

**Dual Setpoint/Deadband
Pneumatic Room Thermostats
General Instructions**

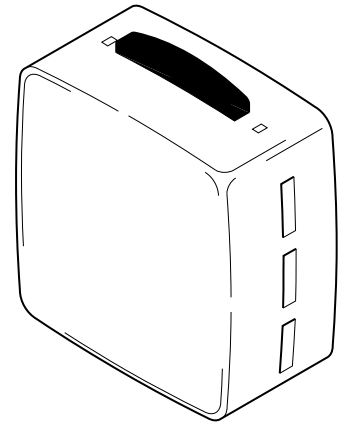
Application

The 2212-318 and 2212-319 Dual Setpoint/Deadband Pneumatic Room Thermostats are designed for the proportional control of pneumatic valves, damper actuators, or other final control devices in environmental control systems. These devices are used when it is desirable to set up, between selected heating and cooling setpoints, a temperature span within which the HVAC system uses no energy for heating or cooling. The high capacity, two-pipe, pilot-operated, relay-type design provides pneumatic feedback for accuracy and stability over the entire operating range.

These thermostats are available in either direct- or reverse-acting models, each utilizing two bimetals, one heating and one cooling, to interrupt the deadband (branch) pressure. In the direct-acting model, the heating bimetal modulates the pressure between zero and the deadband pressure, and the cooling bimetal modulates the branch pressure between the deadband pressure and main air pressure. In the reverse-acting model, this action is reversed. The deadband pressure is adjustable in the field, to adapt to specific applications. Two concealed setpoint dials, one heating and one cooling, are used to set the individual heating and cooling setpoints to the desired values. This creates the desired deadband between the two selected setpoints. All calibration functions are accessible from the front of the thermostat. The use of a blank cover (21-928) is recommended with this device. Other cover options may be utilized if desired.

Features

- Factory-calibrated, stainless steel ball-in-seat provides pneumatic feedback for stable, linear operation.
- Deadband is easily selected by setting the desired heating and cooling setpoints.
- Field-adjustable deadband output pressure is factory set at 8 psig.
- Leak-proof, self-closing branch gauge tap.



Blank Cover Shown
(Covers must be ordered separately except as noted.)

SPECIFICATIONS

Action: Proportional.

Setpoint Range:

Heating, 57 to 75 °F (14 to 24 °C).

Cooling, 65 to 83 °F (18 to 28 °C).

Throttling Range: 1.5 °F (approx.) non-adjustable for each setpoint.

Maximum Air Pressure: 30 psig.

Main Air Consumption: 30 scim.

Setpoint Adjustment: Individual concealed adjustments for heating and cooling by means of a 20-881 calibration wrench.

Calibration:

Deadband, Factory-set at 8 psig (adjustable).

Direct-Acting Models,

Heating 5.5 psig at setpoint.

Cooling 10.5 psig at setpoint.

Reverse-Acting Models,

Cooling 5.5 psig at setpoint.

Heating 10.5 psig at setpoint.

Construction:

Mechanical Components, Die cast aluminum, stainless steel, and glass-filled nylon.

Diaphragm, Fabric-reinforced Neoprene.

Air Lines, Connect to thermostat nipples with spring-reinforced plastic tubes.

Branch Connections, Equipped with internal filters.

Environment

Humidity: 5 to 95% relative humidity, non-condensing.

Locations: NEMA Type 1.

ORDERING DATA

Table-1 Model Chart — Thermostats.

Wholesale Number	Replaces Model	Action	Description
2212-318	T35-301	Direct	Includes (2) 1/4" x 3/16" barbed couplings, 6" piece of polyethylene tubing, 20-714 wall plate, 20-711 mounting plate, and mounting screws. ^a
2212-319	T36-301	Reverse	

^a Other rough-in hardware and installation fittings must be ordered separately.

Table-2 Model Chart — Thermostat Replacement Kits.

Wholesale Number	Replaces Model	Action	Description
2212-538	T35-301	Direct	Includes thermostat, 21-928 blank cover, and 22-022 conversion kit
2212-539	T36-301	Reverse	

Table-3 Covers.

