TS1 Single Commercial Temperature Control

THE FLEXIBLE CONTROL

- Emerson TS1 Temperature Controls are designed to sense space or surface temperature in cooling or heating applications for cycling and alarm applications.
- Maximum application flexibility is provided by using a heavy-duty 24-amp single pole double throw (SPDT) switch and temperature ranges and power elements designed for specific applications. The parts package includes a lockplate and knob, which allows the user to lock both the range and differential screws or the range or differential screw with a knob on the unlocked screw.

FEATURES

- SPDT switch allows control of heating as well as cooling applications.
- Heavy-Duty 24 Amp SPDT Switch allows the handling of most loads directly without the use of a contactor.
- Non-Ambient Sensitive.
- 10 ft. capillary to provide maximum application flexibility.
- Standard accessories include mounting bracket and knob with lockplate.

SPECIFICATIONS – SWITCH RATINGS

Maximum Load	120VAC	240VAC
Full Load Amps	24 FLA	24 FLA
Locked Rotor Amps	144 LRA	144 LRA
Horsepower	2 HP	3 HP
Pilot Duty	720 VA	720 VA
Non-Inductive	24 amps	24 amps

SAFETY INSTRUCTIONS

1. Read all Instructions thoroughly. Failure to comply can result in control failure, system damage or personal injury.
2. Do not install in Hazardous Locations.
3. Disconnect electrical power before installation. Do not reapply power until control installation is complete, wiring connections secured and cover is in place.

SPECIFICATIONS – TEMPERATURE & PRESSURE RANGES

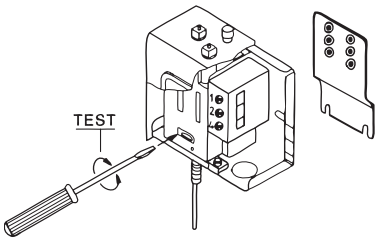
Ambient Temperature Range: -58°F to +158°F
Temperature Range: See Control Label On Box

SPECIFICATIONS – ENCLOSURE

NEMA CLASS I – Mount the control body in an area protected from the weather, water or excessive moisture, dirt, dust and corrosive or explosive atmospheres.

MANUAL OPERATION

The control can be easily manually operated as illustrated.



INSTALLATION INSTRUCTIONS

1. **Cover Removal**—Loosen cover screw and lift cover up.
2. **Mounting**—Mount the control in a protected area with the included mounting bracket and screws, or on a flat surface from the front.
   CAUTION: If other screws are used, use 8-32 screws that do **not** penetrate into the control more than 1/8''.
3. **Temperature Sensing Charges – Type & Application**:
   Three basic types of sensing elements are used on the TS Series of controls, Vapor, Adsorption and Liquid.
   Vapor Charge – Sensor Type A, E, P
   These sensing elements always sense from the coldest point on the capillary, coil, bulb or power element head. For proper operation, it must be ensured that this coldest point is at the sensor portion, which is exposed to the temperature to be sensed. The sensing location should be at least 4°F (2 K) colder than the other parts of the thermal system.

   In order to avoid unwanted effects of heat transfer, e.g. from a cold wall, Emerson vapor charged thermostats come with an integrated bellows heater, which is rated for 230 V applications. For other applications the heater must be disabled, alternatively, a bellows heater with a different rating may be available.

   In addition to the bellows heater, room thermostats are supplied with an insulation console for the same reason.

   Vapor charges respond faster to temperature changes than adsorption and liquid charges.

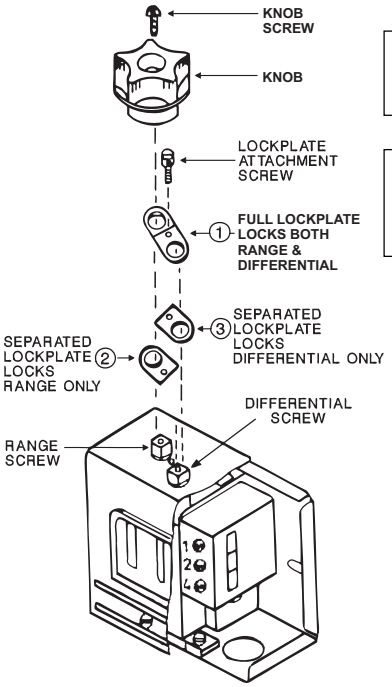
   Adsorption Charge – Sensor Type F
   Adsorption charged sensor types operate on the basis of a temperature dependent adsorption material, which is located inside the bulb only. Therefore these sensor types always respond to temperature changes at the bulb only. This makes them suitable to applications where it is not always defined which part of the thermal system the coldest point is (cross ambient applications). An example for such applications is defrost control. Adsorption charges are slower in response to temperature changes than vapor.

