











TIME DELAY RELAYS

PRODUCT SUMMARY

Macromatic offers a wide variety of time delay relays and accessories. Each one has different features and operating characteristics, allowing you to choose the exact product to meet your needs. Our time delay relays are available in either programmable or non-programmable versions. We offer both single or multiple function time delay relays. Choose between SPDT or DPDT relay outputs & solid state outputs for high duty cycle applications. Time delay relays are available as plug-in units for use with industry standard 8 & 11 pin octal sockets. They also come in 2" x 2" encapsulated & 1/16 DIN mounting configurations. Choose between analog or digital-set time delay relays. Refer to the Selection Table on this page for more information.

Product Series		Mounting Configuration	Time Delay Setting & Ranges	Functions	Input Voltages	Output	See Pages	
	THR Series Relay Output	2" x 2" Encapsulated Panel Mounted with One Screw	Analog-Set 0.1 SEC - 100 HR	Single- Function	12VDC, 24VAC/DC, 120VAC/DC, 240VAC	10A SPDT Relay	43-49	
	THS Series Solid State Output		Analog-Set 0.01 SEC - 100 HR	Single- Function	24-240VAC, 12-48VDC	1A SPNO Solid State	50-53	
	THL Series Solid State Inline (Series) Output		Analog-Set 0.01 SEC - 100 HR	Single- Function	24-240VAC & 12-48VDC	1A SPNO Solid State	54-55	
	TR-5 Series Standard	Plug-in Utilizing Industry-Standard 8 & 11 Pin Sockets	Analog-Set 0.05 SEC - 2 HR	Single- Function	12VDC, 24VAC/DC, 120VAC/DC, 240VAC	10A DPDT 10A SPDT Relay	56-59 60-61	
	TR-6 Series Time Ranger Programmable		Analog-Set Multi-Range 0.1 SEC - 24 HR	Single- Function	12VAC/DC, 24VAC/DC, 120VAC/DC, 240VAC	10A DPDT Relay	62-65	
	TD-8 Series Time Ranger Digital-Set Programmable		Digital-Set Multi-Range 0.1 SEC - 1,023 HR	Multi-Function (16) & Single- Function	12VAC/DC, 24VAC/DC, 120VAC/DC, 240VAC	10A DPDT 10A SPDT Relay	66-68	
	TD-7 Series Time Ranger Digital-Set Programmable		Digital-Set Multi-Range 0.05 SEC - 999 HR	Multi-Function (10) & Single- Function	12VAC/DC, 24VAC/DC, 120VAC/DC, 240VAC	10A DPDT 10A SPDT Relay	69-71	
	SS-6 & SS-8 Series Compact		Analog-Set 0.2 - 300 SEC	Single- Function	12VDC, 24VAC/DC, 120VAC	5A SPDT Relay	76	
	TAD Series Digital-Set 1/16 DIN		1/16 DIN (48mm ²)	Digital-Set Multi-Range 0.01 SEC - 9,990 HR	Multi-Function (10)	24-240VAC & 24-240VDC	5A DPDT Relay	72-73
	TAA Series Analog-Set 1/16 DIN			Digital-Set Multi-Range 0.05 SEC - 100 HR	Multi-Function (6)--2 Versions	24-240VAC & 24-240VDC	3A DPDT & SPDT Relay	74-75

TIME DELAY RELAYS

THR SERIES ENCAPSULATED--RELAY OUTPUT ON DELAY, INTERVAL, FLASHER, CYCLE & DELAYED INTERVAL

Isolated Relay Common

FUNCTION ■	INPUT VOLTAGE	PRODUCT NUMBER **	WIRING
ON DELAY A	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-10262-** THR-10266-** THR-10268-** THR-10261-**	<p>Onboard Adjustable or Fixed Time Delay</p> <p>DIAGRAM 300</p> <p>Remote Time Delay</p> <p>DIAGRAM 302</p>
INTERVAL ON B	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-10562-** THR-10566-** THR-10568-** THR-10561-**	
FLASHER (OFF Time 1st) E	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-10862-** THR-10866-** THR-10868-** THR-10861-**	
FLASHER (ON Time 1st) F	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-10962-** THR-10966-** THR-10968-** THR-10961-**	
REPEAT CYCLE * (OFF Time 1st) L	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-13162-** THR-13166-** THR-13168-** THR-13161-**	
REPEAT CYCLE * (ON Time 1st) M	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-15162-** THR-15166-** THR-15168-** THR-15161-**	
DELAYED INTERVAL * N	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-16162-** THR-16166-** THR-16168-** THR-16161-**	

■ See Pages 77-79 for definitions & explanations of Timing Functions.

* ON & OFF Time Ranges for these functions are the same. See www.macromatic.com/onoff for information on how to order a unit with different ON & OFF time ranges.

** Complete Product Number using two-digit Code from Table below.

TIME DELAYS

THR Series Products have three time delay options:

- **Onboard Adjustable Time Delay**--complete Product Number by adding two-digit Code from Table at right, i.e., THR-10262-30 is an On Delay with a time delay range of 0.1-10 seconds. * See www.macromatic.com/onoff for information on how to order these functions with different ON & OFF time ranges.
- **Onboard Fixed Time Delay**--replace two-digit Code with suffix "F" followed by delay [0.1 ... 100] followed by (S) seconds, (M) minutes or (H) hours, i.e., THR-10262-F5S is an On Delay with a time delay fixed at 5 seconds.
- **Remote Time Delay**--THR Series products can be built with two terminals for remote adjustable or fixed time delays. See Page 49 for information.