Wholesale Number ^a	Replaces Model	Color	Material	Dial Markings	Setpoint Adjustment	Thermometer
21-928	C2-42	Satin Chrome	Metal	Blank	Concealed	No
22-1028	C2-48	Euro-white	Plastic			
21-957	C11-42	Satin Chrome	Metal	None	Concealed	Yes (External)
22-1057	C11-48	Euro-white	Plastic			
21-960	C14-42	Satin Chrome	Metal	Blank	Concealed	Yes (Internal)
22-1060	C14-48	Euro-white	Plastic			

^a Thermostat covers with concealed setpoint adjustment include setpoint adjustment cover 21-800 (black) or 21-801 (Euro-white).

Table-4 Accessories.

Wholesale Number	Replaces Model	Description
20-695	10-15	Aspirating box
20-707	10-53	Metal thermostat guard
20-710	10-57	Universal mounting fitting
20-712	10-59	Dial stop kit
20-714	10-77	Black wall plate
20-715	10-62	Clear thermostat guard
20-716	10-78	Insulated back plate
20-850	—	Thermostat mounting plate
20-881	N2-4	Calibration wrench
21-473	10-73	Drywall mounting bracket
21-800	10-72	Setpoint adjustment cover (black)
21-801	10-81-48	Setpoint adjustment cover (Euro-white)
21-876	10-76	Opaque thermostat guard
22-022	—	Thermostat conversion kit
22-023	—	Thermostat conversion kit
22-138	MCS-GA	Branch tap gauge adaptor
900-002	—	Thermostat calibration kit

TYPICAL APPLICATIONS (Piping Diagram)

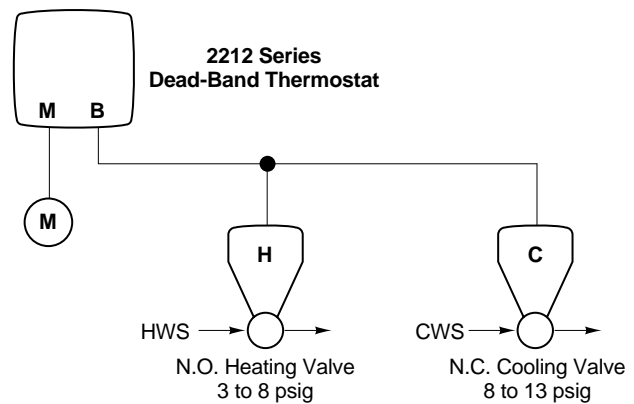


Figure-1 Direct-Acting Application.

INSTALLATION

Inspection

Inspect the package for damage. If damaged, notify the appropriate carrier immediately. If undamaged, open the package and inspect the device for obvious damage. Return damaged products.

Requirements

- Tools (not provided):
 - Appropriate screwdriver for mounting the thermostat
 - 20-881 Thermostat calibration and cover screw wrench (or 1/16" and 1/4" hex wrenches)
- Training: Installer must be a qualified, experienced technician
- Appropriate accessories
- Piping diagrams

Location

Caution:

- Do not locate the thermostat near sources of heat or cold, such as lamps, motors, sunlight, or concealed ducts or pipes. Doing so will affect the accuracy of the thermostat.
- Avoid installing the thermostat on outside walls. If such a location is necessary, mount the thermostat on an insulated back plate (accessory item).
- Mount thermostats *only after the wall surfaces have been finished.*

Locate the thermostat where it will be exposed to an unrestricted circulation of air, which represents the average temperature of the controlled space.

Mounting

Standard Mounting Options

Mount the thermostat according to the applicable figure (Figure-2 through Figure-8). See Figure-12 for mounting dimensions.

