

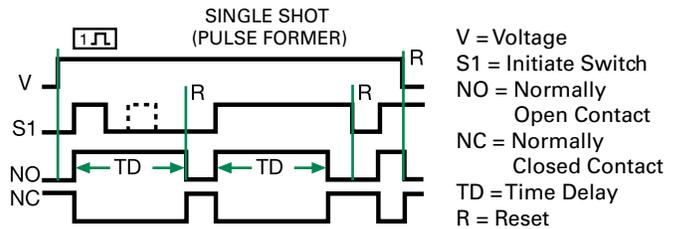
<b>Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≈ 2.4 oz (68 g)

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

## Adjustment Switch Operation



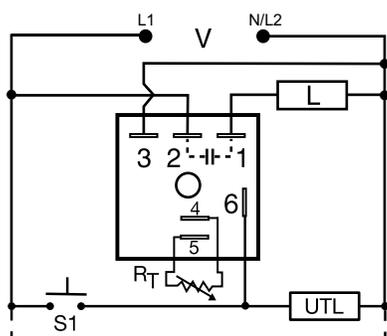
## Function Diagram



# THC / THS SERIES



## Wiring Diagram



V = Voltage  
S1 = Initiate Switch  
L = Timed Load  
UTL = Optional Untimed Load

R<sub>T</sub> is used when external adjustment is ordered.

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

## 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 effect 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

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

## 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

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	OUTPUT RATING
THC421C	120VAC	External	0.1 - 3s	20A
THS422B	120VAC	External	0.5 - 60s	10A
THS422C	120VAC	External	0.5 - 60s	20A

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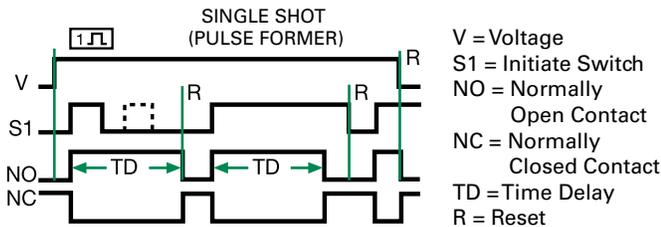
# THC / THS SERIES

## Selection Guide

RT Selection Chart				
Desired Time Delay*				RT
Seconds				
1	2	3	4	Kohms
0.1	0.5	2	5	0
0.3	6	20	60	10
0.6	12	38	120	20
0.9	18	55	180	30
1.2	24	73	240	40
1.5	30	90	300	50
1.8	36	108	360	60
2.1	42	126	420	70
2.4	48	144	480	80
2.7	54	162	540	90
3.0	60	180	600	100

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

## Function Diagram



## 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	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 \*\***

**Dimensions**

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

**Termination**

### 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.

# THDS SERIES



## Description

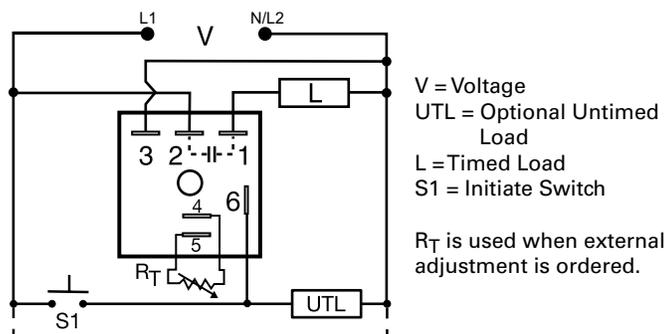
The THDS Series combines accurate timing circuitry with high power solid-state switching. It can switch motors, lamps, and heaters directly without a contactor. You can reduce labor, component cost, and increase reliability with these small, easy-to-use, timers.

### 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 effect 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.

## Wiring Diagram



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

## Features & Benefits

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

## 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.

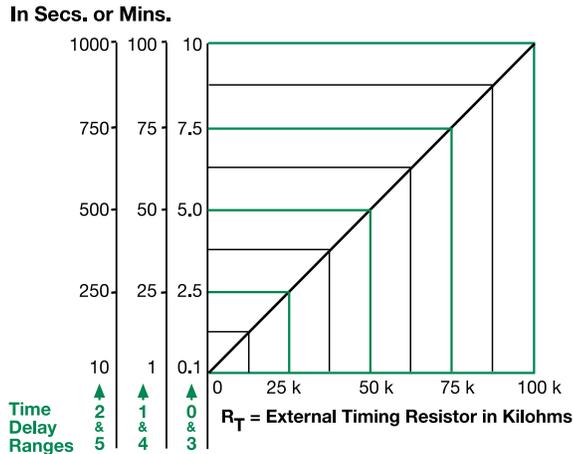
## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	OUTPUT RATING
THDS410.25SA	120VAC	Fixed	0.25s	6A
THDS431C	120VAC	Onboard	1 - 100s	20A
THDS610.25SA	230VAC	Fixed	0.25s	6A

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# THDS SERIES

## External Resistance vs. Time Delay

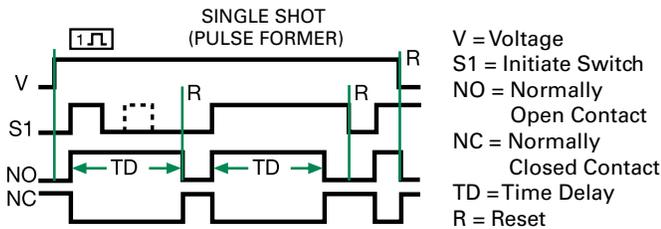


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the time delay increases.

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



## Specifications

<b>Time Delay</b>	0.1s - 1000m in 6 adjustable ranges or fixed
<b>Range</b>	±0.5% or 20ms, whichever is greater
<b>Repeat Accuracy</b>	
<b>Tolerance (Factory Calibration)</b>	≤ ±1%
<b>Reset Time</b>	≤ 150ms
<b>Initiate Time</b>	≤ 20ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±2%
<b>Input Voltage</b>	24, 120, or 230VAC
<b>Tolerance</b>	±20%
<b>AC Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	≤ 2VA
<b>Output Type</b>	Solid state
<b>Form</b>	NO, closed during timing
<b>Maximum Load Current</b>	
	<b>Output</b> <b>Steady State</b> <b>Inrush**</b>
	A                  6A                  60A
	B                  10A                100A
	C                  20A                200A
<b>Voltage Drop</b>	≅ 2.5V @ rated current
<b>Off State Leakage Current</b>	≅ 5mA @ 230VAC
<b>Minimum Load Current</b>	100mA
<b>Protection</b>	
<b>Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Mechanical</b>	
<b>Mounting **</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2.0"); <b>W</b> 50.8 mm (2.0"); <b>D</b> 38.4 mm (1.51")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≅ 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.

### TRS SERIES



### Description

The TRS series combines an isolated, 10 A electromechanical, relay output with digital 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)

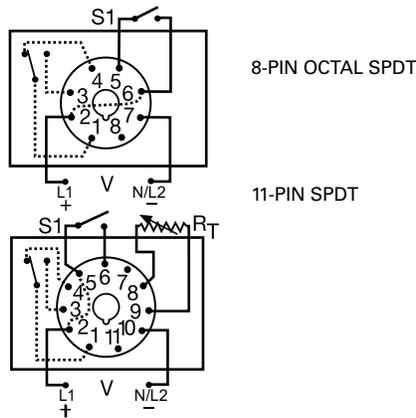
Input voltage must be applied to the input before and during timing. Upon momentary or maintained closure of the initiate switch (leading edge triggered), the output energizes for a measured interval of time. At the end of the delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no effect 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

FEATURES	BENEFITS
<b>Complete isolation of circuit from line</b>	No false trip due to transients
<b>Industry standard octal plug connection</b>	Eliminates need for special connectors
<b>Isolated, 10 A, SPDT or DPDT output contacts</b>	Allows control of loads for ac or dc voltages
<b>Digital circuitry</b>	Repeat accuracy +/- 2 %

### Wiring Diagram



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

### Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	OUTPUT FORM	TIME TOLERANCE	TIME DELAY
TRS120A2X300	120 V ac	Knob	8-Pin, Octal, SPDT	+/- 20 %	7–300s
TRS120A2Y10	120 V ac	Knob	8-Pin, Octal, SPDT	+/- 10 %	0.1–10s
TRS24D7Z10	24 V dc/28 V dc	External	11-Pin, SPDT no potentiometer	+/- 5 %	0.1–10s

# TRS SERIES

## Accessories



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



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



**OT08PC 8-pin Octal Socket for UL listing\***  
Octal Socket for plug-in units. 8-pin surface & DIN-rail mountable. Rated for 10 A @ 600 V ac.



**OT11PC Octal Socket for UL listing\***  
11-pin surface & DIN rail mountable. Rated for 10 A @ 300 V ac



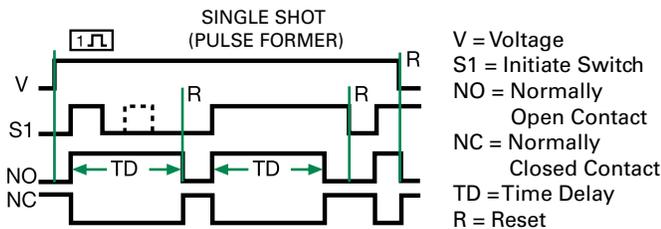
**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

## Selection Guides

External R <sub>T</sub> P/N Selection Table	
VALUE	PART NUMBER*
100K ohm	P1004-95
100K ohm	P1004-95-X

\*Externally adjustable potentiometers. Numbers with additional "-X" include two pre-soldered 8" wire leads with ¼" female quick-connect terminals (for clockwise increase).

## Function Diagram



## Specifications

### Time Delay

<b>Type</b>	Digital circuitry
<b>Range</b>	See "Ordering Information" table
<b>Repeat Accuracy</b>	± 2 %
<b>Fixed Time Tolerance &amp; Setting Accuracy</b>	± 5, 10, or 20 %
<b>Initiate Time</b>	≤ 70 ms
<b>Reset Time</b>	≤ 75 ms
<b>Recycle Time</b>	≤ 250 ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ± 5 %

### Input

<b>Voltage</b>	24/28 V dc; 24, 120 V ac
<b>Tolerance</b>	
<b>24 V dc/ac</b>	-15 %–20 %
<b>120 V ac</b>	-20 %–10 %
<b>AC Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	≤ 3.25W

### Output

<b>Type</b>	Electromechanical relay
<b>Form</b>	Isolated SPDT or DPDT
<b>Rating</b>	10 A resistive @ 120/240 V ac & 28 V dc; 1/3 hp @ 120/240 V ac Mechanical - 1 x 10 <sup>7</sup> ; Electrical - 1 x 10 <sup>6</sup>

### Life

### Protection

<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Isolation Voltage</b>	≥ 1500 V RMS between input & output terminals
<b>Polarity</b>	Dc units are reverse polarity protected

### Mechanical

<b>Mounting</b>	Plug-in socket
<b>Termination</b>	Octal 8-pin plug-in or 11-pin plug-in
<b>Dimensions</b>	<b>H</b> 44.45 mm (1.75"); <b>W</b> 60.33 mm (2.38"); <b>D</b> (with socket) 104.78 mm (4.13")

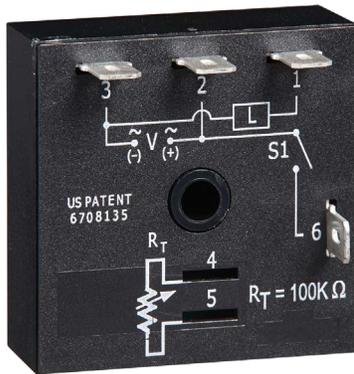
### Environmental

<b>Operating/Storage Temperature</b>	-20 °C to 65 °C/-30 °C to 85 °C
<b>Weight</b>	≈ 4 oz (113 g)
<b>Safety Marks</b>	
<b>UL (socket required)*</b>	4 oz (113 g)

\*UL Listed when used with Part Number OT08-PC, RB08-PC, OT11-PC, or RB11-PC manufactured by Custom Connector Corp.

**Note:** Manufacturer's recommended screw terminal torque for the OT series sockets is 12 in.-lbs.

**TSDS SERIES**



**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)**

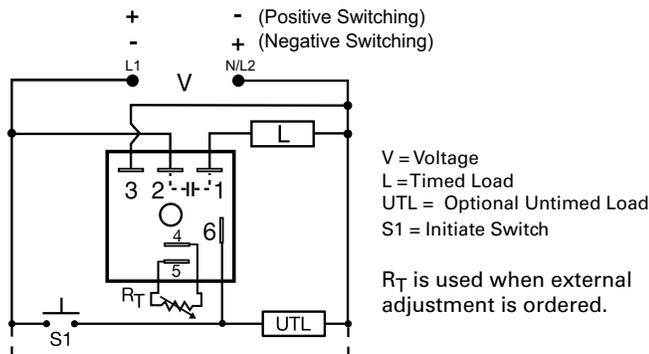
Input voltage must be applied before and during timing. Upon momentary or maintained closure of the initiate switch, the output energizes for a measured interval of time. At the end of the delay, the output de-energizes. Opening or reclosing the initiate switch during timing has no effect on the time 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**

FEATURES	BENEFITS
<b>Compact, low cost design measuring 2 in. (50.8mm) square</b>	Allows flexibility for OEM applications
<b>Microcontroller based</b>	Repeat Accuracy +/- 0.5%, Factory calibration +/- 1%
<b>1A Steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions.
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>Wide temperature range: -40° to 75°C</b>	Reliable in demanding commercial and industrial applications

**Wiring Diagram**



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

**Ordering Information**

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	SWITCHING MODE
TSDS2110S	24VAC	Fixed	10s	n/a
TSDS320N	24VDC	External	0.1 - 10s	Negative
TSDS321P	24VDC	External	1 - 100s	Positive
TSDS421	120VAC	External	1 - 100s	n/a

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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.

# TSDS SERIES

## 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.

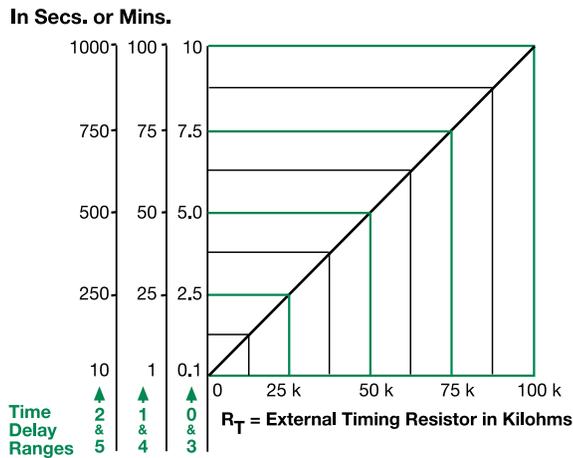


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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

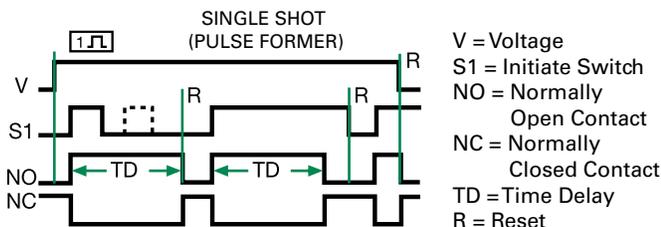


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the time delay increases.

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  $R_T$ .

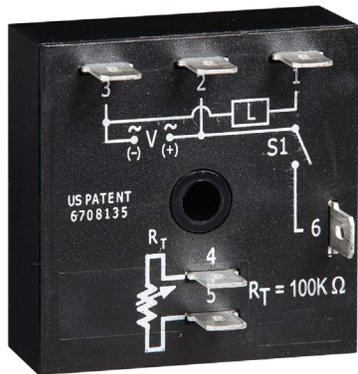
## Function Diagram



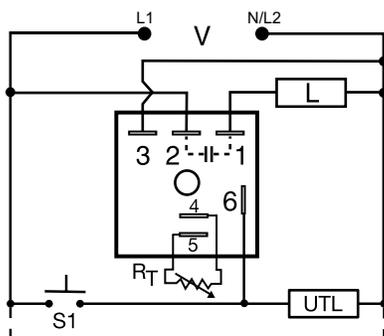
## Specifications

<b>Time Delay Range</b>	0.1s - 1000ms in 6 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ±1%
<b>Reset Time</b>	≤ 150ms
<b>Initiate Time</b>	≤ 20ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±2%
<b>Input Voltage</b>	12 or 24VDC; 24, 120, or 230VAC
<b>Tolerance</b>	±15%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 1W
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10%
<b>Output Type</b>	Solid state
<b>Form</b>	NO, closed during timing
<b>Maximum Load Current</b>	1A steady state, 10A inrush at 60°C
<b>Voltage Drop</b>	AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A
<b>Off State Leakage Current</b>	AC ≅ 5mA @ 230VAC; DC ≅ 1mA
<b>DC Operation</b>	Positive or negative switching
<b>Protection Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reverse polarity protected
<b>Mechanical Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2.0"); <b>W</b> 50.8 mm (2.0"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental Operating/Storage Temperature</b>	-40° to 75°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≅ 2.4 oz (68 g)

**TSS SERIES**



**Wiring Diagram**



V = Voltage  
S1 = Initiate Switch  
L = Timed Load  
UTL = Optional Untimed Load

RT is used when external adjustment is ordered.

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

**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  $\pm 5\%$  and the repeat accuracy is  $\pm 2\%$ . 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 effect 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**

FEATURES	BENEFITS
<b>Analog circuitry</b>	Repeat accuracy +/- 2%, Factory calibration +/- 5%
<b>Compact, low cost design</b>	Allows flexibility for OEM applications
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>Surface or DIN rail mounting</b>	Provides flexibility for installation

**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.

**12 Ordering Information**

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
TSS410.5	120VAC	Fixed	0.5s
TSS421	120VAC	External	0.05 - 3s
TSS422	120VAC	External	0.5 - 60s
TSS424	120VAC	External	5 - 600s
TSS622	230VAC	External	0.5 - 60s
TSS624	230VAC	External	5 - 600s

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.



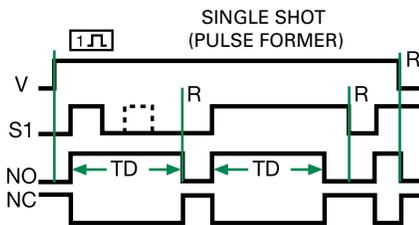
**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

## Selection Guide

RT Selection Chart				
Desired Time Delay*				RT
Seconds				
1	2	3	4	Kohms
0.05	0.5	2	5	0
0.3	6	20	60	10
0.6	12	38	120	20
0.9	18	55	180	30
1.2	24	73	240	40
1.5	30	90	300	50
1.8	36	108	360	60
2.1	42	126	420	70
2.4	48	144	480	80
2.7	54	162	540	90
3.0	60	180	600	100

\* 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

0.05s - 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

### Environmental

#### Operating/Storage

Temperature

- 40° to 75°C / - 40° to 85°C

#### Humidity

95% relative, non-condensing

#### Weight

≈ 2.4 oz (68 g)

**ERDI SERIES**



**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.

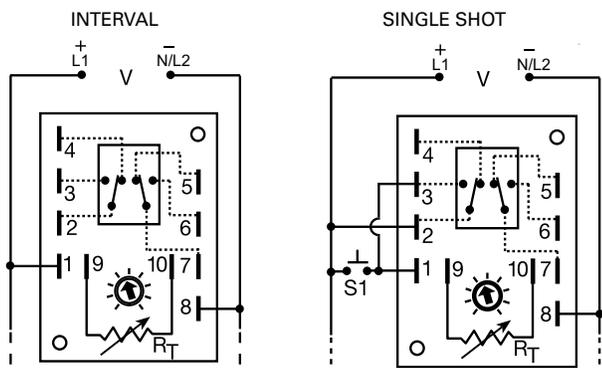
**Reset:** Removing input voltage resets the time delay and the output.

**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.

**Wiring Diagram**



2-3 & 7-6 are Normally Open Contacts (NO)  
2-4 & 7-5 are Normally Closed Contacts (NC)

**Features & Benefits**

FEATURES	BENEFITS
<b>Digital integrated circuitry</b>	Repeat Accuracy +/- 0.5%, Factory calibration +/- 10%
<b>Isolated, 10A, DPDT output contacts</b>	Allows control of loads for AC or DC voltages
<b>Encapsulated</b>	Protects against shock, vibration, and humidity

**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.

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TIME DELAY RELAYS

For dimensional drawing see: Appendix, page 512, Figure 25.

**Ordering Information**

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
ERDI436	120VAC	External	0.6 - 60s
ERDI6210	230VAC	Onboard	1 - 100m

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# ERDI SERIES

## Selection Guides

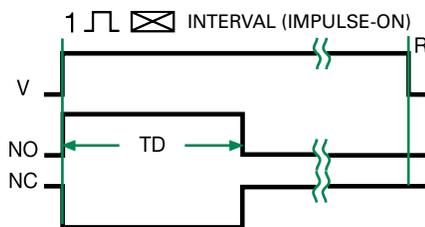
R <sub>T</sub> Selection Chart						
Desired Time Delay*						R <sub>T</sub> Megohm
Seconds						
1	2	3	4	5	6	
0.1	0.1	0.1	0.2	0.3	0.6	0.0
0.19	0.6	1	1.7	3	6	0.1
0.28	1.1	2	3.2	6	12	0.2
0.37	1.6	3	4.7	9	18	0.3
0.46	2.1	4	6.2	12	24	0.4
0.55	2.6	5	7.7	15	30	0.5
0.64	3.0	6	9.2	18	36	0.6
0.73	3.5	7	10.7	21	42	0.7
0.82	4.0	8	12.2	24	48	0.8
0.91	4.5	9	13.7	27	54	0.9
1.0	5.0	10	15	30	60	1.0

\* When selecting an external R<sub>T</sub> add at least 20% for tolerance of unit and the R<sub>T</sub>.

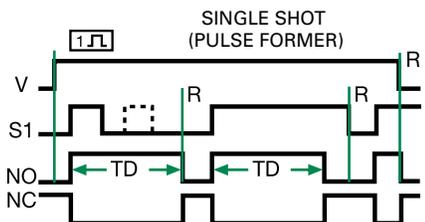
R <sub>T</sub> Selection Chart					
Desired Time Delay*					R <sub>T</sub> Megohm
Minutes					
7	8	9	10	11	
0.1	0.1	0.2	1	10	0.0
0.6	1	1.7	10	50	0.1
1.1	2	3.2	20	100	0.2
1.6	3	4.7	30	150	0.3
2.1	4	6.2	40	200	0.4
2.6	5	7.7	50	250	0.5
3.0	6	9.2	60	300	0.6
3.5	7	10.7	70	350	0.7
4.0	8	12.2	80	400	0.8
4.5	9	13.7	90	450	0.9
5.0	10	15	100	500	1.0

\* When selecting an external R<sub>T</sub> add at least 20% for tolerance of unit and the R<sub>T</sub>.

