

# Bimetal Disc Thermostat

Product Information and  
Application Notes



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# Bimetal Disc Thermostat Application Notes



## Operating Principles

Bimetal disc thermostats are thermally actuated switches. When the bimetal disc is exposed to its predetermined calibration temperature, it snaps and either opens or closes a set of contacts. This breaks or completes the electrical circuit that has been applied to the thermostat.



There are three basic types of thermostat switch actions:

- **Automatic Reset:** This type of control can be built to either open or close its electrical contacts as the temperature increases. Once the temperature of the bimetal disc has returned to the specified reset temperature, the contacts will automatically return to their original state.
- **Manual Reset:** This type of control is available only with electrical contacts that open as the temperature increases. The contacts may be reset by manually pushing on the reset button after the control has cooled below the open temperature calibration.
- **Single Operation:** This type of control is available only with electrical contacts that open as the temperature increases. Once the electrical contacts have opened, they will not automatically reclose unless the ambient that the disc senses drops to a temperature well below room temperature (typically below  $-31^{\circ}\text{F}$ ).

## Temperature Sensing & Response

Many factors can affect how a thermostat senses and responds to temperature changes in an application. Typical factors include, but are not limited to, the following:

- Mass of the thermostat
- Switch head ambient temperature. The “switch head” is the plastic or ceramic body and terminal area of the thermostat. It does not include the sensing area
- Air flow across the sensing surface or sensing area. The “sensing surface” (or area) consists of the bimetal disc and metal disc housing
- Air flow across the switch head of the thermostat
- Internal heating from carrying the application electrical load
- Disc cup or housing type (i.e. enclosed, as on left in picture below, or exposed, as on right)
- Rate of temperature rise and fall in the application
- Intimacy of contact between the thermostat sensing surface and the surface it is mounted on
- Heat transfer by conduction, convection or radiation



It is important to understand that the temperature of the thermostat will typically change more slowly than or lag the temperature it is trying to sense. The impact of the factors mentioned previously will determine the magnitude of the thermal lag. Thermal lag will directly affect determination of thermostat calibration to regulate or limit temperature for a particular application. Reference the “Determining Calibration” section for how to use a thermocouple sample thermostat to establish thermostat calibration.

## Control Location

The location of the thermostat should be carefully selected. Adequate time should be used to determine the temperatures in the various locations within the product to assure the location of the sensor can best measure and control the performance of the product. Various methods may be employed to measure these temperatures such as infrared thermography, multiple thermocouples, etc.

## Determining Calibration

A thermocouple sample thermostat is typically used as a key indication of what the calibration temperature of a thermostat should be for a particular application (see Figure 3). The thermocouple is ideally attached internally to the control on the bimetal disc for optimum results since the bimetal disc is the component that senses the temperature in a bimetal thermostat. The sample control has the same thermal response as a functional thermostat but the contacts will not open.

Once a preliminary calibration temperature has been determined with the thermocouple sample control, a functional control calibrated at the desired temperature must be tested in the application to verify that the calibration is appropriate. Therm-O-Disc provides thermocouple samples upon request. Type J, Type K, and Type T thermocouples are available.

A thermocouple may be placed externally on a thermostat (see Figures 4 and 5). The preferable location would be on the metal disc “cup” / mounting bracket at a point closest to the sensing surface. The sensing surface is the flat area of the “cup” or bimetal housing for thermostats with enclosed bimetal discs. Those with exposed bimetal discs should have the thermocouple positioned as close to the disc as is practical. Care should be taken to assure that the thermocouple wires do not contact one another except at the sensing junction.

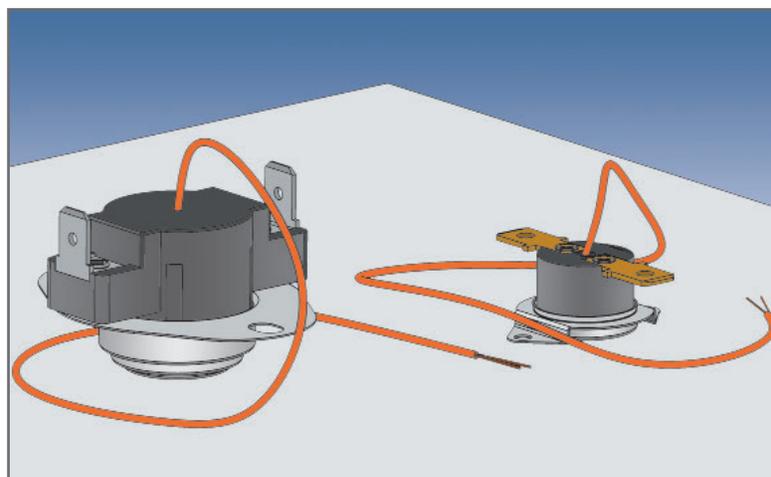


Figure 3  
Thermocouple Sample Controls

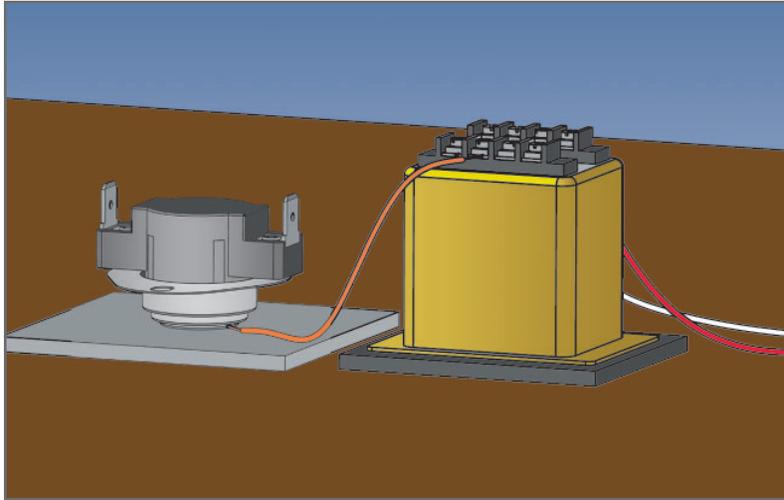


Figure 4  
Thermocouple placed externally to thermostat

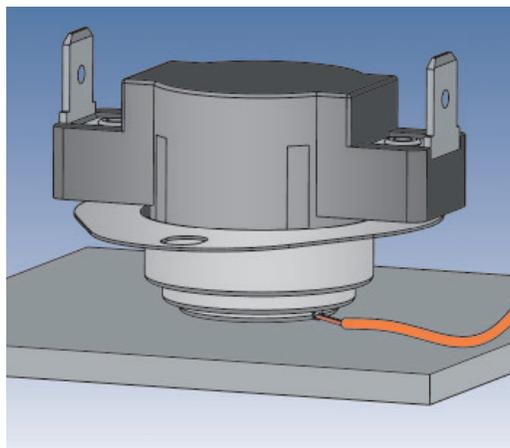


Figure 5  
Thermocouple placed externally to thermostat

Thermostats are used to both regulate and to limit temperatures. A thermostat that regulates temperature is exposed to temperatures of normal operating conditions of a particular application, plus an overshoot temperature. A thermostat that limits temperature is exposed to temperatures of abnormal operating conditions, plus an overshoot temperature. It is important to determine both the normal and abnormal operating temperatures as well as the respective temperature overshoots in each application in order to specify the appropriate thermostat calibration. Since most applications include both regulating and limiting thermostats, it is essential to prevent nuisance tripping of the limit by fully understanding the temperature overshoots. It is important to know what the maximum exposure temperature is to assure that components and complete units do not exceed their respective rated temperatures. The maximum exposure temperature is the combined result of the maximum ambient temperature added to the temperature increase due to the application plus the overshoot.



### Test Guidelines

Install the thermocouple sample thermostat in the appropriate location (see earlier section named “Control Location”) using both the same mounting and electrical connections as will be used in the application. The thermocouple lead should be connected to a device that will monitor and record the output from the thermocouple. Only personnel properly trained in the safe use of electrical equipment should perform testing. Caution must be exercised to assure that line voltage, if present, must not injure personnel or damage equipment. Use of an isolation transformer is recommended if there is any chance that the thermocouple wires may see line voltage.

- CAUTION** To avoid a false reading of the unit under test, thermocouple wires must not make contact with each other except at the temperature sensing junction.
- CAUTION** Ensure that the thermocouple wire insulation will provide isolation against short circuiting and shock hazards.
- CAUTION** The terminal of the temperature measuring instrument, to which the thermocouple is attached, will be the same potential as the connecting circuit wire. This instrument must be electrically isolated and considerable caution must be exercised in its use, since one of the thermocouple terminals is frequently grounded to the instrument chassis.

It will likely be necessary to conduct several trials with varying ambient temperature, air flow rate and/or volume, rate of temperature rise or fall, etc. to identify normal and abnormal operation. Normal manufacturing and assembly variation between units and any applicable approval agency requirements or industry standards must also be considered.

Monitor the temperatures under normal operating conditions using the thermocouple sample thermostat. Repeat using conditions for abnormal operating conditions. Conduct as many trials as are necessary to understand all the potential fault conditions and to assure that the rated temperature of components (including the thermostat) and the test units are not exceeded. The test may be set up to be able to manually open the electrical circuit when the thermocouple sample thermostat reaches a particular target temperature (as determined from testing described above). Continuing to monitor the temperature of the thermocouple sample after the circuit is manually opened, and determining the maximum temperature excursion beyond the “open” temperature can determine the temperature overshoot. This can be conducted for both regulating and limiting thermostats. Once the preliminary calibration value for the thermostat has been determined, by taking into account normal and abnormal operating conditions, product and test variation and overshoots, it is necessary to repeat testing with functional thermostats. It may be necessary to try thermostats calibrated both higher and lower than the targeted temperature to better optimize the calibration temperature. This will also provide useful information for specifying the calibration tolerance.



#### **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.

## Glossary

**Ambient** – The typical environmental temperature at which a product is exposed.

**Approval Agencies** – Agencies created to verify the safety and/or functionality of electrical and gas household products. Therm-O-Disc products are typically recognized at the major global agencies, including UL, CSA, VDE, CQC, and MITI.

**Automatic Reset** – A type of thermostat that will reset itself at a specific temperature (set point minus differential = reset temperature).

**Bimetal** – Metallic strip material made by bonding two different materials together with different thermal expansion rates.

**Bumper** – An actuating pin that transmits motion from the sensing mechanism to an actuating arm.

**Contacts** – Term for components used in all electrical-type products that physically make and break electrical circuits.

**Comparative Tracking Index (CTI)** – A measure of material surface electrical tracking (resistance).

**Cycle Rating** – The agency-recognized number of operations that a control will function, given a specific temperature range and electrical load.

**Dielectric Strength** – A product’s ability to withstand an application of a pre-determined over-voltage for a specified period of time.

**Differential** – The temperature difference between the opening and closing points of a control.

**Disc Cup** – A cup that holds a disc in place on a disc-type control.

**Disc** – A thin, circular bimetallic component.

**DPDT (Double Pole, Double Throw)** – An electrical term where “pole” is a leg of an electrical circuit and “throw” describes the switch action. Therefore, a DPDT will switch two legs and each leg will open a set of contacts, and close another set (4 contacts).

**DPST (Double Pole, Single Throw)** – An electrical term where “pole” means a leg of an electrical circuit and “throw” describes the switch action. Therefore, DPST will switch two legs and each leg is switched open or closed by one mechanism.

**Fan-Type Control** – A thermal control designed such that the contacts close on temperature rise. Also referred to as “close on rise,” or “normally open.”

**Fuse-Type Control** – A control built to cycle only once.

**Limit-Type Control** – A thermal control designed such that the contacts open on temperature rise. Also referred to as “open on rise,” or “normally closed.”

**M1** – Refers to manual reset devices. If the reset button is held down, the control can cycle thermally.

**M2** – Refers to manual reset devices. If the reset button is held down, the control must stay open and not reset automatically.

**Manual Reset (M.R.)** – A control that opens automatically, but must be reclosed manually by pressing a button or lever.

**NTC (Negative Temperature Coefficient)** – A resistor that reduces resistance (ohms) with a temperature increase.

**Pole** – The number of completely separate circuits contained in a control.

**Prime Differential** – The thermal differential between the nominal open temperature and the minimum close temperature.

**PTC (Positive Temperature Coefficient)** – A resistor that increases resistance (ohms) with temperature increase.

**Reference Dimension** – A dimension without tolerance used only for information purposes that does not govern production or inspection operations.

**Reset Temperature** – The temperature at which the contacts return to their normal position.

**Set Point** – Temperature at which normally closed contacts will open, or normally open contacts will close. Also referred to as operating temperature.

**SPDT (Single Pole, Double Throw)** – An electrical switch term where “pole” means a leg of an electrical circuit and “throw” describes the switch action. Therefore, a SPDT will switch one leg that will open a set of contacts, and close another set.

**SPST (Single Pole, Single Throw)** – An electrical term describing switch actions. A SPST will switch one leg and open one set of contacts.

**Stenciling** – The marking on a product identifying the product type, calibration temperature, part number and plant of manufacture.

**Switchcase** – The component that represents the thermostat “body,” made from insulating material that supports switch mechanisms.

**Thermal Cutoff (TCO)** – A product that functions as a thermal fuse (one time operation). Various operating temperatures are achieved by formulating a pellet that melts at very specific temperatures.

**Thermistor** – A device that exhibits a large change in electrical resistance with a change in temperature.

**Tolerance** – The allowable range above or below the set point or reset temperature.

**Trip-Free** – A term associated with manual reset type controls. When the reset button is depressed it cannot restrict the normal opening of the control.

## Important Information

Many variables can affect the operational characteristics of a thermostat. It is for this reason that we recommend that you conduct thorough testing of our products in your specific application. Therm-O-Disc has both functional and thermocoupled samples readily available for determining the desired performance and the correct response in your application. To obtain samples please contact your local Therm-O-Disc sales representative directly. To ensure a quick turnaround, please have the following information ready:

- Application description
- Electrical load
- Operating temperature requirements
- Agency recognition(s) required
- Mounting and terminal configurations
- Estimated annual volume

Don't know what product you need? Do you have a general question about our products? Visit [thermodisc.com](http://thermodisc.com) or contact your local Therm-O-Disc sales office. Our Applications Engineers are always available to assist you in answering your questions or in obtaining any samples you may need.

# 10H Linear Limit Series Special Purpose Controls



## Snap-Action Capillary Controls

The 10H series temperature control from Therm-O-Disc was originally developed to sense hot spots along the length of electric baseboard heaters. It is also used in other applications where it is necessary to sense temperatures along a continuous length.

The 10H capillary tube is vacuum-charged with selected fluids to give specific calibrations. When the calibration temperature is reached, a change in fluid vapor pressure allows the diaphragm to snap through and operate the contacts. The snap-action design provides high-speed contact separation and excellent reliability.

Typical applications for the 10H include electric baseboard heaters and other HVAC applications.



## Features and Benefits

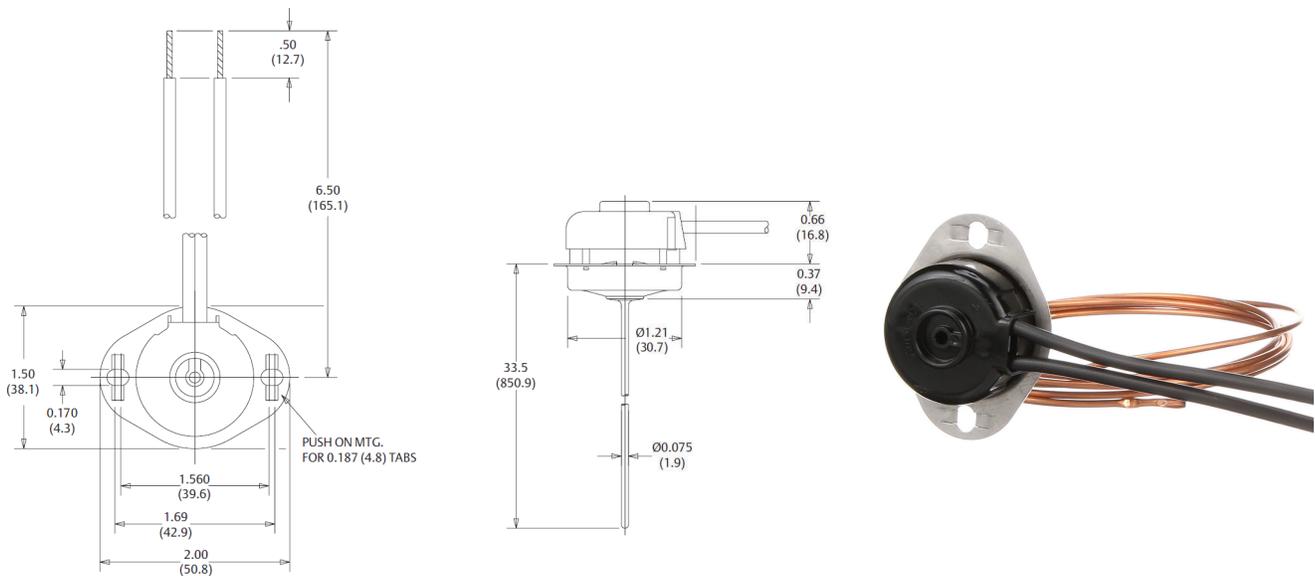
The 10H features include:

- The ability to sense temperature along a continuous length.
- Excellent sensitivity. Since the capillary tube is charged, the 10H responds to the hottest spot along the capillary tube.
- High-speed contact separation for long contact life.
- Design flexibility provided by a variety of switch actions, capillary tube lengths, mounting brackets and terminations.

## Switch Actions

The 10H is available in two switch actions:

Automatic Reset (Type 10H11) – SPST contacts open on temperature rise and automatically reset on temperature fall (see figure 1).

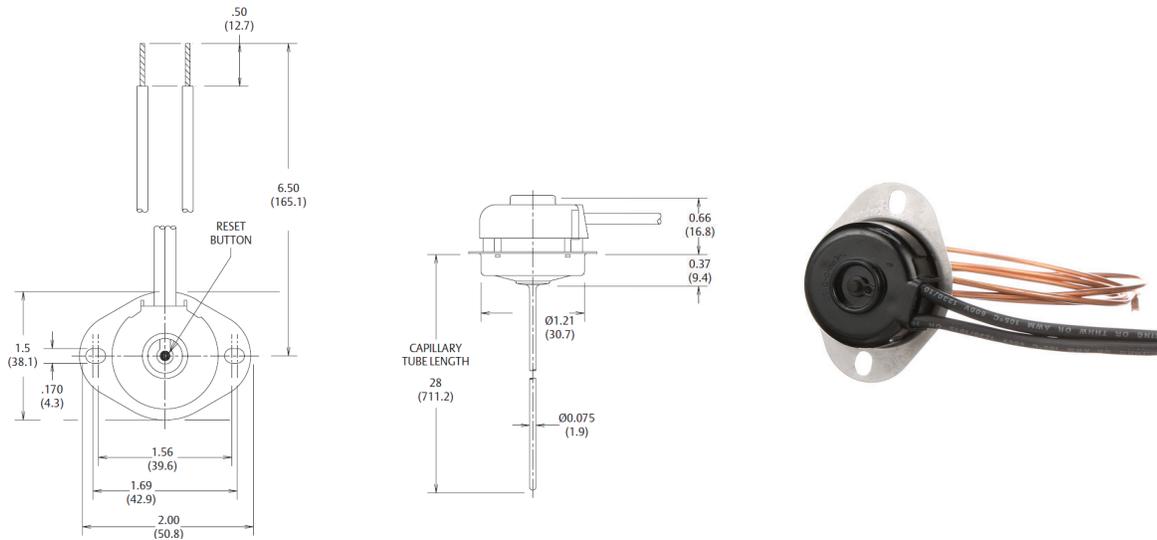


*Shown with terminal cover and “push on” mounting bracket.*

*Figure 1*

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

Manual Reset (Type 10H14) – SPST contacts open on temperature rise and can be reset when the control has cooled to a lower temperature and the reset button has been depressed. The 10H manual reset is agency recognized as an “M1 trip free” construction, which means that if the reset button is held down, the control can cycle thermally (see figure 2).



Shown with required terminal cover and standard mounting bracket

**Figure 2**

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

## Terminal Characteristics

The 10H can be calibrated to open on temperature rise between 150°F (65.6°C) and 350°F (177°C), with a standard tolerance of  $\pm 15^\circ\text{F}$  ( $\pm 8.5^\circ\text{C}$ ). The 10H automatic reset will reclose the contacts at approximately 40°F (22°C) below its open temperature. Manual reset controls may automatically reset when exposed to temperatures below -31°F (-35°C).

## Capillary Tube

The 10H is available with the copper capillary tube in preferred lengths from 24" to 144" as measured from the bottom of the mounting flange.

## Mounting Brackets

The standard mounting bracket (see figure 2) has two slots, each .170" (4.318mm) wide. An alternate "push on" mounting bracket (see figure 1) is also available.

## Terminations

Standard leads are two 6 1/2" (165.1mm), #14 AWG, 105°C, 1/32" (10.8mm) thick, black PVC insulation, stripped 1/2" (12.7mm). Also available (automatic reset only) are 1/4" (6.30mm), 90° angle, .032" (0.8mm) blade terminals. A snap-on terminal cover is available for controls supplied with lead wires.

## General Electrical Ratings

The 10H series of controls has been rated UL and CSA. 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.

Thermostat Type	Maximum Open Temperature	Maximum Switchcase Temperature	Volts AC	Resistive Amperes	Inductive Amps		Pilot Duty VA	Cycles	Agency Recognition
					FLA	LRA			
10H11 (Auto Reset)	350 °F (177 °C)	221 °F (100 °C)	277 600	25 -	4.8 -	28.8 -	480 125	100,000 100,000	UL Guide MBPR2, File MH-5304
10H14 (Manual Reset)	350 °F (177 °C)	221 °F (100 °C)	277 600	25 -	4.8 -	28.8 -	480 125	6,000 6,000	
10H11 (Auto Reset)	350 °F (177 °C)	221 °F (100 °C)	277 600	25 10	- -	- -	125 -	100,000 100,000	CSA File LR19988
10H14 (Manual Reset)	350 °F (177 °C)	221 °F (100 °C)	277 350 600	25 15 10			460 350 400	6,000 6,000 6,000	

Note: For complete and current ratings, please consult a Therm-O-Disc sales engineer. At thermostat end-of-life, the contacts may remain permanently open or closed.

### 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 Control



## Snap-Action Radiant Controls

The 10RS line of controls from Therm-O-Disc offers reliable sensing of radiant energy in hot surface ignition applications, such as gas clothes dryers.

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 control 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 Actions and Typical Applications

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.

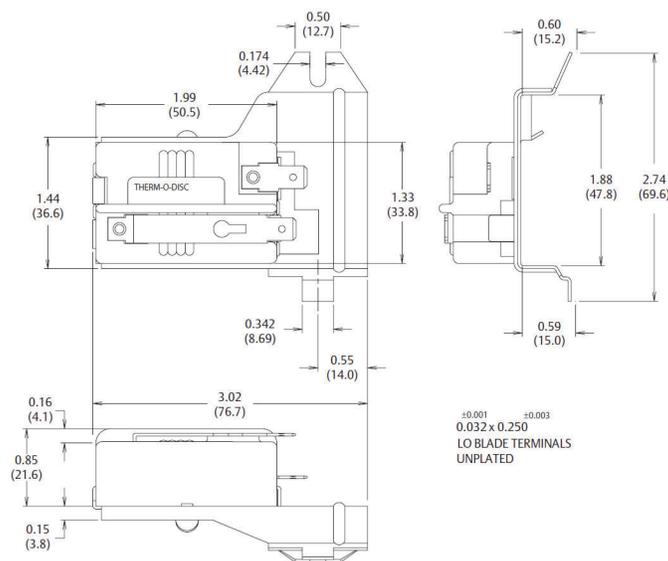
## Typical Applications

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 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 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.

# 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.
- Quiet operation

## Switch Actions and Typical Applications

**Automatic Reset SPST** – Can be built to either open or close a set of contacts within a specified time range.

**Automatic Reset DPST** – Utilizes one bimetal disc to simultaneously open or close two independent sets of contacts 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.

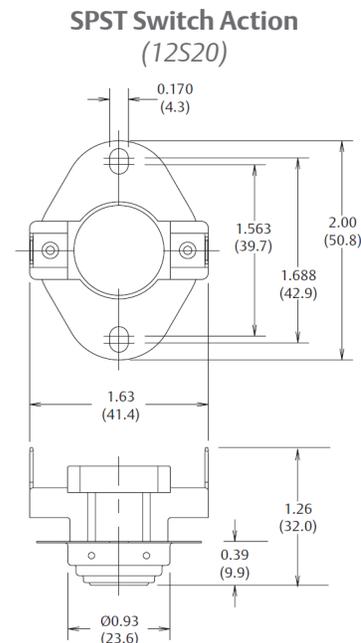


Figure 1

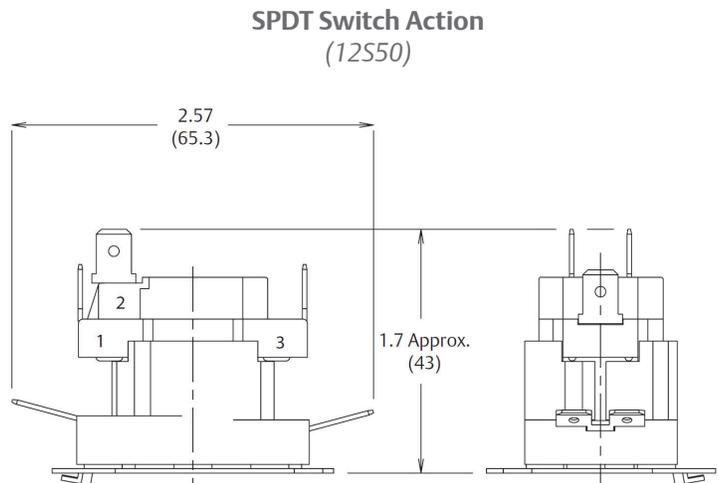
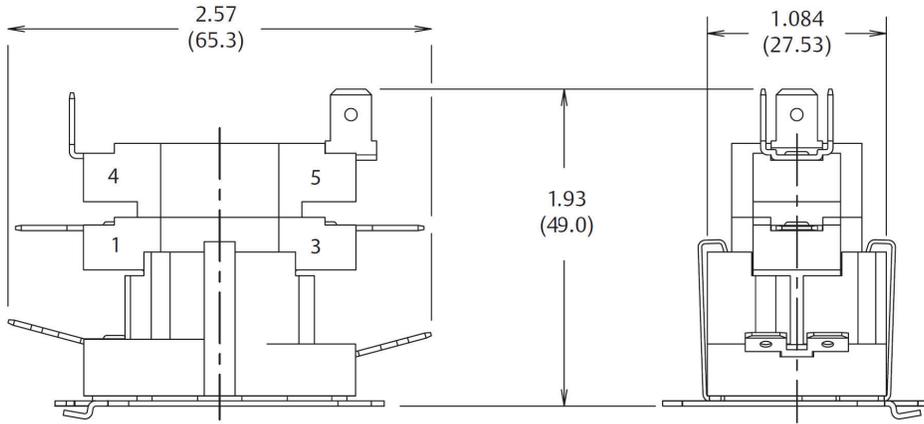
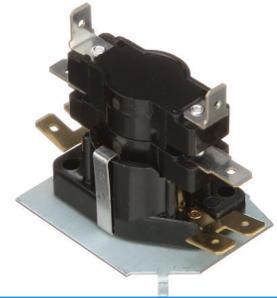


Figure 2



**DPST Switch Action**  
(12S22)  
Figure 3  
Dimensions are shown in inches  
and (millimeters).



### 12S Timings\*

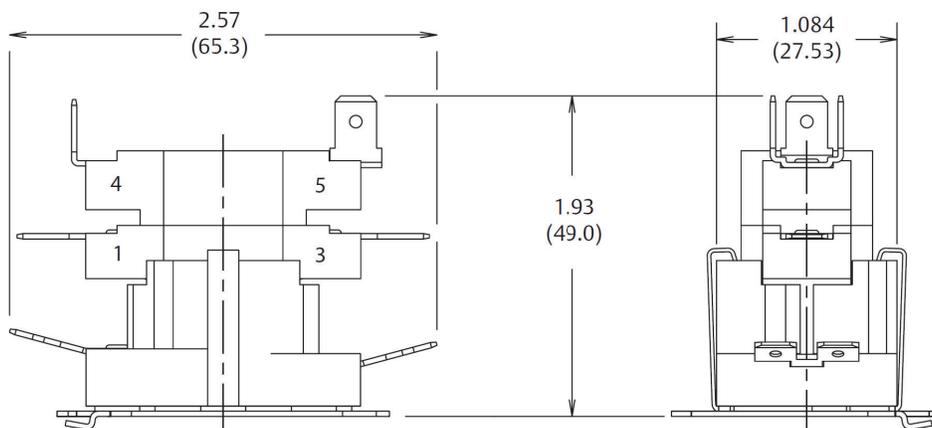
PTC	ON	OFF
24VAC	1-30 Sec.	40-80 Sec.
	10-40 Sec.	20-60 Sec.
	20-55 Sec.	15-55 Sec.
	25-110 Sec.	5-45 Sec.