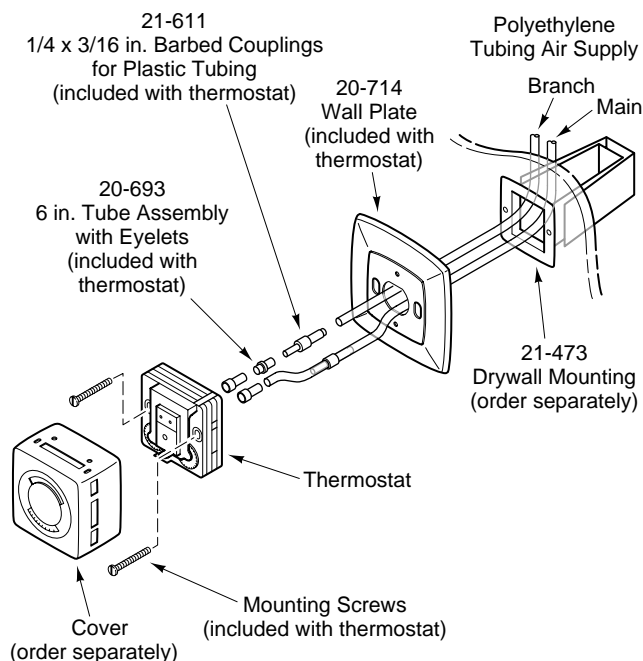


Figure-2 Flush Mounting of Thermostat.

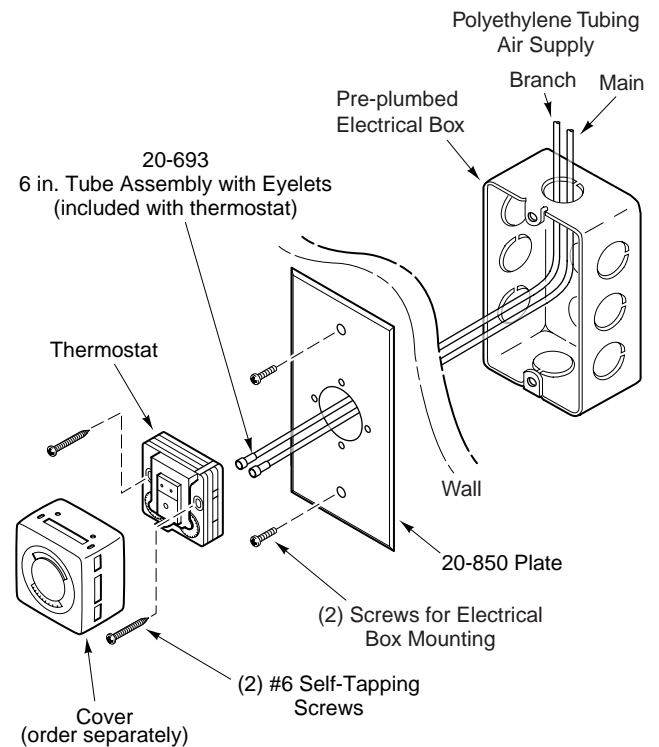


Figure-3 Flush Mounting of Thermostat, Using 20-850 Plate and Pre-Plumbed Electrical Box.

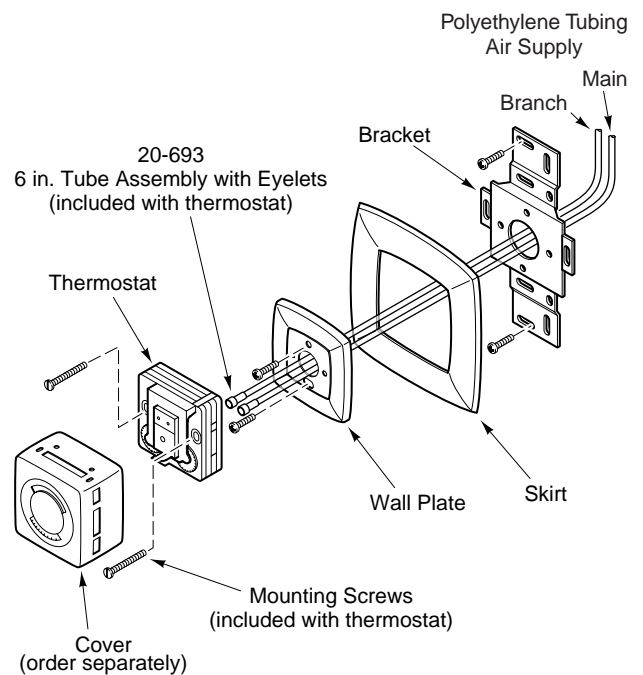


Figure-4 Thermostat Mounted with 22-022 Conversion Kit, Using Wall Plate and Skirt, to Replace Competitive Thermostats.