## Function Diagrams



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



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

## Specifications

### Time Delay

#### Type

Digital integrated circuitry  
0.1s - 500m in 11 adjustable ranges,  
0.1s - 1000m fixed

#### Range

#### 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

#### 12VDC & 24VDC/AC

-15% - 20%

#### 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

Mechanical - 1 x 10<sup>7</sup>; Electrical - 1 x 10<sup>6</sup>

#### Life

#### 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

-40° to 65°C / -40° to 85°C

#### Temperature

≈ 5.7 oz (162 g)

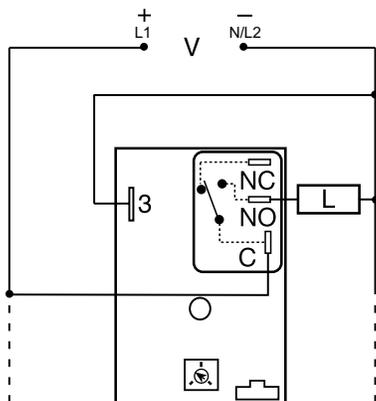
#### Weight

# HRDI SERIES

## Interval Timer



### Wiring Diagram



C = Common, Transfer Contact  
NO = Normally Open  
L = Load

NOTE: A knob, or terminals 4 & 5 are only included on adjustable units. R<sub>T</sub> is used when external adjustment is ordered. Relay contacts are not isolated.

For dimensional drawing see: Appendix, page 512, Figure 17.

### 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  $\pm 0.5\%$ . 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

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

### 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.

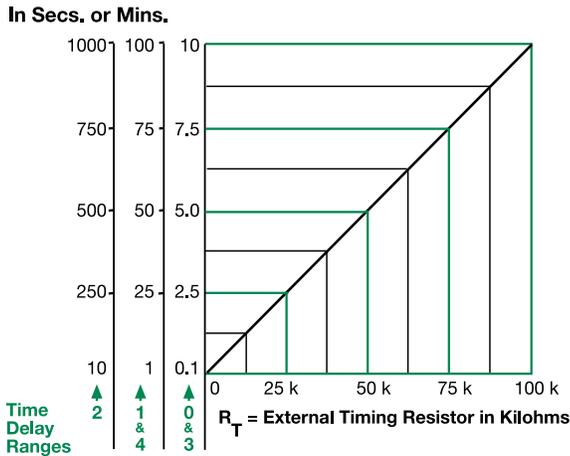
### Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
HRDI117S	12VDC	Fixed	7s
HRDI421	120VAC	Onboard	1 - 100s
HRDI422	120VAC	Onboard	10 - 1000s

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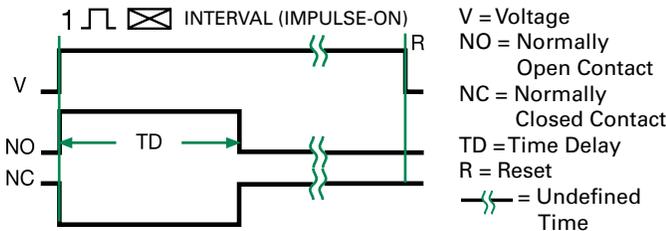
# HRDI SERIES

## 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<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



## Specifications

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

# KRDI SERIES



## Description

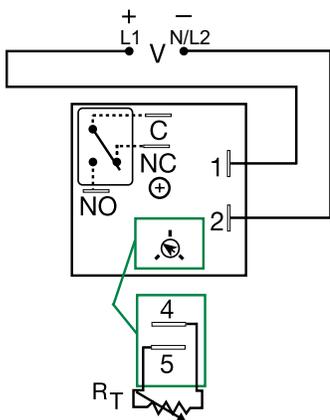
The KRDI Series is a compact time-delay relay measuring only 2 in. (50.8 mm) square. Its solid-state timing circuit provides excellent repeat accuracy and stability. Encapsulation protects against shock, vibration, and humidity. The KRDI Series is a cost effective approach for OEM applications that require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

## Wiring Diagram



V = Voltage  
C = Common, Transfer Contact  
NO = Normally Open  
NC = Normally Closed

A knob is supplied for adjustable units, or  $R_T$  terminals 4 & 5 for external adjust. See external adjustment vs time delay chart.

Relay contacts are isolated.

## Features & Benefits

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

## 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.

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

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
KRDI120	12VDC	Onboard knob	0.1 - 10s
KRDI121	12VDC	Onboard knob	1 - 100s
KRDI122	12VDC	Onboard knob	10 - 1000s
KRDI2110S	24VAC/VDC	Fixed	10s
KRDI2160S	24VAC/VDC	Fixed	60s
KRDI220	24VAC/VDC	Onboard knob	0.1 - 10s
KRDI320	24VDC	Onboard knob	0.1 - 10s
KRDI420	120VAC	Onboard knob	0.1 - 10s
KRDI424	120VAC	Onboard knob	1 - 100m

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12

TIME DELAY RELAYS

## KRDI SERIES

### Accessories

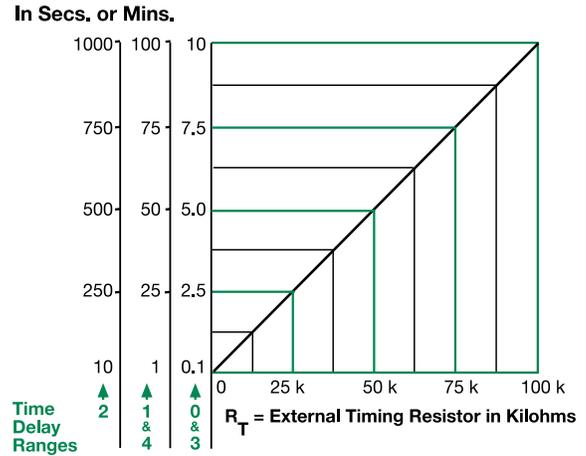
**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

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

### Specifications

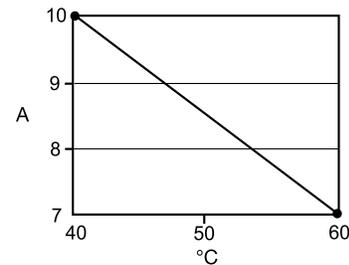
<b>Time Delay</b>	
<b>Range</b>	0.1s - 100m in 5 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater
<b>Tolerance</b>	
<b>(Factory Calibration)</b>	≤ ± 5%
<b>Reset Time</b>	≤ 150ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±5%
<b>Input</b>	
<b>Voltage</b>	12, 24 or 110VDC; 24, 120 or 230VAC
<b>Tolerance</b>	
<b>12VDC &amp; 24VDC/AC</b>	-15% - 20%
<b>110VDC, 120VAC or 230VAC</b>	-20% - 10%
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 2W
<b>Output</b>	
<b>Type</b>	Isolated relay contacts
<b>Form</b>	SPDT
<b>Rating (at 40°C)</b>	10A resistive @ 125VAC; 5A resistive @ 230VAC & 28VDC; 1/4 hp @ 125VAC
<b>Max. Switching Voltage</b>	250VAC
<b>Life (Operations)</b>	Mechanical - 1 x 10 <sup>7</sup> ; Electrical - 1 x 10 <sup>5</sup>
<b>Protection</b>	
<b>Circuitry</b>	Encapsulated
<b>Isolation Voltage</b>	≥ 1500V RMS input to output
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reverse polarity protected
<b>Mechanical</b>	
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-20° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≈ 2.6 oz (74 g)

### External Resistance vs. Time Delay

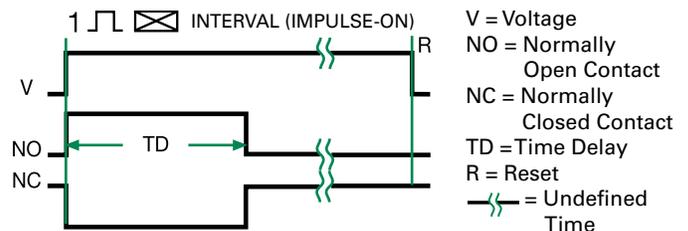


This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals; as the resistance increases the time delay increases. When selecting an external  $R_T$ , add the tolerances of the timer and the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

### Output Current/Ambient Temperature

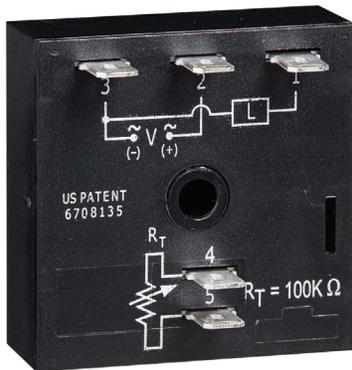


### Function Diagram

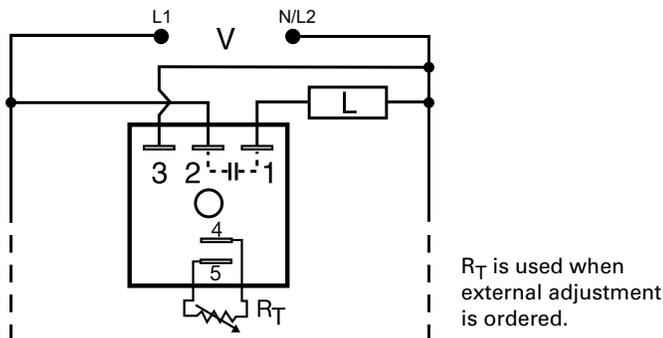


# KSD2 SERIES

## Interval Timer



### Wiring Diagram



### 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

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

### 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

MODEL	INPUT VOLTAGE VAC	ADJUSTMENT	TIME DELAY
KSD2221	24	External	1 - 100s
KSD2413M	120	Fixed	3m
KSD2420	120	External	0.1 - 10s

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

# KSD2 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.



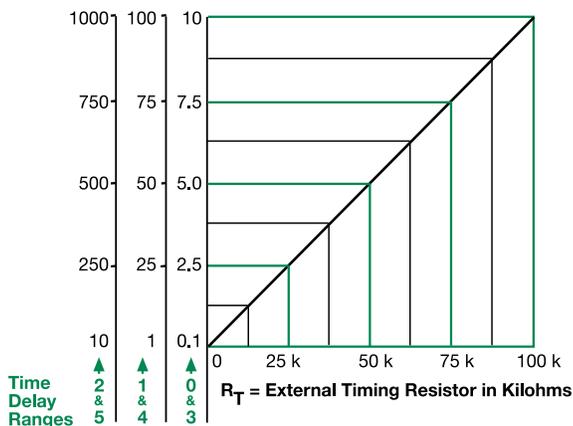
**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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

In Secs. or Mins.

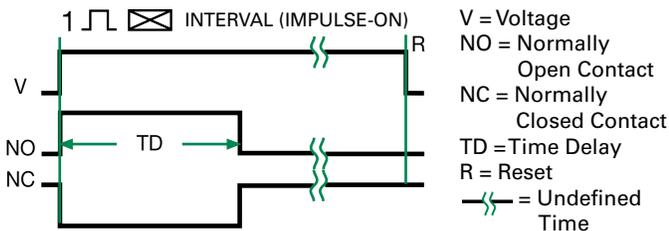


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the time delay increases.

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



## Specifications

<b>Time Delay Range</b>	0.1s - 1000m in 6 adjustable ranges or fixed
<b>Repeat Accuracy Tolerance (Factory Calibration)</b>	±0.5% or 20ms, whichever is greater
<b>Reset Time</b>	≤ ±5%
<b>Time Delay vs. Temperature &amp; Voltage</b>	≤ 150ms
<b>Input Voltage Tolerance</b>	≤ ±10%
<b>AC Line Frequency</b>	24, 120, or 230VAC
<b>Power Consumption</b>	±20%
<b>Output Type</b>	50/60 Hz
<b>Form</b>	≤ 2VA
<b>Maximum Load Current</b>	Solid state
<b>OFF State Leakage Current</b>	NO, closed during timing
<b>Voltage Drop</b>	1A steady state, 10A inrush at 60°C
<b>Protection</b>	≅ 5mA @ 230VAC
<b>Circuitry</b>	≅ 2.5V @ 1A
<b>Dielectric Breakdown</b>	Encapsulated
<b>Insulation Resistance</b>	≥ 2000V RMS terminals to mounting surface
<b>Mechanical</b>	≥ 100 MΩ
<b>Mounting Dimensions</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Termination</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Environmental</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≅ 2.4 oz (68 g)

# KSPU SERIES



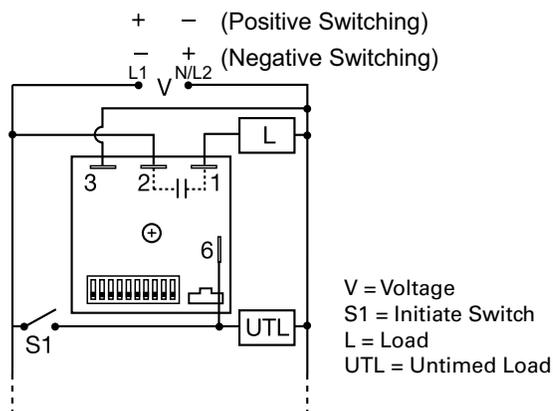
## Description

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

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy + / - 0.1%
<b>Compact design</b>	Allows flexibility for OEM applications
<b>1A steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions.
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity

## Wiring Diagram



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

## 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.

## Ordering Information

MODEL	INPUT VOLTAGE	TIME DELAY/COUNTS	FUNCTION
KSPUA2I	24 to 240VAC	1 - 1023s	Interval
KSPUA8C	24 to 240VAC	1 - 1023 counts (binary) with pulsed output	Counter with pulsed output

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## KSPU SERIES

### 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 ≅ 1 mA

**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")

0.25 in. (6.35 mm) male quick connect terminals

#### Termination

#### Environmental

#### Operating/Storage

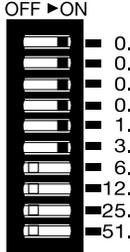
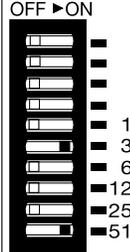
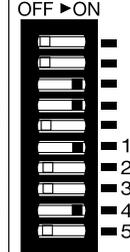
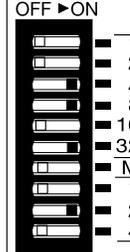
**Temperature** -40° to 60°C / -40° to 85°C

**Humidity** 95% relative, non-condensing

**Weight** ≅ 2.4 oz (68 g)

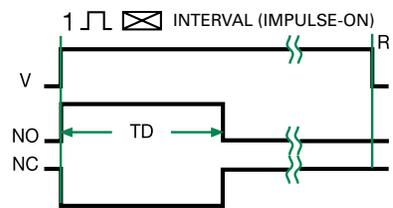
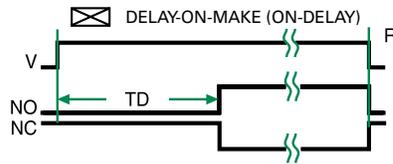
\*For CE approved applications, power must be removed from the unit when a switch position is changed.

### Adjustment Switch Operation

TIME DELAY		COUNTER	
0.1...102.3	1...1023	1...165	1...63
OFF ▶ ON	OFF ▶ ON	OFF ▶ ON	OFF ▶ ON
 0.1 0.2 0.4 0.8 1.6 3.2 6.4 12.8 25.6 51.2 6.3	 1 2 4 8 16 32 64 128 256 512 544	 1 2 3 4 5 10 20 30 40 50 57 counts	 1 2 4 8 16 32 M* 1 2 4 44 s Delay 2 counts to Start

\* for selecting time in minutes or seconds

### Function Diagrams

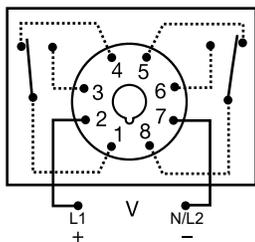


V = Voltage  
 NO = Normally Open Contact  
 NC = Normally Closed Contact  
 TD = Time Delay  
 R = Reset  
 = Undefined Time

# TDI / TDIH / TDIL SERIES



## Wiring Diagram



Relay contacts are isolated.

For dimensional drawing see: Appendix, page 512, Figure 23.

## Ordering Information

MODEL	INPUT VOLTAGE	TIME DELAY	LED
TDI120AL	120 V ac	1–1023 s in 1 s increments	Yes
TDI12D	12 V dc	1–1023 s in 1 s increments	No
TDIH24AL	24 V ac	10–10,230 s in 10 s increments	Yes
TDIL120AL	120 V ac	0.1–102.3 s in 0.1 s increments	Yes
TDIL24DL	24 V dc/28 V dc	0.1–102.3 s in 0.1 s increments	Yes

## Description

The TDI series is an interval timer that combines accurate digital circuitry with isolated, 10 A 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

FEATURES	BENEFITS
<b>Digital circuitry</b>	Repeat Accuracy + / - 0.1 %, Setting accuracy + / - 2 %
<b>Isolated, 10 A, DPDT output contacts</b>	Allows control of loads for ac or dc voltages
<b>DIP switch adjustment</b>	Provides first time setting accuracy
<b>Industry standard octal plug connection</b>	Eliminates need for special connectors
<b>LED indication (select models)</b>	Provides visual indication of timing and output status

## Accessories



### OT08PC 8-pin Octal Socket for UL listing\*

Octal Socket for plug-in units. 8-pin surface & DIN-rail mountable. Rated for 10 A @ 600 V ac.



### C103PM (AL) DIN Rail

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

## TDI / TDIH / TDIL SERIES

### Specifications

#### Time Delay

<b>Type</b>	Digital integrated circuitry
<b>Range</b>	0.1–102.3 s in 0.1 s increments 1–1023 s in 1 s increments 10–10,230 s in 10 s increments
<b>Repeat Accuracy</b>	±0.1 %
<b>Setting Accuracy</b>	±2 %
<b>Reset Time</b>	≤ 150 ms
<b>Time Delay vs Temp. &amp; Voltage</b>	±5 %
<b>Indicator</b>	LED glows during timing; relay is energized

#### Input

<b>Voltage</b>	12, 24 V dc; 24, 120 V ac
<b>Tolerance</b>	
<b>12 V dc &amp; 24 V dc/Ac</b>	-15 %–+20 %
<b>120 V ac</b>	-20 %–+10 %
<b>AC Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	≤ 3.25W

#### Output

<b>Type</b>	Electromechanical relay
<b>Form</b>	DPDT
<b>Rating</b>	10 A resistive @ 120/240 V ac; 1/3 hp @ 120/240 V ac
<b>Life</b>	Mechanical - 1 x 10 <sup>7</sup> ; Electrical - 1 x 10 <sup>6</sup>

#### Protection

<b>Polarity</b>	Dc units are reverse polarity protected
<b>Isolation Voltage</b>	≥ 1500 V RMS input to output

#### Mechanical

<b>Mounting</b>	Plug-in socket
<b>Dimensions</b>	<b>H</b> 44.45 mm (1.75"); <b>W</b> 60.33 mm (2.38"); <b>D</b> (with socket) 104.78 mm (4.13")
<b>Termination</b>	Octal 8-pin plug-in

#### Environmental

<b>Operating/Storage Temperature</b>	-20 °C to 65 °C / -30 °C to 85 °C
<b>Weight</b>	≈ 4 oz (113 g)

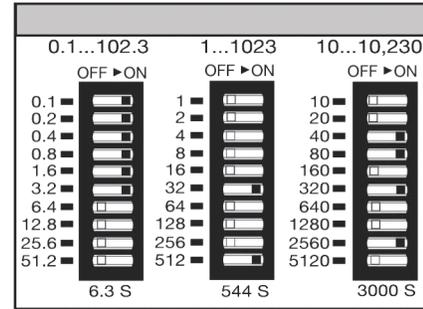
#### Safety Marks

<b>UL (socket required)*</b>	UL 508 (E57310)
------------------------------	-----------------

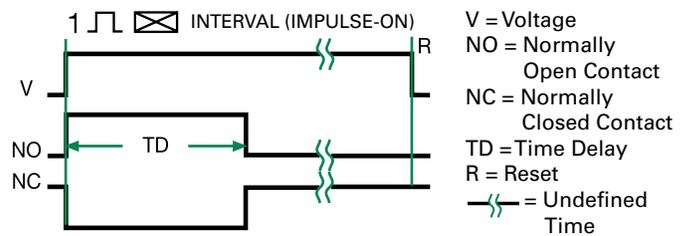
\*UL Listed when used with Part Number OT08-PC or RB08-PC manufactured by Custom Connector Corp.

**Note:** Manufacturer's recommended screw terminal torque for the OT Series sockets is 12 in-lbs.

### Digi-Set Binary Switch Operation



### Function Diagram



# TDUI / TDUIH / TDUIL SERIES



## Description

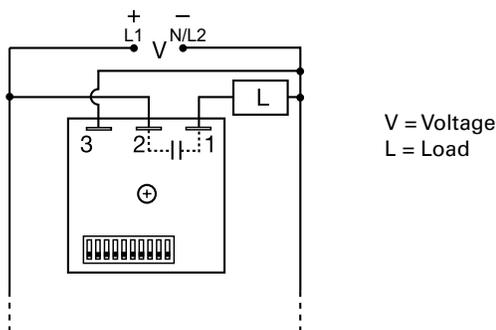
The TDUI Series combines digital timing circuitry with universal voltage operation. Voltages of 24 to 240VAC and 12 to 24VDC are available in three ranges. The TDUI Series offers DIP switch selectable time delays ranging from 0.1 seconds to 102.3 minutes in three ranges. Its 1A rated output, ability 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.