   Liquid Charge – Sensor Type C
   Liquid charge sensors of type 'C' always sense from the warmest point of the thermal system. This condition must always be ensured. The sensing location should always be warmer than 4°F (2 K) than other parts of the thermal system.
4. Capillary Handling
   - Sharp bends or kinks **must** be avoided in the capillary. Do not allow capillary to rub and abrade against any moving surface. Avoid any excessive handling or reforming to minimize work hardening of the copper.
5. WARNING: Before making electrical connections, check with a voltmeter as there could be more than one power source.
4. **Electrical Connections** – Make certain the load to be connected is within the electrical ratings of the control.
   - All wiring should conform to National Electrical Code and local regulations. Use **14AWG or larger copper conductors ONLY**. See Switch Connection Diagrams later in this installation instructions sheet.
   - The terminals are of a clamp design. Loosen the terminal screws with a Phillips head or small screwdriver, insert approximately 3/8'' stripped wire and tighten.

LOCKPLATE AND KNOB

The lockplate can be used to lock:

1. Both Range and Differential Screws. Neither setting can be adjusted. To use lockplate options 2 or 3, break one end off the lockplate along the creaseline (see exploded view diagram below).
2. Range Screw Only. Range screw is locked so that high event is fixed – adjusting the differential screw allows low event only to be changed.
3. Differential Screw Only. Differential is locked so that differential is fixed – adjusting range screw moves both high and low event up or down together.

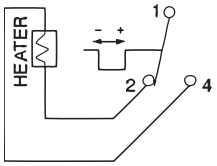


NOTE: If only one screw is locked, knob can be applied to unlocked screw.

NOTE: The Range Screw(s) and Lockplate attachment screw are cross-drilled to allow the use of a wire seal.

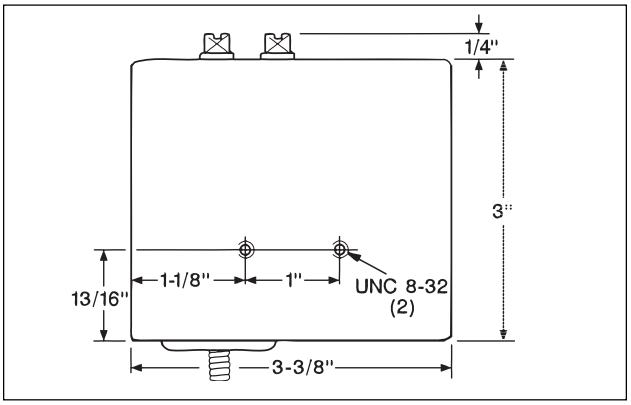
Room Sensing – Air Coil Controls

Room Sensing Air Coil Controls and other vapor charged controls when specified utilize a 82 K ohm bellows/control body heater to reduce cross ambient temperature effects, and improve control sensitivity. An insulating mounting bracket is also provided with air coil controls to reduce the "heat sink" effect of the mounting surface.

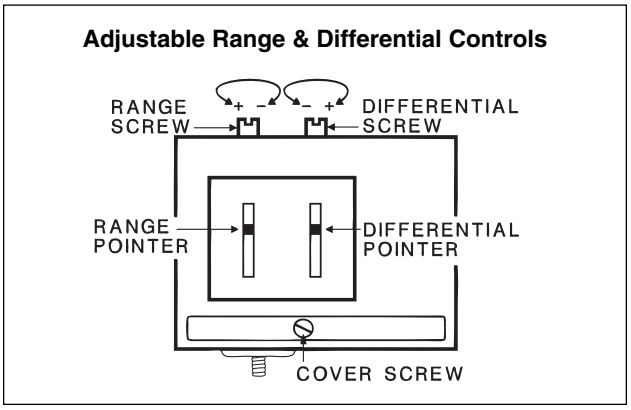


Heater Wiring for thermostats with bellows heater.

MOUNTING DIMENSIONS



SETTINGS & ADJUSTMENTS



Procedures

1) Adjust the Range Screw/Pointer to the desired "High Event" setting.
2) Adjust the Differential screw to the desired differential.
   Low Event = High Event – Differential
3) Adjustment of the Range Screw changes both high and low events.
4) Adjustment of the Differential Screw changes the "Low Event" only.

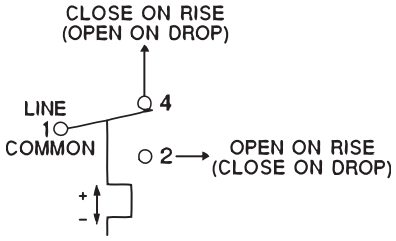
Do not set the Low Event below the lowest allowable event.
Low Event = High Event – Differential

Lowest Allowable Events	
Range	**Lowest Event**
-20 to +60°F	-40°F
-20 to +95°F	-30°F

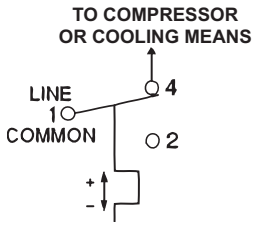
Before leaving a new control installation, it is best to observe a minimum of 3 cycles to assure proper operation.

SINGLE TEMPERATURE CONTROL SWITCH CONNECTIONS

Single Temperature SPDT Switch Response



Refrigeration/Air Conditioning/ Ventilation Applications



Heating Applications