

**Solid State Outdoor Air Thermostat
General Instructions**

DEVICE INFORMATION

Identification

The TS-8791 is identified by the part number which is found on the outside of the carton and on the back of the unit. Stamped on the outside of the unit is the date of manufacture (four digits, the first two representing the week of the year and the second two representing the year).

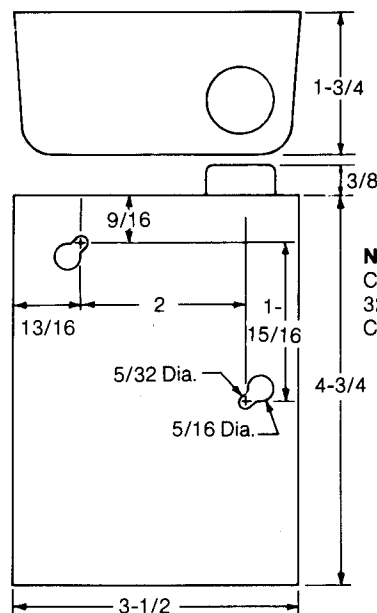
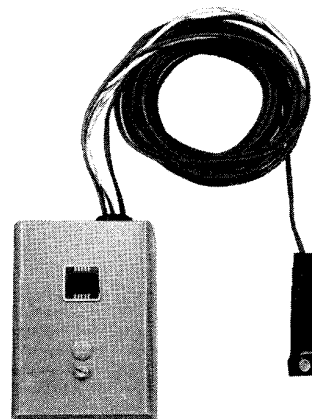
This unit is used in the Digi-Dap control system to disable staged cooling and to return the mixed air actuator to the minimum outside air position as a function of the outside air temperature.

Pre-Installation

Before installing the device, check for obvious shipping damage such as a broken cable or bent case.

Performance

1. Input is 20 VDC from CP-8173.
2. Output is Two stage. Stage 1 (mixed air actuator to minimum outside air position) more than 1 VDC between blue and white/red, when outside air is above CPA setting. Stage 2 (staged cooling disabled) less than 1 VDC between blue and white/blue, when outside air is below CPA setting. The CPA for each stage is adjustable from 55° to 85°F.
3. Deadband is 4°F at each stage setting.
4. As factory set, the normal operation is as follows:
 - a. The mixed air actuator returns to the minimum O.A. position at 70°F, and modulation control is restored at 66°F outside air temperatures (CPA No.1).
 - b. Staged cooling is disabled at 55°F and is restored at 59°F outside air temperatures (CPA No.2)



Note: 20 ft. Cable on Sensor. 32" Power and Control Leads.

INSTALLATION

Requirements

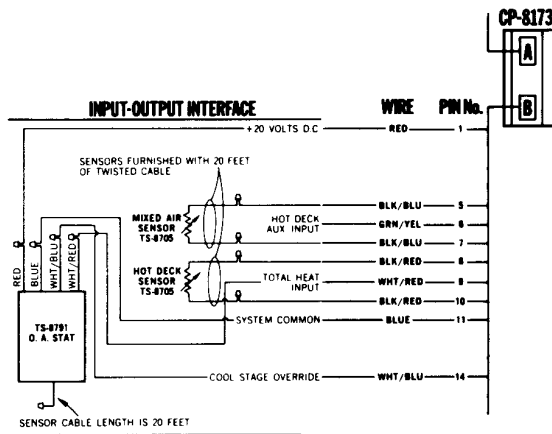
Refer to Figure 1 for mounting dimensions.

The device should be mounted on a vibration free surface. Avoid locations where excessive moisture, corrosive fumes or other vapors are present. The outside air sensor must be mounted to avoid the effects of the sun or precipitation. The device can be mounted in any position, and has ambient limits for operation of 0-135°F. Refer to Fig. 2 for wiring.