\*Please contact us to discuss specific timings needed.

### 14S Series

The 14S series is available in two possible configurations:

- 2 stages, where each stage is SPST and operated by a disc for each stage. The two stages can have different on/off times. See figure 4.
- 3 stages, where the two lower stages are DPST operated simultaneously by one disc. The top stage is SPST and operated by the other disc.



**SPST Switch Action (Each Stage)**  
(14S22)  
Figure 4  
Dimensions are shown in inches and (millimeters).

## 14S Timings\*

PTC	ON	OFF
24VAC	1-110 Sec.	1-110 Sec.

\*Please contact us to discuss specific timings needed.

## 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 Timings\*

PTC	ON	OFF
24V	1-110 Sec.	1-110 Sec.

\*Please contact us to discuss specific timings needed.

## 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. 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. A specific high ambient construction is available at extra cost to allow operation up to 165°F (74°C). This construction requires an “H” in our type number (example 12SH22).

## 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 .032 x .250” (6.3 x .8 mm) tin plated brass. See figures 1, 2, 3, 4 for common stage terminals and terminal numbering

## 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.



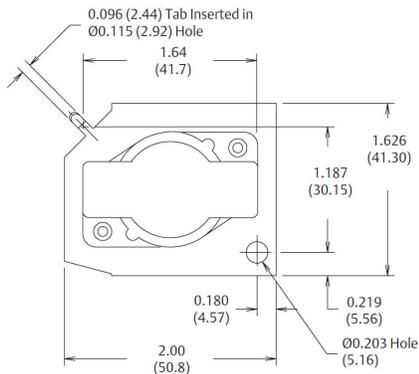


Figure 5

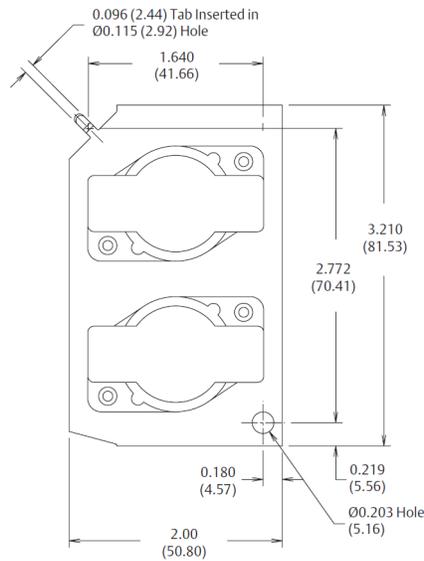


Figure 6

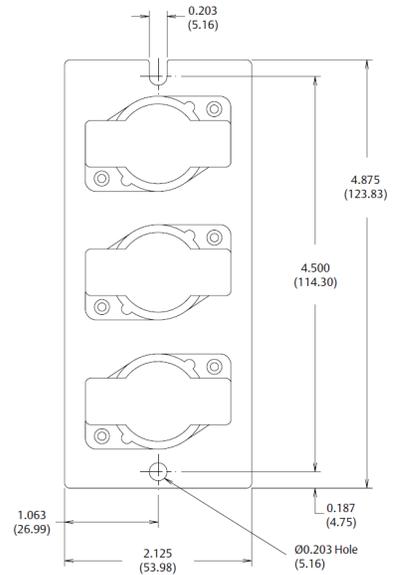


Figure 7

## 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.

## UL Agency Rating

Type	Switching Action	Volts AC	Resistive Amps	Inductive amps		Pilot Duty VA	Cycles	Agency Recognition
				FLA	LRA			
12S/15S	SPST	240	25	8	48	-	100,000	
		240	30*	-	-	-	100,000	
		277	25	-	-	-	30,000	
		480	12.5	5	30	480	100,000	
12S	SPDT (Main Contacts 1-3)	240	25	8	48	-	100,000	
		277	25	-	-	-	30,000	
		480	12.5	5	30	480	100,000	
12S	SPDT (Auxiliary Contacts 1-2)	240	-	4.1	8	125	30,000	ULE19279
		277	25	-	-	-	30,000	
		480	-	-	-	125	30,000	
		480	-	3	16	-	100,000	
12S/15S	DPST	120	-	13.8	82.8	125	30,000	
		240	25	8	48	125	100,000	
		240	30*	-	-	-	30,000	
		277	25	-	-	-	30,000	
		480	12.5	5	30	480	100,000	
14S	2 Pole and 3 Pole	240	25	8	-	-	100,000	
		240	30*	-	-	-	100,000	
		480	12.5	5	-	-	100,000	

\* Note: For complete ratings information, please contact our Sales Engineering Department. At thermostat end-of-life, the contacts may remain permanently closed or open. Maximum combination inductive/resistive, where maximum inductive load is 7FLA, 42LRA. Upper Stage Only.

## CSA Agency Ratings

Type	Switching Action	Volts AC	Resistive amps	Inductive amps		Pilot Duty VA	Cycles	Agency Recognition
				FLA	LRA			
12S/15S	SPST	120	-	1.0	6.0	-	100,000	
		240	-	5.0	30	-	100,000	
		240	30*	-	-	-	100,000	
		480	-	-	-	125	100,000	
12S	SPDT (Main Contacts 1-3)	120	-	10	60	-	100,000	
		240	-	5	30	-	100,000	
		480	-	-	-	125	100,000	
12S	SPDT (Auxiliary Contacts 1-2)	120	10	-	-	125	100,000	CSA 062037
		240	5	5	30	-	100,000	
		480	-	-	-	125	30,000	
12S/15S	DPST	120	-	10	60	-	100,000	
		240	25	5	30	-	100,000	
		240	30*	-	-	-	100,000	
		480	-	-	-	125	100,000	
14S	2 Pole+ 3 Pole	240	25	5	30	-	100,000	
		240	30*	-	-	-	100,000	
		480	-	-	-	12.5	100,000	

\* Note: For complete ratings information, please contact our Sales Engineering Department. At thermostat end-of-life, the contacts may remain permanently closed or open. Maximum combination inductive/resistive, where maximum inductive load is 7FLA, 42LRA. Upper Stage Only.

## Part Numbering System

### Common Sequencer Type Numbers for 12S and 14S

Type	Number of Stages	Description
12S20	1	Normally Open, SPST
12S22	2	Normally Open, DPST
12S50	1	Normally Open, SPDT
14S22	2	Normally Open, Each Stage SPST
14S222	3	Normally Open – Lower Two Stages DPST Upper Stage SPST

### 15S Type Numbers

1st Suffix 1st sequencer on baseplate	2nd Suffix 2nd sequencer on baseplate (if provided)	3rd Suffix 3rd sequencer on baseplate (if provided)	Base sequencer type at each location
1	1	1	12S20
2	2	2	12S22
4	4	4	14S22

You can combine any above configurations on a common base plate.  
Example: 15S221 would contain 12S22-12S22-12S20

#### 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.

# 14T Series Moisture Resistant Temperature Controls



## Heavy-Duty Snap-Action Temperature Controls

The 14T line of heavy-duty sealed bimetal disc controls from Therm-O-Disc meets the higher electrical requirements of commercial applications. The design provides moisture resistance for moisture prone environments. The snap-action of the 1" temperature sensing bimetal disc provides high-speed contact separation resulting in exceptional life characteristics at electrical loads up to 25 amps at 120/240VAC. A variety of mounting configurations, lead wires and terminations give maximum design flexibility. The heavy-duty construction and long life characteristics have made the 14T a popular choice for heating, ventilation and air conditioning systems.



## Features and Benefits

The 14T features include:

- Sealed construction provides moisture resistance for moisture prone environments.
- High-speed contact separation ensures long contact life.
- A wide variety of mounting configurations, lead wires and terminations provide maximum design flexibility.
- Large 25 amp capacity allows direct control of compressors and fans, reducing the need for additional components.

## Switch Actions and Typical Applications

The 14T is available in two switch actions:

**Automatic Reset SPST** – In this configuration, the switch can be built to either open or close its electrical contacts on temperature rise. Once the temperature in the application has returned to the specified reset temperature, the contacts will automatically return to their original state. Typical uses of this construction include limiting and regulating temperatures in air conditioners, heat pumps and fan coil units.

**Automatic Reset SPDT** – This design is the same as the SPST described above with the addition of an auxiliary contact which makes circuit upon opening of the main contacts and breaks circuit when the main contacts reset. Refer to the “General Electrical Ratings” chart for rating limitations on the auxiliary contacts. Typical uses of this construction include fan speed changeover at a specified temperature and lighting of an indicator lamp when an abnormal temperature condition has been reached.

## Mounting Configurations

The 14T is available in a variety of mounting configurations:

**Surface Mounting** – The surface mounting configuration positions the bimetal disc sensing element firmly against the mounting surface, thereby sensing the actual mounting surface temperature (see figures 1 and 2).

### SPST Surface Mounting

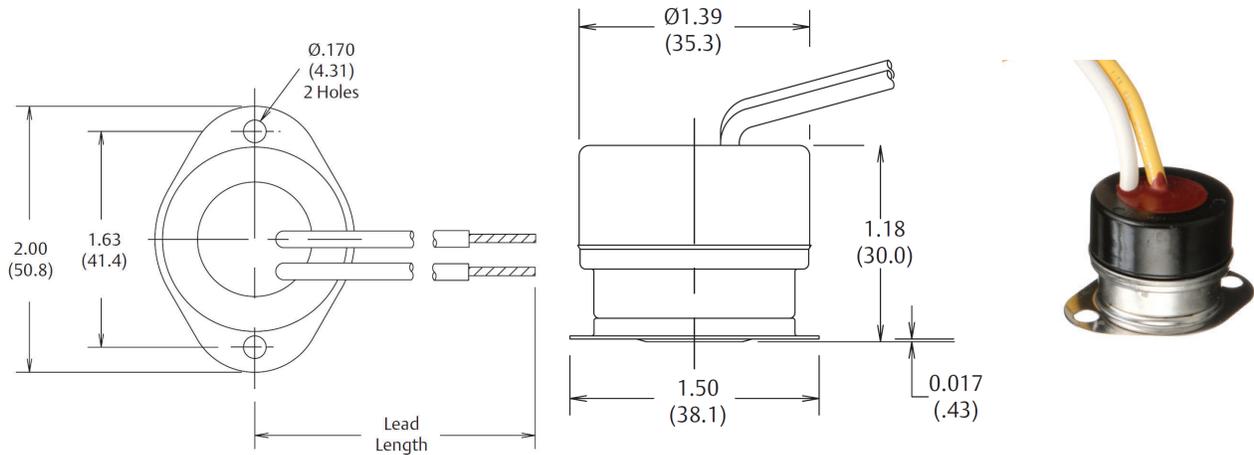


Figure 1  
Dimensions are shown in inches and (millimeters).

### SPDT Surface Mounting

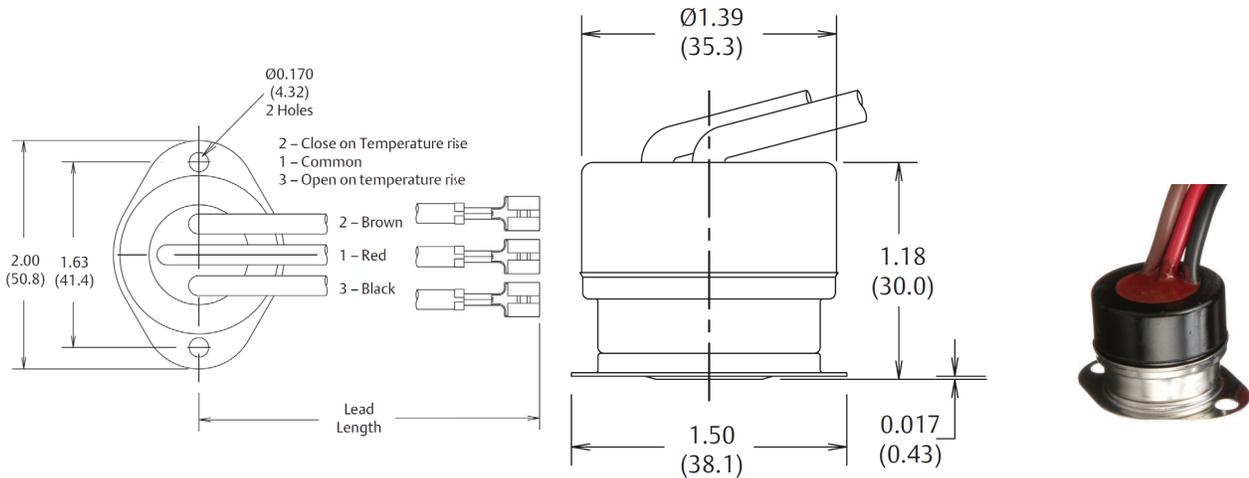


Figure 2  
Dimensions are shown in inches and (millimeters).

**No Mounting Flange** – The 14T is available without a mounting flange for customers who wish to design their own mounting method. Dimensions as shown in figures 1 and 2, except there is no mounting bracket shown.

**Tube Mounting** – In this mounting configuration, the 14T is supplied with a saddle-shaped disc cup and a removable spring clip which holds the control firmly on a tube. This configuration is available for 3/8", 1/2", 5/8" O.D. tubes (see figure 3).

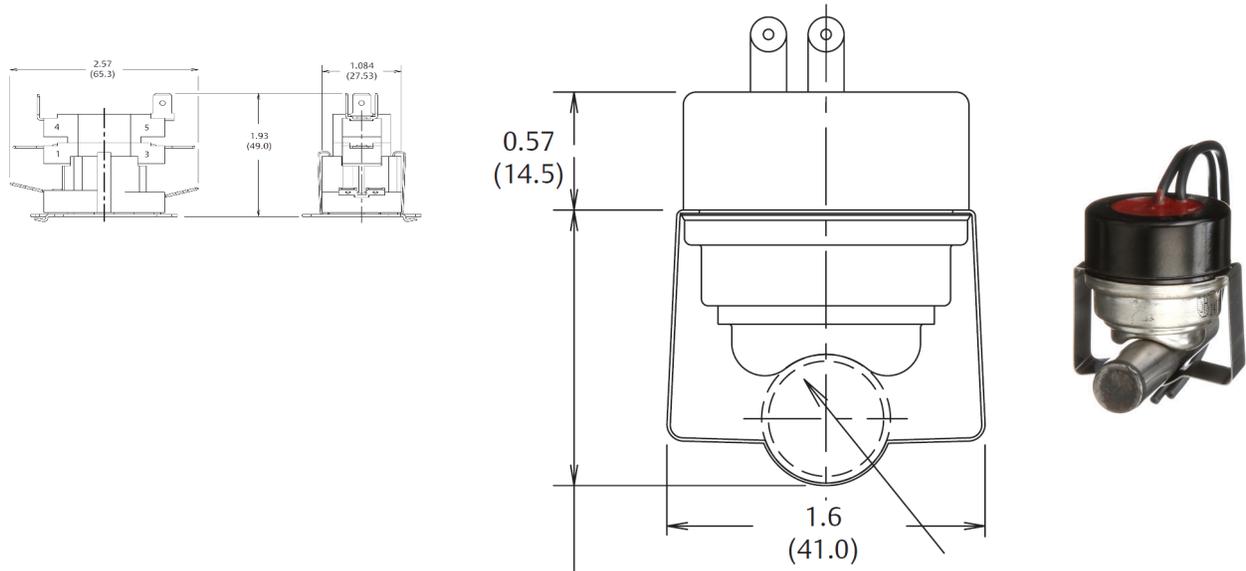


Figure 3  
Dimensions are shown in inches and (millimeters).

### Lead Wire and Terminal Configurations

The standard lead wires are #18 AWG stranded copper wire with 1/32" thick 105°C PVC insulation. A variety of other lead wire size and insulation thickness combinations are available at additional cost. The standard lead wire direction exits from the top of the control. The lead wire can also be specified to exit perpendicular to the mounting hole center-line for surface mount and parallel to the tube for tube mounting. This can be varied in 45 angular degree increments, if required by the application.

**Conduit Connector** – The 14T is also available with a conduit connector designed to enclose the lead wires in a rigid thin wall or flexible metal conduit. In this configuration, the leads extend from the top of the control instead of the side (see figure 4).

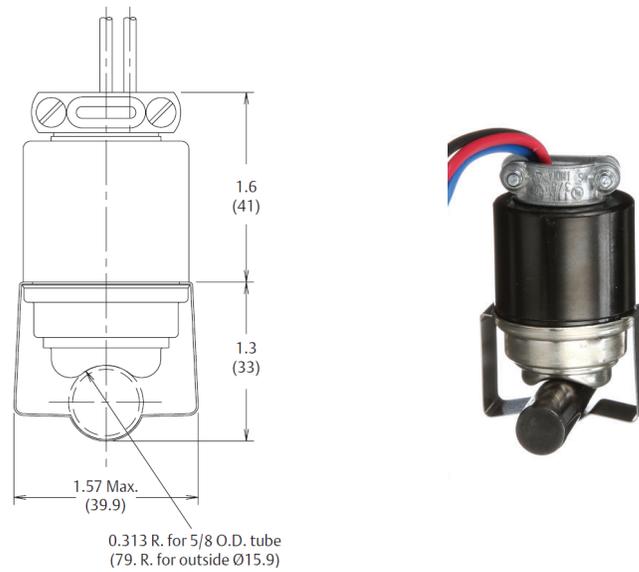


Figure 4  
*Dimensions are shown in inches and (millimeters).*

The standard insulation colors are red, brown and black. Other colors can be provided, as required by a specific application.

The standard maximum combined lead wire length is 24” for SPST and 36” for SPDT controls. Additional lead wire and a variety of popular quick connect terminals are available at additional cost.

For more information on optional lead wires, insulation colors and terminations, please consult one of our sales engineers.

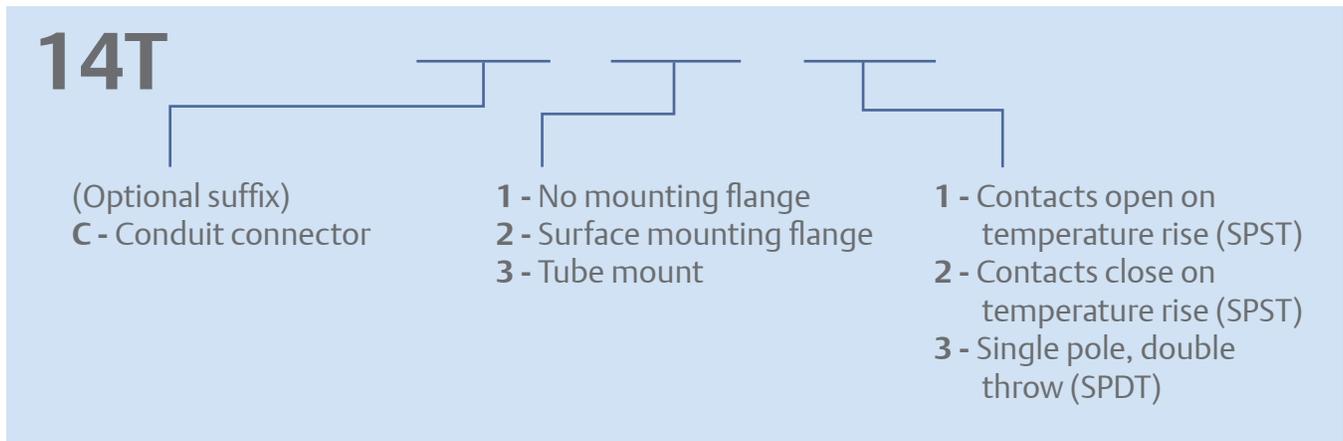
## Calibration Temperatures, Differentials and Tolerances

To use the calibration chart, locate the range in the left hand column, in which the highest calibration set point (open or close) falls. Then locate, across the top, the range in which the nominal differential falls. The standard open and close set point tolerances are shown where the two columns converge. The chart also indicates which differentials are available in each of the calibration set point ranges. Tighter open and close tolerances are available at additional cost. For more information on tightened tolerances or availability of differentials not listed in the chart, please consult one of our sales engineers.

## Calibration Temperatures, Differentials and Standard Tolerance of the 14T Series (SPST and SPDT only)

Highest Calibration Set point Range (Open or Close)	Nominal Differentials (nominal open and close set point)									
	10-14°F 5.5-8°C		15-19°F 8.5-10.5°C		20-29°F 11-16°C		30-39°F 16.5-21.5°C		40-50°F 22-33°C	
	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close
0°-80°F -18°-26°C	±6	±6	±6	±6	±6	±6	±6	±7	±6	±7
	±3.5	±3.5	±3.5	±3.5	±3.5	±3.5	±3.5	±4	±3.5	±4
81°-222°F 27°-105°C	±5	±5	±5	±5	±5	±5	±5	±5	±5	±7
	±3	±3	±3	±3	±3	±3	±3	±3	±3	±4

## Part Numbering System



## General Electrical Ratings

The 14T 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.

Max Temp.	Contact Arrangement	Cycles Rating	Inductive Amps		Pilot Duty VA	Resistive Amperes	Volts AC	Agency Recognition
			FLA	LRA				
14T, 14F 221 °F* 105 °C	SPST or SPDT any load combination except resistive rating on one contact set only	6,000	16	72	125	-	120	UL E29653
		6,000	10	45	125	-	240	
		30,000	10	60	125	25	120	
		30,000	5	30	125	25	240	
	SPST or SPDT any combination	30,000	16	72	125	15	240	
		30,000	10	60	125	-	277	
14T, 14F 150 °F* 65.5 °C	SPST or SPDT any load combination except resistive rating on one contact set only	100,000	10	60	125	25	120	
		100,000	5	30	125	25	240	
		30,000	2.5	15			575	
		100,000				0.5	600	
	SPST or SPDT (125VA pilot duty only on contacts 1-2 of SPDT)	100,000	0	0	125	25	277	
265°F 129.5 °C	SPST	100,000				10	120	
						5	240	
14T 221 °F* 105 °C	SPST	30,000	10	60	125	25	120	CSA LR10281
		30,000	5	30	125	25	240	
		60,000	16	72	125	-	120	
		60,000	10	45	125	-	240	
	SPDT (limited to 125VA on one contact)	30,000	10	60	125	25	120	
		30,000	5	30	125	25	240	
	SPST or SPDT (any load combination)	30,000	7.5	45	125	15	120	
		30,000	3.75	22.5	125	15	240	
		30,000	16	72	125	-	240	
	150 °F 65.5 °C	SPST	30,000	2.5	15			
100,000						0.5	600	
265 °F 129.9 °C		100,000				10	120	
						5	240	

Note: This is a consolidated summary of the 14T series rating. For complete and current ratings information, please contact our Sales Engineering Department. At thermostat end-of-life, the contacts may remain permanently closed or open.

### 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.

# 30M MOTOR PROTECTION Series Special Purpose Controls



## Special Purpose Controls

The Therm-O-Disc line of Motor Protectors offers accurate and reliable protection against hazardous overheating in single phase/single voltage A/C motors. Available in a variety of product types, these motor protectors employ a snap-acting, current and temperature responsive bimetal disc for proven performance over life. An internal resistance heater utilizes the effects of current to bias the operation of the bimetal disc for added thermal response. A wide range of bimetal and heater combinations are available to cover specific design requirements. This design flexibility and proven performance has made Therm-O-Disc Motor Protectors a popular choice among the leading manufacturers of fractional horsepower motors.



## Features and Benefits

The Motor Protector features include:

- High-speed contact separation ensures long contact life.
- Current and temperature responsiveness for excellent design flexibility.
- Manual and automatic reset switching actions combined with a wide selection of bimetal discs and heaters to meet a variety of possible application needs.
- 100% temperature calibration and trip time tests assure high quality levels.

## The Operating Principle of Motor Protectors

The operating mechanism inherent to all Therm-O-Disc Motor Protectors is the snap-action bimetal disc. During abnormal conditions, heat generated by resistance and/or motor ambient causes the bimetal disc to snap at the specified calibration temperature. This allows the circuit to open within the maximum safe limits of the motor windings. Once the motor returns to a normal operating temperature, the bimetal disc resets (automatically or manually). This closes the circuit and re-energizes the motor. This same snap-action principle is utilized in millions of Therm-O-Disc products applied in the appliance, heating and air conditioning industries.

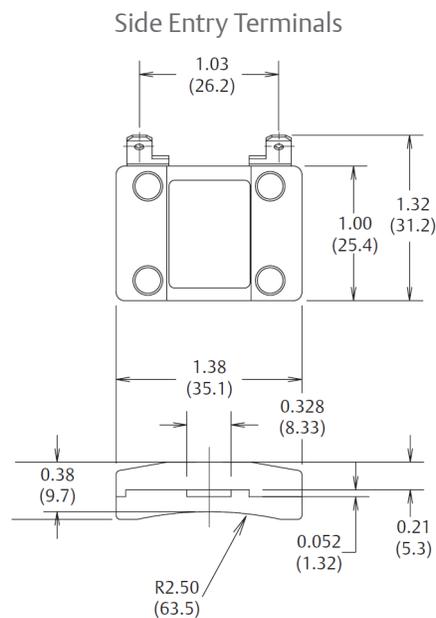


Figure 1  
Dimensions are shown in inches and (millimeters).

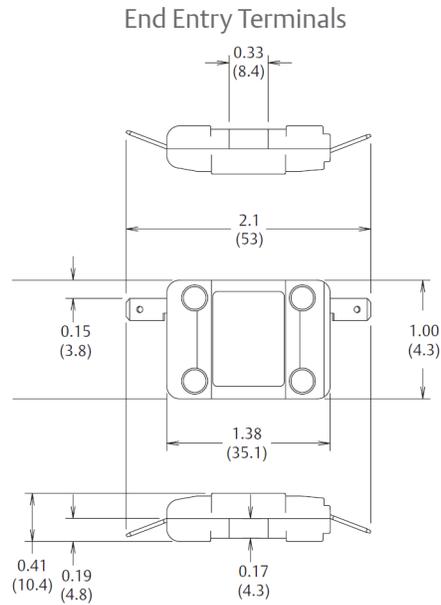


Figure 2  
Dimensions are shown in inches and (millimeters).

Type 30M – The Therm-O-Disc Type 30M (see figure 4) SPST manual reset protector is a compact device designed for applications where inadvertent equipment restarts may result in potential hazard. The contacts may be manually reset after the control has cooled 30°-50°C below the open temperature calibration. The 30M features a “trip free” manual reset design. UL designates the 30M reset as “M1,” meaning the motor protector shall automatically reset to the closed position after normal operating conditions have been restored if the reset button is held in the reset position. Typical uses include disposer and oil burner applications where “tripping” the device should result in the end user taking corrective action. Standard terminations are weld-type connections. Male quick connect terminals, lead wire assemblies and bimetal and heater combinations are available to meet specific requirements. This “trip free” construction means that processing the reset button will not reclose the contacts until the control has cooled.

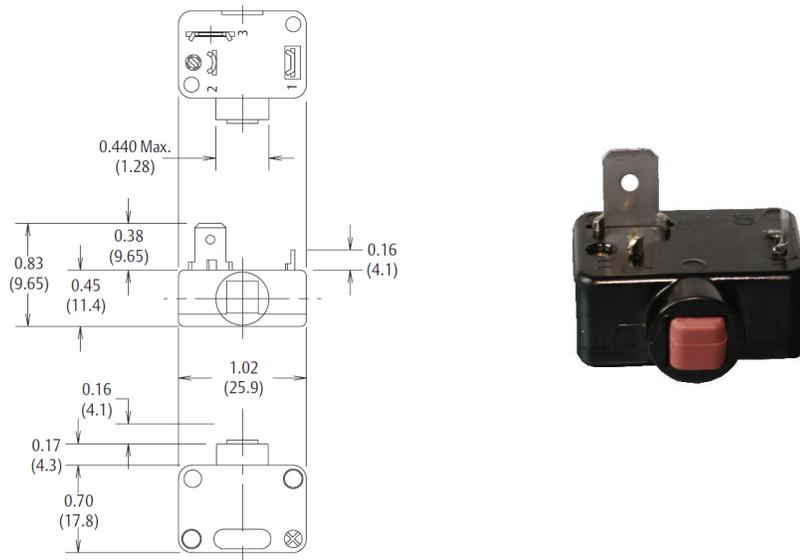


Figure 3  
Dimensions are shown in inches and (millimeters).

