

800 Series Indicating Temperature Controls

Types 800, T800, 800P, 802

Please refer to IMT120 for Explosion Proof Types
820E and 822E

AVALON
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Please read all instructional literature carefully and thoroughly before starting. Refer to the final page for the listing of Recommended Practices, Liabilities and Warranties.

GENERAL

Temperature variations are sensed by a liquid filled sensing bulb which hydraulically transmits motion through a mechanism which rotates the indicating pointer and actuates precision snap-acting switch(es). Control set point(s) are varied by turning the external adjustment knob(s), according to procedures outlined (See Part II - Adjustments). Thermometer type T800 provides temperature indication only with no snap-acting switch.

Part I - Installation

Tools Needed

Screwdriver to secure
customer supplied screws
5/64" Allen Wrench



INSTALL UNIT WHERE SHOCK, VIBRATION AND TEMPERATURE FLUCTUATIONS ARE MINIMAL. DO NOT MOUNT UNIT IN AMBIENT TEMPERATURES EXCEEDING PUBLISHED LIMITS. ORIENT UNIT SO THAT MOISTURE IS PREVENTED FROM ENTERING THE ENCLOSURE.



PREVENTATIVE MAINTENANCE / PERIODIC TESTING (6 MONTHS OR SOONER AS DICTATED BY THE ENVIRONMENT) IS NECESSARY TO ENSURE OPERATION OF THE PRODUCT TO SPECIFICATION. LUBRICATE ALL PIVOT POINTS AND MOVING PARTS, TO PREVENT CORROSION, WITH COMPATIBLE DRY LUBRICANTS OR LIGHT GREASE.

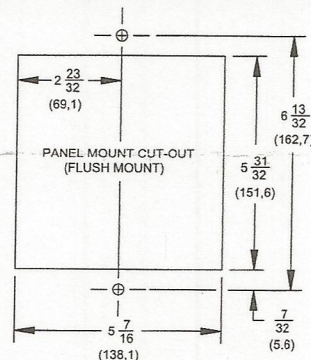
When mounting 800 or 802 type controls, it may be necessary to remove adjustment knob and front cover. The knob is secured with a 5/64" Allen Setscrew. The cover is secured by four screws at the corners.

MOUNTING

The controller may be mounted in any position to either a surface or panel (1/4" thick maximum). Locate it where vibration, shock and ambient temperature fluctuations are minimal. It is recommended that mounting the unit with the conduit connection on the top be avoided.

To Flush Mount

Cut out the panel as shown in Figure 1A. Mount to the panel using the two holes located on the flange of the enclosure.



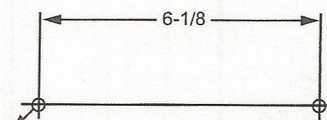
Clearance for #8 screw - (2) places

Figure 1A - Flush Mounting

To Surface Mount

(Option M449)

Attach 2 mounting ears found in separate package to recessed areas on back side of enclosure by means of 2 self-tapping screws. Mount to surface per Figure 1B.



Clearance for #10 screw
- (2) places

Figure 1B - Surface Mounting

Mounting Bulb and Capillary

Fully immerse the bulb and 6" of capillary in the control zone. For best control it is generally desirable to place the bulb close to the heating or cooling source in order to sense temperature fluctuations quickly. Be sure to locate the bulb so it will not be exposed to temperature beyond the instruments range limits.

Try to place any remaining capillary adjacent to the control head so it will sense the same ambient temperatures (control is ambient temperature compensated).

Unless otherwise specified, factory calibration, allows for 6" of capillary tube in the control zone. If longer lengths are required recalibration may be necessary. Follow the procedure outlined in PART II - Adjustments.

Avoid bending or coiling the capillary tube tighter than 1/2" radius. Exercise caution when making bends near the capillary ends.

If a separable well or union connector is used follow separate instructions included with them.

WIRING



DISCONNECT ALL SUPPLY CIRCUITS BEFORE WIRING. ELECTRICAL RATINGS STATED IN LITERATURE AND ON NAMEPLATE SHOULD NEVER BE EXCEEDED. OVERLOAD ON A SWITCH CAN CAUSE FAILURE ON THE FIRST CYCLE. WIRE UNITS ACCORDING TO LOCAL AND NATIONAL ELECTRICAL CODES. MAXIMUM RECOMMENDED WIRE SIZE IS 14 AWG.

Types 800, 802, 800P

(Enclosed units)

Connect the electrical conduit to the case securing it with the grounding locknut supplied.

Note: Unless control is connected to a metallic conduit, grounding bushing should be removed from grounding wire. A separate conductor should be provided from grounding system directly to the non-current carrying metal parts of control (splice the grounding wire).