Figure-1

Procedure

1. Mount unit adjacent to the CP-8173 using two No. 6 screws provided. Note: Maximum distance TS-8791 can be from CP-8173 is 200 feet. Use No. 18 gauge wire when extending leads.
2. Locate the sensor in outside air. Note maximum distance element can be located from TS-8791 is 100 feet. When extending element leads, use No. 18 or 22 gauge shielded cable with shield grounded at TS-8791.
3. Connect the red, blue, white/blue, and white/red leads to the matching colors of the "B" harness from the CP-8173 (see Figure 2) separately provided.



Typical Wiring—AD-1712-300-2 harness shown. Wirenut or tape any unused wires in harness.

Figure-2

CHECKOUT

Refer to Run/Adjust

RUN/ADJUST

Theory of Operation

Refer to Figure 2.

A solid state network in the unit works in conjunction with a 1000 ohm Balco element sensing the outside air. When the outside air temperature is below the CPA setting of either stage, there is a low voltage (less than 1 VDC) between the blue and white/blue or white/red. This action simulates a switch across these leads; shorting blue and white/blue disables the staged cooling and shorting between blue and white/red allows the mixed air actuator to modulate between full open and the minimum air position.

1. Make sure sensing element of TS-8791 is sensing a stable temperature between 60 and 80°F. Measure and record actual temperature. Note: If it is not possible to locate the element as instructed above, a 1000 ohm 1% resistor may be substituted for the sensing element for checkout of the TS-8791 and for rough calibration if required. 1000 ohm represents 70°F. *For exact final calibration, the actual sensing element must be used.*
2. Make sure the CP-8173 is energized.
3. Remove cover from TS-8791.

4. Connect a 20K ohm/volt VOM (0-50 VDC range) across RED (+) and BLUE (-) pins of the TS-8791. Voltage must read 20 ± 2 VDC.
5. Remove White/Blue lead from pin on TS-8791 and move (-) lead of VOM to white/blue pin.
6. Rotate CPA No. 2 to the minimum dial setting (voltage must be below 1 VDC), then slowly rotate the CPA toward a higher value until the VOM reading rises abruptly to more than 1 VDC (i.e., 17-22 VDC). Dial reading should equal the temperature at the sensing element. ($70^\circ \pm 5^\circ$ if ohm resistor has been substituted for element.) If not, hold the CPA shaft in position and slide the indicator around the shaft until it reads the sensed temperature. *(DO NOT adjust indicator if resistor is used.)*
7. Repeat step 6 to verify calibration. Rotate CPA to desired setting. (i.e., 55°) Replace white/blue lead on pin.
8. Remove white/red lead from pin on TS-8791, move (-) lead of VOM to white/red pin.
9. Rotate the CPA No. 1 to the maximum dial reading (voltage must be more VDC (i.e., 17-22 VDC), then slowly rotate the CPA towards a lower value until the VOM reading drops abruptly to less than 1 VDC. Dial reading should equal the temperature at the sensing element. ($70^\circ \pm 5^\circ$ if 1000 ohm resistor has been substituted for element.) If not, hold the CPA shaft in position and slide the indicator around the shaft until it reads the sensed temperature. *(DO NOT adjust indicator if resistor is used.)*
10. Repeat step 9 to verify calibration. Rotate the CPA to desired setting. (i.e., 70° and replace white/red lead on pin.)
11. Disconnect VOM, reconnect element if resistor was used, and replace cover.

Troubleshooting

If unit is not functioning properly, proceed as follows:

1. Refer to RUN/ADJUST and check calibration of unit.
2. If unable to obtain proper results, check wiring to CP-8173. If in error is found, correct and recheck calibration.
3. If wiring is correct, check TS-8791 for foreign material or corrosion on wiring pins. Remove if present and recheck unit.
4. If $20 \text{ VDC} \pm 2 \text{ VDC}$ is not present across red and blue, and wiring is correct, the problem is in the CP-8173.

REPAIR

Field repair is not recommended. Replace with a new unit.

DC Voltage Between Leads Indicated				
CPA	CPA Setting	TS8791 Leads	O.A. Above CPA Setting	O.A. Below CPA Setting
#2	55°F	Blue (-) to White/Blue (+)	More than 1	Less than 1
#1	70°F	Blue (-) to White/Red (+)	More than 1	Less than 1

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