

# 12S, 14S, 15S Series

## *Time Delay Relays and Sequencers*



### ***Time Delay Relays and Sequencers***

The Therm-O-Disc type 12S, 14S and 15S series time delay relays and sequencers are field-proven devices for controlling the operation of heating elements and/or fans in electric furnaces and heat pumps. These controls combine a solid-state positive temperature coefficient (PTC) heater with bimetal actuated contacts to provide time-delayed electrical switching. A wide variety of bimetal disc and PTC combinations are available to provide a broad range of timings. The 12S is a single-timing device while the 14S uses two bimetal discs to achieve two independent timings. The 15S consists of one, two or three 12S and/or 14S controls mounted on a common plate.

### ***Features and Benefits***

The 12S, 14S and 15S features include:

- Available with auto-reset SPST, DPST and SPDT switch configurations.
- PTC heater for stable operation over a wide range of temperatures and voltages.
- Snap-action bimetal disc for high-speed contact separation.
- Standard operating ambients between -40°F (-40°C) and 150°F (65.6°C).
- Available with a wide variety of terminals and mounting plates.
- Welded construction for integrity of current-carrying components.

### ***Switch Actions and Configurations***

Automatic Reset SPST – This 12S or 14S configuration can be built to either open or close a set of contacts on temperature rise within a specified time range.

Automatic Reset DPST – This 12S configuration utilizes one bimetal disc to simultaneously open or close two independent sets of contacts on temperature rise within a specified time range.

Automatic Reset SPDT – This 12S configuration is the same as the SPST except with the addition of an auxiliary contact that makes and breaks circuit in opposition to the main contacts.

***CAUTION . . . When designing a SPDT circuit, an electrical load must be applied to terminal 2 and/or 3 to avoid a transient short circuit condition during switching.***

## 12S Series

The 12S series utilizes one bimetal disc to achieve single-timing operation. The 12S is available in SPST (see figure 1), SPDT (see figure 2), and DPST (see figure 3) switch actions. A variety of standard timings are available for general time delay applications.

### SPST Switch Action (12S10 or 12S20)

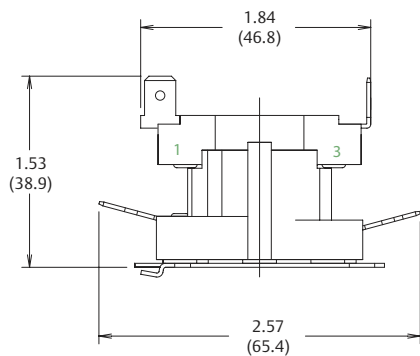


Figure 1

### SPDT Switch Action (12S30 or 12S50)

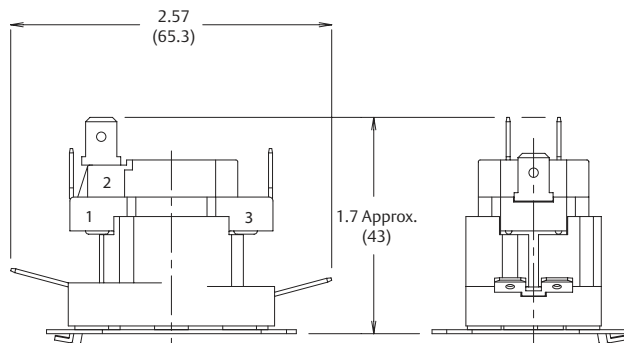


Figure 2

### DPST Switch Action (12S11 or 12S22)

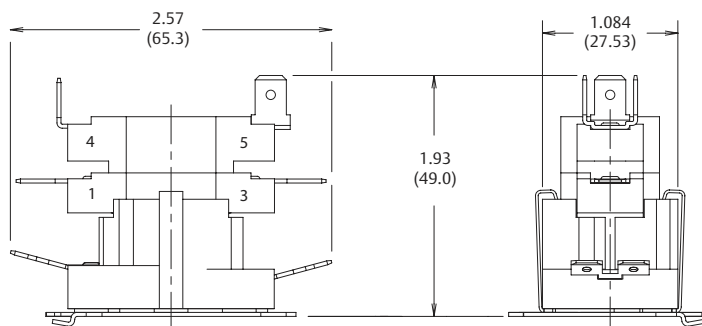


Figure 3

*Dimensions are shown in inches and (millimeters).*



## 12S Timings (Sec.)

PTC	ON	OFF
24VAC	1-30	40-80
	10-40	20-60
	20-55	15-55
	25-110	5-45
120VAC	10-40	60-160
	15-60	30-70
	25-110	20-60
240VAC	5-25	60-170
277VAC	5-40	30-70
	15-60	20-60

## 14S Series

The 14S series utilizes two bimetal discs in conjunction with two SPST switch actions to achieve two independent timings (see figure 4).