** TIMING RANGE TABLE

Time Delay Range	Code
0.05 - 5 Sec.	04
0.1 - 10 Sec.	30
1 - 100 Sec.	31
10 - 1,000 Sec.	36
0.1 - 10 Min.	32
1 - 100 Min.	33
10 - 1,000 Min.	37
1 - 100 Hr.	35



- ◆ Cost effective design & compact 2" x 2" enclosure are ideal for volume OEM applications
- ◆ Microprocessor-based design for greater performance & maximum flexibility
- ◆ Encapsulated for protection against harsh environments
- ◆ 10A SPDT relay output contacts can handle most pilot duty & fractional HP loads
- ◆ Onboard & remote adjustable or fixed time delays from 0.05 seconds to 100 hours



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TIME DELAY RELAYS

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- ◆ Relay Common internally connected to Pin 2--makes wiring easier
- ◆ Onboard & remote adjustable or fixed time delays from 0.05 seconds to 100 hours



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Relay Common Internally Connected to Pin 2

FUNCTION ■	INPUT VOLTAGE	PRODUCT NUMBER **	WIRING
ON DELAY A	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-10262-**J THR-10266-**J THR-10268-**J THR-10261-**J	Onboard Adjustable or Fixed Time Delay N.C. N.O. DIAGRAM 301
INTERVAL ON B	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-10562-**J THR-10566-**J THR-10568-**J THR-10561-**J	
FLASHER (OFF Time 1st) E	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-10862-**J THR-10866-**J THR-10868-**J THR-10861-**J	
FLASHER (ON Time 1st) F	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-10962-**J THR-10966-**J THR-10968-**J THR-10961-**J	
REPEAT CYCLE * (OFF Time 1st) L	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-13162-**J THR-13166-**J THR-13168-**J THR-13161-**J	
REPEAT CYCLE * (ON Time 1st) M	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-15162-**J THR-15166-**J THR-15168-**J THR-15161-**J	
DELAYED INTERVAL * N	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-16162-**J THR-16166-**J THR-16168-**J THR-16161-**J	Remote Time Delay N.C. N.O. EXT. RES. DIAGRAM 303

■ See Pages 77-79 for definitions & explanations of Timing Functions.

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** Complete Product Number using two-digit Code from Table below.

TIME DELAYS

THR Series Products have three time delay options:

- **Onboard Adjustable Time Delay**--complete Product Number by adding two-digit Code from Table at right, i.e., THR-10262-30J is an On Delay with a time delay range of 0.1-10 seconds. * See www.macromatic.com/onoff for information on how to order these functions with different ON & OFF time ranges.
- **Onboard Fixed Time Delay**--replace two-digit Code with suffix "F" followed by delay [0.1 ... 100] followed by (S) seconds, (M) minutes or (H) hours, i.e., THR-10262-F5SJ is an On Delay with a time delay fixed at 5 seconds.
- **Remote Adjustable Time Delay**--THR Series products can be built with two terminals for remote adjustable or fixed time delays. See Page 49 for information.

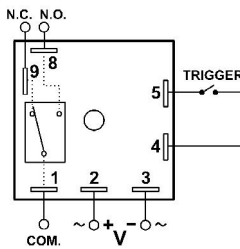
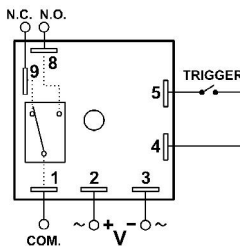
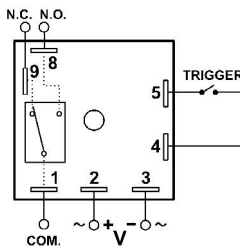
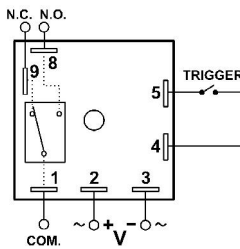
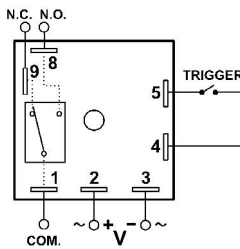
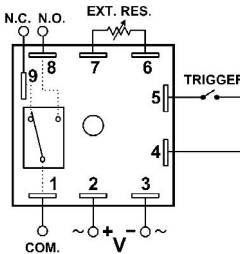
** TIMING RANGE TABLE

Time Delay Range	Code
0.05 - 5 Sec.	04
0.1 - 10 Sec.	30
1 - 100 Sec.	31
10 - 1,000 Sec.	36
0.1 - 10 Min.	32
1 - 100 Min.	33
10 - 1,000 Min.	37
1 - 100 Hr.	35

TIME DELAY RELAYS

THR SERIES ENCAPSULATED--RELAY OUTPUT OFF DELAY, SINGLE SHOT, WATCHDOG, SINGLE SHOT FALLING EDGE, ON DELAY/OFF DELAY & DELAYED INTERVAL

Isolated Control Switch & Isolated Relay Common

FUNCTION ■	INPUT VOLTAGE	PRODUCT NUMBER **	WIRING
OFF DELAY C	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-11662-** THR-11666-** THR-11668-** THR-11661-**	Onboard Adjustable or Fixed Time Delay 
SINGLE SHOT D	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-11562-** THR-11566-** THR-11568-** THR-11561-**	
WATCHDOG (Retriggerable Single Shot) J	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-11362-** THR-11366-** THR-11368-** THR-11361-**	
SINGLE SHOT FALLING EDGE (Retriggerable) H	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-12262-** THR-12266-** THR-12268-** THR-12261-**	
ON/OFF DELAY * G	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-14162-** THR-14166-** THR-14168-** THR-14161-**	
DELAYED INTERVAL * (Triggered) P	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-16562-** THR-16566-** THR-16568-** THR-16561-**	

■ See Pages 77-79 for definitions & explanations of Timing Functions.

* ON & OFF Time Ranges for these functions are the same. See www.macromatic.com/onoff for information on how to order a unit with different ON & OFF time ranges.

** Complete Product Number using two-digit Code from Table below.

TIME DELAYS

THR Series Products have three time delay options:

- **Onboard Adjustable Time Delay**--complete Product Number by adding two-digit Code from Table at right, i.e., THR-11662-30 is an Off Delay with a time delay range of 0.1-10 seconds. * See www.macromatic.com/onoff for information on how to order these functions with different ON & OFF time ranges.
- **Onboard Fixed Time Delay**--replace two-digit Code with suffix "F" followed by delay [0.1 ... 100] followed by (S) seconds, (M) minutes or (H) hours, i.e., THR-11662-F5S is an Off Delay with a time delay fixed at 5 seconds.
- **Remote Adjustable Time Delay**--THR Series products can be built with two terminals for remote adjustable or fixed time delays. See Page 49 for information.