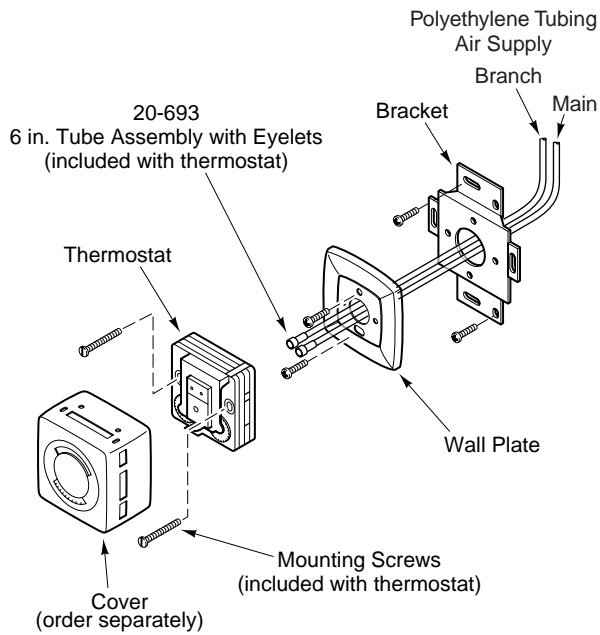


Figure-5 Thermostat Mounted with 22-022 Conversion Kit, Using Wall Plate Only, to Replace Competitive Thermostats.

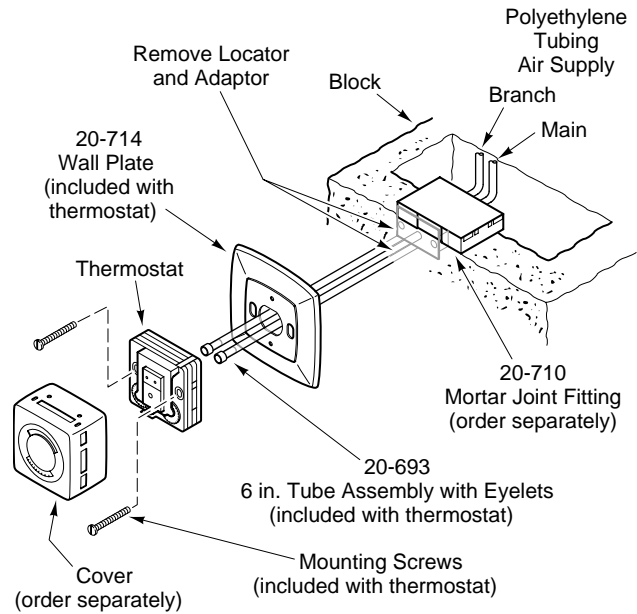
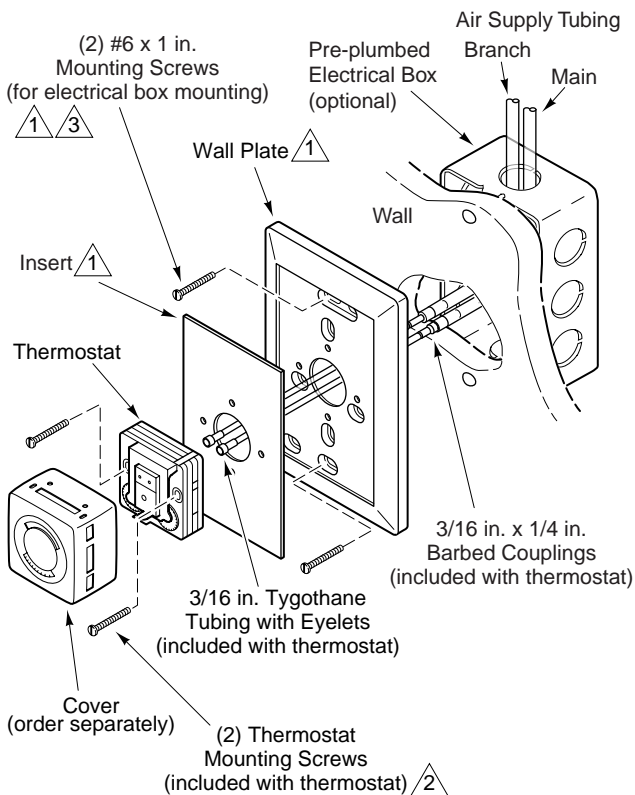