### SPST Switch Action (14S11 or 14S22)

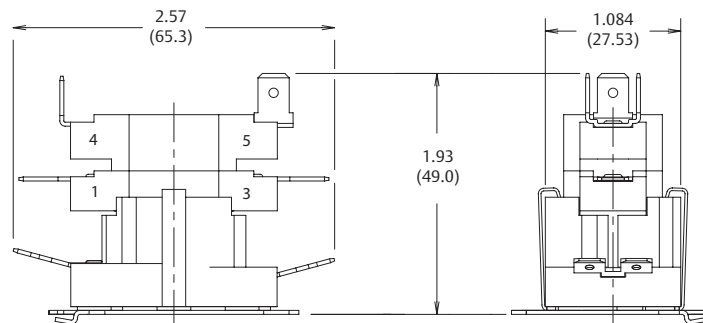
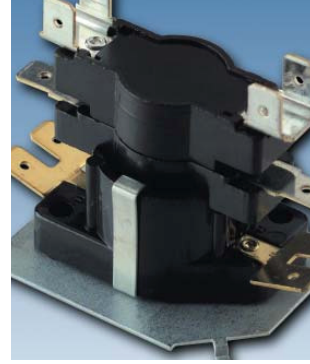


Figure 4

*Dimensions are shown in inches and (millimeters).*



## 14S Timings (Sec.)

PTC	ON	OFF
24VAC	1-110	1-110

## 15S Series

The 15S series consists of either two or three 12S and /or 14S controls mounted on a common baseplate. The timing of the package assures that a set of designated contacts will turn on first and turn off last.

The chart shows the timing range for the 15S package.

## 15S-2 or 3 Timings (Sec.)

PTC	24V	120V	240V
ON	1-110	1-110	1-110
OFF	1-110	1-160	1-170

## PTC Heater

Solid state PTC (Positive Temperature Coefficient) heaters are used to bias the operation of the contacts. These heaters are self-current limiting for stable switch operation over a range of temperatures and over-voltages. The standard line of controls uses a 24VAC PTC rated for Class II circuits. As an option, the 12S and 15S (using 12S combinations) are available with solid state PTC heaters rated for a line voltage circuit of 120 and 240/277VAC. The peak inrush current of the 24VAC PTC heater varies from .35 to 1.0 amps. The inrush current drops below 1/2 of the peak value within approximately 10 seconds and reaches a steady state current between 0.10 and 0.18 amps.

## Operating Ambients

The standard sequencer line is designed to operate in ambients ranging from -40°F to 150°F (-40°C to 65.6°F). The actual sequencer ON and OFF times are 100% checked to the required timings at a 75°F (23.9°C) ambient. The OFF timings are determined after the PTC heater has been energized for a total of five minutes. Timings in an ambient above or below 75°F (23.9°C) will vary and should be evaluated in the end use application to determine suitability.

## Standard Terminals and Markings

The standard heater terminals are .032" x .250" (6.3 x .8mm) double 15° brass male quick connects. The stage terminals are tin-plated brass.

The standard terminal combinations are listed below. Optional terminals are available at extra cost.

Unless specified, terminals will be marked 1-5 (see figures 1, 2, 3 and 4).

SPST: 12S10, 12S20	
Heater	Double 15°
Terminal 1	Double 90°
Terminal 3	Single 90°
DPST: 12S11, 12S22	
Heater	Double 15°
Terminal 1-3	Single 0°
Terminal 4-5	Single 90°
2-SPST: 14S11, 14S22	
Heater	Double 15°
Terminal 1-3	Single 0°
Terminal 4	Single 90°
Terminal 5	Double 90°

## Mounting Plates

The standard mounting plate incorporates a tab and hole arrangement for mounting one (see figure 5) or two (see figure 6) controls. The standard mounting plate for three controls incorporates a slot and hole arrangement (see figure 7). Optional or custom mounting plates are available to meet specific application requirements.

