

APPLICATION

For on-off control of media temperature in ducts, tanks, liquid lines, etc.

SPECIFICATIONS

Setpoint Dial Range: Dial plate is marked as °F on one side and °C on the other. See Table-2 for specific ranges.

Sensing Element: Liquid-filled copper.

Differential: See Table-2.

Dual Bulb Units: One bulb senses the controlled media; the second bulb senses the outside air temperature. The temperature of the controlled media increases as outside air temperature decreases.

Ambient Temperature Limits:

Case,

Shipping -40 to 160°F (-40 to 71°C).

Operating -40 to 150°F (-40 to 65°C): except return air bulb unit, -40 to 140°F (-40 to 60°C).

Bulb, See Table-2.

Electrical Switch: Snap action SPDT, one per stage.

Ratings, See Table-1.

Connections: Coded screw terminals.

Cover: All metal with 1/2" to 3/4" conduit openings.

Case Locations: NEMA Type 1 indoor only.

Mounting: Case can be mounted in any position. See ACCESSORIES for bulb mounting kits (order separately).

Dimensions:

Case, 4-5/8" high x 2-1/4" wide x 2" deep (117 mm x 57 mm x 51 mm)

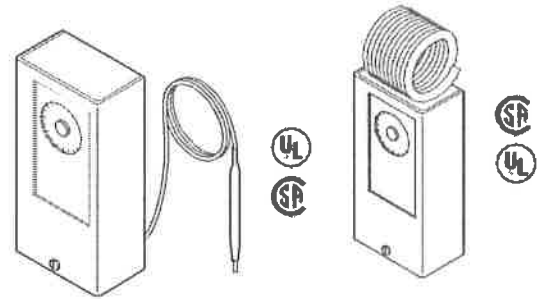
Element and Capillary, See Table-2.

ACCESSORIES

AT-208	Duct Mounting Kit
AT-209	Bulb Mounting Kit
AT-211	Outside Bulb Shield

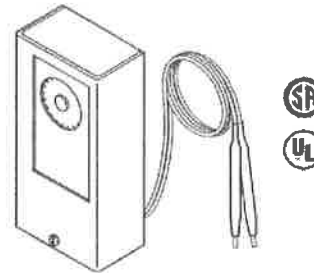
Table-1 Maximum Electrical Rating

Switch Rating (50/60 Hz)	24V	120V	240V
Full Load Amps	9.8	9.8	8.0
Locked Rotor Amps	58.8	58.8	48.0
Pilot Duty VA	60	360	360
Non-Inductive Amps (Resistive)			
Single Stage	22	22	22
Two Stage	16	16	8.0



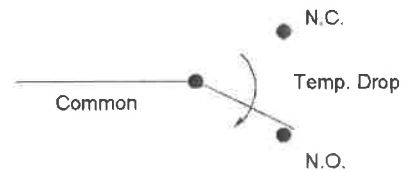
Typical Single Bulb

Typical Return Air Bulb



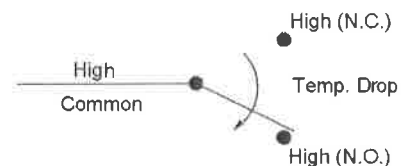
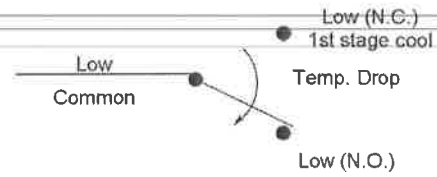
Typical Dual Bulb

Typical Single Stage



N.O. makes ON temperature drop

Typical Two Stage



1st stage Heat

Figure-1 Switch Action and Terminal Identification.

Table-2 Specifications.