Conduit opening is available on the left side as standard. It can be supplied on the right side on request. Wire through the 7/8" conduit hole directly to the lead-wire(s) provided, color coded as follows, or to the optional terminal block.

	Switch 1	Switch 2
Common	Violet	Yellow
Normally Open	Blue	Orange
Normally Closed	Black	Red

See wiring Diagrams Figure 2A and 2B.

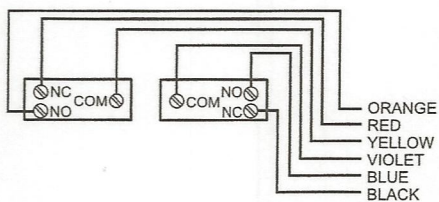


Figure 2A - Dual Switch

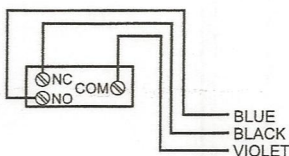


Figure 2B - Single Switch

Optional terminal block wiring is available for single or dual switch controls (option M100). See Figure 2C.

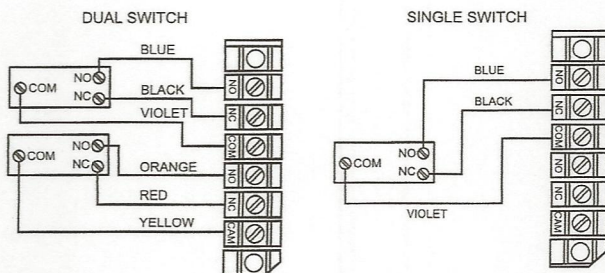


Figure 2C - Terminal Block Option

Part II - Adjustments

Tools Needed

5/64" Allen Wrench
5/16" Open End Wrench (2 required)
Screwdriver

Switch Settings

(Dual switch type only)

The basic enclosed dual switch controller is furnished with individual adjustment of set points as described below.

Type 802 has a separate knob and pointer for each switch. Turn black knob for switch #2 and turn green inserted knob for switch #1. Set points are shown by individual pointers and may be separated up to 100% of dial range apart, so long as the red pointer is set higher than the green pointer.

Replace cover and adjustment knob if removed during installation. Controller is ready for operation. Turn setting pointer to desired control temperature and start up the process. To suit particular process conditions or for greater controller accuracy it may be desirable to make slight alterations to the set point or indicator reading. Procedures for making these adjustments are described below.

Note: Indicating Pointer Deflection:

The indicating pointers will read slightly low when the bulb temperature is 15° above the controller setting. This deflection is normal and repeatable (approximately 0.5% of scale range on single switch models) and is due to the transference of the switching mechanism load to the thermal system. It can be measured by moving the setting pointer from the high to the low end of the scale and observing the resultant indicating pointer deflection.

Note: Prior to making any controller adjustments, the cover and adjustment knobs should be removed. When adjustments are completed, all applicable parts should be replaced.

Note: The adjustment knob slides off adjustment shaft for all controls except the 802. The 802 requires a 5/64" allen wrench. Be sure to replace gasket when re-assembling.

In-Process Adjustments

Use an accurate test thermometer such as a thermocouple with its probe mounted directly to the center of the sensing bulb. Before making any adjustments, allow process temperature to stabilize; i.e., successive on-off cycles repeated.

Correct any difference between the Indicating Pointer and the test thermometer by holding the compensator with a 5/16" wrench while turning the zero adjustment "C" on the thermal assembly with a second 5/16" wrench, per Figure 3 until the brown Indicating Pointer reads the same as the test thermometer. Turning clockwise lowers indicated reading. Compare the process temperature with the set point Adjustment Pointer. Loosen adjustment screw "A" to align set point Adjustment Pointer with the Indicating Pointer. Re-tighten screw "A".

Adjusting Thermometer Type T800

Use the in-process adjustment to check the control. Differences between the rest instrument and the thermometer can be corrected by turning the

zero adjustment "C" per Figure 3 on the thermal assembly. Turning in lowers indicated reading.

Adjusting Single Switch Type 800

Move the set point Adjustment Pointer up scale beyond the black Indicating Pointer. This permits checking the set point by moving the lever arm upward with a finger or tool simulating thermal assembly movement. Connect test lights to indicate switch operation or listen for the switch to click. Loosen adjustment "A" and move the Adjustment Pointer until it agrees with the Indicating Pointer. When the switch clicks re-tighten the screw.

Adjusting Dual Switch Type 802

Connect test lights to indicate switch operation or listen for the individual switch clicks. The separation between switches is the difference between the high and low set points. The set points are determined by setting individual adjustment pointers and may be separated up to 100% of scale range apart.

