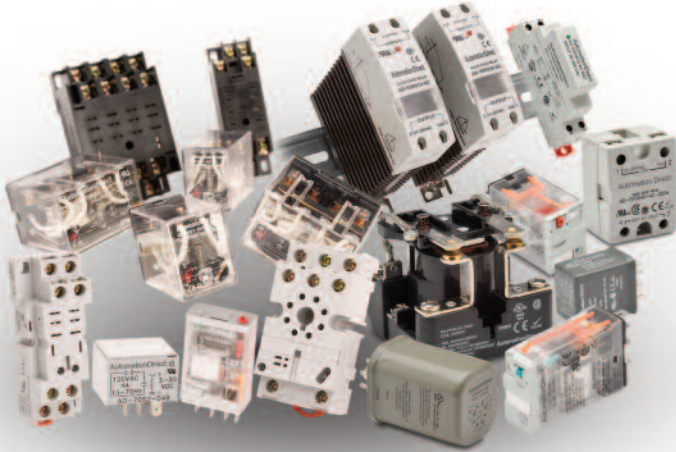
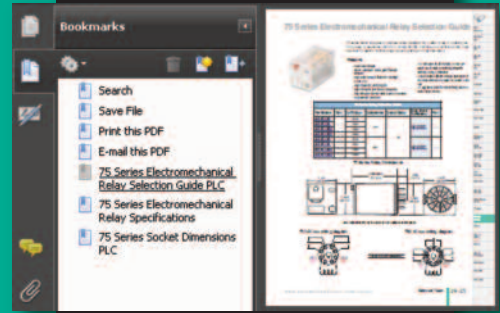


# Relays & Timers

## Section 27



In this interactive PDF you can:



- Use bookmarks to navigate by product category
- Use bookmarks to save, search, print or e-mail the catalog section
- Click on part #s to link directly to our online store for current pricing, specs, stocking information and more

Relays/ Timers



# Electromechanical



## Electromechanical Square/Cube Relays

**QL Series:** General purpose relays designed for a wide range of applications. Units plug into DIN-rail mountable relay sockets, with a 10A contact rating. Ideal for electric control panels requiring stable and reliable relays.

**QM Series:** General purpose relays with a 5A DPDT or 3A 4PDT contact rating, designed for use in applications from power to sequence controls in various factory machines and control panels.

**78 Series:** 78 series cube relays, with a 15A contact rating, are ideal for applications demanding high power control in various factory machines and control panels. Available in 24 VAC, 120 VAC, 240 VAC and 24 VDC coil voltages.

# A Full Lineup of Control Relays

Our general purpose industrial relays are a low-cost way of adding control and isolation relays to any application. Electromechanical relays are available in cube, open and card styles for a diverse range of installation requirements. Cube relays are available with standard linear or octal base connection patterns. Solid state relays available include hazardous location, socket-mount, DIN-rail mount and panel-mount styles.

All relays feature LED indicators for easy troubleshooting.



## Plug-in Octal Cube Relays

### 75 Series



750/755 series cube relays with standard octal base design, offer high-current capability (12A) with compact design. Available in 24 VAC, 120 VAC, 240 VAC and 24 VDC coil voltages.

## Open-Style Power Relays

### AD Series



AD-PR40 series power relays are open construction design with high power contacts capable of switching up to 40A. SPDT, DPST and DPDT models are available.

## Plug-in Hazardous Location Octal and Square/Cube Relays

### H782/H750 Series



H782/H750 series hermetically sealed, ice cube style relays are designed for applications requiring hermetically sealed units for hazardous factory locations. (Class I, Div. 2 Groups A, B, C, D).

## Latching Octal Cube Relay

### 755 Series



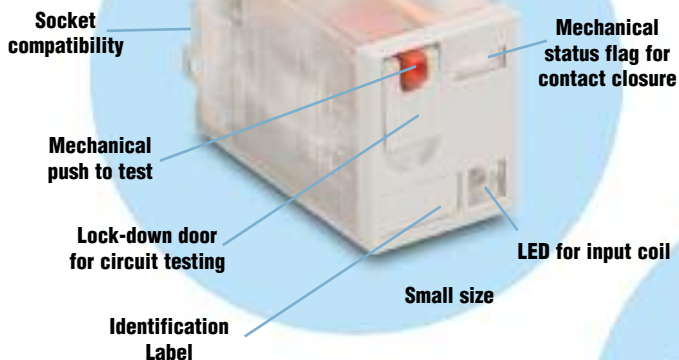
755 series cube relays, with a 16A contact rating, are ideal for applications requiring a latching device. Permanent magnet maintains last position. Available in 120 VAC and 24 VDC coil voltages.



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- Proximity Sensors
- Photo Sensors
- Limit Switches
- Encoders
- Current Sensors
- Pressure Sensors
- Temperature Sensors
- Pushbuttons/Lights
- Process
- Relays/Timers**
- Comm.
- Terminal Blocks & Wiring
- Power
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- Tools
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- Safety
- Appendix
- Product Index
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## Electromechanical Relays

### 78 Series



**Check the technical specifications on the following pages to choose the right relay for your application.**

## Quality built into every relay at an affordable price.

Low price combined with industry-demanded quality make our relays one of the best values in automation.

Our manufacturers ensure that nothing is spared in the design and production of our products. By offering them direct to you, AUTOMATIONDIRECT makes certain that you get the same or better quality than other brands at a great price.

## Solid State Relays



# Solid State

### Slim/Card Relay

#### RS Series



RS series relays are compact, space-saving, relay terminal modules containing four or six relays with one N.O. contact each. These relay-and-terminal modules are ideal for interfacing electronic control devices with output devices.

### Panel Mount Hockey Puck Relays

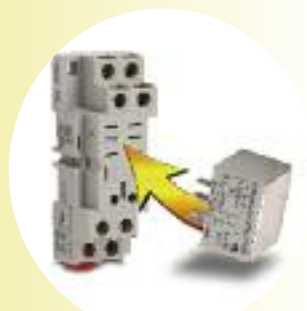
#### AD-SSR5 Series



AD-SSR6 series Class 6 solid state relays have electro-mechanical relays with solid-state circuitry and high load ratings up to 75 amps in a finger-safe "Hockey Puck" housing.

### Socket Mount Relays

#### AD-70S2 Series



These solid state relays, with 4A contact ratings, plug into a DIN-rail mountable relay socket or can be wired with the quick-connect terminals.

### DIN Rail Mount Relays

#### AD-SSR/AD-HSSR Series



Class 8 hazardous location series in a slim, space-saving housing (8A, 10A, 15A) with the added feature of being approved for hazardous locations (Class 1, Div. 2, Groups A, B, C, D).

### DIN Rail Mount Relays

#### AD-SSR/AD-HSSR Series



- AD-SSR2 Series - AC and DC input, AC output with 10 or 25 Amp loads
- AD-SSR8 Series - Class 8 solid state relays with energy efficient current switching in a slim, space-saving housing
- AD-HSSR8 Series - hazardous location solid state relays (HAZLOC relays)



# Electromechanical Relay Selection Guide



Specification	QL Series	QM Series	RS Series Card Relays
<b>Coil Voltages</b>	110/120VAC, 220VAC, 24VDC	110/120VAC, 220VAC, 24VDC	24VDC
<b>Configuration</b>	2PDT, 4PDT	2PDT, 4PDT	SPST (up to six relays)
<b>Contact Rating</b>	10A	5A DPDT ; 3A 4PDT	5A
<b>Base Socket</b>	8 or 14 pin spade terminal	8 or 14 pin spade terminal	-
<b>Agency Approvals</b>	UL Recognized (#E222847), CE Certified (9667186-9811), CSA Certified (218218)	UL Recognized (#E222847), CE Certified (9667186-9811), CSA Certified (218218)	UL Recognized (E44592), CSA (LR20479) TUV (R95551729)
<b>Prices starting at</b>	<-->	<-->	<-->

## QL Series Electromechanical Relay Selection Guide



QL series relays are general purpose relays designed for a wide range of applications, from power to sequence controls in various factory machines and control panels. They are ideal for electric control panels requiring stable and reliable relays.

### Features

- Small package design
- ARC Barrier equipped
- Silver Cadmium Oxide contact
- High dielectric strength (1,800 VAC)
- High reliability and long life
- Ultra-high sensitivity with quick response time (25 ms max.)
- High vibration and shock resistance
- LED indicator on all models, so you can easily see if relay is working properly without using a voltmeter
- Diode protection available on 24 VDC models, which protects contacts and electronic components from back EMF
- UL recognized, CE certified, CSA approval pending
- DPDT and 4PDT models

• **ORDER SOCKET SEPARATELY**

### QL Series Selection Guide

Part Number	Price	Coil Voltage	Configuration	Contact Rating	Dimensions (see page 24-7)	Relay Socket Part Number	Price	Dimensions (see page 24-13)
<b>QL2N1-A120</b>	<-->	110/120VAC	2PDT	10A	Figure 1	<b>SQL08D</b>	<-->	Figure 3
<b>QL4N1-A120</b>	<-->		4PDT	10A	Figure 2	<b>SQL14D</b>	<-->	Figure 4
<b>QL2N1-A220</b>	<-->	220VAC	2PDT	10A	Figure 1	<b>SQL08D</b>	<-->	Figure 3
<b>QL4N1-A220</b>	<-->		4PDT	10A	Figure 2	<b>SQL14D</b>	<-->	Figure 4
<b>QL2N1-D24</b>	<-->	24VDC	2PDT	10A	Figure 1	<b>SQL08D</b>	<-->	Figure 3
<b>QL2X1-D24</b>	<-->		2PDT	10A	Figure 1	<b>SQL08D</b>	<-->	Figure 3
<b>QL4N1-D24</b>	<-->		4PDT	10A	Figure 2	<b>SQL14D</b>	<-->	Figure 4
<b>QL4X1-D24</b>	<-->		4PDT	10A	Figure 2	<b>SQL14D</b>	<-->	Figure 4



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C-more &amp; other HMI

Drives

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Motors &amp; Gearbox

Steppers/Servos

Motor Controls

Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Current Sensors

Pressure Sensors

Temperature Sensors

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# QL Series Electromechanical Relay Specifications

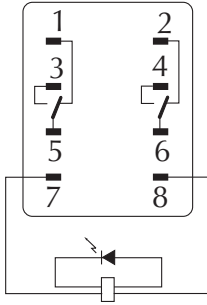
QL Series Specification Table								
Part Numbers	QL2N1-A120	QL2N1-A220	QL4N1-A120	QL4N1-A220	QL2N1-D24	QL2X1-D24	QL4N1-D24	QL4X1-D24
<b>Contact Specifications</b>								
<b>Current Rating</b>	10A							
<b>Contact Type</b>	DPDT		4PDT		DPDT		4PDT	
<b>Terminal Type</b>	Spade Plug-In Socket							
<b>Rated Max. Resistive Load</b>	10A@110VAC/10A@24VDC							
<b>Rated Max. Inductive Load</b>	7.5A@110VAC/ 5A@24VDC							
<b>Minimum Recommended Load</b>	1mA @ 5VDC							
<b>Max. Switching Cap. (Resistive Load)</b>	1,100VAC/240W							
<b>Max. Switching Cap. (Inductive Load)</b>	825VAC/120W							
<b>Max. Contact Rating</b>	250VAC/125VDC							
<b>Coil Specifications</b>								
<b>Options</b>	LED Indicator					LED Indicator/Diode Protection	LED Indicator	LED Indicator/Diode Protection
<b>Coil Input Voltage</b>	110/120VAC	220/240VAC	110/120VAC	220/240VAC	24VDC			
<b>Rated Current at 50Hz</b>	9.9/10.8mA	6.2/6.8mA	17/19mA	11.5/13.1mA	36.9mA		69mA	
<b>Rated Current at 60Hz</b>	8.4/9.2mA	5.3/5.8mA	18/16.4mA	9.8/11.2mA	36.9mA		69mA	
<b>Coil Resistance</b>	4.43kΩ	12.95kΩ	2.2kΩ	6.7kΩ	650Ω		350Ω	
<b>Power Consumption</b>	Approx. 0.9W to 1.1W (at 60Hz)				Approx. 0.9W			
<b>Dropout Voltage (% of rated voltage)</b>	Min. 30%				Min. 10%			
<b>Pick-Up Voltage (Must operate voltage)</b>	Max. 80% of the rated coil voltage							
<b>Max. Voltage (Max. continuous voltage)</b>	110% of the rated coil voltage							
<b>Min. Operating Voltage</b>	80% of the rated coil voltage							
<b>General Specifications</b>								
<b>Service Life</b>	Mechanical: AC: Min. 50 million operations; DC: Min. 100 million operations (at operating frequency of 18,000 operations/hour) Electrical: DPDT: Min. 500k operations; 4PDT: Min. 200k operations (at operating frequency of 1,800 operations/hour)							
<b>Operate Time</b>	25ms max							
<b>Release Time</b>	25ms max							
<b>Ambient Temperature</b>	-25° C to 70° C (-13° F to 158° F)							
<b>Ambient Humidity</b>	45% to 85% Relative Humidity							
<b>Contact Material</b>	Silver Cadmium Oxide							
<b>Contact Resistance</b>	50mΩ max.							
<b>Operating Frequency</b>	Mechanical 18,000 operations/hour; Electrical 1,800 operations/hour							
<b>Vibration Resistance</b>	10Hz to 55Hz at double amplitude of 1.0mm							
<b>Shock Resistance</b>	1,000m/s <sup>2</sup> (approx. 100G)							
<b>Weight</b>	35g (1.24oz.)							
<b>Agency Approvals and Standards</b>	UL Recognized (#E222847), CE Certified (9667186-9811), CSA Certified (218218)							

# QL Series Wiring Diagrams and Derating Curves

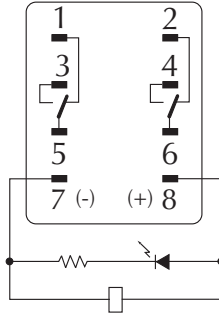
## Wiring Diagrams

**QL2N1-A120**

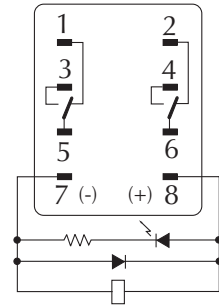
**QL2N1-A220**



**QL2N1-D24**

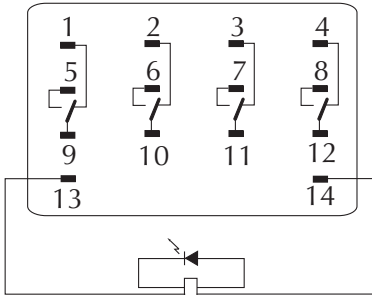


**QL2X1-D24**

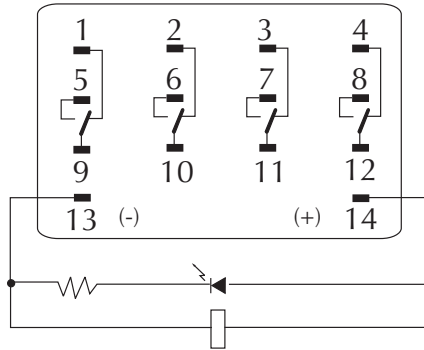


**QL4N1-A120**

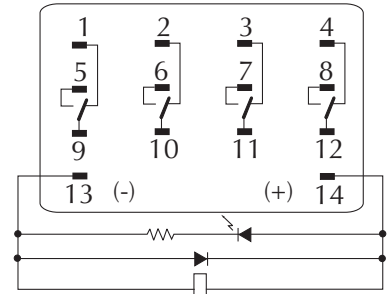
**QL4N1-A220**



**QL4N1-D24**

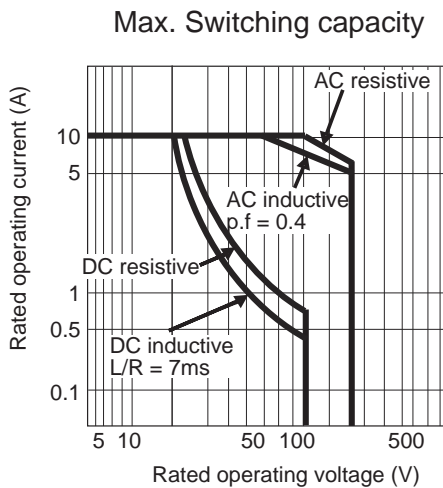


**QL4X1-D24**



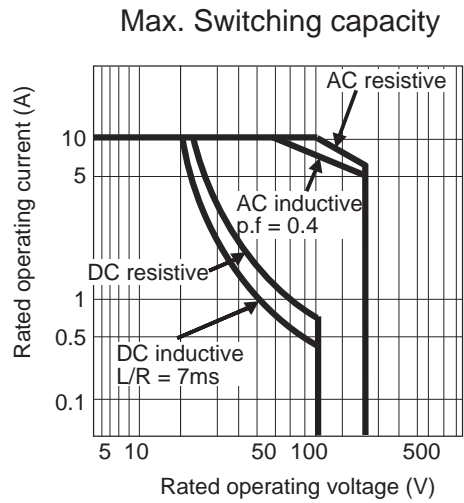
## Derating Curves

### 2PDT



**QL 2PDT**

### 4PDT



**QL 4PDT**

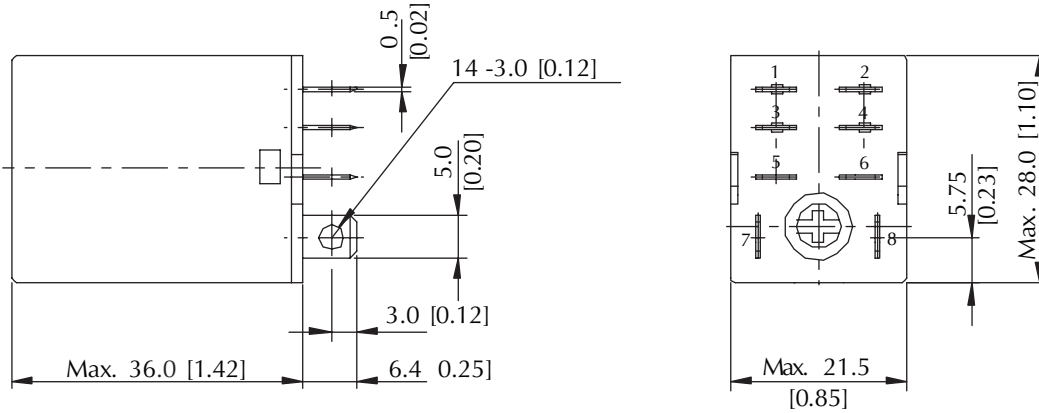


# QL Series Dimensional Drawings

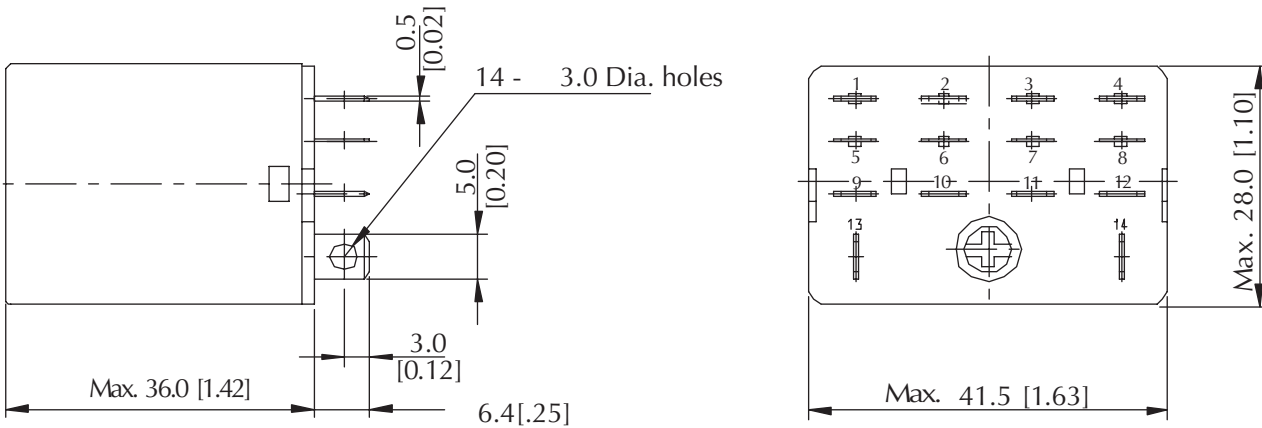
## Dimensions

mm [inches]

**Figure 1  
QL2**



**Figure 2  
QL4**



# QM Series Electromechanical Relay Selection Guide

QM series relays are general purpose relays designed for a wide range of applications, from power to sequence controls in various factory machines and control panels. They are ideal for electric control panels requiring stable and reliable relays.



## Features

- Small package design
- DPDT has a fine silver contact with 5A capability
- 4PDT has a gold-plated silver contact with 3A capability
- High dielectric strength (1,800 VAC)
- High reliability and long life
- Ultra-high sensitivity with quick response time (20 ms max.)
- High vibration and shock resistance
- LED indicator on all models, so you can easily see if relay is working properly without using a voltmeter
- Diode protection on some 24 VDC models protects contacts and electronic components from back EMF
- UL recognized, CE certified, CSA certified (218218)

• **ORDER SOCKET SEPARATELY**

QM Series Selection Guide								
Part Number	Price	Coil Voltage	Configuration	Contact Rating	Dimensions (see page 24-11)	Relay Socket Part Number	Price	Dimensions (see page 24-13)
<b>QM2N1-A120</b>	<--->	110/120VAC	2PDT	5A	Figure 1	<b>SQM08D</b>	<--->	Figure 5
<b>QM4N1-A120</b>	<--->		4PDT	3A	Figure 2	<b>SQM14D</b>	<--->	Figure 6
<b>QM2N1-A220</b>	<--->	220VAC	2PDT	5A	Figure 1	<b>SQM08D</b>	<--->	Figure 5
<b>QM4N1-A220</b>	<--->		4PDT	3A	Figure 2	<b>SQM14D</b>	<--->	Figure 6
<b>QM2N1-D24</b>	<--->	24VDC	2PDT	5A	Figure 1	<b>SQM08D</b>	<--->	Figure 5
<b>QM2X1-D24</b>	<--->		2PDT	5A	Figure 1	<b>SQM08D</b>	<--->	Figure 5
<b>QM4N1-D24</b>	<--->		4PDT	3A	Figure 2	<b>SQM14D</b>	<--->	Figure 6
<b>QM4X1-D24</b>	<--->		4PDT	3A	Figure 2	<b>SQM14D</b>	<--->	Figure 6





# QM Series Electromechanical Relay Specifications

Company Information

Systems Overview

Programmable Controllers

Field I/O

Software

C-more & other HMI

Drives

Soft Starters

Motors & Gearbox

Steppers/Servos

Motor Controls

Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Current Sensors

Pressure Sensors

Temperature Sensors

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Relays/Timers

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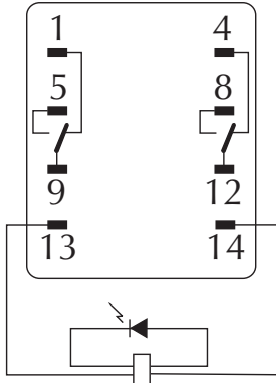
**QM Series Specification Table**

Part Numbers	QM2N1-A120	QM2N1-A220	QM4N1-A120	QM4N1-A220	QM2N1-D24	QM2X1-D24	QM4N1-D24	QM4X1-D24
<b>Contact Specifications</b>								
<b>Current Rating</b>	5A		3A		5A		3A	
<b>Contact Type</b>	DPDT		4PDT		DPDT		4PDT	
<b>Terminal Type</b>	Spade plug-in socket							
<b>Rated Max. Resistive Load</b>	5A @ 220VAC/5A @ 24VDC		3A @ 220VAC/3A @ 24VDC		5A @ 220VAC/5A @ 24VDC		3A @ 220VAC/3A @ 24VDC	
<b>Rated Max. Inductive Load</b>	2A @ 220VAC/2A @ 24VDC		1.5A @ 220VAC/0.8A @ 24VDC		2A @ 220VAC/2A @ 24VDC		1.5A @ 220VAC/0.8A @ 24VDC	
<b>Minimum Recommended Load</b>	1mA @ 1VDC							
<b>Max. Switching Cap. (Resistive Load)</b>	1,100VA/120W		660VA/72W		1,100VA/120W		660VA/72W	
<b>Max. Switching Cap. (Inductive Load)</b>	440VA/48W		176VA/36W		440VA/48W		176VA/36W	
<b>Max. Contact Rating</b>	250VAC/125VDC				250VAC/125VDC			
<b>Coil Specifications</b>								
<b>Options</b>	LED Indicator				LED Indicator/Diode Protection	LED Indicator	LED Indicator/Diode Protection	
<b>Coil Input Voltage</b>	110/120VAC	220/240VAC	110/120VAC	220/240VAC	24VDC			
<b>Rated Current at 50Hz</b>	9.9 /10.8mA	6.2/6.8mA	9.9/10.8mA	6.2/6.8mA	36.9mA			
<b>Rated Current at 60Hz</b>	8.4/ 9.2mA	5.3/5.8mA	8.4/9.2mA	5.3/5.8mA				
<b>Coil Resistance</b>	4.43kΩ	12.95kΩ	4.43kΩ	12.95kΩ	650Ω			
<b>Power Consumption</b>	Approx. 0.9W to 1.1W (at 60Hz)				Approx. 0.9W			
<b>Dropout Voltage (% of rated voltage)</b>	Min. 30%				Min. 10%			
<b>Pick-Up Voltage (Must operate voltage)</b>	Max. 80% of the rated coil voltage							
<b>Max. Voltage (Max. continuous voltage)</b>	110% of the rated coil voltage							
<b>Min. Operating Voltage</b>	80% of the rated coil voltage							
<b>General Specifications</b>								
<b>Service Life</b>	Mechanical: AC: Min. 50 million operations; DC: Min. 100 million operations (at operating frequency of 18,000 operations/hour)							
	Electrical: DPDT: Min. 500k operations; 4PDT: Min. 200k operations (at operating frequency of 1,800 operations/hour)							
<b>Operate Time</b>	20ms max							
<b>Release Time</b>	20ms max							
<b>Ambient Temperature</b>	-25° C to 75° C (-13° F to 167° F)							
<b>Ambient Humidity</b>	45% RH to 85% RH							
<b>Contact Material</b>	Fine Silver		Gold-plated Silver		Fine Silver		Gold-plated Silver	
<b>Contact Resistance</b>	50mΩ max							
<b>Operating Frequency</b>	Mechanical: 18,000 operations/hour; Electrical: 1,800 operations/hour							
<b>Vibration Resistance</b>	10Hz to 55Hz at double amplitude of 1.0mm							
<b>Shock Resistance</b>	1,000m/s <sup>2</sup> (approx. 100G)							
<b>Weight</b>	35g (1.24oz.)							
<b>Agency Approvals and Standards</b>	UL Recognized (#E222847), CE Certified (9667186-9811), CSA Certified (218218)							

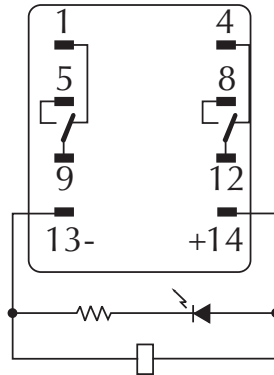
# QM Series Wiring Diagrams and Derating Curves

## Wiring diagrams

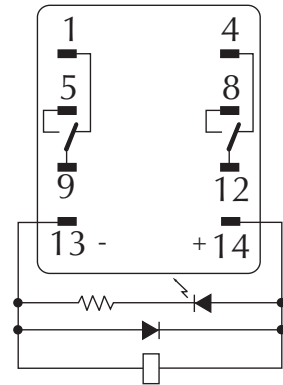
**QM2N1-A120**  
**QM2N1-A220**



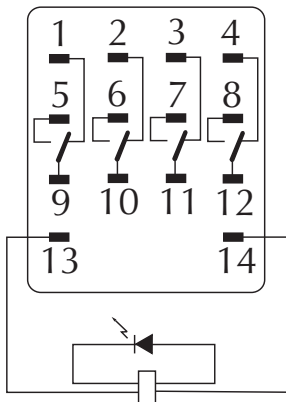
**QM2N1-D24**



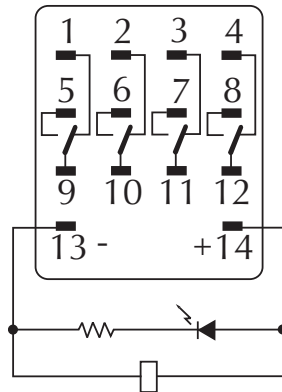
**QM2X1-D24**



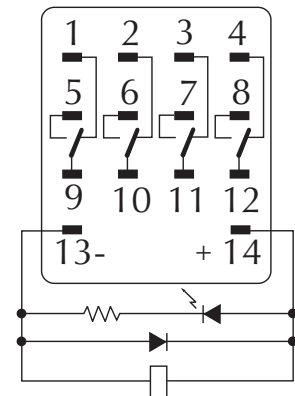
**QM4N1-A120**  
**QM4N1-A220**



**QM4N1-D24**



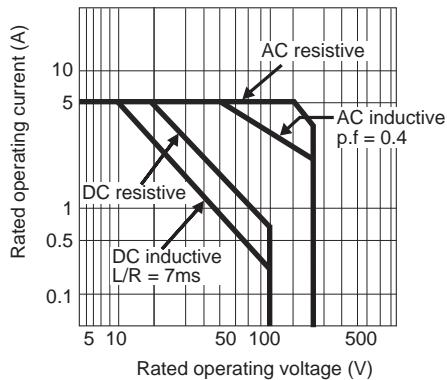
**QM4X1-D24**



## Derating curves

**DPDT**

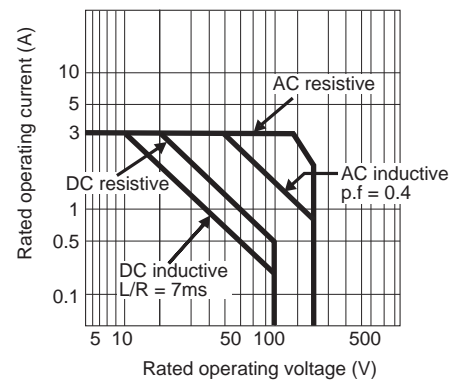
Max. Switching capacity



QM DPDT

**4PDT**

Max. Switching capacity



QM 4PDT



# QM Series Dimensional Drawings

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Programmable Controllers

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Steppers/ Servos

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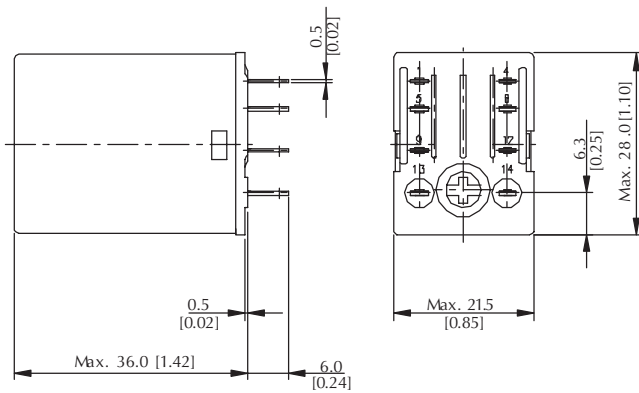
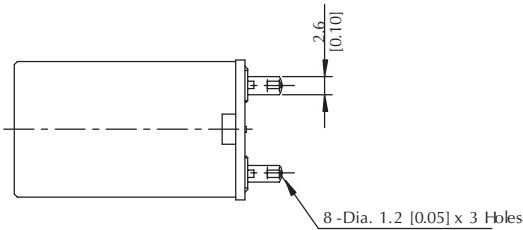
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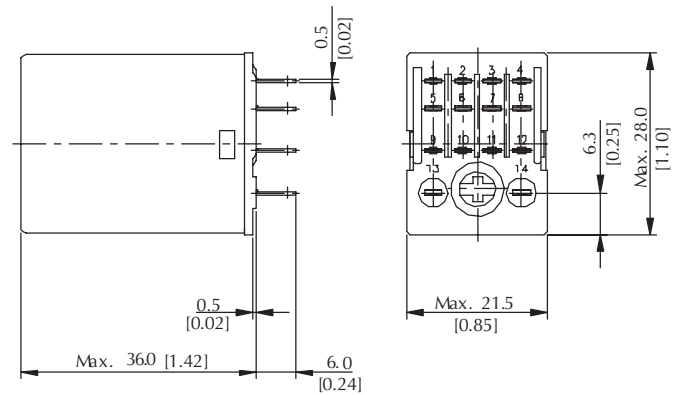
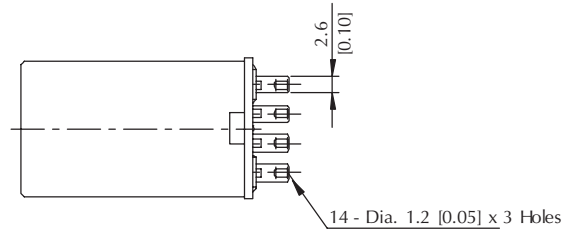
## Dimensions

mm [inches]

### Figure 1 QM2 Series



### Figure 2 QM4 Series



# Sockets for QL/QM Series Relays

**SQL08D**



Din-rail mounting, DPDT, for use with QL2 series relays

<--->

**SQL14D**



Din-rail mounting, 4PDT, for use with QL4 series relays

<--->

**SQM08D**



Din-rail mounting, DPDT, for use with QM2 series relays

<--->

**SQM14D**



Din-rail mounting, 4PDT, for use with QM4 series relays

<--->

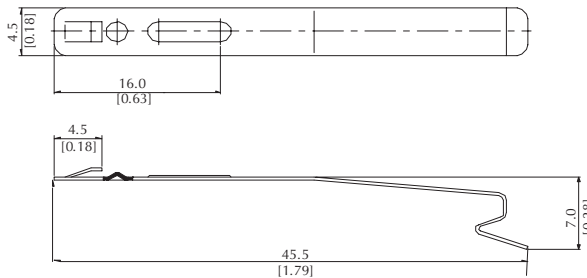
## Holding Clips

Holding clips for the QL2, QL4, QM2 and QM4 series relays can be removed by pushing the side of the inserting hole with a sharp object.