Part Number	Type	Setpoint Adjustment Range °F (°C)	Dual ^a Bulb Ratio	Dimensions			Differential °F (°C)	Safe Bulb Temperature Range °F (°C)
				Capillary Copper ft. (m)	Bulb Copper In. (mm)			
					Indoor	Outdoor		
TC-4111-CS&S	Single Stage Single Bulb	-40 to 120 (-40 to 49)	N.A.	6 (1.8)	3/8 X 4 (9.5 X 102)		Factory Set 3 (2) Adj. 3 to 16 (2 to 9)	-40 to 170 (-40 to 77)
TC-4111-020-CS&S				20 (6)				
TC-4111-116-CS&S (°C side of dial up)				6 (1.8)				
TC-4112-CS&S		100 to 260 (38 to 127)		10 (3) Armored				-40 to 170 (-40 to 77)
TC-4121-CS&S		-40 to 120 (-40 to 49)						
TC-4122-CS&S		100 to 260 (38 to 127)						
TC-4152-CS&S	Single Stage Dual Bulb	70 to 120 (21 to 49)	1:1	30 (9) Each Bulb	3/8 X 4 (9.5 X 102)	3/8 X 4 (9.5 X 102)	Factory Set 3 (2) Adj. 1-1/2 to 10 (1 to 5)	Total of indoor and outdoor temperatures must not exceed 280 (138)
TC-4166-CS&S	Single Stage Return Air Bulb	50 to 90 (10 to 32)	N.A.	None	Coiled 2-1/2 X 2 (64 X 51)		Fixed 2 (1)	-40 to 145 (-40 to 63)
TC-4211-CS&S	Two Stage Single Bulb	-40 to 120 (-40 to 49)		6 (1.8)	3/8 X 4 (9.5 X 102)		Per Stage Fixed 3 (2) Between Stages Set 3 (2) Adj. 2 to 10 (1 to 5)	-40 to 170 (-40 to 77)
TC-4211-20-CS&S				20 (6)				
TC-4221-CS&S				10 (3) Armored				
TC-4222-CS&S		100 to 260 (38 to 127)		-40 to 145 (-40 to 63)				
TC-4266-CS&S	Two Stage Return Air Bulb	50 to 90 (10 to 32)			None	Coiled 2-1/2 X 2 (64 X 51)		Each Stage Fixed 2 (1) Between Stages Set 3 (2) Adj. 1 to 5 (0.5 to 3)

^a First number of reset ratio typically indicates outdoor air temperature change required to increase the setpoint by the second number.

Location

Locate the device allowing proper distance to the bulb location. The case can be mounted in any position. Refer to Figure-2 for case dimensions.

PRE-INSTALLATION

Inspection

Visually inspect the carton for damage. If damaged, notify the appropriate carrier immediately. If undamaged, open the carton and visually inspect the device for obvious defects. Return damaged or defective products.

Required Installation Items

- Wiring diagram
- Tools (not provided):
 - Volt-ohm meter
 - Room temperature thermometer on °F or °C
 - Appropriate screwdriver(s) for cover, terminals and mounting screws
 - Appropriate drill and drill bit for mounting screws

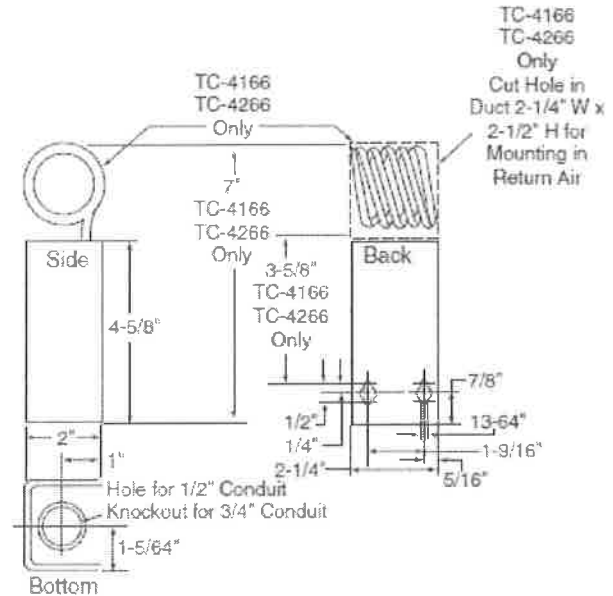


Figure-2 Case Dimensions.

INSTALLATION

Caution:

1. Installer must be a qualified, experienced technician.
2. Disconnect power supply before installation to prevent electrical shock and equipment damage.
3. Make all connections in accordance with the electrical wiring diagrams, and in compliance with national and local codes. *Use copper conductors only.*
4. Do not exceed ratings of the device.
5. Avoid locations where excessive moisture, corrosive fumes or vibrations are present.

Air Bulb Models — Mounting Outside of Return Air Duct

1. Prepare duct for mounting by cutting hole and providing mounting screw holes per Figure-2.
2. Fabricate a cover as shown in Figure-3.
3. Carefully roll bulbs toward back of unit and insert through 2-1/4" x 2-1/2" (57 mm x 64 mm) hole.
4. Remove cover and attach unit to duct with #10 screws.
5. Attach cover over 2-1/4" x 2-1/2" (57 mm x 64 mm) hole.

Procedure for Remote Bulb Mounting

Air Bulb Models — Mounting in Return Air Duct

1. Remove cover and provide two holes for #10 round head screws using the housing as the template or by using the dimensions shown in Figure-2.
2. Partially insert the mounting screws in the screwholes. Fit the housing over the screws, slide housing down on the screws and tighten the screws.

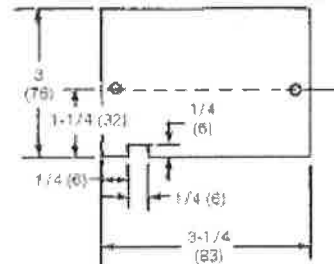


Figure-3 Field Supplied Duct Hole Cover Plate.

