

## Time Delay Relays – Application Data

### Definition:

Time Delay is defined as the controlled period between the functioning of two events. A Time Delay relay is a combination of an electromechanical output relay and a control circuit. The control circuit is comprised of solid state components and timing circuits that control operation of the relay and timing range. Typical time delay functions include On-Delay, Repeat cycle (starting off), Interval, Off-Delay, Retriggerable One Shot, Repeat cycle (starting on), Pulse Generator, One Shot, On/Off Delay, and Memory Latch. Each function is explained in the table below. Time delay relays have a broad choice of timing ranges from less than one second to many days. There are many choices of timing adjustments from calibrated external knobs, DIP switches, thumbwheel switches, or recessed potentiometer. The output contacts on the electromechanical output relay are direct wired to the output terminals. The contact load ratings are specified for each specific type of time delay relay.

Understanding the differences between all the functions available in time delay relays can sometimes be a daunting task. When designing circuits using time delay relays questions such as:

“What initiates a time delay relay?”

“Does the timing start with the application or release of voltage?”

“When does the output relay come on?”

must be asked.

Time delay relays are simply control relays with a time delay built in. Their purpose is to control an event based on time. The difference between relays and time delay relays is when the output contacts open & close: on a control relay, it happens when voltage is applied and removed from the coil; on time delay relays, the contacts will open or close before or after a pre-selected, timed interval.

Typically, time delay relays are initiated or triggered by one of two methods:

- application of input voltage (On Delay, Interval On, Flasher, Repeat Cycle, Delayed Interval & Interval/Flasher).
- opening or closing of a trigger signal (Off Delay, Single Shot & Watchdog).

These trigger signals can be one of two designs:

- a control switch (dry contact), i.e., limit switch, push button, float switch, etc.
- voltage (commonly known as a power trigger).

To help understand, some definitions are important:



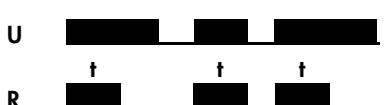
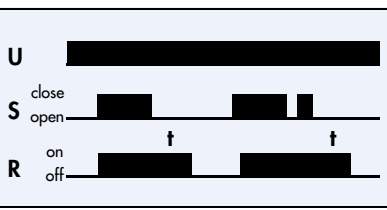
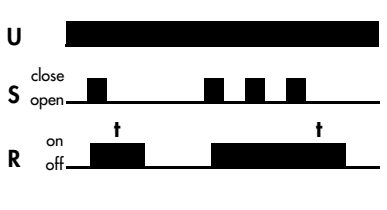
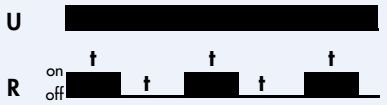
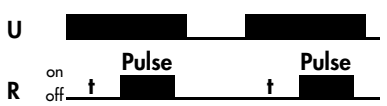
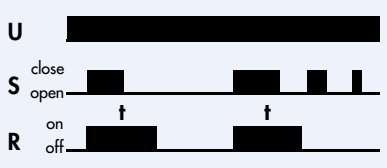
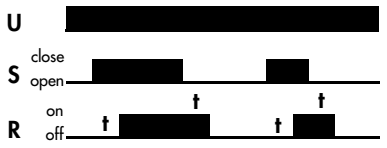
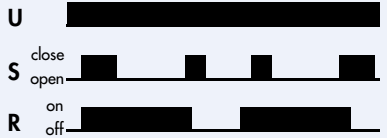
**Input Voltage:** Control voltage applied to the input terminals (see wiring diagrams below). Depending on the function, input voltage will either initiate the unit or make it ready to initiate when a trigger signal is applied.

**Trigger Signal:** On certain timing functions, a trigger signal is used to initiate the unit after input voltage has been applied. As noted above, this trigger signal can either be a control switch (dry contact switch) or a power trigger (voltage).

**Output (Load):** Every time delay relay has an internal relay (usually mechanical) with contacts that open & close to control the load. They are represented by the dotted lines in the wiring diagrams. Note that the user must provide the voltage to power the load being switched by the output contacts of the time delay relay.

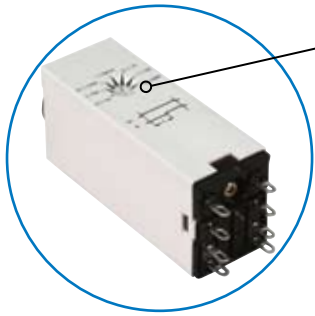
The following tables contain both written and visual descriptions on how the common timing functions operate. A Timing Chart shows the relationship between Input Voltage, Trigger Signal (if present) and Output Contacts.