## Lead Wire and Terminal Configurations

All Therm-O-Disc Motor Protectors can be furnished with a variety of terminal and lead wire configurations. Custom packages or special assemblies may be specified to meet unique application needs. By taking advantage of our high volume production methods, Therm-O-Disc may be able to provide significant savings. Our sales engineers can assist in selecting a package that is tailored to specific requirements.

## Mounting Configurations

Due to the variation of terminal and switch configurations, Therm-O-Disc Motor Protectors may be mounted in a number of positions. For maximum performance, we recommend locating the protector as close to the motor windings as possible. Customers typically provide their own mounting methods.

## Product Quality

Therm-O-Disc Motor Protectors are assembled, calibrated and tested automatically, using the latest manufacturing technologies and quality methods. Each motor protector is 100% temperature calibrated and tested to ensure high quality levels. Our goal of providing motor protectors of the highest uniform quality is reinforced by the training of our operators in modern statistical techniques. Therm-O-Disc is committed to continuously improving our quality and manufacturing capabilities. This objective, in turn, allows our products to meet the escalating standards of our customers.

## Protector Selection

To determine which Therm-O-Disc Motor Protector is right for a specific application, simply use the following steps:

- Select the appropriate switch action (manual or automatic) and product type.
- Verify that electrical load does not exceed the recommended rating of the device.
- Determine calibration based on test data.
- Determine the specific bimetal and heater resistance required for the application. (Consult factory for trip curves.)
- Test the protector to verify compliance with specific requirements.
- Choose from a variety of optional components to complete a package.

## Calibration Range, Differentials, and Standard Tolerances

Protector Type	30M
Open Range (°C)	80-150
Open Tolerance (°C)	±5
Close Range (°C)	45-110
Close Tolerance (°C)	±10
Minimum Differential (°C)	30
Maximum Differential (°C)	50

NOTE: For additional information on calibrations, tolerances or differentials not listed in this chart, please contact our Sales Engineering Department.

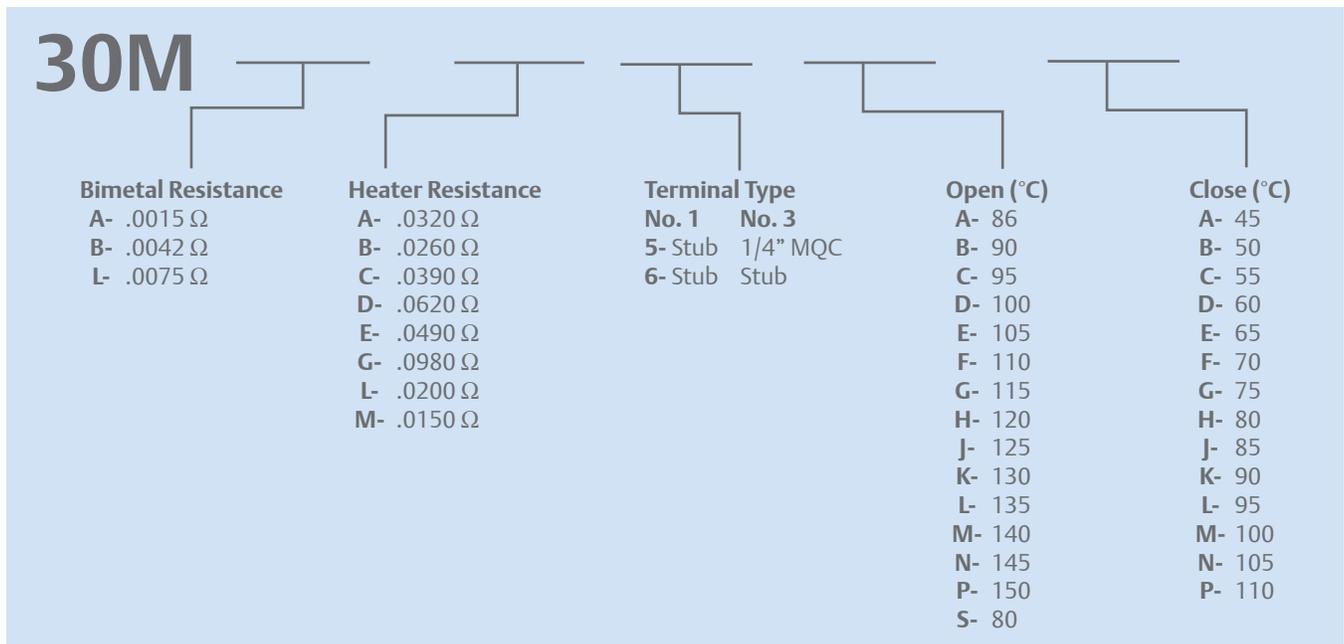
## General Electrical Ratings

The Motor Protector series 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.

Protector Type	Maximum Temperature (°C)	Recommended Contact Ratings*	Limited Short Circuit	Group Fusing Short Circuit	Agency Recognition
30M	150	50 amp L.R. @ 120 V 37 amp L.R. @240V	1000 amp Circuit: 40 amp fuse @240V	2000 amp Circuit: 80 amp fuse @120V	UL File E52937 CSA File LR80616

\* Therm-O-Disc Motor Protectors are recognized by Underwriters Laboratory (UL) and certified by the Canadian Standards Association (CSA). For complete details on European Agencies or the latest rating information, please contact our Sales Engineering Department.

## Part Numbering System



### 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.

# 36T Series Snap-Action Temperature Controls



## Snap-Action Temperature Control

The 36T Series of 1/2" bimetal temperature controls from Therm-O-Disc offers proven reliability in a compact, versatile, cost-effective design. The snap action of the bimetal disc provides high-speed contact separation resulting in excellent life cycle characteristics at electrical loads up to 15 amps at 120VAC and 10 amps at 250VAC (100,000 cycles) and 16 amps at 250VAC (30,000 cycles).

A variety of terminal and mounting configurations are available for maximum design flexibility. The quality, reliability, affordability, versatility and world-wide agency approvals of the 36T Series make it the thermostat of choice for a wide variety of temperature control applications.



## Switch Actions

The 36T is available in three single pole, single throw (SPST) switch actions:

**Automatic Reset** – Can be built to either open or close its contacts on temperature rise.

**Manual Reset** – Available with contacts that open on temperature rise. The contacts can be reset by depressing the button after the control has cooled down.

**Single Operation Fuse Disc** – Available with contacts that open on temperature rise, and which never reclose unless the ambient temperature drops below +32°F (0°C) or below -31°F (-35°C).

## Typical Applications

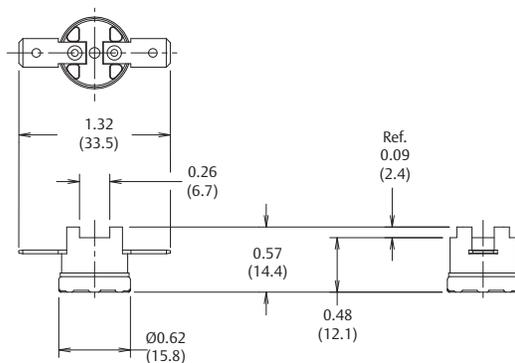
The 36T is applied to a wide variety of applications as either a regulating control or a safety limit. Examples of applications include:

- Coffeemakers
- Sandwich toasters
- Dishwashers
- Dryers
- Washing machines
- Refrigerators
- Microwave ovens
- Water heaters
- Furnaces
- Boilers
- Electric heaters
- Office equipment
- Automotive seat heaters

## Mounting Configurations

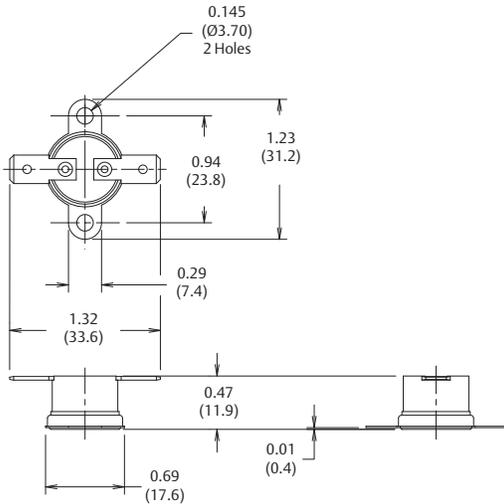
The 36T is available in several mounting configurations:

**No Mounting Bracket** – The 36T may be specified without a mounting bracket. One popular version (designated 36TM or 36TMH) has a switch body designed to accept the customer's clamp bracket (see Figure 1).



**Figure 1**  
Dimensions are shown in inches and (millimeters).

**Surface Mount Bracket** – The bimetal disc sensing element is positioned firmly against the mounting surface so it senses the actual mounting surface temperature (see Figure 2). There are many available surface mounting brackets available – typically in either aluminum or stainless steel.

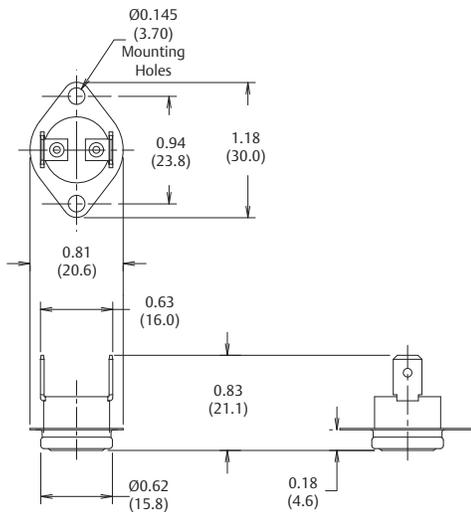


**Figure 2**

Dimensions are shown in inches and (millimeters).

Surface brackets can be supplied on the 36T either loose or crimped in a fixed position (except for ceramic body 36Ts, 36Ts with stainless steel disc housings, and 36Ts with raised pad disc housings, which must be supplied loose).

**Airstream Mount** – The bimetal housing extends through a hole in the mounting surface into the airstream (see Figure 3). There are many available aluminum and stainless steel airstream mount configurations.



**Figure 3**

Dimensions are shown in inches and (millimeters).

### Terminal to Mounting Hole Crimp Angle

Both surface brackets and air stream housings can be supplied where the customer can specify the angular orientation (in 15 degree increments) of the terminals with respect to the mounting hole centerline (see figure 4).

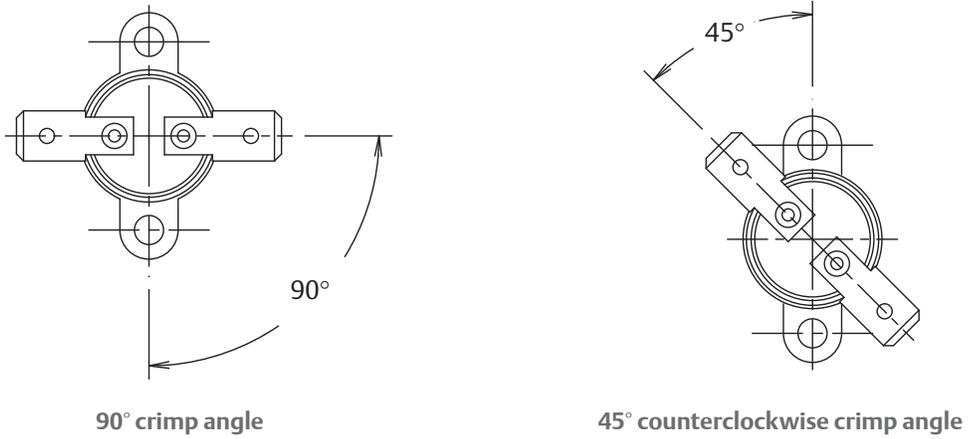


Figure 4

**Stud Mount** – The 36T can be supplied with an integral threaded stud mount. Figure 5 shows two popular brass stud mounts with hex shape (brass stud available with plastic switchcases only). Figure 6 shows an aluminum stud mount available with plastic or ceramic switchcases.



Figure 5



Figure 6

**36T Board Mount** – The 36T is mounted on extension straps, for applications where the thermostat must extend further into the airstream to sense adequately (see Figure 7). Available strap lengths include 2” (50.4mm), 3” (75.6mm), 5” (126mm) and 7” (176.4mm). Insulating sleeves can be provided for the extension straps, and various mounting board configurations are available.



Figure 7

### Thermal Response

Most 36Ts are provided with an enclosed disc. The enclosed disc construction provides greater protection against airborne contaminants entering the control. It also protects the bimetal disc from possible damage during customer handling. In applications where faster response to radiant heat is required, an exposed bimetal disc can be specified.

### 36T Mounting Options

The letter “A” means available. Consult a Sales Engineer for other available configurations.

### Surface Mount – No Mounting Bracket

Description	Aluminum	Stainless Steel (not available with ceramic body)	Drawing
Enclosed (raised pad)	A	A	Figure 8
Enclosed (flat)	A	A	Figure 9A
Exposed	A	A	Figure 9B

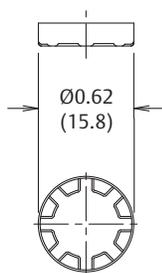


Figure 8

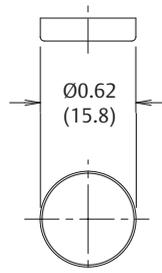


Figure 9A

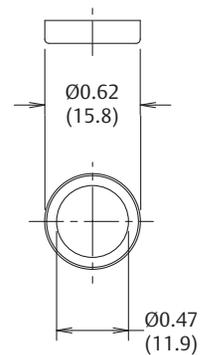


Figure 9B

Dimensions are shown in inches and (millimeters).

## Surface Mount – With Mounting Bracket

Mounting Hole	Aluminum Bracket	Stainless Steel Bracket	Drawing
0.125" (3.2mm) diameter	A	A	Figure 10A
0.145" (3.7mm) diameter	A	A	Figure 10B
0.172" (4.4mm) diameter	—	A	Figure 11

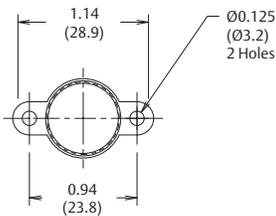


Figure 10A

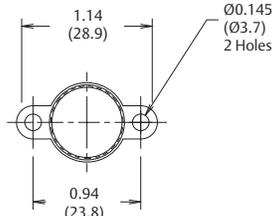


Figure 10B

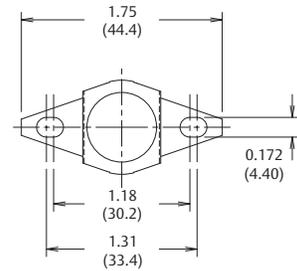


Figure 11

Dimensions are shown in inches and (millimeters).

## Airstream Mount

Mounting Hole	Aluminum (enclosed)	Aluminum (exposed)	Stainless Steel (enclosed)	Stainless Steel (exposed)	Drawing
			(not available with ceramic body)		
0.145" (3.7mm) diameter	A	A	A	A	Figure 12
0.188" (4.74mm) wide slot	A	A	A	A	Figure 13
0.170" (4.28mm) wide slot	—	A	A	A	Figure 14

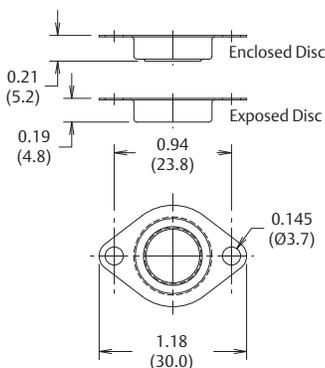


Figure 12

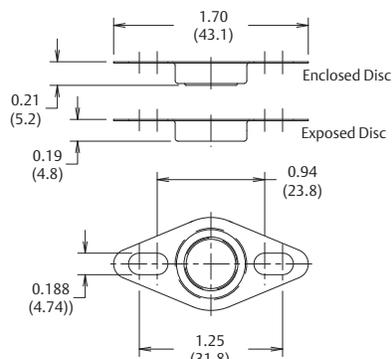


Figure 13

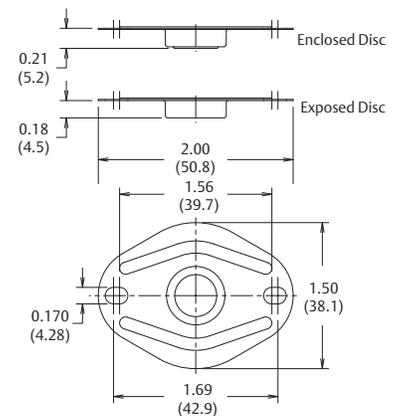
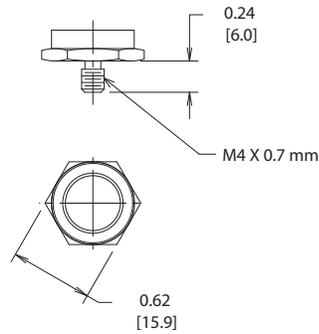


Figure 14

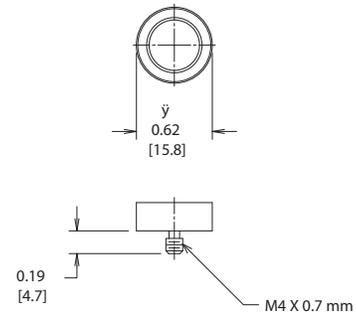
Dimensions are shown in inches and (millimeters).

## Stud Mount

Thread	Stud length	Material	Drawing
M4 x 0.7mm	0.24" (6mm)	Brass (not available with ceramic body)	Figure 15
M4 x 0.7mm	0.190" (4.7mm)	Aluminum	Figure 16



**Figure 15**



**Figure 16**

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

## 36T Terminals

Most 36Ts are supplied with 1/4" x .032" (6.3mm x .8mm) quick connect blade terminals that are available in unplated brass, tin plated brass and nickel plated steel. We also have 3/16" (4.8mm) blade terminals available in both .020" (0.5mm) and .032" (0.8mm) thicknesses. Most of these blade terminals are available in 0, 45 and 90 degree angles. The 36T can also be supplied with various weld tab and crimp/solder terminals. Please see the 36T Standard Terminals chart that shows our most frequently used terminals. Note that other configurations/platings may be available if our standard offerings do not satisfy your application. Please contact a Sales Engineer to discuss requirements.



## 36T Standard Terminals

Dimensions are shown in inches and (millimeters). "A" designates available.

Mounting Hole	Terminal Angle	Unplated Brass	Tin Plated Brass	Tin Plated Brass Steel	Drawing
3/16 x .020 (4.8 x 0.5 blade)	low	A	A	A	Figure 17
	45°	--	A	A	
	90°	A	A	A	
3/16 x .032 (4.8 x 0.8 blade)	low	A	A	A	Figure 18
	45°	A	A	--	
	90°	A	A	A	
1/4 x .032 (6.3 x 0.8 blade without stops)	low	A	A	A	Figure 19
	45°	A	A	A	
	90°	A	A	A	
1/4 x .032 (6.3 x 0.8 blade)	low	--	A	A	Figure 20
	45°	A	A	--	
	90°	A	A	A	
.020 (0.5) weld tab	90°	--	--	A	Figure 21
.020 (0.5) crimp/solder	90°	--	A	--	Figure 22
.020 (0.5) solder	low	--	A	--	Figure 23
.020 (0.5) PCB solder	90°	--	A	--	Figure 24

3/16 (4.8) x 0.020 (.5) Blade

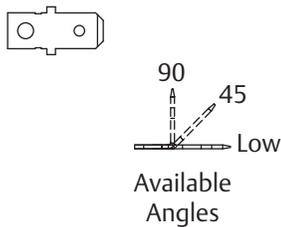


Figure 17

3/16 (4.8) x 0.032 (.8) Blade

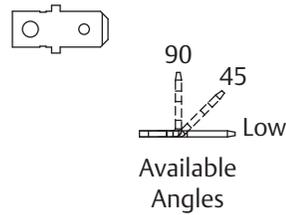


Figure 18

1/4 (6.3) x 0.032 (.8) Blade Without Stops

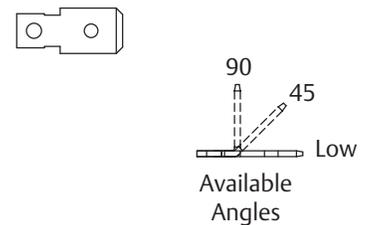


Figure 19

1/4 (6.3) x 0.032 (.8) Blade

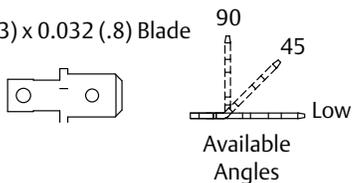


Figure 20

0.020 (.5) Weld Tab



Figure 21

0.020 (.5) Crimp / Solder



Figure 22

0.020 (.5) Solder



Figure 23

0.020 (.5) PCB Solder

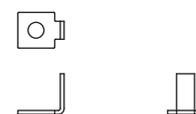


Figure 24

Dimensions are shown in inches and (millimeters).

## 36T Switchcases

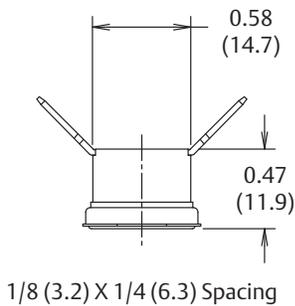
There are many available switchcases (or switchbodies) available for the 36T. When choosing a particular switchcase, there are several key items to consider:

**Electrical Spacing** – This is the minimum distance required to prevent electrical “arcing” from a live part (terminal) to a dead part (disc housing). The required electrical spacing is determined by the customer’s agency spacing requirements. There are 36T switchcases with two different spacings available:

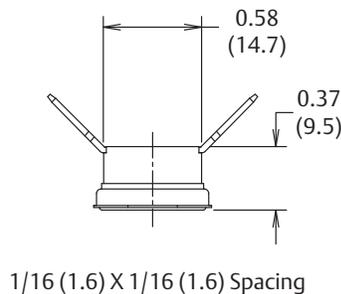
- 1/8” (3.2mm) by 1/4” (6.3mm) air/surface – designated by an ‘X’ in the nomenclature (see Figure 25). (Preferred)
- 1/16” (1.6mm) by 1/16” (1.6mm) air/surface (see Figures 26, 27).

The greater spacings are achieved by an increased switchcase height.

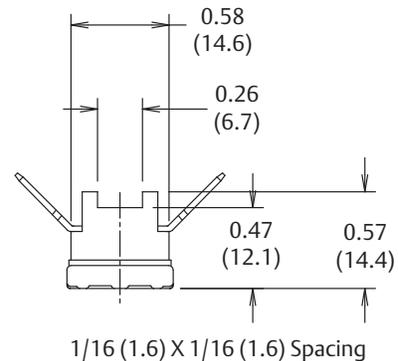
**Mounting** – All of the available switchcases can be provided in both surface (with or without brackets) or airstream mount configurations. There are several switchcases designed to accept a customer clamp bracket (over the top of the switchcase). These are designated by an ‘M’ in the nomenclature. (See Figure 27)



**TX, TXE, TXH**  
Figure 25



**T, TE, TH**  
Figure 26



**TM, TMH, TME**  
Figure 27

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

**Switchcase Material** – For calibrations up to 350°F (177°C), plastic can be specified; for calibrations above 350°F (177°C), ceramic is available. Ceramic switchcases are designated by ‘H’ in the nomenclature.

**Manual Reset** – Manual reset switchcases are basically similar to those used on automatic reset and fuse disc configurations except for a hole in the top of the case (for the reset pin) and a pad on the top of the case to prevent overtravel of the reset pin. Please refer to the manual reset portion of the catalog for more information.

## Calibration Temperatures, Differentials and Tolerances

36Ts (automatic reset) are supplied to customer specified open and close calibration set points with a tolerance on both set points.

Please refer to the chart below. To use this chart, start by finding the higher of your open/close calibration set points in the far left hand column. Then look across the top (left to right) to locate your desired nominal differential. Differential is the difference between your nominal open and close calibration set points. The available open and close set point tolerances are shown where the two columns converge. Please note that this chart is applicable to either normally closed contacts (contacts open on temperature rise) or normally open contacts (contacts close on temperature rise).

### Example 1:

If you require a nominal open temperature of 250°F (121°C) and a nominal close temperature of 210°F (99°C), then the nominal differential = 40°F (22°C), so the tolerance on the open temperature is  $\pm 7^\circ\text{F}$  ( $\pm 4^\circ\text{C}$ ), and the tolerance on the close temperature is  $\pm 11^\circ\text{F}$  ( $\pm 6^\circ\text{C}$ ). (Refer to the yellow shaded area in the chart.)

### Example 2:

If you require a nominal close temperature of 160°F (71°C) and a nominal open temperature of 140°F (60°C), then the nominal differential = 20°F (11°C), so the tolerance on the open temperature is  $\pm 5^\circ\text{F}$  ( $\pm 3^\circ\text{C}$ ), and the tolerance on the close temperature is  $\pm 7^\circ\text{F}$  ( $\pm 4^\circ\text{C}$ ). (Refer to the gray shaded area in the chart.)

## Calibration Temperatures, Differentials and Standard Tolerance for the 36T Series

Highest Calibration Set Point (Open or Close)	NOMINAL DIFFERENTIAL (temperature difference between nominal open and close set point)															
	*F15-19 *C8.5-10.5		20-24 11-13.5		25-29 14-16		30-39 16.5-21.5		40-49 22-27		50-60 27.5-33.5		61-80 34-44.5		81-100 45-55.5	
	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close
35°F-79°F 2°C-26°C	$\pm 5$	$\pm 6$	$\pm 5$	$\pm 6$	$\pm 5$	$\pm 7$	$\pm 5$	$\pm 8$	$\pm 6$	$\pm 8$	$\pm 7$	$\pm 9$	-	-	-	-
80°F-180°F 27°C-82°C	$\pm 5$	$\pm 6$	$\pm 5$	$\pm 7$	$\pm 5$	$\pm 7$	$\pm 5$	$\pm 8$	$\pm 5$	$\pm 8$	$\pm 6$	$\pm 10$	$\pm 7$	$\pm 11$	$\pm 9$	$\pm 13$
181°F-230°F 83°C-110°C	$\pm 5$	$\pm 7$	$\pm 5$	$\pm 7$	$\pm 5$	$\pm 8$	$\pm 5$	$\pm 8$	$\pm 6$	$\pm 9$	$\pm 7$	$\pm 11$	$\pm 8$	$\pm 12$	$\pm 10$	$\pm 14$
231°F-300°F 111°C-149°C	-	-	-	-	$\pm 6$	$\pm 9$	$\pm 6$	$\pm 10$	$\pm 7$	$\pm 11$	$\pm 8$	$\pm 11$	$\pm 9$	$\pm 14$	$\pm 11$	$\pm 17$
301°F-350°F 150°C-177°C	-	-	-	-	-	-	-	-	-	-	$\pm 8$	$\pm 12$	$\pm 10$	$\pm 15$	$\pm 12$	$\pm 20$
351°F-428°F 178°C-220°C	-	-	-	-	-	-	-	-	-	-	-	-	$\pm 16$	$\pm 23$	$\pm 18$	$\pm 25$

- NOTES:**
1. We can supply tolerances that are tighter than those shown at extra cost. Please contact a Sales Engineer.
  2. Wider tolerances required for conical contact construction. Please contact a Sales Engineer.
  3. Requires ceramic construction for temperatures above 350°F (177°C)
  4. Lowest nominal open or close calibration is -6°F (-21°C).

### 36T Manual Reset

The 36T manual reset is available with normally closed contacts that open on temperature rise and is a non-trip free design. The 36T manual reset is normally supplied so that it does not automatically reset unless the ambient temperature drops below -31°F (-35°C).

Once the 36T manual reset has opened at its calibration temperature, the ambient temperature must drop before it can be reset. To determine the manually resettable temperature for a specific open temperature – refer to the graph in Figure 28. The manually resettable temperature is the temperature at which (or below which) the 36T can be reset. To use this chart, first find the point on the vertical axis that designates the nominal open temperature minus the tolerance. Then, move across to the curve and find the manually resettable temperature on the horizontal axis. There are two lines shown: one without a compressible washer, and one with a compressible washer. The compressible washer (located under the reset button) can be specified (at extra cost) when the customer desires a higher manually resettable temperature.

Example:

For an open temp/tolerance of 210°F (99°C) ±10°F (±5.5°C), the manually resettable temperature is 100°F (38°C) without the compressible washer, which means that the 36T can be reset when the temperature is at or below 100°F (38°C).