** TIMING RANGE TABLE	
Time Delay Range	Code
0.05 - 5 Sec.	04
0.1 - 10 Sec.	30
1 - 100 Sec.	31
10 - 1,000 Sec.	36
0.1 - 10 Min.	32
1 - 100 Min.	33
10 - 1,000 Min.	37
1 - 100 Hr.	35



- ◆ Cost effective design & compact 2" x 2" enclosure are ideal for volume OEM applications
- ◆ Microprocessor-based design for greater performance & maximum flexibility
- ◆ Encapsulated for protection against harsh environments
- ◆ 10A SPDT relay output contacts can handle most pilot duty & fractional HP loads
- ◆ Onboard & remote adjustable or fixed time delays from 0.05 seconds to 100 hours



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TIME DELAY RELAYS

THR SERIES ENCAPSULATED--RELAY OUTPUT

OFF DELAY, SINGLE SHOT, WATCHDOG, SINGLE SHOT FALLING EDGE, ON DELAY/OFF DELAY & DELAYED INTERVAL



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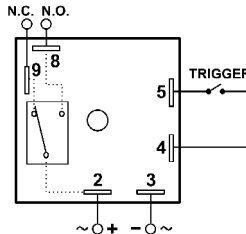
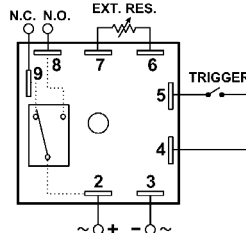


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Isolated Control Switch & Relay Common Internally Connected to Pin 2

FUNCTION ■	INPUT VOLTAGE	PRODUCT NUMBER **	WIRING
OFF DELAY C	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-11662-**J THR-11666-**J THR-11668-**J THR-11661-**J	Onboard Adjustable or Fixed Time Delay 
SINGLE SHOT D	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-11562-**J THR-11566-**J THR-11568-**J THR-11561-**J	Remote Time Delay 
WATCHDOG (Retriggerable Single Shot) J	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-11362-**J THR-11366-**J THR-11368-**J THR-11361-**J	
SINGLE SHOT FALLING EDGE (Retriggerable) H	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-12262-**J THR-12266-**J THR-12268-**J THR-12261-**J	
ON/OFF DELAY * G	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-14162-**J THR-14166-**J THR-14168-**J THR-14161-**J	
DELAYED INTERVAL * (Triggered) P	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-16562-**J THR-16566-**J THR-16568-**J THR-16561-**J	

■ See Pages 77-79 for definitions & explanations of Timing Functions.

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TIME DELAYS

THR Series Products have three time delay options:

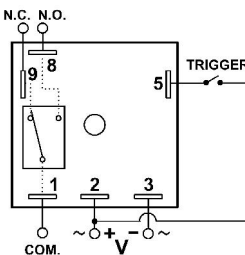
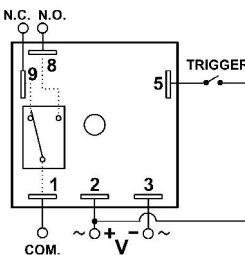
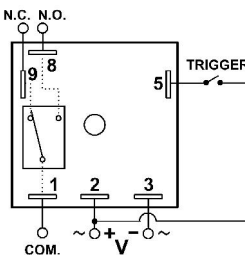
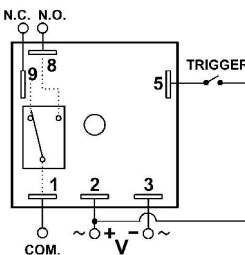
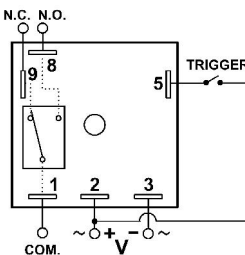
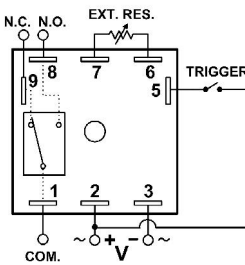
- **Onboard Adjustable Time Delay**--complete Product Number by adding two-digit Code from Table at right, i.e., THR-11662-30J is an Off Delay with a time delay range of 0.1-10 seconds. * See www.macromatic.com/onoff for information on how to order these functions with different ON & OFF time ranges.
- **Onboard Fixed Time Delay**--replace two-digit Code with suffix "F" followed by delay [0.1 ... 100] followed by (S) seconds, (M) minutes or (H) hours, i.e., THR-11662-F5SJ is an Off Delay with a time delay fixed at 5 seconds.
- **Remote Adjustable Time Delay**--THR Series products can be built with two terminals for remote adjustable or fixed time delays. See Page 49 for information.

** TIMING RANGE TABLE	
Time Delay Range	Code
0.05 - 5 Sec.	04
0.1 - 10 Sec.	30
1 - 100 Sec.	31
10 - 1,000 Sec.	36
0.1 - 10 Min.	32
1 - 100 Min.	33
10 - 1,000 Min.	37
1 - 100 Hr.	35

TIME DELAY RELAYS

THR SERIES ENCAPSULATED--RELAY OUTPUT OFF DELAY, SINGLE SHOT, WATCHDOG, SINGLE SHOT FALLING EDGE, ON DELAY/OFF DELAY & DELAYED INTERVAL

Control Switch Common to Pin 2 & Isolated Relay Common

FUNCTION ■	INPUT VOLTAGE	PRODUCT NUMBER **	WIRING
OFF DELAY C	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-11662-**T THR-11666-**T THR-11668-**T THR-11661-**T	Onboard Adjustable or Fixed Time Delay 
SINGLE SHOT D	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-11562-**T THR-11566-**T THR-11568-**T THR-11561-**T	
WATCHDOG (Retriggerable Single Shot) J	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-11362-**T THR-11366-**T THR-11368-**T THR-11361-**T	
SINGLE SHOT FALLING EDGE (Retriggerable) H	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-12262-**T THR-12266-**T THR-12268-**T THR-12261-**T	
ON/OFF DELAY * G	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-14162-**T THR-14166-**T THR-14168-**T THR-14161-**T	
DELAYED INTERVAL * (Triggered) P	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-16562-**T THR-16566-**T THR-16568-**T THR-16561-**T	

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- **Onboard Fixed Time Delay**--replace two-digit Code with suffix "F" followed by delay [0.1 ... 100] followed by (S) seconds, (M) minutes or (H) hours, i.e., THR-11662-F5ST is an Off Delay with a time delay fixed at 5 seconds.
- **Remote Adjustable Time Delay**--THR Series products can be built with two terminals for remote adjustable or fixed time delays. See Page 49 for information.