## Wiring Diagram



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

## Features & Benefits

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy +/- 0.5%, Setting accuracy +/- 2%
<b>Compact design</b>	Allows flexibility for OEM applications
<b>1A steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>Wide voltage ranges</b>	Flexibility to handle multiple voltages found in control systems and OEM applications
<b>DIP switch Adjustment</b>	Provides first time setting accuracy

## 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

MODEL	INPUT VOLTAGE	TIME DELAY
TDUI3000A	24 to 120VAC	1 - 102.3s
TDUIH3002A	12 to 24VDC	0.1 - 102.3m
TDUIL3001A	100 to 240VAC	0.1 - 102.3s
TDUIL3002A	12 to 24VDC	0.1 - 102.3s

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# TDUI / TDUIH / TDUIL SERIES

## Specifications

### Time Delay

<b>Range*</b>	0.1 - 102.3s in 0.1s increments 1 - 1023s in 1s increments 0.1 - 102.3m in 0.1m increments
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater
<b>Setting Accuracy</b>	≤ ±2% or 20ms, whichever is greater
<b>Reset Time</b>	≤ 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

**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")

0.25 in. (6.35 mm) male quick connect terminals

### Environmental

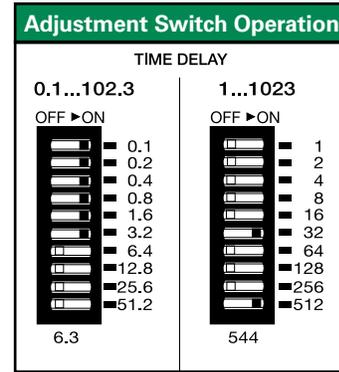
**Operating/Storage Temperature** -40° to 60°C / -40° to 85°C

**Humidity** 95% relative, non-condensing

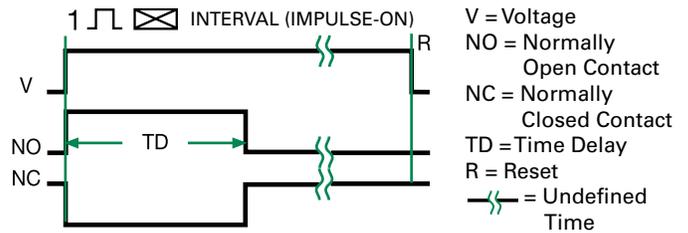
**Weight** ≅ 2.4 oz (68 g)

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

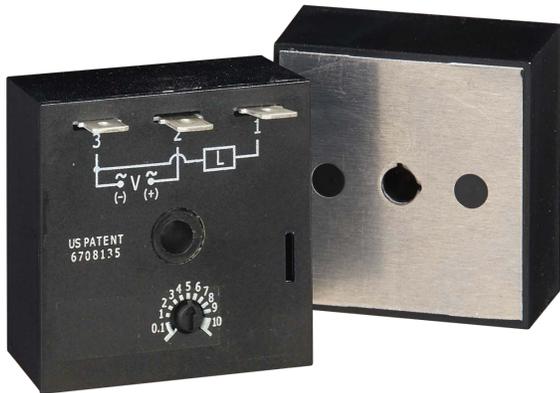
## Switch Operation



## Function Diagram



**THD2 SERIES**



**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)**

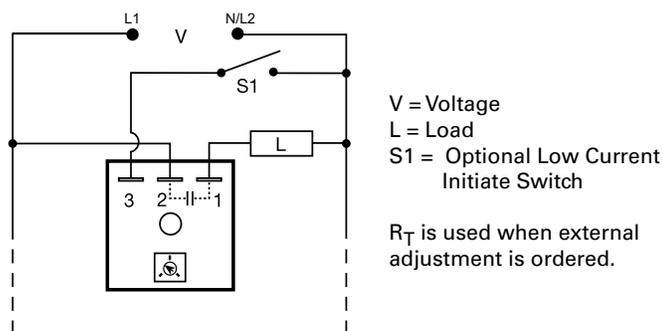
Upon application of input voltage, the time delay begins. The output energizes during the time delay. At the end of the time delay, the output de-energizes and remains de-energized until input voltage is removed.

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

**Features & Benefits**

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

**Wiring Diagram**



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

**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**

MODEL	OUTPUT RATING	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
THD2C420	20A	120VAC	External	0.1 - 10s
THD2C423	20A	120VAC	External	0.1 - 10m
THD2C433	20A	120VAC	Onboard	0.1 - 10m
THD2C620	20A	230VAC	External	0.1 - 10s
THD2C633	20A	230VAC	Onboard	0.1 - 10m

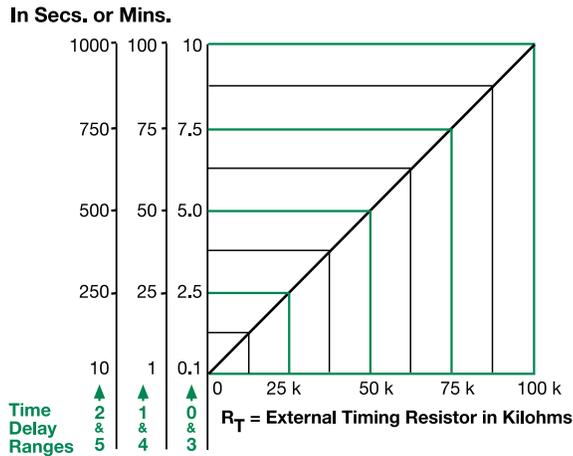
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12

TIME DELAY RELAYS

# THD2 SERIES

## External Resistance vs. Time Delay

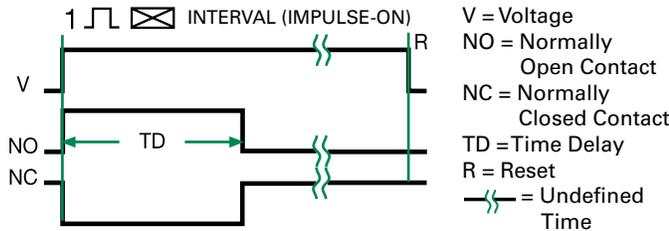


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the time delay increases.

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

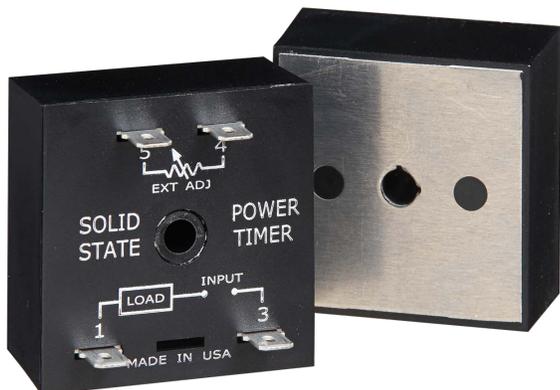


## Specifications

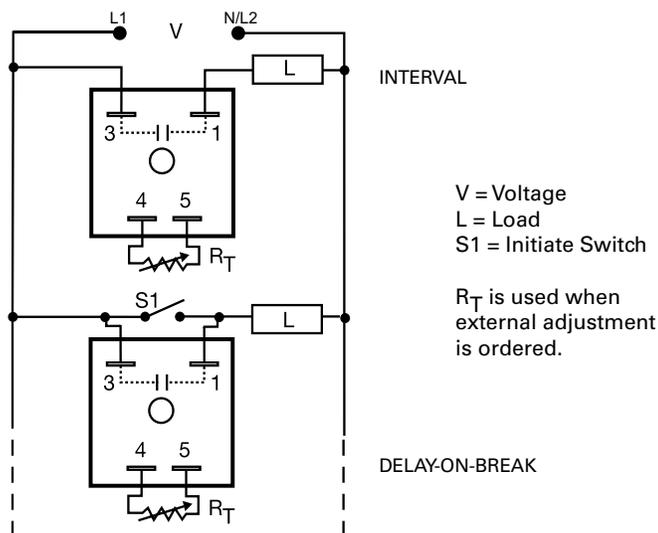
<b>Time Delay Range</b>	0.1s - 1000ms in 6 adjustable ranges or fixed		
<b>Repeat Accuracy Tolerance (Factory Calibration)</b>	±0.5% or 20ms, whichever is greater		
<b>Reset Time</b>	≤ 150ms		
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±2%		
<b>Input Voltage Tolerance</b>	24, 120, or 230VAC ±20%		
<b>AC Line Frequency</b>	50/60 Hz		
<b>Output Type</b>	Solid state		
<b>Form</b>	NO, closed during timing		
<b>Maximum Load Current</b>	<b>Output</b>	<b>Steady State</b>	<b>Inrush**</b>
	A	6A	60A
	B	10A	100A
	C	20A	200A
<b>Minimum Load Current</b>	10mA		
<b>Voltage Drop</b>	≈ 2.5V at rated current		
<b>OFF State Leakage Current</b>	≈ 5mA @ 230VAC		
<b>Protection Circuitry</b>	Encapsulated		
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface		
<b>Insulation Resistance</b>	≥ 100 MΩ		
<b>Mechanical Mounting**</b>	Surface mount with one #10 (M5 x 0.8) screw		
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 38.4 mm (1.51")		
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals		
<b>Environmental Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C		
<b>Humidity</b>	95% relative, non-condensing		
<b>Weight</b>	≈ 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.

**THD7 SERIES**



**Wiring Diagram**



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

**Ordering Information**

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	OUTPUT RATING
THD7421A	120VAC	External	1 - 100s	6A
THD7621C	230VAC	External	1 - 100s	20A

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**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**

FEATURES	BENEFITS
<b>Digital integrated circuitry</b>	Repeat Accuracy +/- 0.5%
<b>High load currents up to 20A, 200A inrush</b>	Allows direct operation of motors, lamps and heaters without a contactor
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration and humidity
<b>Metalized mounting surface</b>	Facilitates heat transfer in high current applications
<b>Compact, low cost design</b>	Allows flexibility for OEM applications and reduces labor and component costs

**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.

12 TIME DELAY RELAYS

# THD7 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.



**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**

Time Delay	VTP P/N
1 - 1-100s	VTP5G
2 - 10-1000s	VTP5K
3 - 0.1-10m	VTP5N
4 - 1-100m	VTP5P
5 - 10-1000m	VTP5R

## Selection Guide

RT Selection Chart					
Desired Time Delay*					RT
Seconds		Minutes			
1	2	3	4	5	Megohm
1	10	0.1	1	10	0.0
10	100	1	10	100	0.5
20	200	2	20	200	1.0
30	300	3	30	300	1.5
40	400	4	40	400	2.0
50	500	5	50	500	2.5
60	600	6	60	600	3.0
70	700	7	70	700	3.5
80	800	8	80	800	4.0
90	900	9	90	900	4.5
100	1000	10	100	1000	5.0

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

## Specifications

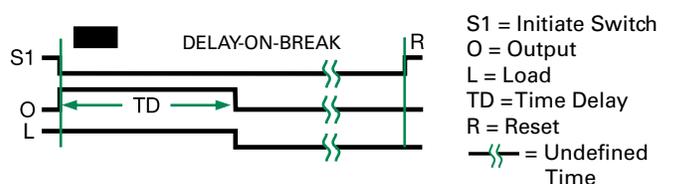
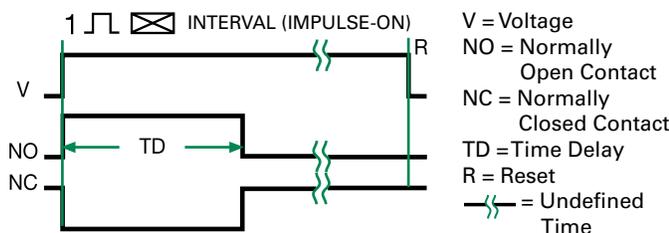
<b>Time Delay Type</b>	Digital integrated circuitry		
<b>Range</b>	1s - 1000m in 5 adjustable ranges or fixed		
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater		
<b>Tolerance (Factory Calibration)</b>	≤ ±10%		
<b>Recycle Time</b>	After timing: ≤150ms; During timing: ≤ 350ms		
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±2%		
<b>Input Voltage</b>	24, 120, or 230VAC		
<b>Tolerance</b>	±20%		
<b>AC Line Frequency</b>	50/60 Hz		
<b>Output Type</b>	Solid state		
<b>Form</b>	NO, closed during timing		
<b>Rating</b>	<b>Output</b>	<b>Steady State</b>	<b>Inrush**</b>
	A	6A	60A
	B	10A	100A
	C	20A	200A

<b>Effective Voltage Drop (VLine-VLoad)</b>	<b>Input</b>	<b>Effective Drop</b>
	24VAC	≤ 3V
	120VAC	≤ 3V
	230VAC	≤ 5V
<b>Minimum Load Current</b>	100mA	

<b>Protection</b>	Encapsulated
<b>Circuitry</b>	≥ 2000V RMS terminals to mounting surface
<b>Dielectric Breakdown Insulation Resistance</b>	≥ 100 MΩ
<b>Mechanical</b>	
<b>Mounting **</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 38.4 mm (1.51")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≈ 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



# TS2 / TS6 SERIES



TS2



TS6

## Description

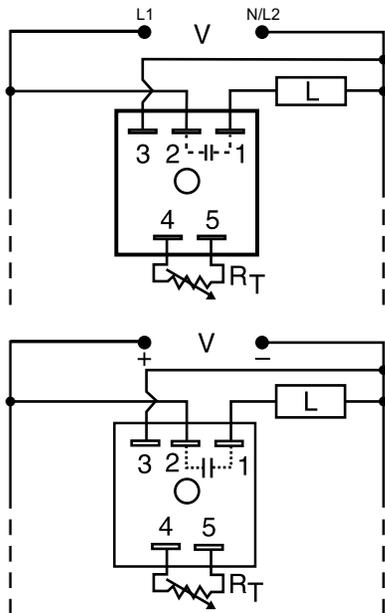
The TS2 Series is designed for 24, 120 or 230VAC and the TS6 Series is designed for 12 or 24VDC. These series are capable of controlling load currents of up to 1A steady state, 10A inrush. Encapsulated circuitry and the reliability of a  $\pm 2\%$  repeat accuracy make the TS2 and TS6 ideal for cost 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.

## Wiring Diagram



V = Voltage  
L = Load

$R_T$  is used when external adjustment is ordered.

Note: TS6 is not reverse polarity protected.

## Features & Benefits

FEATURES	BENEFITS
<b>Analog circuitry</b>	Repeat accuracy $\pm 2\%$ , Factory calibration $\pm 10\%$
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>1A steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions
<b>Rated for operation up to 75°C</b>	Can be used in the harshest environments

## 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.

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

## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	SWITCHING MODE	MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	SWITCHING MODE
TS22120	24VAC	Fixed	20s	n/a	TS2424	120VAC	External	5 - 600s	n/a
TS2223	24VAC	External	2 - 180s	n/a	TS6116P	12VDC	Fixed	6s	Positive
TS2412	120VAC	Fixed	2s	n/a	TS6122P	12VDC	External	0.5 - 20s	Positive
TS24130	120VAC	Fixed	30s	n/a	TS6123P	12VDC	External	2 - 60s	Positive
TS2421	120VAC	External	0.05 - 3s	n/a	TS6321P	24VDC	External	0.05 - 3s	Positive
TS2422	120VAC	External	0.5 - 60s	n/a	TS6323P	24VDC	External	2 - 180s	Positive
TS2423	120VAC	External	2 - 180s	n/a					

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# TS2 / TS6 SERIES

## 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.

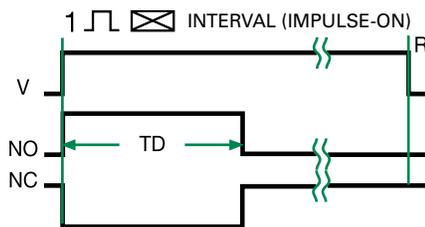
**Selection Table for VTP Plug-on Adjustment Accessory**

TS6 12VDC			
Time Delay	VTP P/N	Versa-Pot (potentiometer)	
		Fig. A P/N	Fig. B P/N
1 - 0.05-1s	VTP2A	P1004-16	P1004-16-X
2 - 0.5-20s	VTP2E	P1004-16	P1004-16-X
3 - 2-60s	VTP2F	P1004-16	P1004-16-X
4 - 5-120s	VTP2H	P1004-16	P1004-16-X

TS2 & TS6 All Other Voltages			
Time Delay	VTP P/N	Versa-Pot (potentiometer)	
		Fig. A P/N	Fig. B P/N
1 - 0.05-3s	VTP4B	P1004-12	P1004-12-X
2 - 0.5-60s	VTP4F	P1004-12	P1004-12-X
3 - 2-180s	VTP4J	P1004-12	P1004-12-X
4 - 5-600s	VTP5N	P1004-13	P1004-13-X

## Function Diagram



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

## Selection Guide

RT Selection Chart				
Desired Time Delay*				RT
Seconds				
1	2	3	4	Megohm
0.05	0.5	2	5	0.0
0.5	10	30	60	0.5
1.0	20	60	120	1.0
▼ 24VDC or AC ONLY† ▼				
1.5	30	90	180	1.5
2.0	40	120	240	2.0
2.5	50	150	300	2.5
3.0	60	180	360	3.0
			420	3.5
			480	4.0
			540	4.5
			600	5.0

\* When selecting an external RT add to least 20% for tolerance of unit and the RT.  
† 1 Megohm max for 12 VDC Units

## Specifications

### Time Delay

**Type**

Analog circuitry

**Range**

**12VDC**

0.05 - 120s in 4 adjustable ranges or fixed (1 MΩ max. RT)

**Other Voltages**

0.05 - 600s in 4 adjustable ranges or fixed ±2% or 20ms, whichever is greater

**Repeat Accuracy**

**Tolerance**

≤ ±10%

**(Factory Calibration)**

**Time Delay vs Temp. & Voltage**

≤ ±10%

**Reset Time**

≤ 150ms

**Input**

**Voltage**

12 or 24VDC; 24 or 20VAC

**Tolerance**

±15%

**DC Ripple**

10%

**Power Consumption**

DC ≤ 1W; AC ≤ 2VA

**Output**

**Type**

Solid state

**Form**

NO, closed during timing

**Maximum Load Current**

1A steady state, 10A inrush at 60°C

**Voltage Drop**

DC ≈ 1.0V @ 1A; AC ≈ 2.5V @ 1A

**Protection**

**Circuitry**

Encapsulated

**Polarity**

TS6 is not reverse polarity protected

**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")

0.25 in. (6.35 mm) male quick connect terminals

**Termination**

**Environmental**

**Operating/Storage**

**Temperature**

-40° to 75°C / -40° to 85°C

**Humidity**

95% relative, non-condensing

**Weight**

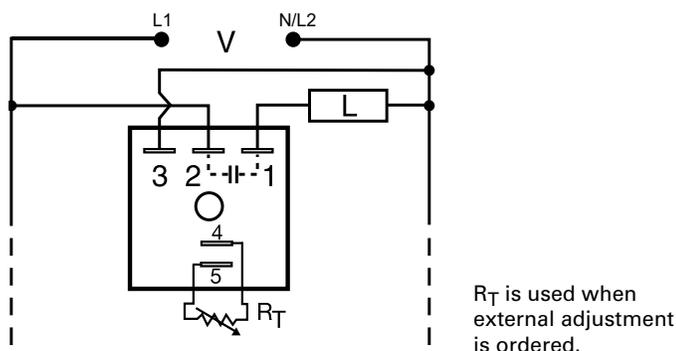
≈ 2.4 oz (68 g)

# TSD2 SERIES

## Interval Timer



### Wiring Diagram



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

### 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

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

### 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

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
TSD2411S	120VAC	Fixed	1s
TSD24145S	120VAC	Fixed	45s
TSD241600S	120VAC	Fixed	600s
TSD2434	120VAC	Onboard	1 - 100m

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# TSD2 SERIES

## Accessories

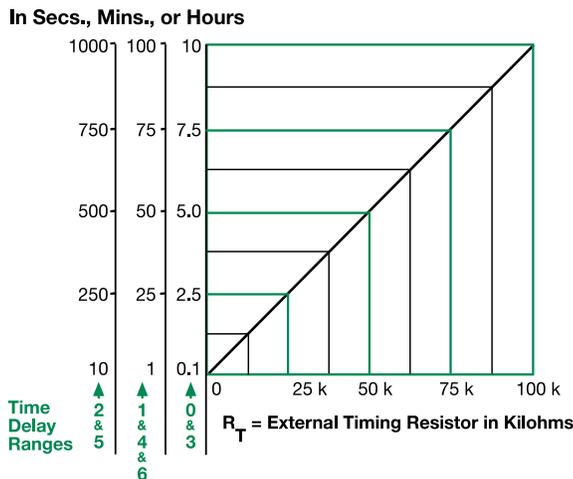


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



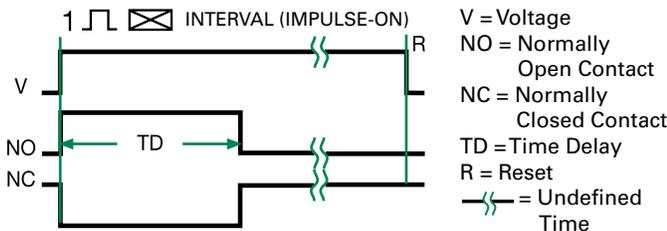
**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

## External Resistance vs. Time Delay



**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



## Specifications

<b>Time Delay</b>	
<b>Range</b>	0.1s - 100h in 7 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.1% or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ±1%
<b>Reset Time</b>	≤ 150ms
<b>Time Delay vs. Temperature &amp; Voltage</b>	≤ ±1%
<b>Input Voltage</b>	24, 120, or 230VAC
<b>Tolerance</b>	±20%
<b>AC Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	≤ 2VA
<b>Output Type</b>	Solid state
<b>Form</b>	NO, closed during timing
<b>Maximum Load Current</b>	1A steady state, 10A inrush at 60°C
<b>Off State Leakage Current</b>	≅ 5mA @ 230VAC
<b>Voltage Drop</b>	≅ 2.5V @ 1A
<b>Protection Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Mechanical Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental Operating/Storage Temperature</b>	-40° to 75°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≅ 2.4 oz (68 g)

# TSD6 SERIES

## Interval Timer



### Description

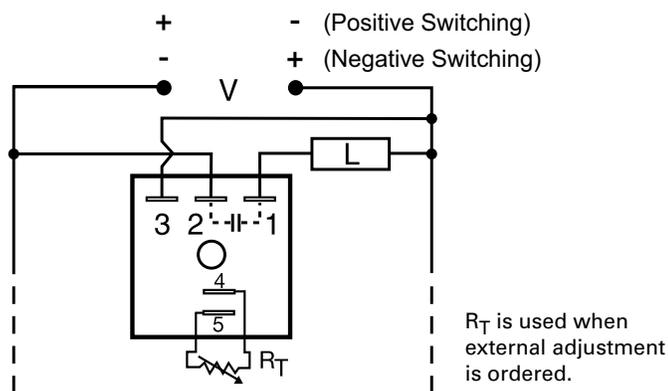
The TSD6 Series offers total solid-state, interval timing for 12 or 24VDC applications. This series provides either negative or positive switching. The TSD6 Series is designed for more demanding commercial and industrial applications where small size and accurate performance is required. The factory 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.

### Wiring Diagram



### Features & Benefits

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

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.

### Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	SWITCHING MODE
TSD6113SP	12VDC	Fixed	3s	Positive
TSD6115SP	12VDC	Fixed	15s	Positive
TSD6113SN	12VDC	Fixed	3s	Negative
TSD6310.8SN	24VDC	Fixed	0.8s	Negative
TSD631380SP	24VDC	Fixed	380s	Positive
TSD6320P	24VDC	External	0.1 - 10s	Positive

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## TSD6 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.



