

## MACON CONTROLS NON-ELECTRIC THERMOSTATICALLY CONTROLLED RADIATOR VALVES

### APPLICATION

The Valve Body is used with the Thermostatic Head to provide automatic control of baseboard units, convectors, or standing radiators in hot water systems and in 2-pipe steam heat systems. For 1-pipe steam systems, a 1-pipe steam radiator adapter assembly is available. A temperature sensitive element in the head modulates the valve in response to room temperature. Neither the valve nor the thermostatic head requires the use of electric power.

### INSTALLATION

#### CAUTION

1. Installer must be a trained, experienced servicetech.
2. When installing the valve body, the arrow must be in the direction of flow.
3. Always conduct a thorough checkout when installation is complete.

#### IMPORTANT

1. On Straight-through body models, do not install with thermostatic head directly above valve body. On angle body models, assemble with thermostatic head on the far side of the valve from the heating surfaces to minimize the effects of radiant heat.
2. If boiler for 1-pipe steam system is cycled by a space thermostat in one zone, do not apply a radiator valve to the radiator in that zone.
3. Do not apply a radiator valve in 1-pipe steam systems that do not use steam air vent valves venting to atmosphere on each radiation unit.

#### LOCATION

The valve may be used to control radiators, baseboard units or convectors in single or multi-zone hot water systems. The valve is used in 1-pipe (mono) or 2-pipe heating systems. When the valve is used to control a single radiator, baseboard unit or convector, the head is installed on the inlet side (Fig. 1A). When a valve is used to control a series of radiators or baseboards, the valve should be installed on the return side of the series run (Fig. 1B). In a multi-zone heating system with a single radiator, baseboard unit, or convector in each zone, a valve is installed on the inlet side of each radiator in each zone (Fig. 1C).

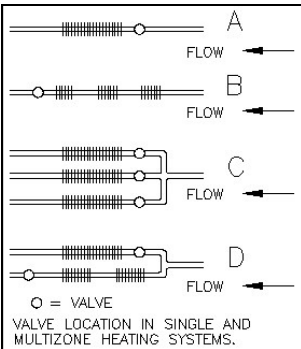


Fig. 1 Valve Location in Single and Multi-zone Hot Water Heating.

and 1D). In a multi-zone heating system with a

series of radiators or baseboards in a single zone, install the valve on the return side of the series run (Fig. 1D). In a 1-pipe steam system, a vacuum breaker must be installed between the steam vent and the radiator (Fig. 9).

#### IMPORTANT

The location of the valve depends on the location of the thermostatic head. Be sure the thermostatic head is NOT located where it is subject to drafts, exposed to direct sunlight, or covered by draperies or curtains. Note: When installing the Thermostatic Head for remote mounting, the hole in the mounting surface must be plugged with suitable insulation to insure that it receives minimal radiated heat and properly senses room temperature.

#### VALVE BODY INSTALLATION

The valve body must be installed within the following specified limits:  
Max. Static Pressure: 145 psig  
Max. Differential Pressure: 20 psig  
Sug. Differential Pressure: .5 to 2.9 psig  
Max. Steam Pressure: 15 psig  
Max. Water Temperature: 250°F

When installing the valve body in water and 2-pipe steam systems, the arrow must point in the direction of flow. For valve bodies with NPT threads, use new, properly reamed pipe, free of chips. Valve distortion or malfunction may result from excess pipe within the valve body.

#### For valves with sweat fittings:

#### IMPORTANT

- Insert assembly MUST be removed from valve bodies with sweat fittings before installation to avoid heat damage to rubber components (Fig. 2).
1. Use steel wool to thoroughly clean areas inside of valve into which copper tubing fits and approximately ¼ inch (19mm) at ends of tubing.
  2. Apply small amount of solder flux around outside ends of tubing.
  3. Insert both pieces of tubing completely into valve body.
  4. Use a propane torch to heat valve body at the general area in which tubing is fitted. Note: The hole in cover must be at least as large as the knurled setting knob on the thermostatic head to allow for baseboard cover removal.
  5. When valve body and tubing reach melting temperature of solder, apply solder to joint. Solder should draw evenly around fitting.
  6. Do not disturb until solder sets up.
  7. After cooling reinstall insert and visibly inspect for leaks with water supply turned on.
  8. If leak is found, drain water and repeat soldering procedure. Remember, only a clean, fluxed joint which is free from water will accept solder.