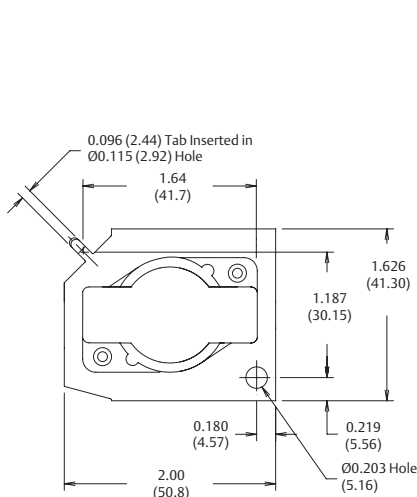


Figure 5

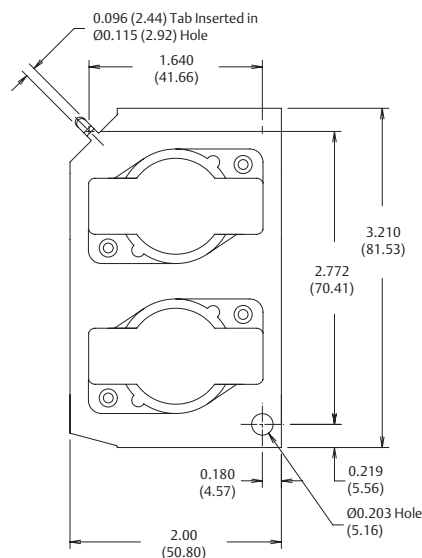


Figure 6

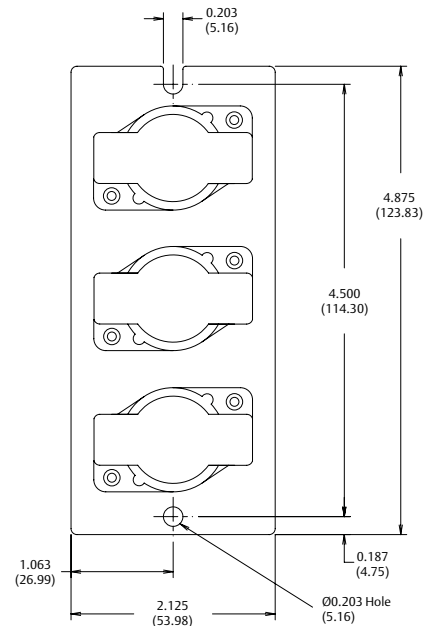


Figure 7

Dimensions are shown in inches and (millimeters).



## Electrical Spacings

The 12S, 14S, 15S series have electrical spacings of 1/4" (6.35mm) through air and 3/8" (9.52mm) over surface to ground. With the suffix "X," increased spacings of 3/8" (9.53mm) through air and 1/2" (12.7mm) over surface to ground are available.

## General Electrical Ratings

The agency ratings can be used as a guide when evaluating specific applications. However, the mechanical, electrical, thermal and environmental conditions to which a control may be exposed in an application may differ significantly from agency test conditions. Therefore, the user must not rely solely on agency ratings, but must perform adequate testing of the product to confirm that the control selected will operate as intended in the user's application.

Type	Cycles	Inductive amps		Pilot Duty VA	Resistive amps	Watts	Volts AC	Agency Recognition	
		FLA	LRA						
12S, 14S, 15S SPST or 12S SPDT Main Contacts 1-3 Only	100,000	14.0	72.0	125	25.0	3000	120	UL File E19279 Guide XAPX2	
	100,000	7.0	42.0	125	25.0	6000	240		
	100,000	—	—	125	12.5	6000	480		
	100,000	5.0	30.0	480	—	—	120-480		
12S, 14S, 15S SPST	100,000	7.0	42.0	—	30.0	**	240		
	100,000	4.0	24.0	—	15.0	***	480		
12S SPDT Contacts 1-2	100,000	—	—	125	10.0	1200	120		
	100,000	—	—	125	5.0	1200	240		
	100,000	—	—	125	—	—	480		
	100,000	4.1	8.0	—	—	—	240		
12S, 14S, 15S SPST or 12S SPDT Main Contacts 1-3 Only	100,000	10.0	60.0	480	25.0	3000	120		CSA File LR62037
	100,000	5.0	30.0	480	25.0	6000	240		
	100,000	—	—	96	—	—	24		
	100,000	—	—	480	10.0	6000	600		
12S, 14S, 15S SPST	100,000	12.0	60.0	—	—	—	240		
	100,000	7.0	42.0	—	30.0	**	240		
12S SPDT Contacts 1-2	100,000	4.0	24.0	—	15.0	***	480		
	100,000	—	—	125	10.0	1200	120		
100,000	—	—	125	5.0	1200	240			

\*\* Combined rating: 30 amps total of inductive and resistive with 7.0 FLA max.