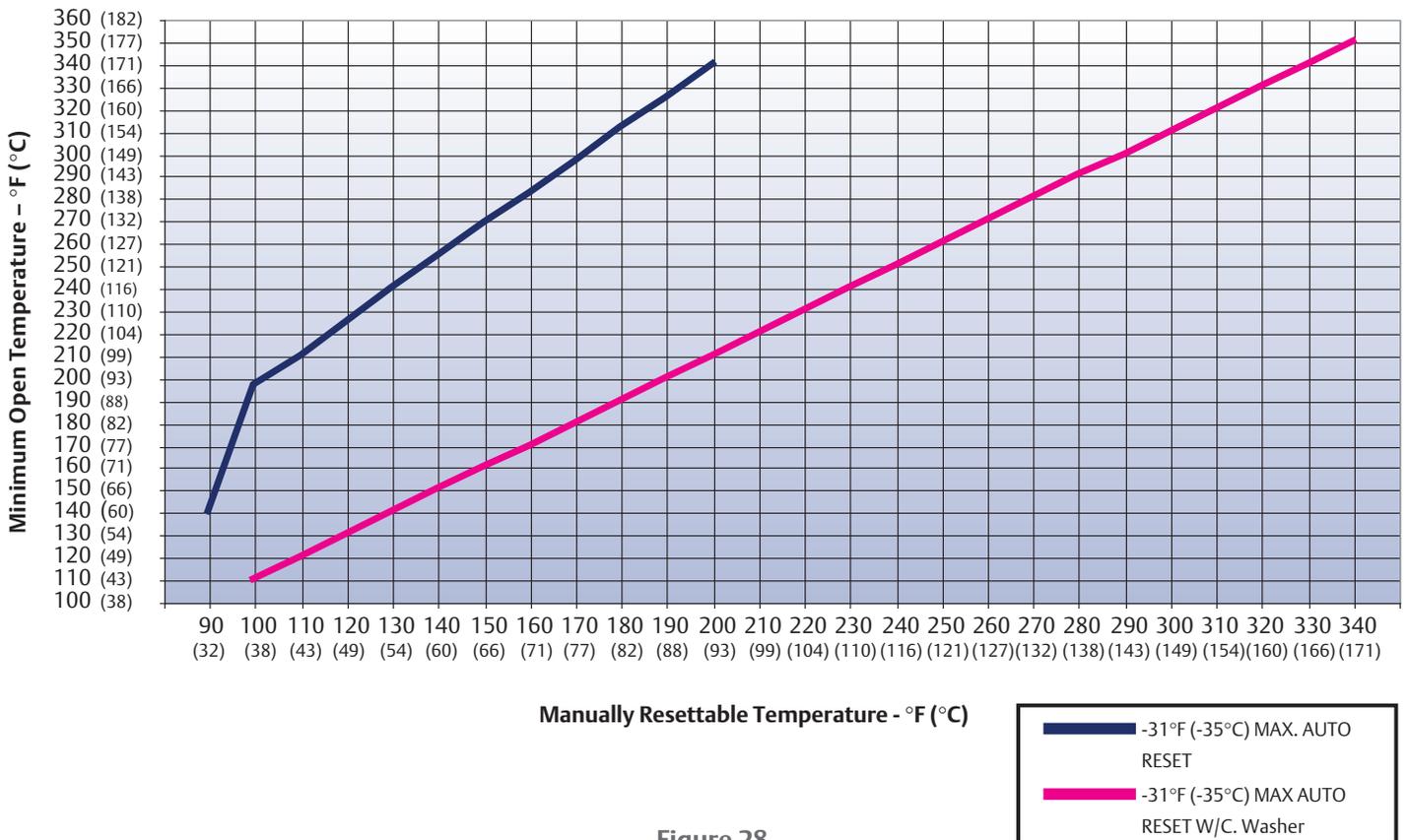


Figure 28

For 36T manual reset calibrations/tolerances, see the table below. Please contact a Sales Engineer if non-standard calibrations or tolerances are required.

Calibration Range		Standard Calibration Tolerance	
°F	°C	°F	°C
150-200	65-93	±8	±4.5
201-240	94-115	±10	±5.5
241-280	116-138	±12	±6.5
281-320	139-160	±14	±8
321-350	161-177	±16	±9

36T Manual Reset Mounting and Terminals – The 36T manual reset is available with all of the mounting and terminal configurations that are available on the automatic reset 36T. Figures 29 and 30 show two very common configurations.



Figure 29



Figure 30

### Single Operation 36F

The 36F fuse thermostat is a single operation version of the 36T. Once the electrical contacts have opened, they will not reclose unless the ambient temperature drops below +32°F (0°C), or below -31°F (-35°C).

The 36F is available with any of the terminals, mounting configurations or switchcases that are available on the 36T automatic reset version.

The 36F is available with the same open temperature set points and tolerances as the 36T manual reset. Please refer to the chart in the manual reset section. The customer should specify either a +32°F (0°C) or a -31°F (-35°C) maximum automatic reset temperature for the 36F.

## General Electrical Ratings

The 36T series of controls has been rated by major agencies throughout the world. Agencies include UL, CSA, VDE, CQC, MITI, and KETI. 36T series controls are rated up to 15Amps @ 120Volts, and 16Amps @ 240Volts. 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. Please consult a Sales Engineer for rating information that covers your specific application.

## Type Numbering System

The following table summarizes the type numbering system for the 36T. These designations represent the type numbers that are agency recognized.

### 36 \_\_\_\_\_

**T** – Automatic Reset or Manual Reset

**F** – Single Operation (fuse disc)

**M** – Switchcase designed to accept customer clamp (*see figure 1*)

**X** – Switchcase with increased electrical spacing  
1/8" (3mm) through air and 1/4" (6.3mm) over surface

**V** – Conical movable contact – silver

**VG** – Conical gold movable contact (with gold-plated stationary contact)

**E** – Eyelet construction (required for European agency approval)

**H** – Ceramic switchcase

**0** – No mounting bracket

**1** – Airstream mount

**2** – Surface mount bracket

**3** – Stud mount

**4** – Large flange – airstream mount

**1** – Contacts open on temperature rise

**2** – Contacts close on temperature rise

**4** – Fuse disc with automatic reset  
temperature below -31°F (-35°C)

**6** – Manual reset or fuse disc with automatic reset  
temperature below 32°F (0°C)

## 36T Board Mount Nomenclature

### 36 \_\_\_\_\_

**T** – Automatic Reset – plastic switchcase

**TH** – Automatic Reset – ceramic switchcase

**TVH** – Automatic Reset – ceramic switchcase – conical silver movable contact

**0** – No mounting bracket

**1** – Contacts open on temperature rise

**2** – Contacts close on temperature rise

**B** – Board mount

**2** – 2” strap length\*

**3** – 3” strap length\*

**5** – 5” strap length\*

**7** – 7” strap length\*

\* Approximate length

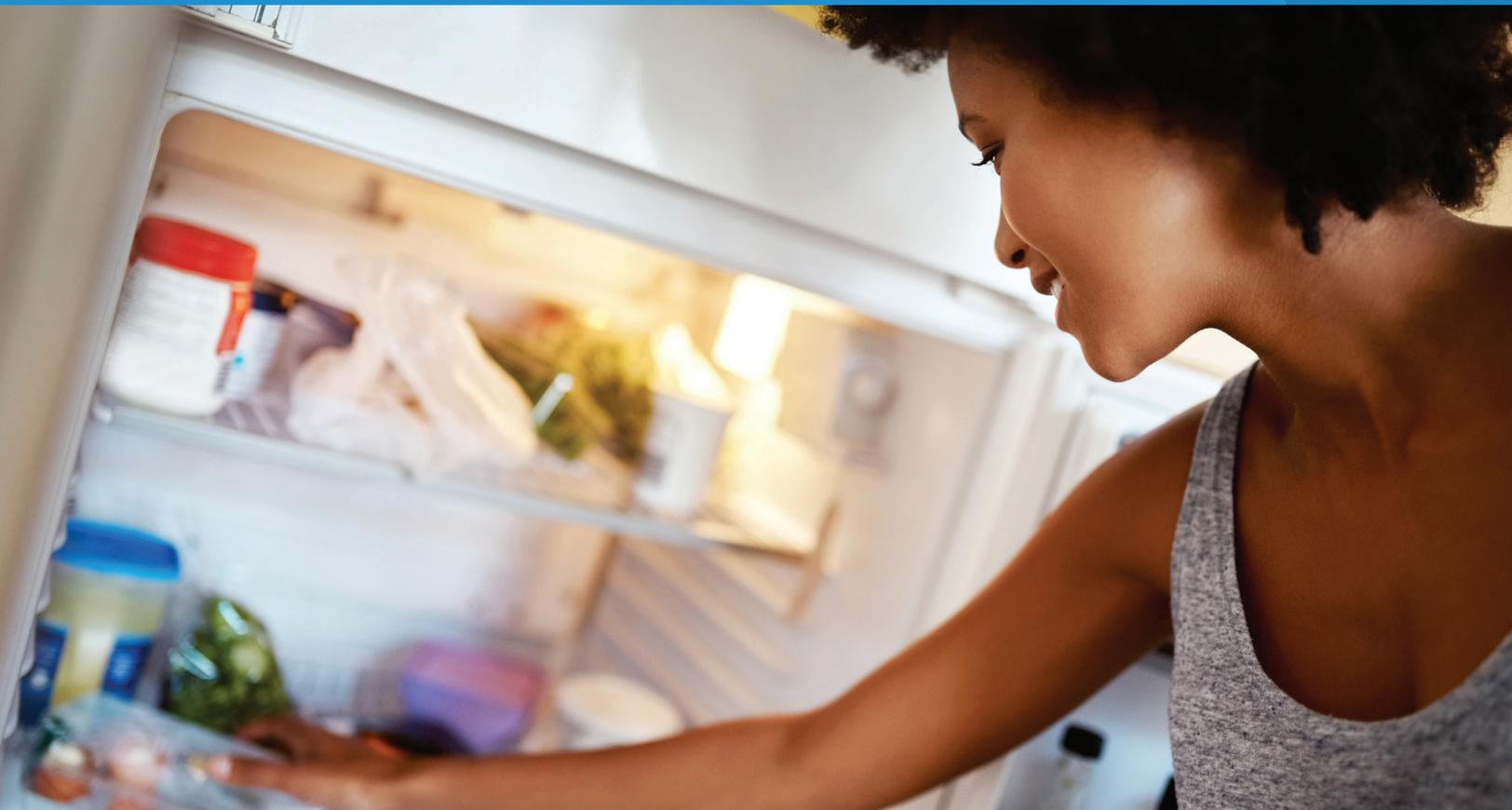
### Important Notice

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.

# 37T Series Moisture Resistant Temperature Controls



## Moisture Resistant Temperature Controls

The 37T series of 3/4" (19mm) bimetals disc temperature controls from Therm-O-Disc offers proven reliability in a moisture resistant sealed design. The snap-action of the bimetal disc provides high-speed contact separation resulting in excellent life cycle characteristics at electrical loads up to 10 amps at 120VAC and 5 amps at 250VAC. The sealed design provides moisture resistance for moisture prone environments. A wide variety of terminal, lead wire and mounting configurations are available to provide maximum design flexibility.

The 37T is the most popular and widely applied temperature control in refrigeration applications such as defrost termination and ice cube maker control. It is also applied in a range of heat pump and air conditioning applications.



## Features and Benefits

The 37T features include:

- Sealed construction provides moisture resistance for moisture prone environments.
- High-speed contact separation ensures long contact life.
- A wide variety of mounting configurations, lead wires and terminations provide maximum design flexibility.
- All materials have been selected to pass the refrigeration industry's odor and taste tests.
- Controls are 100% operation checked and dielectric tested.

## Switch Actions and Typical Applications

The 37T is available in two switch actions:

**Automatic Reset SPST** – In this design, the switch can be built to either open or close its electrical contacts on temperature rise. Once the temperature in the application has returned to the specified reset temperature, the contacts automatically return to their original state. Open on rise contact design is typically used for refrigeration defrost termination and ice cube maker control. Type 37TF includes an internal resistor wired in parallel with the contacts which serves as an aid to factory circuit testing where the contacts are open at room temperature.

**Automatic Reset SPDT** – This design is the same as the SPST with the addition of an auxiliary contact which makes a circuit upon the opening of the main contacts and breaks the circuit when the main contacts reset. In this design, any combination of electrical ratings shown in the rating table may be switched from one circuit to the other.

## Mounting Configurations

The 37T is available in several mounting configurations:

**No Mounting Bracket** – The 37T may be specified without a mounting bracket. The 37T (see figure 1) is available with a polyethylene cap or a phenolic centerpost which may be used for a customer’s bracket. The phenolic centerpost may be customized to meet unique requirements. mount configurations. Airstream mounting is typically used in applications where the temperature being sensed is contained within an enclosure such as an air duct or heater box. An optional surface mount configuration is available for applications where the temperature being sensed is the actual mounting surface. Exposed or enclosed bimetal disc mounting versions may be specified.

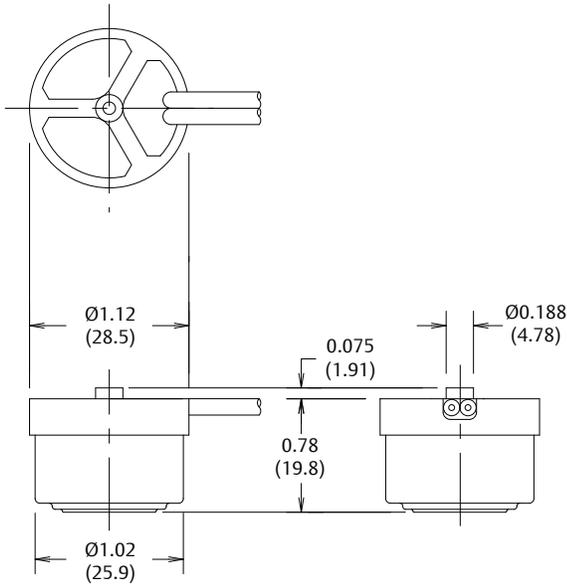


Figure 1  
Dimensions are shown in inches and (millimeters).

**Surface Mounting** – The surface mounting configuration (see figure 2) positions the sensing element firmly against the surface to be monitored.

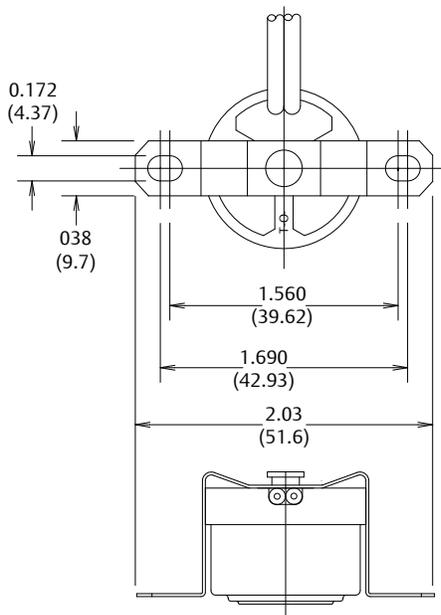


Figure 2  
Dimensions are shown in inches and (millimeters).

**Tube Mounting** – Several different tube mountings are available (see figures 4-7). These brackets firmly attach the 37T to tubes ranging from 1/4” (6.4mm) to 7/8” (22.2mm) in diameter. Radius cups provide best thermal response are available in stainless steel, tin plated copper, and Aluminum.

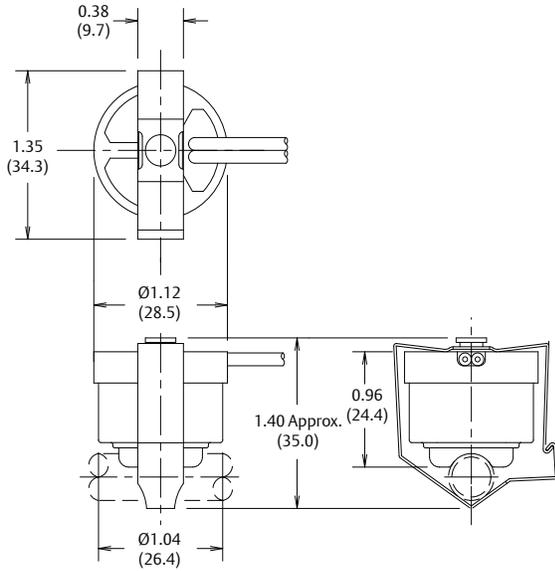


Figure 3  
Dimensions are shown in inches and (millimeters).

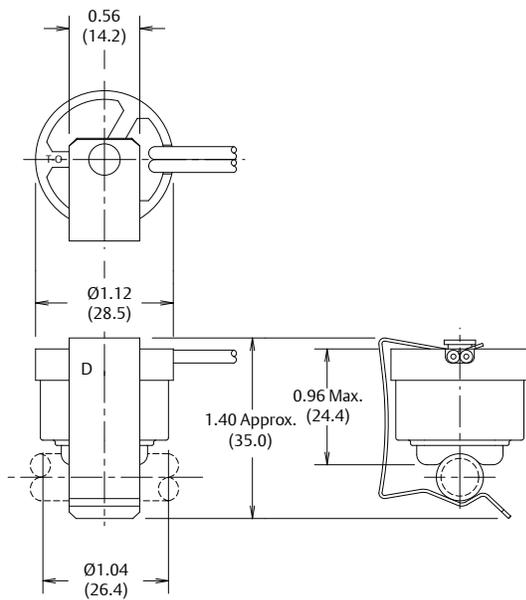


Figure 4  
Dimensions are shown in inches and (millimeters).

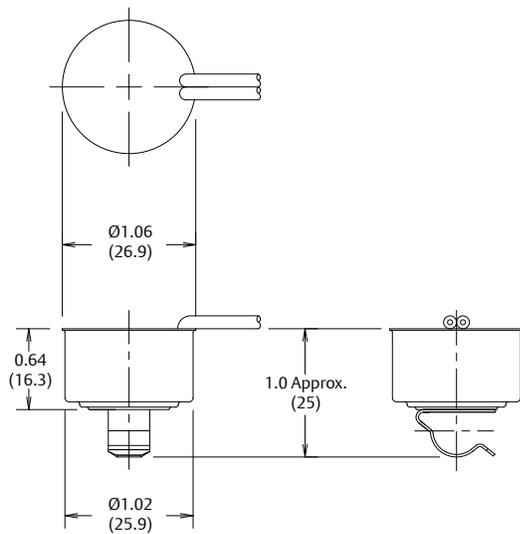


Figure 5  
Dimensions are shown in inches and (millimeters).

### Lead Wire and Terminal Configurations

**Standard Lead Wire-** The standard leads for the 37T controls are available in lengths between 3" (76.2mm) and 36" (914.4mm) with #18 AWG, 16/30 standard copper wire and 1/32" (0.8mm) thick 105 °C PVC odorless insulation stripped 1/2" (13mm).

In addition, #16 AWG wire can be supplied with 1/32 (0.8mm) or 1/16" (1.6mm) thick insulation. The maximum wire size available is #14 AWG with 1/32" (0.8mm) insulation.

**Terminals-** A wide variety of terminals can be attached to the 37T lead wires in addition to strip and retain. Please consult a Therm-O-Disc sales engineer for further variations of terminals, wire lengths, and/or wire types.

**Pin terminals-** The 37TB construction provides pin terminals in place of lead wire coming from the thermostat (see figure 8).

### High Temperature 37TJ Construction

The 37TJ construction incorporates a stainless steel disc cup, as well as high temperature sealant and lead wires. The 37TJ, available in SPST construction only, may be calibrated up to 300°F (149°) with maximum ambient temperatures up to 257°F (125°C).

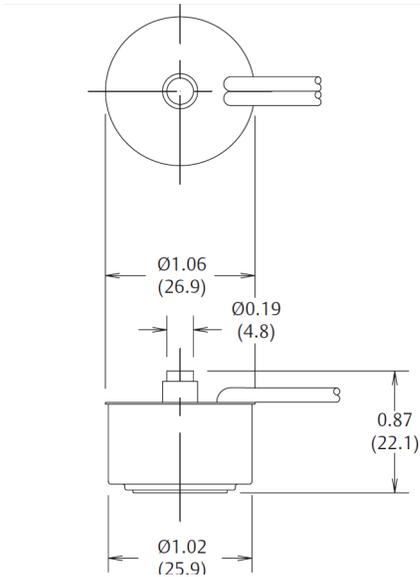


Figure 6  
Dimensions are shown in inches and (millimeters).

**Clip-in Mounting** – Clip-in mounting brackets (see figure 3) hold the sensing element firmly against the surface where the thickness of the surface is from .03” (0.8mm) to .06” (1.5mm).

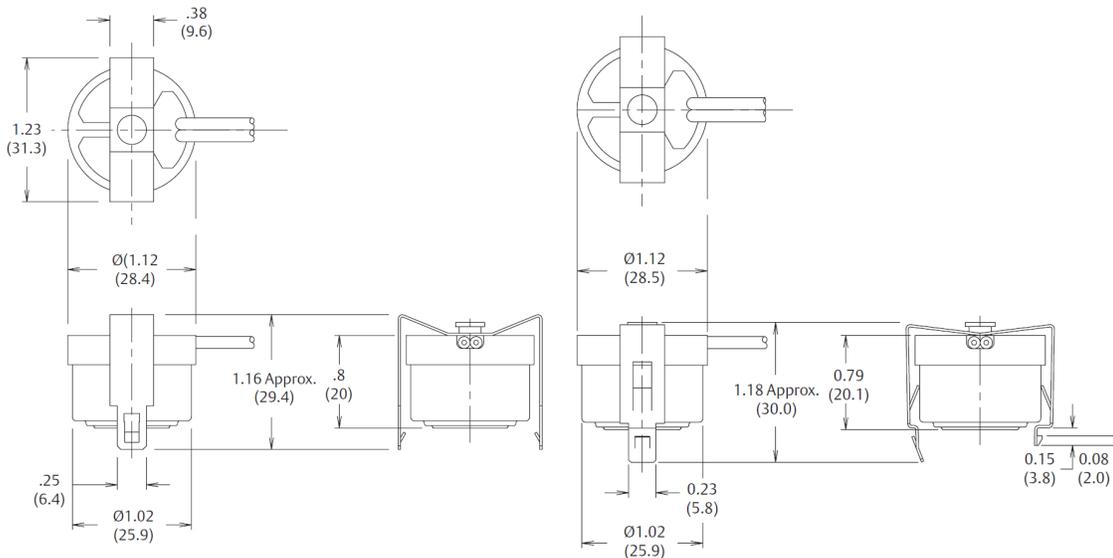


Figure 7  
Dimensions are shown in inches and (millimeters).



## Thermal Response

The temperature sensitive bimetal disc is located at the bottom of the disc cup adjacent to the surface to be monitored. Aluminum, tin-plated copper and stainless steel cups are available for calibrations not exceeding 172°F (78°C) and temperature overrides not exceeding 200°F (93°C). Stainless steel disc cups may also be used for higher temperature applications.

## Calibration Temperatures, Differentials and Tolerances

To use the calibration chart, locate the range in the left hand column, in which the highest calibration set point (open or close) falls. Then locate, across the top, the range in which the nominal differential falls. The standard open and close set point tolerances are shown where the two columns converge. The chart also indicates what differentials are available in each of the calibration set point ranges. Closer tolerances and special differentials are available at extra cost. Please consult a sales engineer for further information.

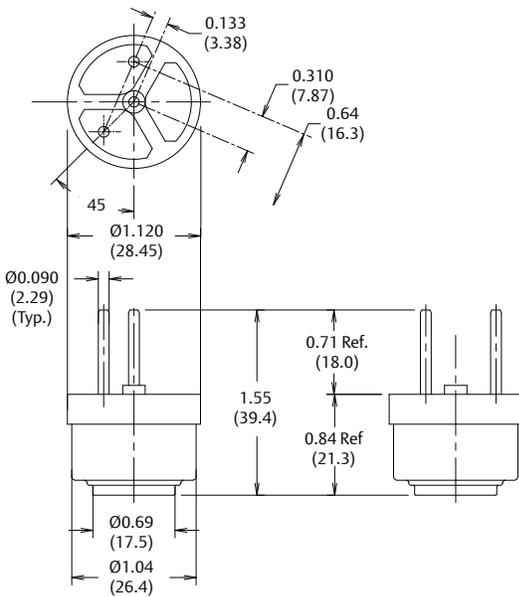


Figure 8  
Dimensions are shown in inches and (millimeters).

## Calibration Temperatures, Differentials and Tolerances

To use the calibration chart, locate the range in the left hand column, in which the highest calibration set point (open or close) falls. Then locate, across the top, the range in which the nominal differential falls. The standard open and close set point tolerances are shown where the two columns converge. The chart also indicates what differentials are available in each of the calibration set point ranges. Closer tolerances and special differentials are available at extra cost. Please consult a sales engineer for further information.

## Calibration Temperatures, Differentials and Standard Tolerance of the 37T Series

Highest Calibration Set Point Range (Open or Close)	Nominal Differentials (temperature difference between nominal open and close set point)											
	10-14F* 5.5-8 °C		15-19 °F 8.5-10.5 °C		20-29 °F 11-16 °C		30-39 °F 16.5-21.5 °C		40-50 °F 22.27.5 °C		51-80 °F 28-44.5 °C	
	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close
10 °-80 °F** -12 °-27 °C	±5 ±3	±6 ±3.5	±5 ±3	±6 ±3.5	±5 ±3	±6 ±3.5	±5 ±3	±7 ±4	±5 ±3	±7 ±4	- -	- -
81 °-200 °F*** 28 °-93 °C	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±7 ±4	±5 ±3	±7 ±4	- -	- -
201 °-221 °F*** 94 °-105 °C	- -	- -	±5 ±3	±6 ±3.5	±5 ±3	±7 ±4	±6 ±3.5	±8 ±4.5	±7 ±4	±8 ±5	- -	- -
222 °-300 °F**** 106 °-149 °C (37TJ only)	- -	- -	- -	- -	±6 ±3.5	±8 ±4.5	±7 ±4	±9 ±5	±8 ±4.5	±11 ±6	±9 ±5	±13 ±7

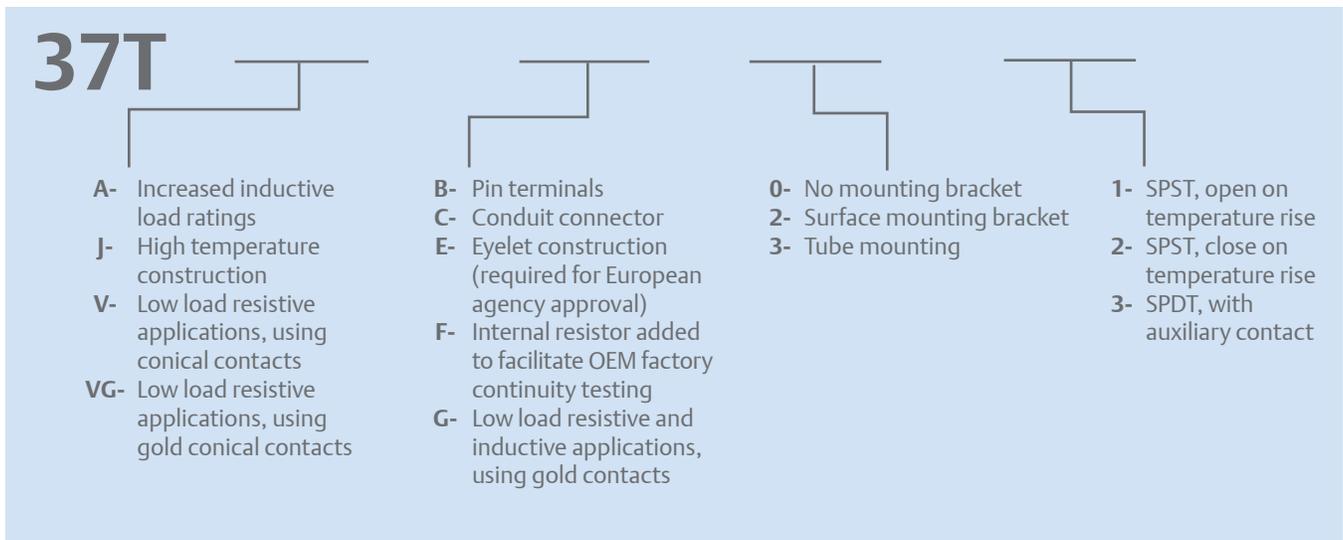
\* SPDT – Minimum differential is 15°F (8°C).

\*\* The minimum bottom temperature is -10°F (-23°C).

\*\*\* Type 37T maximum ambient temperature for the polyethylene cap is 172°F (78°C).

\*\*\*\* Type 37TJ maximum ambient temperature for the epoxy and lead wires in 257°F (125°C).

## Part Numbering System



## General Electric Rating

The 37T 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.