Figure-7 Thermostat Installation Using Pipehead in Masonry Wall.



- 1 Provided in the 22-023 thermostat conversion kit.
- 2 Optionally, the thermostat may be mounted with the #6 x 1 in. self-tapping screws provided in the 22-023 kit.
- 3 Use the #8 x 1 in. mounting screws provided in the 22-023 kit when mounting the wall plate directly to the wall, without an electrical box.

Figure-6 Thermostat Mounted with 22-023 Thermostat Conversion Kit.

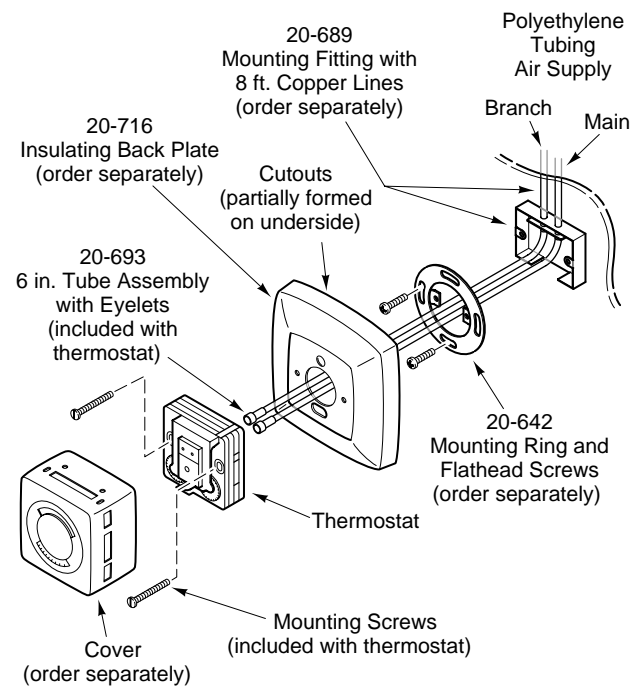


Figure-8 Surface Mounting of Thermostat, Pipehead Application.

Optional Mounting

Eliminate the pipehead fitting by using the 22-022 thermostat conversion kit and the included instructions, plus the following:

1/4" Plastic Air Lines: Install the 1/4" barbed couplings into the air lines. Connect the tube assembly to the 3/16" end of these couplings.

1/4" Copper Air Lines: Solder the barbed couplings into the copper lines. The tube assembly can then be connected to the 3/16" end of the couplings.

OPERATION

The deadband output (branch) pressure is factory set at 8 psig (55.2 kPa), placing both heating and cooling actuators in the “off” (or closed) position. The output remains at that pressure while the ambient (room) temperature varies within the deadband. When the ambient temperature closely approaches either the heating or cooling setpoint at either end of the deadband, the output pressure changes at the rate of approximately 3.3 psi/°F (41 kPa/°C). This modulates the respective heating or cooling actuator from its closed position toward its open position, while the other actuator remains in its closed position. The temperature sensing assembly, consisting of a deadband lever and two bimetal elements, allows only one actuator at a time to be modulated toward the open position.

