

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:

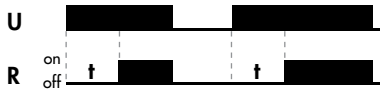
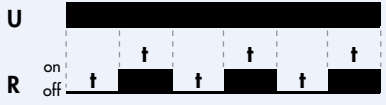
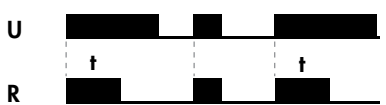
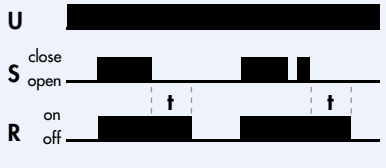
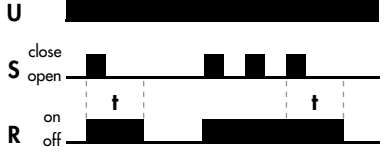
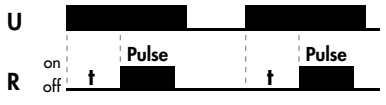
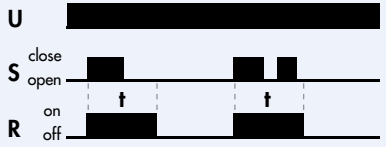
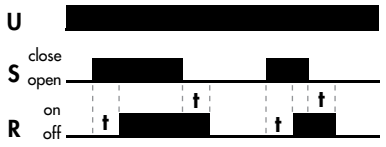
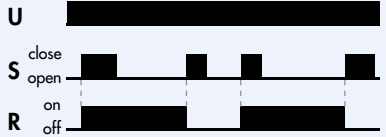
Input Voltage: Control voltage applied to the input terminals (see wiring diagrams below). Depending on the function, input voltage will either initiate the unit or make it ready to initiate when a trigger signal is applied.

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.

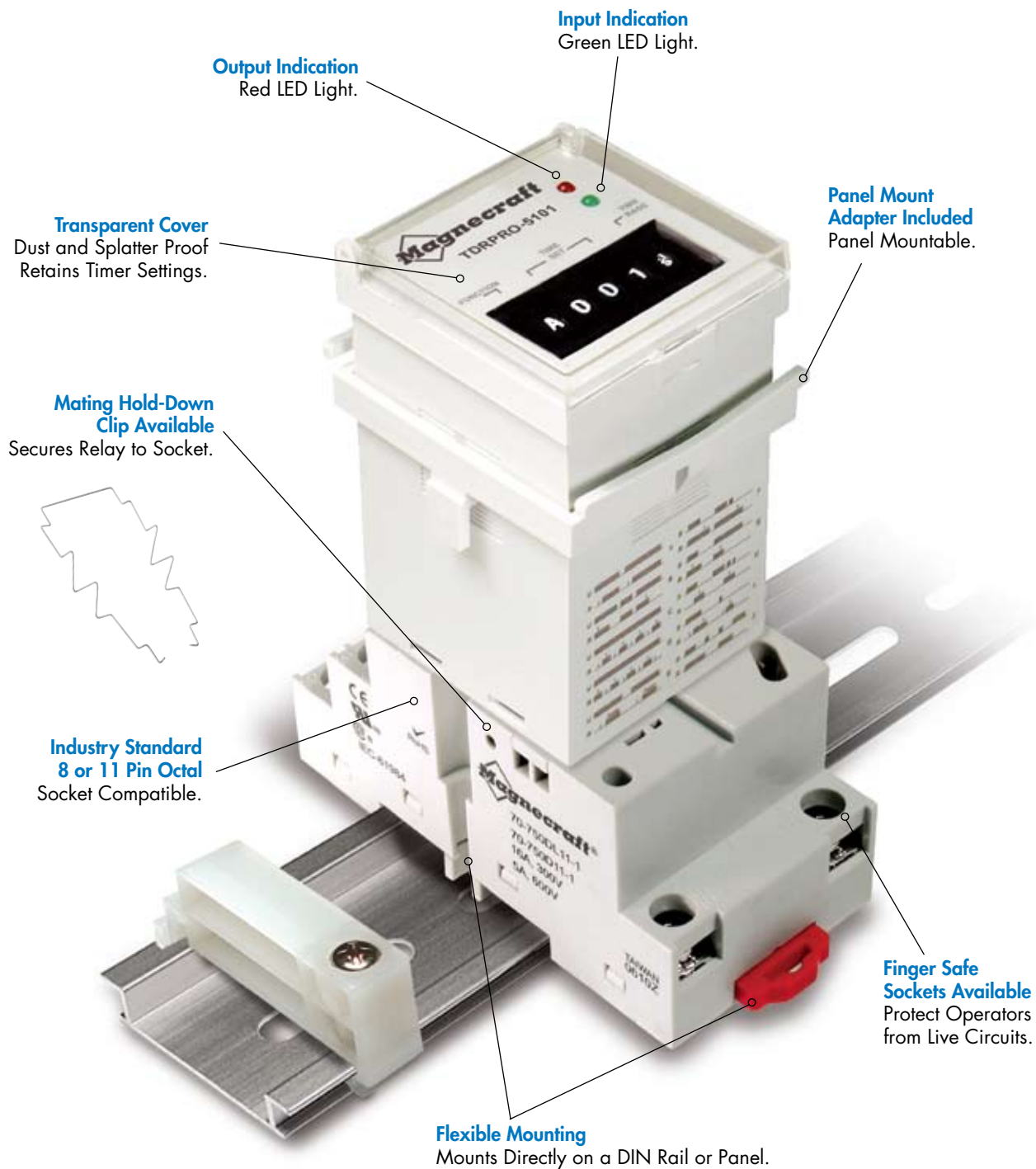
The following tables contain both written and visual descriptions on how the common timing functions operate. A Timing Chart shows the relationship between Input Voltage, Trigger Signal (if present) and Output Contacts.