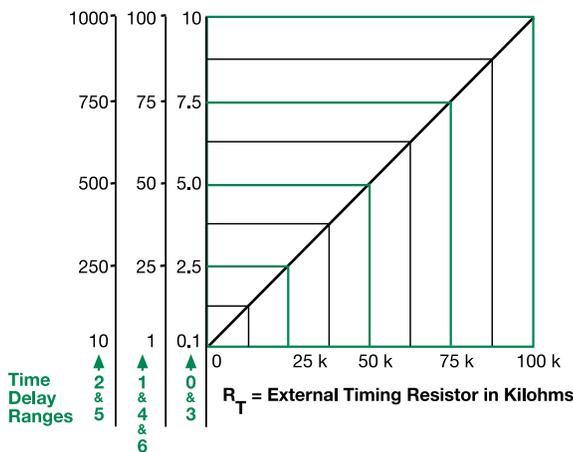
**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



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

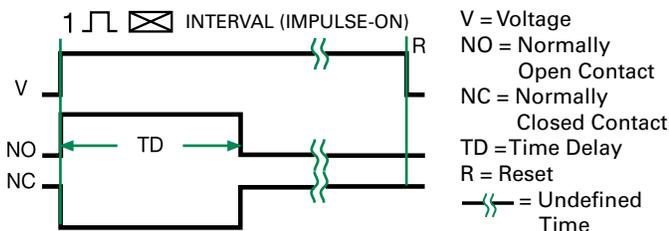
### External Resistance vs. Time Delay

In Secs., Mins., or Hours



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



### Specifications

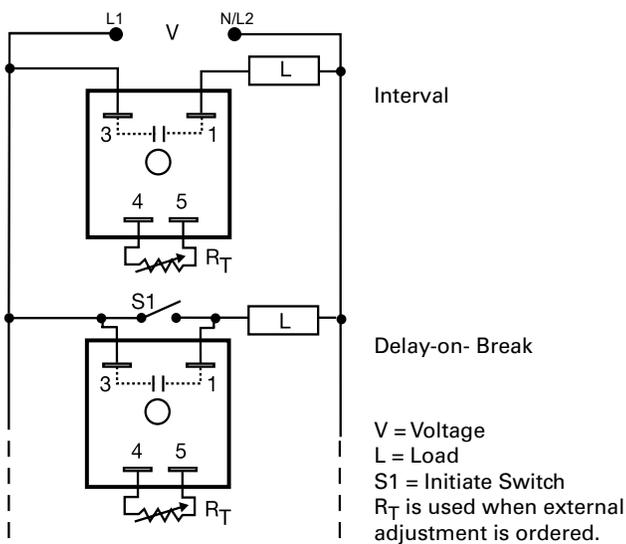
<b>Time Delay</b>	
<b>Range</b>	0.1s - 100h in 7 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.1% or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ±1%
<b>Reset Time</b>	≤ 150ms
<b>Time Delay vs. Temperature &amp; Voltage</b>	≤ ±1%
<b>Input Voltage</b>	12 or 24VDC
<b>Tolerance</b>	±15%
<b>DC Ripple</b>	±10%
<b>Power Consumption</b>	≤ 1W
<b>Output Type</b>	Solid state, positive or negative switching
<b>Form</b>	NO, closed during timing
<b>Maximum Load Current</b>	1A steady state, 10A inrush at 60°C
<b>Off State Leakage Current</b>	≅ 1mA
<b>Voltage Drop</b>	≅ 1.0V @ 1A
<b>Protection Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	Units are reverse polarity protected
<b>Mechanical Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental Operating/Storage Temperature</b>	-40° to 75°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≅ 2.4 oz (68 g)

# TSD7 SERIES

## Interval/Delay-on-Break Timer



### Wiring Diagram



### 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

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy +/- 0.5%, +/- 1% time delay accuracy
<b>Extended temperature range</b>	Rated to 75°C operating temperature to withstand high heat applications
<b>Compact, low cost design</b>	Allows flexibility for OEM applications
<b>1A steady solid-state output, 10A inrush</b>	Provides 100 million operations in typical conditions.
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>Two terminal series load connections</b>	Provides quick and easy installation for new or existing systems

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

### Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
TSD7412S	120VAC	Fixed	2s	TSD761120S	230VAC	Fixed	120s
TSD7414M	120VAC	Fixed	4m	TSD761180S	230VAC	Fixed	180s
TSD7421	120VAC	External	1 - 100s	TSD7611S	230VAC	Fixed	1s
TSD7423	120VAC	External	0.1 - 10m	TSD7621	230VAC	External	1 - 100s
TSD7424	120VAC	External	1 - 100m				

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## 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 0.25W at 55°C. Available in resistance values from 5KΩ to 5MΩ.

Selection Table for VTP Plug-on Adjustment Accessory

Time Delay	VTP P/N	Time Delay	VTP P/N
1 - 1-100s	VTP5G	4 - 1-100m	VTP5P
2 - 10-1000s	VTP5K	5 - 10-1000m	VTP5R
3 - 0.1-10m	VTP5N		

### Selection Guide

RT Selection Chart					
Desired Time Delay*					RT
Seconds		Minutes			
1	2	3	4	5	Megohm
1	10	0.1	1	10	0.0
10	100	1	10	100	0.5
20	200	2	20	200	1.0
30	300	3	30	300	1.5
40	400	4	40	400	2.0
50	500	5	50	500	2.5
60	600	6	60	600	3.0
70	700	7	70	700	3.5
80	800	8	80	800	4.0
90	900	9	90	900	4.5
100	1000	10	100	1000	5.0

\* When selecting an external RT add at least 20% for tolerance of 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** ≤ 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	Effective Drop
24VAC	3V
120VAC	4V
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

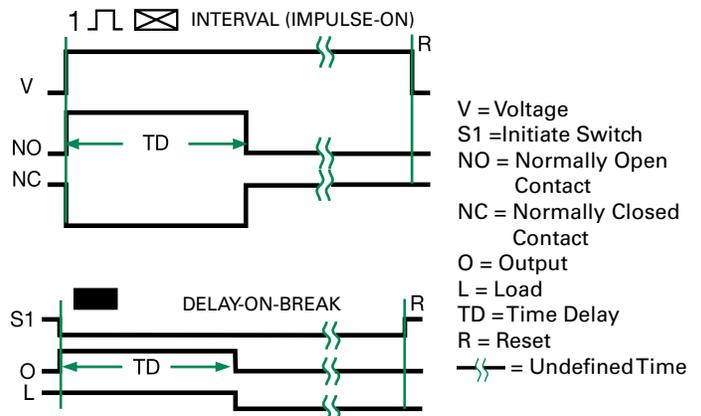
##### Humidity

95% relative, non-condensing

##### Weight

≈ 2.4 oz (68 g)

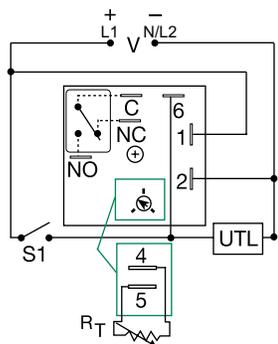
### Function Diagrams



### KRD9 SERIES



### Wiring Diagram



V = Voltage  
S1 = Initiate Switch C = Common, Transfer Contact  
UTL = Untimed Load (optional)

A knob is supplied for adjustable units, or  $R_T$  terminals 4 & 5 for external adjust. See external adjustment vs time delay chart. The untimed load is optional. Relay contacts are isolated.

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

### 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

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy +/- 0.5%, Factory calibration +/- 5%
<b>Compact, low cost design</b>	Allows flexibility for OEM applications and reduces labor and component costs
<b>Isolated, 10A, SPDT output contacts</b>	Allows control of loads for AC or DC voltages
<b>Encapsulated circuitry</b>	Protects against shock, vibration, and humidity

### 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

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	FUNCTION TYPE
KRD9120B	12VDC	Onboard	0.1 - 10s	Energized
KRD92115MA	24VAC/DC	Fixed	15m	De-energized
KRD92115MB	24VAC/DC	Fixed	15m	Energized
KRD9220B	24VAC/DC	Onboard	0.1 - 10s	Energized
KRD93115MA	24VDC	Fixed	15m	De-energized
KRD9423B	120VAC	Onboard	0.1 - 10m	Energized

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## 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.

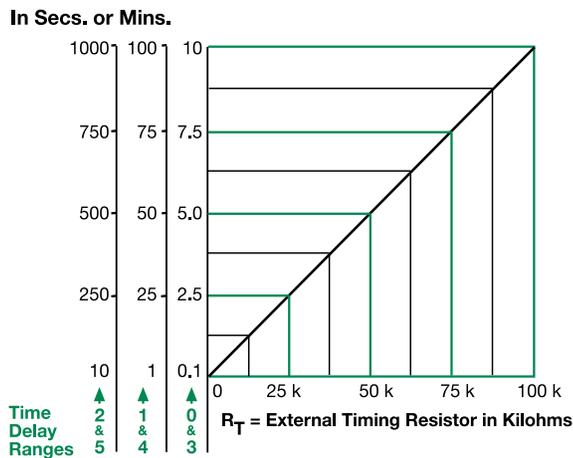


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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

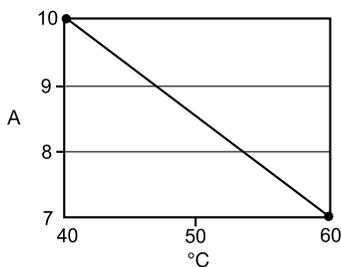


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the time delay increases.

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  $R_T$ .

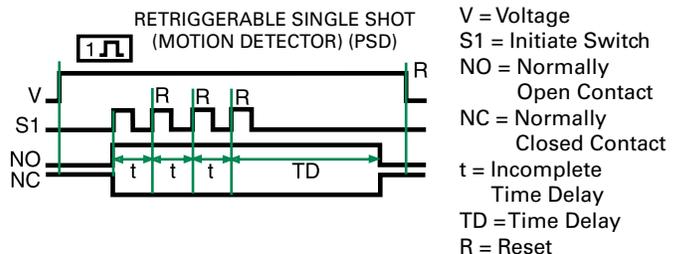
### Output Current/Ambient Temperature



### Specifications

<b>Time Delay</b>	Microcontroller based with watchdog circuitry
<b>Type</b>	0.1s - 1000m in 6 adjustable ranges or fixed
<b>Range</b>	±0.5% or 20ms, whichever is greater
<b>Repeat Accuracy</b>	
<b>Tolerance</b>	
<b>(Factory Calibration)</b>	≤ ±5%
<b>Reset Time</b>	≤ 150ms
<b>Initiate Time</b>	≤ 40ms; ≤ 750 operations per minute
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±5%
<b>Input</b>	
<b>Voltage</b>	12, 24 or 110VDC; 24, 120 or 230VAC
<b>Tolerance</b>	
<b>12VDC &amp; 24VDC/AC</b>	-15% - +20%
<b>110VDC, 120 or 230VAC</b>	-20% - +10%
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 2W
<b>Output</b>	
<b>Type</b>	Isolated relay contacts
<b>Form</b>	SPDT
<b>Rating (at 40°C)</b>	10A resistive @ 125VAC; 5A resistive @ 230VAC & 28VDC; 1/4 hp @ 125VAC 250VAC
<b>Max. Switching Voltage</b>	250VAC
<b>Life (Operations)</b>	Mechanical - 1 x 10 <sup>7</sup> ; Electrical - 1 x 10 <sup>5</sup>
<b>Protection</b>	
<b>Circuitry</b>	Encapsulated
<b>Isolation Voltage</b>	≥ 1500V RMS input to output
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reversed polarity protected
<b>Mechanical</b>	
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2.0"); <b>W</b> 50.8 mm (2.0"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental</b>	
<b>Operating/Storage</b>	
<b>Temperature</b>	-40° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≈ 2.6 oz (74 g)

### Function Diagram

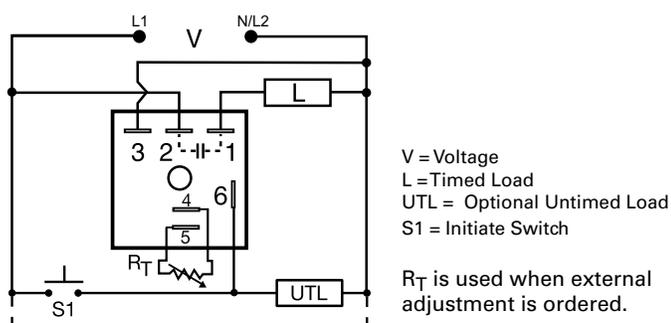


# TSD94110SB

## Retriggerable Single-Shot Timer



### Wiring Diagram



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

### 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

<b>Type</b>	Microcontroller circuitry
<b>Range</b>	Factory fixed 10s
<b>Repeat Accuracy</b>	±0.5%
<b>Tolerance</b>	
<b>(Factory Calibration)</b>	±1%
<b>Recycle Time</b>	300ms max.
<b>Time Delay vs. Temp. &amp; Voltage</b>	±2%
<b>Initiate Timing</b>	16ms max. AC
<b>Input</b>	
<b>Operating Voltage</b>	120 volts AC
<b>Tolerance</b>	±15%
<b>Output</b>	
<b>Type</b>	Solid State
<b>Form</b>	Normally open
<b>Rating</b>	1 ampere steady state, 10 amperes inrush at 55°C
<b>Voltage Drop</b>	AC 2.5 volts typical at 1 ampere
<b>Protection</b>	
<b>Transient</b>	Protected
<b>Dielectric</b>	1500 volts RMS
<b>Insulation Resistance</b>	100 megohms minimum 4.4

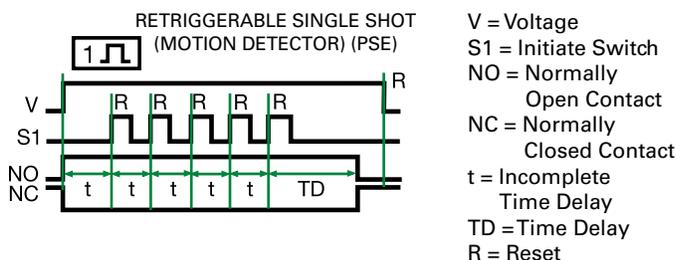
### Mechanical

<b>Mounting</b>	Surface mount with one #8 or #10 screw
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Package</b>	Molded housing with encapsulated circuitry
<b>Dimensions</b>	<b>H</b> 50.80 mm (2.00"); <b>W</b> 50.80 mm (2.00"); <b>D</b> 30.70 mm (1.21")

### Environmental

<b>Operating/Storage Temperature</b>	-40°C to 60°C / -40°C to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	Approx. 2.4 oz (68 g)

### Function Diagram



# ERD3425A



## 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 - ONTime First)

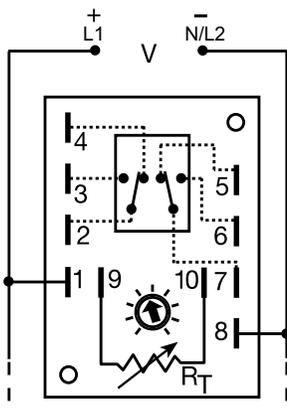
Upon application of input voltage, the output relay energizes and the T1 ON time begins. At the end of the ON time, the output de-energizes and the T2 OFF time begins. At the end of the OFF time, the output relay energizes and the cycle repeats as long as input voltage is applied.

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

## Features & Benefits

FEATURES	BENEFITS
<b>Digital integrated circuitry</b>	Repeat Accuracy +/- 0.5%, Factory calibration +/- 10%
<b>Isolated, 10A, DPDT output contacts</b>	Allows control of loads for AC or DC voltages
<b>Encapsulated</b>	Protects against shock, vibration, and humidity

## 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.

## 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.

# ERD3425A

## Selection Guides

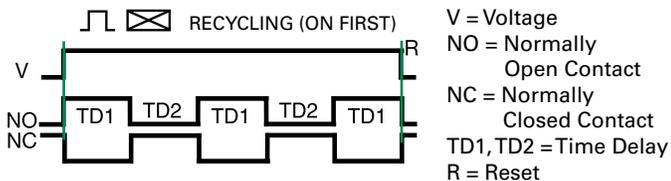
RT Selection Chart						
Desired Time Delay*						RT Megohm
Seconds						
1	2	3	4	5	6	
0.1	0.1	0.1	0.2	0.3	0.6	0.0
0.19	0.6	1	1.7	3	6	0.1
0.28	1.1	2	3.2	6	12	0.2
0.37	1.6	3	4.7	9	18	0.3
0.46	2.1	4	6.2	12	24	0.4
0.55	2.6	5	7.7	15	30	0.5
0.64	3.0	6	9.2	18	36	0.6
0.73	3.5	7	10.7	21	42	0.7
0.82	4.0	8	12.2	24	48	0.8
0.91	4.5	9	13.7	27	54	0.9
1.0	5.0	10	15	30	60	1.0

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

RT Selection Chart					
Desired Time Delay*					RT Megohm
Minutes					
7	8	9	10	11	
0.1	0.1	0.2	1	10	0.0
0.6	1	1.7	10	50	0.1
1.1	2	3.2	20	100	0.2
1.6	3	4.7	30	150	0.3
2.1	4	6.2	40	200	0.4
2.6	5	7.7	50	250	0.5
3.0	6	9.2	60	300	0.6
3.5	7	10.7	70	350	0.7
4.0	8	12.2	80	400	0.8
4.5	9	13.7	90	450	0.9
5.0	10	15	100	500	1.0

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

## Function Diagram



## 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

≤ ±10%

#### (Factory Calibration)

#### Reset Time

≤ 150ms

#### Time Delay vs Temp.

≤ ±2%

#### & Voltage

#### Input

12, 24, or 120VDC; 24, 120, or 230VAC

#### Voltage

#### Tolerance

-15% - 20%

#### 12VDC & 24VDC/AC

-20% - 10%

#### 120VAC/DC & 230VAC

#### 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<sup>7</sup>; Electrical - 1 x 10<sup>6</sup>

#### 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

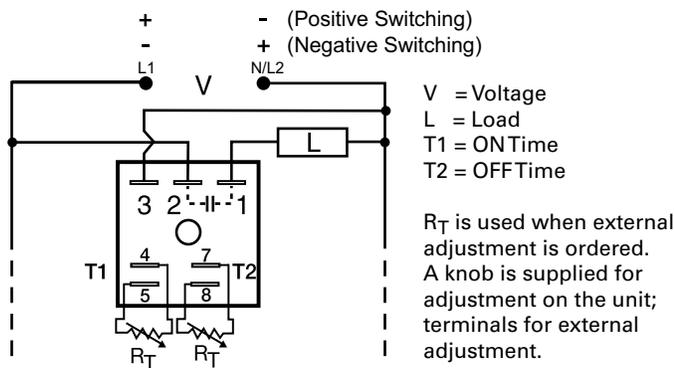
#### Weight

≈ 5.7 oz (162 g)

# ESDR SERIES



## Wiring Diagram



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.

## 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  $\pm 5\%$ . 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

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy + / - 0.1%, Factory calibration + / - 5%
<b>1A steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions.
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>ON/OFF recycling with independent adjustment of both time periods</b>	Separate on and off timing settings are knob adjustable for added flexibility
<b>Compact, low cost design measuring 2 in. (50.8mm) square</b>	Allows flexibility for OEM applications

## Ordering Information

See next page.

# ESDR SERIES

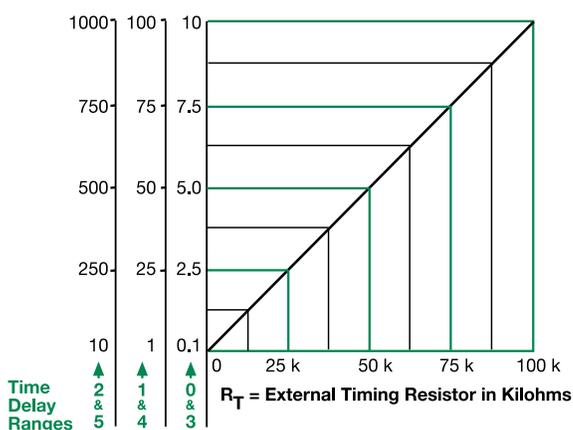
## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	T1 ON TIME	FIRST DELAY	T2 OFF TIME	SWITCHING MODE
ESDR120A0P	12VDC	Onboard	0.1 - 10s	On time	0.1 - 10s	Positive
ESDR120B3P	12VDC	Onboard	0.1 - 10s	Off time	0.1 - 10m	Positive
ESDR123B4P	12VDC	Onboard	0.1 - 10m	Off time	1 - 100m	Positive
ESDR125A5P	12VDC	Onboard	10 - 1000m	On time	10 - 1000m	Positive
ESDR221A2	24VAC	Onboard	1 - 100s	On time	10 - 1000s	n/a
ESDR320A0P	24VDC	Onboard	0.1 - 10s	On time	0.1 - 10s	Positive
ESDR320A3P	24VDC	Onboard	0.1 - 10s	On time	0.1 - 10m	Positive
ESDR420A0	120VAC	Onboard	0.1 - 10s	On time	0.1 - 10s	n/a
ESDR420A1	120VAC	Onboard	0.1 - 10s	On time	1 - 100s	n/a
ESDR420A4	120VAC	Onboard	0.1 - 10s	On time	1 - 100m	n/a
ESDR420B1	120VAC	Onboard	0.1 - 10s	Off time	1 - 100s	n/a
ESDR420B4	120VAC	Onboard	0.1 - 10s	Off time	1 - 100m	n/a
ESDR421A1	120VAC	Onboard	1 - 100s	On time	1 - 100s	n/a
ESDR421A4	120VAC	Onboard	1 - 100s	On time	1 - 100m	n/a
ESDR423A3	120VAC	Onboard	0.1 - 10m	On time	0.1 - 10m	n/a
ESDR423A4	120VAC	Onboard	0.1 - 10m	On time	1 - 100m	n/a
ESDR424A1	120VAC	Onboard	1 - 100m	On time	1 - 100s	n/a
ESDR450A1	120VAC	External	0.1 - 10s	On time	1 - 100s	n/a

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## External Resistance vs. Time Delay

In Secs. or Mins.

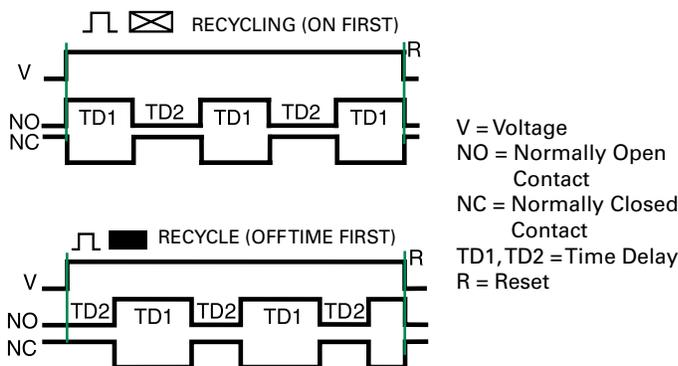


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the time delay increases.