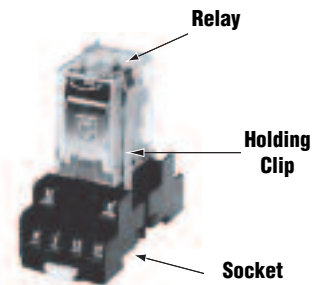
**Note:** Order sockets separately; holding clips are included with sockets.

### Holding Clip Dimensions mm [in]

Holding clip for QL4 series relays is included with SQL14D sockets.

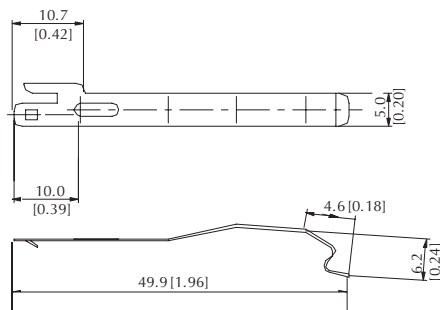


Insert holding clip into the slots provided on the socket.



### Holding Clip Dimensions mm [in]

Holding clip for QL2, QM2 and QM4 series relays is included with SQL08D, SQM08D and SQM14D sockets.



# Socket Dimensions for QL/QM Series Relays



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Drives

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Motors & Gearbox

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Photo Sensors

Limit Switches

Encoders

Current Sensors

Pressure Sensors

Temperature Sensors

Pushbuttons/ Lights

Process

Relays/ Timers

Comm.

Terminal Blocks & Wiring

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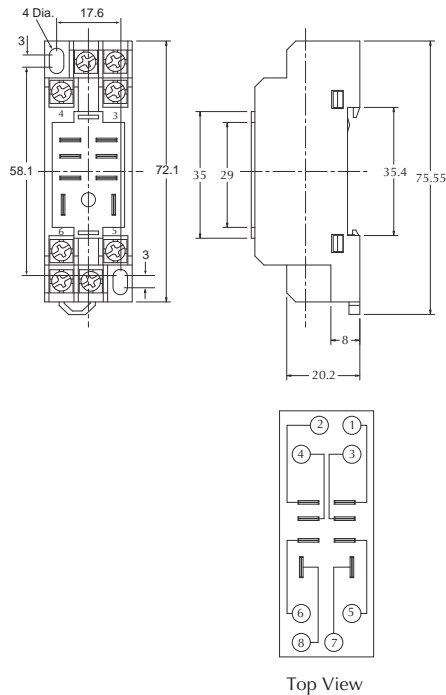
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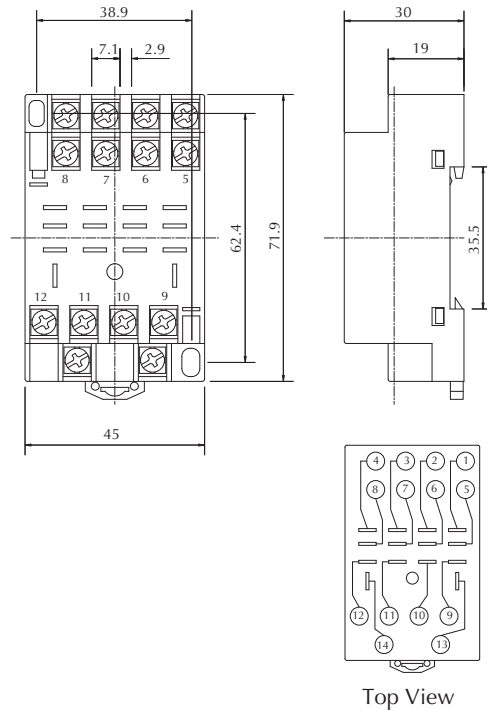
## Dimensions

mm

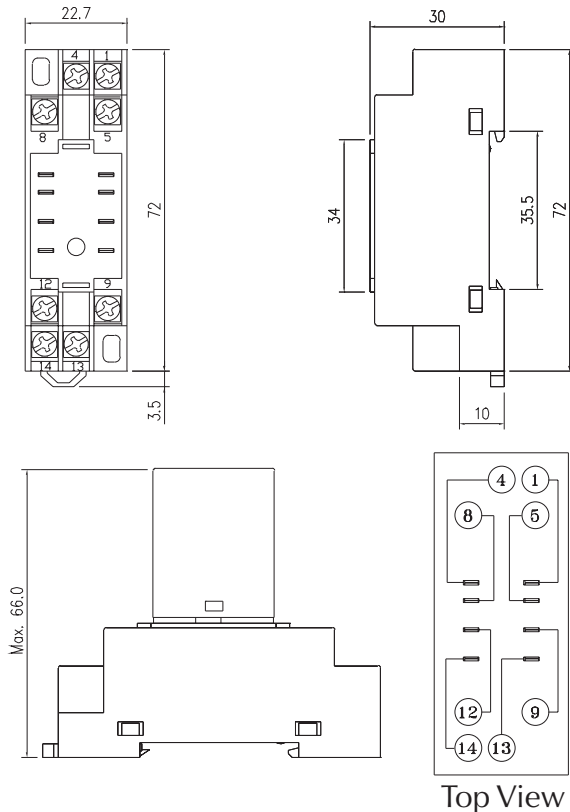
**Figure 3**  
**SQL08D (for QL2 Series Relays)**



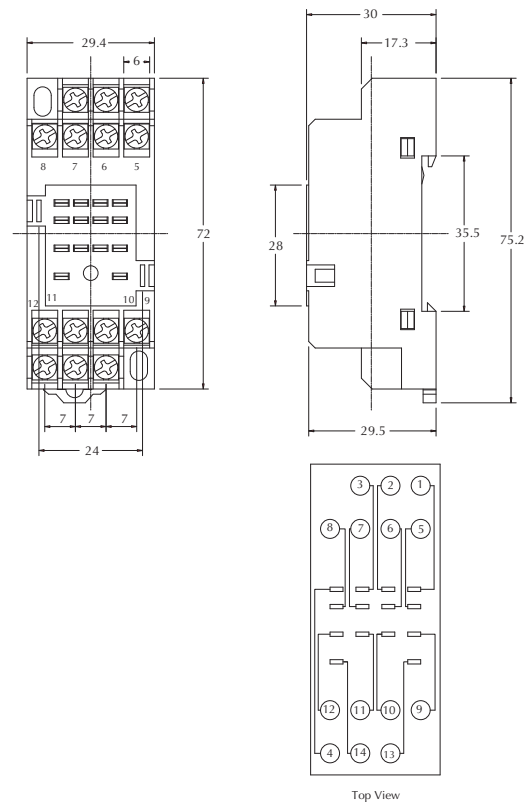
**Figure 4**  
**SQL14D (for QL4 Series Relays)**



**Figure 5**  
**SQM08D (for QM2 Series Relays)**

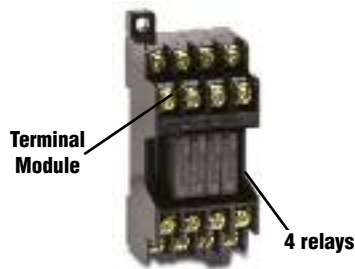


**Figure 6**  
**SQM14D (for QM4 Series Relays)**





# RS Series Electromechanical Relay Selection Guide



**RS4N-DE**



**RB105-DE**



**TY3**



**RZ4N**

RS Series Card Relay Selection Guide			
<i>Part Number</i>	<i>Price</i>	<i>Description</i>	<i>Dimensions and Wiring Diagrams</i>
<b>RS4N-DE</b>	<-->	Card relay (4 relays included; 4 commons), mounted in socket, 24VDC coil, SPST, 5A rating. TY3 included; (can only be wired one way for proper operation of LEDs)	Figure 3
<b>RS6N-DE</b>	<-->	Card relay (6 relays included; 2 commons; 3 relays per common), mounted in socket, 24VDC coil, SPST, 5A rating. TY3 included.	Figure 4
<b>RB105-DE</b>	<-->	Spare relays (package of 10) for the RS series Relays. 24V DC coil, SPST, 5A rating.	Figure 1
<b>TY3</b>	<-->	Relay remover for RS series relays. Package of 10.	-
<b>RZ4N</b>	<-->	Terminal guard for RS series relays. Package of 10.	Figure 2



# RS Series Relay Specifications



RS6N-DE

RS series relays are compact, space-saving relay terminal modules containing four or six card relays with one normally open contact each. These relay-and-terminal modules are ideal for interfacing electronic control devices (such as PLCs or photoelectric sensors) with output devices.

RS6N-DE <--->  
RS4N-DE <--->

## Features:

- Compact size of 34 mm wide by 69 mm long, including screw terminals
- Input terminals are located in the upper part and output terminals in the lower part of the module to separate them from each other, making wiring easy
- RB105 plug-in relays and TP04 sockets make maintenance easy
- Built-in coil surge-suppression diodes and operation indicator LEDs simplify circuit design and maintenance
- The module is easily-mounted on a 35 mm DIN rail
- The RS4N module includes two standard accessory jumper plates, which are convenient for common wiring of terminals

RS4N-DE and RS6N-DE Series Card Relay Specifications Table

<b>Contact</b>		1 NO / SPST			
<b>Contact Resistance</b>		30mΩ or less (before use)			
<b>Contact Material</b>		Silver alloy (gold-plated)			
<b>Min. Operating Voltage and Current</b>		0.1VDC, 1mA			
<b>Rated Thermal Current</b>		5A			
<b>Max. Make/Break Current (Resistive Load)</b>		250VAC, 5A 30VDC, 5A			
<b>Operating Time</b>		10ms or less at rated voltage			
<b>Release Time</b>		10ms or less at rated voltage			
<b>Insulation Resistance</b>		100MΩ (at 500VDC megger)			
<b>Dielectric Strength</b>	<b>Between Contact and Coil</b>	2000VAC 1 minute			
	<b>Between Contacts of Same Pole</b>	750VAC 1 minute			
	<b>Between Contacts of Different Pole</b>	2000VAC 1 minute			
	<b>Between Coils of Different Pole</b>	500VAC 1 minute			
<b>Vibration</b>	<b>Malfunction Durability</b>	10 to 55Hz, 1mm double amplitude			
	<b>Mechanical Durability</b>	10 to 55Hz, 1.5mm double amplitude			
<b>Shock</b>	<b>Malfunction Durability</b>	100m/s <sup>2</sup>			
	<b>Mechanical Durability</b>	1000m/s <sup>2</sup>			
<b>Life Expectancy</b>	<b>Mechanical</b>	20 million operations			
	<b>Electrical</b>	<b>Voltage</b>	<b>Make Current (A)</b>	<b>Break Current (A)</b>	<b>Operations</b>
		220VAC (inductive load)	2 (cos θ = 0.7)	2 (cos θ = 0.3 - 0.4)	100,000
		220VAC (resistive load)	3 (cos θ = 1.0)	3 (cos θ = 1.0)	130,000
		24VDC (inductive load)	1 (T = 15ms)	1 (T = 15ms)	150,000
		24VDC (resistive load)	5 (T = 1ms or less)	5 (T = 1ms or less)	100,000
<b>Ambient Temperature</b>		-25 to +55° C (no icing)			

# Electromechanical Relay RB105-DE Specifications



**RB105-DE**

These spare relays are for replacement in RS4N-DE and RS6N-DE relay modules (5 mm). Bifurcated contacts ensure high contact reliability, allowing use in low-level circuits.

RB105-DE <--->

## Features

- Narrow, miniature size and light weight reduces space on the DIN rail
- UL, CSA, CE, and TUV approved
- Low power consumption
- Can be operated with a non-polarity magnet
- Flux-tight construction

**RB105-DE Card Relay Specification Table**

<b>Operating Time</b>	10ms or less at rated voltage	
<b>Release Time</b>	5ms or less at rated voltage	
<b>Insulation Resistance</b>	100M $\Omega$ (at 500VDC megger)	
<b>Dielectric Strength</b>	750VAC 1 minute between open contacts 2000VAC 1 minute between contact and coil	
<b>Impulse</b>	4,500V or more 1.2 x 50 $\mu$ s between contact and coil	
<b>Electrical Life Expectancy</b>	AC: 100,000 operations at 220VAC 2A, inductive load 130,000 operations at 220VAC 3A, resistive load DC: 150,000 operations at 24VDC 1A, inductive load 100,000 operations at 24VDC 5A, resistive load	
<b>Mechanical Life Expectancy</b>	20 million operations	
<b>Ambient Temperature</b>	-40° C to +70° C (no icing)	
<b>Thermal Current</b>	5A	
<b>Make and Break Current (Resistive Load)</b>	250VAC, 5A 30VDC, 5A	
<b>Operating Coil</b>	<b>Rated voltage</b>	24VDC
	<b>Pick-up voltage</b>	70% of rated coil voltage
	<b>Drop-out voltage</b>	5% of rated coil voltage
	<b>Power consumption</b>	200mW
	<b>Coil resistance</b>	2880 $\Omega$



# RS Series Relay Remover and Protective Cover

## Relay remover, TY3

To remove a relay from the terminal module, use the TY3 relay remover. RS4N-DE and RS6N-DE modules include a TY3 relay remover. Pull the relay in a direction perpendicular to the terminal module surface. Incorrectly removing or mounting a relay may damage the relay pins and pin jacks of the module.

TY3 <--->



## Optional protective cover, RZ4N

A protective cover fits over the RS4N-DE or RS6N-DE module and protects the terminals.

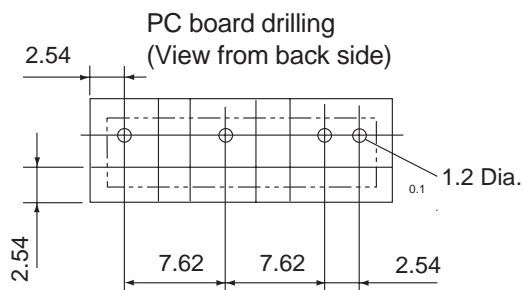
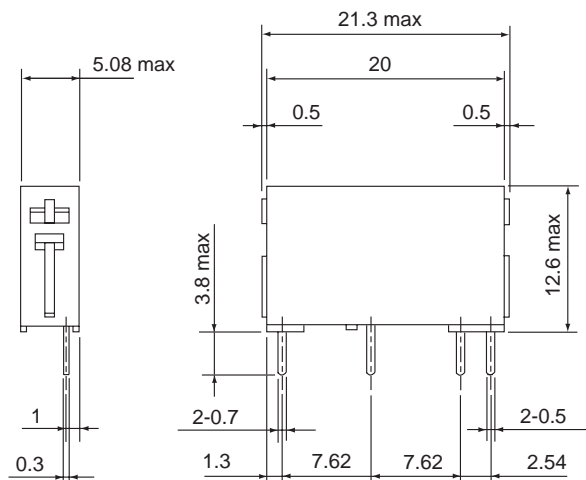
RZ4N <--->



## Dimensions

mm

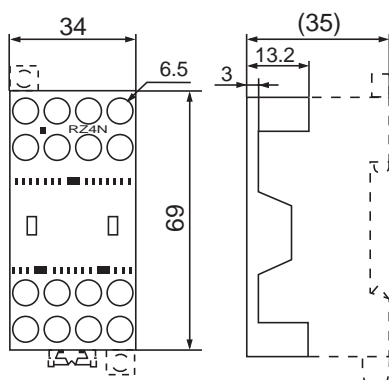
Figure 1 RB105-DE



Internal wiring diagram



Figure 2 RZ4N (Terminal guard for RS Series)

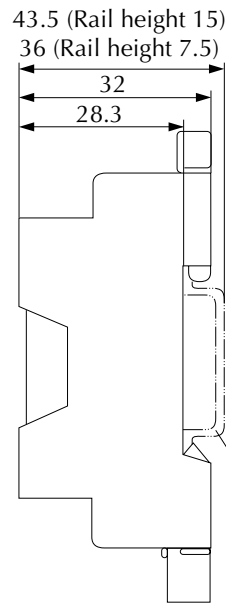
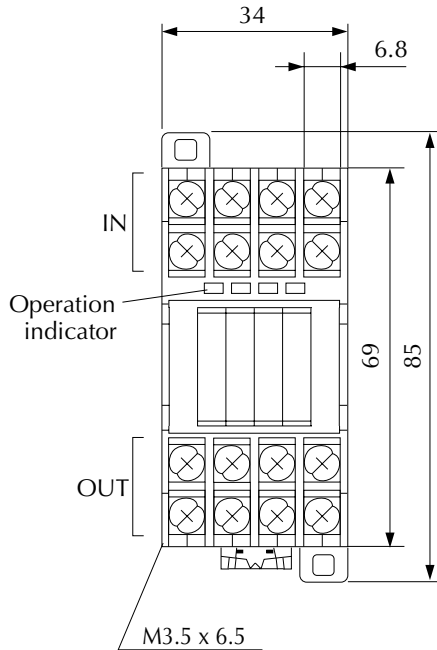


# RS Series Relay Dimensions and Wiring Diagrams

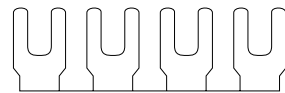
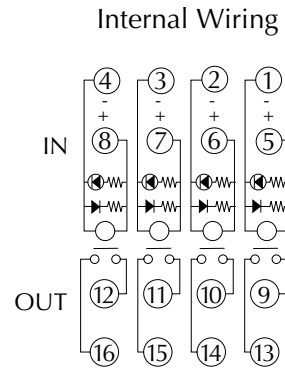
## Dimensions

mm

**Figure 3 RS4N-DE**

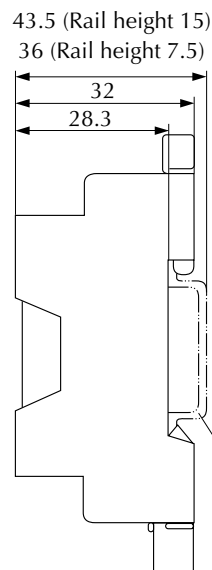
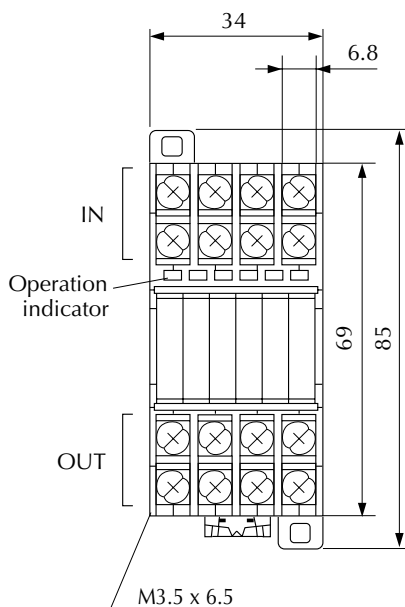


**Wiring diagram  
RS4N-DE**

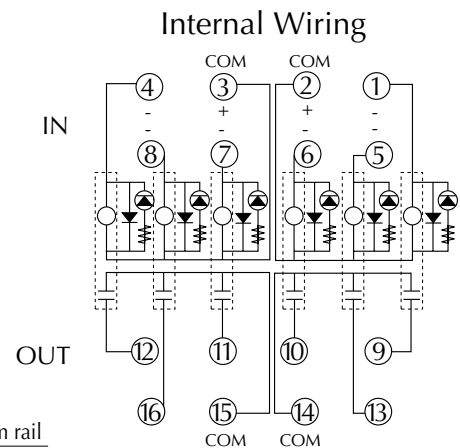


Jumper - included only with RS4N-DE

**Figure 4 RS6N-DE**



**Wiring diagram  
RS6N-DE**







# 78 Series Electromechanical Relay Selection Guide



Specification	781 Series	782 Series	783 Series	784 Series
<b>Coil Voltages</b>	110/120VAC, 220VAC, 12VAC, 12VDC, 24VAC, 24VDC	110/120VAC, 220VAC, 12VAC, 12VDC, 24VAC, 24VDC	110/120VAC, 220VAC, 12VAC, 12VDC, 24VAC, 24VDC	110/120VAC, 220VAC, 12VAC, 12VDC, 24VAC, 24VDC
<b>Configuration</b>	SPDT	DPDT	3PDT	4PDT
<b>Contact Rating</b>	12 to 15A	12 to 15A	12 to 15A	12 to 15A
<b>Base Socket</b>	5 pin spade terminal	8 pin spade terminal	11 pin spade terminal	14 pin spade terminal
<b>Agency Approvals</b>	UL Recognized (E191059), CE, IEC Std 947-4-1 and 947-5-1, CSA 244610	UL Recognized (E191059), CE, IEC Std 947-4-1 and 947-5-1, CSA 244610	UL Recognized (E191059), CE, IEC Std 947-4-1 and 947-5-1, CSA 244610	UL Recognized (E191059), CE, CSA 244610
<b>Prices starting at</b>	<--->	<--->	<--->	<--->



## Features

These ice cube style relays are power relays designed for applications demanding high power control in various factory machines and control panels. They are ideal for electrical control panels requiring stable and reliable relays.

- Small package design
- Silver Cadmium Oxide gold flashed contact
- High open contact dielectric strength (up to 2500V rms)
- High reliability and long life
- High vibration and shock resistance
- LED indicator on all models, so you can easily see if the relay is working properly without using a voltmeter
- Flag indicator shows relay status in manual or powered condition
- A pushbutton allows manual operation of the relay without the need for power to the coil
- Lock-Down door, when activated, holds pushbutton and contacts in the "operate" position, allowing circuits to be analyzed. **This feature is not available on 781 series.**
- SPDT, DPDT, 3PDT and 4PDT models
- Finger grip cover allows easier removal of relays from sockets than conventional relays
- I.D. tag/write labels for identifying relays in multi-relay circuits

## 78 Series Relays Selection Guide

**NOTE: Not recommended for low current switching. Find contacts' Minimum Switching Requirement on following page. For low current switching, please see the QM4N1 and QM4X1 series.**

Part Number	Price	Coil Voltage	Configuration	Dimensions	Relay Socket Part Number	Price	Dimensions
<b>781-1C-12D</b>	<--->	12VDC	SPDT	Figure 1	<b>781-1C-SKT</b>	<--->	Figure 5
<b>781-1C-12A</b>	<--->	12VAC					
<b>781-1C-24D</b>	<--->	24VDC					
<b>781-1C-24A</b>	<--->	24VAC					
<b>781-1C-120A</b>	<--->	120VAC					
<b>781-1C-240A</b>	<--->	240VAC					
<b>782-2C-12D</b>	<--->	12VDC	DPDT	Figure 2	<b>782-2C-SKT</b>	<--->	Figure 6
<b>782-2C-12A</b>	<--->	12VAC					
<b>782-2C-24D</b>	<--->	24VDC					
<b>782-2C-24A</b>	<--->	24VAC					
<b>782-2C-120A</b>	<--->	120VAC					
<b>782-2C-240A</b>	<--->	240VAC					
<b>783-3C-12D</b>	<--->	12VDC	3PDT	Figure 3	<b>783-3C-SKT</b>	<--->	Figure 7
<b>783-3C-12A</b>	<--->	12VAC					
<b>783-3C-24D</b>	<--->	24VDC					
<b>783-3C-24A</b>	<--->	24VAC					
<b>783-3C-120A</b>	<--->	120VAC					
<b>783-3C-240A</b>	<--->	240VAC					
<b>784-4C-12D</b>	<--->	12VDC	4PDT	Figure 4	<b>784-4C-SKT-1</b>	<--->	Figure 8
<b>784-4C-12A</b>	<--->	12VAC					
<b>784-4C-24D</b>	<--->	24VDC					
<b>784-4C-24A</b>	<--->	24VAC					
<b>784-4C-120A</b>	<--->	120VAC					
<b>784-4C-240A</b>	<--->	240VAC					

# 78 Series Electromechanical Relay Specifications

78 Series Relay Specification Table												
Part Numbers	781-1C-12D	781-1C-12A	781-1C-24D	781-1C-24A	781-1C-120A	781-1C-240A	782-2C-12D	782-2C-12A	782-2C-24D	782-2C-24A	782-2C-120A	782-2C-240A
<b>General Specifications</b>												
<b>*Service Life: Mechanical / Electrical Operations</b>	Mechanical: 10,000,000 operations unpowered Electrical: 100,000 operations @ rated resistive load											
<b>Operating Temperature</b>	-40°C to 55°C (-40°F to 131°F)											
<b>Response Time</b>	20 ms											
<b>Ambient Humidity</b>	45% RH to 85% RH											
<b>Vibration Resistance</b>	3 G's, 10 to 55Hz (0.6mm double amplitude)											
<b>Shock Resistance</b>	10 G's											
<b>Weight</b>	29 g (1.02 oz)						36 g (1.27 oz)					
<b>**Agency Approvals and Standards</b>	UL Recognized File E191059, CE, CSA											
<b>Environmental Protection</b>	IEC IP40											
<b>NEMA B300 Pilot Duty Rated</b>	Yes											
<b>Coil Specifications</b>												
<b>Standard</b>	LED Indicator											
<b>Coil Input Voltage</b>	12VDC	12VAC	24VDC	24VAC	120VAC	240VAC	12VDC	12VAC	24VDC	24VAC	120VAC	240VAC
<b>Coil Resistance</b>	188Ω	46Ω	750Ω	180Ω	4.43kΩ	15.72kΩ	160Ω	46Ω	650Ω	180Ω	4.43kΩ	15.7kΩ
<b>Power Consumption</b>	0.7W DC, 0.9VA @ 60Hz AC @ 25°C						0.9W DC, 1.2VA @ 60Hz AC @ 25°C					
<b>Dropout Voltage (% of nominal voltage or more)</b>	10%	15%	Min. 10%	Min. 15%			10%	15%	Min. 10%	Min. 15%		
<b>Pull-in Voltage (% of nominal voltage or less)</b>	80%	85%	80%	85%			80%	85%	80%	85%		
<b>Max. Voltage (Max. continuous voltage)</b>	110% of the rated coil voltage											
<b>Contact Specifications</b>												
<b>Contact Type</b>	SPDT						DPDT					
<b>Contact Material</b>	Silver cadmium oxide, gold flashed											
<b>Minimum Switching Requirement</b>	100mA @ 5VDC											
<b>Max. Contact Rating</b>	Refer to Contact Ratings charts.											
<b>Dielectric Strength Between Contacts</b>	1500V rms											

\*Note: These devices are rated for 1,000 cycles when used in a motor application. (Per Table 45.1, UL 508).

\*\*Note: UL listed when used with sockets 781-1C-SKT, 782-2C-SKT, 783-3C-SKT, 784-4C-SKT, or 784-4C-SKT-1. Current limited to rating of relay or socket, whichever is less.

NEMA Mechanical Switching Ratings and Test Values for AC Control Circuit Contacts											
Contact Rating Designation	Thermal Continuous Test Current (A)	Maximum AC Current, 50/60Hz (A)								Voltamperes	
		120 Volts		240 Volts		480 Volts		600 Volts			
		Make	Break	Make	Break	Make	Break	Make	Break	Make	Break
<b>B300</b>	5	30	3.00	15	1.50	---	---	---	---	3600	360

This chart is provided as a guideline only, and the ratings and values are not guaranteed to be accurate. It is the users' responsibility to properly size their control circuit devices. The chart values are from NEMA Standard ICS 5-2000, Table 1-4-1.

781 Series Contact Ratings (current)				
Resistive				*Motor Load
Voltage	Nominal	UL	CSA	UL
28VDC	12A	12A	12A	---
120VAC	15A	15A	15A	1/2Hp
277VAC	12A	12A	12A	1Hp

782 Series Contact Ratings (current)				
Resistive				*Motor Load
Voltage	Nominal	UL	CSA	UL
28VDC	12A	12A	12A	---
120VAC	15A	15A	15A	1/2Hp
277VAC	12A	12A	12A	1Hp

# 78 Series Electromechanical Relay Specifications



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C-more & other HMI

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Soft Starters

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Steppers/Servos

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Photo Sensors

Limit Switches

Encoders

Current Sensors

Pressure Sensors

Temperature Sensors

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78 Series Relay Specification Table														
Part Numbers	783-3C-12D	783-3C-12A	783-3C-24D	783-3C-24A	783-3C-120A	783-3C-240A	784-4C-12D	784-4C-12A	784-4C-24A	784-4C-24A	784-4C-120A	784-4C-240A		
<b>General Specifications</b>														
<b>*Service Life: Mechanical / Electrical Operations</b>	Mechanical: 10,000,000 operations unpowered 200,000 operations @ rated resistive load													
<b>Operating Temperature</b>	-40°C to 55°C (-40°F to 131°F)													
<b>Response Time</b>	20 ms													
<b>Ambient Humidity</b>	45% RH to 85% RH													
<b>Vibration Resistance</b>	3 G's, 10 to 55Hz (0.6mm double amplitude)													
<b>Shock Resistance</b>	10 G's													
<b>Weight</b>	60 g. (2.12 oz.)						80 g (2.82 oz)							
<b>**Agency Approvals and Standards</b>	UL Recognized File E191059, CE, CSA													
<b>Environmental Protection</b>	IEC IP40													
<b>NEMA B300 Pilot Duty Rated</b>	Yes													
<b>Coil Specifications</b>														
<b>Standard</b>	LED Indicator													
<b>Coil Input Voltage</b>	12VDC	12VAC	24VDC	24VAC	120VAC	240VAC	12VDC	12VAC	24VDC	24VAC	120VAC	240VAC		
<b>Coil Resistance</b>	100 Ω	25.3Ω	400Ω	103Ω	2.77kΩ	12.1kΩ	96 Ω	21.2Ω	388Ω	84.5Ω	2.22kΩ	9.12kΩ		
<b>Power Consumption</b>	1.4W DC, 1.5VA @ 60Hz AC @ 25°C						1.5W DC, 1.5VA @ 60Hz AC @ 25°C							
<b>Dropout Voltage (% of nominal voltage or more)</b>	10%	15%	10%	15%	10%	15%	10%	15%	Min. 10%	15%	Min. 10%	15%		
<b>Pull-in Voltage (% of nominal voltage or less)</b>	80%	85%	80%	85%	80%	85%	80%	85%	80%	85%	80%	85%		
<b>Max. Voltage (Max. continuous voltage)</b>	110% of the rated coil voltage													
<b>Contact Specifications</b>														
<b>Contact Type</b>	3PDT						4PDT							
<b>Contact Material</b>	Silver cadmium oxide, gold flashed													
<b>Minimum Switching Requirement</b>	100mA @ 5VDC													
<b>Max. Contact Rating</b>	Refer to Contact Ratings charts.													
<b>Dielectric Strength Between Contacts</b>	1500 V rms						2500V rms							

\*Note: These devices are rated for 1,000 cycles when used in a motor application. (Per Table 45.1, UL 508).

\*\*Note: UL listed when used with sockets 781-1C-SKT, 782-2C-SKT, 783-3C-SKT, 784-4C-SKT, or 784-4C-SKT-1. Current limited to rating of relay or socket, whichever is less.