To align either switch to the Adjustment Pointer the corresponding adjustment "A" must be loosened and the Adjustment Pointer set to the Indicating Pointer, then tighten adjustment "A".

Note: Switch #1, green pointer, cannot be set to operate at a higher setting than switch #2, red pointer.

Correction of Capillary

If the length of capillary immersed in the process differs from the amount immersed at the factory calibration bath, a calibration shift will occur. The error may be corrected as follows:

Move set pointer to the highest temperature setting. Note indicating scale reading with the head and sensor at room temperature. Loosen the two thermal assembly mounting screws. Re-position the housing index against the calibration on the instrument case (or skeleton casting) at a rate of 1 division line per capillary length listed in the following column. Move to the left if capillary is to be added to the process, or to the right if capillary is to be removed from process.

Model Number	Range	Cap Length/Division*
1	-180 to 120°F	2 ft
2	-125 to 350°F	1 1/2 ft
3	-125 to 500°F	1 ft
4	-40 to 120°F	4 ft
5	-40 to 180°F	3 ft
6	0 to 250°F	2 1/2 ft
7	0 to 400°F	2 ft
8	50 to 650°F	2 ft

* Added to or taken away from the process.

Tighten the two thermal assembly mounting screws. Note change indicated scale reading (if any).

Turn zero adjustment "C" to bring indicating pointer reading back to the original reading noted before. Turning in lowers indicated reading.

Note: The thermal assembly can be returned to its original position by aligning its flange with the line scribed on the instrument case.