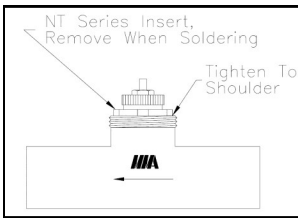


Fig. 2 NT Series Insert

Note: Protective cap on body may be used to manually operate valve before head is installed.

### THERMOSTATIC HEAD

#### INSTALLATION

##### Models EVO / MTW

##### Direct Mounting on Radiator

Use the following procedure (Fig. 3):

1. Install the valve body on the radiator.
2. Remove the protective dust cover from the valve body. Do not discard it.
3. Open thermostat to highest number.
4. Install the thermostatic head to the valve body. **do not over tighten thermostat nut, finger tighten, snug 1/4 turn with wrench.**

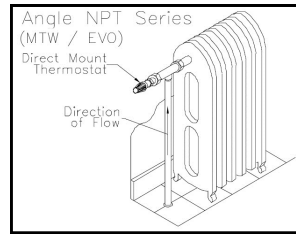


Fig. 3 Typical Installation of Valve (Angle Body) on Radiator

##### Direct Mounting on Radiator

Use the following procedure (Fig. 4):

1. Install the valve body on the baseboard unit.
2. Cut a hole in the baseboard unit directly in front of the valve connection. Note: The hole must be at least as large as the knurled setting knob on the thermostatic head to allow for base board cover removal.
3. Remove the protective dust cover from the valve body.
4. Open thermostat to highest number.
5. Install the thermostatic head to the valve body. **do not over tighten thermostat nut, finger tighten, snug 1/4 turn with wrench.**
6. Replace the baseboard cover.
7. Install pipe collar (collar not supplied) around the insulating sleeve.

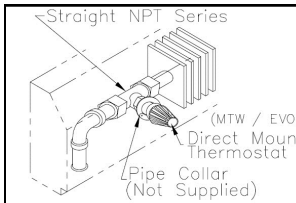


Fig. 4 Typical Installation of Direct Mount Thermostat Head in Baseboard

##### Models B46000 (ENTL) Fig. 5

##### Remote Wall Mounting

The Thermostatic Sensor is remote mounted from the valve on a plasterboard wall.

#### IMPORTANT

When selecting a location to mount the thermostatic head, remember it must not be subject to drafts, exposed to direct sunlight, or covered by draperies or curtains. To mount the thermostat on a wall, use the following procedure (Figs. 5 & 8):

1. Select a location to mount the thermostatic head. In making the selection, locate the wall studs. Unnecessary and troublesome work can be avoided by mounting the thermostatic head and running the capillary between 2 wall studs.

2. After selecting a location, prepare two openings 1½ inches in diameter. Prepare one opening near the actuator behind the baseboard unit or convector and one at the thermostatic head location. Note: Capillary is 6'6" long.

3. Open thermostat to highest number.
4. Install the thermostatic head to the valve body. **do not over tighten thermostat nut, finger tighten, snug 1/4 turn with wrench.**
5. Replace the baseboard unit or convector cover.