Duct and Outdoor Mounting

Maximum insertion length is 6 inches.

Duct: Install bulb with AT-208 kit as shown in Figure-4.

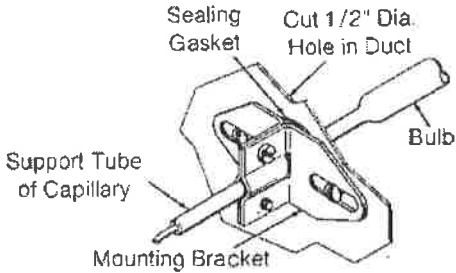


Figure-4 Duct Mounting with AT-208.

Outdoor: Install with AT-211 kit as shown in Figure-5.

1. Mount bulb to outside wall or surface with bulb clip.
2. Place shield over bulb and fasten to mounting surface.

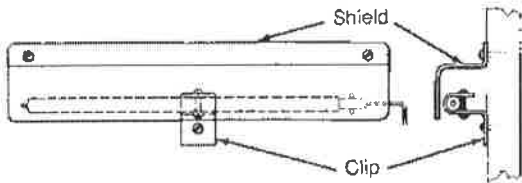


Figure-5 Outdoor Mounting with AT-211.

Bulb Mounting — Liquid Line and Tank

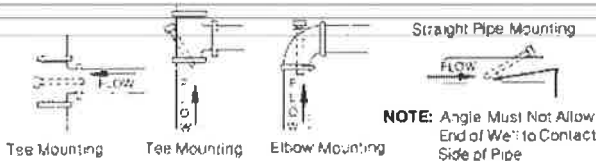


Figure-6 Bulb Mounting for Liquid Line and Tank.

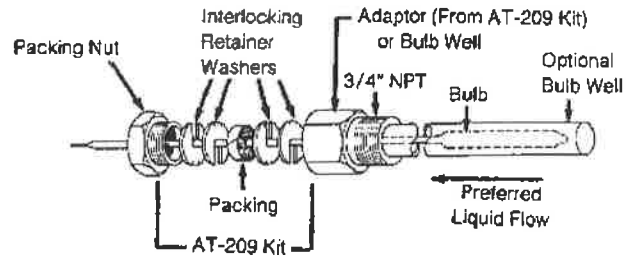


Figure-7 AT-201 or AT-203 Installation.

AT-201 or AT-203 Installation (see Figures-6 and 7):

1. Install bulb well or adaptor from AT-209 into 3/4" FNPT opening.
2. Place packing nut, washers and packing from AT-209 over bulb support section and insert bulb well or AT-209 adaptor.
3. Push interlocking washers and packing into well or adaptor and tighten packing nut until firmly sealed.

(Note: AT-201 & AT-203 are Barber Colman Bulb Wells)

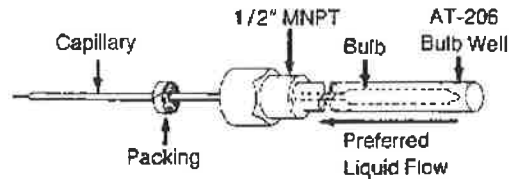


Figure-8 AT-206 Installation.

AT-206 Installation (see Figures-6 and 8):

1. Install AT-206 bulb well into 1/2" FNPT opening.
2. Place packing (included with AT-206) over bulb support section and insert bulb into well.
3. Push packing into nut on well using a screwdriver.

(Note: AT-206 is a Barber Colman Bulb Well.)

WIRING

The thermostat has one 1/2" to 3/4" conduit opening in the bottom of the housing. Terminal coding and switch action are shown in Figures-9 and 10.

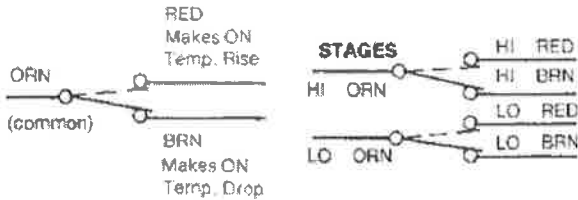


Figure-9 Terminal Coding and Switch Action.

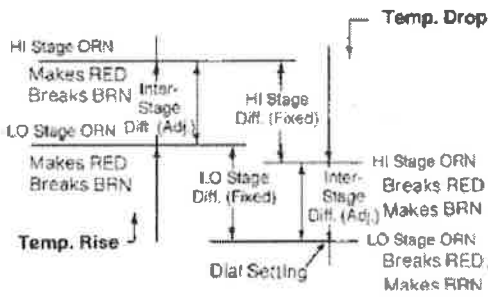


Figure-10 Two Stage Switch Sequence.