Thermostat Type	Max Temp.	Contact Arrangement	Cycles	Inductive Amps		Pilot Duty VA	Resistive Amperes	Watts	Volts AC	Agency Recognition
				FLA	LRA					
37T, 37TB, 37TJ	221 °F* 105 °C	SPST or SPDT****	100,000	5.8	34.8	125	10.0	1200	120	UL File E29653
			100,000	2.9	17.4	125	5.0	1200	240	
			100,000	-	-	-	1.0	-	277	
			30,000	3.6	21.6	125	-	-	277	
37TV, 37TVF	221 °F * 105 °C	low load application	30,000	-	-	-	10.0	-	120	
			100,000	-	-	-	7.0	-	120	
			100,000	-	-	-	2.5	-	240	
			100,000	-	-	-	1.0	-	24VDC	
37TG, 37TVG	221 °F* 105 °C	low load application	100,000	-	-	125	1.0	-	120	
			100,000	-	-	-	1.0	-	24VDC	
37TA	221 °F* 105 °C	high inductive load	300,000	7.5	40.0	-	-	-	120	
37TF	***	SPST only	100,000	5.8	34.8	125	10.0	1200	120	
37TJ	300 °F** 149 °C	high temperature SPST only	30,000	-	-	125	-	-	120	
			30,000	2.9	17.4	-	5.0	-	240	
37T, 37TJ	221 °F* 105 °C	SPST or SPDT****	30,000	5.8	34.8	125	10.0	1200	120	
			30,000	2.9	17.4	125	5.0	1200	240	
			30,000	3.6	21.6	-	-	-	277	
			100,000	-	-	125	-	-	277	
			100,000	-	-	-	8.3	-	120	
37TJ	300 °F** 149 °C	high temperature SPST only	100,000	-	-	125	2.0	-	120	CSA File LR19988 File LR62082
37TG 37TVG	221 °F* 105 °C	low load application	100,00	-	-	-	1.0	-	120	
			100,00	-	-	-	1.0	-	24VDC	
37TA	221 °F* 105 °C	high inductive load	30,000	7.8	46.8	-	-	-	120	
37TV, 37TVF	221 °F* 105 °C	low load application	30,000	-	-	-	10.0	-	120	
			100,000	-	-	-	5.0	-	120	
			100,000	-	-	-	2.5	-	240	
37TF	***	SPST only	100,000	5.8	34.8	125	10.0	1200	120	
37TE 37TFE	105 °C ***	SPST only	100,000	2.9	-	-	5.0	-	250	BEAB File CO662
	10,000		2.9	-	-	8.5	-	250		
37TVE 37TVFE	105 °C ***	SPST only	30,000	-	-	-	5.0	-	250	
	100,000		-	-	-	2.5	-	250		

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

\* (a) The 37T maximum ambient temperature for the polyethylene cap is 172°F (78°C).

(b) Aluminum disc cups are limited to calibrations not exceeding 172°F (78°C) and over-rides not exceeding 200°F (93°C).

Special cup crimp is recommended for stainless steel and tin-plated copper disc cups for calibrations above 172°F (78°C)

\*\* The maximum ambient temperature for the epoxy and lead wires is 257°F (125°C).

\*\*\* 56K or 240K Ohm resistor.

\*\*\*\* For SPDT, any combination of ratings in the table may be used. The 37TJ is SPST only.

### **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.

# 39T Series Moisture Resistant Temperature Controls



## Moisture Resistant Temperature Controls

The 39T series of 1/2" (13mm) bimetals disc temperature controls from Therm-O-Disc offers proven reliability in a moisture resistant sealed design. The snap-action of the bimetals disc provides high-speed contact separation resulting in excellent life cycle characteristics. The sealed design provides moisture resistance for moisture prone environments. A variety of lead wire configurations are available to provide maximum design flexibility.

The 39T has been specifically designed to permit easy mounting onto copper or aluminum tubing with excellent retention and thermal response. The stainless steel mounting bracket has been designed to accommodate a wide range of tubing sizes without the need to modify the control platform.

The most popular applications include refrigeration defrost termination and ice cube maker control. It is also applied in a range of heat pump and air conditioning applications.



## Features and Benefits

The 39T features include:

- Sealed construction provides moisture resistance for moisture prone environments.
- High-speed contact separation ensures long contact life.
- A variety of lead wire options provide excellent design flexibility.
- All materials have been selected to pass the refrigeration industry's odor and taste tests.
- Controls are 100% operation tested.

## Switch Actions and Typical Applications

The 39T is an automatic reset (SPST) switch. The switch can be built to either open or close its electrical contacts on temperature rise or fall. Once the temperature in the application has returned to the specified reset temperature, the contacts automatically return to their original state. Open on rise contact design is typically used for refrigeration defrost termination and ice cube maker control. The type 39TR includes an internal resistor wired in parallel with the contacts which serves as an aid to factory circuit testing where the contacts are open at room temperature.

## Mounting Brackets

The 39T (see figure 1) has been specifically designed to permit easy mounting onto copper or aluminum tubing with excellent retention and thermal response. The stainless steel mounting bracket has been designed to accommodate a wide range of tubing sizes without the need to modify the control platform or worry about thermal response. To assure compatibility with other materials, the 39T can be provided with either an aluminum or tin-plated copper sensing surface.

The rugged design of the sensing surface permits carefree handling regardless of the sensing material chosen.

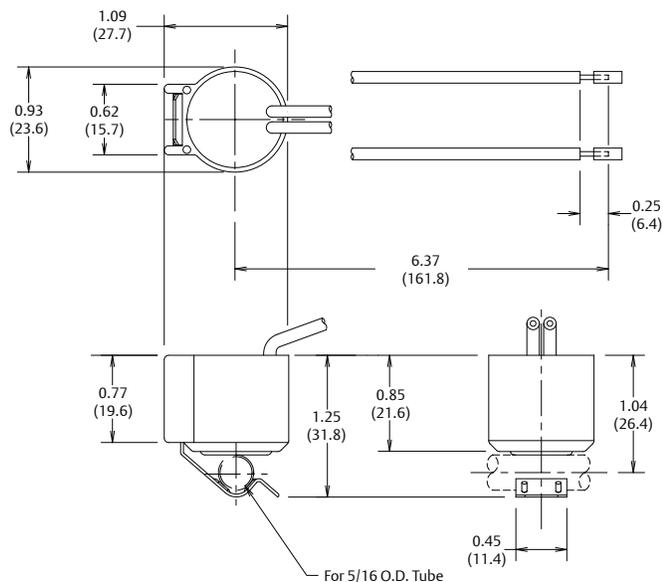


Figure 1  
Dimensions are shown in inches and (millimeters).

## Thermal Response

The temperature sensitive bimetal disc is located at the bottom of the disc cup adjacent to the surface to be monitored. Aluminum and tin-plated copper cups are available for calibrations not exceeding 221°F (105°C) and temperature overrides not exceeding 250°F (121°C).

## Lead Wire and Terminal Configurations

**Standard Lead Wire-** The standard leads for the 39T controls are available in lengths between 3” (76.2mm) and 36” (914.4mm) with #18 AWG, 16/30 standard copper wire and 1/32” (0.8mm) thick 105 °C PVC odorless insulation stripped 1/2” (13mm).

In addition, #16 AWG wire can be supplied with 1/32 (0.8mm) or 1/16” (1.6mm) thick insulation. The maximum wire size available is #14 AWG with 1/32” (0.8mm) insulation.

**Terminals-** A wide variety of terminals can be attached to the 39T lead wires in addition to strip and retain. Please consult a Therm-O-Disc sales engineer for further variations of terminals, wire lengths, and/or wire types.

**Pin terminals-** The 39TB construction provides pin terminals in place of lead wire coming from the thermostat.

## Calibration Temperature, Differentials and Tolerances

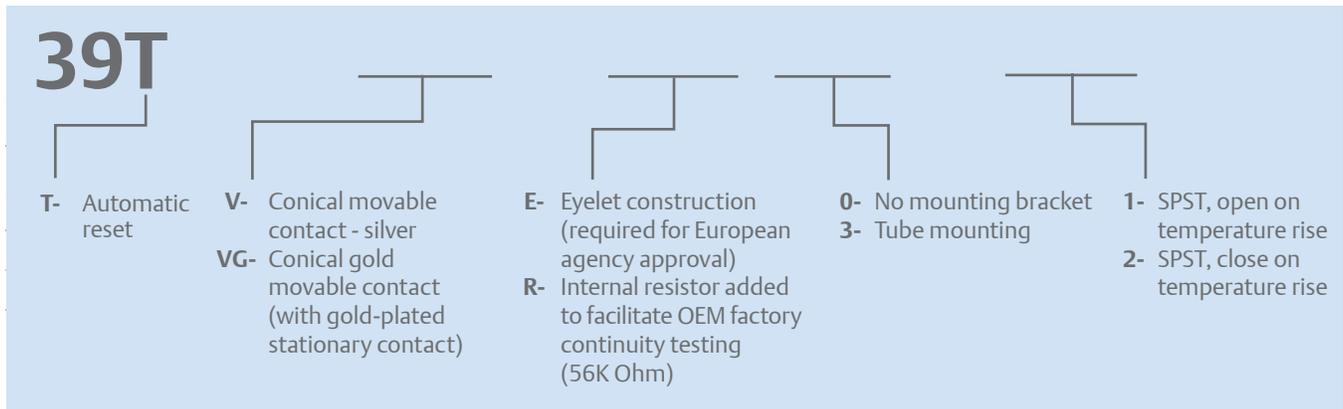
To use the calibration chart, locate the range in the left hand column, in which the highest calibration set point (open or close) falls. Then locate, across the top, the range in which the nominal differential falls. The standard open and close set point tolerances are shown where the two columns converge. The chart also indicates what differentials are available in each of the calibration set point ranges. Closer tolerances and special differentials are available at extra cost. Please consult a sales engineer for further information.

## Calibration Temperatures, Differentials and Standard Tolerance of the 39T Series

Highest calibration Set Point Range (Open or Close)	Nominal Differentials (temperature difference between nominal open and close set point)									
	15-19 °F 8.5-10.5 °C		20-29 °F 11-16 °C		30-39 °F 16.5-21.5 °C		40-50 °F 22-27.5 °C		51-80 °F 28-44.5 °C	
	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close
15 °-80 °F** -9 °-27 °C	±5 ±3	±6 ±3.5	±5 ±3	±6 ±3.5	±5 ±3	±7 ±4	±5 ±3	±7 ±4	- -	- -
81 °-200 °F*** 28 °-93 °C	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±7 ±4	±5 ±3	±7 ±4	- -	- -
201 °-221 °F*** 94 °-105 °C	±5 ±3	±6 ±3.5	±5 ±3	±7 ±4	±6 ±3.5	±8 ±4.5	±7 ±4	±9 ±5	- -	- -

NOTE: Minimum differential is 15°F (8°C).  
The minimum bottom temperature is 0°F (-18°C).

## Part Numbering System



## General Electrical Ratings

The 39T 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.

Thermostat Type	Max Temp	Contact Arrangement	Cycles	Inductive Amperes		Pilot Duty	Resistive Amperes	DC Amperes	Volts AC	Agency Recognition
				FLA	LRA					
39TV	221°F 105°C	SPST	30,000	—	—	—	10.0	120	—	CUL File E29653
			100,000				5.0	120		
			100,000				2.5	240		
39T	221°F 105°C	SPST	30,000	3.6	21.6	125	—	—	277	CUL File E29653
			100,000	—	—	—	—	1	24	
			100,000	2.9	17.4	125	—	—	240	
			100,000	—	—	—	1	—	277	
39TXVE	221°F 105°C	SPST	30,000	—	—	—	5.0	—	250	CB Cert# US/12884/UL
			100,000	—	—	—	2.5	—	250	
39TVE	221°F 105°C	SPST	100,000	0.8	—	—	5	—	125	VDE CERT # 4002298
			100,000	0.4	—	—	2.5	—	250	
			30,000	0.8	—	—	5	—	250	

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

### 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.

# 44T,48T Series Auto Reset Bimetal Controls



## Low Voltage Temperature Controls

The 44T/48T series line of bimetal temperature switches provide high speed contact separation resulting in exceptional life characteristics. Gold plated contacts with biased closed operation results in a repeatable low resistance with reliable switching action in more rigorous environments. Typical applications include gas appliances and heating systems as well as automotive air ambient, coolant, transmission fluid, emissions, and drivability systems.

Both 44T and 48T provide a variety of terminals, lead wire and mounting configurations, as well as a wide range of temperature calibrations, are available to provide maximum application flexibility.



## Features and Benefits

The 44T and 48T features include:

- Epoxy sealed for resistance to contamination from the application environment.
- Vibration resistant construction provides for high reliability.
- High Speed contact separation and contact force ensure long contact life and reliable operation.
- 3/4" snap-action disc for high-speed contact separation and long life.
- Low internal resistance.
- 100% tested for electrical operation.
- Wide range of available calibration temperatures.
- Large selection of terminals and lead wires.
- Surface, airstream or stud mounting configurations.
- A 48TS with a single terminal and grounding through the stud.

## Switch Actions and Typical Applications

The 44T and 48T are automatic reset single pole, single throw (SPST) switch that is designed to open its electrical contacts on temperature rise. Once the temperature in the application has returned to the specified reset calibration, the switch will automatically return to the closed position.

Typical uses of the Therm-O-Disc 44T include limiting or regulating temperatures in gas appliances and heating systems that require the thermostat to make/break the millivolt circuit of a thermocouple or the low voltage circuit of other types of devices.

For low voltage applications requiring a "one-shot" or fuse operation, the 44F is a SPST switch whose contacts open on temperature rise. However, the 44F is a single operation device. Once the switch has operated, the "fuse" disc prevents reset of the contacts to their closed state at temperatures above -31°F (-35°C).

Therm-O-Disc 48T can be used in a variety of automotive temperature sensing applications. Each control incorporates high contact force, epoxy sealant and vibration resistant construction which meets ASTM salt spray and other environmental test requirements.

Typical applications include:

- Control of electrically driven coolant fan motors found in most smaller cars which utilize front wheel drive and transverse mounted engines. The switch can carry the electrical load of the coolant fan directly, thus eliminating the need for a fan relay.
- Control of early fuel evaporation heater relay and turn-off of the early fuel evaporation heater on coolant temperature rise. These switches are designed to provide maximum sensitivity and quick thermal response to changes in temperature.
- Ambient air sensing for air conditioning systems, sensors for engine coolant, transmission fluid, emission, and driveability systems. Customized mounting capabilities can satisfy airstream, surface or stud mount requirements.
- Control of such applications as cold engine lockout and engine coolant fans which demand heavier electrical loads up to 14VDC at 10 amps.

## Application Configurations

Typical configurations for surface, airstream and stud mounting are shown in the line drawing. A variety of lead wires and terminals are also available for any of the mounting configurations. The 44T/48T open temperature calibration may be specified between 120°-300°F (49°-149°C).

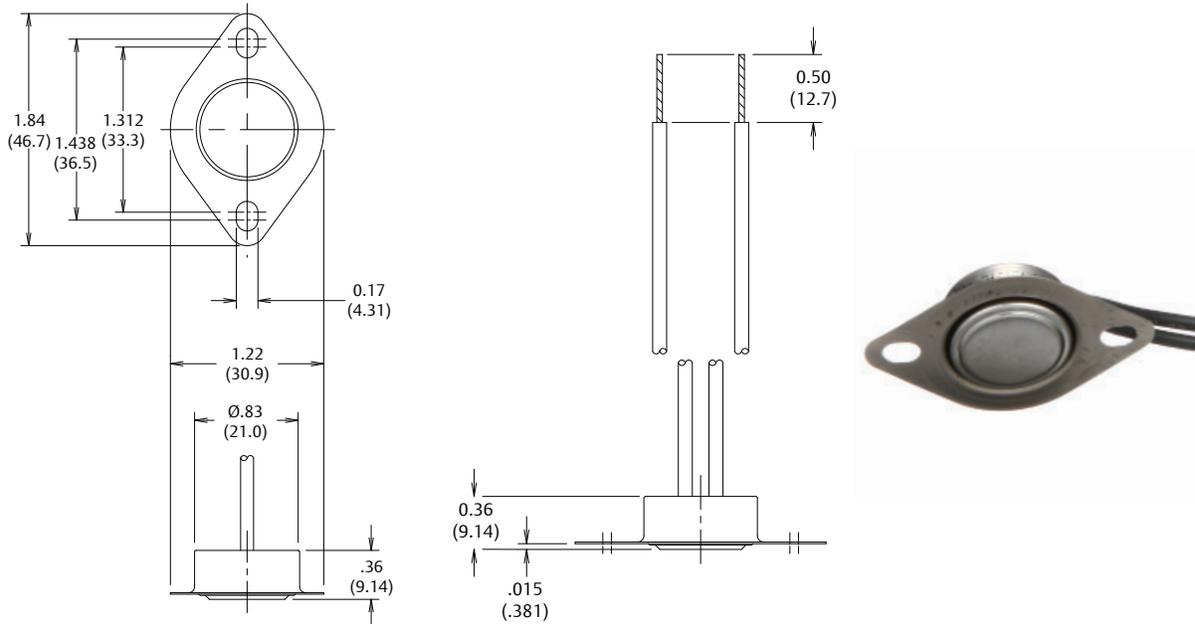


Figure 1  
Dimensions are shown in inches and (millimeters).  
**Surface Mounting**

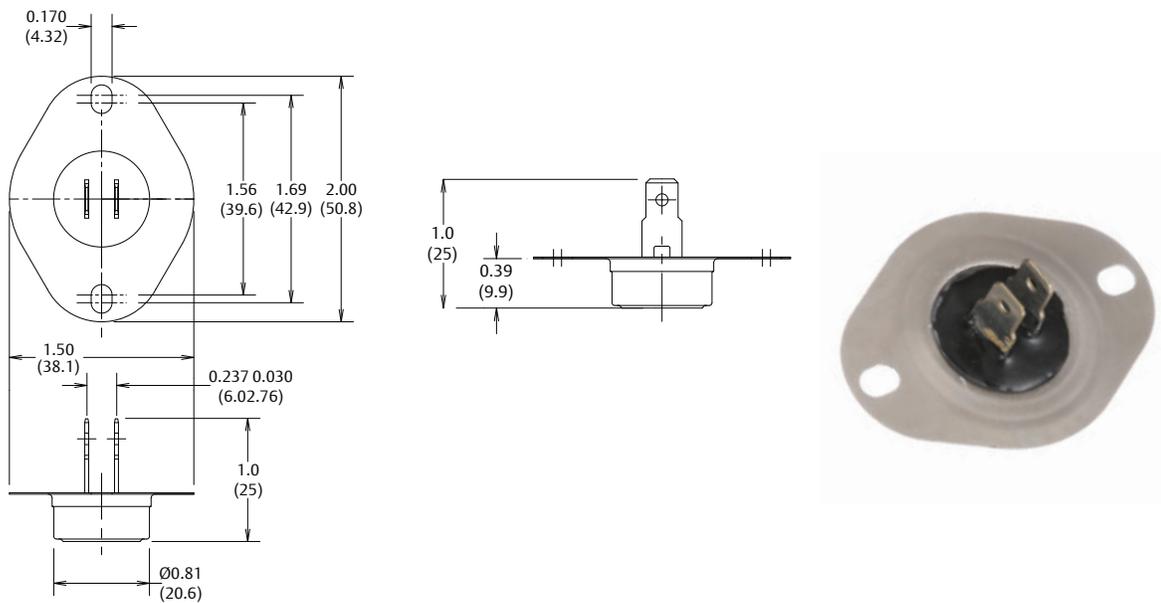


Figure 2  
Dimensions are shown in inches and (millimeters).  
**Airstream Mounting**

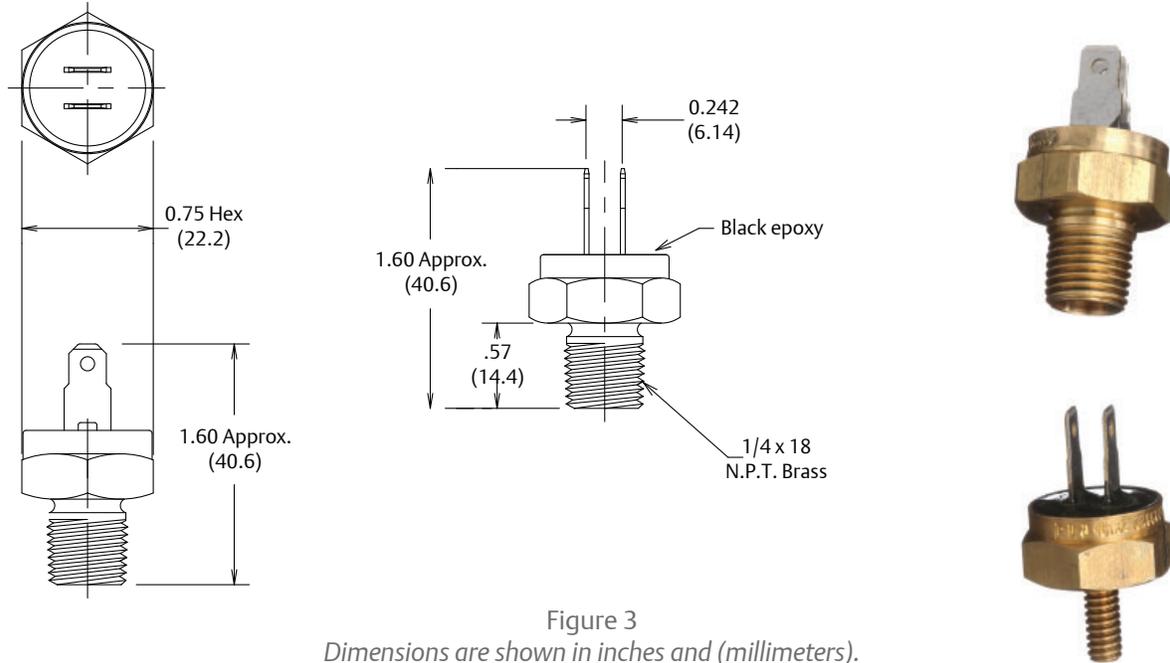


Figure 3  
 Dimensions are shown in inches and (millimeters).  
**Stud Mounting**

### 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.

Thermostat Type	Max. Temperature	Comments	Cycle Rating	Pilot amps	Resistive amps	Volts AC	Agency Recognition
44T	300°F	Gold Contacts	100,000	- 40	1.0 -	12VDC 26	UL File MH-5304
44F			Fuse	- 40	1.0 -	12VDC 26	
44TA			100,000	40	-	26	UL
44FA			Fuse	40	-	26	File MH-5304
44T	300°F	Gold Contacts Gas Appliance Thermostat	100,000	- 40	1.0 -	12VDC 26	CSA Z21.23
44TG	200°F	Gold Contacts Automatic Gas Shut-off device, 120°F min. reclose	100	- 40	1.0 -	12VDC 26	CSA Z21.22
48T			100,000		10	14VDC	

\*Consolidated ratings. For complete and current ratings, please contact a sales engineer.

## Calibration Temperatures and Tolerance 44T/48T

Open Temperature	Open Tolerance	Prime Differential *
120°-200°F (48.9°-93.3°C)	± 8°F (± 4.4°C)	20°-50°F (11.1°-27.8°C)
201°-250°F (93.9°-121.1°C)	± 10°F (± 5.6°C)	30°-50°F (16.7°-27.8°C)
251°-300°F (121.7°-148.9°C)	± 12°F (± 6.7°C)	30°-50°F (16.7°-27.8°C)

\* Prime Differential = The difference between the nominal opening temperature and the minimum reset temperature.

### Calibration Example

Normally closed, open on temperature rise.

Open = 190°±8°F

40°F Prime Differential

This specification means that the thermostat will open its contacts at 190°±8°F and reclose at a temperature not lower than 190°-40°F = 150°F.

### Typical Temperature Switch Configurations

Therm-O-Disc can supply our 44T/48T Temperature Switches in a wide variety of configurations. Some specifications are shown on the “Typical Configurations” chart. According to specific applications, switches with different mountings, diameters, thread types, connections and housings are available. Our sales engineers can assist in selecting a switch package that is tailored to specific requirements.

For testing purposes, calibrated samples and/or equal mass thermocouple samples can be provided.

Please contact one of our Sales Engineers for details.

#### 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.

# 49T/49F Series Snap-Action Temperature Controls



## Snap-Action Temperature Controls

The 49T line of controls from Therm-O-Disc offers proven 3/4" (19mm) bimetal disc reliability in a high temperature package. The ceramic design of the 49T control, along with the snap action of the bimetal disc, provides exceptional life characteristics at calibrations up to 550°F (288°C).

The bimetal disc housing may be either enclosed for protection from contaminants or exposed for greater thermal sensitivity. To ensure electrical integrity, terminal connections are made with #8 terminal screws. The ability to handle electrical loads up to 25 amps at high temperatures has made the Therm-O-Disc 49T a popular choice with heating and major appliance manufacturers.



## Features and Benefits

The 49T series features include:

- Ceramic construction for high-temperature operation up to 550°F (288°C).
- Snap-action bimetal disc for high-speed contact separation.
- Available with an exposed or enclosed bimetal disc in either increased thermal response or protection from airborne contaminants.
- Welded construction for integrity of current-carrying components.



## Switch Actions and Typical Applications

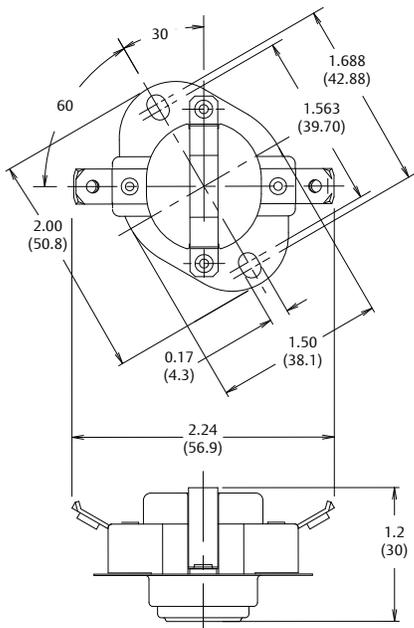
The 49T is an automatic reset single pole, single throw (SPST) switch that can be built to either open or close its electrical contacts on temperature rise. Once the temperature in the application has returned to the specified reset calibration, the switch will automatically return to its original state.

Typical uses of the Therm-O-Disc 49T include limiting or regulating temperatures in appliances and heating systems. This reliable, economical switch also provides temperature control in a variety of commercial and industrial applications. Airstream or surface mounting flanges are available with the 49T and are interchangeable with the Therm-O-Disc 60T series of temperature controls.

## Mounting Configurations

**Airstream Mounting** – In this mounting configuration, the bimetal disc sensing element protrudes through the mounting surface where the temperature being sensed is contained within an enclosure (air duct, heater box, etc.), (see figure 1).

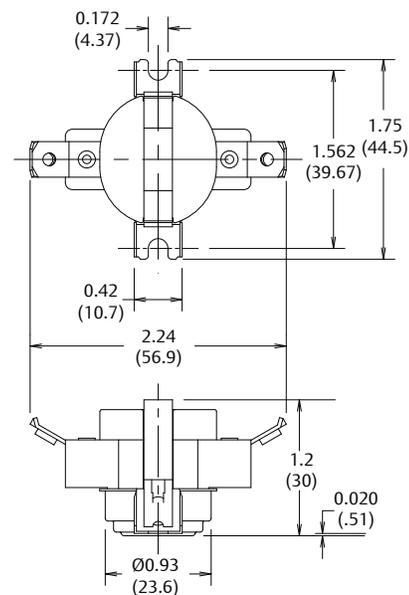
**Surface Mounting** – The surface mounting configuration positions the bimetal disc sensing element firmly against the mounting surface, thereby sensing the actual mounting surface temperature (see figure 2).



**Figure 1**

**Airstream Mount**

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



**Figure 2**

**Surface Mounting**

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



## Calibration Temperatures, Differentials and Standard Tolerances of the 49T Series

Highest Calibration Set Point Range (Open or Close)	Nominal Differentials (nominal open and close set point)											
	20-29 °F 11.1-16.1 °C		30-39 °F 16.7-21.7 °C		40-49 °F 22.2-27.2 °C		50-59 °F 27.8-32.8 °C		40-59 °F 22.2-32.8 °C		60-90 °F 33.3-50.0 °C	
	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close
80°-200°F 26.7°-93.3°C	±5°F ±2.8°C	±6°F ±3.3°C	±5°F ±2.8°C	±7°F ±3.9°C	±6°F ±3.3°C	±8°F ±4.4°C	-	-	-	-	-	-
201°-250°F 93.9°-121.1°C	±6°F ±3.3°C	±7°F ±3.9°C	±6°F ±3.3°C	±8°F ±4.4°C	±7°F ±3.9°C	±9°F ±5.0°C	-	-	-	-	-	-
251°-300°F 121.7°-148.9°C	-	-	±7°F ±3.9°C	±10°F ±5.6°C	±8°F ±4.4°C	±15°F ±8.3°C	±8°F ±4.4°C	±15°F ±8.3°C	-	-	-	-
301°-350°F 149.4°-176.7°C	-	-	±8°F ±4.4°C	±15°F ±8.3°C	±9°F ±5.0°C	±20°F ±11.1°C	±9°F ±5.0°C	±20°F ±11.1°C	-	-	-	-
351°-400°F 177.2°-204.4°C	-	-	-	-	-	-	-	-	±10°F ±5.6°C	±20°F ±11.1°C	-	-
401°-450°F 205.0°-232.2°C	-	-	-	-	-	-	-	-	±15°F ±8.3°C	±20°F ±11.1°C	-	-
451°-500°F 232.8°-260.0°C	-	-	-	-	-	-	-	-	±20°F ±11.1°C	±25°F ±13.9°C	±20°F ±11.1°C	±25°F ±13.9°C
501°-550°F 260.6°-287.8°C	-	-	-	-	-	-	-	-	±25°F ±13.9°C	±30°F ±16.7°C	±25°F ±13.9°C	±30°F ±16.7°C

### Type 49F One shot Fuse Disc

The 49F is identical in construction to the 49T automatic reset, except that it's bimetal disc is calibrated to reclose at -31°F (-35°C) maximum.