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



## ESDR SERIES

### Specifications

#### Time Delay

**Range** 0.1s - 1000ms in 6 adjustable ranges or fixed  
**Repeat Accuracy**  $\pm 0.1\%$  or 20ms, whichever is greater

**Tolerance (Factory Calibration)**  $\leq \pm 5\%$

**Time Delay vs Temp. & Voltage**  $\leq \pm 2\%$

**Reset Time**  $\leq 150\text{ms}$

#### Input

**Voltage** 12 or 24VDC; 24, 120, or 230VAC

**Tolerance**  $\pm 20\%$

**Power Consumption** AC  $\leq 2\text{VA}$ ; DC  $\leq 1\text{W}$

**AC Line Frequency/DC Ripple** 50/60 Hz /  $\leq 10\%$

#### Output

**Type** Solid state

**Maximum Load Current** 1A steady state, 10A inrush at 60°C

**OFF State Leakage Current** AC  $\cong 5\text{mA}$  @ 230VAC; DC  $\cong 1\text{mA}$

**Voltage Drop** AC  $\cong 2.5\text{V}$  @ 1A; DC  $\cong 1\text{V}$  @ 1A

#### Protection

##### Circuitry

##### Dielectric Breakdown

##### Insulation Resistance

##### Polarity

#### Mechanical

##### Mounting

##### Dimensions

##### Termination

##### Operating/Storage

##### Temperature

##### Humidity

##### Weight

Encapsulated

$\geq 2000\text{V RMS}$  terminals to mounting surface

$\geq 100\text{ M}\Omega$

DC units are reverse polarity protected

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

**H** 50.8 mm (2"); **W** 50.8 mm (2");

**D** 30.7 mm (1.21")

0.25 in. (6.35 mm) male quick connect terminals

-40° to 75°C / -40° to 85°C

95% relative, non-condensing

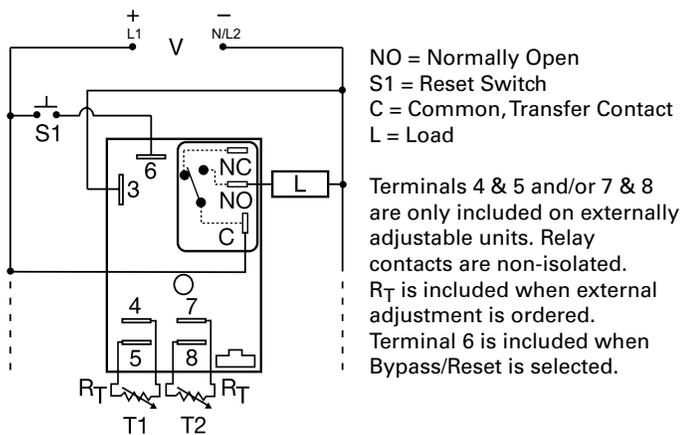
$\cong 2.4\text{ oz}$  (68 g)

# HRDR SERIES

## Recycling Timer



### Wiring Diagram



For dimensional drawing see: Appendix, page 512, Figure 17.

### 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  $\pm 0.5\%$ . 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

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy + / - 0.5%
<b>Compact, low cost design</b>	Allows flexibility for OEM applications
<b>Isolated, 30A, SPDT, NO output contacts</b>	Allows direct operation of heavy loads: compressors, pumps, blower motors, heaters.
<b>Encapsulated</b>	Protects against shock, vibration, and humidity
<b>Independent adjustment of On and Off delays</b>	Provides greater flexibility of timing options
<b>Bypass/Reset switch option</b>	Allows operator to interrupt the timing sequence and energize the output relay

### Ordering Information

MODEL	INPUT VOLTAGE	EXTERNAL ADJUSTMENT	T1 ON TIME	OPERATING SEQUENCE	T2 OFF TIME	BYPASS / RESET OPTION
HRDR121A4R	12VDC	Both time onboard adj	1 - 100s	On time first	1 - 100m	Yes
HRDR321A4R	24VDC	Both time onboard adj	1 - 100s	On time first	1 - 100m	Yes
HRDR322B2R	24VDC	Both time onboard adj	10 - 1000S	Off time first	10 - 1000S	Yes
HRDR330A0R	24VDC	Both time external adj	0.1 - 10s	On time first	0.1 - 10s	Yes
HRDR331A1	24VDC	Both time external adj	1 - 100s	On time first	1 - 100s	No
HRDR411SB30MR	120VAC	Both times fixed	1s	Off time first	30m	Yes
HRDR431A1R	120VAC	Both times external adj	0.1 - 100s	On time first	0.1 - 100s	Yes

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# HRDR 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) 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.

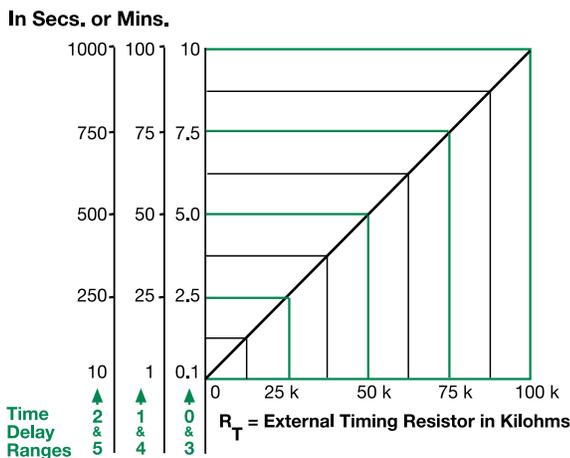


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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

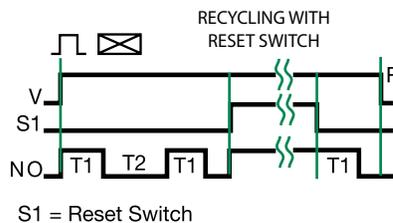


This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the R<sub>T</sub> terminals; as the resistance increases the time delay increases. When selecting an external R<sub>T</sub>, add the tolerances of 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>.

## Specifications

<b>Time Delay</b>	100ms - 1000ms in 6 adjustable ranges or fixed		
<b>Range</b>	±0.5% or 20ms, whichever is greater		
<b>Repeat Accuracy</b>			
<b>Tolerance (Factory Calibration)</b>	±5%		
<b>Reset Time</b>	≤ 150ms		
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±2%		
<b>Input Voltage</b>	12 or 24VDC; 24, 120, or 230VAC		
<b>Tolerance 12VDC &amp; 24VDC</b>	-15% - 20%		
<b>24 to 230VAC</b>	-20% - 10%		
<b>AC Line Frequency</b>	50/60 Hz		
<b>Power Consumption</b>	AC ≤ 4VA; DC ≤ 2W		
<b>Output Type</b>	Electromechanical relay		
<b>Form</b>	SPDT, non-isolated		
<b>Ratings</b>	<b>SPDT-NO</b>	<b>SPDT-NC</b>	
<b>General Purpose</b>	125/240VAC	30A	15A
<b>Resistive</b>	125/240VAC	30A	15A
	28VDC	20A	10A
<b>Motor Load</b>	125VAC	1 hp*	1/4 hp**
	240VAC	2 hp**	1 hp**
<b>Life</b>	Mechanical - 1 x 10 <sup>6</sup> ; Electrical - 1 x 10 <sup>5</sup> , *3 x 10 <sup>4</sup> , **6,000		
<b>Protection</b>	IEEE C62.41-1991 Level A		
<b>Surge</b>	Encapsulated		
<b>Circuitry</b>	≥ 2000V RMS terminals to mounting surface		
<b>Dielectric Breakdown</b>	≥ 100 MΩ		
<b>Insulation Resistance</b>	DC units are reverse polarity protected		
<b>Polarity</b>			
<b>Mechanical</b>			
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw		
<b>Dimensions</b>	<b>H</b> 76.7 mm (3"); <b>W</b> 51.3 mm (2"); <b>D</b> 38.1 mm (1.5")		
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals		
<b>Environmental</b>			
<b>Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C		
<b>Humidity</b>	95% relative non-condensing		
<b>Weight</b>	≈ 3.9 oz (111 g)		

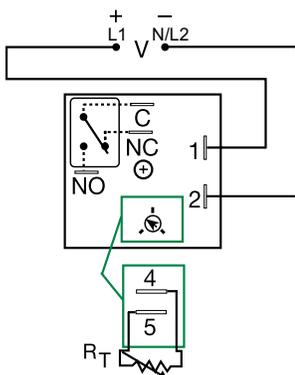
## Function Diagram



# KRD3 SERIES



## Wiring Diagram



V = Voltage  
C = Common, Transfer Contact  
NO = Normally Open  
NC = Normally Closed

A knob is supplied for adjustable units, or  $R_T$  terminals 4 & 5 for external adjust. See external adjustment vs time delay chart.

Relay contacts are isolated.

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

## 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

FEATURES	BENEFITS
<b>Compact, low cost design measuring 2 in. (50.8mm) square</b>	Provides greater flexibility for OEM applications and reduces component and labor costs
<b>Microcontroller based</b>	Repeat Accuracy + / - 0.5%, Factory calibration + / - 5%
<b>Isolated, 10A, SPDT output contacts</b>	Allows control of loads for AC or DC voltages
<b>Encapsulated</b>	Protects against shock, vibration, and humidity

## 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.

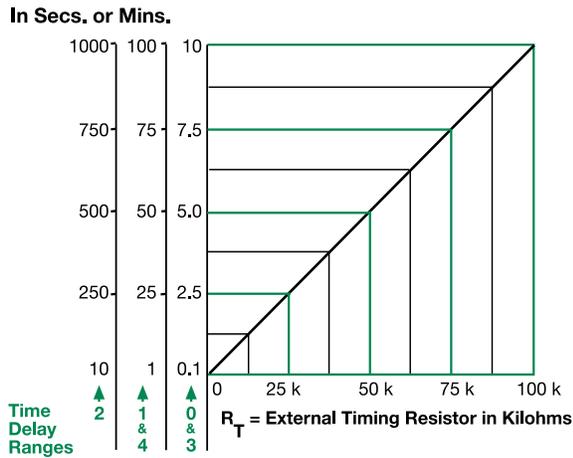
## Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	OPERATING SEQUENCE
KRD3420A	120VAC	Onboard knob	0.1 - 10s	On time first
KRD3421A	120VAC	Onboard knob	1 - 100s	On time first
KRD3434A	120VAC	External	1 - 100m	On time first

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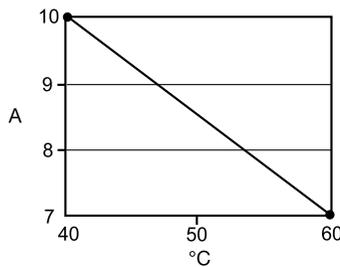
# KRD3 SERIES

## External Resistance vs. Time Delay

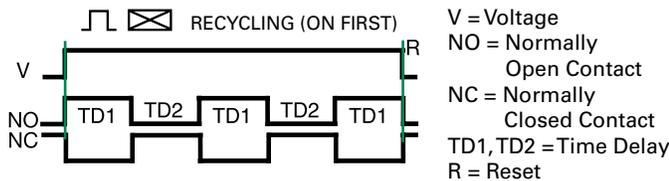


This chart applies to externally adjustable part numbers. The time delay is adjustable over the time delay range selected by varying the resistance across the RT terminals; as the resistance increases the time delay increases. When selecting an external RT, add the tolerances of the timer and the RT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



## Function Diagram



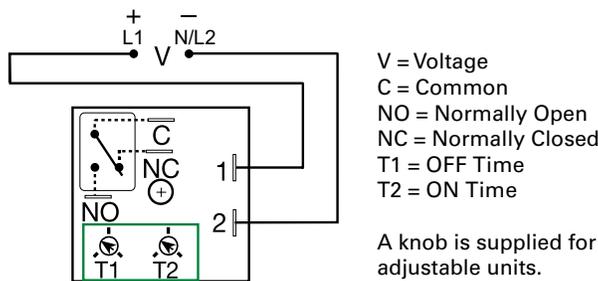
## Specifications

<b>Time Delay Range</b>	0.1s - 100m in 5 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ± 5%
<b>Reset Time</b>	≤ 150ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±5%
<b>Input Voltage</b>	12, 24 or 110VDC; 24, 120, or 230VAC
<b>Tolerance</b>	
<b>12VDC &amp; 24VDC/AC</b>	-15% - 20%
<b>110VDC, 120 or 230VAC</b>	-20% - 10%
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 2W
<b>Output Type</b>	Isolated relay contacts
<b>Form</b>	SPDT
<b>Rating (at 40°C)</b>	10A resistive @ 125VAC; 5A resistive @ 230VAC & 28VDC; 1/4 hp @ 125VAC 250VAC
<b>Max. Switching Voltage</b>	250VAC
<b>Life (Operations)</b>	Mechanical - 1 x 10 <sup>7</sup> ; Electrical - 1 x 10 <sup>5</sup>
<b>Protection</b>	Encapsulated
<b>Circuitry</b>	≥ 1500V RMS input to output
<b>Isolation Voltage</b>	≥ 100 MΩ
<b>Insulation Resistance</b>	DC units are reverse polarity protected
<b>Polarity</b>	
<b>Mechanical Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental Operating/Storage Temperature</b>	-20° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≈ 2.6 oz (74 g)

# KRDR SERIES



## Wiring Diagram



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

## Ordering Information

MODEL	INPUT VOLT.	ADJUST.	T2 ON TIME	FIRST DELAY	T1 OFF TIME
KRDR115MB25M	12VDC	Fixed	5m	Off time	25m
KRDR120A0	12VDC	Adjustable	0.1 - 10s	On time	0.1 - 10s
KRDR121A1	12VDC	Adjustable	1 - 100s	On time	1 - 100s
KRDR320B0	24VDC	Adjustable	0.1 - 10s	Off time	0.1 - 10s
KRDR321A4	24VDC	Adjustable	1 - 100s	On time	1 - 100m
KRDR321B4	24VDC	Adjustable	1 - 100s	Off time	1 - 100m
KRDR420A3	120VAC	Adjustable	0.1 - 10s	On time	0.1 - 10m
KRDR421A4	120VAC	Adjustable	1 - 100s	On time	1 - 100m
KRDR424A0	120VAC	Adjustable	1 - 100m	On time	0.1 - 10s
KRDR424A4	120VAC	Adjustable	1 - 100m	On time	1 - 100m
KRDR440.5SA0	120VAC	On time fixed	0.5s	On time	0.1 - 10s

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## 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

FEATURES	BENEFITS
<b>Compact design and independent adjustment of ON and OFF times</b>	Provides greater flexibility for OEM applications and reduces component and labor costs
<b>Microcontroller based</b>	Repeat Accuracy + / - 0.5%, Factory calibration + / - 5%
<b>Isolated, 10A, SPDT output contacts</b>	Allows control of loads for AC or DC voltages
<b>Encapsulated</b>	Protects against shock, vibration, and humidity

## 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.

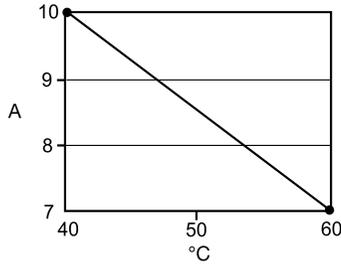


### P1023-20 DIN Rail Adapter

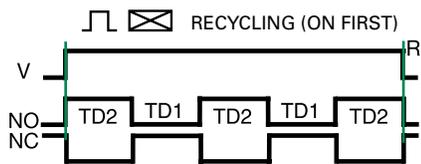
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

# KRDR SERIES

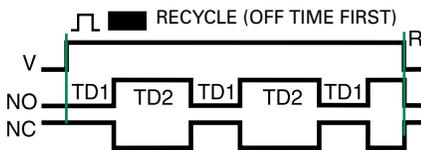
## Output Current/Ambient Temperature



## Function Diagrams



V = Voltage  
NO = Normally Open Contact  
NC = Normally Closed Contact  
T1 = OFF Time  
T2 = ON Time  
R = Reset



## Specifications

<b>Time Delay Range</b>	0.1s - 1000m in 6 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.5 % or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ±5%
<b>Reset Time</b>	≤ 150ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±5%
<b>Input Voltage</b>	12, 24 or 110VDC; 24, 120 or 230VAC
<b>Tolerance 12VDC &amp; 24VDC/AC</b>	-15% - 20%
<b>110VDC &amp; 120 or 230VAC</b>	-20% - 10%
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 2W
<b>Output Type</b>	Isolated relay contacts
<b>Form</b>	SPDT
<b>Rating (at 40°C)</b>	10A resistive @ 125VAC; 5A resistive @ 230VAC & 28VDC; 1/4 hp @ 125VAC
<b>Max. Switching Voltage Life (Operations)</b>	250VAC Mechanical - 1 x 10 <sup>7</sup> ; Electrical - 1 x 10 <sup>5</sup>
<b>Protection Circuitry</b>	Encapsulated
<b>Isolation Voltage</b>	≥ 1500V RMS input to output
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reverse polarity protected
<b>Mechanical Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental Operating/Storage Temperature</b>	-20° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≈ 2.6 oz (74 g)

# 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.

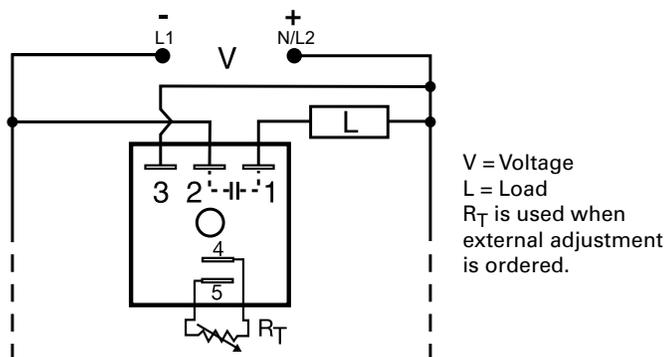
Reset: Removing input voltage resets the output and time delays, and returns the sequence to the ON time.

#### 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.

### Wiring Diagram



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

### Features & Benefits

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

### 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

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY	OPERATING SEQUENCE
KSD3120A	12VDC	External	0.1 - 10s	ON time first
KSD3310.1SA	24VDC	Fixed	0.1s	ON time first
KSD3415MA	120VAC	Fixed	5m	ON time first
KSD3432A	120VAC	Onboard	10 - 1000s	ON time first

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# KSD3 SERIES

## 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.

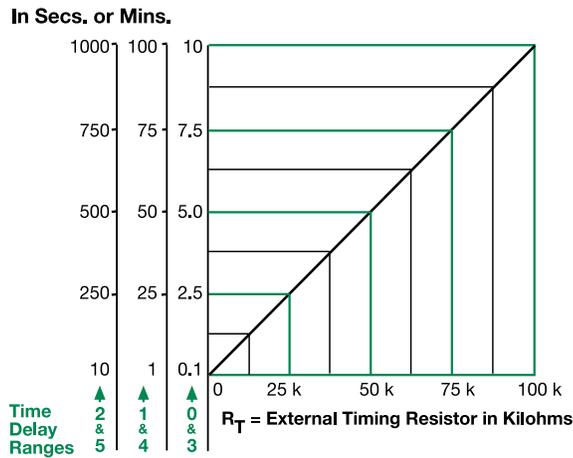


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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

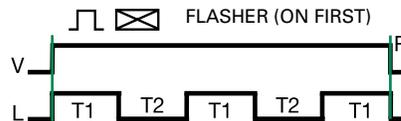


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the tie delay increases.  
When selecting an external  $R_T$ , add the tolerances of the 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  $R_T$ .

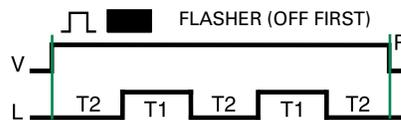
## Specifications

<b>Time Delay</b>	
<b>Range</b>	0.1s - 1000m in 6 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ± 5%
<b>Reset Time</b>	≤ 150ms
<b>Time Delay vs. Temperature &amp; Voltage</b>	≤ ±10%
<b>Input Voltage</b>	24 or 120VAC; 12 or 24VDC
<b>Tolerance</b>	±20%
<b>AC Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 1W
<b>Output Type</b>	Solid state
<b>Maximum Load Current</b>	1A steady state, 10A inrush at 60°C
<b>OFF State Leakage Current</b>	AC ≅ 5mA @ 230VAC; DC ≅ 1mA
<b>Voltage Drop</b>	AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A
<b>DC Operation</b>	Negative switching only
<b>Protection</b>	Encapsulated
<b>Circuitry</b>	≥ 2000V RMS terminals to mounting surface
<b>Dielectric Breakdown</b>	≥ 100 MΩ
<b>Insulation Resistance</b>	DC units are reverse polarity protected
<b>Polarity</b>	
<b>Mechanical</b>	
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≅ 2.4 oz (68 g)

## Function Diagrams



ON time plus OFF time equals one complete flash.

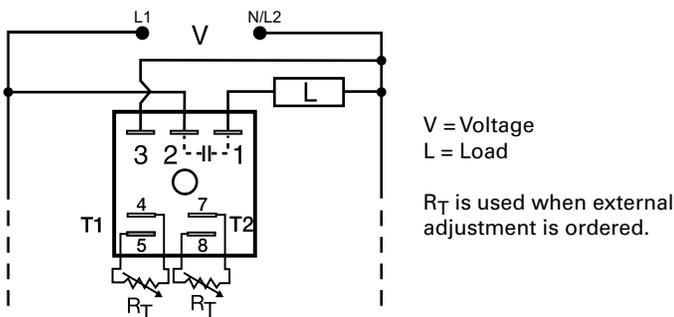


V = Voltage  
L = Load  
T1 = ONTime  
T2 = OFFTime  
T1 ≅ T2  
R = Reset

**KSDR SERIES**



**Wiring Diagram**



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

**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  $\pm 5\%$  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**

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy + / - 0.5%, Factory calibration + / - 5%
<b>1A steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>Wide operating temperature range: -40° to 75°C</b>	Reliable in demanding commercial and industrial applications
<b>Compact, low cost design measuring 2 in. (50.8mm) square</b>	Allows flexibility for OEM applications

**Ordering Information**

MODEL	INPUT VOLTAGE	T1 ON TIME	FIRST DELAY	T2 OFF TIME
KSDR40A0	120VAC	0.1 - 10s	On time	0.1 - 10s
KSDR42A4	120VAC	10 - 1000s	On time	1 - 100m

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# 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.

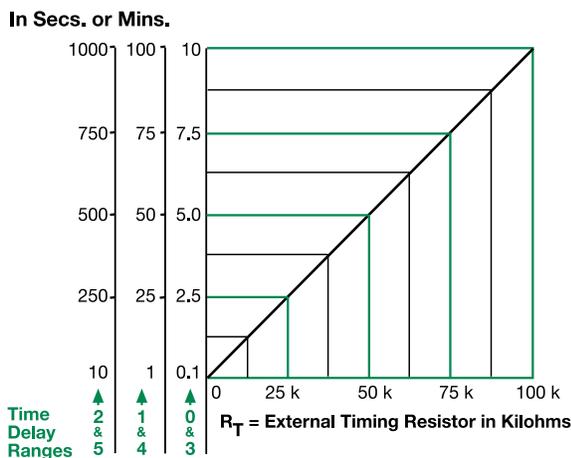


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



**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

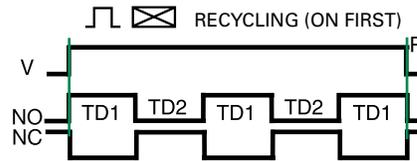


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the tie delay increases.

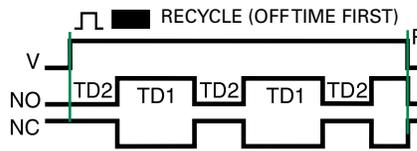
When selecting an external  $R_T$ , add the tolerances of the timer and the  $R_T$  for the full time range adjustment.