\*\*\* Combined rating: 15 amps (4 FLA + 11 resistive).

NOTE: For complete ratings information, please contact our Sales Engineering Department. At thermostat end-of-life, the contacts may remain permanently closed or open.

# Product Numbering System

## 12S, 14S

Basic Type	1st Suffix Lower Stage	2nd Suffix Upper Stage	
12S	1	—	1-3 N.C. SPST
	2	—	1-3 N.O. SPST
	3	—	1-3 N.C. SPDT
	5	—	1-3 N.O. SPDT
			0 — No Upper Stage
			1 — 4-5 N.C. SPST
			2 — 4-5 N.O. SPST
14S	1	—	1-3 N.C. SPST
	2	—	1-3 N.O. SPST
			1 — 4-5 N.C. SPST
			2 — 4-5 N.O. SPST

### Available Combinations of Lower and Upper Stages

-10 (N.C. SPST, -11 (N.C. DPST)  
 -20 (N.O. SPST), -22 (N.O. DPST)  
 -30 (N.C. SPDT)  
 -50 (N.O. SPDT)

NOTE: Add Suffix as follows:  
 X: 480V opposite polarity spacings.

-11 (2 SPST N.C.)  
 -12 (Lower Stage N.C., Upper Stage N.O.)  
 -21 (Lower Stage N.O., Upper Stage N.C.)  
 -22 (2 SPST N.O.)

NOTE: N.C. – Normally Closed, N.O. – Normally Open

## 15S

NOTE: Add suffix as follows:  
 X: 480V opposite polarity spacings.

Basic Type	1st Suffix 1st Sequencer in package	2nd Suffix 2nd Sequence in package (if provided)	3rd Suffix 3rd Sequencer in package (if provided)	Basic Sequencer Type at each Location on plate	Basic Combinations of 12S or 14S Units
15S	1	1	1	12S20 (N.O. SPST)	-1, -11
	2	2	2	12S22 (N.O. DPST)	-2, -21, -22, -24
	4	4	4	14S22 (2 N.O. SPST)	-4, -41, -42, -44



### ***Important Notice***

Users must determine the suitability of the control for their application, including the level of reliability required, and are solely responsible for the function of the end-use product.

These controls contain exposed electrical components and are not intended to withstand exposure to water or other environmental contaminants which can compromise insulating components. Such exposure may result in insulation breakdown and accompanying localized electrical heating.

A control may remain permanently closed or open as a result of exposure to excessive mechanical, electrical, thermal or environmental conditions or at normal end-of-life. If failure of the control to operate could result in personal injury or property damage, the user should incorporate supplemental system control features to achieve the desired level of reliability and safety. For example, backup controls have been incorporated in a number of applications for this reason.



# 10RS RADIANT ENERGY Series

## *Special Purpose Controls*



### ***Snap-Action Radiant Control***

The 10RS line of controls from Therm-O-Disc offers reliable sensing of radiant energy in hot surface ignition applications.

The unique snap-action bimetal design not only provides high-speed contact separation and time-proven reliability, but also enables the 10RS to maintain radiant sensitivity while compensating for ambient temperature changes.

A glass “window” is used to maximize the effect of radiant energy on the bimetal element without exposing the entire sensing package to high ignitor temperatures.

These features have made the Therm-O-Disc 10RS an integral component of gas ignition systems.

### ***Features and Benefits***

The 10RS features include:

- Glass “window” design maximizes effect of radiant energy without sensor overheating.
- Unique “U”-shaped actuator compensates for ambient temperature conditions.
- High-speed contact switching for exceptional life characteristics.

### ***Switch Action***

The 10RS is an automatic reset, single pole, single throw (SPST) switch that opens its electrical contacts when exposed to heat generated by radiant energy. This is accomplished with a “U”-shaped bimetal actuator which has one leg exposed to radiant energy while the other leg is shielded.

As radiant energy passing through the glass “window” heats the exposed bimetal leg, a temperature differential is created which causes the bimetal element to snap and open the contacts. As radiant energy dissipates, both actuator legs return to approximately the same temperature, allowing the contacts to automatically reclose.