** TIMING RANGE TABLE	
Time Delay Range	Code
0.05 - 5 Sec.	04
0.1 - 10 Sec.	30
1 - 100 Sec.	31
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0.1 - 10 Min.	32
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1 - 100 Hr.	35



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TIME DELAY RELAYS

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OFF DELAY, SINGLE SHOT, WATCHDOG, SINGLE SHOT FALLING EDGE, ON DELAY/OFF DELAY & DELAYED INTERVAL



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Control Switch Common to Pin 2 &
Relay Common Internally Connected to Pin 2

FUNCTION ■	INPUT VOLTAGE	PRODUCT NUMBER **	WIRING
OFF DELAY C	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-11662-**JT THR-11666-**JT THR-11668-**JT THR-11661-**JT	<p>Onboard Adjustable or Fixed Time Delay</p> <p>DIAGRAM 309</p> <p>Remote Time Delay</p> <p>DIAGRAM 311</p>
SINGLE SHOT D	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-11562-**JT THR-11566-**JT THR-11568-**JT THR-11561-**JT	
WATCHDOG (Retriggerable Single Shot) J	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-11362-**JT THR-11366-**JT THR-11368-**JT THR-11361-**JT	
SINGLE SHOT FALLING EDGE (Retriggerable) H	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-12262-**JT THR-12266-**JT THR-12268-**JT THR-12261-**JT	
ON/OFF DELAY * G	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-14162-**JT THR-14166-**JT THR-14168-**JT THR-14161-**JT	
DELAYED INTERVAL * (Triggered) P	120V AC/DC 12V DC 24V AC/DC 240V AC	THR-16562-**JT THR-16566-**JT THR-16568-**JT THR-16561-**JT	

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- ** Complete Product Number using two-digit Code from Table below.

TIME DELAYS

THR Series Products have three time delay options:

- **Onboard Adjustable Time Delay**--complete Product Number by adding two-digit Code from Table at right, i.e., THR-11662-30JT is an Off Delay with a time delay range of 0.1-10 seconds. * See www.macromatic.com/onoff for information on how to order these functions with different ON & OFF time ranges.
- **Onboard Fixed Time Delay**--replace two-digit Code with suffix "F" followed by delay [0.1 ... 100] followed by (S) seconds, (M) minutes or (H) hours, i.e., THR-11662-F5SJT is an Off Delay with a time delay fixed at 5 seconds.
- **Remote Adjustable Time Delay**--THR Series products can be built with two terminals for remote adjustable or fixed time delays. See Page 49 for information.

** TIMING RANGE TABLE	
Time Delay Range	Code
0.05 - 5 Sec.	04
0.1 - 10 Sec.	30
1 - 100 Sec.	31
10 - 1,000 Sec.	36
0.1 - 10 Min.	32
1 - 100 Min.	33
10 - 1,000 Min.	37
1 - 100 Hr.	35

TIME DELAY RELAYS

THR SERIES ENCAPSULATED--RELAY OUTPUT

APPLICATION DATA & DIMENSIONS

APPLICATION DATA

Voltage Tolerance:

AC Operation: +10/-15% of nominal at 50/60 Hz.
 DC Operation: +10/-15% of nominal.

Load (Burden): Maximum of 2 VA for all voltages

Setting Accuracy:

Maximum Setting (Adjustable): +5%, -0%
 Minimum Setting (Adjustable): +0%, -50%
 Fixed Time Delay: ±2% or 50ms, whichever is greater

Repeat Accuracy (constant voltage and temperature):
 ±0.1% or ± 0.04 seconds, whichever is greater

Reset Time:

Triggered with Input Voltage: 100ms
 Triggered with Control Switch: 40ms

Start-up Time (Time from when power is applied until unit is timing): 0.05 Seconds

Maintain Function Time (Time unit continues to operate after power is removed): 0.01 Seconds

Units Triggered by a Control Switch:

Minimum required trigger switch closure time is 50ms.

Temperature: -28° to 65°C (-18° to 149°F)

Output Contacts:

10A @ 240VAC / 7A @ 28VDC SPDT, ¼hp @ 120VAC (N.O.)

Life:

Mechanical: 10,000,000 operations
 Full Load: 100,000 operations

Compatibility:

Using a solid state switch to initiate the time sequence is acceptable. See www.macromatic.com/leakage or contact Macromatic for information regarding leakage current limits and other solid state design considerations.

Mounting:

Surface with one #8 or #10 screw

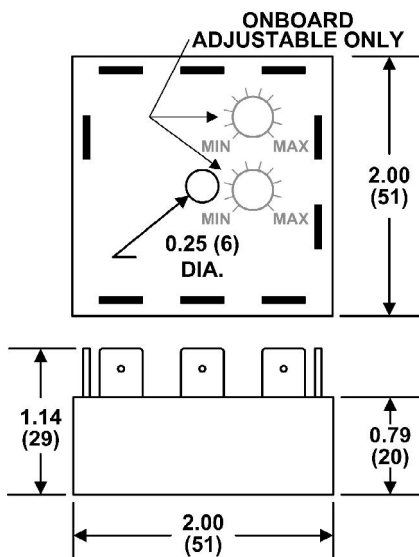
Termination:

0.25" male quick-connect terminals

Approvals:



DIMENSIONS



All Dimensions in Inches (Millimeters)

REMOTE TIME DELAY

Most THR Series products can be built with two terminals for remote adjustable or fixed time delays. To order a product with a remote time delay, complete the Product Number by adding the two-digit Code from the Table shown on the appropriate product selection page followed by the suffix "R1", i.e., THR-10262-30R1. Contact Macromatic for information on limitations of remote time delays on functions with ON & OFF timing ranges.

Adjustable Time Delay

A 100K ohm potentiometer is required to obtain the maximum time delay for all standard ranges. To use other values of remote potentiometers, contact Macromatic.

