Honeywell

T775J
Electronic Remote Temperature Controller

FEATURES

- **T775 model provides reset control with two temperature inputs and one of either 4 to 20 mA, 0 to 18 Vdc, or Electronic Series 90[a] Proportional + Integral modulating output with 0 or 1 relay output stages, or 1 or 2 relay output stages with no modulation.**
- **-40°F to +220°F (-40°C to +105°C) setpoint temperature range.**
- **-45°F to +225°F (-43°C to +107°C) sensor display range.**
- **-30°F to + 140°F (-34°C to +60°C) ambient temperature range.**
- **Linear platinum temperature sensor.**
- **Adjustable temperature range and differential.**
- **Adjustable throttling range of 2° to 30° F or C.**
- **Adjustable reset ratio.**
- **Liquid crystal display (LCD) indication for mode and output status.**
- **Keypad provides ease of programming and operation.**
- **Accuracy is within +/- 1°F/C at nominal input voltage, nominal sensor ambient temperature (77°F (25°C) operating ambient). Accuracy can vary as parameters deviate from nominal.**
- **Stages independently programmed for heating or cooling.**
- **24/120/240 Vac voltage inputs.**
- **Spdt relay outputs.**

IMPORTANT
> *The T775 is an operating control, not a limit or safety control. When used in applications requiring safety or limit controls, use a separate safety or limit control device in conjunction with the T775.*

[a] The Electronic Series 90 output provided with T775J models will not drive electromechanical Series 90 slidewire devices.

GENERAL

The T775J family of electronic remote temperature controllers provides reset control for chillers, heating and cooling systems, and other applications where electronic accuracy in addition to remote sensing is desired.

Contents

63-2248-4

SPECIFICATIONS

IMPORTANT

> *The specifications given in this publication do not include normal manufacturing tolerances. Therefore, an individual unit may not exactly match the listed specifications. Also, this product is tested and calibrated under closely controlled conditions and some minor differences in performance can be expected if those conditions are changed.*

Models (See Table 1):
The T775J family of electronic remote temperature controls provides reset control for chillers, heating and cooling systems, and other applications where electronic accuracy in addition to remote sensing is desired.

T775J provides reset control with *two* temperature inputs and one of either 4 to 20 mA, Electronic Series 90, or 0 to 18 Vdc Proportional + Integral modulating output with 0 or 1 relay output stages, or 1 to 2 relay output stages with no modulation. Includes two part number 193987GA Sensors.

Table 1. T775J Model Numbers and Outputs.

Model Number	Outputs	
	Modulation Type	Number of Relay Outputs
T775J1001	None	1
T775J1019	Series 90	0
T775J1027	4-20 mA	0
T775J1035	0-18 Vdc	0
T775J1043	Series 90	1
T775J1050	4-20 mA	1
T775J1068	0-18 Vdc	1
T775J1076	None	2

Electrical Ratings:
Voltage Input: 24/120/240 Vac, 50/60 Hz (+10/-15%).
Power Consumption:
  50 Hz: 10 VA maximum.
  60 Hz: 8 VA maximum.

Contact Ratings:
1/2 HP: 9.8 FLA, 58.8 LRA at 120 Vac.
1/2 HP: 4.9 FLA; 29;4 LRA at 240 Vac.
125 VA pilot duty at 120/240 Vac.
10A at 24 Vac (resistive).

Temperature Accuracy:
±1° F (0.6° C) (at nominal input voltage, 77°F (25°C) operating ambient, nominal sensor ambient).

Setpoint Adjustment Range:
-40° F to +220° F
(-40° C to +105° C).

Operating Ambient Temperature:
Controller: -30°F to + 140°F (-34°C to 60°C).
Sensor: -45°F to + 225°F (-43°C to 107°C).

Throttling Range for Modulating Output:
Adjustable 2° to 30° F or C.

Differential Range for Staged Output:
Adjustable 1° to 30° F.

Reset Ratio:
Adjustable between 1 to 30 and 30 to 1.

Operating Humidity:
5 to 95 percent relative humidity, noncondensing.

Sensor:
Positive coefficient platinum type, 4.8 ohms/°F, 1000 feet maximum distance between sensor and solid state controller (requires calibration over 400 feet).

Approvals:
Underwriters Laboratories Inc. Listed: File No. E4436.
  Guide XAPX.
Canadian Standards Association Certified: File No.
  LR47125.

ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number .
  1. Model Number
  2. Accessory

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:
  1. Your local Home and Building Control Sales Office (check white pages of your phone directory).
  2. Home and Building Control Customer Logistics
    Honeywell Inc., 1885 Douglas Drive North
    Minneapolis, Minnesota 55422-4386

In Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Scarborough, Ontario M1V 4Z9. International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

Mounting:
Mounts on any suitable horizontal or vertical surface. (See Fig. 5 for mounting hole locations.)

Dimensions:
See Fig. 1.

Display Resolution:
Sensed temperature and other operating parameters are displayed via a liquid crystal display (LCD) with a resolution of 1°F or 1°C.

Accessories:
C7100C1003 Duct Mount Averaging Sensor*.
T7047C1090 Wall Mount Sensor Case.
107324A Bulb Holder, duct insertion.
121371A Copper Immersion Well.
121371E Stainless Steel Immersion Well.
107408 Heat Conduction Compound, 4 ounce.
C7043A1098 Case and Immersion Well.
203401B Waterproof Sensor.
203531A Panel Mounting Kit.
A775A1003 Sensor Simulator.
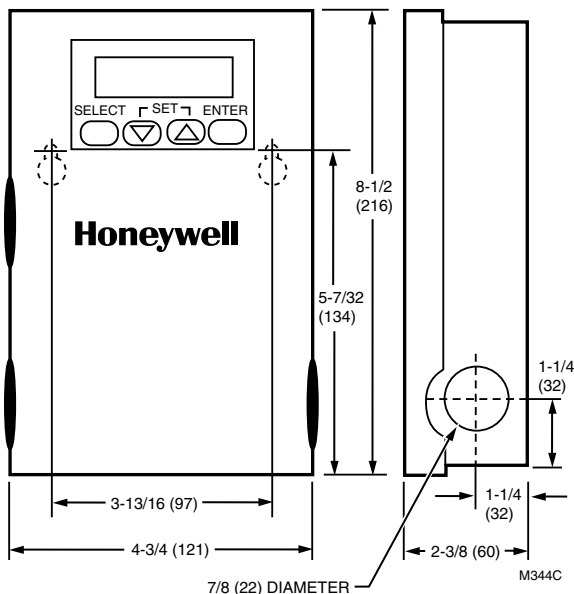*Use of C7100C1003 decreases accuracy of T775 to ±2°F (±1°C).

Fig. 1. Approximate T775J dimensions in in. (mm).

INSTALLATION

When Installing this Product...

❶ Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
❷ Check the ratings given in these instructions and on the product to make sure the product is suitable for your application.
❸ Installer must be a trained, experienced service technician.
❹ After installation is complete, check out the product operation as provided in these instructions.

⚠ **CAUTION**

Disconnect power before installation to prevent electrical shock or equipment damage.

Location and Mounting

Mount the controller in any convenient interior location using the two mounting holes provided. Mounting screws are not included. Use controller dimensions in Fig. 1 as a guide.

Sensor Location

The 193987GA Sensor can be used up to 1000 ft (304m) from the T775 using standard AWG 18/2 unshielded wire. If longer than 25 feet in an electrically noisy environment, use shielded cable. Locate the sensor on pipes, in immersion wells, in wall-mounted cases or on a bulb holder.

Multiple sensors can be parallel-series wired to sense average temperature in large spaces. In order to maintain control accuracy, be sure the number of sensors parallel-series wired is of the n^2 power (i.e., 1, 4, 9, 16, etc). See Fig. 2.
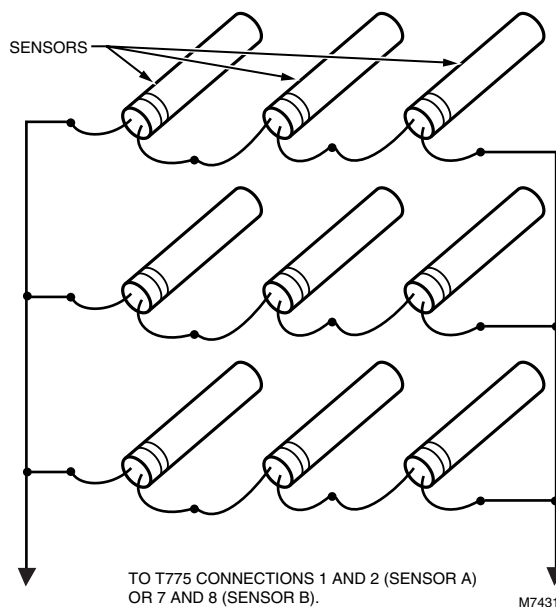

TO T775 CONNECTIONS 1 AND 2 (SENSOR A)
OR 7 AND 8 (SENSOR B).