It is available with the same disc housings: airstream or surface, enclosed or exposed, as the 49T.

Screw terminals are also supplied

It is an excellent choice as a primary or back up limit in applications with high temperature such as cooking appliances.

### 49F Calibration Temperatures and Tolerances

Open Temperature	Tolerance
80 °F- 200 °F (28 °-93 °C)	±8°F (±4.5°C)
201 °F-300 °F (94 °C-149 °C)	±10°F(±5.5°C)
301 °F-550 °F (150 °C-288 °C)	±25°F (±13.9°C)



## General Electrical Ratings- 49T/49F

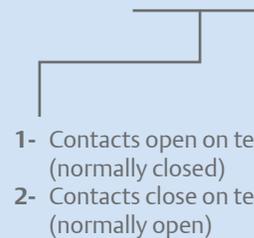
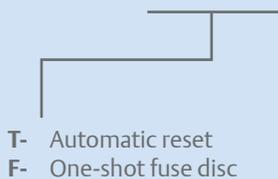
The agency ratings can be used as a guide when evaluating specific applications. However, the mechanical, electrical, thermal and environmental conditions to which a control may be exposed in an application may differ significantly from agency test conditions. Therefore, the user must not rely solely 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.

Thermostat Type	Max Temp.	Volts AC	Inductive Amps		Pilot Duty VA	Resistive Amperes	Cycles	Agency Recognition
			FLA	LRA				
49T Auto Reset	550°F (288°C)	250	-	-	-	25	100,000	UL File MH-5304
		277	-	-	-	15	100,000	
		120	10	60	125	-	100,000	
		240	5	30	125	-	100,000	
49T Auto Reset	550°F (288°C)	277	-	-	-	15	100,000	CSA File LR19988
		120	10	60	125	-	100,000	
		240	5	30	125	-	100,000	
		277	-	-	-	25	6,000	
49F One-Shot Fuse Disc	550°F (288°C)	250	-	-	-	25	1	UL/CB IEC60730-1 Reference 99NK43584-053000
49F One-Shot Fuse	550°F (288°C)	250	-	-	-	25	1	CSA File LR10281C
49F One-Shot Fuse Disc	550°F (288°C)	250	-	-	-	10	1	VDE Certificate 400338916

Note: At thermostat end-of-life, the contacts may remain closed or open. Please contact our Sales Engineering Department for specific agency ratings.

## Part Numbering System

# 49



### 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.

# 58T Series Adjustable Temperature Controls



## Adjustable Temperature Controls

The 58T line of adjustable temperature controls from Therm-O-Disc is designed for applications requiring accurate calibration tolerances and narrow temperature differential. The bimetal disc design of the 58T provides instantaneous “snap-action” contact operation, which offers excellent reliability under heavy electrical load conditions – 277VAC, 25 amps resistive and 20 amps inductive.



## Features and Benefits

The 58T series features include:

- Tight calibration and differential tolerances provide accurate temperature control.
- Instantaneous contact separation provides excellent reliability for use in applications with heavy inductive or resistive electrical loads.
- A wide variety of mounting brackets, adjusting stems, terminals and lead wires provide excellent design flexibility.

## Typical Applications

Typical applications include electric baseboard heaters, room air conditioners, portable and built-in electric heaters and attic ventilator fans.

## Switch Actions

The 58T cycling contacts are single pole, single throw (SPST). They can be provided to open on temperature rise and close on temperature fall, as required for electric heat applications; or to close on temperature rise and open on temperature fall, as required for ventilator fans or room air conditioners.

The 58T is available with auxiliary mechanically operated contacts to provide either a double pole break in the “off” position for electric heat applications or a “fan on only” feature.

## Thermal Characteristics

**Calibration** – The 58T can be calibrated at any temperature from 30°F (-1°C) to 165°F (74°C). Our preferred calibration tolerance is  $\pm 5^\circ\text{F}$  ( $\pm 2.8^\circ\text{C}$ ), with tighter tolerances available when required.

**Differential** – The differential is the difference between the nominal open and close temperatures. Our preferred differential is  $7^\circ\text{F}$  ( $4^\circ\text{C}$ )  $\pm 5^\circ\text{F}$  ( $\pm 2.8^\circ\text{C}$ ). Tighter differentials are available at extra cost.

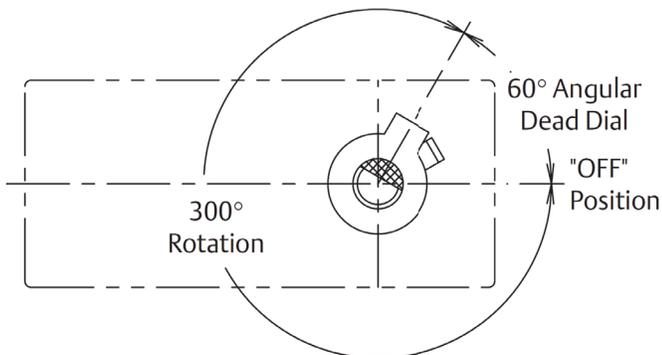
**Range** – The range is the difference between the thermostat operating temperatures measured at extremes of the set positions of the adjusting stem – full clockwise vs. full counterclockwise. The preferred range for the 58T is  $60^\circ\text{F}$  ( $35^\circ\text{C}$ ).

For more information on calibration, differentials and ranges not mentioned above, please consult one of our sales engineers.



## Calibration Positions

The desired calibration can be specified at any point on the dial. The preferred calibration position is when the adjusting stem is located clockwise against the positive stop (see figure 1).



***Stop and stem flat are shown in standard extreme clockwise position.  
High Position- open on rise switching (electric heat). Low Position- close on rise switching (air conditioning).***  
Figure 1

## Positive Off Feature

Positive off means that when the adjusting stem is turned to the off position, the contacts will not close regardless of ambient temperature. This is accomplished by a mechanical shuttle mechanism that prevents the bumper from moving and closing contacts.

58T's with positive off will have 270 degrees of usable rotation (vs. 300° without positive off).

All 58T's with 4 terminals have the mechanically operated auxiliary contacts and also have the positive off feature.

58T's with 2 terminals, (without the mechanically operated auxiliary contact) are not provided with the positive off feature unless requested by the customer. For those 58T's there is an S in the Type nomenclature designating positive off. Example: 58T1S.



## Mounting Configurations

There are a variety of mounting brackets available for the 58T. A centerline (see figure 3) or transverse (see figure 4) bracket can be used depending upon the orientation to the temperature control specified.

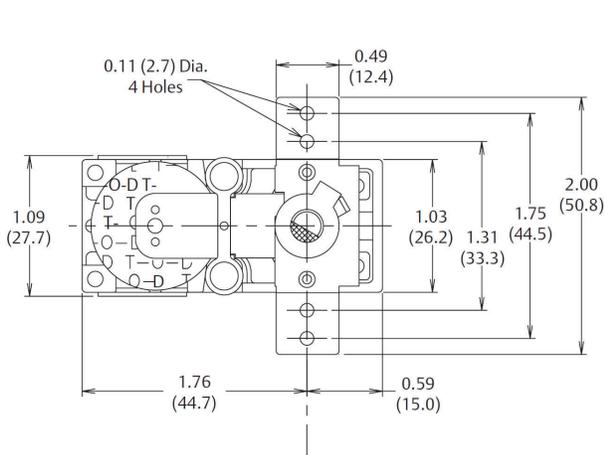


Figure 3

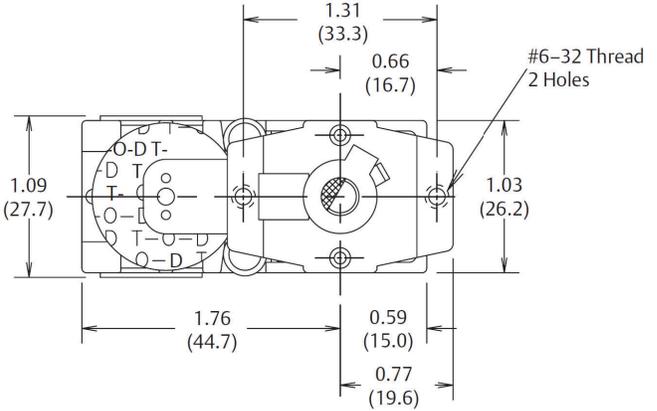


Figure 4

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

## Adjusting Stem

The adjusting stem of the 58T is available in three different standard heights: 3/8" (9.53mm), 1/2" (12.7mm) and 5/8" (15.9mm) (see figure 5). The adjusting stem can also be provided with or without a flat. The stem flat can be oriented per a specific dial requirements relative to the pointer.

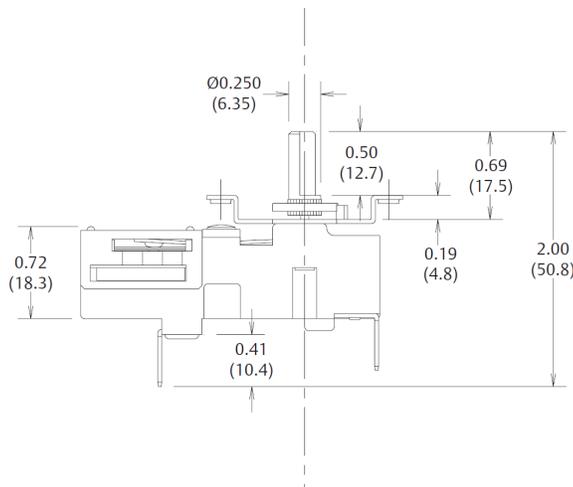


Figure 4

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

## Terminal Selection

1/4" (6.35mm), 90°, unplated brass terminals are preferred for the 58T. A variety of other blade and screw terminals, and lead wires are available.



## General Electrical Ratings

The 58T series from Therm-O-Disc is both UL and CSA recognized.

Thermostat Type	Volts AC	Resistive Amperes	Inductive Amperes		Pilot Duty VA	Max. Temperature	Cycles	Agency Recognition
			FLA	LRA				
58T (Max 25 Amps)	277	25	20	90	720	150°F (65.5°C)	100,000	UL E19279
	240	10	-	-	-	165°F (74°C)	30,000	
	480	10	10	45	720	150°F (65.5°C)	30,000	
	120	-	9	48	-	150°F (65.5°C)	30,000	
58TV (Max 22 Amps)	277	22	-	-	-	150°F (65.5°C)	30,000	
	350	15.5	-	-	-	150°F (65.5°C)	30,000	
	600	10	-	-	-	150°F (65.5°C)	30,000	
	240	22	-	-	-	150°F (65.5°C)	100,000	
	277	18	-	-	-	150°F (65.5°C)	100,000	
58T,TV	277	25	20	90	720	150°F (65.5°C)	30,000	
	240	10	-	-	-	165°F (74°C)	30,000	
	600	10	-	-	-	150°F (65.5°C)	30,000	

## Part Numbering System

# 58T

- 
- 1- Cycline contacts - open on temperature rise
  - 2- Cycling contacts - close on temperature rise

V- (Max. 22 Amp. construction)

- 
- D- Auxiliary contacts, positive off
  - S- Single pole, positive off

### 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.

# 59T, 66T Series Electric Water Heater Controls



## Snap-Action Bimetal Discs in Both Controls

The 59T and 66T series controls are designed to meet the high electrical capacity requirements of electric water heaters. Both use a temperature sensitive bimetal disc to deliver snap-action to the contacts. The speed and force of contact separation provides long-dependable control life at high electrical loads.

## Features and Benefits

The 59T and 66T series features include:

- The 59T mounting tabs snap into the customer's bracket to mount the thermostat on the surface of the tank
- The M2 trip free manual reset 66T limit control is available with non-adjustable calibrations from 160° to 235°F (71° to 113°C)
- The 59T has an adjustable range of approximately 60°F (33°C)  
The lowest adjustable limit is 90°F (32°C) and the highest adjustable limit is 200°F (93°C)
- Controls are 100% operation checked



## Switch Actions

The 59T is available in two switch actions:

Automatic reset SPST – The switch opens the normally closed contacts on temperature rise. The contacts automatically return to the closed position when temperatures return to the reset point.

Automatic reset SPDT – This operation is the same as the SPST with the addition of an auxiliary set of contacts, which make circuit upon opening of the normally closed contacts and breaks this circuit upon automatic reset.

The 66T is a manual reset DPST – The switch opens two sets of normally closed contacts on temperature rise to provide full power disconnect of both conductors. The contacts will reset to the closed position when the reset button is depressed after the control has cooled to 90°F. Once opened, until the reset button is pressed, the contacts will not automatically reset at control temperatures above 32°F (0°C).

The construction is classified as “M2 Trip Free” by the approval agencies. This design holds the contacts open in the event the reset button is held in the depressed position in an attempt to defeat the manual reset function of the thermostat.

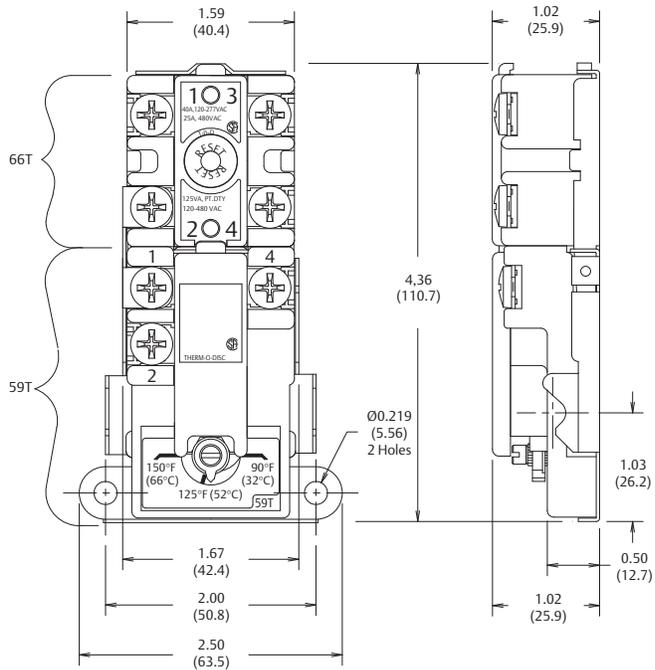


## Typical Application

The thermostats and wiring diagram (shown on next page) are typical of a residential electrical storage water heater installation using two heating elements for non-simultaneous operation. The upper electrical control is a combination 59T SPDT regulating thermostat and a 66T DPST manual reset limiting thermostat. The lower electrical control is a 59T SPST thermostat. All the thermostats sense the surface temperature of the water heater tank.

The 66T function is to provide full power disconnect (through both power conductors) in the event of an overheat condition. The 59T SPDT normally closed contacts route power to the upper heating element. When the 59T SPDT control reaches its set temperature, its switch action breaks power to the upper heating element and switches power to the lower heating element through the normally closed contacts of the 59T SPST. When its set point is satisfied, the switch action breaks power to the lower heating element.

## 59T SPDT, 66T DPST



Dimensions are shown in inches and (millimeters)

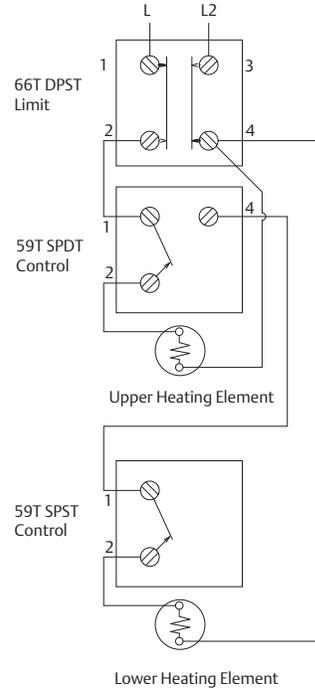
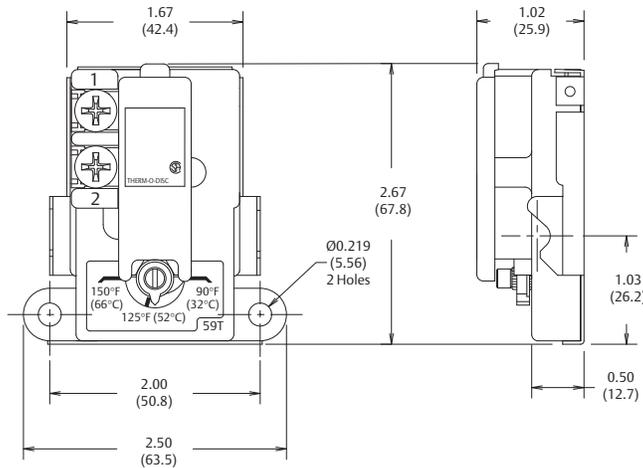


Figure 1

Double element limited demand circuit for full power disconnect through both power conductors.

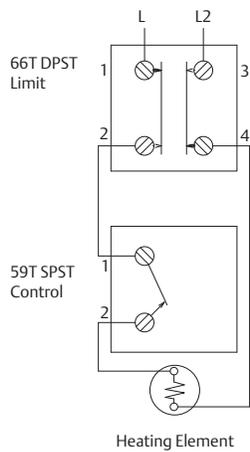
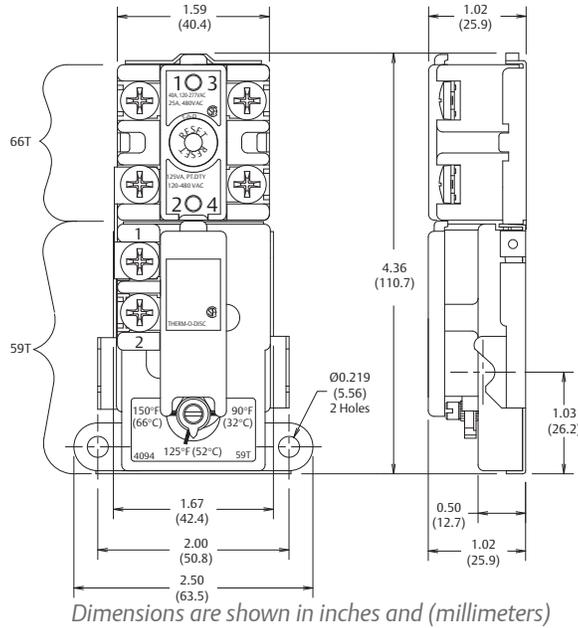
## 59T SPST



Dimensions are shown in inches and (millimeters)

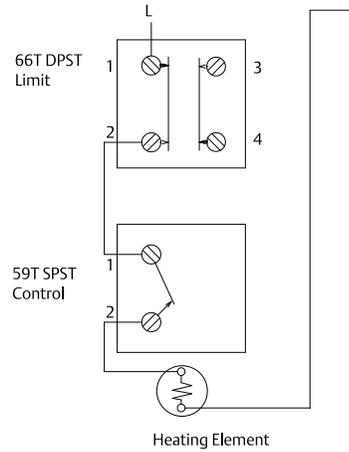
The thermostats and wiring for single element water heaters are shown below. The combination 59T SPST and 66T DPST is used in residential 240VAC applications, as well as in commercial electric water heater applications where each element may be independently controlled (see Figure 2 below). The combination 59T SPST and 66T DPST can also be used in 120VAC single element installations by leaving terminals 3 and 4 of 66T not utilized. (see Figure 3 below)

### 59T SPST, 66T DPST



**Figure 2**

240VAC Single element circuit for full power disconnect through both power conductors.



**Figure 3**

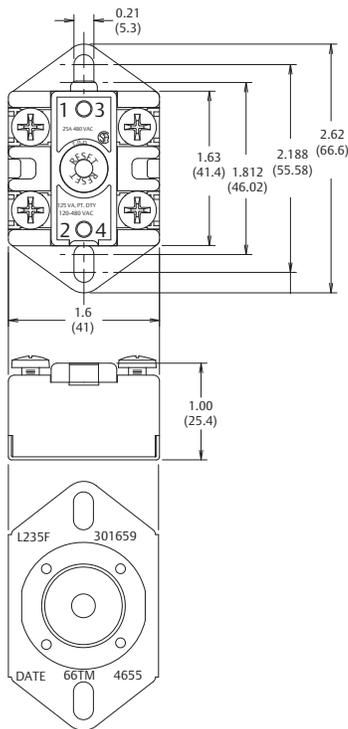
120VAC single element circuit for full power disconnect.

## 66TM Option

The 66T DPST is available with the 66TM mounting option shown below. The flanges on the backplate allow the 66TM to be screw or stud-mounted.

## Temperature Calibration

Type	Thermal Range	Factory Calibration Temps	Lowest Dial Setting	Highest Dial Setting	Temperature Differential
59T SPST	60°F (34°C)	Minimum 100°F +/- 5°F (38°C +/- 3°C) Maximum 170°F +/- 5°F (77°C +/- 3°C)	90°F (32°C)	200°F (93°C)	5-15°F (3-8°C)
59T SPDT	60°F (34°C)	Minimum 100°F +/- 5°F (38°C +/- 3°C) Maximum 170°F +/- 5°F (77°C +/- 3°C)	90°F (32°C)	200°F (93°C)	17-27°F (9-15°C)
66T DPST 66TM DPST	N/A	Minimum 160°F +/- 5°F (71°C +/- 3°C) Maximum 235°F +/- 5°F (113°C +/- 3°C)	N/A	N/A	N/A



Dimensions are shown in inches and (millimeters)

## General Electrical Ratings

The 59T, 66T 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.



Thermostat Type	Maximum Calibration Temperature	Cycles	Pilot Duty VA	Resistive Amps	Volts AC	Agency & File #
59T SPST	181°F/83°C	30,000		13.5	480	UL File # E19279 CSA File # LR10281
		100,000		30	250	
	200°F/93°C	30,000		25	277	
		30,000		12.5	480	
		30,000	125		120/480	
59T SPDT	181°F/83°C	30,000		13.5	480	UL File # E19279 CSA File # LR10281
		30,000		30	250	
	200°F/93°C	30,000		25	277	
		30,000		12.5	480	
		30,000	125		120/480	
66T or 66TM DPST	235°F/113°C	6,000		40	277	UL File # E19279 CSA File # LR10281
		6,000		25	480	
		6,000	125		120/480	
59T SPST	212°F/100°C	30,000		30	250	VDE File # 121213
		100,000		16	480	
66T or 66TM DPST	248°F/120°C	30		40	250	VDE File # 40014721
		30		30	400	
		100		30	250	
		100		16	480	
59T SPST 59T SPDT	181°F (83°C)	10,000		25	240	Intertek CB Report # 102503546DAL-001
		10,000		28.8	208	
		10,000		21.67	277	
		10,000		15.8	380	
		10,000		14.7	408	
		10,000		12.5	480	
66T DPST	200°F (93°C)	30		25	240	Intertek CB Report # 102503546DAL-001
		30		28.8	208	
		30		21.67	277	
		30		15.8	380	
		30		14.7	408	
		30		12.5	480	

### **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.

# 60T Series Snap-Action Temperature Controls



## Snap-Action Temperature Control

The 60T line of 3/4" (19mm) bimetal disc temperature controls from Therm-O-Disc offers proven reliability in a versatile, cost-effective design. The snap-action of the temperature sensing bimetal disc provides high-speed contact separation, resulting in exceptional life characteristics at electrical loads up to 25 amps at 240VAC. A wide variety of terminal and mounting configurations are available for maximum design flexibility. This unsurpassed flexibility and time proven reliability, at an affordable price, has made the Therm-O-Disc 60T the most popular and widely applied temperature control in the major appliance and heating/air conditioning industries.

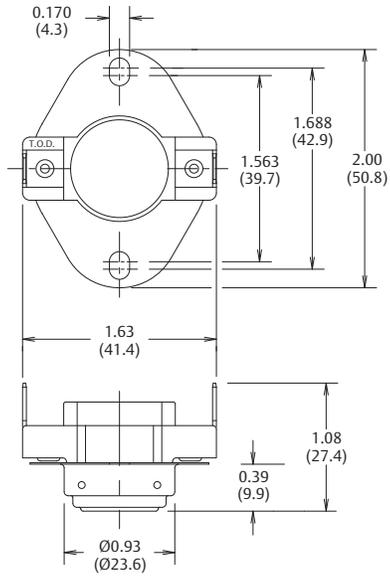
## Switch Actions and Typical Applications

The 60T is available in three switch actions:

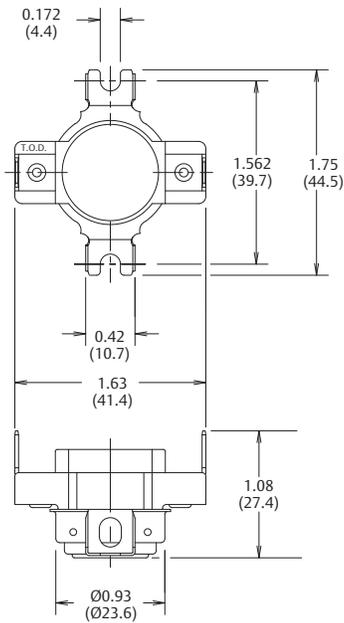
- Automatic Reset SPST
- Automatic Reset SPDT
- Manual Reset SPST (M2 Trip Free)

Automatic Reset SPST – In this design, the switch can be built to either open or close its electrical contacts on temperature rise. Once the temperature of the bimetal disc has returned to a specified reset temperature, the contacts will automatically return to their original state. Typical uses of this construction include limiting and regulating temperatures in clothes dryers and heating/air conditioning systems (see figures 1 and 2).





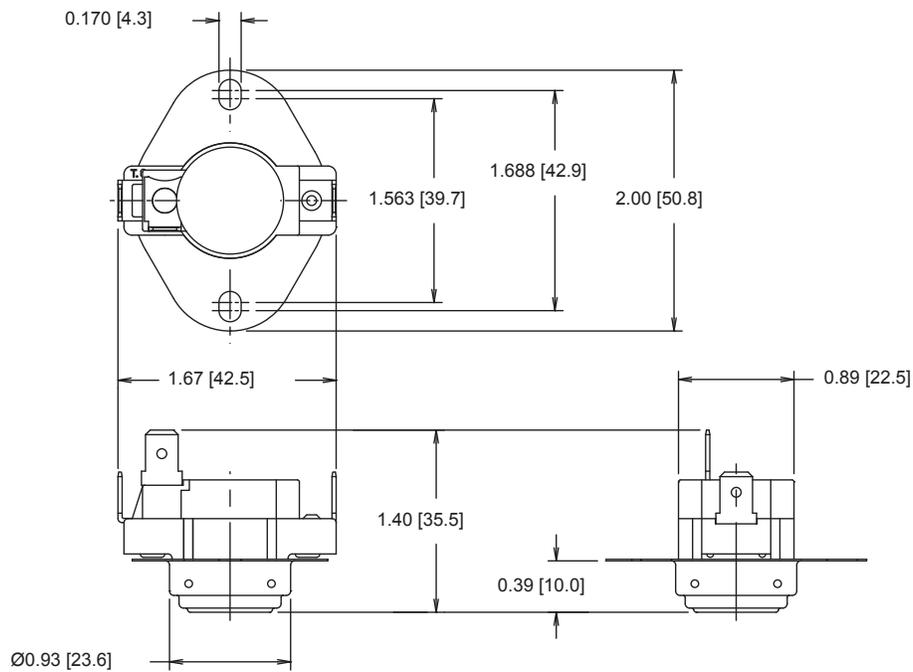
**Figure 1**  
**Airstream Mounting (enclosed)**



**Figure 2**  
**Surface Mounting (enclosed)**  
**Dimensions are shown in inches and (millimeters).**

**Automatic Reset SPDT** – This design is the same as the SPST described above with the addition of an auxiliary contact which makes circuit upon the opening of the main contacts and breaks circuit when the main contacts reset. Refer to the “General Electrical Ratings” chart for rating limitations on the auxiliary contacts. Typical uses of this construction include fan speed changeover at a specified temperature and lighting of an indicator lamp when an abnormal temperature condition has been reached (see figure 3).