783 Series Contact Ratings (current)				
Voltage	Resistive			*Motor Load
	Nominal	UL	CSA	UL
28VDC	12A	12A	12A	---
120VAC	15A	15A	15A	1/2Hp
277VAC	12A	12A	12A	3/4Hp

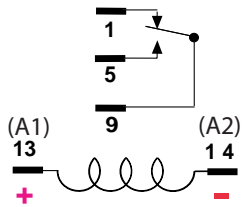
784 Series Contact Ratings (current)				
Voltage	Resistive			*Motor Load
	Nominal	UL	CSA	UL
28VDC	12A	12A	12A	---
120VAC	15A	15A	15A	1/2Hp
277VAC	12A	12A	12A	3/4Hp

\*Note: These devices are rated for 1,000 cycles when applied to a motor application. (Per Table 46.1 UL 508)

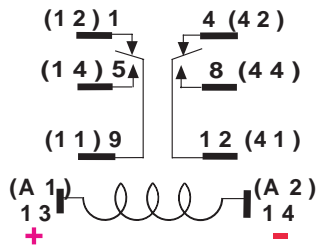
# 78 Series Wiring Diagrams and Dimensions

## Wiring Diagrams (viewed from pin end)

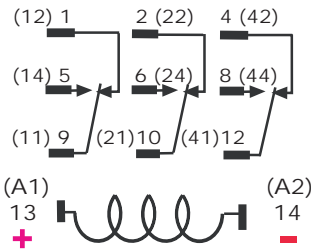
**781-1C-XXX**



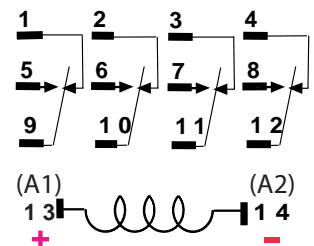
**782-2C-XXX**



**783-3C-XXX**



**784-4C-XXX**

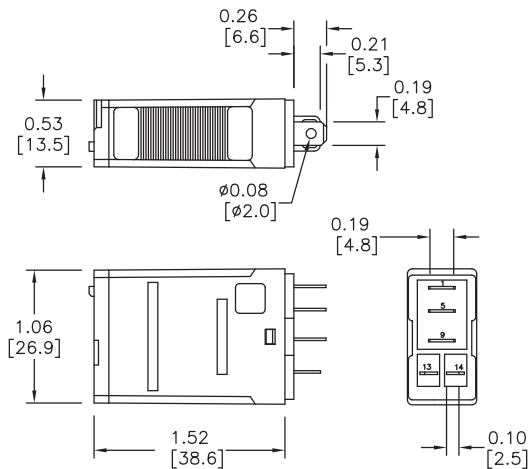


ALTERNATE NEMA OR IEC ( ) NUMBERS, VIEWED FROM PIN SIDE

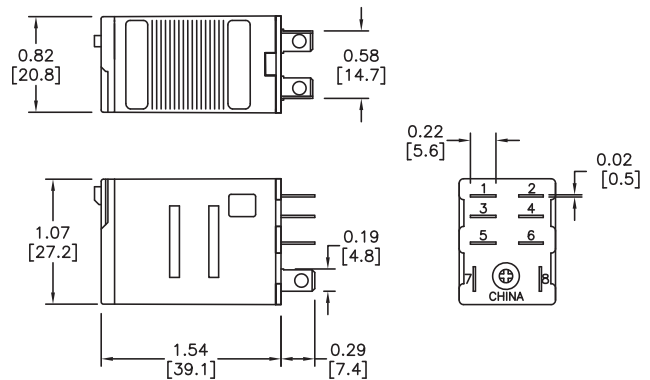
## Dimensions

inches [mm]

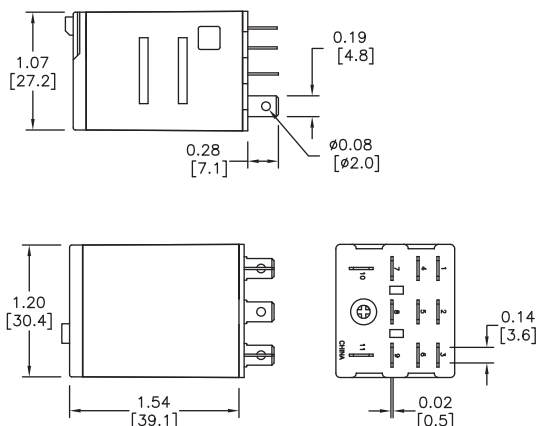
**Figure 1: 781-1C**



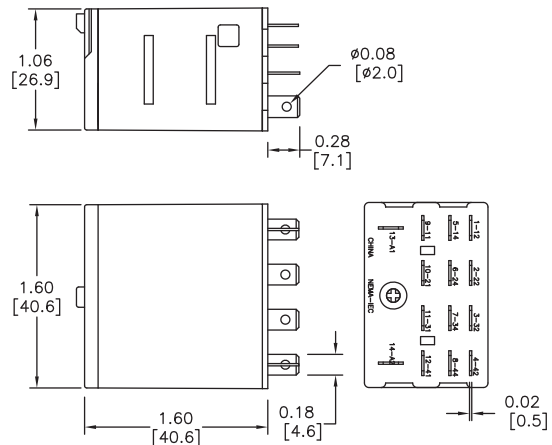
**Figure 2: 782-2C**



**Figure 3: 783-3C**



**Figure 4: 784-4C**





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Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Current Sensors

Pressure Sensors

Temperature Sensors

Pushbuttons/ Lights

Process

Relays/ Timers

Comm.

Terminal Blocks & Wiring

Power

Circuit Protection

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Tools

Pneumatics

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# 78 Series Relay Socket Dimensions

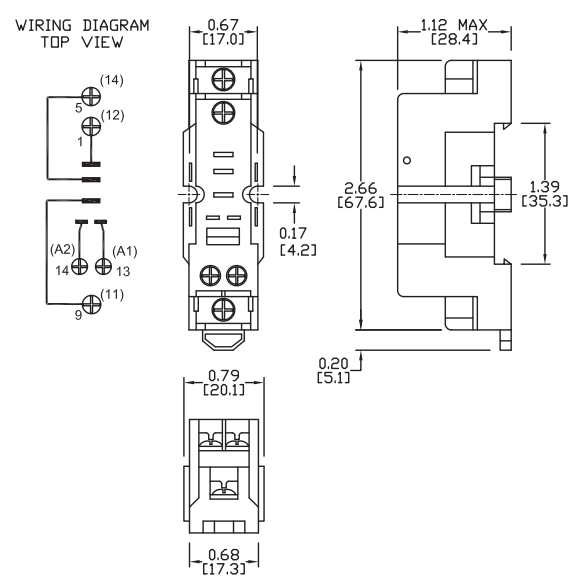
## Dimensions

inches [mm]

### Figure 5: 781-1C-SKT

DIN-rail mounting, SPDT, for use with 781 series relays

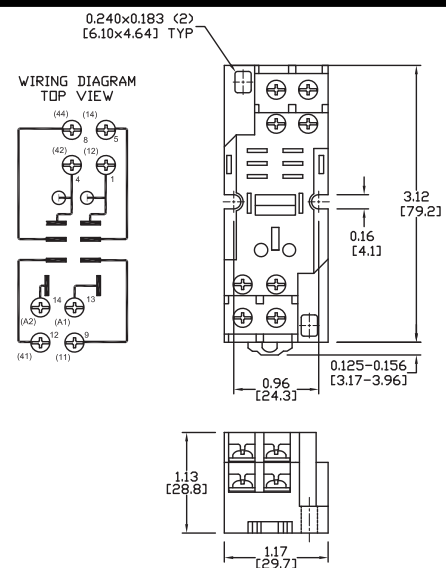
*Note: See Table on next page for maximum screw torques and wire sizes*



### Figure 6: 782-2C-SKT

DIN-rail mounting, DPDT, for use with 782 series and AD-70S2 relays

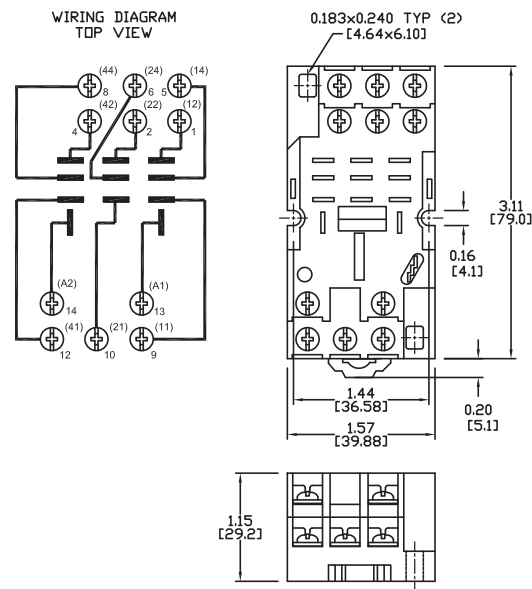
*Note: See Table on next page for maximum screw torques and wire sizes*



### Figure 7: 783-3C-SKT

DIN-rail mounting, 3PDT, for use with 783 series relays.

*Note: See Table on next page for maximum screw torques and wire sizes*



*Note: Order sockets separately; holding clips are included with sockets.*

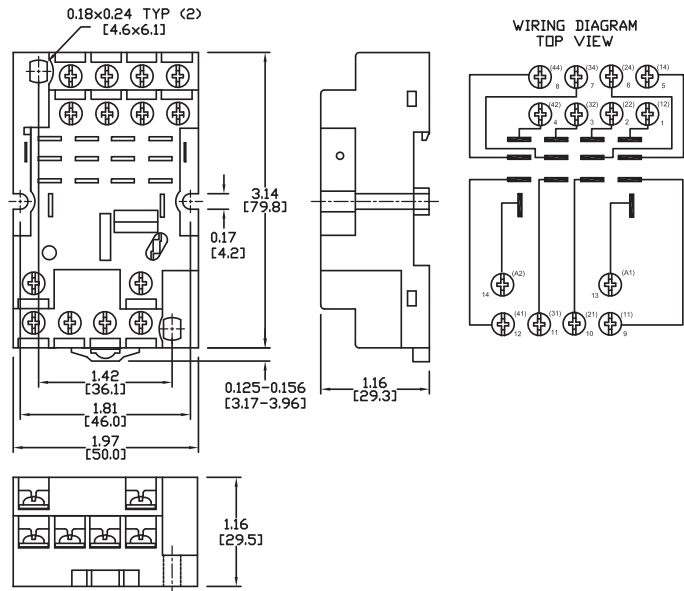


# 78 Series Relay Socket Dimensions



## Dimensions

inches [mm]



**Figure 8: 784-4C-SKT-1**

DIN-rail mounting, 4PDT,  
for use with 784 series relays.

**Note:** Order sockets separately;  
holding clips are included with sockets.

**Note:** See table below for maximum screw  
torques and wire sizes

Part Number	Price	Maximum Screw Torques	Maximum Wire Sizes
<b>781-1C-SKT</b>	<--->	Terminals 13, 14: 7 in-lbs/0.8Nm Terminals 1, 5, 9: 9 in-lbs/1.0Nm	Terminals 13, 14: 18 to 20 AWG, solid or stranded, one or two identical wires Terminals 1, 5, 9: 12 to 20 AWG, solid or stranded, one or two identical wires
<b>782-2C-SKT</b>	<--->	All terminals: 9 in-lbs/1.0Nm	All terminals: 12 to 20 AWG, solid or stranded, one or two identical wires
<b>783-3C-SKT</b>	<--->		
<b>784-4C-SKT-1</b>	<--->		



# H782 Series Hermetically Sealed Electromechanical Relay Selection Guide

Company Information

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Programmable Controllers

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Specification	H782 Series
<b>Coil Voltages</b>	120VAC, 240VAC, 12VAC, 12VDC, 24VAC, 24VDC
<b>Configuration</b>	4PDT
<b>Contact Rating</b>	3A, 5A
<b>Base Socket</b>	14 pin spade terminal
<b>Agency Approvals</b>	UL Recognized (E344123), cULus when used with 782-4C-SKT socket, CSA, CE, RoHS
<b>Prices starting at</b>	<--->

These ice cube style relays are designed for applications requiring hermetically sealed units for hazardous factory locations. (Class I, Div. 2 Groups A, B, C, D).



**H782-4C3-12A shown**

## Features

- Hermetically sealed for use in hazardous locations (Class I, Div. 2 Groups A, B, C, D)
- Small package design
- Silver Cadmium Oxide gold flashed contact
- High reliability and long life
- High vibration and shock resistance
- Sealed for washdown conditions
- 4PDT models

782 Series Hermetically Sealed Relays Selection Guide								
Part Number	Price	Coil Voltage	Configuration	Contact Rating	Dimensions	Relay Socket Part Number	Price	Dimensions
H782-4C3-12D	<--->	12VDC	4PDT	3A	Figure 1	782-4C-SKT	<--->	Figure 2
H782-4C3-12A	<--->	12VAC						
H782-4C3-24D	<--->	24VDC						
H782-4C3-24A	<--->	24VAC						
H782-4C3-120A	<--->	120VAC						
H782-4C3-240A	<--->	240VAC		5A				
H782-4C5-12D	<--->	12VDC						
H782-4C5-12A	<--->	12VAC						
H782-4C5-24D	<--->	24VDC						
H782-4C5-24A	<--->	24VAC						
H782-4C5-120A	<--->	120VAC						
H782-4C5-240A	<--->	240VAC						

# H782 Series Hermetically Sealed Electromechanical Relay Specifications

H782 Series Hermetically Sealed Relay Specification Table													
Part Numbers	H782-4C3-12D	H782-4C3-12A	H782-4C3-24D	H782-4C3-24A	H782-4C3-120A	H782-4C3-240A	H782-4C5-12D	H782-4C5-12A	H782-4C5-24D	H782-4C5-24A	H782-4C5-120A	H782-4C5-240A	
<b>General Specifications</b>													
<b>*Service Life: Mechanical / Electrical Operations</b>	Mechanical: 10,000,000 operations unpowered Electrical life: 100,000 operations @ rated resistive load												
<b>Operating Temperature</b>	-40°C to 70°C (-40°F to 158°F)												
<b>Response Time</b>	20 ms												
<b>Ambient Humidity</b>	45% RH to 85% RH												
<b>Vibration Resistance</b>	3 G's, 10 to 55Hz (0.6mm double amplitude)												
<b>Shock Resistance</b>	10 G's												
<b>Weight</b>	45 g (1.59 oz)												
<b>**Agency Approvals and Standards</b>	UL Recognized File E344123, CE, CSA, RoHS												
<b>Environmental Protection</b>	IEC IP67 (Class I, Div. 2 Groups A, B, C, D)												
<b>NEMA B300 Pilot Duty Rated</b>	Yes												
<b>Coil Specifications</b>													
<b>Coil Input Voltage</b>	12VDC	12VAC	24VDC	24VAC	120VAC	240VAC	12VDC	12VAC	24VDC	24VAC	120VAC	240VAC	
<b>Coil Resistance</b>	160Ω	43Ω	650Ω	160Ω	3.9kΩ	12kΩ	160Ω	43Ω	650Ω	160Ω	3.9kΩ	12kΩ	
<b>Power Consumption</b>	0.9W DC; 1.2VA @ 60Hz AC @ 25°C												
<b>Dropout Voltage (% of nominal voltage or more)</b>	15% AC, 10% DC												
<b>Pull-in Voltage (% of nominal voltage or less)</b>	85% AC, 80% DC												
<b>Max. Voltage (Max. continuous voltage)</b>	110% of the rated coil voltage												
<b>Contact Specifications</b>													
<b>Contact Type</b>	4PDT												
<b>Contact Material</b>	Fine silver, gold flashed						Silver alloy						
<b>Minimum Switching Requirement</b>	10 mA @ 5VDC						100mA @ 5VDC						
<b>Max. Contact Rating</b>	Refer to Contact Ratings charts.												
<b>Dielectric Strength Between Contacts</b>	500V rms												

\*Note: These devices are rated for 1,000 cycles when used in a motor application. (Per Table 45.1, UL 508).

\*\*Note: UL listed when used with socket 782-4C-SKT. Current limited to rating of relay or socket, whichever is less.

782 Series Contact Ratings (current)				
Voltage	Resistive			*Motor Load
	Nominal	UL	CSA	UL
30VAC	3A	3A	3A	
120VAC	3A	3A	3A	1/16 HP
240VAC	3A	3A	3A	1/10 HP

782 Series Contact Ratings (current)				
Voltage	Resistive			*Motor Load
	Nominal	UL	CSA	UL
30VAC	5A	5A	5A	
120VAC	5A	5A	5A	
240VAC	5A	5A	5A	

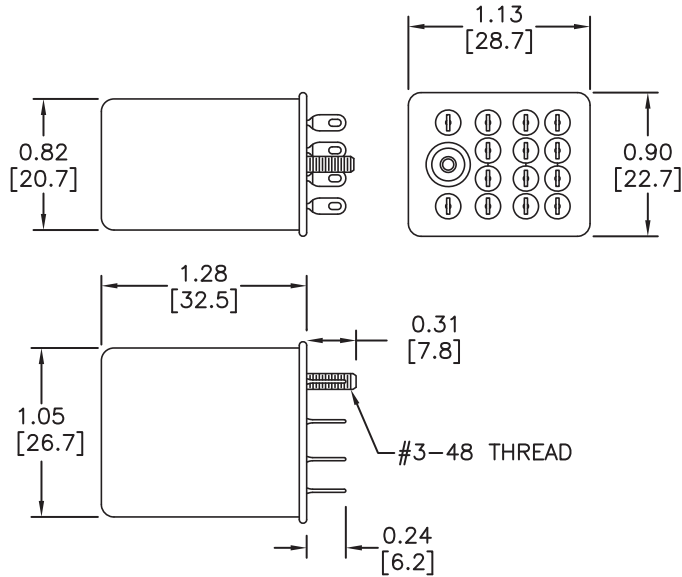


# H782 Series Hermetically Sealed Electromechanical Relay Dimensions

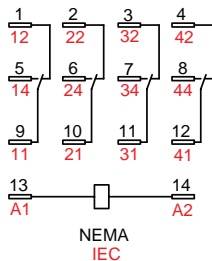
## Dimensions

inches [mm]

**Figure 1: H782-4C3-xx and H782-4C5-xx**



## Wiring



Wiring Diagram  
Bottom View

# Socket for H782 Series Hermetically Sealed Electromechanical Relay

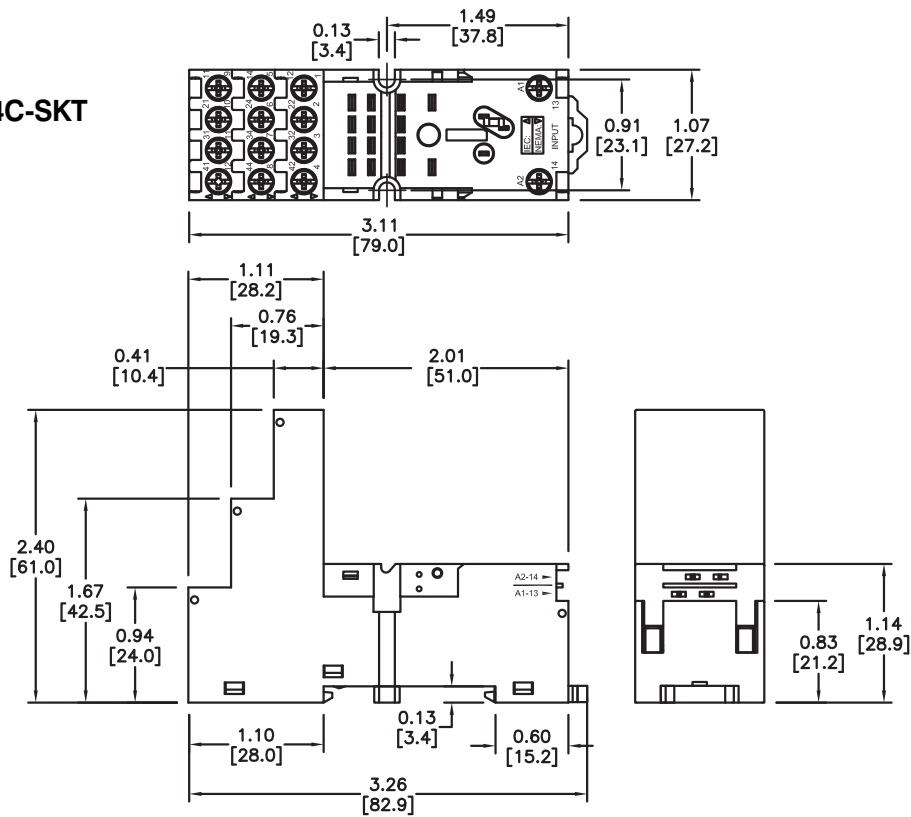


Part Number	Price	Maximum Screw Torques	Maximum Wire Sizes
<b>782-4C-SKT</b>	<--->	All terminals: 9 in-lbs/1Nm	All terminals: 12 to 20 AWG, solid or stranded, one or two identical wires

## Dimensions

inches [mm]

Figure 2: 782-4C-SKT





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# 75 Series Electromechanical Relay Selection Guide

75 series relays are general purpose relays designed for a wide range of applications, from power to sequence controls in various factory machines and control panels. They are ideal for electrical control panels requiring stable and reliable relays.



## Features

- Octal base design
- Silver Cadmium Oxide, gold flashed contacts
- High open contact dielectric strength (1,500 V rms)
- High reliability and long life
- High vibration and shock resistance
- Flag indicator shows relay status in manual or powered condition
- LED indicator on all models, so you can easily see if relay is working properly without using a voltmeter
- A pushbutton allows manual operation of the relay without the need for power to the coil
- I.D. tag/write label for identifying relays in multi-relay circuits

75 Series Relay Selection Guide							
Part Number	Price	Coil Voltage	Configuration	Contact Rating	Dimensions	Relay Socket Part Number	Price
750-2C-12D	<-->	12VDC	DPDT	12A	Figure 1	750-2C-SKT	<-->
750-2C-12A	<-->	12VAC					
750-2C-24D	<-->	24VDC					
750-2C-24A	<-->	24VAC					
750-2C-120A	<-->	120VAC					
750-2C-240A	<-->	220VAC					
750-3C-12D	<-->	12VDC	3PDT	12A	Figure 2	750-3C-SKT	<-->
750-3C-12A	<-->	12VAC					
750-3C-24D	<-->	24VDC					
750-3C-24A	<-->	24VAC					
750-3C-120A	<-->	120VAC					
750-3C-240A	<-->	240VAC					

Order socket separately.

## Dimensions

inches [mm]

Figure 1: 750-2C-xxx

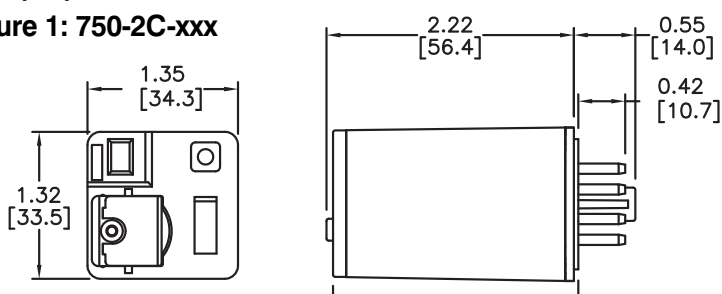
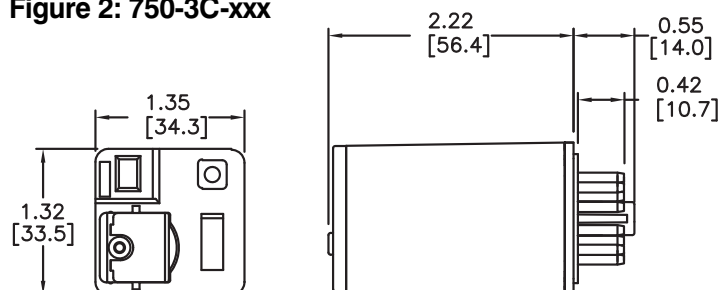
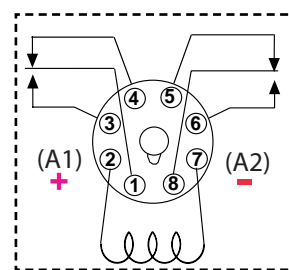


Figure 2: 750-3C-xxx



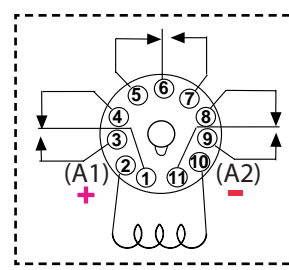
## Wiring

750-2C-xxx wiring diagram



Note: Contacts and coil shown are internal to the relay

750-3C-xxx wiring diagram



Note: Contacts and coil shown are internal to the relay

# 75 Series Electromechanical Relay Specifications

75 Series Specification Table												
Part Numbers	750-2C-12D	750-2C-12A	750-2C-24D	750-2C-24A	750-2C-120A	750-2C-240A	750-3C-12D	750-3C-12A	750-3C-24D	750-3C-24A	750-3C-120A	750-3C-240A
<b>General Specifications</b>												
<b>Service Life</b>	Mechanical: 5 million operations, Electrical: 100,000 operations @ rated resistive load											
<b>Operating Temperature</b>	-40°C to 55°C (-40°F to 131°F)											
<b>Response Time</b>	20 ms											
<b>Vibration Resistance</b>	3 G's @ 10 to 55 Hz(0.6mm double amplitude)											
<b>Shock Resistance</b>	10 G's											
<b>Weight</b>	89 g (3.1 oz)											
<b>*Agency Approvals and Standards</b>	UL Recognized file E191059, CE, CSA Certified 244610											
<b>Environmental Protection</b>	IEC IP40											
<b>Coil Specifications</b>												
<b>Standard</b>	LED Indicator											
<b>Coil Input Voltage</b>	12VDC	12VAC	24VDC	24VAC	120VAC	240VAC	12VDC	12VAC	24VDC	24VAC	120VAC	240VAC
<b>Coil Resistance</b>	120Ω	18Ω	470Ω	72Ω	1.7kΩ	7.2kΩ	120Ω	18Ω	470Ω	72Ω	1.7kΩ	7.2kΩ
<b>Power Consumption</b>	3VA (60Hz) AC, 1.4W DC											
<b>Dropout Voltage (% of rated voltage)</b>	15% AC, 10% DC											
<b>Pull-in Voltage</b>	Max. 85% of nominal voltage or less											
<b>Max. Voltage (Max. continuous voltage)</b>	110% of the rated coil voltage											
<b>Contact Specifications</b>												
<b>Contact Type</b>	DPDT						3PDT					
<b>Contact Material</b>	Silver cadmium oxide, gold flashed											
<b>Minimum Switching Requirement</b>	100mA @ 5VDC											
<b>Contact Rating</b>	Refer to Contact Ratings chart											
<b>Dielectric Strength Between Contacts</b>	1500V rms											

\*Note: UL listed when used with sockets 750-2C-SKT, 750-3C-SKT. Current limited to rating of relay or socket, whichever is less.

75 Series Contact Ratings (current)				
Voltage	Resistive			Motor Load
	Nominal	UL	CSA	UL
28VDC	12A	12A	12A	---
120VAC	12A	12A	12A	1/3Hp
240VAC	12A	12A	12A	1/2Hp





# H750 Series Hermetically Sealed Electromechanical Relay Selection Guide

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- Comm.
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- Power
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Specification	H750 Series
<b>Coil Voltages</b>	120VAC, 240VAC, 12VAC, 12VDC, 24VAC, 24VDC
<b>Configuration</b>	DPDT or 3PDT
<b>Contact Rating</b>	12A
<b>Base Socket</b>	8-pin or 11-pin spade terminal,
<b>Agency Approvals</b>	UL Recognized (E344123), cULus when used with 750 sockets RoHS
<b>Prices starting at</b>	<-->

H750 series hermetically sealed relays are designed for use in hazardous applications. (Class 1, Div 2, Groups A, B, C, D).

## Features

- Hermetically sealed for use in hazardous locations (Class 1, Div 2, Groups A, B, C, D)
- Octal base design
- Silver Cadmium Oxide, gold flashed contacts
- High open contact dielectric strength (1,500V rms)
- High reliability and long life
- High vibration and shock resistance
- DPDT and 3PDT models



**H750-2C-12D shown**

H750 Series Hermetically Sealed Relay Selection Guide								
Part Number	Price	Coil Voltage	Configuration	Contact Rating	Dimensions	Relay Socket Part Number	Price	
<b>H750-2C-12D</b>	<-->	12VDC	DPDT	12A	Figure 1	<b>750-2C-SKT</b>	<-->	
<b>H750-2C-12A</b>	<-->	12VAC						
<b>H750-2C-24D</b>	<-->	24VDC						
<b>H750-2C-24A</b>	<-->	24VAC						
<b>H750-2C-120A</b>	<-->	120VAC						
<b>H750-2C-240A</b>	<-->	220VAC						
<b>H750-3C-12D</b>	<-->	12VDC	3PDT		12A	Figure 2	<b>750-3C-SKT</b>	<-->
<b>H750-3C-12A</b>	<-->	12VAC						
<b>H750-3C-24D</b>	<-->	24VDC						
<b>H750-3C-24A</b>	<-->	24VAC						
<b>H750-3C-120A</b>	<-->	120VAC						
<b>H750-3C-240A</b>	<-->	240VAC						

*Order socket separately.*

# H750 Series Hermetically Sealed Electromechanical Relay Specifications

H750 Series Hermetically Sealed Relays Specification Table												
Part Numbers	H750-2C-12D	H750-2C-12A	H750-2C-24D	H750-2C-24A	H750-2C-120A	H750-2C-240A	H750-3C-12D	H750-3C-12A	H750-3C-24D	H750-3C-24A	H750-3C-120A	H750-3C-240A
<b>General Specifications</b>												
<b>Service Life</b>	Mechanical: 10 million operations Electrical: 100,000 operations @ rated resistive load											
<b>Operating Temperature</b>	-40°C to 55°C (-40°F to 131°F)											
<b>Response Time</b>	20 ms											
<b>Vibration Resistance</b>	3 G, 10 to 55 Hz											
<b>Shock Resistance</b>	10 G											
<b>Weight</b>	130 g (4.6 oz)											
<b>*Agency Approvals and Standards</b>	UL Recognized file E344123, CSA 244610, RoHS											
<b>Environmental Protection</b>	IEC IP67 (Class I, Div. 2 Groups A, B, C, D)											
<b>Coil Specifications</b>												
<b>Standard</b>	LED Indicator											
<b>Coil Input Voltage</b>	12VDC	12VAC	24VDC	24VAC	120VAC	240VAC	12VDC	12VAC	24VDC	24VAC	120VAC	240VAC
<b>Coil Resistance</b>	120Ω	18Ω	470Ω	72Ω	1.7kΩ	7.2kΩ	120Ω	18Ω	72Ω	470Ω	1.7kΩ	7.2kΩ
<b>Power Consumption</b>	1.2 VA (60Hz) AC, 0.9W DC						2 VA (60Hz) AC, 1.2W DC					
<b>Dropout Voltage (% of rated voltage)</b>	10% to 15%											
<b>Pull-in Voltage</b>	Max. 85% of nominal voltage or less											
<b>Max. Voltage (Max. continuous voltage)</b>	110% of the rated coil voltage											
<b>Contact Specifications</b>												
<b>Contact Type</b>	DPDT						3PDT					
<b>Contact Material</b>	Silver alloy											
<b>Minimum Switching Requirement</b>	100mA @ 5VDC											
<b>Contact Rating</b>	Refer to Contact Ratings charts											
<b>Dielectric Strength Between Contacts</b>	1500V rms											

\*Note: UL listed when used with sockets 750-2C-SKT, 750-3C-SKT. Current limited to rating of relay or socket, whichever is less.