**Important:** Do not mount thermostat directly

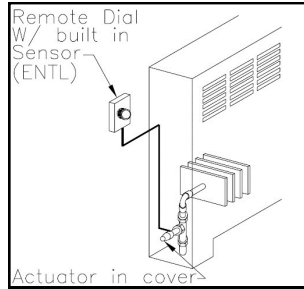


Fig. 5 Typical Wall Mounting of ENTL Installation for Convectors

**\*Important:** Do not mount sensor directly over

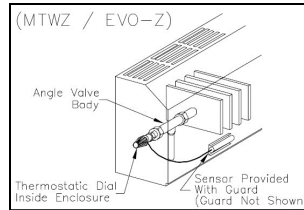


Fig. 6 Typical Wall Mounting of MTWZ Installation for Baseboard

##### Models EVO-Z / MTWZ (Fig. 7)

##### Remote Sensor Mounting

Use the following procedure (Fig. 6 & 7):

1. Install the valve body on the radiator.
2. Remove the protective dust cover from the valve body.
3. Open thermostat to highest number.
4. Install the thermostatic head to the valve body. **do not over tighten thermostat nut, finger tighten, snug 1/4 turn with wrench.**
5. Select a sensor location. Note: When selecting a location, remember that the sensor must not be exposed to drafts or direct sunlight, or covered by draperies or curtains.
7. Mount the sensor guard to the wall with 2 screws (not supplied).
8. Snap the sensor bulb into place on the sensor guard base.
9. Snap the sensor guard cover into place on the sensor guard base.

##### Models B56000-ENTLZ (Fig. 8)

##### Remote Wall Mounting

Use the following procedure (Fig. 8):

1. Select a location on the wall to mount the dial. In making the selection, locate the wall studs and mount the dial so the capillary can be flush mounted.

2. After selecting a location, drill 2 holes 1½ inches in diameter, one at the dial location, the other behind the baseboard or convector unit. Note: Each capillary is 6'6" long. **\*Important:** Do not locate sensor behind

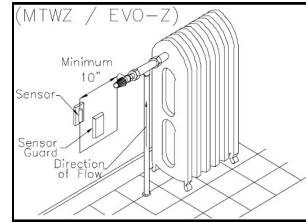


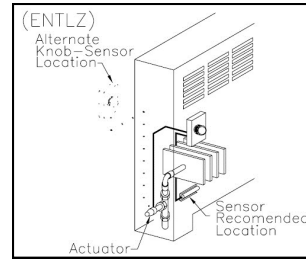
Fig. 7 Typical Free Standing Radiator Installation

3. Feed the actuator through the hole at the dial location behind the wall and out through the second hole.
4. Install the valve body.
5. Remove the protective cover from the valve body.
6. Open thermostat to highest number.
7. Install the thermostatic head to the valve body. **do not over tighten thermostat nut, finger tighten, snug 1/4 turn with wrench.**
8. Secure the dial to the unit cover with 4 screws (not supplied). Snap cover into place.
9. Mount the sensor below the radiation in the return air. Note: Secure the sensor guard base to the wall with 2 screws (not supplied). Snap the sensor bulb into place. The sensor guard cover may be used if desired.

##### Remote Mounting on Unit Cover

Use the following procedure (Fig. 8):

1. Install the valve body.
2. Select a location for the dial and drill a 1½ inch diameter hole at the location.
3. Feed the actuator through the hole to the valve body.
4. Remove the protective cover from the valve body.
5. Install the actuator on the valve body.



**\*Important:** Do not locate sensor behind curtains, drapes or in direct sunlight.

Fig. 8 Typical Wall Mounting of ENTLZ Installation for Convectors

#### CHECKOUT

When the installation is complete, rotate the dial until steam or water flow is detected. After the room temperature has stabilized (4 or 5 hours), reset the dial to the desired setting between 1 and 7 for MTW/EVO Series. (See chart on back page for temperature settings.) The set point will vary with the location of the sensor. A floor level sensor on a baseboard radiator will control at a different set point than a wall level sensor.

Note: Repositioning of the actuator head may be necessary for convenient visibility of the index mark. Loosen the union between the actuator head and the valve body. Turn the actuator head to the desired position and retighten the actuator nut.

#### SERVICE (All Models)

##### Recalibration

The thermostatic head is factory calibrated and should not need calibration. If, however, you feel that recalibration is required please contact factory.