**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  $R_T$ .

## Function Diagrams



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



## Specifications

### Time Delay

**Range** 0.1s - 1000ms 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")

0.25 in. (6.35 mm) male quick connect terminals

### Termination

### 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



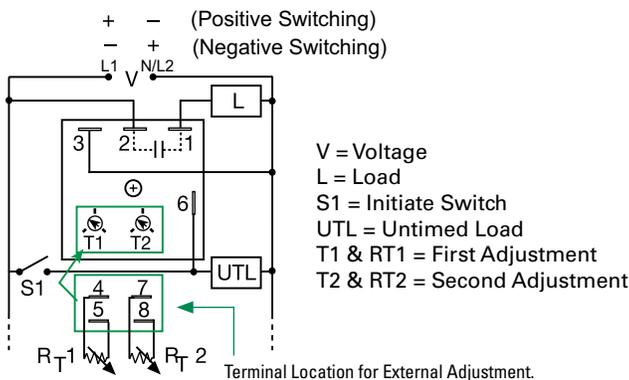
### Description

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

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy +/- 0.5%
<b>Compact design</b>	Allows flexibility for OEM applications
<b>1A steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions.
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity

### Wiring Diagram



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.



**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.

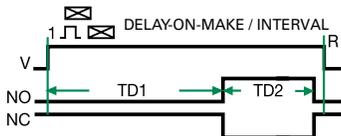
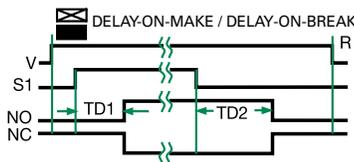
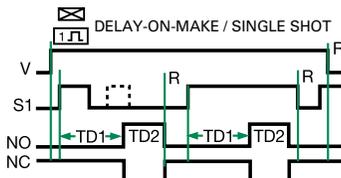
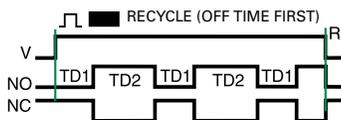
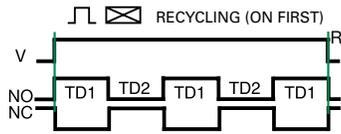
### Ordering Information

MODEL	INPUT	ADJUSTMENT 1	TIME DELAY 1	ADJUSTMENT 2	TIME DELAY 2	FUNCTION
KSPDA2222RXE	24 to 240VAC	Onboard	1-100s	Onboard	1-100s	Recycling/On Time First
KSPDP110M18SRXE	12 to 120VDC positive switching	Fixed	10 mins	Fixed	8s	Recycling/On Time First

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# KSPD SERIES

## Function Diagrams



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

## Specifications

### Time Delay

#### Type

#### Range

Microcontroller circuitry  
0.1s - 1000h in 9 adjustable ranges or fixed (to 999)

#### Repeat Accuracy

#### Tolerance

#### (Factory Calibration)

#### Reset Time

#### Initiate Time

#### Time Delay vs Temp.

#### & Voltage

±0.5% or 20ms, whichever is greater

≤ ±2%

≤ 150ms  
≤ 20ms; ≤ 1500 operations per minute

≤ ±2%

### Input

#### Voltage

#### Tolerance

#### AC Line Frequency/DC Ripple

#### Power Consumption

12 to 120VDC; 24 to 240VAC

≤ ±15%

50/60Hz / ≤ 10%

AC ≤ 2VA; DC ≤ 1W

### Output

#### Type

#### Rating

#### Voltage Drop

#### OFF State Leakage Current

Solid-state output

1A steady, 10A inrush for 16ms

AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A

AC ≅ 5mA @ 230VAC; DC ≅ 1mA

### Protection

#### Circuitry

#### Dielectric Breakdown

#### Insulation Resistance

#### Polarity

Encapsulated

≥ 2000V rms terminals to mounting surface

≥ 100 MΩ

DC units are reverse polarity protected

### Mechanical

#### Mounting

#### Dimensions

Surface mt. with one #10 (M5 x 0.8) screw

**H** 50.8 mm (2"); **W** 50.8 mm (2");

**D** 30.7 mm (1.21")

0.25 in. (6.35 mm) male quick connects

### Termination

### Environmental

#### Operating/Storage

#### Temperature

#### Humidity

#### Weight

-40° to 60°C / -40° to 85°C

95% relative, non-condensing

≅ 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.

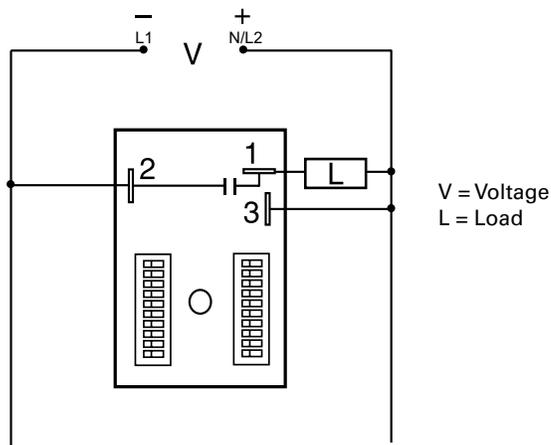
**Reset:** Removing input voltage resets the output and time delays, and returns the sequence to the ON time.

**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.

**Wiring Diagram**



For dimensional drawing see: Appendix, page 512, Figure 17.

**Features & Benefits**

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat Accuracy +/- 0.1%, Setting accuracy +/- 2%
<b>1A steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>ON and OFF time delay settings</b>	Independent adjustment provides greater timing flexibility
<b>DIP switch adjustment</b>	Provides first time setting accuracy

**Ordering Information**

MODEL	INPUT VOLTAGE	FIRST DELAY	T1 ON TIME	T2 OFF TIME	MODEL	INPUT VOLTAGE	FIRST DELAY	T1 ON TIME	T2 OFF TIME
RS1A11	12VDC	On time	0.1 - 102.3s in 0.1s increments	0.1 - 102.3s in 0.1s increments	RS4A22	120VAC	On time	0.1 - 102.3m in 0.1m increments	0.1 - 102.3m in 0.1m increments
RS2B44	24VAC	Off time	1 - 1023h in 1h increments	1 - 1023h in 1h increments	RS4A24	120VAC	On time	0.1 - 102.3m in 0.1m increments	1 - 1023h in 1h increments
RS4A11	120VAC	On time	0.1 - 102.3s in 0.1s increments	0.1 - 102.3s in 0.1s increments	RS4A33	120VAC	On time	1 - 1023m in 1m increments	1 - 1023m in 1m increments
RS4A12	120VAC	On time	0.1 - 102.3s in 0.1s increments	0.1 - 102.3m in 0.1m increments	RS4B12	120VAC	Off time	0.1 - 102.3s in 0.1s increments	0.1 - 102.3m in 0.1m increments
RS4A13	120VAC	On time	0.1 - 102.3s in 0.1s increments	1 - 1023m in 1m increments	RS6A13	230VAC	On time	0.1 - 102.3s in 0.1s increments	1 - 1023m in 1m increments

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TIME DELAY RELAYS

# RS SERIES

## 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.

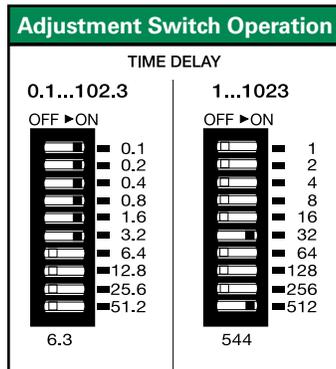


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

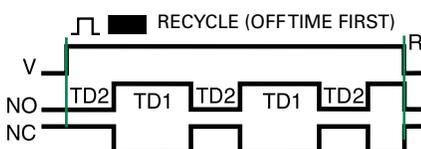
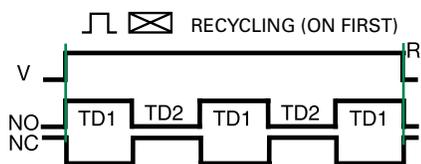


**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

## Adjustment Switch Operation



## Function Diagrams



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

## Specifications

<b>Time Delay Range*</b>	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
<b>Repeat Accuracy</b>	±0.1% or 20ms, whichever is greater
<b>Setting Accuracy</b>	≤ ±2% or 20ms, whichever is greater
<b>Reset Time</b>	≤ 150ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±2%
<b>Input Voltage</b>	12, or 24VDC; 24, 120, or 230VAC
<b>Tolerance</b>	±20%
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ ±10%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 1W
<b>Output Type</b>	Solid state
<b>Maximum Load Current</b>	1A steady state, 10A inrush at 60°C
<b>OFF State Leakage Current</b>	AC ≅ 5mA @ 230VAC; DC ≅ 1mA
<b>Voltage Drop</b>	AC ≅ 2.5V @ 1A; DC ≅ 1V @ 1A
<b>Protection</b>	
<b>Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Polarity</b>	DC units are reverse polarity protected
<b>Mechanical</b>	
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 76.7 mm (3"); <b>W</b> 50.8 mm (2"); <b>D</b> 38.1 mm (1.5")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-40° to 75°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≅ 3.9 oz (111 g)

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

# TDR SERIES

## Relay Output, Recycling Time Delay Relay



8-PIN

### 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.

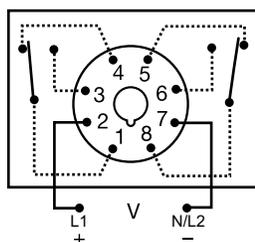
**Reset:** Removing input voltage resets the output and time delays, and returns the sequence to the first delay.

#### 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.

### Wiring Diagram



Relay contacts are isolated

For dimensional drawing see: Appendix, page 512, Figure 23.

### Features & Benefits

FEATURES	BENEFITS
<b>ON &amp; OFF time delay settings</b>	Independent adjustment allows for greater flexibility
<b>3 Time Ranges Available (0.1s to 2.8h)</b>	Makes it versatile for use in many applications
<b>Microcontroller based</b>	Repeat Accuracy +/- 0.1% or 20 ms, whichever is greater; Setting Accuracy +/- 2% or 50 ms, whichever is greater
<b>DIP switch adjustment</b>	Provides first time setting accuracy
<b>Isolated output contacts</b>	Allows control of loads for AC or DC voltages
<b>LED indication (select models)</b>	Provides visual indication of relay status

### Ordering Information

MODEL	INPUT VOLTAGE	LED	SEQUENCE	ON TIME (SEC)	OFF TIME (SEC)
TDR1A22	12VDC		ON time first	1-1023 in 1s increments	1-1023 in 1s increments
TDR2A23	24VAC	X	ON time first	1-1023 in 1s increments	10-10230 in 10s increments
TDR4A11	120VAC	X	ON time first	0.1-102.3 in 0.1s increments	0.1-102.3 in 0.1s increments
TDR4A12	120VAC	X	ON time first	0.1-102.3 in 0.1s increments	1-1023 in 1s increments
TDR4A13	120VAC	X	ON time first	0.1-102.3 in 0.1s increments	10-10230 in 10s increments
TDR4A22	120VAC	X	ON time first	1-1023 in 1s increments	1-1023 in 1s increments
TDR4A23	120VAC	X	ON time first	1-1023 in 1s increments	10-10230 in 10s increments
TDR4A33	120VAC	X	ON time first	10-10230 in 10s increments	10-10230 in 10s increments
TDR4B22	120VAC	X	OFF time first	1-1023 in 1s increments	1-1023 in 1s increments
TDR4B23	120VAC	X	OFF time first	1-1023 in 1s increments	10-10230 in 10s increments
TDR6A22	230VAC	X	ON time first	1-1023 in 1s increments	1-1023 in 1s increments

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# TDR 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.

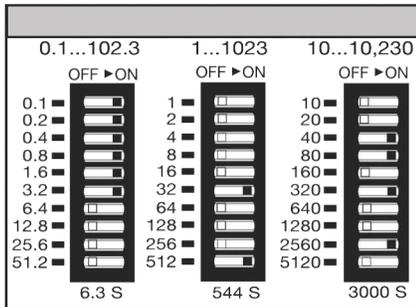


**PSC8 Hold-down Clips**  
Securely mounts plug-in controls in any position. Provides protection against vibration. Use with NDS-8 Octal Socket. Sold in pairs.



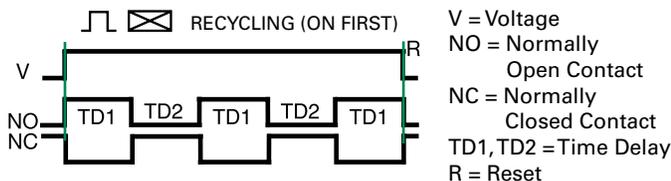
**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

## Binary Switch Operation



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

## Function Diagram



## Specifications

**Time Delay Type**  
**Range\*\***

Digital integrated circuitry  
0.1 - 102.3s in 0.1s increments  
1 - 1023s in 1s increments  
10 - 10,230s in 10s increments  
±0.1% or 20ms, whichever is greater  
±2% or 50ms, whichever is greater  
≤ 50ms  
≤ 150ms

**Repeat Accuracy**  
**Setting Accuracy**  
**Reset Time**  
**Recycle Time**  
**Time Delay vs Temp. & Voltage**

±5%

**Input**

12, 24/28, or 110VDC; 24, 120, or 230VAC

**Voltage 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

**Life**

Mechanical - 1 x 10<sup>7</sup>; Electrical - 1 x 10<sup>6</sup>

**Max. Switching Voltage**

250VAC

**Relay LED Indicator**

Red; ON when output relay energizes

**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")

**Termination**

Octal 8-pin plug-in

**Environmental**

**Operating/Storage**

-20° to 65°C/-30° to 85°C

**Temperature**

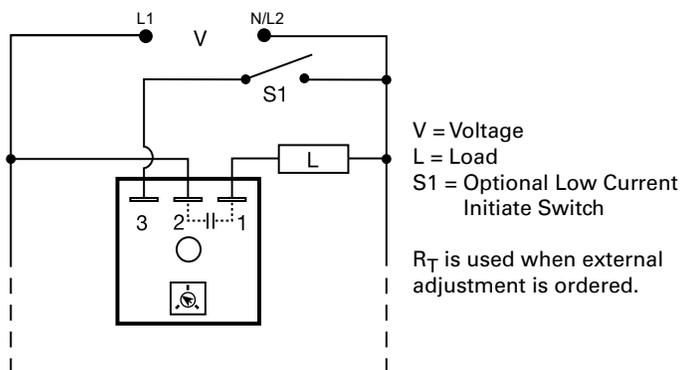
≈ 6 oz (170 g)

**Weight**

# THD3C42A0



## Wiring Diagram



## 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

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

## 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.



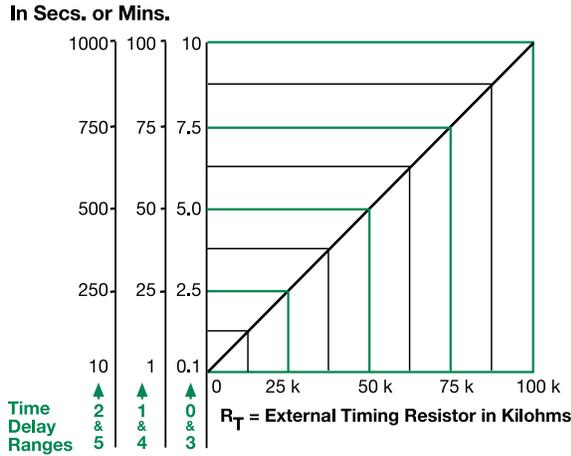
### P1015-18 Quick Connect to Screw Adapter

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.

# THD3C42A0

## External Resistance vs. Time Delay

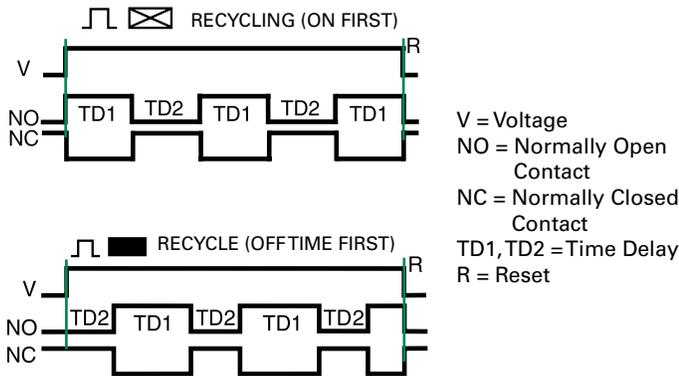


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the R<sub>T</sub> terminals; as the resistance increases the time delay increases.

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 Diagrams



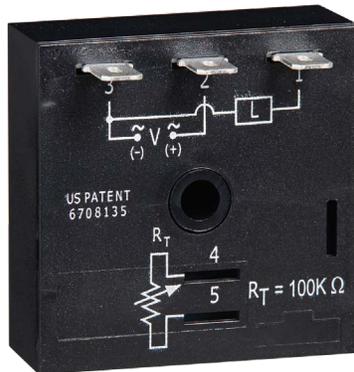
## Specifications

<b>Time Delay Range Adjustment</b>	0.1s - 1000m in 6 adjustable ranges or fixed Single variable resistor changes both the on & off times equally	
<b>Repeat Accuracy Tolerance (Factory Calibration)</b>	±0.5% or 20ms, whichever is greater	
<b>Reset Time</b>	≤ ±1%	
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ 150ms	
<b>Input Voltage Tolerance</b>	≤ ±2%	
<b>AC Line Frequency</b>	24, 120, or 230VAC	
<b>Power Consumption</b>	±20%	
<b>Output Type</b>	50/60 Hz	
<b>Maximum Load Current</b>	≤ 2VA	
<b>Minimum Load Current</b>	Solid state	
<b>Voltage Drop</b>	<b>Steady State</b>	<b>Inrush**</b>
<b>OFF State Leakage Current</b>	20A	200A
<b>Protection</b>	100mA	
<b>Circuitry</b>	≅ 2.5V at rated current	
<b>Dielectric Breakdown</b>	≅ 5mA @ 230VAC	
<b>Insulation Resistance</b>	Encapsulated	
<b>Mechanical</b>	≥ 2000V RMS terminals to mounting surface	
<b>Mounting **</b>	≥ 100 MΩ	
<b>Dimensions</b>	Surface mount with one #10 (M5 x 0.8) screw	
<b>Termination</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2");	
<b>Environmental</b>	<b>D</b> 38.4 mm (1.51")	
<b>Operating/Storage Temperature</b>	0.25 in. (6.35 mm) male quick connect terminals	
<b>Humidity</b>	-40° to 60°C / -40° to 85°C	
<b>Weight</b>	95% relative, non-condensing	
	≅ 3.9 oz (111 g)	

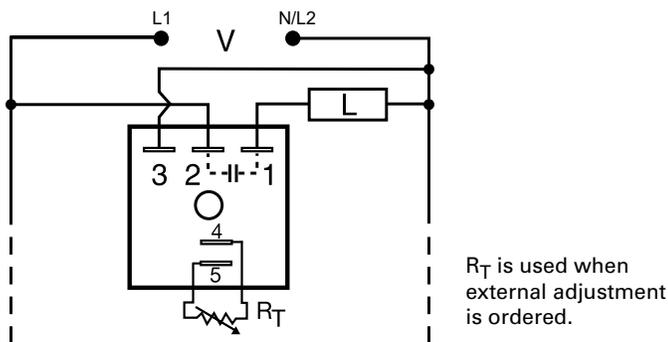
\*\*Must be bolted to a metal surface using the included heat sink compound. The maximum mounting surface temperature is 90°C. Inrush: Non-repetitive for 16ms.

# TSD3411S

## Recycling Timer



### Wiring Diagram



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

### Description

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

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

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TIME DELAY RELAYS

### 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.



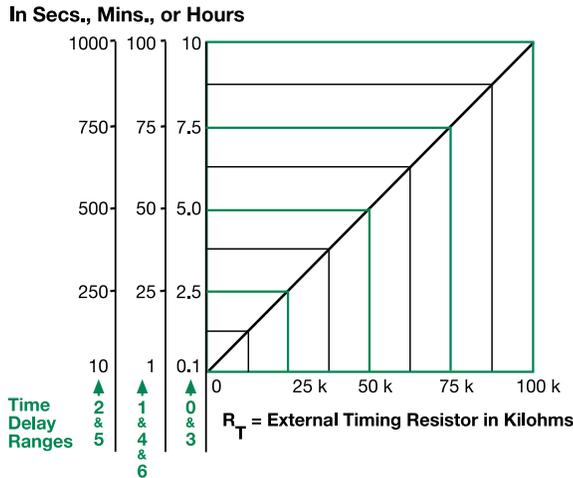
**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



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

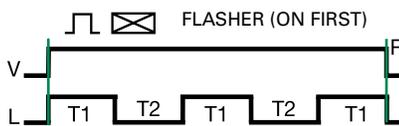
# TSD3411S

## 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  
L = Load  
T1 = ON Time  
T2 = OFF Time  
T1  $\cong$  T2  
R = Reset

ON time plus OFF time equals one complete flash.