75 Series Contact Ratings (current)				
Voltage	Resistive			Motor Load
	Nominal	UL	CSA	UL
28VDC	12A	12A	12A	---
120VAC	12A	12A	12A	1/3Hp
240VAC	12A	12A	12A	1/2Hp

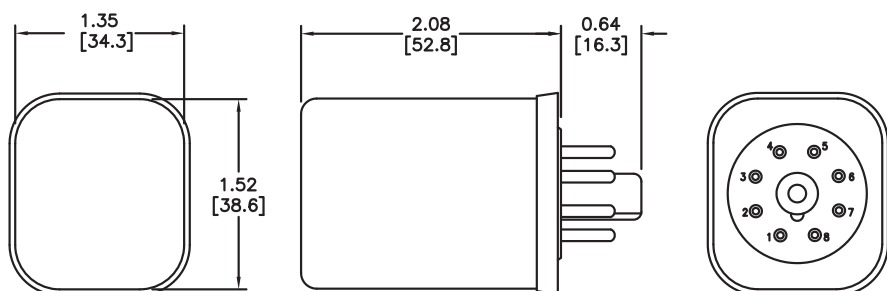


# H750 Series Hermetically Sealed Electromechanical Relay Specifications

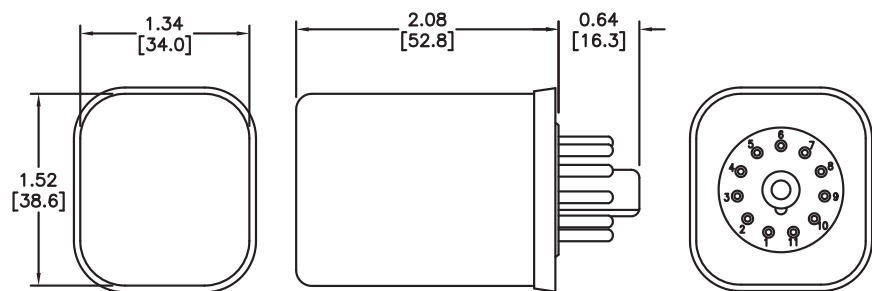
## Dimensions

inches [mm]

**Figure 1: H750-2C Series 8-pin**

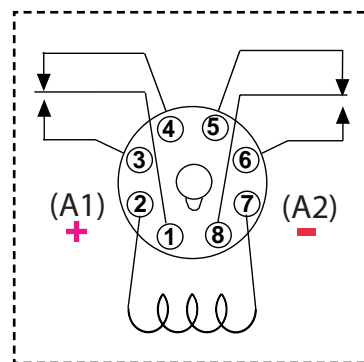


**Figure 2: H750-3C Series 11-pin**



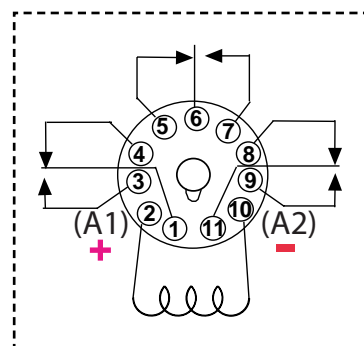
## Wiring

**H750-2C-xxx wiring diagram**



*Note: Contacts and coil shown are internal to the relay*

**H750-3C-xxx wiring diagram**



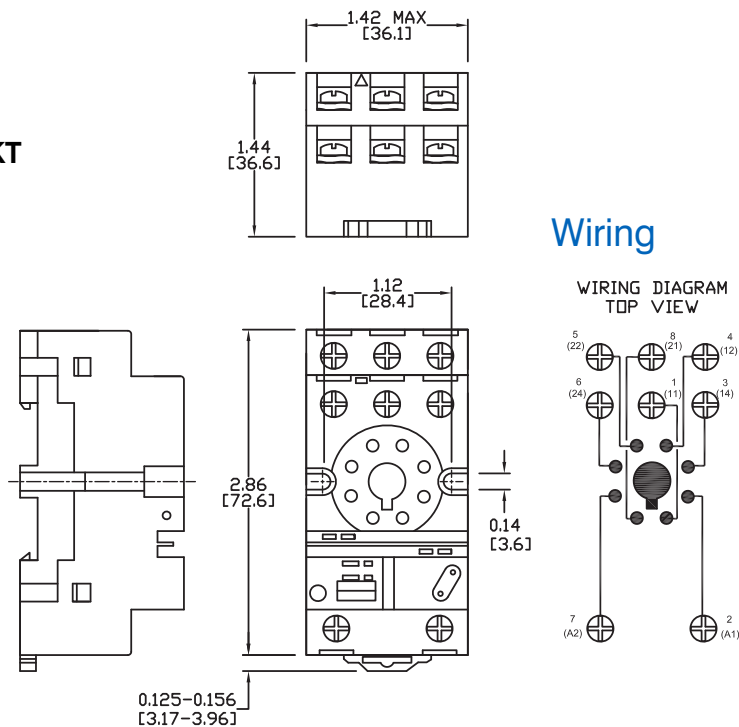
*Note: Contacts and coil shown are internal to the relay*

# 75 Series Socket Dimensions

## Dimensions

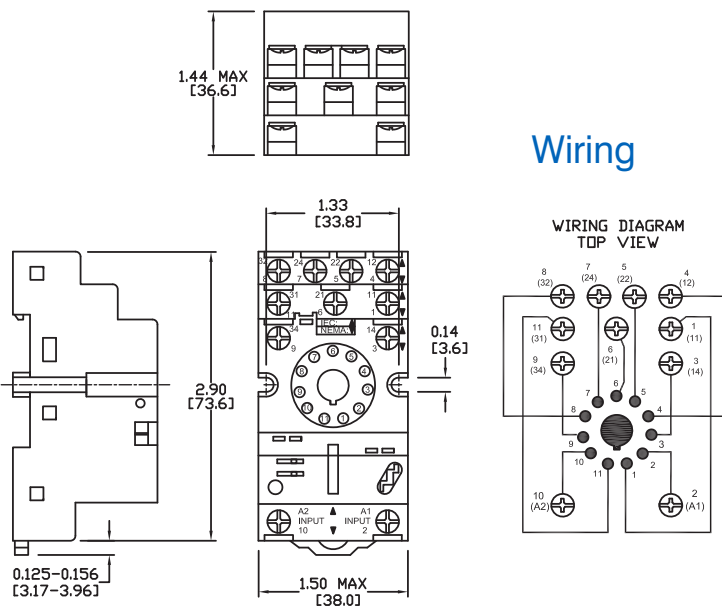
inches [mm]

**Figure 3: 750-2C-SKT**



## Wiring

**Figure 4: 750-3C-SKT**



## Wiring

### Bus Connector



Accessory		
Part Number	Description	Price
<b>33-796-1</b>	Coil bus connector used to connect multiple relays in parallel. Package includes 5 pairs of bus bars to connect up to 5 relays together.	<--->



# 755 Series Octal Base Magnetic Latching Relay Selection Guide



755-2C-120A shown

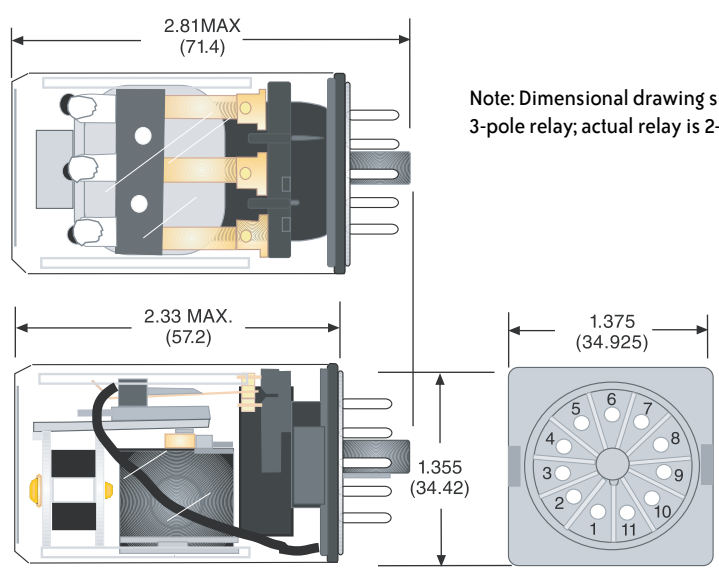
## Features

- 11-pin octal base (use 750-3C-SKT) installs easily
- 16 amp contact rating handles most control circuit loads
- Permanent magnet latching mechanism holds last set position

755 Series Relay Selection Guide						
Part Number	Price	Coil Voltage	Configuration	Contact Rating	Relay Socket Part	Price
755-2C-120A	<-->	120VAC	DPDT	16A	750-3C-SKT	<-->
755-2C-240A	<-->	240VAC				
755-2CD-24D	<-->	24VDC				

## Dimensions

inches [mm]

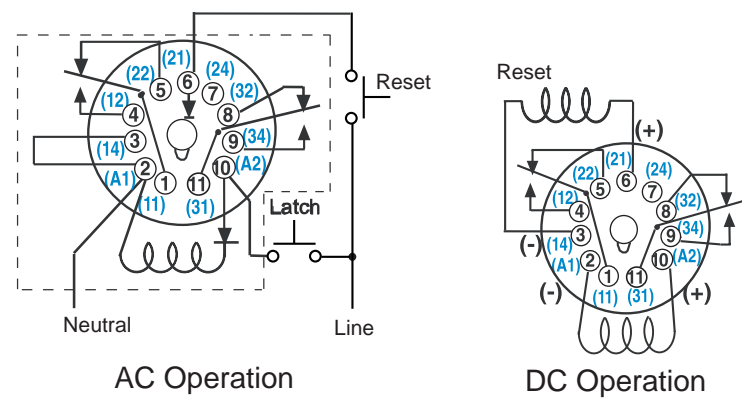


Uses 1 1 Pin Octal base (750-3C-SKT, not shown)

## Wiring

### 755 Series

Latch and reset are designed to be impulse activated.



# 755 Series Octal Base Magnetic Latching Relay Specifications

755 Series Specifications (@ 25°C)			
Part Numbers	755-2C-120A (single coil)	755-2C-240A (single coil)	755-2CD-24D (double coil)
<b>Contact Specifications</b>			
<b>Contact Type</b>	DPDT		
<b>Contact Material</b>	Silver cadmium oxide, gold flashed		
<b>Contact Rating</b>	16A @ 120/240VAC 50/60Hz, 16A @ 28VDC		
<b>Minimum Switching Requirement</b>	100mA @ 5VDC or 0.5W		
<b>Contact Resistance</b>	50mΩ		
<b>Coil Specifications</b>			
<b>Standard</b>	LED Indicator		
<b>Coil Input Voltage</b>	120VAC	240VAC	24VDC
<b>Coil Resistance</b>	10kΩ	3.6kΩ	350Ω
<b>Power Consumption</b>	2VA to 3.55VA (60Hz) AC		
<b>Dropout Voltage (% of rated voltage)</b>	N/A		
<b>Pull-in Voltage</b>	AC: Max. 85% of nominal voltage or less DC: Max 80% of nominal voltage or less		
<b>Max. Voltage (Max. instantaneous voltage)</b>	115% of the rated coil voltage		
<b>General Specifications</b>			
<b>Service Life</b>	Mechanical @ no load: 10 million operations		
	Electrical: 100,000 operations @ rated resistive load (AC1)		
<b>Operating Temperature</b>	AC: -30°C to 70°C (-22°F to 158°F) DC: -30°C to 75°C (-22°F to 167°F)		
<b>Weight</b>	170 g (6 oz)		
<b>*Agency Approvals and Standards</b>	UL Recognized file E43641, CE Pending, CSA 244610		

\* UL Listed when used with sockets 750-2C-SKT and 750-3C-SKT.  
Current limited to rating of relay or socket, whichever is less.



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# Packaged M.O.V.s and Diodes

## Overview

Metal Oxide Varistors (MOV) and Diode circuits are offered as convenient plug-in modules. Plugging a module into the relay socket connects the circuit in parallel with the relay coil. No additional wiring is required.

Modules fit within the maximum dimensions of the relay and socket.

## Features

- MOVs protect by shunting potentially damaging electrical spikes away from the relay coil. Ideal for AC and DC applications.
- Diodes protect external drive circuitry from inductive voltages generated when removing coil voltage. Ideal for DC applications. Polarity sensitive.

## Application

Many PLC systems control one or more inductive load devices. These inductive loads (devices with a coil) generate transient voltages when they are de-energized with a relay contact. When a relay contact is closed it “bounces”, which causes the coil to energize and de-energize until the “bouncing” stops. The transient voltage which is generated is much larger in amplitude than the supply voltage, especially with a DC supply voltage.

When switching a DC-supplied inductive load the full supply voltage is always present when the relay contact opens (or “bounces”). When switching an AC-supplied inductive load, if the voltage is not zero when the relay contact opens, there is energy stored in the inductor that is released when the voltage to the inductor is suddenly removed. This release of energy is what produces transient voltages.



When inductive load devices (motors, motor starters, interposing relays, solenoids, valves, etc.) are controlled with relay contacts, it is recommended that a surge suppression device be connected directly across the coil of the field device. If the inductive device has plug-type connectors, the suppression device can be installed on the terminal block of the relay output.

Metal oxide varistors (MOV) and diodes are devices which provide good surge and transient suppression of AC and DC powered coils.

### Protection Device Selection Guide

Part Number	Price	Description	Nominal Input Voltage	Dimensions & Package	Mating Socket
<b>AD-ASMD-250</b>	<--->	Protection diode module for 784 and 75 series relays. Plug-in modules come in package of 5.	6-250VDC	Figure 1	783-3C-SKT 784-4C-SKT-1 750-2C-SKT 750-3C-SKT
<b>AD-ASMM-24</b>		MOV module for 784 and 75 series relays that operate at 24VAC coil voltage. Package includes 5 modules.	24VAC/VDC		
<b>AD-ASMM-120</b>		MOV module for 784 and 75 series relays that operate at 120VAC coil voltage. Package includes 5 modules.	120VAC/VDC		
<b>AD-ASMM-240</b>		MOV module for 784 and 75 series relays that operate at 240VAC coil voltage. Package includes 5 modules.	240VAC/VDC		
<b>AD-BSMD-250</b>	<--->	Protection diode module for 782 series relays. Plug-in modules come in package of 5.	6-250VDC	Figure 2	782-2C-SKT
<b>AD-BSMM-24</b>		MOV module for 782 series relays that operate at 24VAC coil voltage. Package includes 5 modules.	24VAC/VDC		
<b>AD-BSMM-120</b>		MOV module for 782 series relays that operate at 120VAC coil voltage. Package includes 5 modules.	120VAC/VDC		
<b>AD-BSMM-240</b>		MOV module for 782 series relays that operate at 240VAC coil voltage. Package includes 5 modules.	240VAC/VDC		

## Accessory dimensions

inches [mm]

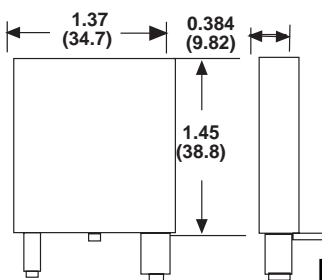


Figure 1

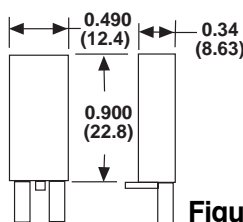
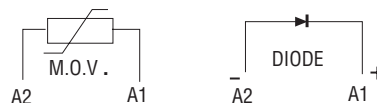


Figure 2





# Power Relays



## Features

- High power contacts capable of switching up to 40A
- Open construction
- SPDT, DPST and DPDT models
- Riveted construction for high reliability
- Maximum contact voltage up to 600V

AD-PR40-1C-12D shown

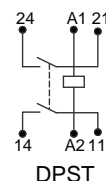
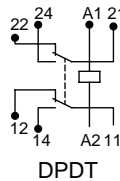
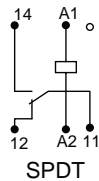
Power Relay Selection Guide						
Part Number	Price	Coil Voltage	Configuration	Contact Rating	Price	Dimensions
<b>AD-PR40-1C-12D</b>	<--->	12VDC	SPDT	40A	<--->	Figure 1
<b>AD-PR40-1C-24D</b>	<--->	24VDC				
<b>AD-PR40-1C-24A</b>	<--->	24VAC				
<b>AD-PR40-1C-120A</b>	<--->	120VAC				
<b>AD-PR40-1C-240A</b>	<--->	240VAC				
<b>AD-PR40-2A-12D</b>	<--->	12VDC	DPST	40A	<--->	Figure 2
<b>AD-PR40-2A-24D</b>	<--->	24VDC				
<b>AD-PR40-2A-24A</b>	<--->	24VAC				
<b>AD-PR40-2A-120A</b>	<--->	120VAC				
<b>AD-PR40-2A-240A</b>	<--->	240VAC				
<b>AD-PR40-2C-12D</b>	<--->	12VDC	DPDT	40A	<--->	Figure 3
<b>AD-PR40-2C-24D</b>	<--->	24VDC				
<b>AD-PR40-2C-24A</b>	<--->	24VAC				
<b>AD-PR40-2C-120A</b>	<--->	120VAC				
<b>AD-PR40-2C-240A</b>	<--->	240VAC				

AD-PR40-1C-xxxx

AD-PR40-2C-xxxx

AD-PR40-2A-xxxx

## Wiring



## Dimensions inches [mm]

Figure 1

AD-PR40-1C-xx

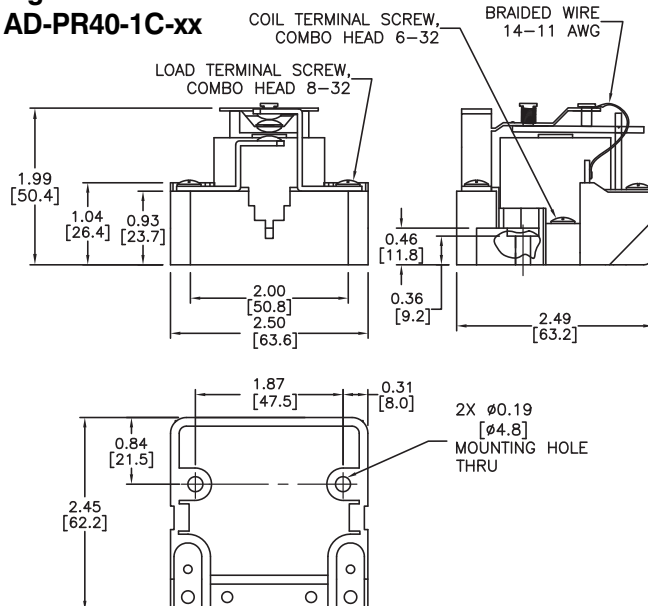
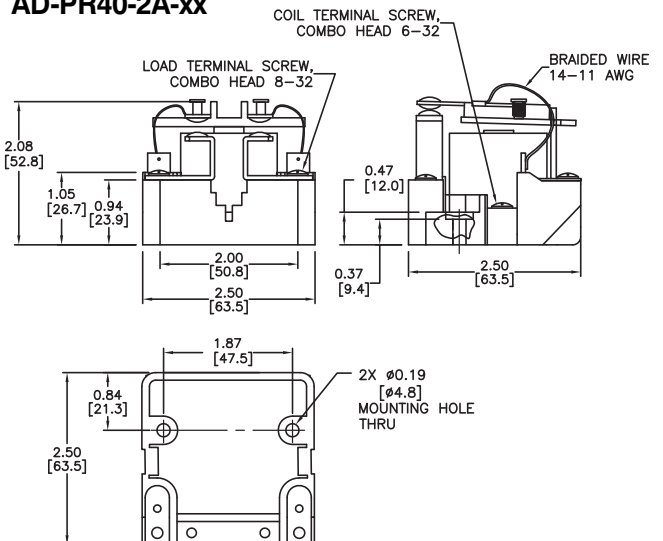


Figure 2

AD-PR40-2A-xx





# Power Relays Specifications

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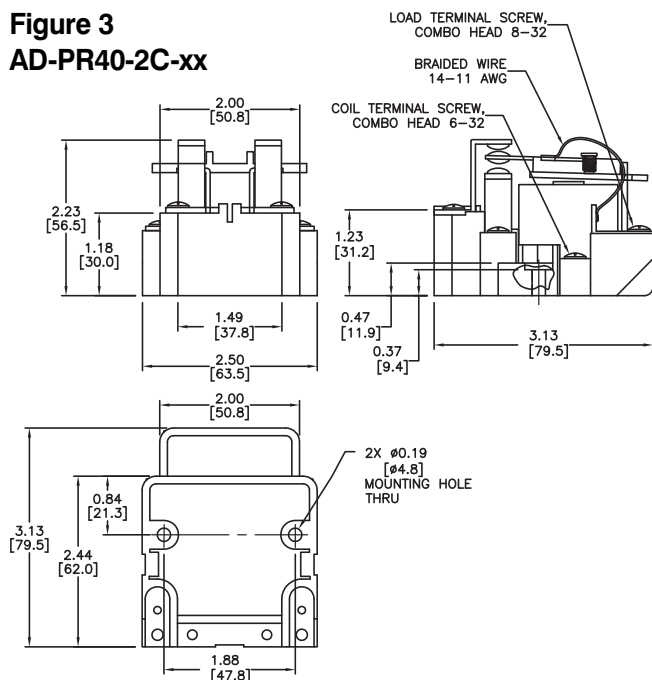
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Power Relays Specification Table															
Part Numbers	AD-PR40-1C-12D	AD-PR40-1C-24D	AD-PR40-1C-24A	AD-PR40-1C-120A	AD-PR40-1C-240A	AD-PR40-2A-12D	AD-PR40-2A-24D	AD-PR40-2A-24A	AD-PR40-2A-120A	AD-PR40-2A-240A	AD-PR40-2C-12D	AD-PR40-2C-24D	AD-PR40-2C-24A	AD-PR40-2C-120A	AD-PR40-2C-240A
<b>General Specifications</b>															
<b>Service Life</b>	Mechanical: 1 million operations AC and DC Electrical: 50,000 operations @ 300VAC/100,000 @ 28VDC														
<b>Operating Temperature</b>	-55°C to 55°C (-67°F to 131°F)														
<b>Response Time</b>	30 ms														
<b>Weight</b>	227g (8 oz) to 312g (11 oz)														
<b>Agency Approvals and Standards</b>	UL Recognized E191059, CE Certified (9667186-9811), CSA Certified 244610, RoHS														
<b>Environmental Protection</b>	Not applicable to open relays														
<b>Pilot Duty</b>	A600														
<b>Terminal Wire</b>	Max 10 AWG														
<b>Terminal Torque</b>	11 to 15 in-lb (1.2 to 1.7 Nm)														
<b>Coil Specifications</b>															
<b>Coil Input Voltage</b>	12VDC	24VDC	24VAC	120VAC	240VAC	12VDC	24VDC	24VAC	120VAC	240VAC	12VDC	24VDC	24VAC	120VAC	240VAC
<b>Coil Resistance</b>	70Ω	290Ω	12Ω	290Ω	1.2kΩ	70Ω	290Ω	12Ω	290Ω	1.2kΩ	70Ω	290Ω	12Ω	290Ω	1.2kΩ
<b>Power Consumption</b>	60Hz, 10VA (AC) , 4.0W DC														
<b>Dropout Voltage (% of rated voltage)</b>	Min. 10%														
<b>Pull-in Voltage</b>	Max. 85% of nominal voltage or less AC, Max. 80% of nominal voltage or less DC														
<b>Max. Voltage (Max. continuous voltage)</b>	110% of the rated coil voltage														
<b>Contact Specifications</b>															
<b>Contact Type</b>	SPDT					DPST					DPDT				
<b>Contact Material</b>	Silver cadmium oxide, gold flashed														
<b>Contact Rating</b>	40A @ 300VAC or 28VDC; 2HP motor load														
<b>Minimum Switching Requirement</b>	1A @ 5VAC/VDC														
<b>Maximum Switching Voltage</b>	600V @ 5A														
<b>Dielectric Strength Between Contacts</b>	1600V rms														

## Dimensions inches [mm]

**Figure 3**  
**AD-PR40-2C-xx**



# AD Series Solid State Relays



**AD-SSR210-DC shown**

A solid state relay is a relay with isolated input and output, whose functions are achieved by means of using electronic components without the use of moving parts (vs. electromechanical relays).



**AD-70S2-04B shown**

## Operation

Solid state relays (SSR) are similar to electromechanical relays, in that both use a control circuit and a separate circuit for switching the load. When voltage is applied to the input of the SSR, the relay is energized by a light-emitting diode. The light from the diode is beamed into a light sensitive semiconductor which, in the case of zero voltage crossover relays, signals the control circuit to turn on the output of the solid state switch at the next zero voltage crossover.

## Solid State Relay Features

Solid state relays have features which electromechanical relays do not, such as:

- Long life
- Shock and vibration resistant
- No generation of RFI, EMI
- No contact bounce
- Arcless switching
- No acoustic noise
- Zero crossing
- IC compatibility
- Immunity to humidity, salt spray and dirt
- UL # E222847

## AD-SSR Features

- AC & DC input
- AC output
- 10 or 25 amp loads
- Photo isolated zero voltage switching
- 4000V rms isolation input to output
- Internal RC (snubber) network
- RFI suppression
- Integral safety cover and heatsink
- DIN-rail mounting or panel-mount

## AD-70S2 Features

- DC input
- AC output
- Up to 4 amp loads
- Optically isolated
- Quick connect terminal, or panel mount when inserted into DIN-rail mountable socket

## Solid State Relay Selection Guide

Part Number	Price	Description	Dimensions & Derating Charts	Relay Socket Part Number	Price	Socket Dimensions
<b>AD-SSR210-AC</b>	<--->	Solid state DIN-rail mount relay with 10A contact rating. Coil voltage 90-280VAC. Load voltage is 24-280VAC. Finger-safe design and LED status lamp.	Figure 1	<b>N/A</b>	N/A	N/A
<b>AD-SSR225-AC</b>	<--->	Solid state DIN-rail mount relay with 25A contact rating. Coil voltage 90-280VAC. Load voltage is 24-280VAC. Finger-safe design and LED status lamp.				
<b>AD-SSR210-DC</b>	<--->	Solid state DIN-rail mount relay with 10A contact rating. Coil voltage 3-32VDC. Load voltage is 24-280VAC. Finger-safe design and LED status lamp.				
<b>AD-SSR225-DC</b>	<--->	Solid state DIN-rail mount relay with 25A contact rating. Coil voltage 3-32VDC. Load voltage is 24-280VAC. Finger-safe design and LED status lamp.				
<b>AD-70S2-04B</b>	<--->	Solid state plug-in relay with 4A contact rating. Coil voltage is 3-30VDC. Load voltage is 24-140VAC.	Figure 2	<b>782-2C-SKT</b> (see wiring diagram on next page)	<--->	Figure 6 *
<b>AD-70S2-04C</b>	<--->	Solid state plug-in relay with 4A contact rating. Coil voltage is 3-30VDC. Load voltage is 24-280VAC.				
<b>AD-70S2-04D</b>	<--->	Solid state plug-in relay with 4A contact rating. Coil voltage is 3-30VDC. Load voltage is 8-50VAC.				

\*NOTE: See 78 Series Relays Socket Dimensions.



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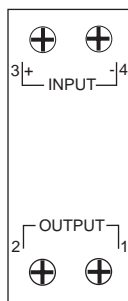
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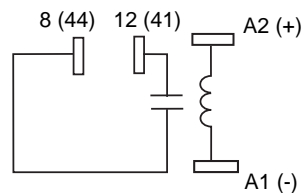
# Solid State Relay Specifications

Specifications							
Part Number	AD-SSR210-DC	AD-SSR210-AC	AD-SSR225-DC	AD-SSR225-AC	AD-70S2-04B	AD-70S2-04C	AD-70S2-04D
<b>Input Characteristics</b>							
Control Voltage Range	3-32 VDC	90-280 VAC	3-32 VDC	90-280 VAC	3-30 VDC		
Typical Input Current	16 mA	12 mA	16 mA	12 mA	1-17 mA		
Must Release Voltage	1 VDC	10 VAC	1 VDC	10 VAC	1.0 VDC		
Reverse Polarity Protection	Yes	N/A	Yes	N/A	No		
Maximum Reverse Control Voltage	N/A				5 VDC		
Power Indicator	Red LED Status Lamp				N/A		
<b>Output Characteristics</b>							
Load Voltage Range	24-280VAC			24-140 VAC	24-280 VAC	8-50 VAC	
Rated Load Current	10 A		25 A	4 A	4 A	4 A	
Maximum Off-State Voltage dv/dt	200 $\mu$ s		500 $\mu$ s	3000 V / $\mu$ s Typical			
Minimum Load Current	50 mA		120 mA	75 mA			
Non-Repetitive Surge Current (1 Cycle)	83 A		800 A	60 A Peak Max. @ 25°C			
Maximum Off State Leakage current (RMS)	10 mA			6 mA	3 mA		
Typical On-State Voltage Drop (RMS)	1.25 VAC		1.35 VAC	1.6 VAC			
Maximum I <sup>2</sup> T for Fusing (A <sup>2</sup> Sec)	83		3700	N/A			
Maximum Peak Blocking Voltage	N/A			400 V	600 V	200 V	
Operating Frequency Range	25 Hz to 70 Hz						
Maximum Turn-On Time	10ms	40ms	10ms	40ms	8.3 ms		
Maximum Turn-Off Time	10ms	80ms	10ms	80ms	8.3 ms		
<b>General Characteristics</b>							
Dielectric Strength (Input-to-Output Isolation)	4000 V rms			3000 V rms			
Insulation Resistance	10 <sup>10</sup> Ω Min.						
Operating Temperature Range	-30°C to 80°C			-40°C to 100°C			
Storage Temperature Range	-40°C to 100°C			-40°C to 125°C			
Weight	12.35 oz. (350 g) approx.			1.4 oz. (40 g) approx.			
Agency Approvals	UL Recognized, CE, CSA						

AD-SSRxxx-xx wiring diagram



AD-70S2-xx wiring diagram

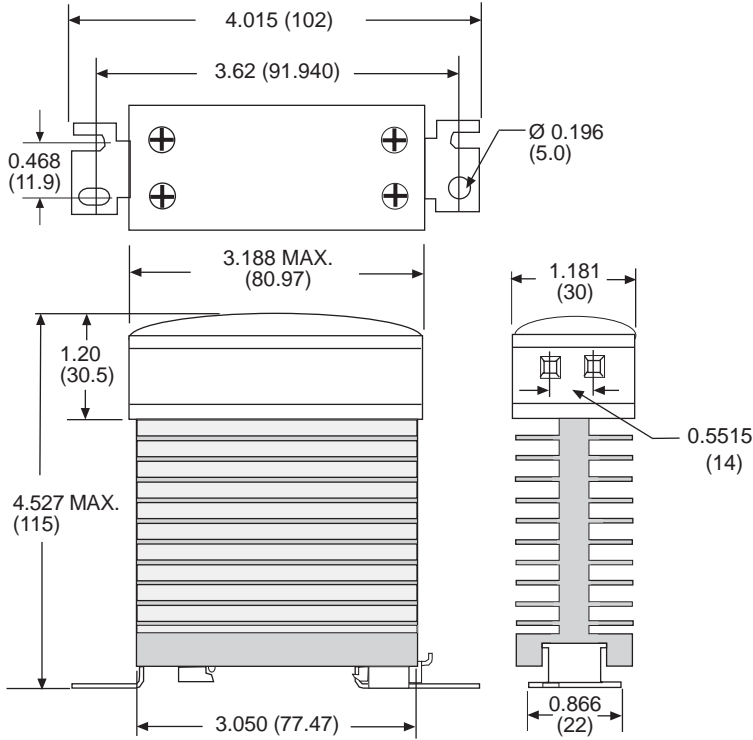


# SSR Series Dimensions & Derating Charts

## Dimensions

inches [mm]

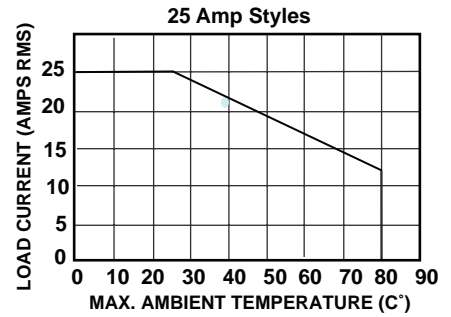
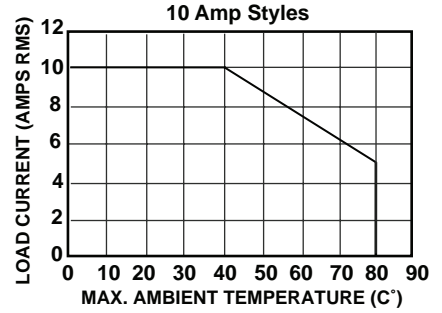
### AD-SSR Series



Note: Recommended spacing between multiple SSRs is 0.75 inch.