FUNCTION DEFINITION TABLE

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

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

Advantages of the TDRPRO-5100 Series Time Delay Relays



The Complete System Solution!



The TDRPRO-5100 Series is a programmable multi-function, multi-voltage time delay relay with multiple time ranges for the ultimate in flexibility. The TDRPRO-5100 features thumb wheel adjustment for impeccable accuracy. The two indicator LEDs allow the user to know when power is present at the coil, output is energized or if the relay is performing one of its 10 timing functions.

*See Application Data (p. 5/2-5/3) for Function Definition.

- Offers a “one stop solution” for your power management system.
- Several configurations available to meet your individual needs.
- Switching capabilities up to 12 amps.
- The broad timing range meets most timing requirements.
- The 12 to 240 VAC/VDC input voltage range enables this timer to work with all popular voltages.
- The two LED status indicators; indicate status at a glance. The green LED is on when power is applied to the input terminals. The red LED blinks during timeout and is on when the output is energized.
- The tamper proof dust cover retains the settings and keeps the dust out.
- The thumb wheel adjustment for function and timing ensures accuracy and eliminates mechanical deviation.
- Color and appearance designed to high visibility in all environments.
- Engineering availability allows for customized control system solutions.

TDRPRO-5100 Series Time Delay Relays/SPDT, DPDT 12 Amp Rating



General Specifications (@ 25°C) (UL 508)

New Part Number:
Legacy Part Number:

TDRPRO-5100
TDRPRO-5000

TDRPRO-5101
TDRPRO-5001

TDRPRO-5102
TDRPRO-5002

Output Characteristics

		Units	DPDT	SPDT	DPDT
Number and type of Contacts			Silver Alloy	Silver Alloy	Silver Alloy
Contact Material			12	12	12
Current rating	@ 240 VAC, 30 VDC	A	240 AC, 50/60 Hz	240 AC, 50/60 Hz	240 AC, 50/60 Hz
Switching voltage		V	30 DC	30 DC	30 DC
		HP	1/3 @ 120VAC	1/3 @ 120VAC	1/3 @ 120VAC
		HP	1/2 @ 240 VAC	1/2 @ 240 VAC	1/2 @ 240 VAC
Minimum Switching Requirement		Pilot Duty	B300	B300	B300
Indication	LED	mA	100	100	100
		Blinks = Timing	Red	Red	Red
		On = Energized			