## Typical Applications

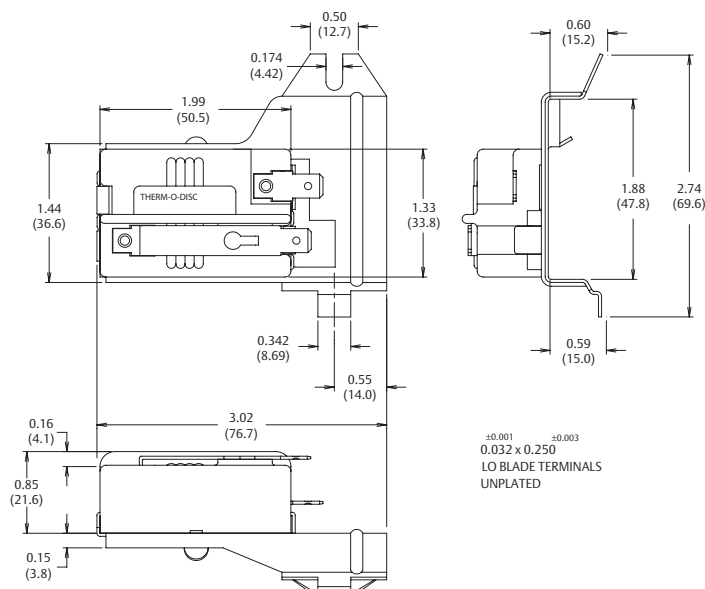
The type 10RS control is utilized in gas-fired appliances in conjunction with a hot surface ignitor. As red hot ignitor temperatures are achieved, the 10RS opens the circuit which signals the gas valve to open. Upon ignition, radiant energy from the gas flame keeps the 10RS open until the operating cycle is completed. Once the gas valve closes and the flame dissipates, the contacts reclose and the ignition cycle is complete.

## Calibration

The standard 10RS calibration calls for the contacts to open within 12 to 20 seconds after exposure to a radiant energy source.

Contact reclose occurs within 26 to 40 seconds after the radiant source dissipates.

Note: Calibration timing of the 10RS in the actual application is dependent upon the type of ignition system and position of the sensor relative to the radiant energy source.



Dimensions are shown in inches and (millimeters).



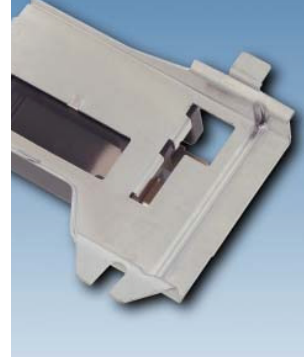
### ***Mounting Bracket***

The 10RS is available in two standard tab mounts. The brackets are fabricated from .032" (.81mm) aluminum and can easily be mounted with a sheet metal screw.



### ***Terminal Configurations***

The 10RS is furnished with .032" x .250" (.81mm x 6.35mm) brass quick connects in the horizontal position.



## General Electrical Ratings

The 10RS series of controls has been rated by major agencies throughout the world. The agency ratings can be used as a guide when evaluating specific applications. However, the mechanical, electrical, thermal and environmental conditions to which a control may be exposed in an application may differ significantly from agency test conditions. Therefore, the user must not rely solely on agency ratings, but must perform adequate testing of the product to confirm that the control selected will operate as intended in the user's application.

Maximum Bimetal Temperature (°F)	Maximum Ambient Temperature (°F)	Cycles	Resistive Amperes	Volts AC	Agency Recognition
375	325	100,000	5.75	120	CSA
375	325	100,000	5.75	120	File 112672-0-000

NOTE: At thermostat end-of-life the contacts may remain permanently closed or open.  
For complete and current ratings, please contact our Sales Engineering Department.

### ***Important Notice***

Users must determine the suitability of the control for their application, including the level of reliability required, and are solely responsible for the function of the end-use product.

These controls contain exposed electrical components and are not intended to withstand exposure to water or other environmental contaminants which can compromise insulating components. Such exposure may result in insulation breakdown and accompanying localized electrical heating.

A control may remain permanently closed or open as a result of exposure to excessive mechanical, electrical, thermal or environmental conditions or at normal end-of-life. If failure of the control to operate could result in personal injury or property damage, the user should incorporate supplemental system control features to achieve the desired level of reliability and safety. For example, backup controls have been incorporated in a number of applications for this reason.