TYPICAL APPLICATIONS

Figures-11 and 12 show typical heating and cooling applications for single stage units. Figures-13 and 14 show typical heating and cooling applications for two stage units.

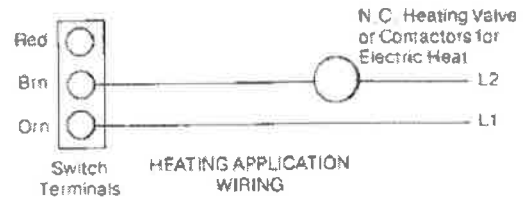


Figure-11 Typical Heating Application for Single Stage Units.

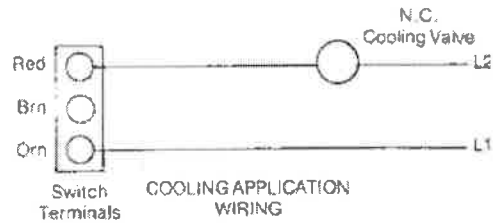


Figure-12 Typical Cooling Application for Single Stage Units.

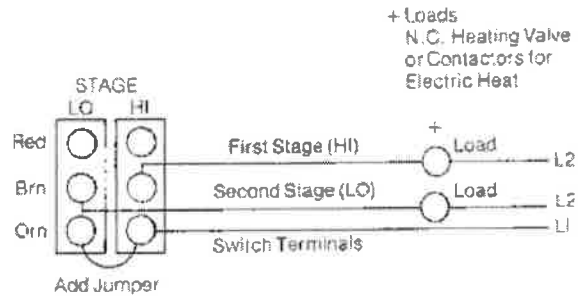


Figure-13 Typical Heating Application for Two Stage Units.

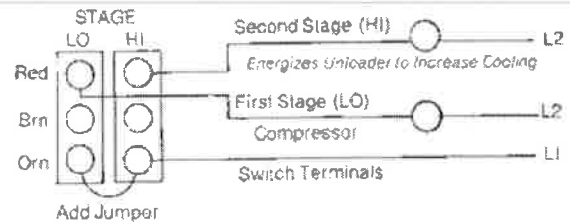


Figure-14 Typical Cooling Application for Two Stage Units.

CHECKOUT

After installing a thermostat, make an initial check of the switching action. Verify the switch action by listening to the switch contacts.

1. Turn the setpoint dial to a temperature above ambient. This should cause the thermostat to switch, making orange to brown.
2. Turn the setpoint dial setting down gradually. Orange to brown must break, making orange to red.
3. Compare the differential of the device to the differential shown on the performance charts by turning the dial. The differential of the device is the difference in dial reading between the make of orange to brown and the make of orange to red on single switch units.

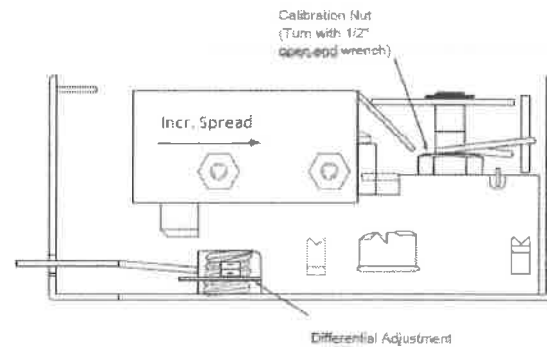


Figure-15 Adjustments.

Single Stage: Each line represents approximately 3°F (2°C) change.

Two Stage: Each notch represents approximately 2°F (1°C) change between stages. (Differential per switch is fixed)

ADJUSTMENTS

Setpoint

Screwdriver adjustment. Scales dual marked °F on front and °C on back. To change scale, remove spring retaining ring, select scale and replace retaining ring.

Differential

The differential is adjustable by turning the adjustor located on the side of the device (see Figure-15).

To adjust interstage differential:

1. Disconnect power to unit.
2. Remove cover.
3. Turn adjustor to approximately desired position.
4. Check out by turning dial and noting dial readings where switch contacts make.
5. After changing interstage differential, recalibrate. See CALIBRATION.

CALIBRATION

1. With all power disconnected, soak bulb(s) for 10 minutes at known temperature (must be 70°F for dual bulb).
2. Turn dial and note where switch contacts make.
3. Turn dial midway between click points.
4. Turn the calibration nut (located under dial) until the temperature of the bulb is indicated on the dial (see Figure-15).

Note: On two stage units follow above procedure. LO switch is first stage on cooling applications. HI switch is first stage on heating applications.

MAINTENANCE

Regular maintenance of the total system is needed to assure sustained optimum performance. Thermostats should be periodically inspected for dirt or blockage of air over the elements.

REPAIR

Field repair is not recommended. Replace defective device.