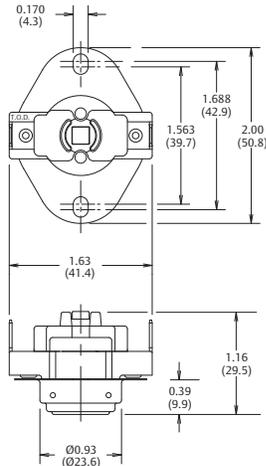
CAUTION...When designing a circuit for a single pole, double throw control, an electrical load must be applied to terminal number 2 and/or 3 to avoid a possible short circuit condition.



**Figure 3**  
**SPDT automatic reset - airstream mounting**

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

**Manual Reset SPST** – This design is available only with electrical contacts which open on temperature rise. The contacts may be manually reset after the control has cooled below the open temperature calibration. This construction is classified as ‘M2 Trip Free’ by the approval agencies. A patented design holds the contacts open in the event the reset button is held in the depressed position in an attempt to defeat the manual reset function of the thermostat. Typical uses include any temperature limiting application where operation of the thermostat should result in the user or service personnel having to attend the unit (see figure 4).



**Figure 4**  
SPST manual reset - airstream mounting

### Thermal Response

An enclosed (see Figure 5) or exposed (see Figure 6) disc may be specified with any of the airstream or surface mounting configurations. The enclosed disc construction provides greater protection than the exposed disc construction, keeping airborne contaminants such as dirt and dust from entering the control. It also protects the bimetal disc from possible physical damage during assembly and in the final application. In applications where faster response to radiant heat is required, an exposed bimetal disc or an optional matte finish disc may be specified.



**Figure 5**  
Enclosed Disc



**Figure 6**  
Exposed Disc

Dimensions are shown in inches and (millimeters).

## Mounting Configurations

The 60T is available in an airstream or a surface mount configuration:

**Airstream Mounting** – This mounting configuration positions the bimetal disc through a hole in the mounting surface to sense temperature within an enclosure such as a heater box or air duct. The standard configuration (see figure 1) positions the bimetal disc .39” (9.9mm) into the airstream while an optional version (see figure 5) positions the bimetal disc .78” (19.8mm) into the airstream. Airstream configurations may be specified with a flange (see figure 5) or without a flange (see figure 6) to suit specific application needs.

**Surface Mounting** – This optional mounting configuration positions the bimetal disc firmly against the mounting surface to sense the actual mounting surface temperature.

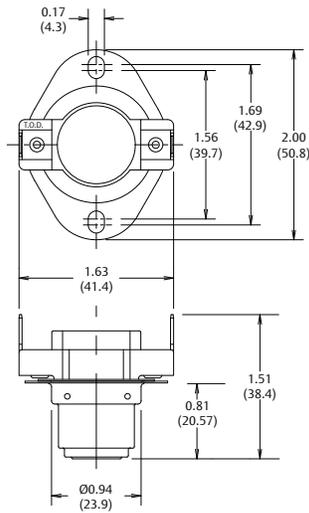


Figure 5

### SPST Airstream Mounting - Deep Disc Cup

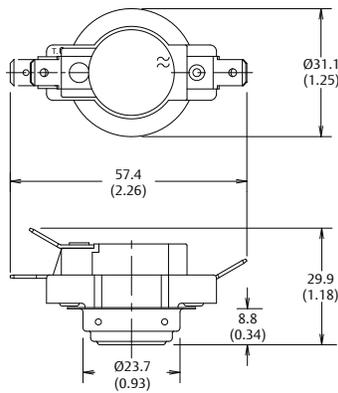


Figure 6

### SPDT Airstream - No Flange

Dimensions are shown in inches and (millimeters).

## Terminal Configurations

**Standard Terminals** – Standard terminations for the 60T are .250" x .032" (6.3 x .8mm) tin-plated brass blade terminals formed at 90 angular degrees to the thermostat mounting surface. Terminal angles of 0 and 30 degrees can also be provided (see below).



0° Terminal Angle



90° Terminal Angle



30° Terminal Angle

### Blade Terminal Angles

**Non-Standard Terminals** – The 60T can also be provided with a variety of optional terminals. Some of the more common variations include .188" (4.8mm) blade terminals, 8-32 screw terminals and fork terminals. Unique variations are also available (see below).



### Non-Standard Terminals

## Terminal Orientation

For added flexibility, the orientation of the terminals with respect to the mounting bracket can be specified in 45 angular degree increments (see below).



Terminals 90° to mounting holes (standard)



Terminals 45° **clockwise** to mounting holes



Terminals 45° **counterclockwise** to mounting holes

### Terminal to Mounting Bracket Orientation

## Calibration Temperatures, Differentials and Tolerances

To use the calibration chart, locate the range in the left hand column, in which the highest calibration set point (open or close) falls. Locate across the top, the range in which the nominal differential falls. The standard open and close set point tolerances are shown where the two columns converge. The chart also indicates what differentials are available in each of the calibration set point ranges. Tighter open and close tolerances are available at added cost. Thermocouple samples can be provided to assist in determining the appropriate calibration temperature for specific application.



For more information on tightened tolerances or availability of differentials not listed in the chart, please consult one of our sales engineers.

## Calibration Temperatures, Differentials and Standard Tolerance for the 60T Series

Highest Calibration Set Point (Open or Close)	NOMINAL DIFFERENTIAL (temperature difference between nominal open and close set point)													
	10-14°F 5.5-8°C		15-19°F 8.5-10.5°C		20-29°F 11-16°C		30-39°F 16.5-21.5°C		40-49°F 22-33°C		50-80°F 33.5-44.5°C		Manual Reset 34-44.5°C	
	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close
0°-79°F -18°-26°C	±6 ±3.5	±6 ±3.5	±6 ±3.5	±6 ±3.5	±6 ±3.5	±6 ±3.5	±6 ±3.5	±7 ±4	±6 ±3.5	±8 ±4.5	±7 ±4	±8 ±4.5	-	-
80°-200°F 28°-93°C	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±6 ±3.5	±5 ±3	±7 ±4	±6 ±3.5	±8 ±4.5	±8 ±4.5	<- 31 <-35
201°-250°F 94°-121°C	-	-	±5 ±3	±6 ±3.5	±5 ±3	±6 ±3.5	±5 ±3	±7 ±4	±6 ±3.5	±8 ±4.5	±7 ±4	±9 ±5	±7 ±4	<- 31 <-35
251°-300°F 122°-149°C	-	-	-	-	±6 ±3.5	±8 ±4.5	±6 ±3.5	±8 ±4.5	±7 ±4	±10 ±5.5	±8 ±4.5	±11 ±6	±8 ±4.5	<- 31 <-35
301°-350°F 150°-177°C	-	-	-	-	±7 ±4	±9 ±5	±7 ±4	±10 ±5.5	±8 ±4.5	±12 ±6.5	±9 ±5	±13 ±7	±9 ±5	<- 31 <-35

**NOTES:** Tighter tolerances and/or differentials than those listed in the chart are also available. Please consult a Therm-O-Disc sales engineer for assistance.

## General Electrical Ratings

The 60T series of controls has been rated by major agencies throughout the world including UL, CSA, VDE, CQC, and KETI. 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 solely rely on agency ratings, but must perform adequate testing to confirm that the control will operate as intended in the users' application.

The first table below summarizes many of our UL / CSA ratings. The maximum nominal open temperature is 350°F (175°C). The auto reset ratings shown are 100,000 cycles and the manual reset ratings shown are 6,000 cycles.

The second table below summarizes many of our VDE ratings. The maximum nominal open temperature is 350°F (175°C).

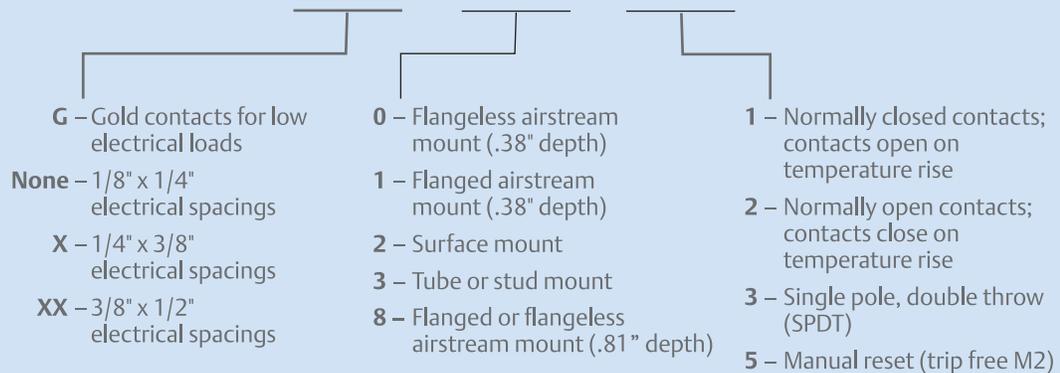
Thermostat Type	Contact Arrangement	Inductive Amps		Pilot Duty	Resistive Amps	Volts AC	Agency Recognition
		FLA	LRA	VA			
60T Auto Reset	Contacts 1 & 3 SPST or SPDT	10	60	125	25	120	UL E19279
		5	30	125	25	240	
		-	-	125	21.6	277	
		-	-	125	12.5	480	
		2	12	400	10	600	
60T Auto Reset	Contacts 1 & 2 SPDT	-	-	125	-	277	
		5.8	34.8	-	10	120*	
		2.9	17.4	-	10	240*	
60T Manual Reset	Contacts 1&3	-	-	-	25	277	
		0.65	3.9	125	12.5	480	
		5.5	33	1061	-	480	
60T Auto Reset	Contacts 1 & 3 SPST or SPDT	2	12	400	10	600	
		10	60	125	25	120	
		5	30	125	25	240	
		-	-	125	21.6	277	
		-	-	125	12.5	480	
60T Auto Reset	Contacts 1 & 2 SPDT	2	12	400	10	600	
		-	-	125	-	277	
		5.8	34.8	-	10	120*	
60T Manual Reset	Contacts 1&3	2.9	17.4	-	10	240*	
		-	-	-	25	277	
		0.65	3.9	125	12.5	480	
60T Manual Reset	Contacts 1&3	5.5	33	1061	-	480	
		2	12	400	10	600	
		-	-	-	-	-	

\*6000 cycles

Thermostat Type	Contact Arrangement	Inductive amps FLA	Resistive amps	Voltage VAC	Cycles	Agency Recognition
60T Auto Reset SPST	Contacts 1 & 3 SPST	3.3	16	250	100,000	VDE 40021320
		3.3	16	400	1,000	
		3.3	25	250	100,000	
		-	45	250	6,000	
60T Auto Reset SPDT	Contacts 1&3 SPDT	3.3	25	250	10,000	
	Contacts 1&2 SPDT	2.2	5	250	10,000	
60T Manual Reset	Contacts 1 & 3	3.3	16	250	1,000	
		3.3	25	250	300	
		-	37.5	250	300	

## Part Numbering System

# 60T



**Example:** 60TG11=60T control with gold contacts, airstream mounting bracket and normally closed contacts that open on temperature rise.



### 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.

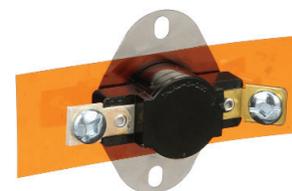
A control may remain permanently closed or open as a result of exposure to excessive mechanical, electrical, thermal or environmental conditions or at normal end-of-life. If failure of the control to operate could result in personal injury or property damage, the user should incorporate supplemental 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.

# 60F, 61F Series Snap-Action *One-Shot* Temperature Controls



## Snap-Action Temperature Controls

The 60F and 61F line of 3/4" (19mm) bimetals disc temperature limit controls offer reliable "one shot" operation at temperatures up to 350°F (177°C). Utilizing the same bimetals temperature sensing principle as the 60T automatic reset control, the 60F and 61F permit a uniform approach to the application of temperature limits. A wide variety of terminal and mounting configurations are available to give maximum design flexibility. Rated for electrical loads up to 25 amps at 600VAC (60F) and 49 amps at 600VAC (61F), these temperature limit controls provide unsurpassed over-temperature protection in a non-resettable design.



## Features and Benefits

The 60F/61F series features include:

- Single operation for reliable, non-resettable, temperature limiting.
- Special Kapton insulator for application voltages up to 600VAC.
- Snap-action bimetal disc for high-speed contact separation.
- Welded construction for integrity of current-carrying components.
- A wide variety of terminal and mounting options for design flexibility.
- Available with an exposed or enclosed bimetal disc for either increased thermal response or protection from airborne contaminants.

## Switch Actions and Typical Applications

The 60F and 61F are single pole, single throw (SPST) switches designed to open their electrical contacts on temperature rise. Once the switch has operated, the unique bimetal “fuse” disc prevents reset of the contacts to their original state at temperatures above -31°F (-35°C). The 60F reflects the same 25 Amp contact rating found in the 60T automatic reset series while the 61F provides a higher current-carrying construction for 49 Amp capability. The Therm-O-Disc 60F and 61F are typically utilized as primary or secondary temperature limits in electric heating equipment.

## Mounting Brackets

The 60F and 61F are available in either flangeless (see figure 1) or flanged (see figure 2) airstream mount configurations. Airstream mounting is typically used in applications where the temperature being sensed is contained within an enclosure such as an air duct or heater box. An optional surface mount configuration is available for applications where the temperature being sensed is the actual mounting surface. Exposed or enclosed bimetal disc mounting versions may be specified with any of the mounting configurations.

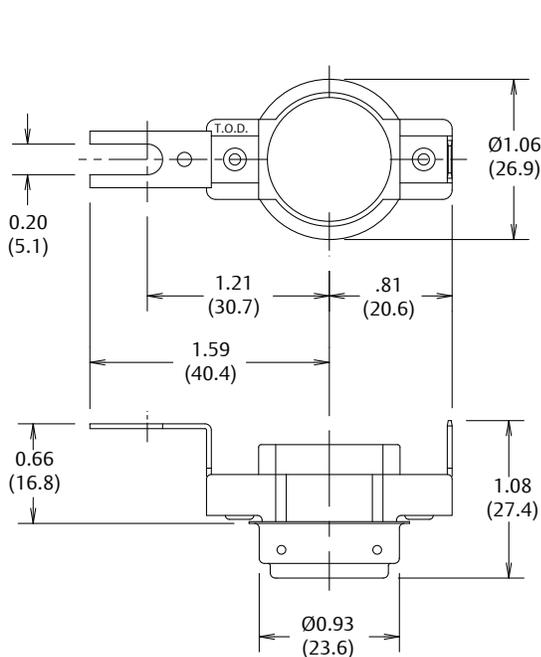


Figure 1

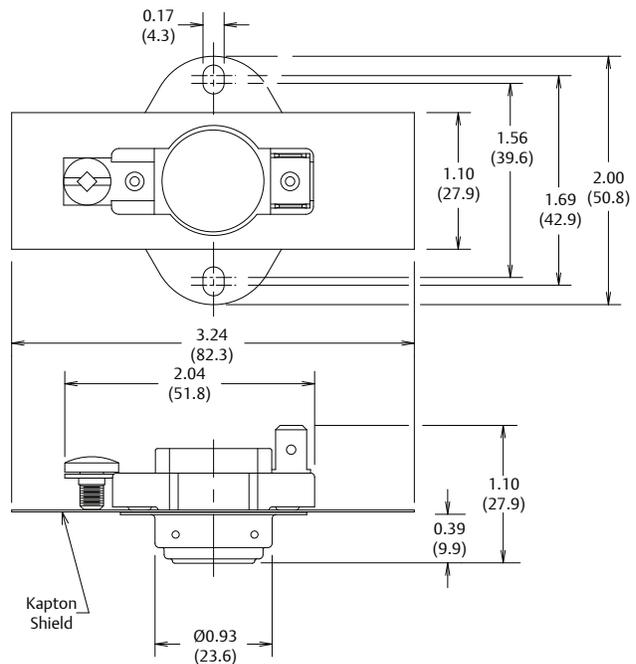


Figure 2

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

## Terminal Configurations

Standard terminations for the 60F are .250" x .032" (6.35mm x .81mm) tin-plated brass blades. The 61F is provided with a 10-32 screw and double .250" x .032" (6.35mm x .81mm) blade combination. Optional configurations, which include fork, screw and double blade terminations, are available at additional cost.

## General Electrical Ratings

The 60F, 61F series of controls has been rated by UL, CSA, VDE, and CQC. 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.

Thermostat Type	Inductive Amps		Pilot Duty	Resistive Amps	Volts	Agency Recognition
	FLA	LRA				
60F SPST	-	-	500	25	600VAC	UL MH5304 CSA LR10281C
	14	72	-	25	240VAC	UL MH5304
	-	-	-	45*	250VAC	VDE 135009
	-	-	-	5	24VDC	VDE135009
61F SPST	12	72	-	49	240VAC	UL MH5304
	-	-	1000	48	600VAC	UL MH5304 CSA LR10281C

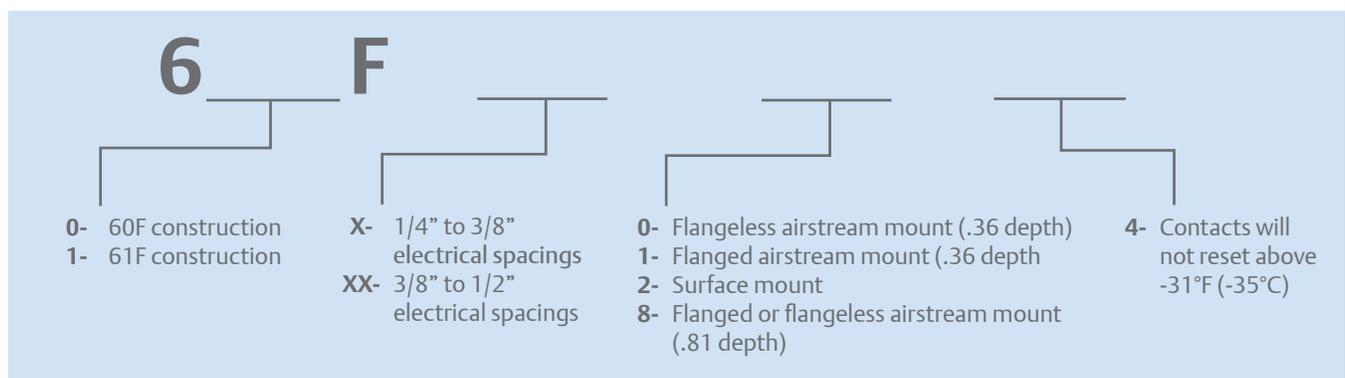
\*Requires Screw Terminals Above 25 Amps.

## Calibration Temperatures and Tolerances

Thermostat Type	Opening Temperature Tolerances		
	80°-200°F (28°-93°C)	201°-300°F (94°-149°C)	301°-350°F (150°-177°C)
60F,61F	±8° (±4.5°C)	±10°F (±5.5°C)	±12°F (±6.5°C)



## Part Numbering System



### **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.

# 64T/64F Series Snap-Action Temperature Controls



## Snap-Action Temperature Controls

The 64T line of temperature controls from Therm-O-Disc combines a double pole, single throw (DPST) switch mechanism with a 3/4" (19mm) bimetal disc to provide simultaneous operation of two separate electrical circuits. Available in calibrations from 80°F to 350°F (28°C to 177°C) and nominal differentials from 30°F to 80°F (16.5°C to 44.5°C), the 64T provides excellent life characteristics at electrical loads up to 25 amps at 240VAC. A wide variety of terminal and mounting configurations are available for design flexibility.



## Features and Benefits

The 64T series features include:

- Double pole, single throw switch configuration.
- Auto-reset switch action with nominal differentials from 30°F to 80°F (16.5°C to 44.5°C).
- Snap-action bimetal disc for high-speed contact separation.
- Available with an exposed or enclosed bimetal disc in either surface or airstream mounting configurations.
- Welded construction for integrity of current-carrying-components.

## Switch Actions and Typical Applications

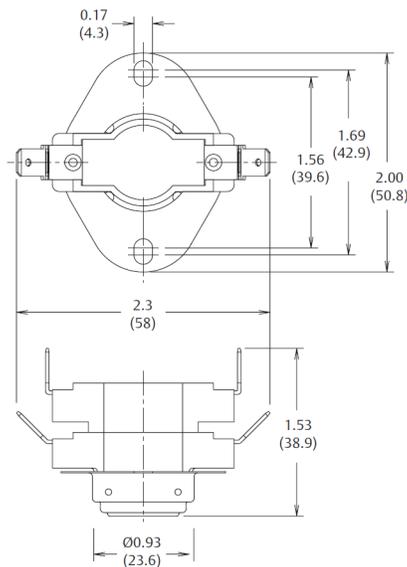
The 64T is an automatic reset double pole, single throw (DPST) switch that can be built to either open or close two independent sets of contacts on temperature rise. Once the temperature falls to the specified reset calibration, the contacts automatically return to their original state. A “two stage” switch configuration allows simultaneous switching of two independent circuits with a single bimetal disc. The 64T is typically utilized to limit temperatures of heating elements in electric furnaces and clothes dryers.

## Electrical Spacings

The 64T has electrical spacings of 1/8” (3.18mm) through air and 1/4” (6.3mm) over surface. Increased electrical spacings of 1/4” x 3/8” (6.3mm x 9.53mm) (64TX) and 3/8” x 1/2” (9.53mm x 12.70mm) (64TXX) are available.

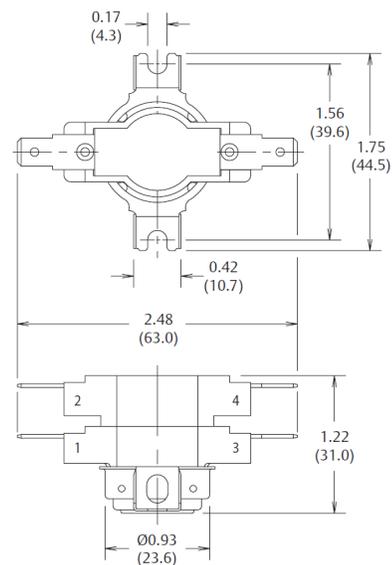
## Mounting Configurations

The 64T is available in either airstream (see figure 1) or surface (see figure 2) mount configurations. Exposed or enclosed bimetal disc versions may be specified with any of the mounting configurations.



Airstream Mounting  
Figure 1

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



SPST Surface Mounting  
Figure 2

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

## Terminal Configurations

Standard terminations for the 64T are .250" x .032" (6.3mm x .8mm) tin-plated brass blades.

Terminal form angles of 0, 45 and 90 degrees are available. (90° available only on top stage)



## General Electrical Ratings

The 64T 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.

Inductive Amps		Pilot Duty VA	Resistive Am-peres	Volts AC	Cycles Rating	Agency Recognition
FLA	LRA					
10	60	480	25	120	100,000	UL
5	30	480	25	240	100,000	File MH-5304
2.5	15	480	20	300	100,000	CSA
-	-	480	10	600*	100,000	File LR62036

Note: At thermostat end-of-life, the contacts may remain permanently open or closed  
 \*600VAC rating at CSA only.

## Calibration Temperatures, Differentials and Standard Tolerances of the 64T Series

Highest Calibration Set point (Open or Close)	Standard Tolerances	
	Open	Close
0°-79°F (-18°-26°C)	±6°F (±3.3°C)	±8°F (±4.4°C)
80°-200°F (28°-93°C)	±5°F (±2.8°C)	±9°F (±5.0°C)
201°-250°F (94°-121°C)	±6°F (±3.3°C)	±11°F (±6.1°C)
251°-300°F (122°-149°C)	±7°F (±3.9°C)	±12°F (±6.7°)
301°-350°F (150°-177°C)	±10°F (±5.6°C)	±16°F (±8.9°C)

Note: 30°-80°F (16.7°- 44.4°C) nominal differential available.

## Type 64F- One Shot Fuse Disc

The 64F is identical in construction to the 64T auto reset, except the bimetal disc is calibrated to close no higher than -31F (-35C). It is useful for agency required backup limits where space is at premium.

It is available in both airstream and surface mount, and also with enclosed or exposed disc, same as the 64T.

Due to the 600VAC/ 40 amp rating, the 64F must be supplied with double blade tin-plated brass terminals. The upper terminals are 1/4" 90°, and the lower terminals are 1/4" 30° (see picture).



64F with double terminals

## 64F Agency Electrical Ratings

Resistive Amps	Volts AC	Cycles of Operation	Agency Recognition
40	600	1	UL/CULE19279

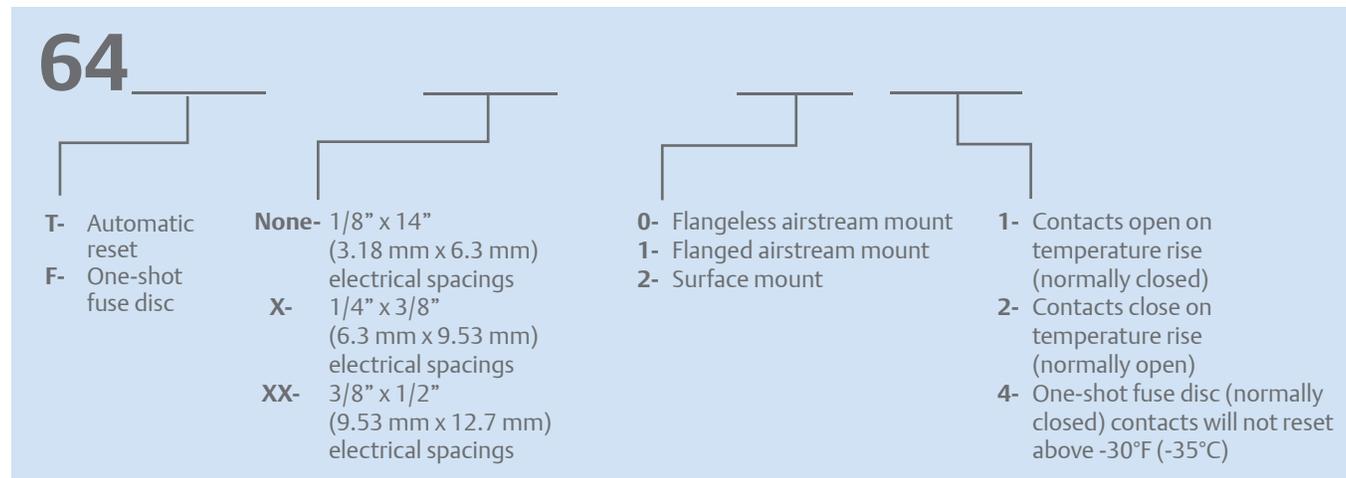
## 64F Calibration

Open Temperature	Open Temperature Tolerance
201°-300°F (94°-150°C)	±10°F (±5.5°C)

## 64F Tmax

The above open temperatures and electrical rating require that the ambient temperature the switchcase is exposed to under normal operation conditions does not exceed 176°F (80°C).

## Part Numbering System



## General Electrical Ratings

The 64T 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.

### **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.

# 69T Series Internal Heater Biased Temperature Controls



## Snap-Action Temperature Controls

The 69T line of 3/4" (19mm) bimetal disc temperature controls from Therm-O-Disc offers multiple temperature operation in a unique, cost-effective design. The snap-action bimetal disc provides high-speed contact separation resulting in exceptional life characteristics at electrical loads up to 25 amps at 240VAC. By utilizing resistors mounted internally, the open or close calibration of the bimetal disc can be biased lower. The more power applied to the internal resistors the more supplemental heat is generated to bias the operating temperature of the control. The 69T is a cost-effective alternative in applications where multiple temperature control is required, such as clothes dryers.



## Features and Benefits

The 69T features include:

- Internal resistor construction for consistent temperature depression.
- Available in automatic reset SPST and SPDT switch configurations.
- Snap-action bimetal disc for high-speed contact separation.
- A wide variety of terminal and mounting options for design flexibility.
- Welded construction for integrity of current-carrying components.
- Exposed or enclosed bimetal disc for either increased thermal response or protection from airborne contaminants.