Fixed Time Delay

A fixed time delay can be set by connecting a resistor across the two terminals. To determine the resistor value required, use the following equation:

$$R = \frac{T}{T_{max}} \times 100,000$$

R = Resistance value required to obtain T
 T = Desired time delay
 T_{max} = Maximum time delay of range

Example: Using time range 0.1-10 seconds, what resistor value is required for a fixed time delay of 5 seconds:

$$R = \frac{5}{10} \times 100,000 = 50,000 \text{ ohms (50K ohms)}$$

TIME DELAY RELAYS

THS SERIES ENCAPSULATED--SOLID STATE OUTPUT ON DELAY, INTERVAL, FLASHER, CYCLE & DELAYED INTERVAL



- ◆ Cost effective design & compact 2" x 2" enclosure are ideal for volume OEM applications
- ◆ Microprocessor-based design for greater performance & maximum flexibility
- ◆ Encapsulated for protection against harsh environments
- ◆ Output rated 1A continuous/ 10A inrush is perfect for high duty cycle/long life applications
- ◆ Onboard & remote adjustable or fixed time delays from 0.01 seconds to 100 hours



FUNCTION ■	INPUT VOLTAGE	PRODUCT NUMBER **	WIRING ●
ON DELAY ◆ A	24-240V AC 12-48V DC	THS-1024A-** THS-1024D-**	Onboard Adjustable or Fixed Time Delay DIAGRAM 317
INTERVAL ON B	24-240V AC 12-48V DC	THS-1054A-** THS-1054D-**	
FLASHER (ON Time 1st) E	24-240V AC 12-48V DC	THS-1094A-** THS-1094D-**	
REPEAT CYCLE * (OFF Time 1st) L	24-240V AC 12-48V DC	THS-1314A-** THS-1314D-**	Remote Time Delay DIAGRAM 320
REPEAT CYCLE * (ON Time 1st) M	24-240V AC 12-48V DC	THS-1514A-** THS-1514D-**	
DELAYED INTERVAL * N	24-240V AC 12-48V DC	THS-1614A-** THS-1614D-**	

- See Pages 77-79 for definitions & explanations of Timing Functions.
- ◆ See Page 54 for Inline (Series-Connection) On Delay.
- Diagrams shown are for products with AC input voltage. For products with DC input voltage, the "+" terminal is 2 & the "-" terminal is 3.
- * ON & OFF Time Ranges for these functions are the same. See www.macromatic.com/onoff for information on how to order a unit with different ON & OFF time ranges.
- ** Complete Product Number using two-digit Code from Table below.

TIME DELAYS

THS Series Products have three time delay options:

- **Onboard Adjustable Time Delay**--complete Product Number by adding two-digit Code from Table at right, i.e., THS-1054A-30 is an Interval On with a time delay range of 0.1-10 seconds.
* See www.macromatic.com/onoff for information on how to order these functions with different ON & OFF time ranges.
- **Onboard Fixed Time Delay**--replace two-digit Code with suffix "F" followed by delay [0.1 ... 100] followed by (S) seconds, (M) minutes or (H) hours, i.e., THS-1054A-F5S is an Interval On with a time delay fixed at 5 seconds.
- **Remote Time Delay**--THS Series products can be built with two terminals for remote adjustable or fixed time delays. See Page 53 for information.

** TIMING RANGE TABLE

Time Delay Range	Code
0.01 - 1 Sec.	02
0.05 - 5 Sec.	04
0.1 - 10 Sec.	30
1 - 100 Sec.	31
10 - 1,000 Sec.	36
0.1 - 10 Min.	32
1 - 100 Min.	33
10 - 1,000 Min.	37
1 - 100 Hr.	35



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TIME DELAY RELAYS

THS SERIES ENCAPSULATED--SOLID STATE OUTPUT OFF DELAY, SINGLE SHOT, WATCHDOG, SINGLE SHOT FALLING EDGE, ON DELAY/OFF DELAY & DELAYED INTERVAL

Isolated Control Switch

FUNCTION ■	INPUT VOLTAGE	PRODUCT NUMBER **	WIRING ●
OFF DELAY C	24-240V AC 12-48V DC	THS-1164A-** THS-1164D-**	<p>DIAGRAM 318</p> <p>DIAGRAM 321</p>
SINGLE SHOT D	24-240V AC 12-48V DC	THS-1154A-** THS-1154D-**	
WATCHDOG (Retriggerable Single Shot) J	24-240V AC 12-48V DC	THS-1134A-** THS-1134D-**	
SINGLE SHOT FALLING EDGE (Retriggerable) H	24-240V AC 12-48V DC	THS-1224A-** THS-1224D-**	
ON/OFF DELAY * G	24-240V AC 12-48V DC	THS-1414A-** THS-1414D-**	
DELAYED INTERVAL * (Retriggerable) P	24-240V AC 12-48V DC	THS-1654A-** THS-1654D-**	

- See Pages 77-79 for definitions & explanations of Timing Functions.
- Diagrams shown are for products with AC input voltage. For products with DC input voltage, the "+" terminal is 2 & the "-" terminal is 3.
- * ON & OFF Time Ranges for these functions are the same. See www.macromatic.com/onoff for information on how to order a unit with different ON & OFF time ranges.
- ** Complete Product Number using two-digit Code from Table below.

TIME DELAYS

THS Series Products have three time delay options:

- **Onboard Adjustable Time Delay**--complete Product Number by adding two-digit Code from Table at right, i.e., THS-11642-30 is an Off Delay with a time delay range of 0.1-10 seconds. * See www.macromatic.com/onoff for information on how to order these functions with different ON & OFF time ranges.
- **Onboard Fixed Time Delay**--replace two-digit Code with suffix "F" followed by delay [0.1 ... 100] followed by (S) seconds, (M) minutes or (H) hours, i.e., THS-1164A-F5S is an Off Delay with a time delay fixed at 5 seconds.
- **Remote Time Delay**--THS Series products can be built with two terminals for remote adjustable or fixed time delays. See Page 53 for information.

** TIMING RANGE TABLE	
Time Delay Range	Code
0.01 - 1 Sec.	02
0.05 - 5 Sec.	04
0.1 - 10 Sec.	30
1 - 100 Sec.	31
10 - 1,000 Sec.	36
0.1 - 10 Min.	32
1 - 100 Min.	33
10 - 1,000 Min.	37
1 - 100 Hr.	35



- ◆ Cost effective design & compact 2" x 2" enclosure are ideal for volume OEM applications
- ◆ Microprocessor-based design for greater performance & maximum flexibility
- ◆ Encapsulated for protection against harsh environments
- ◆ Output rated 1A continuous/ 10A inrush is perfect for high duty cycle/long life applications
- ◆ Onboard & remote adjustable or fixed time delays from 0.01 seconds to 100 hours



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TIME DELAY RELAYS

THS SERIES ENCAPSULATED--SOLID STATE OUTPUT
OFF DELAY, SINGLE SHOT, WATCHDOG, SINGLE SHOT FALLING EDGE,
ON DELAY/OFF DELAY & DELAYED INTERVAL



- ◆ Cost effective design & compact 2" x 2" enclosure are ideal for volume OEM applications
- ◆ Microprocessor-based design for greater performance & maximum flexibility
- ◆ Encapsulated for protection against harsh environments
- ◆ Output rated 1A continuous/ 10A inrush is perfect for high duty cycle/long life applications
- ◆ Onboard & remote adjustable or fixed time delays from 0.01 seconds to 100 hours