## FUNCTION DEFINITION TABLES

Function	Operation	Timing Chart
<b>A.</b> <b>ON DELAY</b> Power On	When the input voltage <b>U</b> is applied, timing delay <b>t</b> begins. Relay contacts <b>R</b> change state after time delay is complete. Contacts return to their shelf state when power <b>U</b> is removed. Control switch is not used in this mode.	
<b>B.</b> <b>REPEAT CYCLE</b> Starting Off	When input voltage <b>U</b> is applied, time delay <b>t</b> begins. When time delay <b>t</b> is complete, relay contact <b>R</b> change state for time delay <b>t</b> . This cycle will repeat until input voltage <b>U</b> is removed. Control switch is not used in this mode.	
<b>C.</b> <b>INTERVAL</b> Power On	When input voltage <b>U</b> is applied, relay contacts <b>R</b> change state immediately and timing cycle begins. When time delay is complete, contacts return to shelf state. When input voltage <b>U</b> is removed, contacts return to their shelf state. Control switch is not used in this mode.	
<b>D.</b> <b>OFF DELAY</b> S Break	Input voltage <b>U</b> must be applied continuously. When control <b>S</b> is closed, relay contacts <b>R</b> change state. When control <b>S</b> is opened delay <b>t</b> begins. When delay <b>t</b> is complete, contact <b>R</b> return to their shelf state. If signal <b>S</b> is closed before time delay <b>t</b> is complete, then time is reset, the delay begins again, and relay contacts remain in their energized state. If input voltage <b>U</b> is removed, relay contact <b>R</b> return to their shelf state.	
<b>E.</b> <b>RETRIGGERABLE ONE SHOT</b>	Upon application of input voltage <b>U</b> , the time delay relay is ready to accept trigger signals <b>S</b> . Upon application of the trigger signal <b>S</b> , the relay contacts <b>R</b> transfer and the preset time <b>t</b> begins. At the end of the preset time <b>t</b> , the relay contacts <b>R</b> return to their normal condition unless the trigger signal <b>S</b> is opened and closed prior to time out <b>t</b> (before preset time elapses). Continuous cycling of the trigger signal <b>S</b> at a rate faster than the preset time will cause the relay contacts <b>R</b> to remain closed.	
<b>F.</b> <b>REPEAT CYCLE</b> Starting On	When input voltage <b>U</b> is applied, relay contacts <b>R</b> change state immediately and time delay <b>t</b> begins. When time delay <b>t</b> is complete, contacts return to their shelf state for time delay <b>t</b> . This cycle will repeat until input voltage <b>U</b> is removed. Control switch is not used in this mode.	
<b>G.</b> <b>PULSE GENERATOR</b>	Upon application of input voltage <b>U</b> , a single output pulse of 0.5 seconds long is delivered to relay after time delay <b>t</b> . Power must be removed and reapplied to repeat pulse. Control switch <b>S</b> is not used in the mode.	
<b>H.</b> <b>ONE SHOT</b>	Upon application of input voltage <b>U</b> , the time delay relay is ready to accept trigger signals <b>S</b> . Upon application of the trigger signal <b>S</b> , the relay contacts <b>R</b> transfer and the preset time <b>t</b> begins. During time-out, the trigger signal <b>S</b> is ignored. The time delay relay resets by applying the trigger signal <b>S</b> when the relay is not energized.	
<b>I.</b> <b>ON/OFF DELAY</b> S Make/Break	Input voltage <b>U</b> must be applied continuously. When control <b>S</b> is closed, time delay <b>t</b> begins. When time delay <b>t</b> is complete, relay contacts <b>R</b> change state and remain transferred until control <b>S</b> is opened. If input power <b>U</b> is removed relay contacts <b>R</b> return to their shelf state.	
<b>J.</b> <b>MEMORY LATCH</b> S Make	Input voltage <b>U</b> must be applied continuously. Output changes state with every control <b>S</b> closure. Returned to rest condition when power is removed.	