#### CAUTION

Be careful not to damage "O" rings.

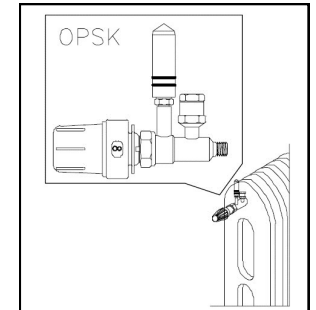
##### Insert Replacement

1. Relieve system pressure and drain below level of valve.
2. Remove thermostatic head.
3. Unscrew insert.
4. Screw new insert into body.
5. Replace thermostatic head and refill system.

#### ONE-PIPE STEAM SYSTEMS (Fig. 9)

Be sure boiler is cycled. Keep pressure as low as possible (1-1/2 psi recommended).

1. Use direct or remote Thermostat with one-pipe steam valve.
2. Install as shown in Fig. 9. Note: Steam air vent must be mounted in upright position. Vacuum breaker required.
3. If the boiler is being cycled by a space



thermostat, do not install a valve in this

Contact your local distributor for parts

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Section: Warranty & Engineering Data

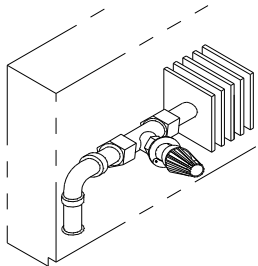
## ADJUSTING ROOM TEMPERATURE

Set the dial on the thermostat to achieve the desired temperature as indicated by the charts below.

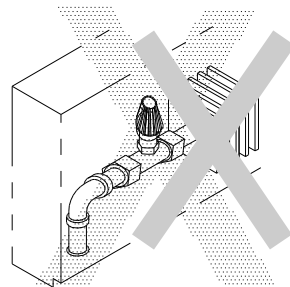
### EVO Series Thermostats

Dial Setting	0	*	1	3	5	6	7	8	9
Room Temperature (°F)	Off	50	54	61	68	72	75	79	82

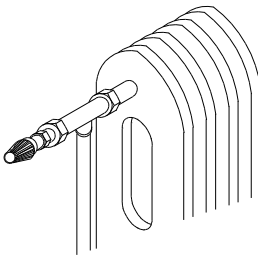
### INSTALLATION EXAMPLES (Direct Mount)



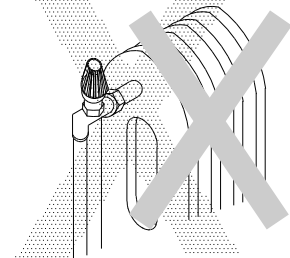
**RECOMMENDED**



**NOT RECOMMENDED**



**RECOMMENDED**



**NOT RECOMMENDED**

**NT SERIES VALVES** Valve bodies for EVO, MTW & NT series thermostats are non-electric temperature control valves for radiators, convectors, fan coil units and hydronic central heating systems. The valve can be actuated by a handknob or thermostats with remote or direct sensors or VM electric actuators.



Vertical angle valve with straight nipple. NPT - female inlet, male union outlet.

1/2"	N10637
3/4"	N10657
1"	N10677
1-1/4"	N10697



Straight valve with straight nipple. NPT - female inlet, male union outlet.

1/2"	N10737
3/4"	N10757
1"	N10777
1-1/4"	N10797



Horizontal angle valve with straight nipple. NPT - female inlet, male union outlet.

1/2"	N10837
3/4"	N10857
1"	N10877
1-1/4"	N10897



Sweat valve with female inlet and outlet.