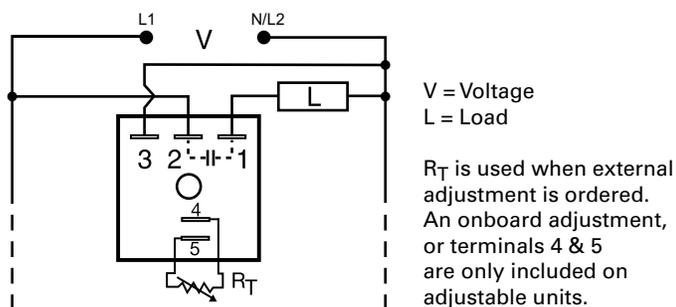
## Specifications

<b>Time Delay</b>	0.1s - 100h in 7 adjustable ranges
<b>Range</b>	0.1s - 100h in 7 adjustable ranges
<b>Repeat Accuracy</b>	$\pm 0.1\%$ or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	$\leq \pm 1\%$
<b>Reset Time</b>	$\leq 150\text{ms}$
<b>Time Delay vs. Temperature &amp; Voltage</b>	$\leq \pm 1\%$
<b>Input Voltage</b>	24, 120, or 230VAC
<b>Tolerance</b>	$\pm 20\%$
<b>AC Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	$\leq 2\text{VA}$
<b>Output Type</b>	Solid state
<b>Maximum Load Current</b>	1A steady state, 10A inrush at 60°C
<b>Off State Leakage Current</b>	$\cong 5\text{mA}$ @ 230VAC
<b>Voltage Drop</b>	$\cong 2.5\text{V}$ @ 1A
<b>Protection Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	$\geq 2000\text{V}$ RMS terminals to mounting surface
<b>Insulation Resistance</b>	$\geq 100\text{M}\Omega$
<b>Mechanical Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental Operating/Storage Temperature</b>	-40° to 75°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	$\cong 2.4\text{ oz}$ (68 g)

**TSDR SERIES**



**Wiring Diagram**



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

**Ordering Information**

MODEL	INPUT VOLT.	ADJUST.	T1 ON TIME	FIRST DELAY	T2 OFF TIME
TSDR215SB18M	24VAC	Fixed	5s	Off time	18m
TSDR415SB18M	120VAC	Fixed	5s	Off time	18m
TSDR4412SA1	120VAC	On time fixed, off external	12s	On time	1 - 100s
TSDR442MA2	120VAC	On time fixed, off external	2m	On time	10 - 1000s
TSDR4430SA2	120VAC	On time fixed, off external	30s	On time	10 - 1000s
TSDR610.2SA0.2S	230VAC	Fixed	0.2s	On time	0.2s
TSDR6110SA30S	230VAC	Fixed	10s	On time	30s
TSDR612.5SA4.5S	230VAC	Fixed	2.5s	On time	4.5s
TSDR615SB18M	230VAC	Fixed	5s	Off time	18m
TSDR6412SA1	230VAC	On time fixed, off external	12s	On time	1 - 100s

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

**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 <math>\pm 5\%</math>. 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**

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat accuracy +/- 0.5%, Factory calibration +/- 5%
<b>1A steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>Wide operating temperature range: -40° to 75°C</b>	Reliable in demanding commercial and industrial applications
<b>Compact, low cost design measuring 2 in. (50.8mm) square</b>	Allows flexibility for OEM applications

**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.

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TIME DELAY RELAYS

# 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.

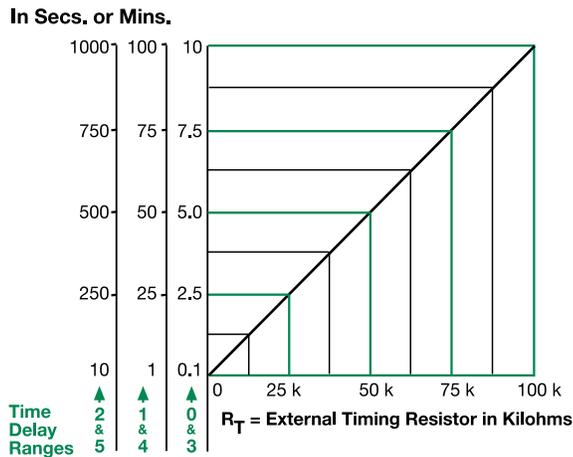


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



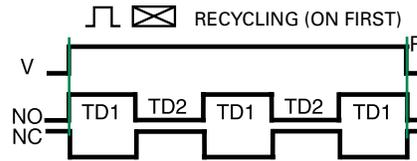
**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

## External Resistance vs. Time Delay

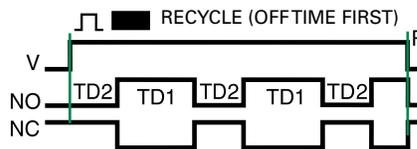


**This chart applies to externally adjustable part numbers.**  
The time delay is adjustable over the time delay range selected by varying the resistance across the  $R_T$  terminals; as the resistance increases the time delay increases.  
When selecting an external  $R_T$ , add the tolerances of the 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 Diagrams



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



## Specifications

<b>Time Delay</b>	
<b>Range</b>	0.1s - 1000ms in 6 adjustable ranges or fixed
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ±5%
<b>Reset Time</b>	≤ 150ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±5%
<b>Input</b>	
<b>Voltage</b>	24, 120, or 230VAC
<b>Tolerance</b>	±20%
<b>AC Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	≤ 2VA
<b>Output</b>	
<b>Type</b>	Solid state
<b>Maximum Load Current</b>	1A steady state, 10A inrush at 60°C
<b>Off State Leakage Current</b>	≅ 5mA @ 230VAC
<b>Voltage Drop</b>	≅ 2.5V @ 1A
<b>Protection</b>	
<b>Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Mechanical</b>	
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental</b>	
<b>Operating/Storage</b>	
<b>Temperature</b>	-40° to 75°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≅ 2.4 oz (68 g)

# PTHF4900DK



## Description

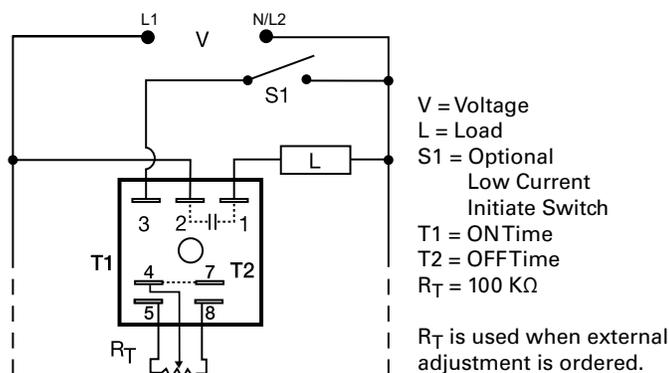
The PTHF4900DK can be used for a variety of applications from chemical metering, to temperature regulating, to energy management. The infinite adjustability from 1 to 99% provides accurate percentage on control over a wide factory fixed cycle period. When mounted on a metal surface, it can be used to 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.

## Wiring Diagram



## Features & Benefits

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat accuracy +/- 0.5%, Factory calibration +/- 5%
<b>ON/OFF recycling percentage control 1 to 99%</b>	Accurate control over a wide factory fixed cycle period
<b>Compact, low cost design</b>	Allows flexibility for OEM applications and reduces component and labor costs
<b>High load currents up to 20A, 200A inrush</b>	Allows direct operation of motors, lamps, and heaters without a contactor
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>Metalized mounting surface</b>	Facilitates heat transfer in high current applications

## 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.

# PTHF4900DK

## Specifications

### Time Delay

<b>Type</b>	External or onboard knob
<b>Range/External</b>	
<b>Adjustment Resistance</b>	Adjustable from 1 - 99% / $R_T = 100\text{ K}\Omega$
<b>Cycle Period</b>	Fixed from 10s - 1000m
<b>Repeat Accuracy</b>	$\pm 0.5\%$ or 20ms, whichever is greater
<b>Cycle Period Tolerance</b>	
<b>(Factory Calibration)</b>	$\leq \pm 5\%$
<b>Reset Time</b>	$\leq 150\text{ms}$
<b>Time Delay vs Temp. &amp; Voltage</b>	$\leq \pm 10\%$

### Input

<b>Voltage</b>	120 or 230VAC
<b>Tolerance</b>	$\pm 20\%$
<b>AC Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	$\leq 2\text{VA}$

### Output

<b>Type</b>	Solid state
<b>Maximum Load Currents</b>	<b>Steady State</b> <b>Inrush*</b>
	1A                      10A

**Voltage Drop**  $\approx 2.5\text{V}$  at rated current

**OFF State Leakage Current**  $\approx 5\text{mA}$  @ 230VAC

### Protection

<b>Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	$\geq 2000\text{V RMS}$ terminals to mounting surface
<b>Insulation Resistance</b>	$\geq 100\text{ M}\Omega$

## Mechanical

### Mounting \* Dimensions

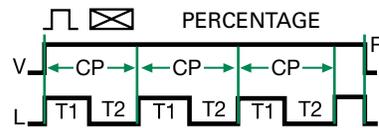
Surface mount with one #10 (M5 x 0.8) screw  
**H** 50.8 mm (2"); **W** 50.8 mm (2");  
**D** 38.4 mm (1.51")  
 0.25 in. (6.35 mm) male quick connect terminals

### Termination Environmental Operating/Storage Temperature Humidity

-40° to 60°C / -40° to 85°C  
 95% relative, non-condensing  
 6, 10, 20A units:  $\approx 3.9\text{ oz}$  (111 g)

\*Units rated  $\geq 6\text{A}$  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

# TDMB SERIES

## Delay-on-Make/Delay-on-Break

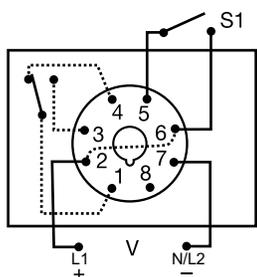


8-PIN



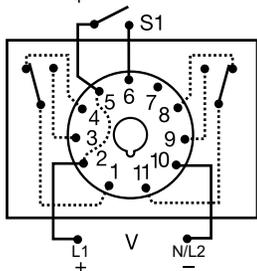
11-PIN

### Wiring Diagram



8-PIN OCTAL SPDT

V = Voltage  
S1 = Initiate Switch or Thermostat



Relay contacts are isolated.

11-PIN DPDT  
(P/N ends with D)

### 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

FEATURES	BENEFITS
<b>Digital circuitry</b>	Repeat Accuracy +/- 0.1%, Setting accuracy +/- 2%
<b>Isolated, 10A, SPDT or DPDT output contacts</b>	Allows control of loads for AC or DC voltages
<b>User selectable Delay-on-Make and Delay-on-Break time delay</b>	Timing settings are independently adjustable for added flexibility
<b>Industry standard octal plug connection</b>	Eliminates need for special connectors
<b>LED Indication</b>	Provides visual indication of initiate, timing, and relay output status
<b>DIP switch adjustment</b>	Provides first time setting accuracy

### 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.

For dimensional drawing see: Appendix, page 512, Figure 23.

### Ordering Information

MODEL	INPUT VOLTAGE	DELAY-ON-MAKE	DELAY-ON-BREAK	PLUG TYPE
TDMB411	120VAC	0.1 - 102.3s in 0.1s increments	0.1 - 102.3s in 0.1s increments	Octal (8-pin) SPDT
TDMB413D	120VAC	0.1 - 102.3s in 0.1s increments	10 - 10230s in 10s increments	11-pin DPDT
TDMB422	120VAC	1 - 1023s in 1s increments	1 - 1023s in 1s increments	Octal (8-pin) SPDT
TDMB422D	120VAC	1 - 1023s in 1s increments	1 - 1023s in 1s increments	11-pin DPDT
TDMB622	230VAC	1 - 1023s in 1s increments	1 - 1023s in 1s increments	Octal (8-pin) SPDT

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# TDMB SERIES

## Specifications

### Time Delay

<b>Type</b>	Microcontroller circuitry
<b>Range**</b>	0.1 - 102.3s in 0.1s increments 1 - 1023s in 1s increments 10 - 10,230s in 10s increments
<b>Repeat Accuracy</b>	±0.1% or 20ms, whichever is greater
<b>Setting Accuracy</b>	≤ ±2% or 50ms, whichever is greater
<b>Reset Time</b>	≤ 150ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±2%
<b>Control LED Indicator</b>	Green; on when the initiate switch is closed
<b>Input Voltage</b>	12 or 24VDC; 24, 120, or 230VAC; 24 to 240VAC/DC; 12 to 48VDC

<b>Tolerance</b>	
<b>12VDC &amp; 24VDC/AC</b>	-15% - 20%
<b>110 to 230VAC/DC</b>	-20% - 10%
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10%
<b>Power Consumption</b>	AC ≤ 2VA; DC ≤ 2W

<b>Output Type</b>	Electromechanical relay
<b>Form</b>	SPDT or DPDT
<b>Rating</b>	10A resistive @ 120/240VAC & 28VDC; 1/3 hp @ 230VAC
<b>Life</b>	Mechanical - 1 x 10 <sup>7</sup> ; Electrical - 1 x 10 <sup>5</sup>
<b>Max. Switching Voltage</b>	250VAC
<b>Relay LED Indicator</b>	Red; on when output relay energizes (not included on 12VDC units)

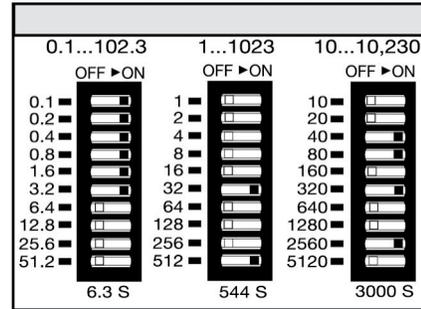
<b>Protection</b>	
<b>Insulation Resistance</b>	≥ 100M
<b>Polarity</b>	DC units are reverse polarity protected
<b>Isolation Voltage</b>	≥ 1500V RMS input to output

<b>Mechanical</b>	
<b>Mounting</b>	Plug-in socket
<b>Dimensions</b>	<b>H</b> 81.3 mm (3.2"); <b>W</b> 60.7 mm (2.4"); <b>D</b> 45.2 mm (1.8")
<b>Termination</b>	Octal 8-pin plug-in, magnal 11-pin plug-in

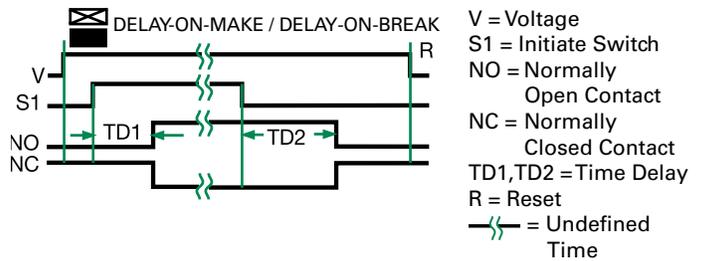
<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-20° to 60°C / -30° to 85°C
<b>Weight</b>	≈ 6 oz (170 g)

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

## Digi-Set Binary Switch Operation

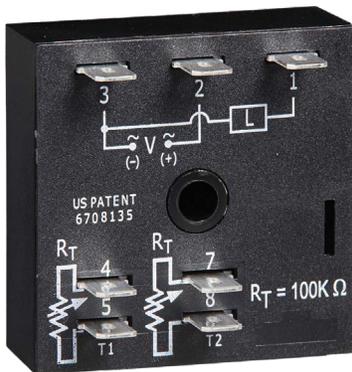


## Function Diagram



### ESD52233

#### Delay-on-Make/Interval



#### Description

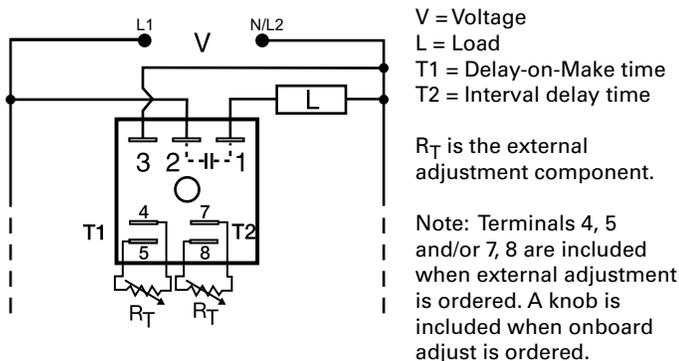
The ESD5 Series is an accurate, solid-state, delayed interval timer. It offers a 1A steady, 10A inrush output and is available with adjustable or fixed time delays of 0.1 seconds to 1000 minutes in six ranges. Input voltages of 24, 120, or 230VAC are available. Encapsulation offers protection against 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  $\pm 5\%$ .

#### 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.

#### Wiring Diagram



#### Features & Benefits

FEATURES	BENEFITS
<b>Compact, low cost design measuring 2 in. (50.8mm) square</b>	Allows flexibility for OEM applications and reduces component and labor costs
<b>Microcontroller based</b>	Repeat Accuracy + / - 0.1%, Factory calibration + / - 5%
<b>1A steady, 10A inrush solid-state output</b>	Provides 100 million operations in typical conditions.
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity

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.



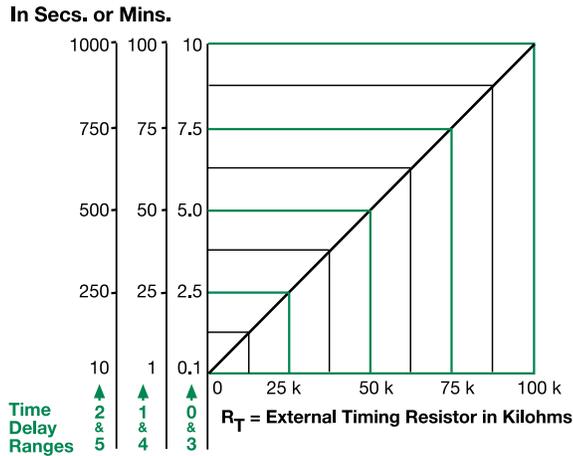
**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



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

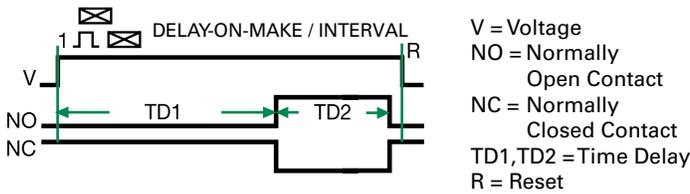
# ESD52233

## 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



## Specifications

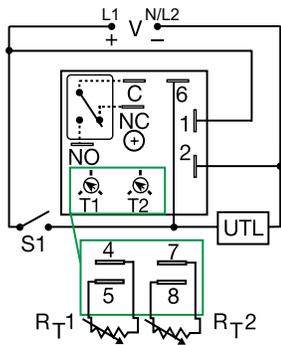
<b>Time Delay Range</b>	0.1s - 1000m in 6 adjustable ranges or fixed
<b>Repeat Accuracy Tolerance (Factory Calibration)</b>	±0.1% or 20ms, whichever is greater
<b>Reset Time</b>	≤ 150ms
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±2%
<b>Input Voltage Tolerance</b>	24VAC ±20%
<b>AC Line Frequency</b>	50/60 Hz
<b>Power Consumption</b>	≤ 2VA
<b>Output Type</b>	Solid state
<b>Rating</b>	1A steady state, 10A inrush at 60°C
<b>OFF State Leakage Current</b>	≅ 5mA @ 230VAC
<b>Voltage Drop</b>	≅ 2.5V @ 1A
<b>Protection Circuitry</b>	Encapsulated
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ
<b>Mechanical Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental Operating/Storage Temperature</b>	-40° to 75°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≅ 2.4 oz (68g)

# KRPD SERIES

## Relay Output Timer



### Wiring Diagram



V = Voltage  
C = Common, Transfer Contact  
NC = Normally Closed  
NO = Normally Open  
S1 = Initiate Switch  
UTL = Untimed Load

A knob is supplied for adjustable units or  $R_T$  terminals for external adjust. The untimed load is optional. S1 is not used for some functions.

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

### 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

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

### 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.

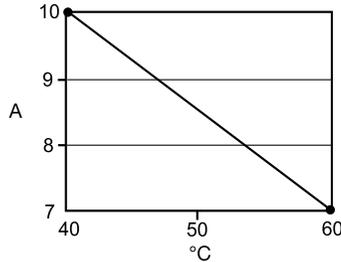
### Ordering Information

MODEL	INPUT	ADJUSTMENT 1	TIME DELAY 1	ADJUSTMENT 2	TIME DELAY 2	FUNCTION
KRPD215S190SMB	24VAC	Fixed	5s	Fixed	90s	Delay-on-Make/Delay-on-Break
KRPD417M113MRXD	120VAC	Fixed	7m	Fixed	13m	Recycling/Off Time First
KRPDA175S130SMI	24 to 240VAC/DC	Fixed	75s	Fixed	30s	Delay-on-Make/Interval
KRPDA2129RXE	24 to 240VAC/DC	Onboard	0.1 - 10s	Onboard	10 - 1000h	Recycling
KRPDD2121MB	12 to 48VDC	Onboard	0.1-10s	Onboard	0.1-10s	Delay-on-Make/Delay-on-Break

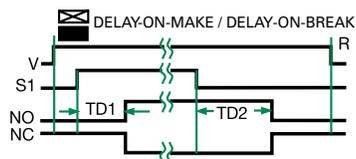
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# KRPD SERIES

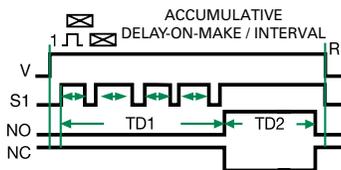
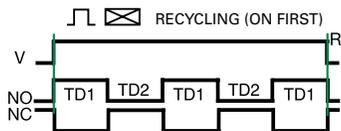
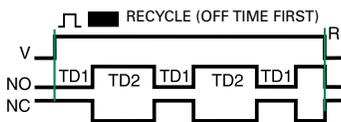
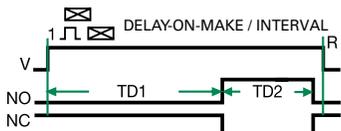
## Output Current/Ambient Temperature



## Function Diagrams



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

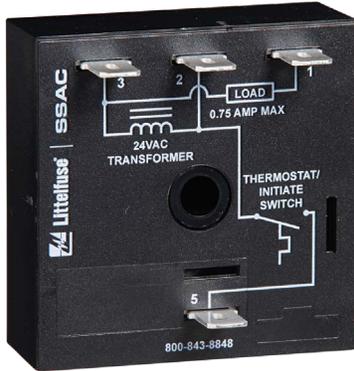


## Specifications

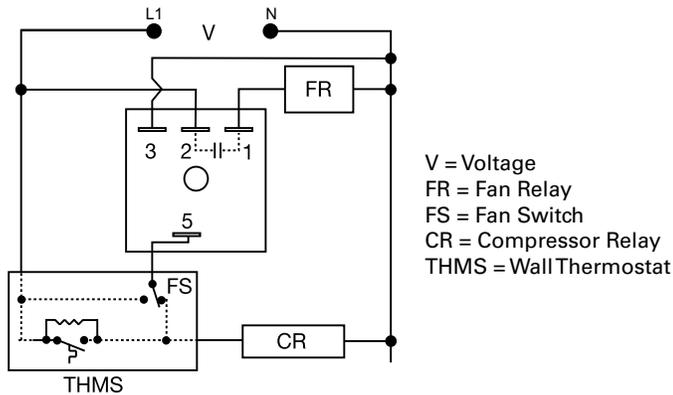
<b>Time Delay Type</b>	Microcontroller circuitry
<b>Range</b>	0.1s - 1000h in 9 adjustable ranges or fixed (to 999)
<b>Repeat Accuracy</b>	±0.5% or 20ms, whichever is greater
<b>Tolerance (Factory Calibration)</b>	≤ ±2%
<b>Reset Time</b>	≤ 150ms
<b>Initiate Time</b>	≤ 40ms; 750 operations per minute
<b>Time Delay vs. Temperature &amp; Voltage</b>	≤ ±2%
<b>Input Voltage</b>	12 to 48VDC; 24 to 240VAC/DC
<b>Tolerance</b>	-15% - 20%
<b>12 to 48VDC</b>	-20% - 10%
<b>24 to 240VAC/DC</b>	50/60 Hz / ≤ 10%
<b>AC Line Frequency/DC Ripple</b>	AC ≤ 2VA; DC ≤ 2W
<b>Power Consumption</b>	
<b>Output Type</b>	Isolated relay contacts
<b>Form</b>	SPDT
<b>Rating (at 40°C)</b>	10A resistive @ 125VAC 5A resistive @ 230VAC & 28VDC 1/4 hp @ 125VAC 250VAC
<b>Max. Switching Voltage</b>	250VAC
<b>Life (Operations)</b>	Mechanical - 1 x 10 <sup>7</sup> ; Electrical - 1 x 10 <sup>5</sup>
<b>Protection</b>	Encapsulated
<b>Circuitry</b>	≥ 1500V RMS input to output
<b>Isolation Voltage</b>	≥ 100 MΩ
<b>Insulation Resistance</b>	
<b>Polarity</b>	DC units are reverse polarity protected
<b>Mechanical</b>	
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connects
<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-40° to 60°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≈ 2.6 oz (74 g)

# CT SERIES

## Delay-on-Make/Delay-on-Break Timer



### Wiring Diagram



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

### 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  $\geq 3000$  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

FEATURES	BENEFITS
<b>Delay-on-Make and Delay-on-Break in one unit</b>	Simplifies wiring and installation, and optimizes efficiency of heating and cooling systems
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>Interconnectability with other CT modules</b>	Combine modules to provide sequencing on of a number of loads and sequencing off of the same loads

### 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

MODEL	DELAY-ON-MAKE (FIXED SECONDS)	DELAY-ON-BREAK (FIXED SECONDS)
CT1S30	1	30
CT1S45	1	45
CT1S8	1	8
CT1S90	1	90
CT30S1	30	1
CT45S45	45	45
CT5S300	5	300

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# CT SERIES

## Accessories

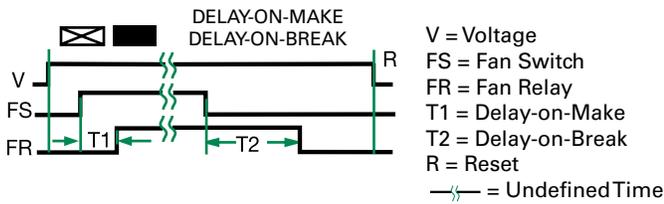


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.