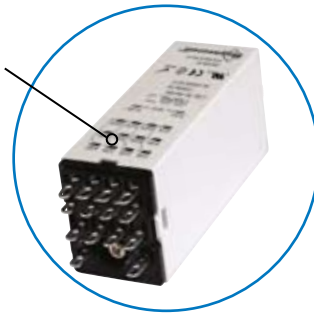
**U** = Input Voltage    **S** = Control Switch    **R** = Relay Contacts    **t** = Time Delay

# Advantages of the TDR782 Time Delay Relay

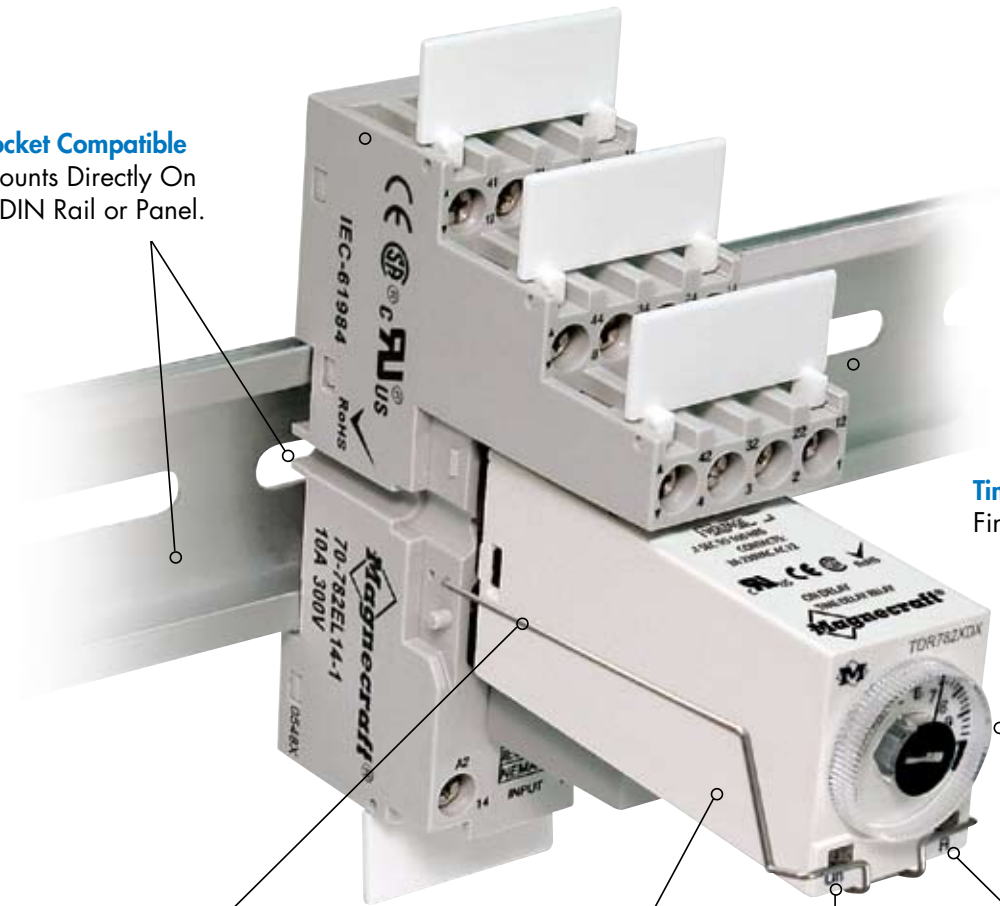


**Time Setting**  
Select Between  
7 Different Time  
Scales.

**Marked with Both IEC  
and NEMA Markings**  
Universal Socket  
Compatibility.



**Socket Compatible**  
Mounts Directly On  
a DIN Rail or Panel.



**Time Adjustment Dial**  
Fine Tune the Time Setting.

**Mating Hold-Down Clip Available**  
Secures Relay to Socket.

**Excellent Immunity to Interference**  
Conforms to IEC 61812-1/A11.

**Output Indication**  
Status at a Glance.

**Input Indication**  
Status at a Glance.

## The Complete System Solution!



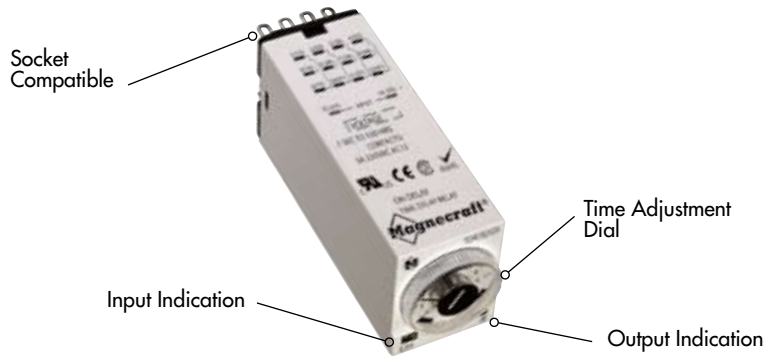
The miniature TDR782 series is a single-function, single-voltage time delay relay with multiple time ranges for the ultimate in packaging the most within the smallest space possible in a panel or on the DIN rail. The TDR782 features a screw driver adjustable knob which allows the user to choose 1 of 7 timing ranges and a large knob on top for fine tuning the timing setting. This dual adjustment design allows for supreme flexibility and timing accuracy. The dual LEDs allow the user to know when power is present at the coil and when the output is energized. When mated with the Magnecraft sockets and accessories, these ROHS compliant timers provide a complete modular system that will meet all your control relay requirements in a package that is both visually appealing and functionally outstanding.

- Offers a “one stop solution” for your power management system.
- Available as a DPDT and 4PDT to meet your individual needs.
- Switching capabilities of either 3 or 5 amps.
- The two LED status indicators; indicate status at a glance.
- Color and appearance designed to high visibility in all environments.