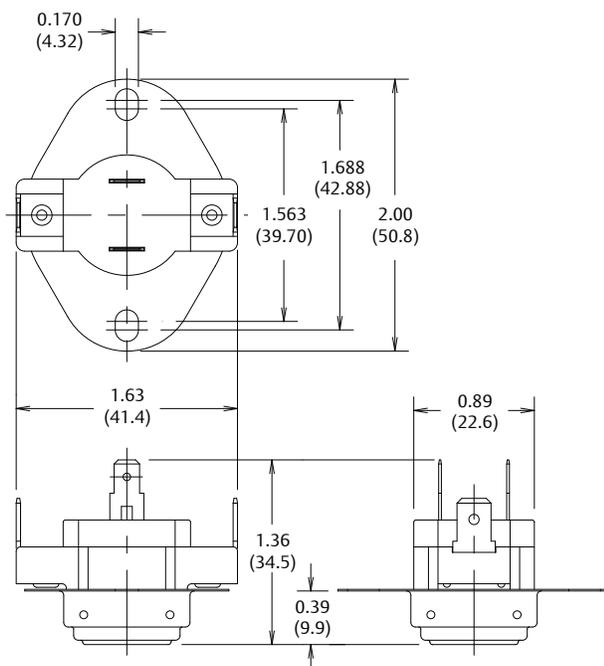
## Switch Actions and Typical Applications

The 69T is available in two automatic reset switch actions:

**Automatic Reset SPST** – In this design, the switch can be built to either open or close its electrical contacts on temperature rise. Once the temperature of the bimetal disc has returned to the specified reset temperature, the contacts automatically return to their original state. The SPST switch action is typically used to regulate clothes dryer drum temperatures (see figures 1 and 2).

**Automatic Reset SPDT** – This design is the same as the SPST described above with the addition of an auxiliary set of contacts that open and close in opposition to the main contacts. Refer to the “General Electrical Ratings” chart for rating limitations on the auxiliary contacts. Typical uses of this construction include fan speed changeover at a specified temperature and lighting of an indicator lamp when an abnormal temperature condition has been reached (see figure 3).

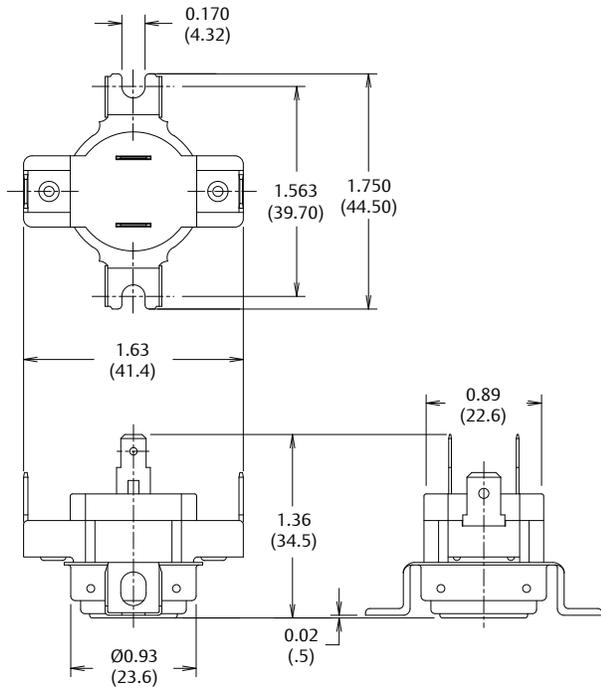
**CAUTION . . .** When designing a circuit for a single pole, double throw control, an electrical load must be applied to terminal number 2 and/or 3 to avoid a possible short-circuit condition.



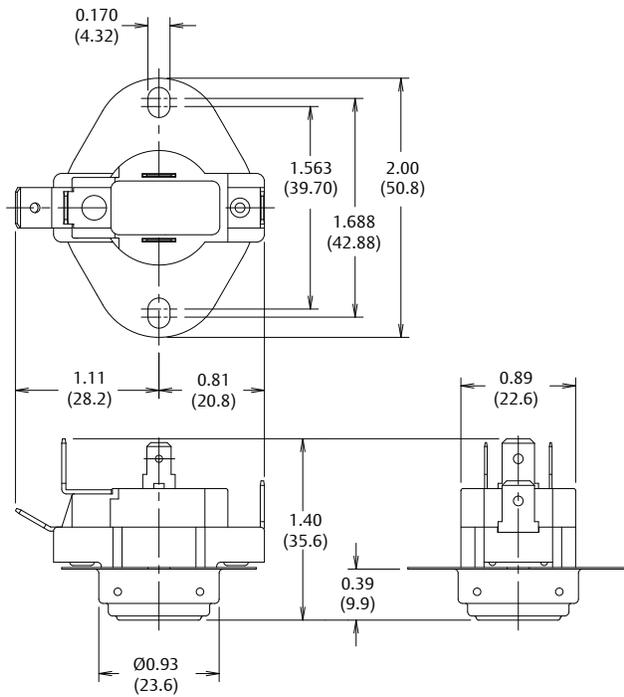
**SPST Automatic Reset Airstream Mounting**

Figure 1

Dimensions are shown in inches and (millimeters).



**SPST Automatic Reset Surface Mounting**  
 Figure 2  
 Dimensions are shown in inches and (millimeters).



**SPDT Automatic Reset Airstream Mounting**  
 Figure 3  
 Dimensions are shown in inches and (millimeters).

## Mounting Configurations

**Airstream Mounting** – This mounting configuration positions the bimetal disc .39” (9.9mm) through a hole in the mounting surface to sense temperature within an enclosure such as a heater box or air duct (see figure 1).

**Surface Mounting** – This optional mounting configuration positions the bimetal disc firmly against the mounting surface to sense the actual mounting surface temperature (see figure 2).

## Thermal Response

An exposed or enclosed bimetal disc may be specified with any of the airstream or surface mounting configurations. The enclosed disc construction provides greater protection than the exposed disc construction, keeping airborne contaminants, such as dirt and dust, from entering the control. It also protects the bimetal disc from possible physical damage during assembly and in the final application.

## Terminal Configurations

Standard terminations for the 69T are .250” x .032” (6.3 x .8mm) tin-plated brass blade terminals formed at 90 angular degrees to the thermostat mounting surface. Terminal angles of 0 and 30 degrees can also be provided.

Terminal orientation – For added flexibility, the orientation of the terminals with respect to the mounting bracket can be specified in 45 angular degree increments (see figure 4).



*Terminals 90° to mounting holes (standard)*



*Terminals 45° counterclockwise to mounting holes*

Figure 4

## Temperature Depression

The amount of change in the open or close calibration that results from energizing the internal resistors is referred to as temperature depression. The amount of depression which can be realized in an actual application is dependent upon several characteristics. Resistor wattage and voltage, ambient, airflow, thermal off-set and rate of temperature change are all variables which affect temperature depression. As a point of reference, the depression chart reflects the approximate temperature shift after energizing the internal resistors in a circulating air chamber. Due to the material rating of the thermostat body, limitations to the resistors wattage and thermostat calibration are necessary. Refer to the temperature depression chart for maximum resistance and calibration combinations. The depression data shown was obtained in a controlled test environment; application performance may vary.

## Temperature Depression

Internal Heater		Maximum Calibration	Temperature Depression	
Voltage	Resistance		Open	Close
120 VAC	7000 Ohms	180°F(82.2°C)	3°F (7.2°C)	15°F (8.3°C)
120 VAC	9000 Ohms	233°F(111.7°C)	9°F (5.0°C)	11°F (6.1°C)
120 VAC	3600 Ohms	155°F(68.3°C)	27°F (15°C)	32°F (17.8°C)
24 VAC	281 Ohms	171°F(77.2°C)	10°F (5.6°)	11°F (6.1°C)



## Calibration Temperature, Differentials and Tolerance

To use the calibration chart, locate the range in the left hand column, in which the highest calibration set point (open or close) falls. Then locate, across the top, the range in which the nominal differential falls. The standard open and close set point tolerances are shown where the two columns converge. The chart also indicates what differentials are available in each of the calibration set point ranges. Tighter open and close tolerances are available at added cost. Thermocouple samples can be provided to assist in determining the appropriate calibration temperature for specific application. For more information on tightened tolerances or availability of differentials not listed in the chart, please consult one of our sales engineers.

## Calibration Temperatures, Differentials and Standard Tolerance of the 69T Series

Highest calibration Set Point Range (Open or Close)	Nominal Differentials (temperature difference between nominal open and close set point)									
	10-14°F 5-5.8°C		15-19°F 8.5-10.5°C		20-29°F 11-16°C		30-39°F 16.5-21.5°C		40-59°F 22-33°C	
	Open	Close	Open	Close	Open	Close	Open	Close	Open	Close
0°-79°F -18°-26°C	±5 ±3	±6 ±3.5	±5 ±3	±6 ±3.5	±5 ±3	±6 ±3.5	±5 ±3	±7 ±4	±5 ±3	±7 ±4
80°-283°F 28°-111.7°C	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±5 ±3	±7 ±4	±5 ±3	±7 ±4

## Part Numbering System

**69T**

- None-** 1/8" x 14" (3.18 mm x 6.3 mm) electrical spacings
- X-** 1/4" x 3/8" (6.3 mm x 9.53 mm) electrical spacings
- K-** 3600 Ohm resistance
- 0-** Flangeless airstream mount (.38" depth)
- 1-** Flanged airstream mount (.38" depth)
- 2-** Surface mount
- 1-** Contacts open on temperature rise (normally closed)
- 2-** Contacts close on temperature rise (normally open)
- 4-** Single pole, double throw (SPDT)

**Example:** 69T23=control with surface mount and single pole double throw switching

## General Electrical Ratings

The 69T, 69TK 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.

Thermostat Type	Contact Arrangement	Inductive Amperes		Pilot Duty	Resistive Amperes	Volts AC	Agency Recognition
		FLA	LRA				
69T	Contacts 1 & 3 SPST or SPDT	10	60	125	25	120	UL E19279
		5	30	125	25	240	
		-	-	125	12.5	277	
69T	Contacts 1 & 2 SPDT	-	-	125	-	120	CSA LR10281C
		10	60	125	25	120	
		5	30	125	25	240	
69T	Contacts 1 & 3 SPST	-	-	-	16*	250	VDE 40010454
		-	-	-	25**	250	
		-	-	-	-	-	

\* 169°F (76°C) Max Nominal Calibration

\*\* 158°F (70°C) Max Nominal Calibration

### **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.

# 74T Series Adjustable Temperature Controls



## Adjustable Temperature Controls

The 74T line of temperature controls features adjustable fan or limit operation in a versatile 3/4" (19mm) bimetal disc design. Available in calibrations from 110°F to 250°F (43°C to 121°C) and mean differentials from 20°F to 40°F (11°C to 22°C), the 74T allows adjustment of the operating temperature within an approximate 40°F (22°C) thermal range. The snap-action of the temperature sensing bimetal disc provides high-speed contact separation for exceptional life characteristics at electrical loads up to 25 amps at 240VAC. Airstream or surface mounting flanges are available with the 74T.



## Features and Benefits

The 74T series features include:

- Adjustable operating temperatures for maximum design or service flexibility.
- Snap-action bimetal disc for high-speed contact separation.
- Welded construction for integrity of current-carrying components.
- Available with an exposed or enclosed bimetal disc for either increased thermal response or protection from airborne contaminants.



## Switch Actions and Typical Applications

The 74T is an automatic reset single pole, single throw (SPST) switch that can be built to either open or close its electrical contacts on temperature rise. The desired calibration can be adjusted within the thermal range of the pointer set positions. Once the application temperature cools to the specified reset differential, the contacts automatically return to their original state.

Typical applications include fan controls for heating products and regulating controls for appliances. The ability to adjust calibrations also makes the 74T an excellent choice for service or field replacement applications.

## Mounting Configurations

The 74T is available in either airstream (see figure 1) or surface (see figure 2) mount configurations. Exposed or enclosed bimetal disc versions may be specified with any of the mounting configurations.



Picture 1

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



Picture 2

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

## Dial Layout

The standard dial plate layout can be provided with alphabetical (standard) or numerical (extra cost) characters to identify the calibration set points.

## Thermal Characteristics

Calibration – The 74T can be calibrated at any temperature from 110°F to 250°F (43°C to 121°C). The standard calibration set point is located at mid-dial. Refer to the tabulation block for calibration tolerances.

Differential – The differential is the difference between the nominal open and close temperature. Preferred differentials are 20°F to 40°F (11°C to 22°C).

Range – The range is the difference between the thermostat operating temperatures measured at the extremes of the pointer set positions: extreme clockwise vs. extreme counterclockwise.

## Terminal Configurations

Standard terminations for the 74T are .250" x .032" (6.35mm x .81mm) tin-plated brass blades. Terminal form angles of 0, 30, 90 degrees are available.

## General Electrical Ratings

The 74T 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.

Inductive Amps		Pilot Duty VA	Resistive Amperes	Volts AC	Cycles	Agency Recognition
FLA	LRA					
-	-	125	25	120	100,000	UL
-	-	125	25	240	100,000	File E19279
14	72	-	-	120	30,000	CSA
10	60	-	-	240	30,000	File LR1281C

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



## Calibration Temperatures and Tolerance

Calibration at Set Point	Mean Differentials							
	20-29 °F 11.1-16.1 °C				30-39 °F 16.7-21.7 °C			
	Limit		Fan		Limit		Fan	
	Open	Close	Open	Close	Open	Close	Open	Close
110°-200°F (43.4°-93.3°C)	±6°F (3.3°C)	±7°F (3.9°C)	±7°F (3.9°C)	±6°F (3.3°C)	±6°F (3.3°C)	±8°F (4.4°C)	±8°F (4.4°C)	±6°F (3.3°C)
201°-250°F (93.9°-121.1°C)	±7°F (3.9°C)	±8°F (4.4°C)	±8°F (4.4°C)	±7°F (3.9°C)	±8°F (4.4°C)	±9°F (5.0°C)	±9°F (5.0°C)	±8°F (4.4°C)

## Part Numbering System

# 74T



### 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.

# 75TF Series Snap-Action Temperature Controls



## Snap-Action Temperature Controls

The 75TF line of temperature controls combines automatic reset and single operation in one unique switch design. Two independent switch mechanisms, electrically in series, provide primary and secondary temperature sensing at electrical loads up to 6000 watts. The 5/8" (16mm) cycling disc is available in calibrations from 80°F to 300°F (27°C to 149°C) and differentials from 15°F to 50°F (8°C to 28°C) while the 3/4" (19mm) fuse disc is available in calibrations from 150°F to 350°F (66°C to 177°C).

A variety of terminal and mounting options are available for design flexibility. The 75TF is a viable alternative in applications where space prohibits two separate sensing devices.



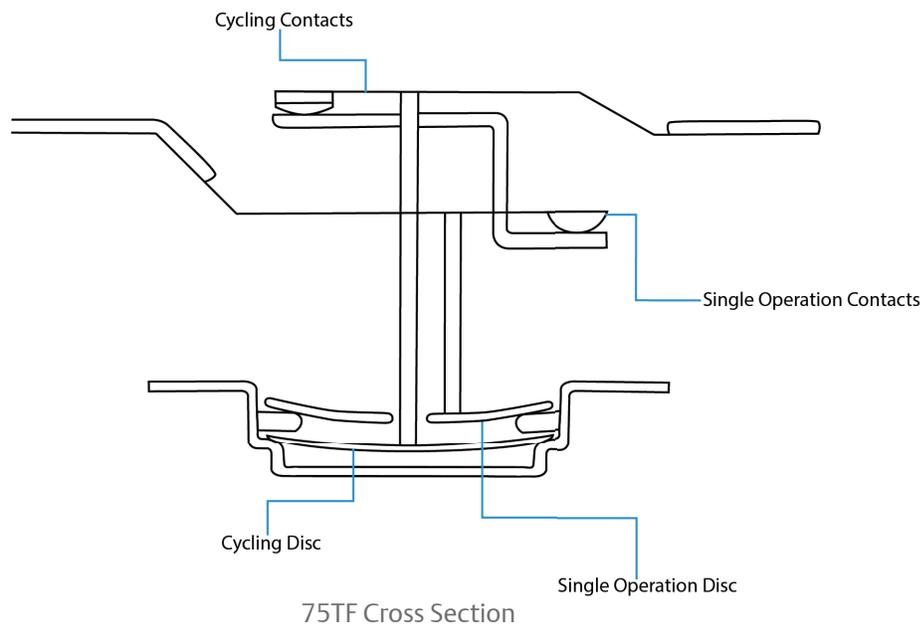
## Features and Benefits

The 75TF series features include:

- Primary and secondary temperature sensing in the same location.
- Automatic reset SPST in series with the single operation SPST.
- Snap-action bimetal disc for high-speed contact separation.
- A wide variety of terminal and mounting options for design flexibility.
- Welded construction for integrity of current-carrying components.
- Available with an exposed or enclosed bimetal disc for either increased thermal response or protection from airborne contaminants.

## Switch Actions and Typical Applications

The 75TF combines two single pole, single throw (SPST) circuits in series to provide cycling and “one-shot” temperature operation. The cycling disc and contacts are agency rated to 100,000 cycles. Utilizing a unique bridging contact system, the single operation switch opens the circuit at the specified back-up calibration in the event the cycling switch fails to operate, and will not reset in ambient temperatures above -31 °F (-35 °C). Typical applications include electric heat furnaces and electric dryers where approval agencies require the use of limit and back-up limit protection.



## Mounting

The 75TF is available in either flanged airstream (see figure 1) or flangeless airstream (see figure 2) mounting configurations. Airstream mounting is typically used in applications where the temperature being sensed is contained within an enclosure such as an air duct or heater box. An optional surface mount configuration is available for applications where the temperature being sensed is the actual mounting surface. Exposed or enclosed bimetal disc versions may be specified with any of the mounting configurations.

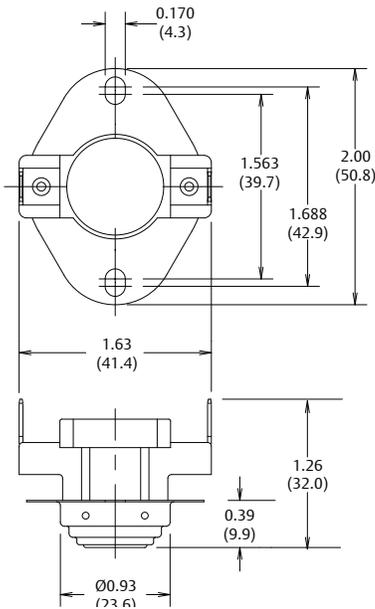


Figure 1

Dimensions are shown in inches and (millimeters).

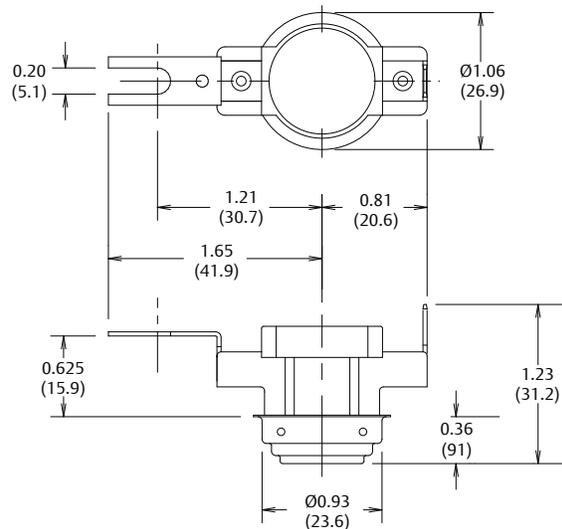


Figure 2

Dimensions are shown in inches and (millimeters).

## Terminal Configurations

Standard terminations for the 75TF are .250" x .032" (6.35mm x .81mm) unplated brass blade terminals formed at 90 angular degrees. Terminal angles of 0 and 30 degrees can also be provided. Optional screw or fork terminals are available at additional cost.



## General Electric 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.

Contact Switching	Pilot Duty VA	Resistive Amperes	Volts AC	Cycles of Operation	Agency Recognition
Automatic Reset	125	25	120-240	100,000	UL File MH5304
	125	21.7	277	100,000	
	125	12.5	480	100,000	
Single Operation	125	25	120-240	1	CSA File LR10281C
	125	21.7	277	1	
	125	12.5	480	1	

NOTE: At thermostat end-of-life, the contacts may remain permanently closed or open

## Calibration Temperatures, Differentials and Standard Tolerance of the 75TF Series

Automatic Reset Calibration	Mean Differentials							
	15-19 °F 8.3-10.6 °C		20-29 °F 11.1-16.1 °C		30-39 °F 16.7-21.7 °C		40-50 °F 22.2-27.8 °C	
	Open	Close	Open	Close	Open	Close	Open	Close
80°-200°F 27°-93°C	±5 ±3	±5 ±3	±5 ±3	±6 ±3.5	±5 ±3	±7 ±4	±5 ±3	±9 ±5
201°-250°F 94°-121°C	±5 ±3	±5 ±3	±5 ±3	±6 ±3.5	±5 ±3	±10 ±5.5	±6 ±3.5	±11 ±6
251°-300°F 122°-149°C	-	-	-	-	±6 ±3.5	±12 ±6.5	±7 ±4	±12 ±6.5

Single Operation Calibration	Top Temperature Range	Tolerance	Reset Point
	150°-249°F	±8°F	-31°F
	66°-120°C	±4.4°C	-35°C
	250°-299°F	±10°F	-31°F
	121°-148°C	±5.5°C	-35°C
	300°-350°F	±15°F	-31°F
149°-177°C	±8.3°C	-35°C	

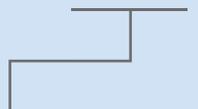
Note: Nominal fuse calibration must be minimum 20°F (-7°C) higher than the cycling disc nominal open temperature.

## Part Numbering System

# 75TF



0- Flangeless airstream mount  
1- Flanged airstream mount  
2- Surface mount

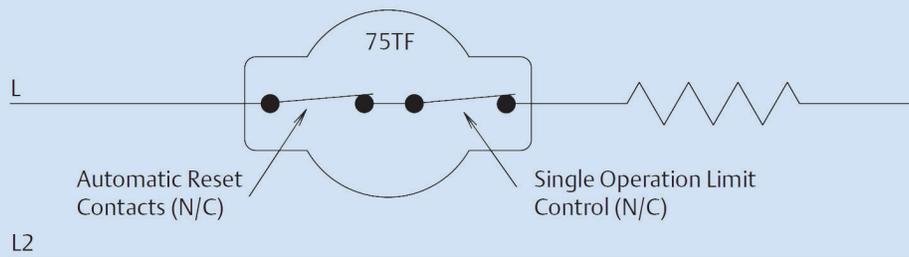


1- Contacts open on temperature rise (normally closed)



4- Contacts will not reset above -31°F (-35°C)

## Circuit Diagram



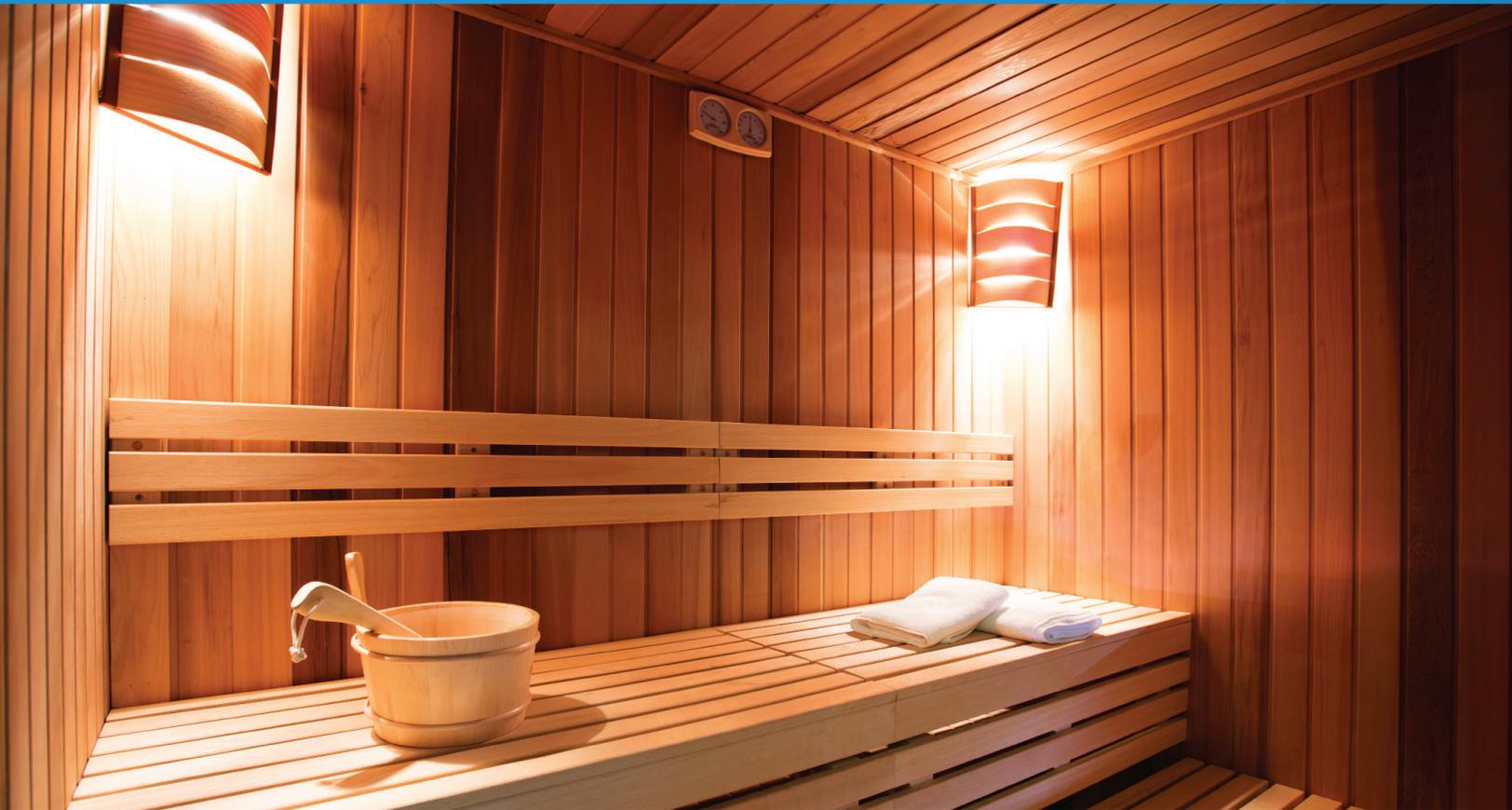
### Important Notice

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.

# HLX Manual Reset Limit Control



## Manual Reset Limit Control

The HLX double pole, single throw limit control provides excellent temperature limiting protection. Large exposed bimetal disc and substantial contact construction ensures reliable fast acting performance along with agency recognized 240VAC and 50 amps resistive switching capabilities.

The thermostat contact cannot be held closed by blocking the reset lever, and the switch mechanism operates independently of the reset lever, for safe M1 type trip-free performance.



## Features and Benefits

The manual reset lever on the HLX is flush with the side of the case when the thermostat is closed. When the thermostat reaches the operation temperature and the contacts open, the reset lever pops out beyond the side of the case indicating the electric power has been shut off.

The thermostat contact cannot be held closed by blocking the reset lever, and the switch mechanism operates independently of the reset lever.

- Contacts open on temperature rise
- Double pole, single throw switching
- Exposed disc only
- M1 Trip free construction
- 10–32 screw terminals provided



## Applications

Typical applications of the HLX include:

- Electrical Water Heaters
- Portable Electrical Heaters
- Industrial Electric Heaters
- Hot and Cold Vending Machines
- Miscellaneous Applications

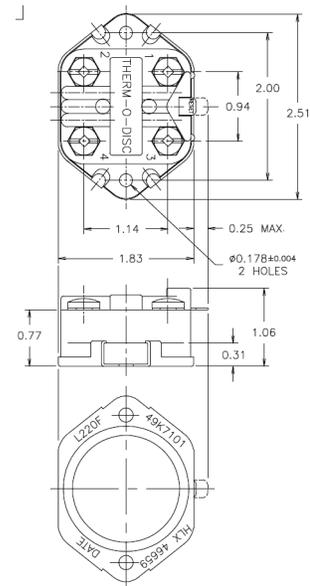


Figure 1

## Operating Temperatures

Can be calibrated to operate at any temperature up to 300 F. Normal Differentials between opening and closing range from 40° F to 70° F, depending on the top operating temperature.

## General Electrical Rating

Max Temperature	Contact Arrangement	inductive Amperes		Pilot Duty VA	Resistive Amperes	Volts AC	Agency Recognition
		FLA	LRA				
300 °F	Double Pole	-	-	125	50	240	UL E19279
149 °C	Single Throw	-	-	125	25	480	
250 °F		-	-	-	30	600	
121 °C		-	-	-	-	-	UL MH5304
300 °F	-	4.6	27.6	125		120	
149 °C	-	2.3	13.8	125	25	480	
	-	-	-	125	50	480	
250 °F	Double Pole			125	50	240	CSA LR10281 (HL only)
121 °C	Single Throw			125	25	480	
				-	30	600	
				330	-	125	
				415	-	250	
				1000	-	600	

## Tolerance Ratings

Open Temperature	Open Tolerance
100°-200 °F	5°F
201°-250 °F	6°F
251°-300 °F	7°F

### **Important Notice**

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