Input Characteristics

Voltage Range		VAC / VDC	12...240	12...240	12...240
Operating Range	% of Nominal		85% to 115%	85% to 115%	85% to 115%
Maximum consumption		AC VA	2.5	2.5	2.5
		DC W	2	2	2
Indication	LED		Green	Green	Green

Timing Characteristics

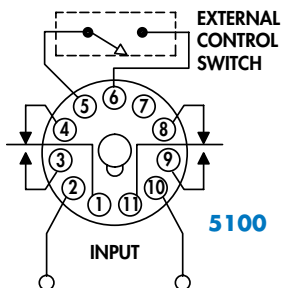
Functions Available	(See page 5/3)		A,B,C,D,E,F,G,H,I,J	A,B,C,D,E,F,G,H,I,J	A,B,C
Time Scales			7	7	7
Time Ranges Available		0.1 sec	0...999	0...999	0...999
		sec	0...999	0...999	0...999
		0.1 min	0...999	0...999	0...999
		min	0...999	0...999	0...999
		0.1 hr	0...999	0...999	0...999
		hr	0...999	0...999	0...999
		10 hr	0...999	0...999	0...999
Tolerance	Mechanical Setting	%	0	0	0
Repeatability	Constant Voltage and Temperature	%	0.1	0.1	0.1
Operate Time	Maximum	ms	25	25	25
Release Time	Maximum	ms	25	25	25
Reset Time		ms	150	150	150

Performance Characteristics

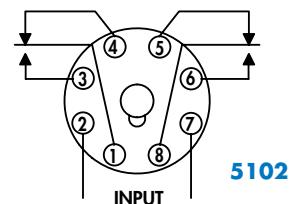
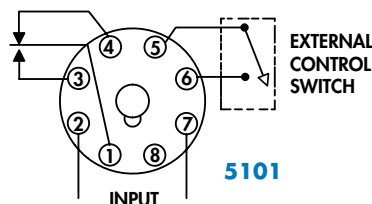
Electrical Life	Operations @ Rated Current (Resistive)		100,000	100,000	100,000
Mechanical Life	Unpowered	V	10,000,000	10,000,000	10,000,000
Dielectric strength	Input to Contacts	V	2500 AC	2500 AC	2500 AC
	Between Open Contacts		1000 AC	1000 AC	1000 AC

Environment

Product certifications	Standard version		UR, CE	UR, CE	UR, CE
Ambient air temperature around the device	Storage	°C	-30...+70	-30...+70	-30...+70
Degree of protection	Operation	°C	-20...+55	-20...+55	-20...+55
Weight		grams	133	133	133



WIRING DIAGRAMS





TDRPRO Relay with the 70-750DL8-1 Socket

Standard Part Numbers

BOLD-FACED PART NUMBERS ARE NORMALLY STOCKED

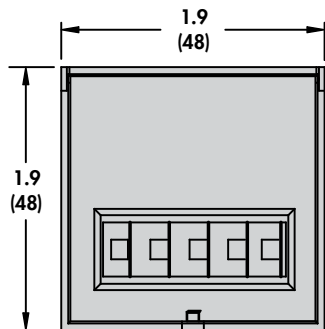
New Part Number	Supersedes	Input Voltage	Timing Range	Functions Available	Contact Configuration	Rated Load Current
TDRPRO-5100	TDRPRO-5000	12...240 VAC/VDC	0.1s...9990h	A,B,C,D,E,F,G,H,I,J	DPDT	12 Amps
TDRPRO-5101	TDRPRO-5001	12...240 VAC/VDC	0.1s...9990h	A,B,C,D,E,F,G,H,I,J	SPDT	12 Amps
TDRPRO-5102	TDRPRO-5002	12...240 VAC/VDC	0.1s...9990h	A,B,C	DPDT	12 Amps

FUNCTION DEFINITIONS

See Section 5 p.3

Part Number Builder

Series	Contact Configuration/ # of Functions
TDRPRO = 48 X 48 Time Delay Relay	5100 = DPDT, 10 Functions
	5101 = SPDT, 10 Functions
	5102 = DPDT, 3 Functions



Other mating sockets see Section 2: 70-750E8-1, 70-750E11-1, 70-169-1, 70-170-1, 70-465-1, 70-464-1

70-750DL8-1, 70-750DL11-1 SOCKETS