Figure 1

### AD-SSR Series derating charts



### AD-70S2 Series

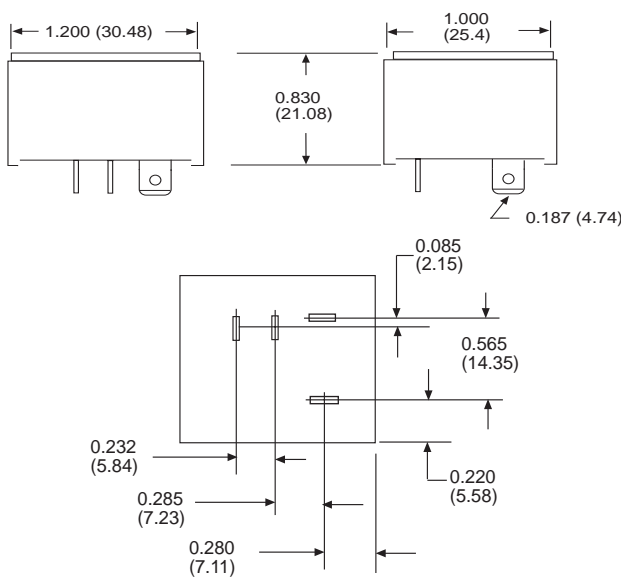
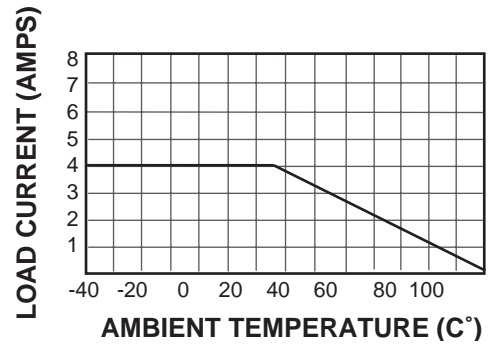


Figure 2

### AD-70S2 Series derating charts





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C-more & other HMI

Drives

Soft Starters

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Part # Index

# AD Series Class 6 Solid State Relays

The Class 6 solid state relays offer an energy-efficient alternative to standard electromechanical relays.

Switching types include DC switching for low-voltage DC loads and Zero Cross for resistive AC loads where the output energizes/de-energizes when control voltage is near zero.

Switching devices include: MOSFET for DC loads, Triac and SCR for AC loads.

## Features

- Finger-safe “Hockey Puck” housing
- Solid-state circuitry
- High load ratings up to 75 amps
- Input indicating LED
- Optically coupled circuits
- Panel mount
- Thermal pad included with each relay



**AD-SSR610-AC-280A shown**

Class 6 Solid State Relay Selection Guide						
Part Number	Price	Type	Input Voltage	Load Voltage	Configuration	Contact Rating
AD-SSR610-AC-280A	<--->	N.O. SCR	90 to 280 VAC	24 to 280 VAC	SPST	10A
AD-SSR610-DC-280A	<--->	N.O. SCR	3 to 32 VDC			
AD-SSR6T10-DC-280A	<--->	N.O. TRIAC	3 to 32 VDC			
AD-SSR625-AC-280A	<--->	N.O. SCR	90 to 280 VAC			
AD-SSR625-DC-280A	<--->	N.O. SCR	3 to 32 VDC			
AD-SSR6T25-DC-280A	<--->	N.O. TRIAC	3 to 32 VDC			
AD-SSR640-AC-280A	<--->	N.O. SCR	90 to 280 VAC			
AD-SSR640-DC-280A	<--->	N.O. SCR	3 to 32 VDC			
AD-SSR6T40-DC-280A	<--->	N.O. TRIAC	3 to 32 VDC			
AD-SSR650-AC-280A	<--->	N.O. SCR	90 to 280 VAC			
AD-SSR650-DC-280A	<--->	N.O. SCR	3 to 32 VDC			
AD-SSR675-AC-280A	<--->	N.O. SCR	90 to 280 VAC			
AD-SSR675-DC-280A	<--->	N.O. SCR	3 to 32 VDC			
AD-SSR6M12-DC-200D	<--->	N.O. MOSFET	3.5 to 32 VDC			3 to 200 VDC
AD-SSR6M25-DC-200D	<--->	N.O. MOSFET	3.5 to 32 VDC	25A		
AD-SSR6M40-DC-200D	<--->	N.O. MOSFET	3.5 to 32 VDC	40A		
AD-SSR610-AC-480A	<--->	N.O. SCR	90 to 280 VAC	48 to 480 VAC		10A
AD-SSR610-DC-480A	<--->	N.O. SCR	3 to 32 VDC			
AD-SSR6T10-DC-480A	<--->	N.O. TRIAC	3 to 32 VDC			
AD-SSR625-AC-480A	<--->	N.O. SCR	90 to 280 VAC			
AD-SSR625-DC-480A	<--->	N.O. SCR	3 to 32 VDC			
AD-SSR6T25-DC-480A	<--->	N.O. TRIAC	3 to 32 VDC			
AD-SSR640-AC-480A	<--->	N.O. SCR	90 to 280 VAC			
AD-SSR640-DC-480A	<--->	N.O. SCR	3 to 32 VDC			
AD-SSR6T40-DC-480A	<--->	N.O. TRIAC	3 to 32 VDC			
					40A	

Note: Thermal pad included with each relay.

# AD Series Class 6 Solid State Relays

Specifications													
Part Number	AD-SSR610-AC-280A	AD-SSR610-DC-280A	AD-SSR6110-DC-280A	AD-SSR625-AC-280A	AD-SSR625-DC-280A	AD-SSR6T25-DC-280A	AD-SSR640-AC-280A	AD-SSR640-DC-280A	AD-SSR6T40-DC-280A	AD-SSR650-AC-280A	AD-SSR650-DC-280A	AD-SSR675-AC-280A	AD-SSR675-DC-280A
<b>Input Characteristics</b>													
<b>Control Voltage Range</b>	90 to 280 VAC	3 to 32 VDC	90 to 280 VAC	3 to 32 VDC	90 to 280 VAC	3 to 32 VDC	90 to 280 VAC	3 to 32 VDC	90 to 280 VAC	3 to 32 VDC	90 to 280 VAC	3 to 32 VDC	90 to 280 VAC
<b>Maximum Input Current</b>	2 mA	10 mA	2 mA	10 mA	2 mA	10 mA	2 mA	10 mA	2 mA	10 mA	2 mA	10 mA	2 mA
<b>Must Release Voltage</b>	10 VAC	1 VDC	10 VAC	1 VDC	10 VAC	1 VDC	10 VAC	1 VDC	10 VAC	1 VDC	10 VAC	1 VDC	1 VDC
<b>Reverse Polarity Protection</b>	-	no	-	no	-	no	-	no	-	no	-	no	no
<b>Switching Type</b>	Zero Cross												
<b>Power Indicator</b>	Green LED status lamp												
<b>Output Characteristics</b>													
<b>Load Voltage Range</b>	24 to 280 VAC												
<b>Rated Load Current</b>	10 A		25 A		40 A		50 A		75 A				
<b>Maximum Off-State Voltage dv/dt</b>	500 V/ $\mu$ s												
<b>Minimum Load Current</b>	40 mA	150 mA	40 mA	150 mA	40 mA	150 mA	40 mA	150 mA	40 mA	150 mA	40 mA	150 mA	
<b>Maximum Non-Repetitive Surge Current (1 Cycle, 16.6 ms), peak</b>	120 A		250 A		625 A				1000 A				
<b>Maximum Off State Leakage current (RMS)</b>	10 mA	1 mA	10 mA	1 mA	10 mA	1 mA	10 mA	1 mA	10 mA	1 mA	10 mA	1 mA	
<b>Maximum On-State Voltage Drop (RMS)</b>	1.6 V rms												
<b>Maximum I<sup>2</sup>T for Fusing (A<sup>2</sup>Sec)</b>	60		260		1620				4150				
<b>Operating Frequency Range</b>	50 to 60 Hz												
<b>Maximum Turn-On Time</b>	10 ms	8.3 ms	10 ms	8.3 ms	10 ms	8.3 ms	10 ms	8.3 ms	10 ms	8.3 ms	10 ms	8.3 ms	
<b>Maximum Turn-Off Time</b>	40 ms	8.3 ms	40 ms	8.3 ms	40 ms	8.3 ms	40 ms	8.3 ms	40 ms	8.3 ms	40 ms	8.3 ms	
<b>General Characteristics</b>													
<b>Dielectric Strength (Input-to-Output Isolation)</b>	4000 VAC (rms)												
<b>Thermal Resistance (Junction to Base)</b>	1.48°C/W (34.66°F/W)		1.02°C/W (33.84°F/W)		0.63°C/W (33.13°F/W)				0.31°C/W (32.56°F)				
<b>Minimum Insulation Resistance @ 500 VDC</b>	1E + 9 $\Omega$												
<b>Operating Temperature Range</b>	-40°C to 80°C (-40° to 176°F) derating applies												
<b>Storage Temperature Range</b>	-40°C to 125°C (-40°F to 257°F)												
<b>Weight</b>	86.5 g (3.05 oz)												
<b>Terminal Torque</b>	Input terminals: 10 lb-in. Output terminals: 20 lb-in												
<b>Agency Approvals and Standards</b>	UL file # E222847 CE, CSA, RoHS												





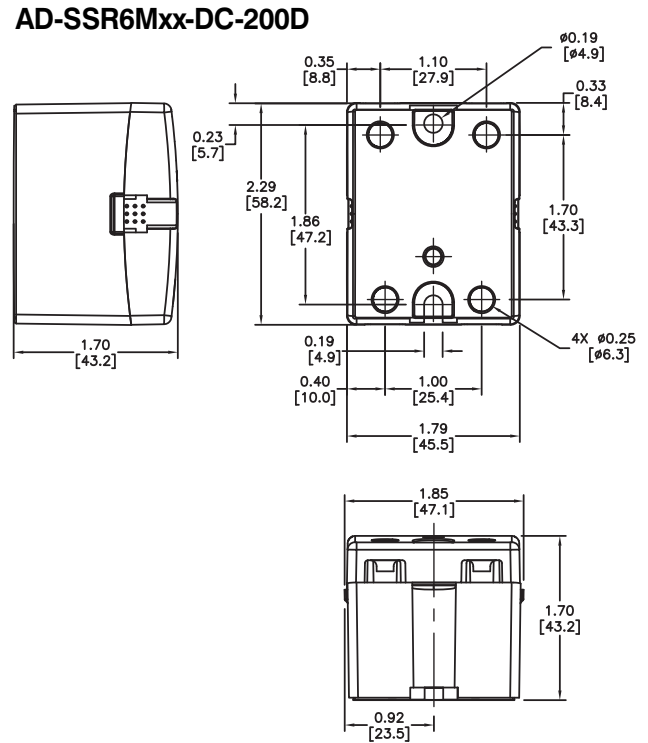
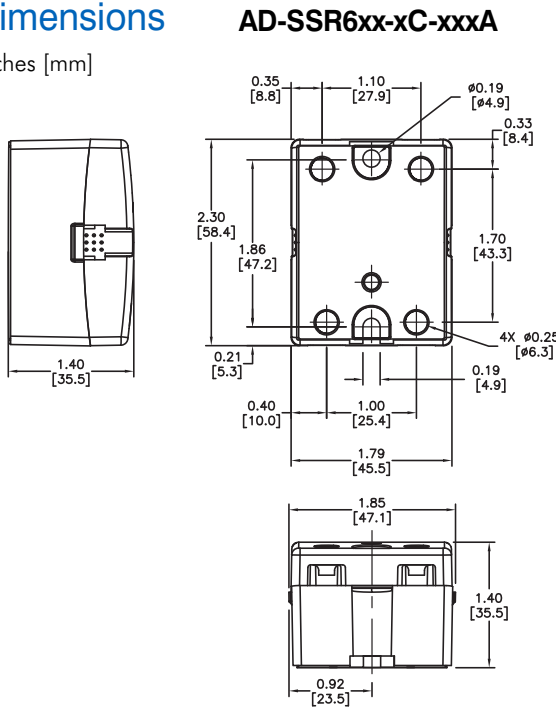
# AD Series Class 6 Solid State Relays

Specifications													
Part Number	AD-SSR6M12-DC-200D	AD-SSR6M25-DC-200D	AD-SSR6M40-DC-200D	AD-SSR610-AC-480A	AD-SSR610-DC-480A	AD-SSR6T10-DC-480A	AD-SSR625-AC-480A	AD-SSR625-DC-480A	AD-SSR6T25-DC-480A	AD-SSR640-AC-480A	AD-SSR640-DC-480A	AD-SSR6T40-DC-480A	
<b>Input Characteristics</b>													
<b>Control Voltage Range</b>	3.5 to 32 VDC			90 to 280 VAC	3 to 32 VDC		90 to 280 VAC	3 to 32 VDC		90 to 280 VAC	3 to 32 VDC		
<b>Maximum Input Current</b>	10 mA			4 mA	15 mA		4 mA	15 mA		4 mA	15 mA		
<b>Must Release Voltage</b>	1 VDC			10 VAC	1 VDC		10 VAC	1 VDC		10 VAC	1 VDC		
<b>Reverse Polarity Protection</b>	no			-	no		-	no		-	no		
<b>Switching Type</b>	DC			Zero Cross									
<b>Power Indicator</b>	Green LED status lamp												
<b>Output Characteristics</b>													
<b>Load Voltage Range</b>	3 to 200 VDC			48 to 480 VAC									
<b>Rated Load Current</b>	12 A	25 A	40 A	10 A			25 A			40 A			
<b>Maximum Off-State Voltage dv/dt</b>	-			500 V/μs									
<b>Minimum Load Current</b>	-			40 mA	150 mA	40 mA	150 mA	40 mA	150 mA	40 mA	150 mA	40 mA	150 mA
<b>Maximum Non-Repetitive Surge Current (1 Cycle, 16.6 ms), peak</b>	27 A	50 A	90 A	140 A			250 A			625 A			
<b>Maximum Off State Leakage current (RMS)</b>	<1 mA			10 mA	1 mA	10 mA	1 mA	10 mA	1 mA	10 mA	1 mA	10 mA	1 mA
<b>Typical On-State Voltage Drop (RMS)</b>	2.8 VDC			1.7 V rms	1.6 V rms	1.7 V rms	1.6 V rms	1.7 V rms	1.6 V rms	1.7 V rms	1.6 V rms	1.7 V rms	1.6 V rms
<b>Maximum I<sup>2</sup>T for Fusing (A<sup>2</sup>Sec)</b>	-			81			260			1620			
<b>Operating Frequency Range</b>	-			50 to 60 Hz									
<b>Maximum Turn-On Time</b>	300 μs			10 ms	8.3 ms	10 ms	8.3 ms	10 ms	8.3 ms	10 ms	8.3 ms	10 ms	8.3 ms
<b>Maximum Turn-Off Time</b>	1 ms			40 ms	8.3 ms	40 ms	8.3 ms	40 ms	8.3 ms	40 ms	8.3 ms	40 ms	8.3 ms
<b>General Characteristics</b>													
<b>Dielectric Strength (Input-to-Output Isolation)</b>	2500 VAC (rms)			4000 VAC (rms)									
<b>Thermal Resistance (Junction to Base)</b>	1.06°C/W (33.90°F/W)			1.48°C/W (34.66°F/W)			1.02°C/W (33.84°F/W)			0.63°C/W (33.13°F/W)			
<b>Minimum Insulation Resistance @ 500 VDC</b>	1E + 9 Ω												
<b>Operating Temperature Range</b>	-40°C to 80°C (-40°F to 176°F) (derating applies)												
<b>Storage Temperature Range</b>	-40°C to 100°C (-40°F to 212°F)			-40°C to 125°C (-40°F to 257°F)									
<b>Weight</b>	110 g (3.88 oz)			86.5 g (3.05 oz)									
<b>Terminal Torque</b>	Input terminals: 10 lb-in. Output terminals: 20 lb-in												
<b>Agency Approvals and Standards</b>	UL file # E222847, CE, CSA, RoHS												

# AD Series Class 6 Solid State Relays Dimensions & Derating Charts

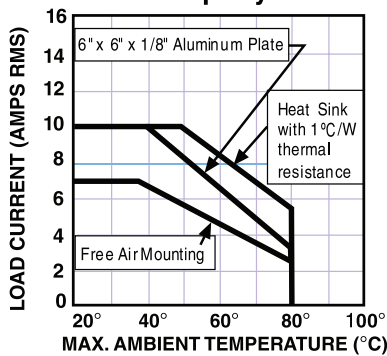
## Dimensions

inches [mm]

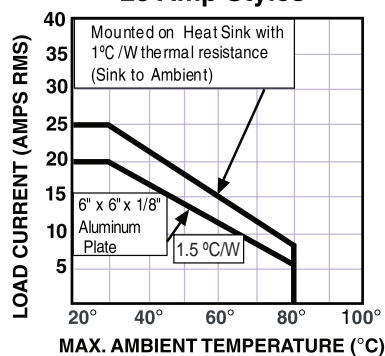


## Derating Charts

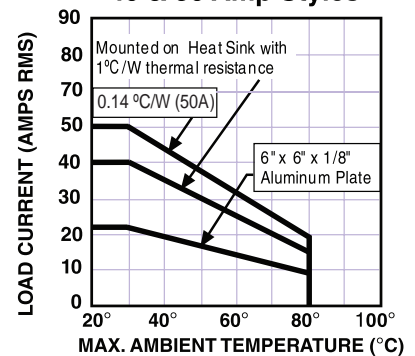
### 10 Amp Styles



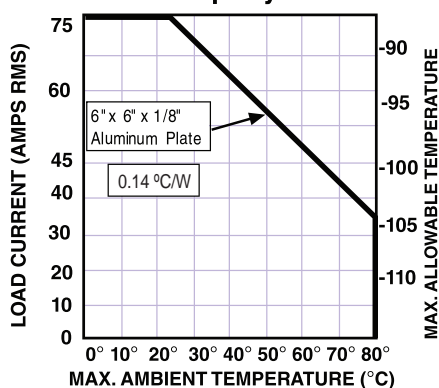
### 25 Amp Styles



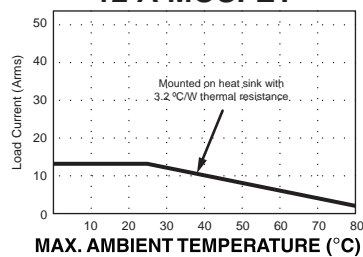
### 40 & 50 Amp Styles



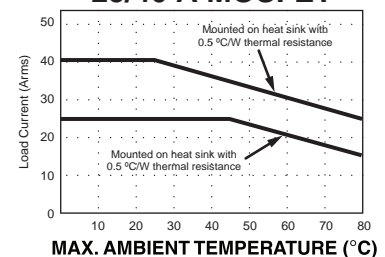
### 75 Amp Styles



### 12 A MOSFET



### 25/40 A MOSFET



Note: Charts are based on using a thermal transfer medium such as the included thermal pad



# AD Series Class 6 Solid State Relays Accessory

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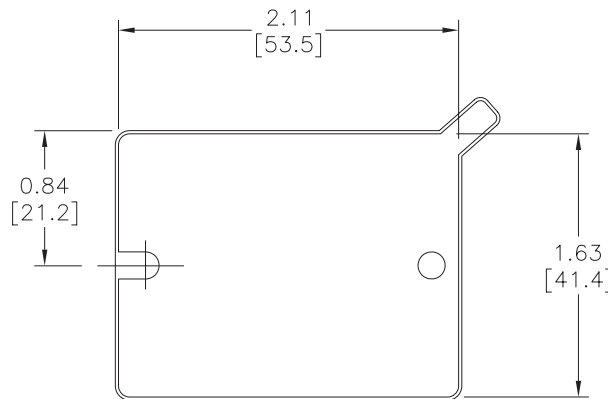
Part #  
Index

Accessory for SSR6 Solid State Relay		
Part Number	Price	Description
AD-SSR-THERM-PAD	<--->	Thermal mounting pad for AD-SSR6 solid state relays <b>ONLY</b> . 10/pk.



## Dimensions

inches [mm]



# AD Series Class 8 Solid State Relays



**AD-SSR810-AC-28Z**  
shown

The Class 8 solid state relays offer energy efficient current switching in a slim housing ideal for space-saving applications.

Switching types include Zero Cross for resistive AC loads where the output energizes/de-energizes when control voltage nears zero, and Random for AC loads where the output switches instantaneously with the actual voltage.

All Class 8 solid state relays use an SCR, which is suited for AC load applications, as the switching device .

## Features

- Internal heat sink
- Finger-safe terminals
- DIN and panel mounting
- Optically coupled circuit

Class 8 Solid State Relay Selection Guide						
Part Number	Price	Type	Input Voltage	Load Voltage	Configuration	Contact Rating
<b>AD-SSR810-AC-28Z</b>	<-->	N.O. SCR	90 to 280 VAC	24 to 280 VAC	SPST	10A
<b>AD-SSR810-AC-28R</b>	<-->		3 to 32 VDC			
<b>AD-SSR810-DC-28Z</b>	<-->					
<b>AD-SSR810-DC-28R</b>	<-->					
<b>AD-SSR810-DC-28RN</b>	<-->	N.C. SCR	3 to 32 VDC			
<b>AD-SSR810-AC-48Z</b>	<-->	N.O. SCR	90 to 280 VAC	48 to 480 VAC		
<b>AD-SSR810-AC-48R</b>	<-->		3 to 32 VDC			
<b>AD-SSR810-DC-48Z</b>	<-->					
<b>AD-SSR810-DC-48R</b>	<-->					
<b>AD-SSR810-AC-60Z</b>	<-->		90 to 280 VAC	48 to 600 VAC		
<b>AD-SSR810-AC-60R</b>	<-->					
<b>AD-SSR810-DC-60Z</b>	<-->					
<b>AD-SSR810-DC-60R</b>	<-->					



# AD Series Class 8 Solid State Relays

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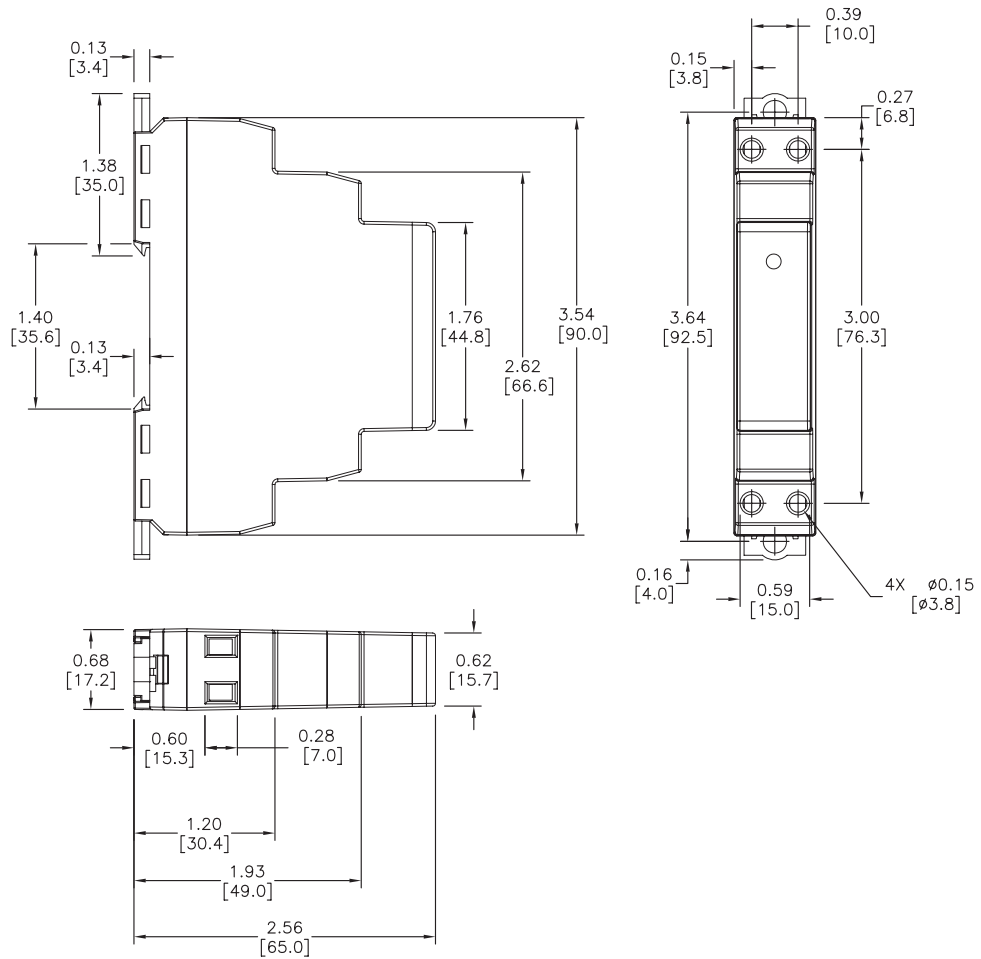
Part # Index

Specifications														
Part Number	AD-SSR810-AC-28Z	AD-SSR810-AC-28R	AD-SSR810-DC-28Z	AD-SSR810-DC-28R	AD-SSR810-DC-28RN	AD-SSR810-AC-48Z	AD-SSR810-AC-48R	AD-SSR810-DC-48Z	AD-SSR810-DC-48R	AD-SSR810-AC-60Z	AD-SSR810-AC-60R	AD-SSR810-DC-60Z	AD-SSR810-DC-60R	
<b>Input Characteristics</b>														
<b>Control Voltage Range</b>	90 to 280 VAC		3 to 32 VDC			90 to 280 VAC		3 to 32 VDC		90 to 280 VAC		3 to 32 VDC		
<b>Typical Input Current</b>	12 mA		16 mA			12 mA		16 mA		12 mA		16 mA		
<b>Must Release Voltage</b>	10 VAC		1 VDC			10 VAC		1 VDC		10 VAC		1 VDC		
<b>Reverse Polarity Protection</b>	-		Yes			-		Yes		-		Yes		
<b>Switching Type</b>	Zero Cross	Random	Zero Cross	Random	Random	Zero Cross	Random	Zero Cross	Random	Zero Cross	Random	Zero Cross	Random	
<b>Input Indicator</b>	Green LED status lamp													
<b>Output Characteristics</b>														
<b>Load Voltage Range</b>	24 to 280 VAC				48 to 480 VAC				48 to 600 VAC					
<b>Rated Load Current</b>	10 A													
<b>Maximum Off-State Voltage dv/dt</b>	500 V/μs			200 V/μs		350 V/μs								
<b>Minimum Load Current</b>	50 mA													
<b>Non-Repetitive Surge Current (1 Cycle)</b>	500 A													
<b>Maximum Off State Leakage current (RMS)</b>	10 mA													
<b>Typical On-State Voltage Drop (RMS)</b>	1.25 VAC													
<b>Maximum I<sup>2</sup>T for Fusing (A<sup>2</sup>Sec)</b>	1250				850				600					
<b>RMS Overload Current/Sec</b>	24A													
<b>Contact Configuration</b>	SPST N.O.				SPST N.C.		SPST N.O.							
<b>Maximum Turn-On Time</b>	40 ms		8.3 ms			40 ms		8.3 ms		40 ms		8.3 ms		
<b>Maximum Turn-Off Time</b>	80 ms		8.3 ms			80 ms		8.3 ms		80 ms		8.3 ms		
<b>General Characteristics</b>														
<b>Dielectric Strength (Terminal to Chassis)</b>	2500 VAC													
<b>Thermal Resistance (Junction to Case)</b>	0.66°C/W (33.19°F/W)													
<b>Internal Heat Sink</b>	4°C/W (39.2°F/W)													
<b>Operating Temperature Range</b>	-30°C to 80°C (-22°F to 176°F)													
<b>Storage Temperature Range</b>	-40°C to 100°C (-40°F to 212°F)													
<b>Weight</b>	127 g (4.1 oz)													
<b>Terminal Torque</b>	7.1 lb-in (0.8 Nm) max													
<b>Terminal Wire Capacity</b>	14 AWG (2.5mm <sup>2</sup> ) max													
<b>Agency Approvals and Standards</b>	UL file # E222847, CE, CSA, RoHS													
<b>Environmental Protection</b>	IP20													

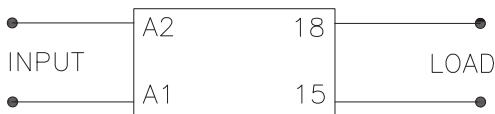
# AD Series Class 8 Solid State Relays Dimensions & Derating Charts

## Dimensions

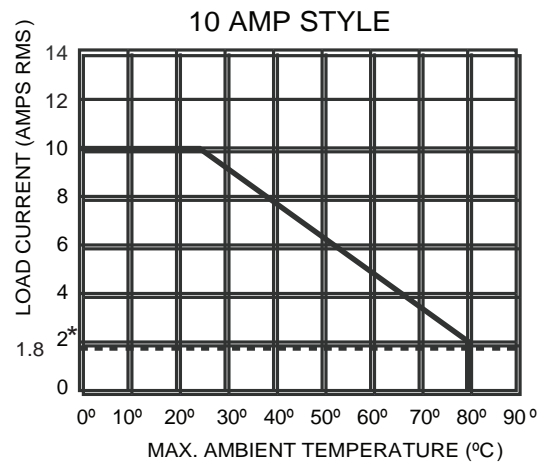
inches [mm]



## Wiring Diagram



## Derating Chart



\* Indicates current cut-off.

**Note:** A minimum spacing of 17.5 mm (0.7 in) between adjacent 861 relays is required in order to achieve the maximum ratings. A 0mm spacing will result in a 50% reduction in the de-rating.



# AD Series Class 8 Solid State Relays for Hazardous Locations

The Class 8 Hazardous Location series is similar to the Class 8 series with the added feature of being approved for hazardous locations (Class 1, Div. 2, Groups A, B, C, D).

Switching types include DC switching for DC loads and Zero Cross for resistive AC loads where the output energizes/de-energizes when the control voltage nears zero.

Switching devices include MOSFET for DC loads and SCR for AC loads.