1/2"	N10930
3/4"	N10950
1"	N10970

TROUBLE SHOOTING GUIDE		
SYMPTON	POSSIBLE REASON	SOLUTION
Not all sections of radiator heating up	<ol style="list-style-type: none"> <li>Many radiators are over-sized and all sections are not required to heat up to maintain the set room temperature.</li> </ol>	<ol style="list-style-type: none"> <li>System is "A" OK.</li> </ol>
Underheating	<ol style="list-style-type: none"> <li>Sensor in the wrong location.</li> <li>Thermostatic control mounted in vertical position.</li> <li>Remote sensor located in convector or near heat source.</li> <li>Flow through valve is in the wrong direction.</li> <li>Inadequate system temperature or pressure.</li> <li>Steam traps defective.</li> <li>Air lock in hot water system.</li> <li>Scale or debris blocking flow.</li> <li>Heating cabinet dampers are closed.</li> </ol>	<ol style="list-style-type: none"> <li>Change the sensor location, or control type. See installation instructions.</li> <li>These control types must be mounted horizontally.</li> <li>Remove sensor away from direct heat source.</li> <li>Check arrow on valve body. It should be in the direction of flow. Change valve direction, or flow direction.</li> <li>Check operating and limiting controls on boiler. Check circulating pump and isolating valves.</li> <li>Repair or replace traps with Tunstall traps.</li> <li>Open valve fully to allow air to pass. Install vents.</li> <li>Flush System. Do not use oil base additives.</li> <li>Open or remove dampers.</li> </ol>
Overheating	<ol style="list-style-type: none"> <li>Sensor in the wrong location.</li> <li>Control not properly installed.</li> <li>Capillary tube broken, kinked, or bent sharply.</li> <li>Dirt or scale under seat, preventing tight shutoff.</li> <li>Flow through valve is in the wrong direction, damaging the valve seat.</li> <li>Steam traps defective.</li> <li>Excessive differential pressure is forcing valve open. (Hot water systems)</li> </ol>	<ol style="list-style-type: none"> <li>Change sensor location, or change control type.</li> <li>Set bosses in grooves and tighten knurled ring to valve body. Do not over tighten.</li> <li>Replace control.</li> <li>Remove control from valve body, allowing valve to open fully and flush away scale and debris. Reinstall control and turn fully clockwise. If valve does not fully close, remove control and inspect valve seat area using cartridge changer tool or service socket tool. Change insert assembly.</li> <li>Check arrow on valve body. It should be in the direction of flow. Change valve direction, or flow direction. Remove valve cartridge and inspect for damage to seat disc.</li> <li>Repair or replace traps with Tunstall traps.</li> <li>Install differential pressure regulator to maintain less than 2.9 psi differential between supply and return pipes.</li> </ol>
Chattering or knocking	<ol style="list-style-type: none"> <li>Flow through valve is in wrong direction.</li> <li>Vacuum in system.</li> <li>Excessive differential pressure. (Refer to Valve/TStat Specifications)</li> <li>Binding of piping.</li> </ol>	<ol style="list-style-type: none"> <li>Check arrow on valve body. It should be in the direction of flow.</li> <li>Steam - Check traps and vents. Hot water - check expansion tank operation and location.</li> <li>Install differential pressure regulator to maintain less than 2.9 psi differential between supply and return pipes.</li> <li>Ensure adequate space for piping.</li> </ol>

**THERMOSTATS:** EVO, MTW & ENT Series Thermostats are installed on NT series valves to automatically control the actions of the valve, thus monitoring room temperature and conserving fuel.



#### EVO-Z

Nonelectric, fully automatic thermostat with valve mounted temperature setting dial and remote sensor.



#### ENTL-B46000 (shown w/valve)

Nonelectric, fully automatic remote thermostat with remote sensor and temperature setting dial.



#### EVO

A non-electric positive mechanical shut-off direct mounting thermostat. Anti-freeze position and adjustable maximum / minimum temperature. Highly sensitive with very accurate temperature settings and reactions.



#### ENTLZ-B56000

Non-electric, fully automatic thermostat with separate remote sensor and remote temperature setting dial.



**Zone Control VMC-24 & VMO-24**  
24-volt electric zone control for controlling individual room temperatures or zones (VMC-24 Normally Closed & VMO-24 Normally Open).