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

## Function Diagram



## Specifications

### Time Delay

**Type** Microcontroller

**Range** 1 - 600s

**Repeat Accuracy** ±5%

**Tolerance** ±20%

**(Factory Calibration)** ≤ 300ms

**Recycle Time**

### 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

**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)

##### Thermostat

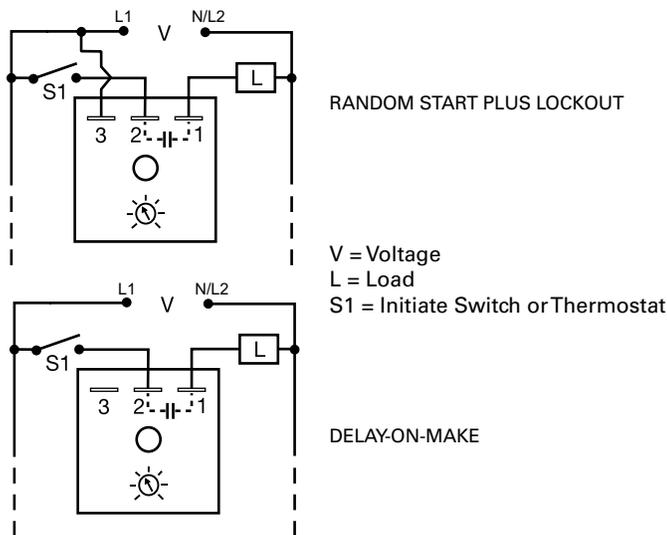
Anticipator Resistor: ≥ 3000 Ω

# T2D120A15M

## Lockout



### Wiring Diagram



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

### 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

FEATURES	BENEFITS
<b>Lockout delay</b>	Prevents rapid cycling of compressor
<b>Random start delay</b>	Prevents low voltage starting
<b>Analog circuitry</b>	Repeat Accuracy +/- 1%
<b>Compact design</b>	Allows flexibility for OEM applications
<b>1A steady, 10A inrush output</b>	Provides 100 million operations in typical conditions.
<b>Totally solid state and fully encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration and humidity

### 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.

# T2D120A15M

## 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

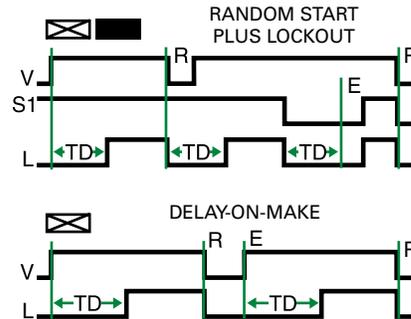
### Environmental

**Operating/Storage**  
**Temperature** -20° to 60°C / -40° 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



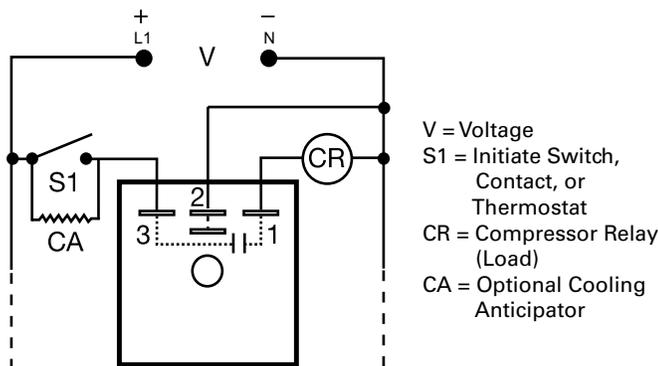
V = Voltage  
S1 = Initiate Switch  
L = Load (CR)  
E = Ready  
TD = Time Delay  
R = Reset

# TA SERIES

## Lockout



### Wiring Diagram



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

### 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

FEATURES	BENEFITS
<b>Lockout delay</b>	Prevents rapid cycling of compressor and eliminates nuisance service calls due to blown fuse or tripped breaker by locked rotor during short cycling
<b>Anti-reversing protection for scroll compressors</b>	Extends life of equipment
<b>Brownout protection</b>	Timer will not allow the compressor to start during low line voltage conditions
<b>Encapsulated</b>	Protects against shock, vibration, and humidity
<b>1A solid state output</b>	No moving parts to arc and wear out. Provides up to 100 million operations under typical conditions

### 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

MODEL	INPUT VOLTAGE	TIME DELAY
TA12D1	12VDC	1m
TA12D2	12VDC	2m
TA24A0.5	24VAC	30s
TA24A3	24VAC	3m
TA24A5	24VAC	5m

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# TA SERIES

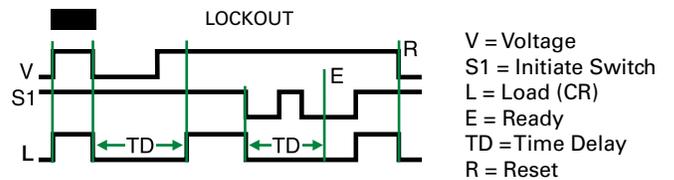
## Specifications

<b>Input</b>	
<b>Voltage</b>	12 or 24VDC; 24VAC
<b>AC Line Frequency</b>	50/60 Hz
<b>Impedance</b>	450 Ω (anticipator by-pass)
<b>Output</b>	
<b>Minimum Load Current</b>	75mA
<b>Maximum Load Current</b>	1A at 60°C
<b>Voltage Drop</b>	≤ 1.25V
<b>Time Delay</b>	≈ 16ms
<b>Initiate Time</b>	≈ 16ms
<b>Lockout Time</b>	Fixed 0.5, 1, 2, 3, or 5m
<b>Tolerance</b>	-15% - 35%
<b>Protection</b>	
<b>Circuitry</b>	Encapsulated
<b>Low Voltage Protection</b>	≈ 20V: 24VAC/DC; ≈ 9V: 12VDC
<b>Dielectric Breakdown</b>	≥ 2000V RMS terminals to mounting surface
<b>Insulation Resistance</b>	≥ 100 MΩ

## Mechanical

<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw
<b>Dimensions</b>	<b>H</b> 50.8 mm (2"); <b>W</b> 50.8 mm (2"); <b>D</b> 30.7 mm (1.21")
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Environmental</b>	
<b>Operating/Storage Temperature</b>	-40° to 70°C / -40° to 85°C
<b>Humidity</b>	95% relative, non-condensing
<b>Weight</b>	≈ 2.4 oz (68 g)
<b>Thermostat</b>	
<b>Cooling Anticipator Resistor</b>	≥ 1800 Ω

## Function Diagram



# TAC1 SERIES

## Delay-on-Make



### 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)

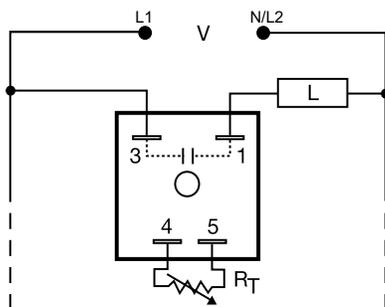
Upon application of input voltage, the time delay begins. The output is de-energized before and during the time delay. At the end of the time delay, the output energizes and remains energized until input voltage is removed.

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

### Features & Benefits

FEATURES	BENEFITS
<b>Analog circuitry</b>	Repeat accuracy +/- 2%, Factory calibration +/- 20%
<b>0.5A steady state, 10A inrush</b>	Provides 100 million operations in typical conditions.
<b>Connects in series with load relay coil</b>	Fail-safe design eliminates contactor chatter
<b>Meets UL 873</b>	UL Recognized for air conditioning and refrigeration equipment
<b>Fully encapsulated</b>	Protects against shock, vibration and humidity

### Wiring Diagram



V = Voltage  
L = Load

Load may be connected to terminals 3 or 1.  
RT is used when external adjustment is ordered.

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

### 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.

### Ordering Information

MODEL	INPUT VOLTAGE	ADJUSTMENT	TIME DELAY
TAC1223	24VAC	External	2 - 180s
TAC1411	120VAC	Fixed	1s
TAC1412	120VAC	Fixed	2s
TAC1413	120VAC	Fixed	3s
TAC14164	120VAC	Fixed	64s

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# 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**

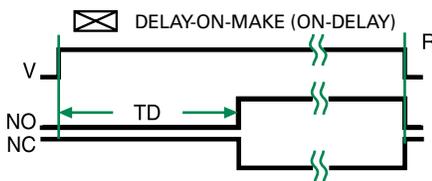
Time Delay	VTP P/N
1 - 0.05-3s	VTP4B
2 - 0.5-60s	VTP4F
3 - 2-180s	VTP4J
4 - 5-600s	VTP5N

## Selection Guide

R <sub>T</sub> Selection Chart				
Desired Time Delay*				R <sub>T</sub>
Seconds				
1	2	3	4	Megohm
0.05	0.5	2	5	0.0
0.5	10	30	60	0.5
1.0	20	60	120	1.0
1.5	30	90	180	1.5
2.0	40	120	240	2.0
2.5	50	150	300	2.5
3.0	60	180	360	3.0
			420	3.5
			480	4.0
			540	4.5
			600	5.0

\* When selecting an external R<sub>T</sub> add at least 30% for tolerance of unit and the R<sub>T</sub>.

## Function Diagram



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

## Specifications

### Time Delay

**Type** Analog circuitry  
**Range** 0.05 - 600s in 4 adjustable ranges or fixed  
**Repeat Accuracy** ±2%

**Tolerance (Factory Calibration)** ±20%  
**Recycle Time** ≤ 20ms after timing, during timing - 0.1% of time delay or 75ms, whichever is greater

### Time Delay vs Temp. & Voltage

≤ ±10%

### 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

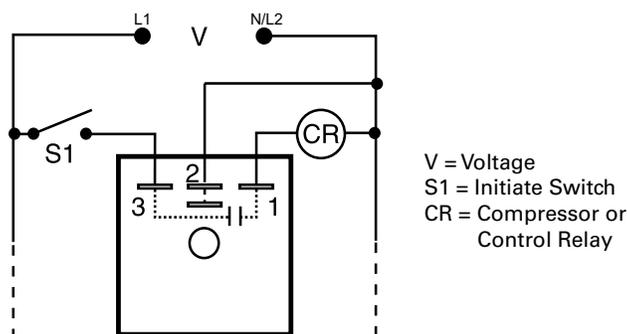
**Operating/Storage Temperature** -40° to 80°C / -40° to 85°C  
**Humidity** 95% relative, non-condensing  
**Weight** ≈ 2.4 oz (68 g)

# TL SERIES

## Lockout



### Wiring Diagram



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

### 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

FEATURES	BENEFITS
<b>Lockout delay</b>	Prevents rapid cycling of compressor and eliminates nuisance service calls due to blown fuse or tripped breaker by locked rotor during short cycling.
<b>One second Delay-on-Make (models ending in T)</b>	Eliminates contactor chatter due to thermostat bounce
<b>Totally solid state and encapsulated</b>	No moving parts to arc and wear out over time and encapsulated to protect against shock, vibration, and humidity
<b>1A steady, 10A inrush, solid state output</b>	Provides 100 million operations in typical conditions

### 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

MODEL	INPUT VOLTAGE	LOCKOUT TIME	DELAY-ON-MAKE
TL120A5T	120VAC	5m	1s
TL230A5	230VAC	5m	No delay
TL24A5T	24VAC	5m	1s

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# TL SERIES

## 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  
**Inrush Current** 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 Dimensions

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

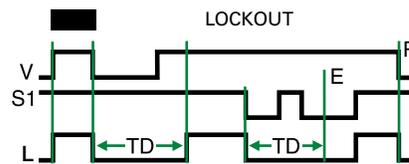
#### Weight

≈ 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



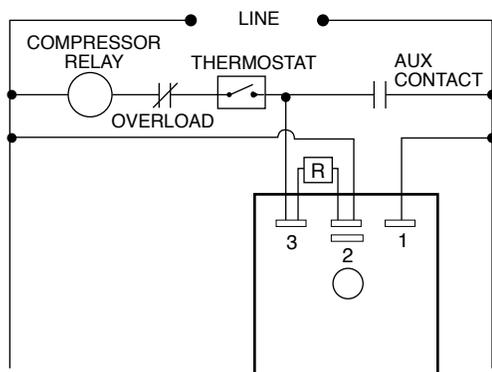
V = Voltage  
 S1 = Initiate Switch  
 L = Load (CR)  
 E = Ready  
 TD = Time Delay  
 R = Reset

# TSA141300

## Anti-Short Cycle, Solid State Timer



### Wiring Diagram



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

### 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

#### Time Delay

<b>Type</b>	Factory fixed 5 minutes
<b>Repeat Accuracy</b>	± 5% under fixed conditions
<b>Tolerance</b>	Factory calibration: ± 15%
<b>Time Delay vs. Temperature</b>	± 10% max.
<b>Input</b>	
<b>Voltage</b>	120 volts AC
<b>Tolerance</b>	± 20% of nominal
<b>AC Line Frequency</b>	50/60 Hz
<b>Output</b>	
<b>Type</b>	Solid State
<b>Maximum Load Current</b>	1 ampere steady state, 10 amperes inrush at 60°C
<b>Voltage Drop</b>	2.5 volts typical at 1 ampere
<b>Protection</b>	
<b>Transient</b>	Protected
<b>Dielectric Breakdown</b>	Greater than 1500 volts RMS
<b>Insulation Resistance</b>	100 megohms min.

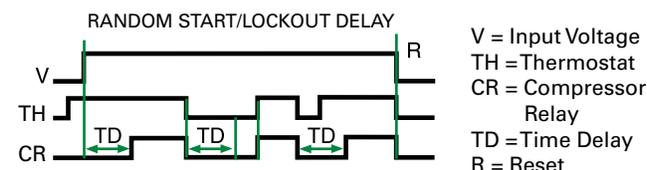
#### Mechanical

<b>Mounting</b>	Surface mount with one #8 or #10 screw
<b>Package</b>	Molded housing with encapsulated circuitry
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals
<b>Dimensions</b>	<b>H</b> 50.80 mm (2.0"); <b>W</b> 50.80 mm (2.0"); <b>D</b> 30.70 mm (1.21")

#### Environmental

<b>Operating/Storage Temperature</b>	-40°C to +80°C/-40°C to +85°C
<b>Humidity</b>	95% relative, non-condensing

### Function Diagram

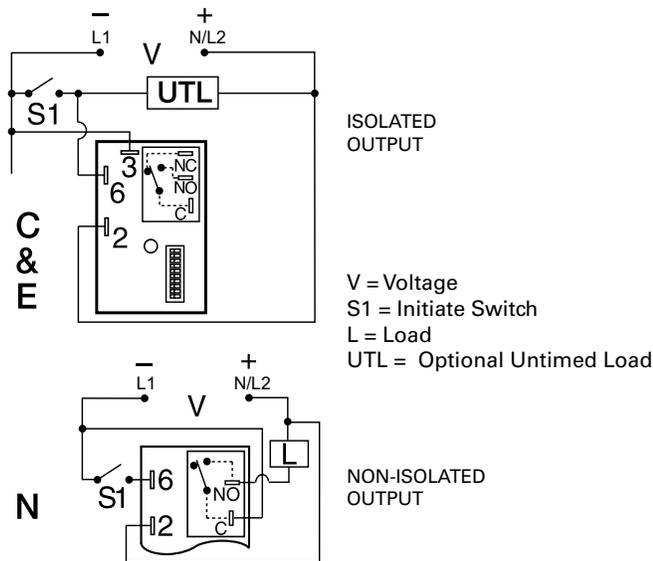


# HRV SERIES

## Coin Counter



### Wiring Diagram



For dimensional drawing see: Appendix, page 512, Figure 17.

### Ordering Information

MODEL	INPUT VOLTAGE	VEND TIME	MODE OF OPERATION	OUTPUT FORM & RATING
HRV11SC	12VDC	1 - 127s	Coin totalizer	30A SPDT, NO (isolated)
HRV24AC	24VAC	0.25 - 31.75m	Accumulating	30A SPDT, NO (isolated)
HRV41AE	120VAC	1 - 127s	Accumulating	30A SPDT, NO (isolated)
HRV41SE	120VAC	1 - 127s	Coin totalizer	30A SPDT, NO (isolated)
HRV42SE	120VAC	5 - 635s	Coin totalizer	30A SPDT, NO (isolated)
HRV43AE	120VAC	0.1 - 12.7m	Accumulating	30A SPDT, NO (isolated)
HRV43AN	120VAC	0.1 - 12.7m	Accumulating	30A SPDT, NO (non-isolated)
HRV43SE	120VAC	0.1 - 12.7m	Coin totalizer	30A SPDT, NO (isolated)

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### 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

FEATURES	BENEFITS
<b>Microcontroller based</b>	Repeat accuracy +/- 0.1%, Setting accuracy 0 - 2%, or 50ms
<b>Encapsulated</b>	Protects against shock, vibration, and humidity
<b>30A, 1Hp at 125VAC, normally open contacts</b>	Allows direct control of loads like compressors, pumps, motors, and heaters without a contactor
<b>Switch selectable coin start</b>	Allows user flexibility to select the number of coins to start vending cycle
<b>Coin switch can be connected to a counter</b>	Provides user with accurate count of total number of coins collected

# HRV SERIES

## 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.

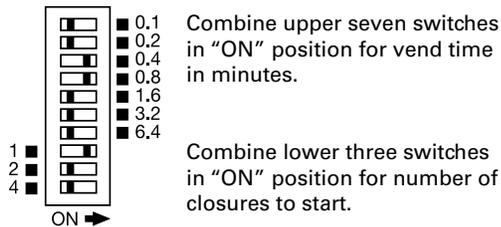


**C103PM (AL) DIN Rail**  
35 mm aluminum DIN rail available in a 36 in. (91.4 cm) length.

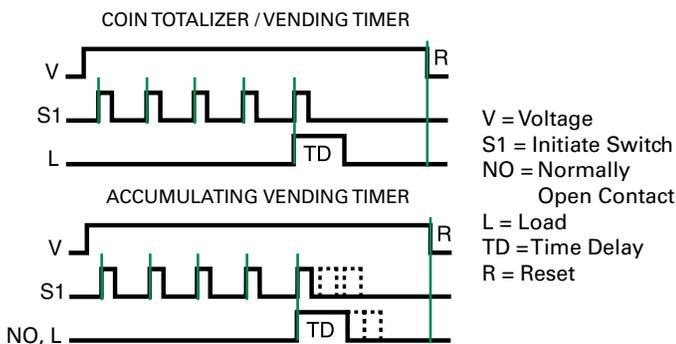


**P1023-20 DIN Rail Adapter**  
Allows module to be mounted on a 35 mm DIN type rail with two #10 screws.

## Switch Adjustment



## Function Diagram



## Specifications

<b>Count Functions/ Switch Type</b>	Mechanical (counts on switch closure)	
<b>Minimum Switch Closure Time</b>	≥ 20ms	
<b>Minimum Switch Open (between closures) Time</b>	≥ 20ms	
<b>Count Range to Start</b>	1 - 7 counts	
<b>Maximum Counts ("A" Version)</b>	250	
<b>Time Delay/Range ***</b>	Adjustable 1s - 31.75m in 4 ranges	
<b>Adjustment</b>	7 of a 10 position DIP switch	
<b>Setting Accuracy</b>	0% to +2% or 50ms, whichever is greater	
<b>Repeat Accuracy</b>	±0.1% or 20ms, whichever is greater	
<b>Reset Time</b>	≤ 150ms	
<b>Time Delay vs Temp. &amp; Voltage</b>	≤ ±2%	
<b>Input Voltage</b>	12 or 24VDC; 24, 120, or 230VAC	
<b>Tolerance</b>		
<b>12VDC &amp; 24VDC/AC</b>	-15% - 20%	
<b>120 &amp; 230 VAC</b>	-20% - 10%	
<b>AC Line Frequency/DC Ripple</b>	50/60 Hz / ≤ 10%	
<b>Power Consumption</b>	AC ≤ 4VA; DC ≤ 2W	
<b>Output Type</b>	Electromechanical relay	
<b>Form</b>	Isolated, SPDT or non-isolated, SPDT	
<b>Ratings</b>	<b>SPDT-NO</b>	<b>SPDT-NC</b>
<b>General Purpose</b>		
<b>125/240VAC</b>	30A	15A
<b>Resistive</b>		
<b>125/240VAC</b>	30A	15A
<b>28VDC</b>	20A	10A
<b>Motor Load</b>		
<b>125VAC</b>	1 hp*	1/4 hp**
<b>240VAC</b>	2 hp**	1 hp**
<b>Life</b>	Mechanical - 1 x 10 <sup>6</sup> ; Electrical - 1 x 10 <sup>5</sup> , *3 x 10 <sup>4</sup> , ** 6,000	
<b>Protection</b>	IEEE C62.41-1991 Level A	
<b>Surge</b>	Encapsulated	
<b>Circuitry</b>	≥ 1500V RMS input to output on isolated units	
<b>Dielectric Breakdown</b>	≥ 100 MΩ	
<b>Insulation Resistance</b>		
<b>Mechanical</b>		
<b>Mounting</b>	Surface mount with one #10 (M5 x 0.8) screw	
<b>Dimensions</b>	<b>H</b> 76.7 mm (3"); <b>W</b> 50.8 mm (2"); <b>D</b> 38.1 mm (1.5")	
<b>Termination</b>	0.25 in. (6.35 mm) male quick connect terminals	
<b>Environmental</b>		
<b>Operating/Storage</b>		
<b>Temperature</b>	-40° to 70°C / -40° to 85°C	
<b>Humidity</b>	95% relative, non-condensing	
<b>Weight</b>	≈ 3.9 oz (111 g)	

\*\*\*For CE approved applications, voltage must be removed when a switch position is changed.