## Features

- For use in hazardous locations (Class I, Div 2, Groups A, B, C, D)
- Internal Heat Sink
- Finger-safe terminals
- DIN and panel mounting
- Optically coupled circuit



**AD-HSSR808-DC-15 shown**

Class 8 Hermetically-sealed Solid State Relay Selection Guide							
Part Number	Price	Type	Input Voltage	Load Voltage	Configuration	Contact Rating	
<b>AD-HSSR815-DC-05</b>	<--->	N.O. MOSFET	3.5 to 32 VDC	3 to 50 VDC	SPST	15A	
<b>AD-HSSR808-DC-15</b>	<--->			3 to 150 VDC		8A	
<b>AD-HSSR810-AC-28</b>	<--->	N.O. SCR	90 to 280 VAC 3 to 32 VDC	24 to 280 VAC		10A	
<b>AD-HSSR810-DC-28</b>	<--->			48 to 480 VAC			
<b>AD-HSSR810-AC-48</b>	<--->			90 to 280 VAC 3 to 32 VDC			48 to 600 VAC
<b>AD-HSSR810-DC-48</b>	<--->			90 to 280 VAC 3 to 32 VDC			48 to 600 VAC
<b>AD-HSSR810-AC-60</b>	<--->			90 to 280 VAC 3 to 32 VDC			48 to 600 VAC
<b>AD-HSSR810-DC-60</b>	<--->			90 to 280 VAC 3 to 32 VDC			48 to 600 VAC

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# AD Series Class 8 Solid State Relays for Hazardous Locations

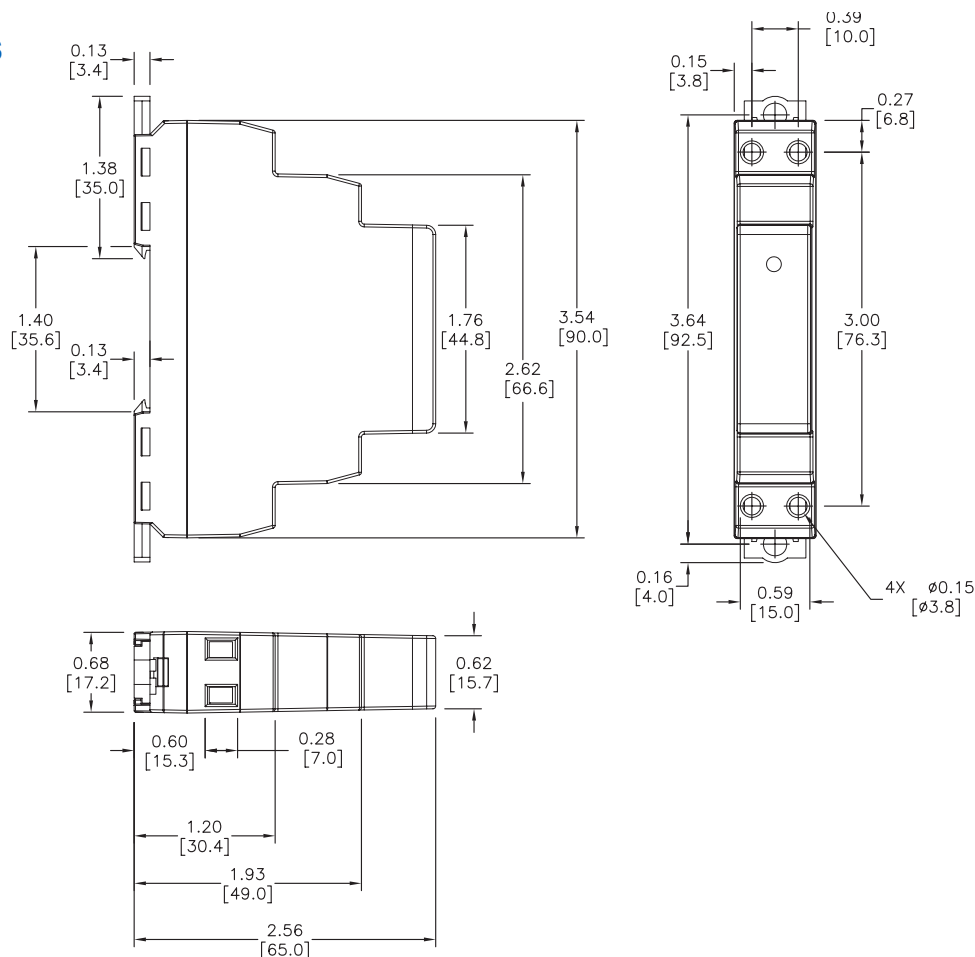
Specifications								
Part Number	AD-HSSR815-DC-05	AD-HSSR808-DC-15	AD-HSSR810-AC-28	AD-HSSR810-DC-28	AD-HSSR810-AC-48	AD-HSSR810-DC-48	AD-HSSR810-AC-60	AD-HSSR810-DC-60
<b>Input Characteristics</b>								
<b>Control Voltage Range</b>	3.5 to 32 VDC	90 to 280 VAC	3 to 32 VDC	90 to 280 VAC	3 to 32 VDC	90 to 280 VAC	3 to 32 VDC	90 to 280 VAC
<b>Typical Input Current</b>	12 mA	12 mA	16 mA	12 mA	16 mA	12 mA	16 mA	16 mA
<b>Must Release Voltage</b>	1 VDC	10 VAC	1 VDC	10 VAC	1 VDC	10 VAC	1 VDC	1 VDC
<b>Reverse Polarity Protection</b>	Yes	—	Yes	—	Yes	—	Yes	Yes
<b>Nominal Input Impedance</b>	Current Regulator	16 to 25k $\Omega$	Current Regulator	16 to 25k $\Omega$	Current Regulator	16 to 25k $\Omega$	Current Regulator	Current Regulator
<b>Switching Type</b>	DC	Zero Cross						
<b>Input Indicator</b>	Green LED status lamp							
<b>Output Characteristics</b>								
<b>Load Voltage Range</b>	3 to 50 VDC	3 to 150 VDC	24 to 280 VAC	48 to 480 VAC	48 to 600 VAC			
<b>Rated Load Current</b>	15 A	8 A	10 A					
<b>Maximum Off-State Voltage dv/dt</b>	—	—	500 V/ $\mu$ s	350 V/ $\mu$ s	500 V/ $\mu$ s			
<b>Minimum Load Current</b>	20 mA		50 mA					
<b>Non-Repetitive Surge Current (1 Cycle)</b>	50 A	35 A	500 A					
<b>Maximum Off State Leakage current (RMS)</b>	0.25 mA		10 mA					
<b>Typical On-State Voltage Drop (RMS)</b>	N/A		1.25 VAC					
<b>Maximum I<sup>2</sup>T for Fusing (A<sup>2</sup>Sec)</b>	—	—	1250	850	600			
<b>RMS Overload Current/Sec</b>	24 A	17 A	24 A					
<b>Maximum Turn-On Time</b>	5 ms		8.3 ms					
<b>Maximum Turn-Off Time</b>	5 ms		8.3 ms					
<b>General Characteristics</b>								
<b>Dielectric Strength Terminals to Chassis</b>	2500 V rms							
<b>Thermal Resistance Junction to Case</b>	1.4°C/W (34.52°F/W)	0.5°C/W (32.9°F/W)	0.66°C/W (33.19°F/W)					
<b>Internal Heat Sink</b>	4.0°C/W (39.2°F/W)							
<b>Operating Temperature Range</b>	-30 to 80°C (-22 to 176°F) (derating applies)							
<b>Storage Temperature Range</b>	-40 to 100°C (-40 to 212°F)							
<b>Weight</b>	127.1 g (4.1 oz)							
<b>Terminal Torque</b>	7.1 in-lb (0.8 Nm) maximum							
<b>Terminal Wire Capacity</b>	14 AWG (2.5mm <sup>2</sup> ) max							
<b>Agency Approvals and Standards</b>	UL file # E344125, CE, RoHS							
<b>Environmental Protections</b>	IP20 (Class I, Div. 2 Groups A, B, C, D)							



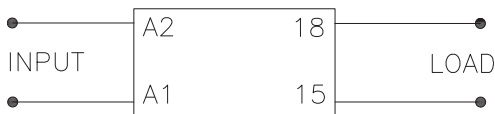
# AD Series Class 8 Solid State Relays for Hazardous Locations Dimensions and Derating Charts

## Dimensions

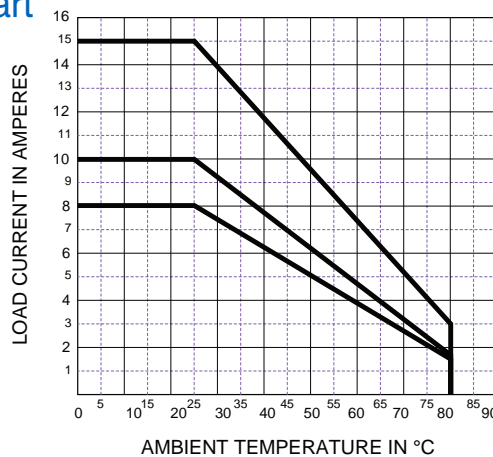
inches [mm]



## Wiring Diagram

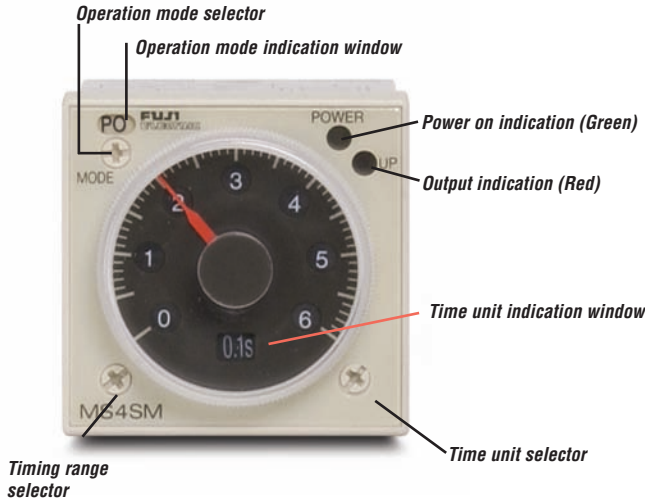


## Derating Chart



**Note:** A minimum spacing of 17.5 mm (0.7 in) between adjacent 861 relays is required in order to achieve the maximum ratings. A 0mm spacing will result in a 50% reduction in the de-rating.

# Timers for all Applications



## Fuji multi-mode timers with full features

**Ease of use:** As the time range is adjusted, the corresponding display changes.

**Full functionality:** Up to four output modes can be selected simply with the turn of a screw. All outputs contain 5A, DPDT relays.

**LED indicators**

## Miniature DIN timers are small and accurate

**Small size:** Under one inch wide

**Easy operation:** A simple dial allows easy setup for the operator.

**Accuracy:** The timer will perform its timing function with repeatable accuracy of +/- 1% of the setting.



## Koyo digital timers: powerful but easy to use

This full-function timer has all the bells and whistles, including full programmability:

**Timing ranges and modes:** Seconds to hours time ranges with decimal selection and up and down timing modes accommodate a wide range of applications.

**Output modes:** Five output modes, from on-delay to one-shot, use a reliable 2A relay to operate the controlled device.

**Tamper-proof:** Key protection can be set for individual keys to prevent unintentional changes by the operator.



ST7P Series	MS4S Series	KT-V4S Series
-------------	-------------	---------------



<b>Display</b>	Manual dial Time setting Output LED indicator	Manual dial Time setting Power LED indicator Output LED indicator Output mode setting	4-digit green LED display for time setting 4-Digit red LED display for current time Output LED indicator Programming indicators
<b>Input Power</b>	100-120 VAC or 24 VDC	100-240 VAC or 24 VDC/AC	85-260 VAC or 10-26 VDC
<b>Inputs</b>	Timed signal	Reset signal Start signal Gate signal Timed signal	Start signal Reset signal Timed signal
<b>Outputs</b>	Normally-open DPDT Normally-closed DPDT	Normally-open DPDT Normally-closed DPDT	1 SPDT DC NPN transistor
<b>Contact Rating</b>	3 A @ 240 VAC (resistive load)	5 A @ 250 VAC (resistive load)	Mechanical: 2 A @ 220 VAC Transistor: 100 mA @ 24 VDC
<b>Output Modes</b>	On-delay	On-delay Flicker One shot Off-delay	On-delay Flicker One shot Off-delay Accumulation
<b>Time Ranges</b>	0.4 seconds to 60 minutes	0.05 seconds to 60 hours	0.001 seconds to 999.9 hours
<b>Enclosure Rating</b>	NEMA 1	NEMA 1	IP65 - faceplate
<b>Agency Approvals</b>	UL/CSA/CE/TUV	UL/CSA/CE/TUV	UL/CSA/CE
<b>Price</b>	starting at <--->	starting at <--->	starting at <--->

# CTT Series - Digital Counter / Timer / Tachometer



## A lot of functionality in one powerful little unit!

- Can operate as a digital counter, timer, combination timer + counter or tachometer
- Accepts voltage and non-voltage inputs from a wide variety of NPN, PNP, or dry contact sensors
- Selectable counting speeds from 1 to 10,000 cycles persecond
- Multiple transistor and relay outputs can operate as momentary or maintained
- Double-line, 6-digit, 2-color LCD display
- Easy configuration with externally accessible DIP switches or the lockable keypad
- Display decimal point selection
- Available in 100-240VAC and 24VDC powered models
- UL508 listed (E311366), cULus, CE marked

Counter Functions	Counter Input Modes	Counter Output Modes
1-Stage	Up	Select from eleven (11) different output modes (F, N, C, R, K, P, Q, A, S, T, D)
2-Stage	Down	
Batch	Up / Command Down	
Total	Up/ Down	
Dual	Quadrature	
	Addition	
	Subtraction	

Timer + Counter		
Timer Functions (Up or Down)	Counter Input Modes	Counter Output Modes
Signal On Delay 1	Up	Select from eight (8) different output modes (F, N, C, R, K, P, Q, A)
Signal On Delay 2	Down	
Signal Off Delay		
Signal On		
Power On Delay		
Power On Delay Hold		
Repeat Cycle		
Repeat Cycle Hold		

## Counter/Timer/Tachometer Functions

Timer Functions (Up or Down)	
Signal On Delay 1	Repeat Cycle
Signal On Delay 2	Repeat Cycle Hold
Signal Off Delay	Repeat Cycle 2
Signal On	Signal Cumulate
Power On Delay	Signal Twin On-Start
Power On Delay Hold	Signal Twin Off-Start

Tachometer Output Modes
Select from four (4) different output modes
2Lo/1Lo
2Lo/1Hi
2Hi/1Lo
2Hi/1Hi



- Company Information
- Systems Overview
- Programmable Controllers
- Field I/O
- Software
- C-more & other HMI
- Drives
- Soft Starters
- Motors & Gearbox
- Steppers/Servos
- Motor Controls
- Proximity Sensors
- Photo Sensors
- Limit Switches
- Encoders
- Current Sensors
- Pressure Sensors
- Temperature Sensors
- Pushbuttons/Lights
- Process
- Relays/Timers
- Comm.
- Terminal Blocks & Wiring
- Power
- Circuit Protection
- Enclosures
- Tools
- Pneumatics
- Safety
- Appendix
- Product Index
- Part # Index

# Fuji 1/16 DIN Super Timers

## Overview

The MS4S series super timers are 1/16 DIN style timing relays designed for process control, machine tool control, safety control and many other types of applications. The timers are plug-in 8-pin or 11-pin surface/DIN-rail mountable with up to four selectable modes of operation and four selectable timing ranges.

## Features

### MS4SM

- Multi-mode timer with mode indication. On-delay (PO), flicker (FL), one-shot (OS), or signal off-delay (SF)
- 11-pin plug-in with start, reset and gate (interrupt) input signals and a DPDT contact output
- Timing range from 0.05 seconds to 60 hours
- Timer scale with selectable ranges of 0-6, 0-12, 0-30 and 0-60
- Timing units in selectable ranges of 0.1s, sec, min and hrs
- Power on LED indicator (green) flickers during timing operation, UP (red) LED is on when normally open contact is closed

### MS4SA

- On-delay timer
- 8-pin plug-in with a DPDT contact output
- Timing range from 0.05 seconds to 60 hours
- Timer scale with selectable ranges of 0-6, 0-12, 0-30 and 0-60

- Timing units in selectable ranges of 0.1s, sec, min and hrs
- Power on LED indicator (green) flickers during timing operation, UP (red) LED is on when normally open contact is closed

### MS4SC

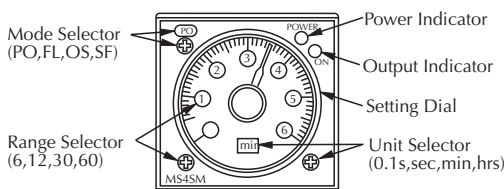
- On-delay timer
- 8-pin plug-in with a SPDT timed contact output and a SPDT instantaneous contact output
- Timing range from 0.05 seconds to 60 hours
- Timer scale with selectable ranges of 0-6, 0-12, 0-30 and 0-60
- Timing units in selectable ranges of 0.1s, sec, min and hrs
- Power on LED indicator (green) flickers during timing operation, UP (red) LED is on when normally open contact is closed

## Product Selection Guide

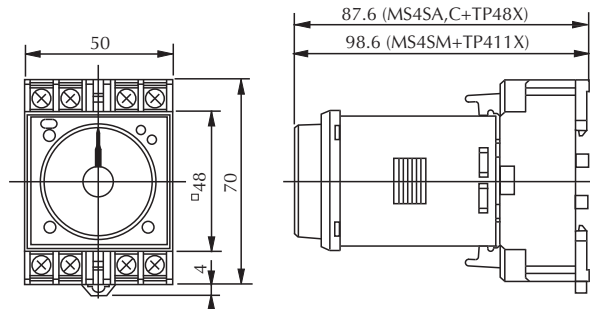
Part Number	Description	Voltage	Time Range	Price
MS4SM-AP-ADC	Multi-mode timer with selectable timing range from 0.05s to 60 hours. Input power is 100 - 240 VAC. DPDT relay output. 11-pin connection. UL, CSA, TÜV approved. <i>Note:</i> Socket mounts must be purchased separately	100-240 VAC	0.05 seconds to 60 hours	<--->
MS4SA-AP-ADC	On-delay timer with selectable timing range from 0.05s to 60 hours. Input power is 100 - 240 VAC. DPDT relay output. 8-pin connection. UL, CSA, TÜV approved. <i>Note:</i> Socket mounts must be purchased separately		0.05 seconds to 60 hours	<--->
MS4SC-AP-ADC	On-delay timer with selectable timing range from 0.05s to 60 hours. Input power is 100 - 240 VAC. SPDT timed relay output and SPDT instantaneous relay output. 8-pin connection. UL, CSA, TÜV approved		0.05 seconds to 60 hours	<--->
MS4SM-CE-ADC	Multi-mode timer with selectable timing range from 0.05s to 60 hours. Input power is 24 VDC/AC. DPDT relay output. 11-pin connection. UL, CSA, TÜV approved. <i>Note:</i> Socket mounts must be purchased separately	24 VDC/AC	0.05 seconds to 60 hours	<--->
MS4SA-CE-ADC	On-delay timer with selectable timing range from 0.05s to 60 hours. Input power is 24 VDC/AC. DPDT relay output. 8-pin connection. UL, CSA, TÜV approved. <i>Note:</i> Socket mounts must be purchased separately		0.05 seconds to 60 hours	<--->
MS4SC-CE-ADC	On-delay timer with selectable timing range from 0.05s to 60 hours. Input power is 24 VDC/AC. SPDT timed relay output and SPDT instantaneous relay output. 8-pin connection. UL, CSA, TÜV approved. <i>Note:</i> Socket mounts must be purchased separately		0.05 seconds to 60 hours	<--->
TP411X	Surface mount socket for MS4SM series timers. UL, CSA, TÜV approved	N/A	N/A	<--->
TP411SBA	Flush mount socket for MS4SM series timers. UL, CSA, TÜV approved, requires PANEL-16*			<--->
TP48X	Surface mount socket for MS4SA and MS4SC series timers. UL, CSA, TÜV approved			<--->
TP48SB	Flush mount socket for MS4SA and MS4SC series timers. UL, CSA, TÜV approved, requires PANEL-16*			<--->

\*Panel clips for mounting through a door are optional and must be purchased separately. See part# PANEL-16 on page 26-43.

## Control



## Dimensions (timer and socket shown attached)





# Fuji 1/16 DIN Super Timers



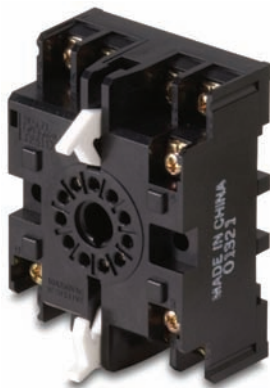
**MS4SM-AP-ADC**  
**MS4SM-CE-ADC**



**MS4SA-AP-ADC**  
**MS4SA-CE-ADC**



**MS4SC-AP-ADC**  
**MS4SC-CE-ADC**



**TP411X**



**TP411SBA\***



**TP48X**



**TP48SB\***

Specifications	
<b>Approvals</b>	UL file no.: E44592, CSA file no.: LR20479, TÜV license no: R9551800
<b>Repeat Accuracy</b>	±0.3% at maximum setting time
<b>Reset Time</b>	0.1 second or less
<b>Operating Voltage Range</b>	85-264 VAC 20.4-26.4 VDC/AC MS4SM-AP-ADC MS4SM-CE-ADC MS4SA-AP-ADC MS4SA-CE-ADC MS4SC-AP-ADC MS4SC-CE-ADC
<b>Operating Temperature Range</b>	-10 to +55°C (14 to 131°F) (no icing)
<b>Humidity</b>	35 to 85% (no condensation)
<b>Contact Ratings</b>	5 A at 30 VDC resistive load, 1 A @ 30 VDC inductive load, 5 A @ 250 VAC resistive load, 2.5 A @ 120 VAC inductive load
<b>Power Consumption</b>	Approx. 10 VA for AC; 1 W at 24 VDC
<b>Insulation Resistance</b>	100MΩ at 500 VDC insulation tested
<b>Dielectric Strength</b>	2000 VAC 1 min. between current carrying part and non-current carrying part 2000 VAC 1 min. between output contact and control circuit 1000 VAC 1 min. between open contacts
<b>Vibration</b>	Malfunction durability: 10 to 55Hz, 0.5mm double amplitude Mechanical durability: 10 to 55Hz, 0.75mm double amplitude
<b>Shock</b>	Malfunction durability: 100m/s <sup>2</sup> Mechanical durability: 500m/s <sup>2</sup>
<b>Life Expectancy</b>	Mechanical: 20 million operations (No load operation cycle: 1800/hr.) Electrical: 100,000 operations at 250 VAC 5 A resistive load (operation cycle: 1800/hr.)
<b>Weight</b>	Approx. 100g (3.527 oz.)

\*When using flush mount sockets TP411SBA and TP48SB, panel mounting clip PANEL-16 is required and must be purchased separately. See page 27-63

Company Information

Systems Overview

Programmable Controllers

Field I/O

Software

C-more & other HMI

Drives

Soft Starters

Motors & Gearbox

Steppers/Servos

Motor Controls

Proximity Sensors

Photo Sensors

Limit Switches

Encoders

Current Sensors

Pressure Sensors

Temperature Sensors

Pushbuttons/Lights

Process

Relays/Timers

Comm.

Terminal Blocks & Wiring

Power

Circuit Protection

Enclosures

Tools

Pneumatics

Safety

Appendix

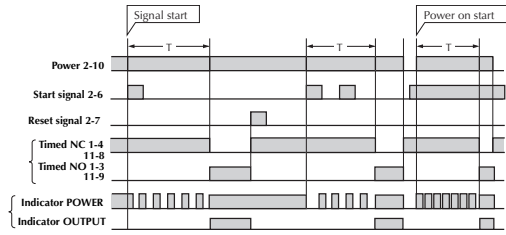
Product Index

Part # Index

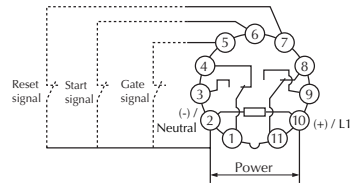
# Fuji 1/16 DIN Timers Timing and Wiring Diagrams

## MS4SM

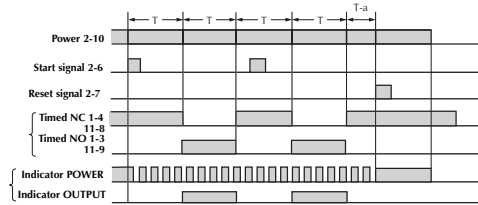
### 1. On-delay PO



- With power off turn the mode selector until **PO** is displayed.
- When power is on, applying the start signal turns the timed N.O. (normally open) contact on after the set time has elapsed.
- When using a power-on start, pins 2 and 6 (start signal) must be jumpered together

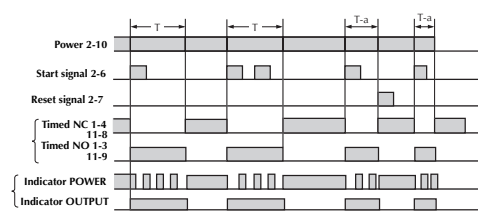


### 2. Flicker FL



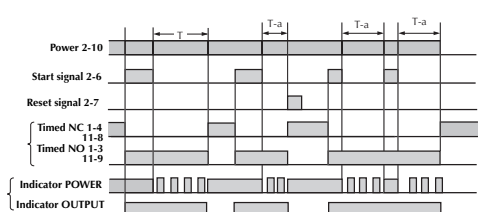
- With power off, turn the mode selector until **FL** is displayed.
- When power is on, applying the start signal turns the timed contact on and off repeatedly at the set time intervals.

### 3. One-shot OS



- With power off, turn the mode selector until **OS** is displayed
- When power is on, applying the start signal instantly turns the timed N.O. contact on and turns it off after the set time has elapsed.

### 4. Signal off-delay SF

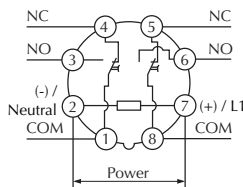
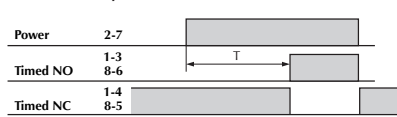


- With power off, turn the mode selector until **SF** is displayed.
- When power is on, applying the start signal instantly turns the timed N.O. contact on. Removing the start signal turns the contact off after the set time has elapsed.

#### Notes:

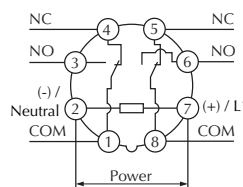
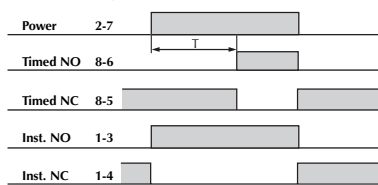
1.  $T$  = set time.  $t$  = time period within set time.
2. The gate signal is used to interrupt the timing operation.

## MS4SA On-delay



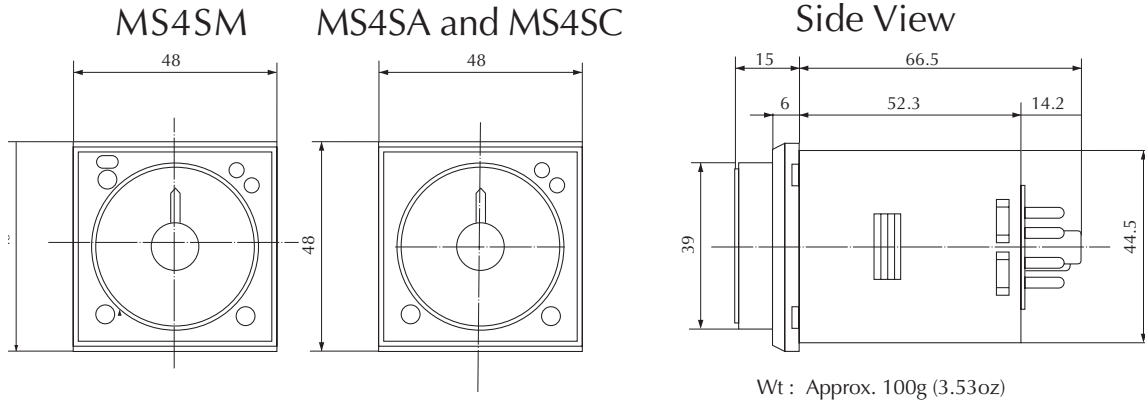
- When power is applied, the timed N.O. contacts make after the set time has elapsed.
- When power is removed, the contacts reset.

## MS4SC On-delay



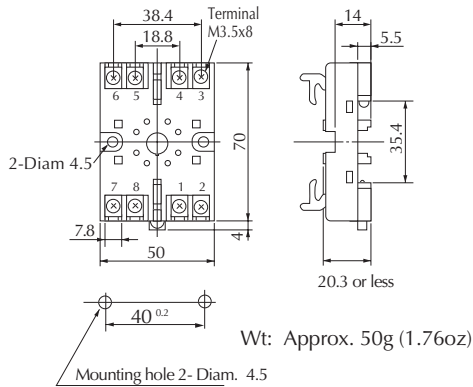
- Timed contact  
When power is applied, the N.O. contact makes after the set time has elapsed. When power is removed, the contacts reset.
- Instantaneous contact  
When power is applied, the N.O. contact makes instantly. When power is removed, the contacts reset.

# Fuji 1/16 DIN Super Timers Dimensions

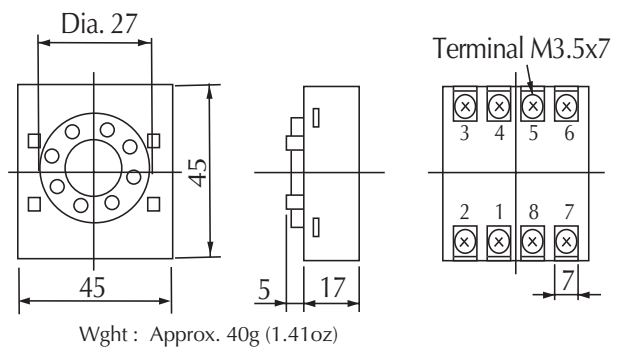


All dimensions in mm

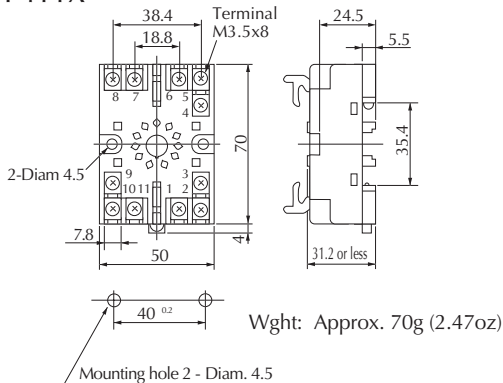
## Socket for MS4SA, MS4SC (8-pin) TP48X



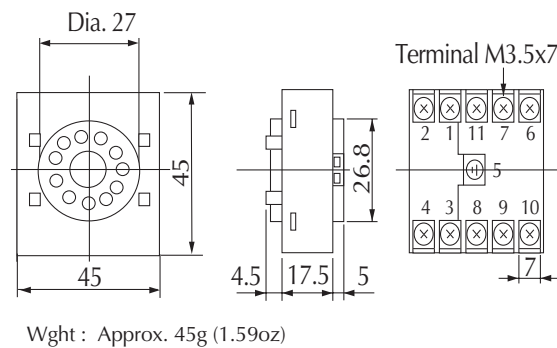
## Socket for MS4SA, MS4SC (8-pin) TP48SB



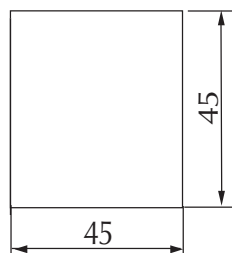
## Socket for MS4SM (11-pin) TP411X



## Socket for MS4SM (11-pin) TP411SBA



## MS4S Cutout for panel mounting using PANEL-16 mounting clips





# Fuji Miniature DIN Super Timers

## Overview

The ST7P is a compact and highly accurate timer. It is an on-delay operation type with a single timing range. These timers are designed to optimize mounting space in small areas. Mounting is by DIN rail or by securing directly to a panel with a fastener.

## Features

- Highly accurate, with a repeat accuracy within  $\pm 1\%$  at maximum setting time
- ST7P models offer a number of timing ranges. Please see Selection Guide below
- Large dial makes time setting easy
- LED indicators make it easy to monitor timer operation
- ST7P series meets UL and CSA standards



**ST7P Miniature Super Timer with TP88X2 Socket**

Product Selection Guide				
Part Number	Description	Voltage	Time Range	Price
<b>ST7P-2A15S-ADC</b>	Mini-DIN on-delay timer with timing range of 0.4s to 5s. Input power is 100-120 VAC. DPDT relay output. UL, CSA, TÜV approved	100-120VAC	0.4 seconds to 5 seconds	<--->
<b>ST7P-2A13T-ADC</b>	Mini-DIN on-delay timer with timing range of 2s to 30s. Input power is 100-120 VAC. DPDT relay output. UL, CSA, TÜV approved		2 seconds to 30 seconds	<--->
<b>ST7P-2A16T-ADC</b>	Mini-DIN on-delay timer with timing range of 4s to 60s. Input power is 100-120 VAC. DPDT relay output. UL, CSA, TÜV approved		4 seconds to 60 seconds	<--->
<b>ST7P-2A11N-ADC</b>	Mini-DIN on-delay timer with timing range of 1 min. to 10 min. Input power is 100-120 VAC. DPDT relay output. UL, CSA, TÜV approved		1 minute to 10 minutes	<--->
<b>ST7P-2A16N-ADC</b>	Mini-DIN on-delay timer with timing range of 4 min. to 60 min. Input power is 100-120 VAC. DPDT relay output. UL, CSA, TÜV approved		4 minutes to 60 minutes	<--->
<b>ST7P-2DE5S-ADC</b>	Mini-DIN on-delay timer with timing range of 0.4s to 5s. Input power is 24 VDC. DPDT relay output. UL, CSA, TÜV approved		24VDC	0.4 seconds to 5 seconds
<b>ST7P-2DE3T-ADC</b>	Mini-DIN on-delay timer with timing range of 2s to 30s. Input power is 24 VDC. DPDT relay output. UL, CSA, TÜV approved	2 seconds to 30 seconds		<--->
<b>ST7P-2DE6T-ADC</b>	Mini-DIN on-delay timer with timing range of 4s to 60s. Input power is 24 VDC. DPDT relay output. UL, CSA, TÜV approved	4 seconds to 60 seconds		<--->
<b>ST7P-2DE1N-ADC</b>	Mini-DIN on-delay timer with timing range of 1 min. to 10 min. Input power is 24 VDC. DPDT relay output. UL, CSA, TÜV approved	1 minute to 10 minutes		<--->
<b>ST7P-2DE6N-ADC</b>	Mini-DIN on-delay timer with timing range of 4 min. to 60 min. Input power is 24 VDC. DPDT relay output. UL, CSA, TÜV approved	4 minutes to 60 minutes		<--->
<b>TP88X2</b>	Socket for ST7P series timers. UL, CSA, TÜV approved	N/A		N/A

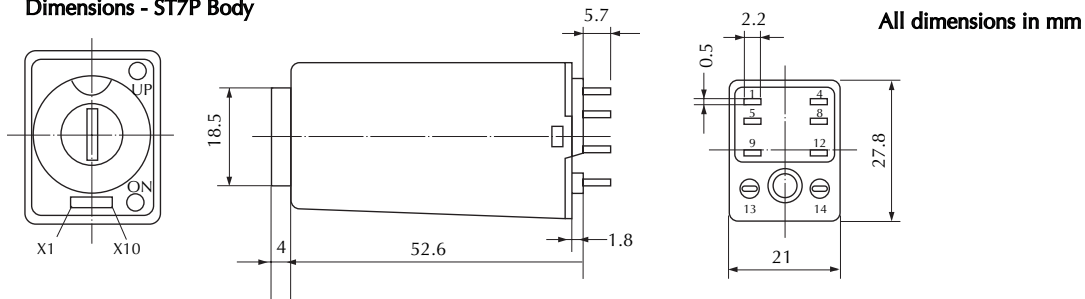
# Fuji Miniature DIN Super Timer Specifications

Specifications	
<b>Approvals</b>	UL file no.: Body - E44592, Socket - E90265; CSA file no.: LR20479; TÜV license no: R9551799
<b>Repeat Accuracy</b>	±0.1% at maximum setting time
<b>Reset Time</b>	0.1 second or less
<b>Maximum Operating Cycle</b>	1800 cycles/hour
<b>Operating Voltage Range</b>	85-132 VAC 50/60 Hz 20.4-26.4 VDC ST7P-2A15S-ADC ST7P-2A13T-ADC ST7P-2A16T-ADC ST7P-2A11N-ADC ST7P-2A16N-ADC ST7P-2DE5S-ADC ST7P-2DE3T-ADC ST7P-2DE6T-ADC ST7P-2DE1N-ADC ST7P-2DE6N-ADC
<b>Operating Temperature Range</b>	-10 to +50°C (14 to 122°F)
<b>Humidity</b>	35 to 85% (no condensation)
<b>Contact Ratings</b>	3 A @ 240 VAC resistive load, 1 A @120 VAC inductive load; 3 A @ 30 VDC resistive load, 0.5 A @ 30 VDC inductive load
<b>Power Consumption</b>	Approx. 1.2 VA at 100 VAC, approx. 1.5 VA at 200 VAC, 1.1 W at 24 VDC.
<b>Insulation Resistance</b>	100MΩ at 500 VDC insulation tested
<b>Surge Voltage*</b>	3000 Volts
<b>Dielectric Strength</b>	2000 VAC 1 min. between current carrying part and non-current carrying part 2000 VAC 1 min. between output contact and control circuit 1000 VAC 1 min. between open contacts
<b>Vibration</b>	Malfunction durability: 10 to 55Hz, 0.5mm double amplitude Mechanical durability: 10 to 55Hz, 0.7mm double amplitude
<b>Shock</b>	Malfunction durability: 50m/s <sup>2</sup> Mechanical durability: 1000m/s <sup>2</sup>
<b>Life Expectancy</b>	Mechanical: 50 million operations (No load; operation cycle 1800/hr.) Electrical: 500,000 operations (3 A @ 220 VAC, resistive load; operation cycle 1800/hr.)
<b>Weight</b>	36.288g (1.28 oz.)