Control Switch Common to Pin 2

FUNCTION ■	INPUT VOLTAGE	PRODUCT NUMBER **	WIRING ■
OFF DELAY C	24-240V AC 12-48V DC	THS-1164A-***T THS-1164D-***T	<p>DIAGRAM 319</p> <p>DIAGRAM 322</p>
SINGLE SHOT D	24-240V AC 12-48V DC	THS-1154A-***T THS-1154D-***T	
WATCHDOG (Retriggerable Single Shot) J	24-240V AC 12-48V DC	THS-1134A-***T THS-1134D-***T	
SINGLE SHOT FALLING EDGE (Retriggerable) H	24-240V AC 12-48V DC	THS-1224A-***T THS-1224D-***T	
ON/OFF DELAY * G	24-240V AC 12-48V DC	THS-1414A-***T THS-1414D-***T	
DELAYED INTERVAL * (Retriggerable) P	24-240V AC 12-48V DC	THS-1654A-***T THS-1654D-***T	

- See Pages 77-79 for definitions & explanations of Timing Functions.
- Diagrams shown are for products with AC input voltage. For products with DC input voltage, the "+" terminal is 2 & the "-" terminal is 3.
- * ON & OFF Time Ranges for these functions are the same. See www.macromatic.com/onoff for information on how to order a unit with different ON & OFF time ranges.
- ** Complete Product Number using two-digit Code from Table below.

TIME DELAYS

THS Series Products have three time delay options:

- **Onboard Adjustable Time Delay**--complete Product Number by adding two-digit Code from Table at right, i.e., THS-11642-30T is an Off Delay with a time delay range of 0.1-10 seconds. * See www.macromatic.com/onoff for information on how to order these functions with different ON & OFF time ranges.
- **Onboard Fixed Time Delay**--replace two-digit Code with suffix "F" followed by delay [0.1 ... 100] followed by (S) seconds, (M) minutes or (H) hours, i.e., THS-1164A-F5ST is an Off Delay with a time delay fixed at 5 seconds.
- **Remote Time Delay**--THS Series products can be built with two terminals for remote adjustable or fixed time delays. See Page 53 for information.

** TIMING RANGE TABLE

Time Delay Range	Code
0.01 - 1 Sec.	02
0.05 - 5 Sec.	04
0.1 - 10 Sec.	30
1 - 100 Sec.	31
10 - 1,000 Sec.	36
0.1 - 10 Min.	32
1 - 100 Min.	33
10 - 1,000 Min.	37
1 - 100 Hr.	35



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TIME DELAY RELAYS

THS SERIES ENCAPSULATED--SOLID STATE OUTPUT

APPLICATION DATA & DIMENSIONS

APPLICATION DATA

Voltage Tolerance:

AC Operation: +10 to -15% of nominal voltage, 50/60 Hz.
 DC Operation: +10 to -15% of nominal voltage

Load (Burden): Maximum of 1VA for all voltages

Setting Accuracy:

Maximum Setting (Adjustable): +5%, -0%
 Minimum Setting (Adjustable): +0%, -50%
 Fixed Time Delay: ±2% or 50ms, whichever is greater

Repeat Accuracy (constant voltage and temperature):

±0.1% or ± 0.04 seconds, whichever is greater

Reset Time:

Triggered with Input Voltage: 50ms
 Triggered with Control Switch: 40ms

Start-up Time:

(Time from when power is applied until unit is timing)
 0.05 Seconds

Maintain Function Time:

(Time unit continues to operate after power is removed)
 0.01 Seconds

Units Triggered by a Control Switch:

Minimum required trigger switch closure time is 50ms.

Temperature:

-28° to 65°C (-18° to 149°F)

Output Contacts:

Normally Open Solid State 1A Continuous, 10A Inrush @ 65° C

Life:

No predictable failure if used within operating parameters.

Leakage Current (OFF-State): < 5ma @ 240V AC

Minimum Load Current: 20ma

Effective Voltage Drop (ON-State): Maximum 1.6V @ 1A for all voltages

Compatibility:

Using a solid state switch to initiate the time sequence is acceptable. See www.macromatic.com/leakage or contact Macromatic for information regarding leakage current limits and other solid state design considerations.

Mounting:

Surface with one #8 or #10 screw

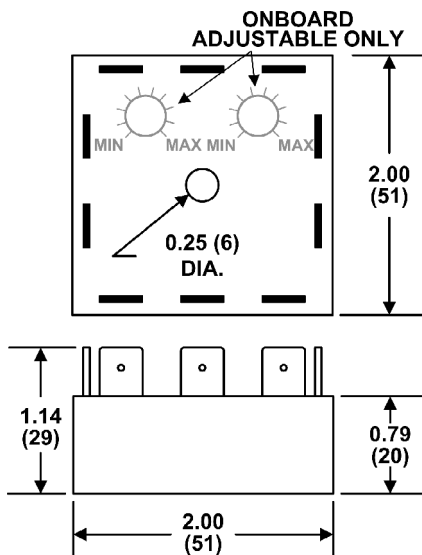
Termination:

0.25" male quick-connect terminals

Approvals:



DIMENSIONS



All Dimensions in Inches (Millimeters)

REMOTE TIME DELAY

THS Series products can be built with two terminals for remote adjustable or fixed time delays. To order a product with a remote time delay, complete the Product Number by adding the two-digit Code from the Table shown on the appropriate product selection page followed by the suffix "R1", i.e., THS-10242-30R1.

Adjustable Time Delay

A 100K ohm potentiometer is required to obtain the maximum time delay for all standard ranges. To use other values of remote potentiometers, contact Macromatic.