General Layout

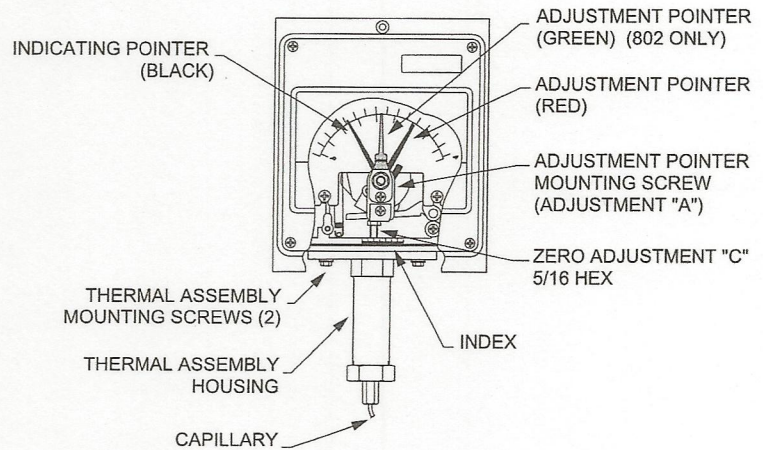


Figure 3

Dimensions

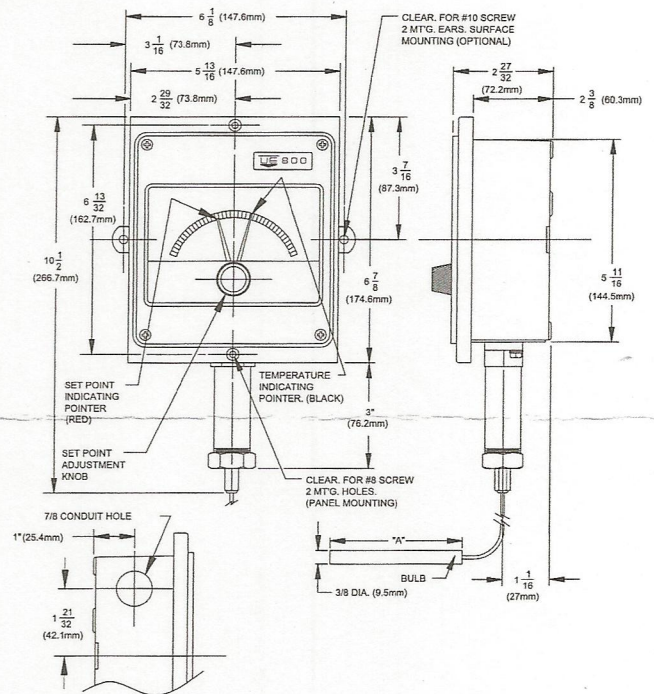


Figure 4

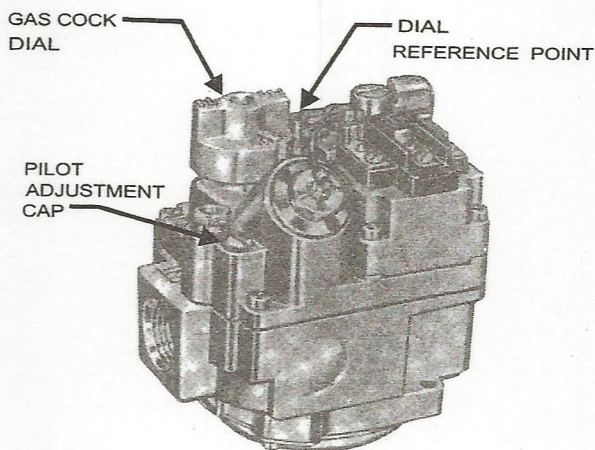
Model	Dimension A	
	Inches	mm
1BS	3-3/4	95,3
2BS	2-5/8	66,7
3BS	2-1/8	54,0
4BS	6-3/4	171,5
5BS	5	127,0
6BS	4-1/2	114,3
7BS	3	76,2
8BS	3-1/4	82,6

THE CONTROL SYSTEM ON YOUR APPLIANCE IS A



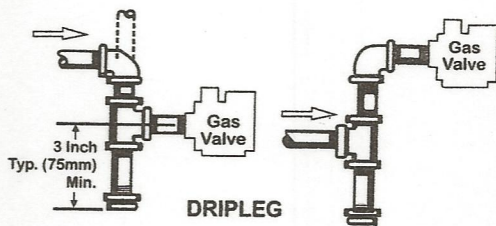
UNITROL

**7000MV, MVR
MILLIVOLT ACTUATED CONTROL VALVE**



TO START OPERATION:

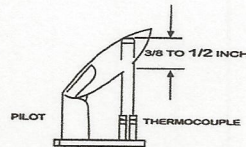
1. Set the room thermostat to the lowest temperature setting, or "OFF".
2. Partially depress and turn control Gas Cock Dial to "OFF" position.
3. Wait five minutes to allow gas which may have accumulated in the main burner compartment to escape.
4. Turn Gas Cock Dial to "PILOT" position.
5. Depress Gas Cock Dial and light Pilot. Hold in depressed position for about 1/2 minute.
Note: Sufficient time must be allowed for a proper size pilot flame to heat the thermocouple and hold the safety magnet in a locked-up position. Also, time must be allowed for air to escape from the lines during the first operation.
6. Release Dial and turn to full "ON".
7. Reset Room Thermostat.



INSTALLER NOTE:

Please leave these lighting instructions with unit.
DO NOT REMOVE.

SEE OTHER SIDE



PILOT BURNER ADJUSTMENT:

1. Remove Pilot Adjustment Cap.
2. Adjust pilot key to provide properly sized flame.
3. Replace Pilot Adjustment Cap.
4. Leak Test Per Warning Note Below

WARNING

1. Shut off gas and electricity before starting installation or service. Turn back on to test or operate.
2. Installation and servicing of gas appliances and controls must only be performed by qualified personnel. After installation or servicing; test manual valve, operating valve, pressure regulation (if so equipped), and automatic safety shut off valve for proper operation.
3. When lighting the pilot, the fail safe safety device must be functionally tested to prove its operation in the event the main control valve malfunctions.
4. A drip leg should be provided in the supply line to the control.
5. Leak test with a soap solution after installation or servicing with main burner on. Coat pipe and tubing joints, gasket etc. with soap solution. Bubbles indicate leaks.
6. **DO NOT** use this control if it has been exposed to water corrosion through immersion, dripping, etc. It may be damaged and must be replaced.
7. **DO NOT** insert any object other than suitable pipe or tubing in the inlet or outlet of this control. Internal damage may occur and result in a hazardous condition.
8. **DO NOT** connect appliance before pressure testing gas piping. Damage to gas valve may result.
9. **DO NOT** grip control body with a pipe wrench or vise. Damage may result causing gas leakage. Use inlet or outlet bosses, or special body wrench.
10. **DO NOT** use Gas Cock Dial to adjust gas flow. Turn dial to full "ON".
11. Dials must only be operated by hand. **DO NOT** use pliers, wrenches or other tools to turn dials.
12. In changing from natural to L.P. gas, or vice versa, regulator assembly (if so equipped), burner and pilot orifices must be changed.
13. When using L.P. gas caution must be taken to ensure that no raw gas is present in the surrounding area before attempting to put appliances into operation, or when relighting pilot.
14. In case of failure of gas valve to shut off. **DO NOT** shut off electrical power; turn off gas supply allowing fan (if so equipped) to continue running until heating unit has cooled.
15. Keep all combustible materials away from gas appliances. **DO NOT** allow lint or dust to collect in burner area.