- Engineering availability allows for customized control system solutions.

# TDR782 Time Delay Relay/DPDT, 4PDT, 3 or 5 Amp Rating



UL Recognized  
File No. E191122



## General Specifications (UL 508)

Output Characteristics		Units	TDR782XBX	TDR782XDX
Number and type of Contacts			DPDT	4PDT
Contact Material			Silver Alloy	Silver Alloy
Current rating		A	5	3
Maximum permissible current	< 0.01 s	A	10	10
Minimum Switching Requirement		mA	100	100
Indication	LED	On = Energized	Amber	Amber
Input Characteristics				
Standard Voltage		VAC	24, 120, 230	24, 120, 230
		VDC	12, 24	12, 24
Operating Range	% of Nominal	VAC	85% to 115%	85% to 115%
	% of Nominal	VDC	90% to 110%	90% to 110%
Maximum consumption	24 AC	VA	1.7	1.7
	120 AC	VA	2.6	2.6
	230 AC	VA	3	3
	12 DC	W	1.5	1.5
	24 DC	W	1.2	1.2
Indication	LED		Green	Green
Timing Characteristics				
Functions Available	(See page 5/3)		A (On Delay)	A (On Delay)
Time Scales			7	7
Time Ranges Available		sec	0.1...1 1...10	0.1...1 1...10
		min	0.1...1 1...10	0.1...1 1...10
		hr	0.1...1 1...10 10...100	0.1...1 1...10 10...100
Tolerance	Mechanical Setting	%	5	5
Repeatability	Constant Voltage and	%	0.5	0.5
Temperature Drift	Temperature	% / °C	0.05	0.05
Reset Time	Maximum	ms	50	50
Performance Characteristics				
Electrical Life	Operations @ Rated Current	(Resistive)	100,000	100,000
Mechanical Life	Unpowered		10,000,000	10,000,000
Dielectric strength	Input to Contacts	V	2000 AC	2000 AC
Environment				
Product certifications	Standard version		UR, CE, CSA	UR, CE, CSA
Ambient air temperature around the device	Storage	°C	-40...+70	-40...+70
	Operation	°C	-20...+60	-20...+60
Degree of protection			IP 50	IP 50
Weight		grams	43	43

Function	Operation	Timing Chart
A. ON DELAY Power On	When the input voltage <b>U</b> is applied, timing delay <b>t</b> begins. Relay contacts <b>R</b> change state after time delay is complete. Contacts return to their shelf state when power <b>U</b> is removed. Control switch is not used in this mode.	