Fixed Time Delay

A fixed time delay can be set by connecting a resistor across the two terminals. To determine the resistor value required, use the following equation:

$$R = \frac{T}{T_{max}} \times 100,000$$

R = Resistance value required to obtain T
 T = Desired time delay
 T_{max} = Maximum time delay of range

Example: Using time range 0.1-10 seconds, what resistor value is required for a fixed time delay of 5 seconds:

$$R = \frac{5}{10} \times 100,000 = 50,000 \text{ ohms (50K ohms)}$$

TIME DELAY RELAYS

THL SERIES ENCAPSULATED--INLINE (SERIES CONNECTION) SOLID STATE OUTPUT ON DELAY



- ◆ Cost effective design & compact 2" x 2" enclosure are ideal for volume OEM applications
- ◆ Microprocessor-based design for greater performance & maximum flexibility
- ◆ Encapsulated for protection against harsh environments
- ◆ Two-terminal series-connection with the load
- ◆ Output rated 1A continuous/ 10A inrush is perfect for high duty cycle/long life applications
- ◆ Onboard & remote adjustable or fixed time delays from 0.01 seconds to 100 hours



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FUNCTION ■	INPUT VOLTAGE	PRODUCT NUMBER **	WIRING
ON DELAY A	24-240V AC & 12-48V DC	THL-1024U-**	<p>Onboard Adjustable or Fixed Time Delay</p> <p>DIAGRAM 329</p> <p>Remote Time Delay</p> <p>DIAGRAM 330</p>

- See Pages 77-79 for definitions & explanations of Timing Functions.
- ** Complete Product Number using two-digit Code from Table below.

TIME DELAYS

THL Series Products have three time delay options:

- **Onboard Adjustable Time Delay**--complete Product Number by adding two-digit Code from Table at right, i.e., THL-1024U-30 is an On Delay with a time delay range of 0.1-10 seconds.
- **Onboard Fixed Time Delay**--replace two-digit Code with suffix "F" followed by delay [0.1 ... 100] followed by (S) seconds, (M) minutes or (H) hours, i.e., THL-1024U-F5S is an On Delay with a time delay fixed at 5 seconds.
- **Remote Time Delay**--THL Series products can be built with two terminals for remote adjustable or fixed time delays. See Page 55 for information.

** TIMING RANGE TABLE	
Time Delay Range	Code
0.01 - 1 Sec.	02
0.05 - 5 Sec.	04
0.1 - 10 Sec.	30
1 - 100 Sec.	31
10 - 1,000 Sec.	36
0.1 - 10 Min.	32
1 - 100 Min.	33
10 - 1,000 Min.	37
1 - 100 Hr.	35

TIME DELAY RELAYS

THL SERIES ENCAPSULATED--INLINE (SERIES-CONNECTION) SOLID STATE OUTPUT

APPLICATION DATA & DIMENSIONS

APPLICATION DATA

Voltage Tolerance:

AC Operation: +10 to -15% of nominal voltage, 50/60 Hz.
DC Operation: +10 to -15% of nominal voltage

Load (Burden): Maximum of 1 VA for all voltages

Setting Accuracy:

Maximum Setting (Adjustable): +5%, -0%
Minimum Setting (Adjustable): +0%, -50%
Fixed Time Delay: ±2% or 50ms, whichever is greater

Repeat Accuracy (constant voltage and temperature):
±0.1% or ± 0.01 seconds, whichever is greater

Reset Time: 50ms

Start-up Time:

(Time from when power is applied until unit is timing)
0.02 Seconds

Maintain Function Time:

(Time unit continues to operate after power is removed)
0.01 Seconds

Temperature:

-28° to 65°C (-18° to 149°F)

Output Contacts:

Normally Open Solid State 1A Continuous, 10A Inrush @ 65° C

Life:

No predictable failure if used within operating parameters.

Leakage Current (OFF-State): < 5ma @ 240V AC

Minimum Load Current: 20ma

Effective Voltage Drop (ON-State): Maximum 3V @ 1A for all voltages

Compatibility:

Using a solid state switch to initiate the time sequence is acceptable. See www.macromatic.com/leakage or contact Macromatic for information regarding leakage current limits and other solid state design considerations.

Mounting:

Surface with one #8 or #10 screw

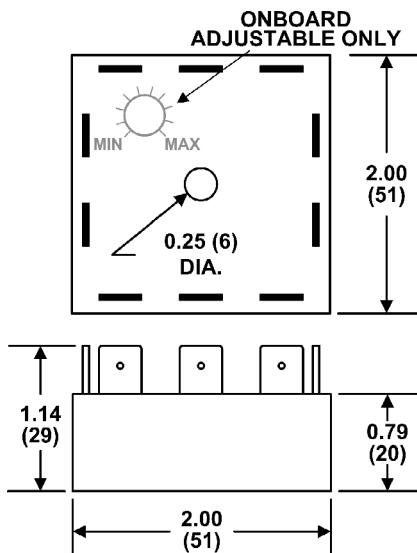
Termination:

0.25" male quick-connect terminals

Approvals:



DIMENSIONS



All Dimensions in Inches (Millimeters)

REMOTE TIME DELAY

THL Series products can be built with two terminals for remote adjustable or fixed time delays. To order a product with a remote time delay, complete the Product Number by adding the two-digit Code from the Table shown on the appropriate product selection page followed by the suffix "R1", i.e., THL-1024U-30R1.

Adjustable Time Delay

A 100K ohm potentiometer is required to obtain the maximum time delay for all standard ranges. To use other values of remote potentiometers, contact Macromatic.

Fixed Time Delay

A fixed time delay can be set by connecting a resistor across the two terminals. To determine the resistor value required, use the following equation:

$$R = \frac{T}{T_{max}} \times 100,000$$

R = Resistance value required to obtain T
 T = Desired time delay
 T_{max} = Maximum time delay of range

Example: Using time range 0.1-10 seconds, what resistor value is required for a fixed time delay of 5 seconds:

$$R = \frac{5}{10} \times 100,000 = 50,000 \text{ ohms (50K ohms)}$$

TIME DELAY RELAYS

DEFINITION OF TIMING FUNCTIONS

Understanding the differences between all the functions available in time delay relays can sometimes be a daunting task. To begin with, time delay relays are simply control relays with a time delay built in. Their purpose is to control an event based on time.

Typically, time delay relays are initiated or triggered by one of two methods, depending on the function:

- ◆ application of input voltage
- ◆ application of a trigger

These triggers can be one of two signals: a control switch (dry contact), i.e., limit switch, push button, float switch, etc., or voltage (commonly known as a power trigger).

To help understand, some definitions are important:

- ◆ Input Voltage - control voltage applied to the input terminals. Depending on the function, input voltage will either initiate the unit or make it ready to initiate when a trigger is applied.
- ◆ Trigger- on certain timing functions, a trigger is used to initiate the unit after input voltage has been applied. As noted above, this trigger can either be a control switch (dry contact switch) or a power trigger (voltage).
- ◆ Output (Load) - every time delay relay has an output (either mechanical relay or solid state) that will open & close to control the load. Note that the user must provide the voltage to power the load being switched by the output contacts of the time delay relay. In all wiring diagrams, the output is shown in the normal de-energized position.