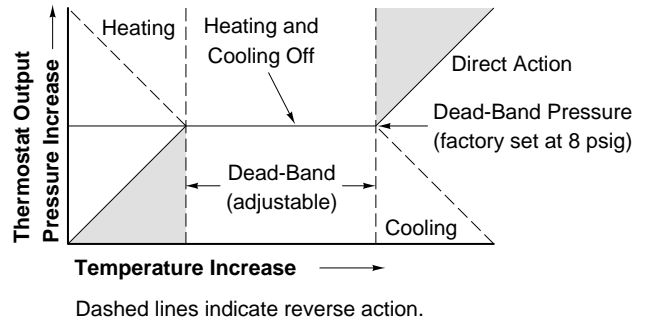


Figure-9 Direct-Acting Thermostat Operation.

CALIBRATION

Deadband Pressure Calibration

The deadband pressure is factory set at 8 psig. If necessary, check calibration or adjust this pressure to meet application requirements, as follows:

1. Remove the thermostat cover, using a 20-881 thermostat wrench (1/4" hex wrench), and install a 22-138 branch tap gauge adaptor and a suitable gauge into the branch pressure tap hole (Figure-10 or Figure-11).
2. Be sure ambient temperature is between 65 and 75°F. Turn the heating dial to 57°F and the cooling dial to 83°F.
3. Adjust the deadband pressure by turning calibrating screw “A” (see Figure-10 or Figure-11), using a 20-881 thermostat wrench (1/16" hex wrench) until the desired deadband pressure is obtained.

Setpoint Calibration

Direct-Acting Models

The direct-acting models are calibrated to have a 5.5 psig branch pressure when the heating dial is set at ambient temperature, and a 10.5 psig branch pressure when the cooling dial is set at ambient temperature.

1. Refer to Figure-10. Using a 20-881 thermostat wrench (1/16" hex wrench), gently turn screw “B” to position the cooling dial to the 83°F setting. This moves the cooling bimetal away from the deadband lever. Turn screw “C” to obtain 5.5 psig output pressure. If there is a difference between the ambient temperature and the dial reading, rotate the dial gently to its stop and continue rotating screw “C”, slipping the screw inside the dial. Rotate the dial back to again obtain 5.5 psig. If the dial does not match the ambient temperature, a second try may be required.

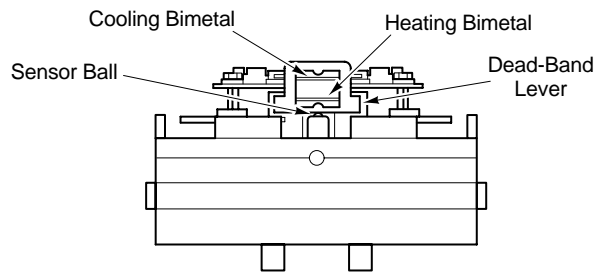
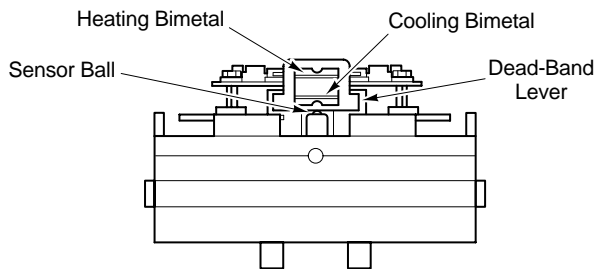
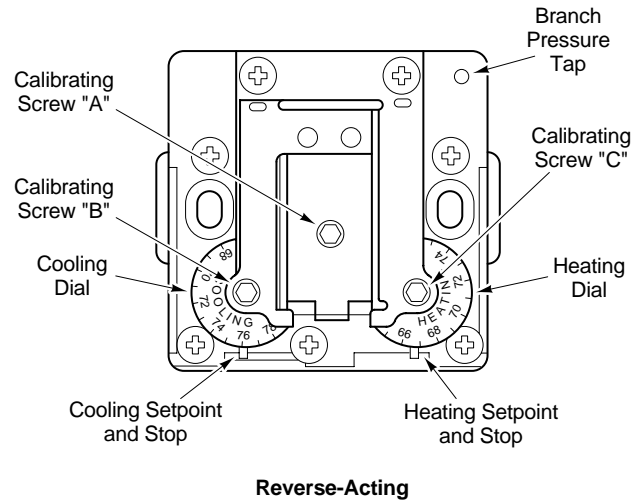
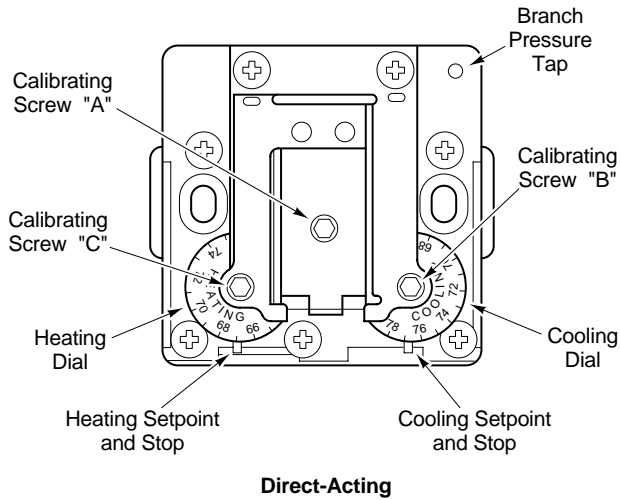