TDR782 Relay with the 70-782EL14-1 Socket

**Standard Part Numbers**

**BOLD-FACED PART NUMBERS ARE NORMALLY STOCKED**

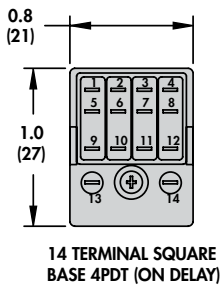
	Input Voltage	Timing Range	Functions Available	Contact Configuration	Rated Load Current
<b>TDR782XBXA-12D</b>	12 VDC	0.1s to 100h	A (On Delay)	DPDT	5 Amps
<b>TDR782XBXA-24D</b>	24 VDC	0.1s to 100h	A (On Delay)	DPDT	5 Amps
<b>TDR782XBXA-24A</b>	24VAC	0.1s to 100h	A (On Delay)	DPDT	5 Amps
<b>TDR782XBXA-110A</b>	110 VAC	0.1s to 100h	A (On Delay)	DPDT	5 Amps
TDR782XBXA-230A	230 VAC	0.1s to 100h	A (On Delay)	DPDT	5 Amps
<b>TDR782XDXA-12D</b>	12 VDC	0.1s to 100h	A (On Delay)	4PDT	3 Amps
<b>TDR782XDXA-24D</b>	24 VDC	0.1s to 100h	A (On Delay)	4PDT	3 Amps
<b>TDR782XDXA-24A</b>	24VAC	0.1s to 100h	A (On Delay)	4PDT	3 Amps
<b>TDR782XDXA-110A</b>	110 VAC	0.1s to 100h	A (On Delay)	4PDT	3 Amps
TDR782XDXA-230A	230 VAC	0.1s to 100h	A (On Delay)	4PDT	3 Amps

**Part Number Builder**

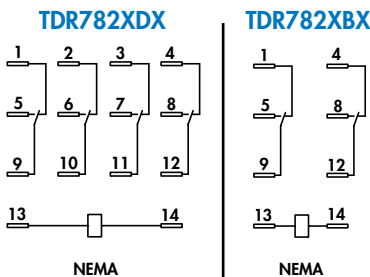
Series	Contact Configuration	Functions	-	Input Voltage
TDR782 = 782 Miniature Timer	XBX = DPDT XDX = 4PDT	A = ON Delay	-	12D = 12 VDC 24D = 24 VDC 24A = 24 VAC 110A = 110 VAC 230A = 230 VAC

Other mating sockets see Section 2: 70-782E14-1, 70-782D14-1, 70-461-1, 70-378-1, 70-379-1

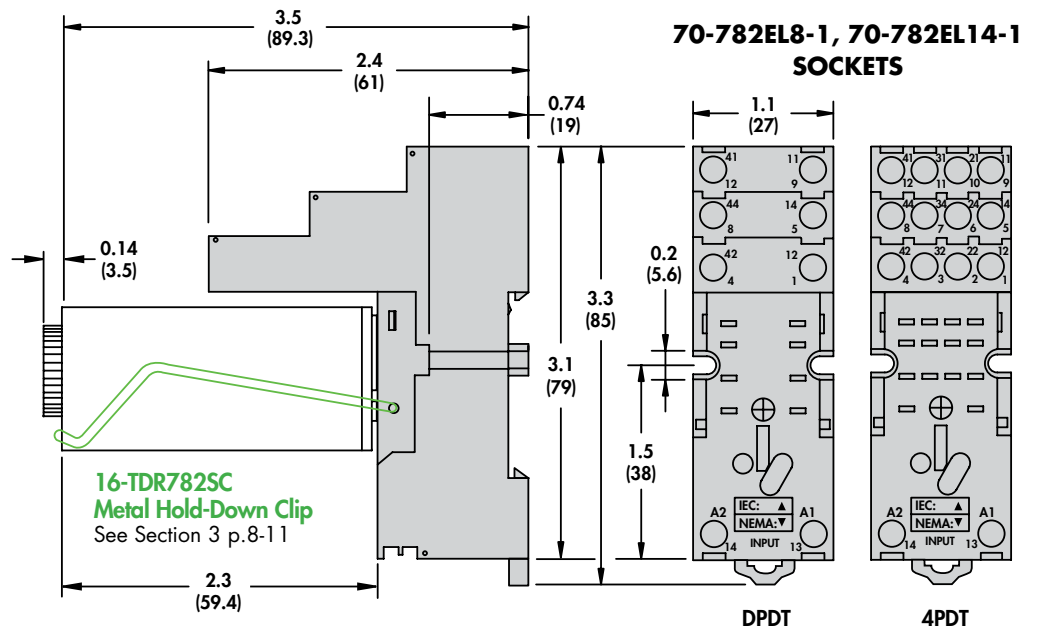
NOTE: Terminal size is 0.105 x 0.020 (2.68 x 0.508)



14 TERMINAL SQUARE BASE 4PDT (ON DELAY)



**WIRING DIAGRAMS**  
Bottom View



**70-782EL8-1, 70-782EL14-1 SOCKETS**

16-TDR782SC Metal Hold-Down Clip See Section 3 p.8-11