Below and on the following pages are both written and visual descriptions on how the common timing functions operate. A Timing Chart shows the relationship between Input Voltage, Trigger (if present) and Output. If you cannot find a product to fit your requirements or have any questions, Macromatic's Application Engineers offer technical information along with product selection and application assistance. Just call us at 800-238-7474 or e-mail us at tech-help@macromatic.com.

Function/Code	Operation	Timing Chart
ON DELAY Delay on Operate Delay on Make A	Upon application of input voltage, the time delay (t) begins. At the end of the time delay (t), the output is energized. Input voltage must be removed to reset the time delay relay & de-energize the output..	
INTERVAL ON Interval B	Upon application of input voltage, the output is energized and the time delay (t) begins. At the end of the time delay (t), the output is de-energized. Input voltage must be removed to reset the time delay relay.	
OFF DELAY Delay on Release Delay on Break Delay on De-Energization C	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the output is energized. Upon removal of the trigger, the time delay (t) begins. At the end of the time delay (t), the output is de-energized. Any application of the trigger during the time delay will reset the time delay (t) and the output remains energized.	
SINGLE SHOT One Shot Momentary Interval D	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the output is energized and the time delay (t) begins. During the time delay (t), the trigger is ignored. At the end of the time delay (t), the output is de-energized and the time delay relay is ready to accept another trigger.	

TIME DELAY RELAYS

DEFINITION OF TIMING FUNCTIONS

Function/Code	Operation	Timing Chart
FLASHER (Off First) E	Upon application of input voltage, the time delay (t) begins. At the end of the time delay (t), the output is energized and remains in that condition for the time delay (t). At the end of the time delay (t), the output is de-energized and the sequence repeats until input voltage is removed.	
FLASHER (ON First) F	Upon application of input voltage, the output is energized and the time delay (t) begins. At the end of the time delay (t), the output is de-energized and remains in that condition for the time delay (t). At the end of the time delay (t), the output is energized and the sequence repeats until input voltage is removed.	
ON/OFF DELAY G	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the time delay (t1) begins. At the end of the time delay (t1), the output is energized. When the trigger is removed, the output contacts remain energized for the time delay (t2). At the end of the time delay (t2), the output is de-energized & the time delay relay is ready to accept another trigger. If the trigger is removed during time delay period (t1), the output will remain de-energized and time delay (t1) will reset. If the trigger is removed during time delay period (t2), the output will remain energized and the time delay (t2) will reset.	
SINGLE SHOT FALLING EDGE H	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the output remains de-energized. Upon removal of the trigger, the output is energized and the time delay (t) begins. At the end of the time delay (t), the output is de-energized unless the trigger is removed and re-applied prior to time out (before time delay (t) elapses). Continuous cycling of the trigger at a rate faster than the time delay (t) will cause the output to remain energized indefinitely.	
WATCHDOG Retriggerable Single Shot J	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the output is energized and the time delay (t) begins. At the end of the time delay (t), the output is de-energized unless the trigger is removed and re-applied prior to time out (before time delay (t) elapses). Continuous cycling of the trigger at a rate faster than the time delay (t) will cause the output to remain energized indefinitely.	
TRIGGERED ON DELAY K	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the time delay (t) begins. At the end of the time delay (t), the output is energized and remains in that condition as long as either the trigger is applied or the input voltage remains. If the trigger is removed during the time delay (t), the output remains de-energized & the time delay (t) is reset.	

TIME DELAY RELAYS

DEFINITION OF TIMING FUNCTIONS

Function/Code	Operation	Timing Chart
REPEAT CYCLE (OFF 1st) L	Upon application of input voltage, the time delay (t1) begins. At the end of the time delay (t1), the output is energized and remains in that condition for the time delay (t2). At the end of this time delay, the output is de-energized and the sequence repeats until input voltage is removed.	
REPEAT CYCLE (ON 1st) M	Upon application of input voltage, the output is energized and the time delay (t1) begins. At the end of the time delay (t1), the output is de-energized and remains in that condition for the time delay (t2). At the end of this time delay, the output is energized and the sequence repeats until input voltage is removed.	
DELAYED INTERVAL Single Cycle N	Upon application of input voltage, the time delay (t1) begins. At the end of the time delay (t1), the output is energized and remains in that condition for the time delay (t2). At the end of this time delay (t2), the output is de-energized. Input voltage must be removed to reset the time delay relay.	
TRIGGERED DELAYED INTERVAL P	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the time delay (t1) begins. At the end of the time delay (t1), the output is energized and remains in that condition for the time delay (t2). At the end of the time delay (t2), the output is de-energized & the relay is ready to accept another trigger. During both time delay (t1) & time delay (t2), the trigger is ignored.	
TRUE OFF DELAY R	Upon application of input voltage, the output is energized. When the input voltage is removed, the time delay (t) begins. At the end of the time delay (t), the output is de-energized. Input voltage must be applied for a minimum of 0.5 seconds to assure proper operation. Any application of the input voltage during the time delay (t) will reset the time delay. No external trigger is required.	
ON DELAY/ TRUE OFF DELAY S	Upon application of input voltage, the time delay (t1) begins. At the end of the time delay (t1), the output is energized. When the input voltage is removed, the output remains energized for the time delay (t2). At the end of the time delay (t2), the output is de-energized. Input voltage must be applied for a minimum of 0.5 seconds to assure proper operation. Any application of the input voltage during the time delay (t2) will keep the output energized & reset the time delay (t2). No external trigger is required.	
SINGLE SHOT-FLASHER T	Upon application of input voltage, the time delay relay is ready to accept a trigger. When the trigger is applied, the time delay (t1) begins and the output is energized for the time delay (t2). At the end of this time delay (t2), the output is de-energized and remains in that condition for the time delay (t2). At the end of the time delay (t2), the output is energized and the sequence repeats until time delay (t1) is completed. During the time delay (t1), the trigger is ignored.	
ON DELAY-FLASHER X	Upon application of input voltage, the time delay begins (t1). At the end of the time delay (t1), the output is energized and remains in that condition for the time delay (t2). At the end of this time delay (t2), the output is de-energized and remains in that condition for the time delay (t2). At the end of the time delay (t2), the output is energized and the sequence repeats until input voltage is removed.	