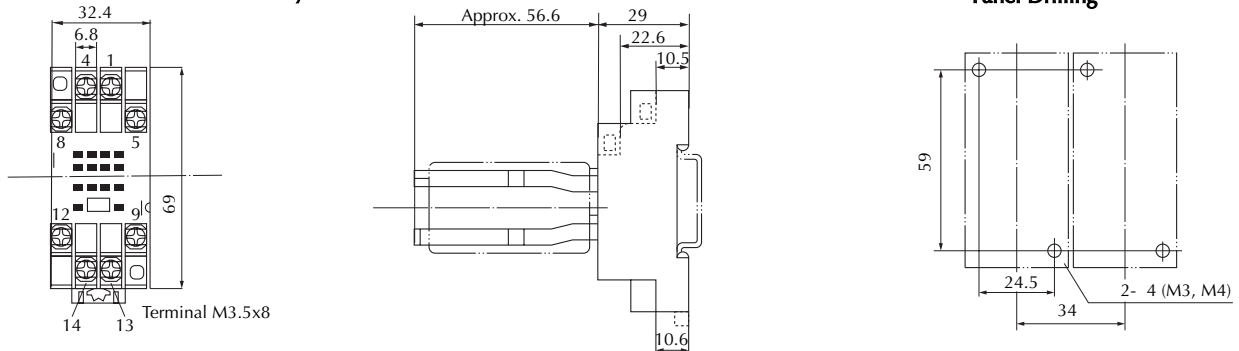
\* Note: If surge voltage exceeds 3000V, use surge suppressors.

# Fuji Miniature DIN Timers Timing and Wiring

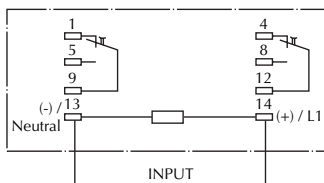
## Dimensions - ST7P Body



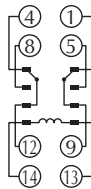
## Dimensions - TP88X2 Body



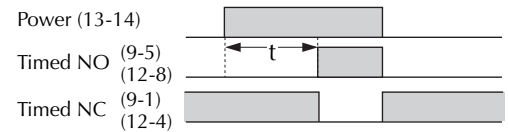
## Wiring Diagram



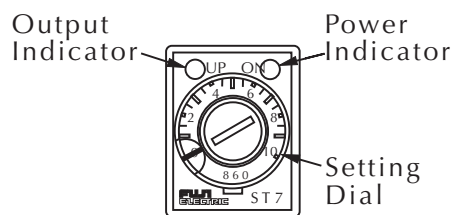
## Sockets/Screw Terminal and Rail Mounting



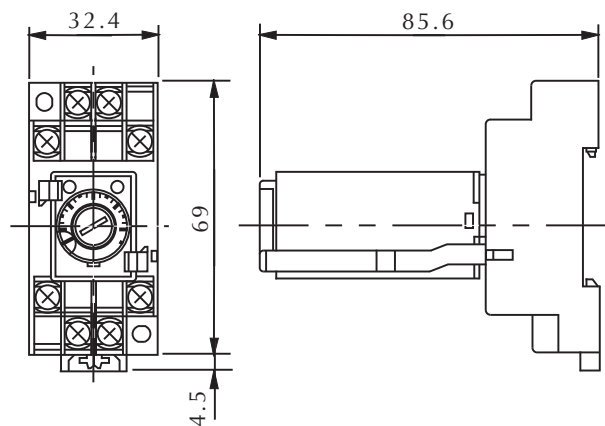
## Timing Diagram



## Control



## Dimensions (Timer and Socket Attached)



# Koyo Digital Timers

## Overview

Koyo digital timers offer flexible features at a great price. A large, easy to read display is offered in a small 1/16 DIN size. The large, bright red LED display has a 12 mm character display height which allows it to be seen easily from a distance and at an angle. In addition, set values use a green LED display to differentiate from timing values. Basic function settings are made with digital switches. Detailed settings are selected with digital keys, so operation is easy.

## Features

- Tamper-proof: key protection can be set for individual keys to prevent a malfunction or tampering
- Battery-less memory retention: EEPROM is used to retain values in memory, so there is no need for battery maintenance
- Maintenance has been reduced via removable terminals. After wiring, the terminal cover provides a safe barrier for worry-free use
- Power source for a DC sensor: you can source the power for the sensor from the built-in power source which supplies 60 mA at 24 VDC
- Wide operating AC voltage range of 85-264 VAC
- Various types of time ranges: covers ten types of time ranges with times of 0.001 second to 999.9 hours
- Five types of operating modes: settings of on-delay, off-delay, one-shot, accumulation and flicker
- Flush door/panel mounting
- Display of elapsed time/remaining time
- IP65 protective structure: front cover panel is made of a clear membrane, so operation with wet or dirty hands can be worry-free
- Fully CE and UL compliant



KT-V4S-D



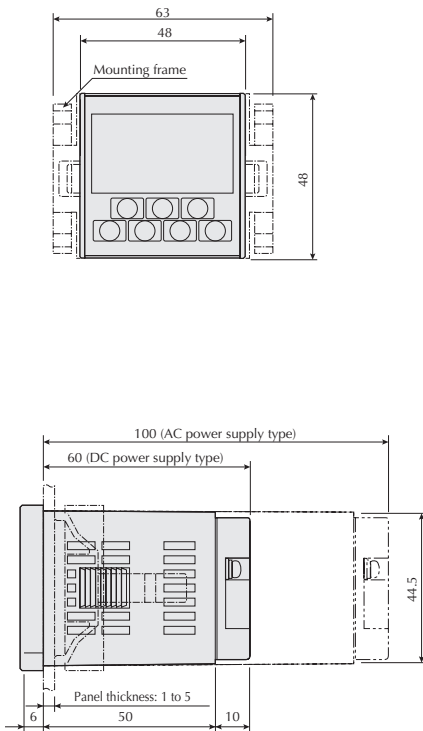
KT-V4S-C-D

Product Selection Guide					
Part Number	Description	Number of Digits	Source Voltage	Time Range	Price
KT-V4S-D*	Digital timer with 10 types of time ranges (see specifications). Input power is 100-240 VAC. UL and CSA approved.	4	100-240 VAC	0.001 second to 999.9 hours	<--->
KT-V4S-C-D*	Digital timer with 10 types of time ranges (see specifications). Input power is 12-24 VDC. UL and CSA approved		12-24 VDC		<--->
Accessories					
Part Number	Description				Price
PANEL-16	Mounting clip for 1/16th DIN timers and temperature/process controllers, for door (flush) mounting. 5 clips per package				<--->

\* Units ship with a PANEL-16 mounting clip for door (flush) mounting, only one required.

# Koyo Digital Timers Specifications

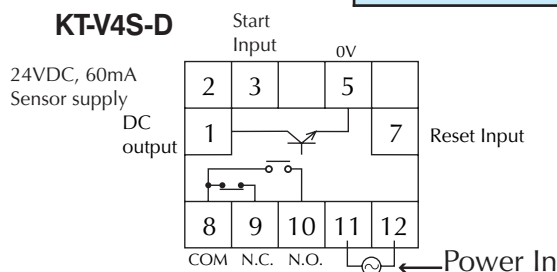
## Dimensions (mm)



	Depth dimension
DC power supply type	66mm
AC power supply type	106mm

Note: Depth dimension includes front panel

## Wiring

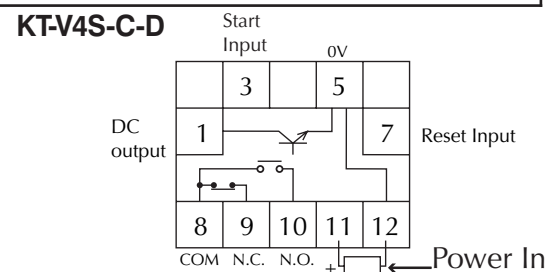


## General Specifications

Power	AC Power	DC Power
Part Number	KT-V4S-D	KT-V4S-C-D
Approvals	UL listed, CSA listed	UL recognized only with Class II power supply; CSA: EN61010-1 and EMI: EN55-11, EMS: EN50082-2. If product has DC power supply, an EMI/EMC filter must be installed on the power supply.
Source Voltage	100-240 VAC, 50/60 Hz	12-24 VDC
Permitted Power Fluctuation	85-264 VAC	10-26.4 VDC
Power Consumption	Approx. 11 VA	Approx. 4 W
Sensor Power	24 VDC (20-28 V) 60 mA (less than 10%p-p ripple noise)	N/A
Memory Backup upon Power Failure	EEPROM writing up to 100,000 times; Memory duration: 10 years	
Ambient Temperature	-10-50°C (14 to 122°F)	
Storage Temperature	-20-70°C (-4 to 158°F) (with no icing)	
Ambient Humidity	35-85% RH non-condensing	
Withstand Voltage	2 kVAC for one minute	
Vibration Resistance	Durability: Displacement amplitude 0.5mm 10-55 Hz along three axes Operating vibration: Displacement amplitude 0.35mm 10-55 Hz along three axes	
Impact Resistance	Durability: 490 m/s <sup>2</sup> along three axes Operating impact: 98 m/s <sup>2</sup> along three axes	
Noise Resistance	AC power between terminals ±1.5 kV (pulse width 1µs and rise time 1ns)	DC power between terminals ± 1.0 kV (pulse width 1 µs and rise time 1 ns)
Protective Structure	IP65 (front panel only) when mounted in appropriate enclosure	
Weight	Approx. 150 grams (5.291 oz.)	Approx. 110 grams (3.88 oz.)
Terminals	Conforming wiring	0.25-1.65 mm <sup>2</sup> 24 to 16 gauge
	Permitted Torque	0.5 Nm (.369 ft./lbs.)

## Performance Specification

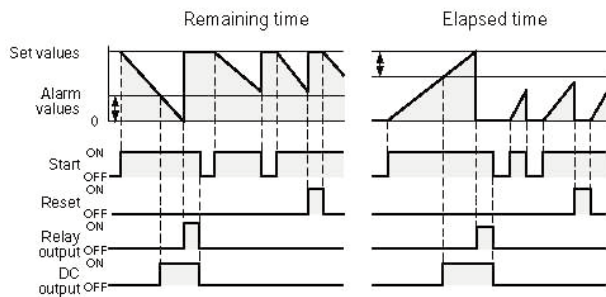
Category	Timer
Operational Format	On-delay, off-delay, one-shot, accumulator, and flicker (with alarm output)
Number of Digits	4 digits
Display	Current values: red LED, character height 12 mm; Preset value: green LED, character height: 7mm
Time Range	0.001s-9.999s/0.01s-99.99s/0.1s-999.9 s/1s-9999 s/1 s-99 min 59 s/1 min-9999 min/1 h-9999 h/1 min-99 h 59 min/0.1 min-999.9 min/0.1h-999.9 h
Display	Elapsed time/remaining time
Timer Precision	0.013% or ±15 ms (using large values)
Input	Input logic: negative logic (no voltage input) positive logic (voltage input)
	Input resistance: positive logic 15 kΩ; negative logic 3.3 kΩ (AC power)/1.8 kΩ (DC power)
	Input voltage: "L" 0-3V "H" 7-30 V
Start Input Response	Less than 15 ms/5 ms/1 ms
External Reset	Min. signal amplitude 5 ms
Output	DC output: NPN open collector output/24 V 100 mA. Withstand voltage 35 V. Residual voltage less than 1.5 V
	Relay output: 1 SPDT 220 VAC 2 A (resistive load). 3A @ 30 VDC, minimum 10mA @ 5 VDC
Output Duration (flicker)	10-9990 ms variable every 10 ms
Installation	1/16 DIN flush door/panel mount



# Koyo Digital Timers Timing and Wiring Diagrams

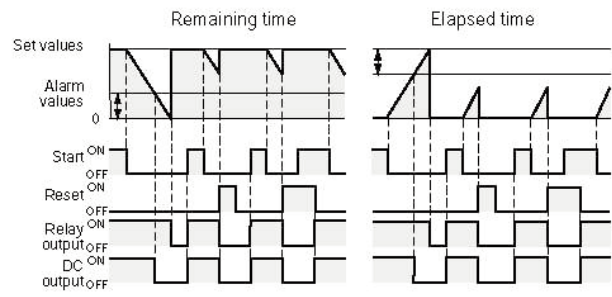
## On-delay

: Alarm setting  
 SW 1 2  
 OFF OFF



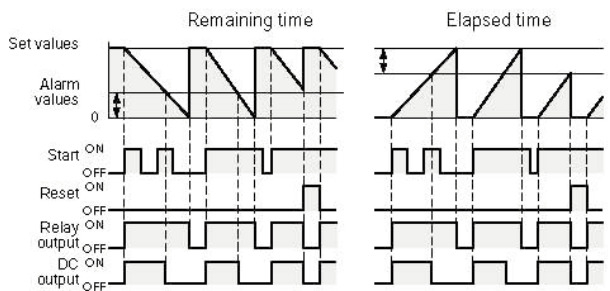
## Off-delay

SW 1 2  
 OFF ON



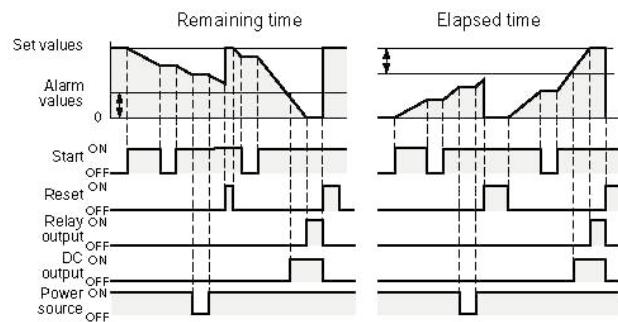
## One-shot

SW 1 2  
 ON OFF



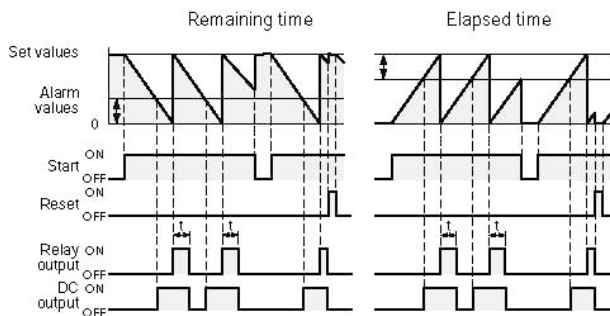
## Accumulation

SW 1 2  
 ON ON



## Flicker

(in Setup mode)



**Note:** Output duration is variable from 0-9990 ms. (Default: 100 ms)

: Alarm settings

When alarm settings are 0, the DC output is the same as the output operations for a relay output.

**Note:** Alarm settings should be less than preset values. Using alarm settings with values that exceed preset values will result in measurement values of 0 and the alarm output (DC output) will come ON.

## KOYO Digital Timers Modes of Operation

**ON Delay:** The rising edge of the Start signal initiates the Timer. When the Timer reaches the set point, the Relay Output turns ON. The Relay Output stays ON until the falling edge (OFF state) of the Start signal, then the Relay Output turns OFF.

**OFF Delay:** The falling edge of the Start signal initiates the Timer. When the timer reaches the set point, the Relay Output turns OFF. The Relay Output stays OFF until the rising edge (On state) of the Start signal turns the Relay Output ON.

**One Shot:** The Start signal works as a one-shot operation. The rising edge of the Start signal initiates the Timer. When the Timer starts timing, the Relay Output turns ON. Once the Timer starts, the Start signal is ignored. The Relay Output stays ON until the Timer reaches the set point, and then it turns OFF.

**Accumulation:** The rising edge of the Start signal initiates the Timer. The Timer operates as long as the Start signal is ON. When the Start signal turns OFF, the Timer value is held in the accumulator. When the Start signal turns ON again, the Timer continues to operate until it reaches the set point, at which time the Relay Output turns ON.

**Flicker:** The rising edge of the Start signal initiates the Timer. When the Timer reaches the set point, the Relay Output turns ON for a preset amount of time. The Relay Output continues to toggle ON and OFF at the preset amount of time as long as the Start signal remains ON.



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Readers' Choice Awards

2004 Control Engineering's  
Editors' Choice Awards

2004 Control  
Readers' Choice Awards

2004 Control Design  
Readers' Choice Awards

2003 Control Engineering's  
Editors' Choice Awards

# CTT Series - Digital Counter / Timer / Tachometer



## Features

- Can operate as a digital counter, timer, combination timer + counter or tachometer
- Accepts voltage and non-voltage inputs from a wide variety of NPN, PNP, or dry contact sensors
- Selectable counting speeds from 1 to 10,000 cycles per second
- Multiple transistor and relay outputs can operate as momentary or maintained
- Double-line, 6-digit, 2-color LCD display
- Easy configuration with externally accessible DIP switches or the lockable keypad
- Display decimal point selection
- Available in 100-240VAC and 24VDC powered models
- UL508 listed (E311366), cULus, CE marked



E311366

The CTT series is an extremely versatile multi-function device that is easily configured for operation as a digital counter, timer, combination timer + counter, or tachometer. Both voltage and non-voltage inputs are accepted from a wide variety of sensor types with NPN, PNP, or dry contact outputs. The first output on the CTT is a single-pole, single-throw relay and NPN transistor that operate concurrently. The second CTT output can be ordered as either a single-pole, double throw relay or NPN transistor. Parameters are easily set using the externally accessible

DIP switches or the lockable keypad. The double-line, 6-digit, two-color LCD display shows the counter, timer, or tachometer present values, setting values and menu parameters during set-up. Additional individual indicators are provided for inputs, outputs and functions. The standard 1/16 DIN size, with included panel mounting clip and gasket, make panel mounting a snap. The CTT is available in 100-240VAC and 24VDC powered models.



VISIT [WWW.AUTOMATIONDIRECT.COM](http://WWW.AUTOMATIONDIRECT.COM) TO DOWNLOAD THE FREE COMPREHENSIVE CTT SERIES MANUAL.

## Counter / Timer / Tachometer Functions

Counter Functions	Counter Input Modes	Counter Output Modes
1-Stage	Up	Select from eleven (11) different output modes (F, N, C, R, K, P, Q, A, S, T, D)
2-Stage	Down	
Batch	Up / Command Down	
Total	Up/ Down	
Dual	Quadrature	
	Addition Subtraction	

Timer Functions (Up or Down)	
Signal On Delay 1	Repeat Cycle
Signal On Delay 2	Repeat Cycle Hold
Signal Off Delay	Repeat Cycle 2
Signal On	Signal Cumulate
Power On Delay	Signal Twin On-Start
Power On Delay Hold	Signal Twin Off-Start

Timer + Counter		
Timer Functions (Up or Down)	Counter Input Modes	Counter Output Modes
Signal On Delay 1	Up	Select from eight (8) different output modes (F, N, C, R, K, P, Q, A)
Signal On Delay 2	Down	
Signal Off Delay		
Signal On		
Power On Delay		
Power On Delay Hold		
Repeat Cycle		
Repeat Cycle Hold		

Tachometer Output Modes
Select from four (4) different output modes
2Lo/1Lo
2Lo/1Hi
2Hi/1Lo
2Hi/1Hi



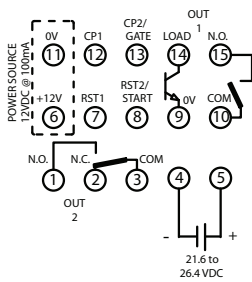
# CTT Series - Digital Counter / Timer / Tachometer

Digital Counter / Timer / Tachometer				
Part Number	Description	Pcs/Pkg	Wt (lb)	Price
CTT-AN-D24	Counter / Timer / Tachometer, Output 1 NPN & SPST relay, Output 2 NPN, 24 VDC powered, panel mounting clip is included	1	0.4	<--->
CTT-AN-A120	Counter / Timer / Tachometer, Output 1 NPN & SPST relay, Output 2 NPN, 100-264 VAC powered, panel mounting clip is included	1	0.4	<--->
CTT-1C-D24	Counter / Timer / Tachometer, Output 1 NPN & SPST relay, Output 2 SPDT relay, 24 VDC powered, panel mounting clip is included	1	0.4	<--->
CTT-1C-A120	Counter / Timer / Tachometer, Output 1 NPN & SPST relay, Output 2 SPDT relay, 100-264 VAC powered, panel mounting clip is included	1	0.4	<--->

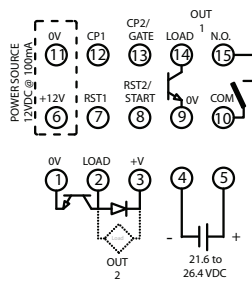
Digital Counter / Timer / Tachometer General Specifications	
<b>Input Power Requirements</b>	100 to 240 VAC 50/60 Hz
<b>Operation Voltage Range</b>	85 to 264 VAC
<b>Power Consumption</b>	Less than 10VA
<b>Power Source</b>	12VDC $\pm$ 10%, 100mA
<b>Display</b>	Double-line, 6-digit LCD display (SV = 8mm, PV = 6mm)
<b>Input Signal</b>	NPN ON impedance 1K ohm max. ON residual voltage: 2V max. PNP 4.5 to 30VDC, low level: 0 to 2VDC
<b>Output 1</b>	Relay: SPST max. 250VAC, 5A (resistance load) Transistor: NPN open collector
<b>Output 2</b>	<b>CTT-1C-xxx</b> Relay: SPDT max. 250VAC, 5A resistive <b>CTT-AN-xxx</b> Transistor: NPN open collector
<b>Dielectric Strength</b>	2000VAC 50/60Hz for 1 minute
<b>Vibration Resistance</b>	Without damage: 10 ~ 55Hz, amplitude = 0.75mm, 3 axes for 2 hours
<b>Shock Resistance</b>	Without damage: drop 4 times, 300m/s <sup>2</sup> 3 edges, 6 surfaces and 1 corner
<b>Ambient Temperature</b>	+32°F to +122°F (0°C to +50°C)
<b>Storage Temperature</b>	-4°F to +145°F (-20°C to +56°C)
<b>Altitude</b>	2000m or less
<b>IP Rating</b>	IP 40
<b>Case Materials</b>	Case = ABS Plastic, Lens = Polycarbonate
<b>Ambient Humidity</b>	35% to 85% RH (non-condensing)
<b>Memory Backup upon Power Failure</b>	EEPROM writing up to 100,000 times; Memory duration: 10 years
<b>Terminals</b>	<b>Conforming Wiring</b> 0.25-1.65mm <sup>2</sup> (24 to 16 AWG) <b>Permitted Torque</b> 0.5Nm (0.369 ft/lbs)
<b>Agency Approvals</b>	UL508 listed (E311366), cULus, CE marked

## Wiring

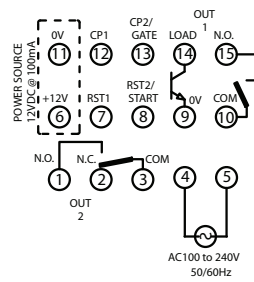
### CTT-1C-D24



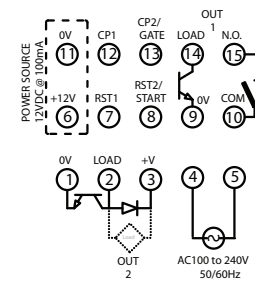
### CTT-AN-D24



### CTT-1C-A120

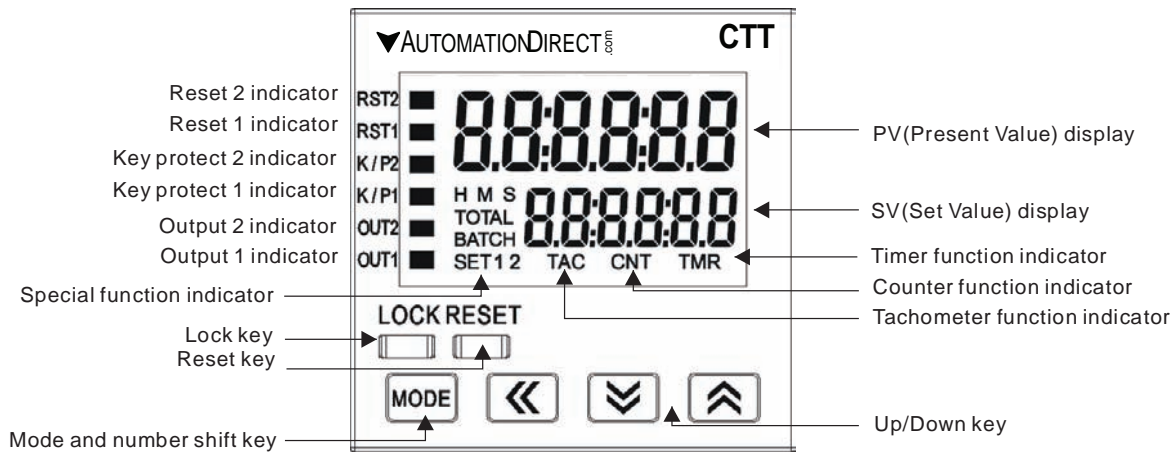


### CTT-AN-A120



# CTT Series - Digital Counter / Timer / Tachometer

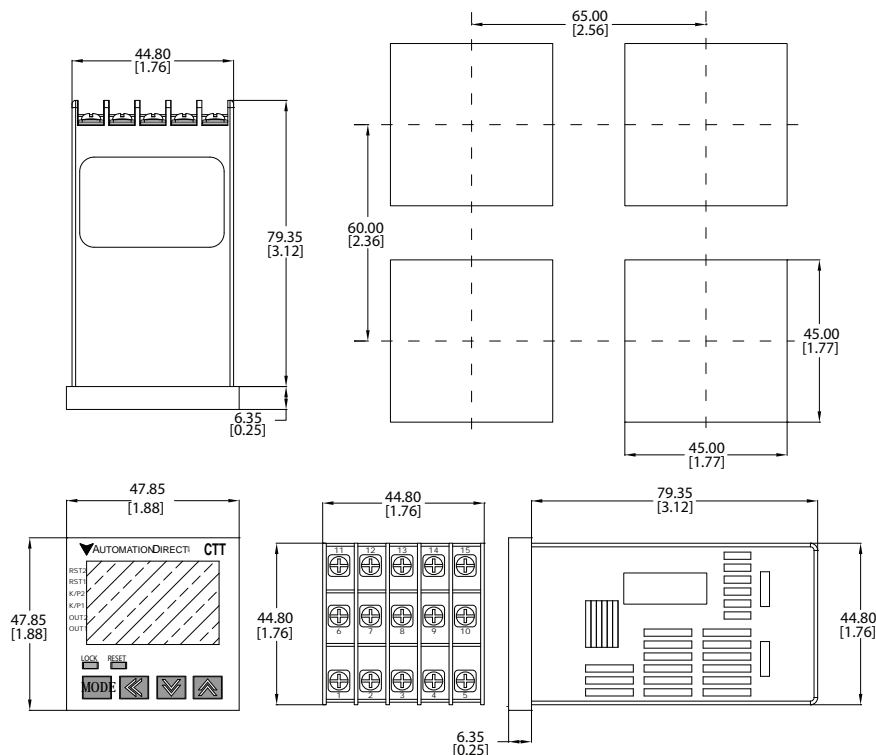
## Display, Indicators & Keys



LCD Display and Indicators			
<b>RST 1/2</b>	Light on when reset signal is detected	<b>BATCH</b>	"Batch Counting Mode" in Counter
<b>K/P 1/2</b>	Light on when key-protected mode is enabled	<b>SET 1 2</b>	SV1, SV2 display
<b>OUT 1/2</b>	Light on when output is executing	<b>TAC</b>	Light on in Tachometer function
<b>H M S</b>	Hour, minute, second, unit of timer, displayed in Timer function	<b>CNT</b>	Light on in Counter function
<b>TOTAL</b>	"Total Counting Mode" in Counter function	<b>TMR</b>	Light on in Timer function

## CTT Series Dimensions

mm [inches]



# CTT Series - Digital Counter / Timer / Tachometer

Counter Performance Specifications	
<b>Counter Functions</b>	1-Stage Counting, 2-Stage Counting, Batch Counting, Total Counting, Dual Counting (See descriptions below)
<b>Input Modes</b>	Counting Up, Counting Down, Counting Up / Command Counting Down, Counting Up / Counting Down, Quadrature, Addition, Subtraction (see descriptions below)
<b>Output Modes</b>	F, N, C, R, K, P, Q, A, S, T, D (For explanation see the manual available at <a href="http://www.AutomationDirect.com">www.AutomationDirect.com</a> )
<b>Timer Precision</b>	Power On start max 0.01% 0.05 sec. Signal start max 0.01% 0.03 sec
<b>Start Input Response</b>	Less than 15ms / 5ms / 1ms
<b>External Reset</b>	Minimum reset input signal width 1ms or 20ms (selectable)
<b>Output Duration (flicker)</b>	10-9990ms variable every 10ms
<b>Number of Digits</b>	6 digits on each line
<b>Display</b>	Current values: red LED, character height 8mm; Preset value: green LED character height 6mm

## Counter Functions

### 1-Stage Counting

A single count setting value SV is available in 1-Stage Counting. Both Outputs 1 and 2 operate concurrently and will turn ON momentarily or will be maintained ON depending on the Output Mode selected.

### 2-Stage Counting

In 2-Stage Counting, count setting value SV1 controls Output 1 and count setting value SV2 controls Output 2. Outputs will turn ON momentarily or will be maintained ON depending on the output mode selected.

### Batch Counting

In Batch Counting, count setting value SV controls Output 2 which will turn ON momentarily or will be maintained ON depending on the output mode selected. Count setting value BATCH SV controls Output 1 which will be maintained ON.

### Total Counting

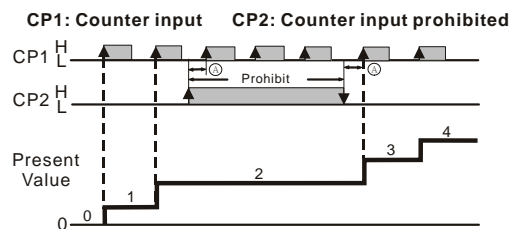
A single count setting value SV is available in Total Counting. Both Outputs 1 and 2 operate concurrently and will turn ON momentarily or will be maintained ON depending on the Output Mode selected.

### Dual Counting

A single count setting value SV is available in Dual Counting. Both Outputs 1 and 2 operate concurrently and will turn ON momentarily or will be maintained ON depending on the Output Mode selected.