Figure-10 Direct-Acting Calibration.

Figure-11 Reverse-Acting Calibration.

2. To calibrate the cooling dial, the heating dial must first be turned to the 57°F setting. This moves the heating bimetal away from the deadband lever. Turn screw "B" to obtain 10.5 psig. If there is a difference between the ambient temperature and the dial reading, rotate the dial gently to its stop and continue rotating the screw, slipping the screw inside the dial. Rotate the dial back to again obtain 10.5 psig. If the dial does not match the ambient temperature, a second try may be required.
3. Position the heating and cooling dials to the desired setting and replace the cover.

Reverse-Acting Models

The reverse-acting models are calibrated to have a 5.5 psig branch pressure when the cooling dial is positioned at ambient temperature, and 10.5 psig when the heating dial is positioned at ambient temperature.

To calibrate the reverse-acting models, refer to Figure-11 and proceed with calibration as outlined under the procedures for the direct-acting models.

Note: If, for some reason, a thermostat gets completely out of adjustment and does not respond to the preceding calibration, first adjust screws "B" and "C" until, by observation, neither the heating nor cooling bimetal are touching the deadband lever. Then proceed with the calibration as outlined.

MAINTENANCE

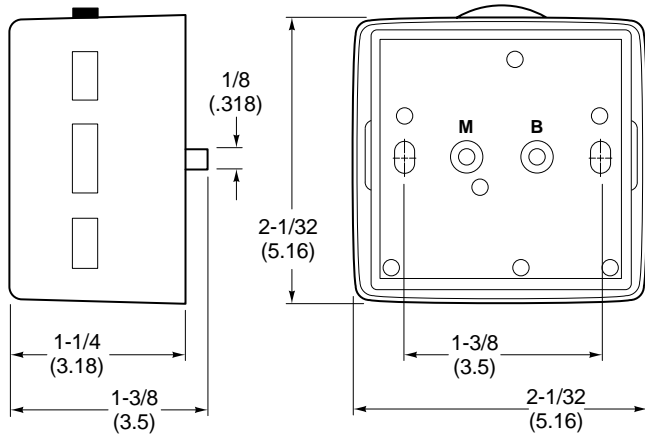
The thermostat requires no maintenance.

Regular maintenance of the total system is recommended to assure sustained, optimum performance.

FIELD REPAIR

None. Replace an inoperative thermostat with a functional unit.

DIMENSIONAL DATA



Dimensions are in inches (mm).

Figure-12 Mounting Dimensions.

Copyright 2008, TAC
All brand names, trademarks and registered
trademarks are the property of their respective
owners. Information contained within this
document is subject to change without notice.

F-24576-4

TAC
1354 Clifford Avenue
P.O. Box 2940
Loves Park, IL 61132-2940
www.tac.com

t.a.c. [®]
by Schneider Electric