## Counter Input Modes

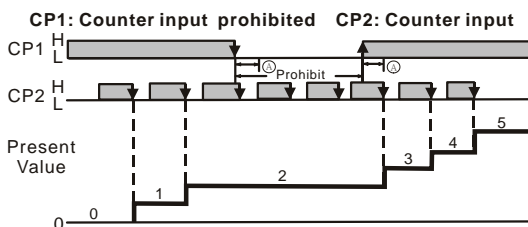
### Counting up



Note: (A) has to be larger than width of min. Input signal

### Counting Up

With the input signal OFF at input CP2, each leading edge of the input signal at CP1 will increment the count present value PV by 1. Turning ON the input signal at CP2 will prohibit the input signal at CP1 from incrementing the PV.



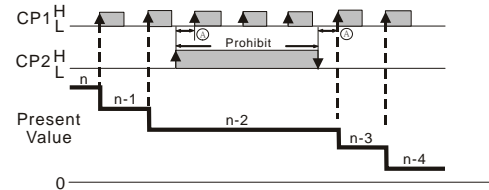
Note: (A) has to be larger than width of min. Input signal

With the input signal ON at input CP1, each trailing edge of the input signal at CP2 will increment the count present value PV by 1. Turning OFF the input signal at CP1 will prohibit the input signal at CP1 from incrementing the PV.

# CTT Series - Digital Counter / Timer / Tachometer

## Counting down

**CP1: Counter input CP2: Counter input prohibited**

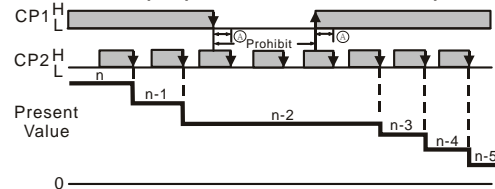


Note: (A) has to be larger than width of min. input signal

## Counting Down

With the input signal OFF at input CP2, each leading edge of the input signal at CP1 will decrement the count present value PV by 1. Turning ON the input signal at CP2 will prohibit the input signal at CP1 from decrementing the PV.

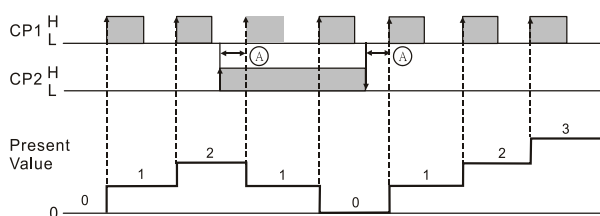
**CP1: Counter input prohibited CP2: Counter input**



Note: (A) has to be larger than width of min. input signal

With the input signal ON at input CP1, each trailing edge of the input signal at CP2 will decrement the count present value PV by 1. Turning OFF the input signal at CP1 will prohibit the input signal at CP2 from decrementing the PV.

## Counting Up/Command Counting Down



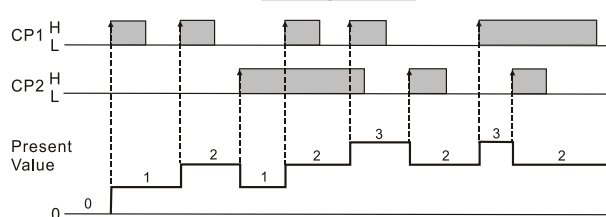
Note: (A) has to be larger than width of min. input signal.

## Counting Up / Command Counting Down

With the input signal OFF at input CP2, each leading edge of the input signal at CP1 will increment the count present value PV by 1.

With the input signal ON at input CP2, each leading edge of the input signal at CP1 will decrement the count present value PV by 1.

## Counting up/down

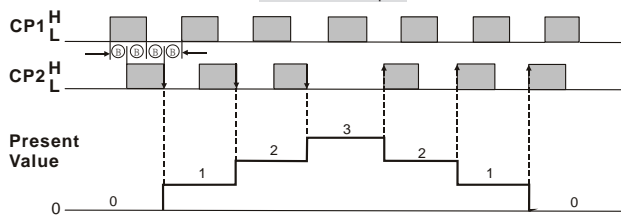


## Counting Up / Counting Down

Each leading edge of the input signal at CP1 will increment the count present value PV by 1.

Each leading edge of the input signal at CP2 will decrement the count present value PV by 1.

## Quadrature input



Note: (B) has to be larger than width of 1/2 min. input signal.

## Quadrature

When the quadrature input signal at CP1 leads the input signal at CP2, the trailing edge of CP2 will increment the count present value PV by 1.

When the quadrature input signal at CP2 leads the input signal at CP1, the leading edge of CP2 will decrement the count present value PV by 1.

## Addition

Each leading edge of the input signal at CP1 will increment the count present value PV by 1.  
Each leading edge of the input signal at CP1 will increment the count present value PV by 1.

## Subtraction

Each leading edge of the input signal at CP1 will increment the count present value PV by 1.  
Each leading edge of the input signal at CP2 will decrement the count present value PV by 1.

# CTT Series - Digital Counter / Timer / Tachometer

Timer Performance Specifications				
<b>Timer Functions</b>	Signal On Delay 1, Signal On Delay 2, Signal Off Delay, Signal On, Power On Delay, Power On Delay Hold, Repeat Cycle, Repeat Cycle Hold, Repeat Cycle 2, Signal Cumulate, Signal Twin On Start, Signal Twin Off Start (See time charts below).			
<b>Number of Digits</b>	6 digits on each line			
<b>Display</b>	Present values: red LED, character height 8mm; Set value: green LED, character height: 6mm			
<b>Time Range</b>	<b>Setting</b>	<b>Range</b>	<b>Units</b>	<b>Maximum</b>
	sec.	0.01 ~ 9,999.99	A unit = 10ms	9,999.99 secs.
	sec.	0.1 ~ 99,999.9	A unit = 0.1 sec.	99,999.9 secs.
	sec.	1 ~ 999,999	A unit = 1 sec.	999,999 secs.
	min., sec.	0.01 ~ 9,959.99	A unit = 0.01 sec.	5,999.99 secs.
	min., sec.	0.1 ~ 99,959.9	A unit = 0.1 sec.	59,999.9 secs.
	min.	0.1 ~ 99,999.9	A unit = 0.1 min.	99,999.9 mins.
	min.	1 ~ 999,999	A unit = 1 min.	999,999 mins.
	hr., min., sec.	1 ~ 995,959	A unit = 1 sec.	359,999 secs. (100 hrs.)
	hr., min.	1 ~ 999,959	A unit = 1 min.	35,999,999 secs. (10,000 hrs.)
hr.	1 ~ 999,999	A unit = 1 hr.	699,999 hrs.	
<b>Display</b>	Elapsed time / remaining time			
<b>Timer</b>	Power ON start max $\pm 0.01\% \pm 0.05$ sec, Signal start max $\pm 0.01\% \pm 0.03$ sec			
<b>Start Input Response</b>	Less than 15ms / 5ms / 1ms			
<b>External Reset</b>	Minimum reset input signal width 1ms or 20ms (selectable)			
<b>Output Duration (flicker)</b>	10-9990ms variable every 10ms			

## Timing Charts

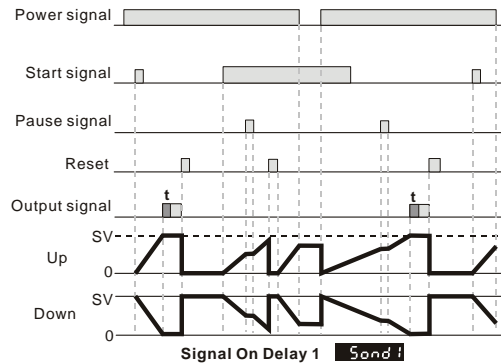
### Signal On Delay 1 (Sond 1)

With power applied to the CTT, the leading edge of the input signal at START will begin the timing period setting value SV (timing up or down based on parameter (MODE) or by DIP switch 2). At the end of the timing period both outputs will turn ON momentarily for the time set in the output pulse width parameter (PULSE 1) or will be maintained ON if the output pulse width parameter (PULSE 1) is set to 0.00. The trailing edge of the "start" signal has no effect on the outputs or timing period.

The leading edge of a "reset" input signal at RST1 will turn OFF the outputs and reset the timing period. The "reset" signal minimum pulse width is set by reset pulse width parameter (PULSE 2) or DIP Switch 8.

The leading edge of a "pause" input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch "pause" (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.



# CTT Series - Digital Counter / Timer / Tachometer

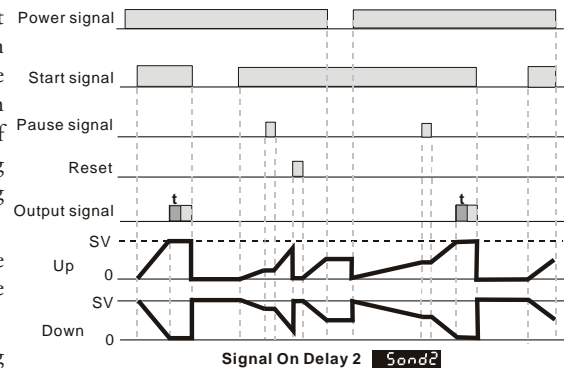
## Signal On Delay 2 (Sond2)

With power applied to the CTT, the leading edge of the input signal at START will begin the timing period setting value SV (timing up or down based on parameter (Snode) or by DIP switch 2). At the end of the timing period both outputs will turn ON momentarily for the time set in the output pulse width parameter (EOUT1) or will be maintained ON if the output pulse width parameter (EOUT1) is set to 0.00. The trailing edge of the "start" signal will turn OFF the outputs and reset the timing period.

The leading edge of a "reset" input signal at RST1 will turn OFF the outputs and reset the timing period. The "reset" signal minimum pulse width is set by reset pulse width parameter (RESR) or DIP Switch 8.

The leading edge of a "pause" input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch "pause" (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.



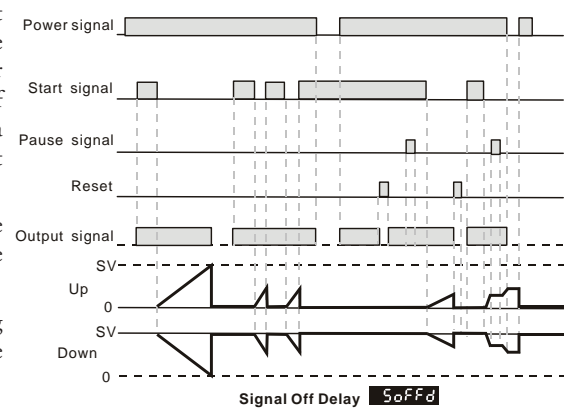
## Signal Off Delay (Soffd)

With power applied to the CTT, the leading edge of the input signal at START will immediately turn ON the outputs. The trailing edge of the "start" signal will begin the timing period setting value SV (timing up or down based on parameter (Snode) or by DIP switch 2). At the end of the timing period both outputs will turn OFF. The leading edge of a "start" signal applied during a previously initiated timing period will reset the timing period.

The leading edge of a "reset" input signal at RST1 will turn OFF the outputs and reset the timing period. The "reset" signal minimum pulse width is set by reset pulse width parameter (RESR) or DIP Switch 8.

The leading edge of a "pause" input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch "pause" (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.



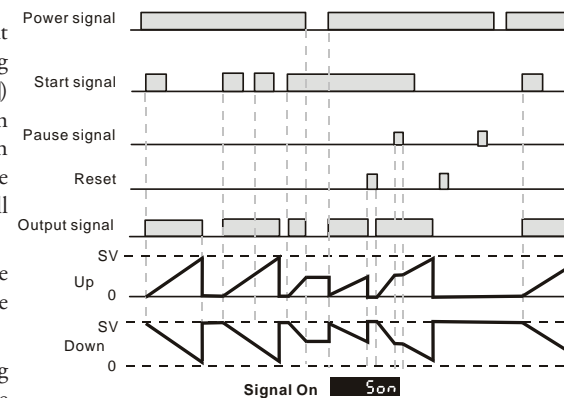
## Signal On (Son)

With power applied to the CTT, the leading edge of the input signal at START will immediately turn ON the outputs and begin the timing period setting value SV (timing up or down based on parameter (Snode) or by DIP switch 2). The trailing edge of the "start" signal has no effect on the outputs or timing period. At the end of the timing period both outputs will turn OFF and the timing period will reset. The leading edge of a "start" signal applied during a previously initiated timing period will not reset the timing period.

The leading edge of a "reset" input signal at RST1 will turn OFF the outputs and reset the timing period. The "reset" signal minimum pulse width is set by reset pulse width parameter (RESR) or DIP Switch 8.

The leading edge of a "pause" input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch "pause" (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.



# CTT Series - Digital Counter / Timer / Tachometer

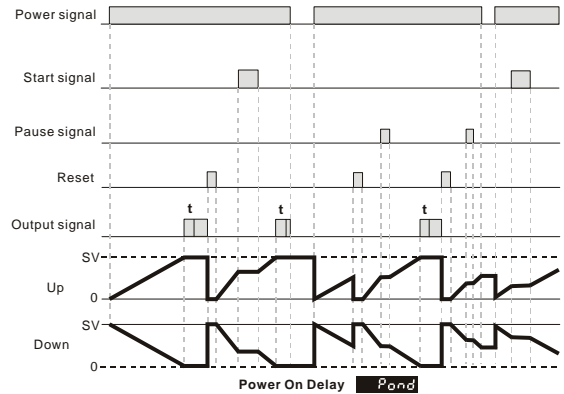
## Power On Delay ( $P_{ond}$ )

When power is applied to the CTT, the timing period setting value SV will begin (timing up or down based on parameter ( $\bar{E}_{mode}$ )). At the end of the timing period both outputs will turn ON momentarily for the time set in the output pulse width parameter ( $\bar{E}_{out}$ ) or will be maintained ON if the output pulse width parameter ( $\bar{E}_{out}$ ) is set to 0.00.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter ( $\bar{R}_{sr}$ ).

The leading edge of a “pause” input signal at GATE or signal at START will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) or “start” signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.



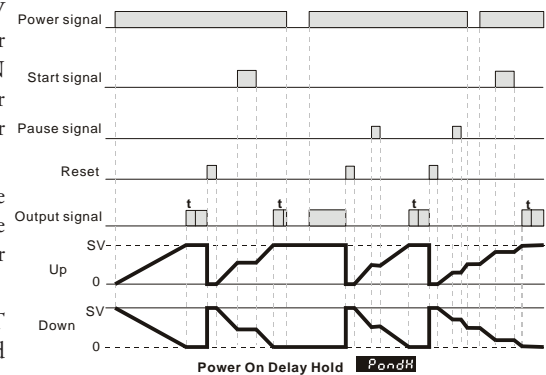
## Power On Delay HOLD ( $P_{ondH}$ )

When power is applied to the CTT, the timing period setting value SV will begin (timing up or down based on parameter ( $\bar{E}_{mode}$ )). At the end of the timing period both outputs will turn ON momentarily for the time set in the output pulse width parameter ( $\bar{E}_{out}$ ) or will be maintained ON if the output pulse width parameter ( $\bar{E}_{out}$ ) is set to 0.00.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter ( $\bar{R}_{sr}$ ).

The leading edge of a “pause” input signal at GATE or signal at START will pause the timing period after it has been started. The timing period will continue after the trailing edge of the “pause” (Gate) or “start” signal.

When power is removed, both outputs will turn OFF. The last state of the outputs and the last value of the current timing period will be “stored” in eeprom when power is removed. When power is reapplied the outputs will return to their last state and timing will resume from the last value of the timing period.





# CTT Series - Digital Counter / Timer / Tachometer

## Repeat Cycle (RCY)

With power applied to the CTT, the leading edge of the input signal at START will begin the timing period setting value SV (timing up or down based on parameter (MODE)). At the end of the timing period, the timing period will reset and repeat automatically.

If the output pulse width parameter (OUTW) is set to 0.00 both outputs will turn ON at the end of the first timing period, turn OFF at the end of the next timing period, turn ON at the end of the next timing period, etc.

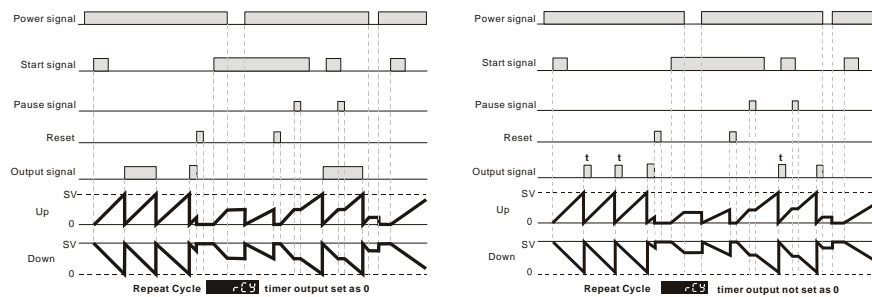
If the output pulse width parameter (OUTW) is set to >0.00 both outputs will turn ON momentarily for the time set in the output pulse width parameter (OUTW) at the beginning of the each timing period.

The trailing edge of the "start" signal has no effect on the outputs or timing period.

The leading edge of a "reset" input signal at RST1 will turn OFF the outputs and reset the timing period. The "reset" signal minimum pulse width is set by reset pulse width parameter (RSTW). The leading edge of a new "start" signal is necessary to restart the cycle.

The leading edge of a "pause" input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch "pause" (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.



## Repeat Cycle HOLD (RCYH)

With power applied to the CTT, the leading edge of the input signal at START will begin the timing period setting value SV (timing up or down based on parameter (MODE)). At the end of the timing period, the timing period will reset and repeat automatically.

If the output pulse width parameter (OUTW) is set to 0, both outputs will turn ON at the end of the first timing period, turn OFF at the end of the next timing period, turn ON at the end of the next timing period, etc.

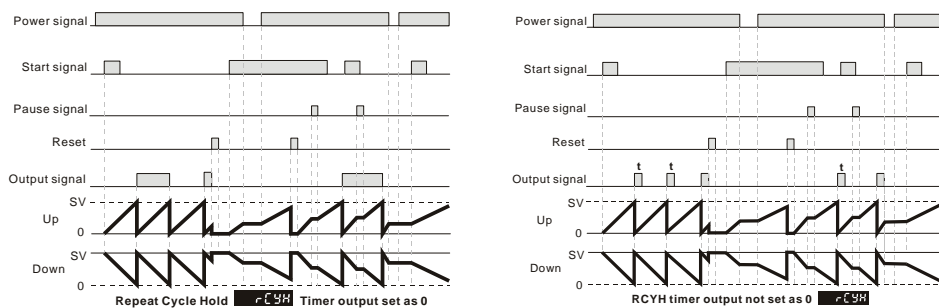
If the output pulse width parameter (OUTW) is set to >0.00, both outputs will turn ON momentarily for the time set in the output pulse width parameter (OUTW) at the beginning of the each timing period.

The trailing edge of the "start" signal has no effect on the outputs or timing period.

The leading edge of a "reset" input signal at RST1 will turn OFF the outputs and reset the timing period. The "reset" signal minimum pulse width is set by reset pulse width parameter (RSTW). The leading edge of a new "start" signal is necessary to restart the cycle.

The leading edge of a "pause" input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch "pause" (Gate) signal.

When power is removed, both outputs will turn OFF. The last state of the outputs and the last value of the current timing period will be "stored" in Eeprom when power is removed. When power is reapplied the outputs will return to their last state and timing will resume from the last value of the timing period by the leading edge of a new "start" signal.





# CTT Series - Digital Counter / Timer / Tachometer

## Repeat Cycle 2 (RCY2)

With power applied to the CTT, the leading edge of the input signal at START will begin the timing period timing up or down based on parameter (MODE). At the end of the timing period, the timing period will reset and repeat automatically.

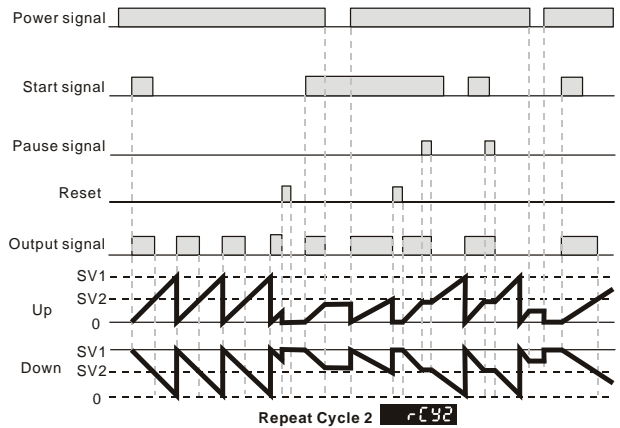
Both outputs will turn ON at the beginning of the first timing period and turn OFF when the timing period reaches time period setting SV2. The outputs will turn ON again when the time period reaches time period setting SV1.

The trailing edge of the “start” signal has no effect on the outputs or timing period.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter (RSTW). The leading edge of a new “start” signal is necessary to restart the cycle.

The leading edge of a “pause” input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.



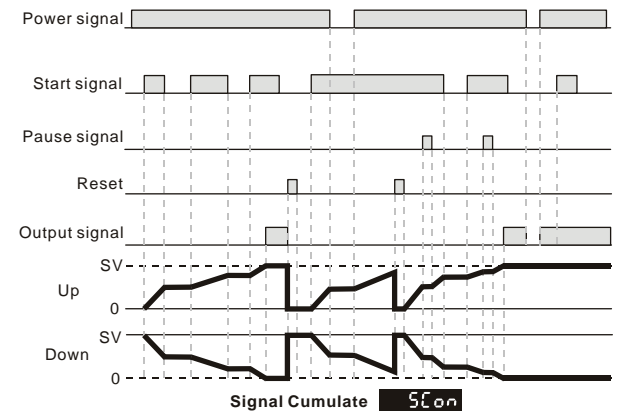
## Signal Cumulate (SCOn)

With power applied to the CTT, the leading edge of the input signal at START will begin the timing period setting value SV timing up or down based on parameter (MODE). The trailing edge of the “start” signal will pause the timing period. The leading edge of a subsequent “start” signal will resume timing from the last value of the timing period. At the end of the timing period both outputs will turn ON.

The leading edge of a “reset” input signal at RST1 will turn OFF the outputs and reset the timing period. The “reset” signal minimum pulse width is set by reset pulse width parameter (RSTW).

The leading edge of a “pause” input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch “pause” (Gate) signal.

When power is removed, both outputs will turn OFF. The last state of the outputs and the last value of the current timing period will be “stored” when power is removed. When power is reapplied the outputs will return to their last state and timing will resume from the last value of the timing period by the leading edge of a new “start” signal.



# CTT Series - Digital Counter / Timer / Tachometer

## Signal Twin ON-Start (StOn)

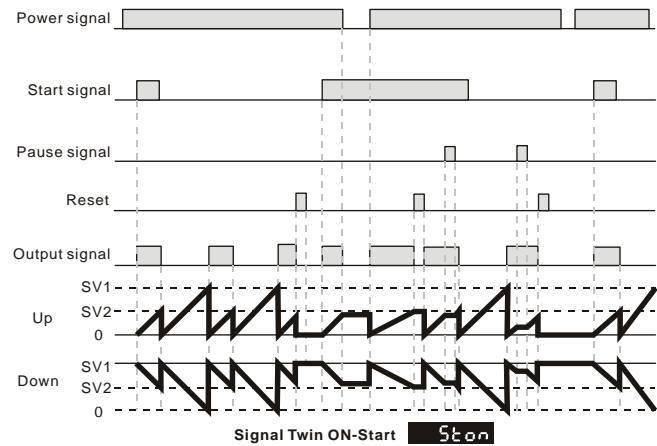
With power applied to the CTT, the leading edge of the input signal at START will turn ON the outputs and begin the timing period timing up or down based on parameter (E mode). When the timing period reaches time setting SV2 the outputs will turn OFF and the time period will reset and restart automatically. When the time period now reaches time setting SV1 the outputs will turn ON again and the time period will reset and repeat automatically.

The trailing edge of the "start" signal has no effect on the outputs or timing period.

The leading edge of a "reset" input signal at RST1 will turn OFF the outputs and reset the timing period. The "reset" signal minimum pulse width is set by reset pulse width parameter (RESR). The leading edge of a new "start" signal is necessary to restart the cycle.

The leading edge of a "pause" input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch "pause" (Gate) signal.

When power is removed, both outputs will turn OFF and the timing period will be reset.



## Signal Twin OFF-Start (StOFF)

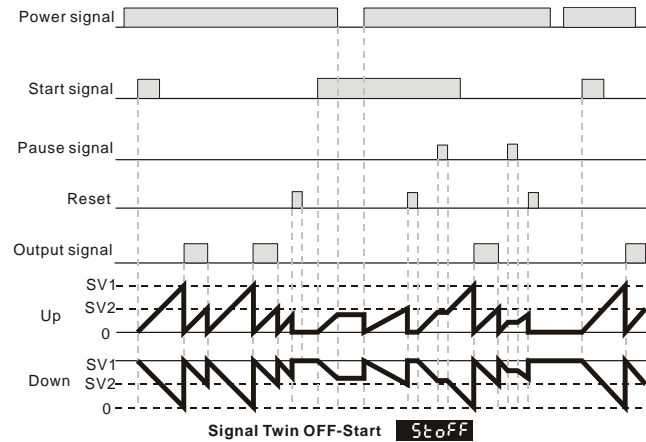
With power applied to the CTT, the leading edge of an input signal at START will begin the timing period timing up or down based on parameter (E mode). When the timing period reaches time setting SV1 the outputs will turn ON and the time period will reset and restart automatically. When the time period now reaches time setting SV2 the outputs will turn OFF again and the time period will reset and repeat automatically.

The trailing edge of the "start" signal has no effect on the outputs or timing period.

The leading edge of a "reset" input signal at RST1 will turn OFF the outputs and reset the timing period. The "reset" signal minimum pulse width is set by reset pulse width parameter (RESR). The leading edge of a new "start" signal is necessary to restart the cycle.

The leading edge of a "pause" input signal at GATE will pause the timing period after it has been started. The timing period will continue after the trailing edge of the external switch "pause" (Gate) signal.

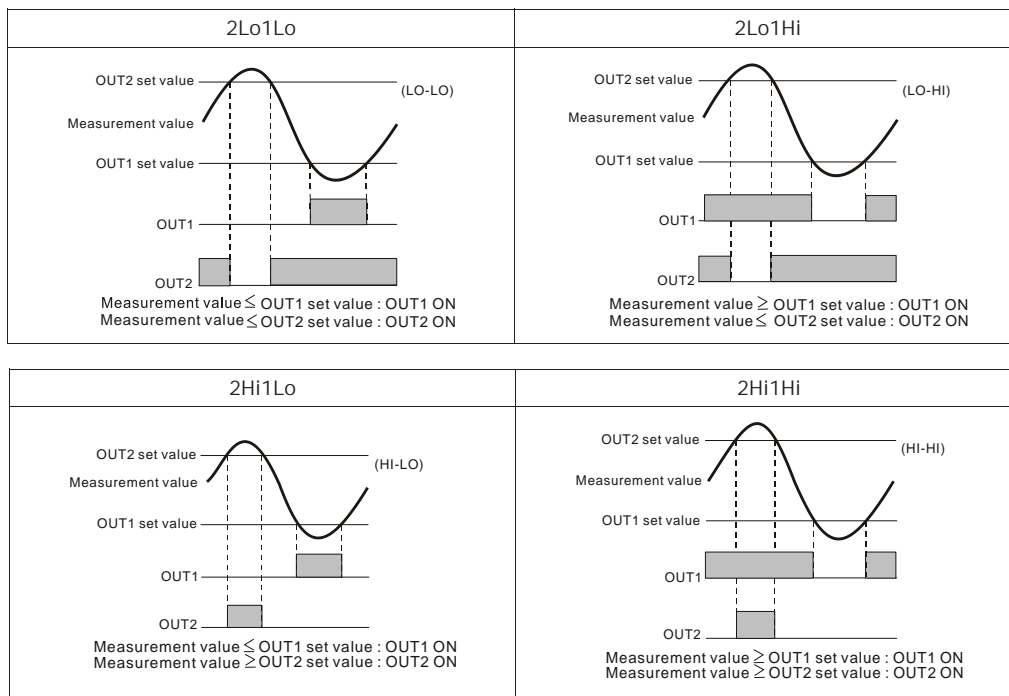
When power is removed, both outputs will turn OFF and the timing period will be reset.



# CTT Series - Digital Counter / Timer / Tachometer

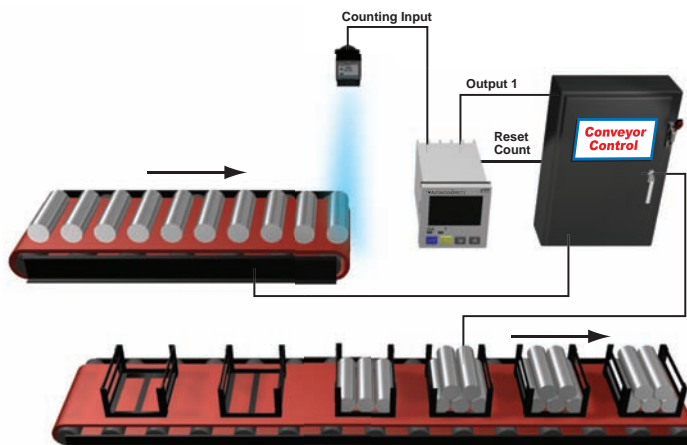
Tachometer Performance Specifications	
<b>Output Modes</b>	2Lo1Lo, 2Lo1Hi, 2Hi1Lo, and 2Hi1Hi (See tachometer output mode charts below).
<b>Number of Digits</b>	6 digits on each line
<b>Input Frequency</b>	1Hz, 30Hz, 200Hz, 1kHz, 5kHz, 10kHz
<b>Display</b>	Present values: red LED, character height: 8mm; Set value: green LED, character height: 6mm
<b>Timer Precision</b>	Power ON start Max $\pm 0.01\% \pm 0.05$ sec, Signal start Max $\pm 0.01\% \pm 0.03$
<b>Start Input Response</b>	Less than 15ms / 5ms / 1ms
<b>External Reset</b>	Minimum reset input signal width 1ms or 20ms (selectable)
<b>Output Duration (Flicker)</b>	10-9990ms variable every 10ms

## Tachometer Output Mode Charts



## Counter Example:

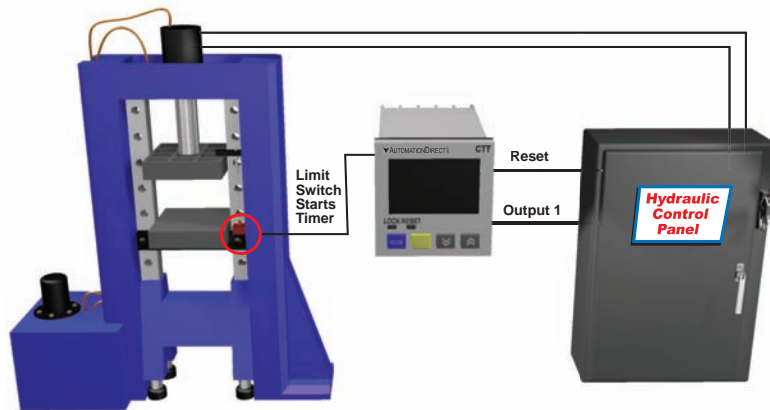
Using the counter feature of the CTT to count the total number of pieces in a box to signal a conveyor to advance to the next station.



# CTT Series - Digital Counter / Timer / Tachometer

## Timer Example:

A basic Timer used to control the clamp time of a compression model press. When the operator signals, the mold is loaded with material. When a start button is pressed, the hydraulic cylinder closes the press to make a limit switch which starts the CTT timing. Upon completion of the timer cycle, Output 1 is turned on and the press is opened by the hydraulic cylinder.



## Tachometer Example:

### Using PSCALE to convert pulses into engineering units

The PSCALE feature of the CTT is very useful in converting the pulsed signal from an encoder or sensor into a usable unit of measurement.

For example, if connecting a proximity switch to the CTT to monitor the speed of a motor using a sensing gear, there is a simple calculation to convert the pulses from the sensor to Motor RPMs.

Using the following formula, you can calculate a PSCALE value to change a pulse signal into RPMs. First, obtain the pulses per revolution (ppr) or number of teeth on the sensing gear. For example, in the illustration below, there are 38 teeth on the gear or 38 ppr. If the gear is coupled directly to the motor, this is all that is required to perform the calculation.

$$\text{PSCALE} = 60/\text{ppr} \text{ or } 60/38$$

$$\text{PSCALE} = 1.579$$

With the PSCALE set to 1.579 for every 38 input cycles the CTT will display a value of 1.