Fig. 2. Parallel-series wiring of sensors.

Sensor Mounting

Mount the sensor on a wall or panel for sensing space temperature (Fig. 3); strap it to a pipe, or insert it into a well (Fig. 4) for hot/cold water sensing; or tape it to a standard cap or bulb holder for duct air sensing. To prevent moisture or condensation entering the sensor through the leadwire holes, mount the sensor with leadwires exiting the bottom of the sensor.

NOTE: Use heat conductive compound in immersion wells. See Accessories.

Mounting Sensor in T7047C1090 Case

❶ Run wires from T775J through wall.
❷ Mount case to wall with screws provided.
❸ Connect wires from the T775J to two T terminals on the T7047C Case.
❹ Cut and strip 193987GA Sensor leads to 3 to 4 inch (76 to 102 mm) length and connect to T terminals in the case.
❺ Position sensor as shown in Fig. 3; assemble cover and tighten cover screws.

⚠ CAUTION

1. Make sure that metal tube of sensor does not short against T terminals in wall-mounted case.
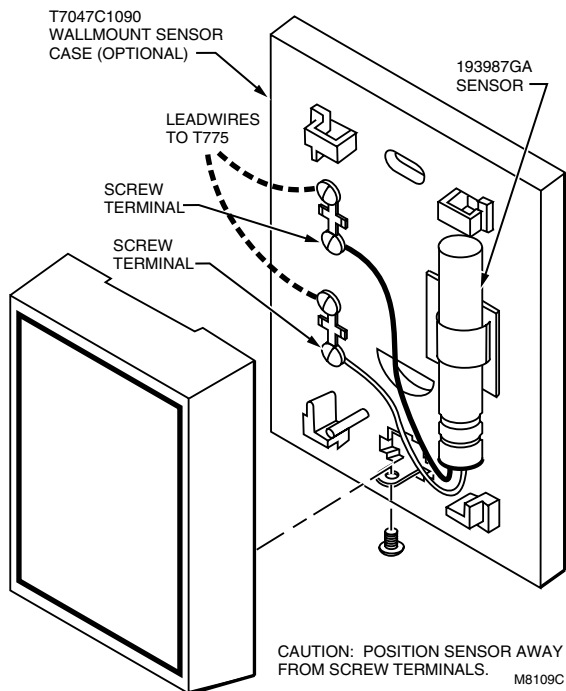2. Do not run sensor wiring (even if using shielded cable) with building power wiring.

CAUTION: POSITION SENSOR AWAY FROM SCREW TERMINALS.
M8109C

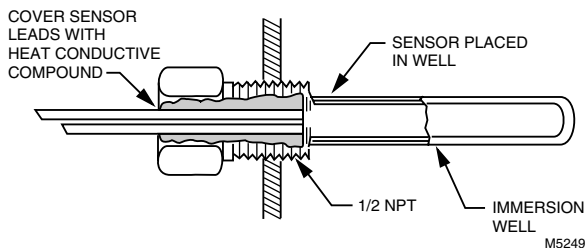**Fig. 3. Sensor mounted on wall.**

M5249

Fig. 4. Sensor inserted in immersion well.

Wiring

⚠ CAUTION

Disconnect external power before wiring to prevent electrical shock or equipment damage.

IMPORTANT

The T775J is not intended for safety limit applications. It is an operating control, not a safety control.

Disconnect external power before wiring to prevent electrical shock or equipment damage. All wiring must comply with applicable local codes and ordinances.

Refer to Fig. 4 for locating the appropriate power inputs, remote sensor inputs, relay, modulating output terminals, contact closure input, and sensor selection switch. Access the terminals through standard conduit knockouts (A-C) located around the enclosure perimeter.

NOTE: Hole A should only be used for remote sensor wiring, low voltage wiring, and access to modulating output.

When wiring the input power, only one source of power can be applied to the T775J (e.g., 24 or 120 or 240 Vac). Knockouts B and C can be used to gain access to 120 or 240 Vac input terminals and the load relay output terminals.

The T775J can be used to provide reset control of damper and valve actuators that accept 4 to 20 mA, 0 to 18 Vdc or Electronic Series 90 modulating inputs, and to control one on-off load. Depending on the application and the motor or actuator used, the T775J can control up to three Modutrol motors by using resistor kits that are available as accessories for existing motors. Use specified resistor kits to control an Electronic Series 90 (Modutrol®) Motor with a 4 to 20 mA controller. Obtain information on these kits from either the TRADELINE® catalog, motor specification or your local distributors. See Fig. 7 through 15 for typical T775J wiring and applications.
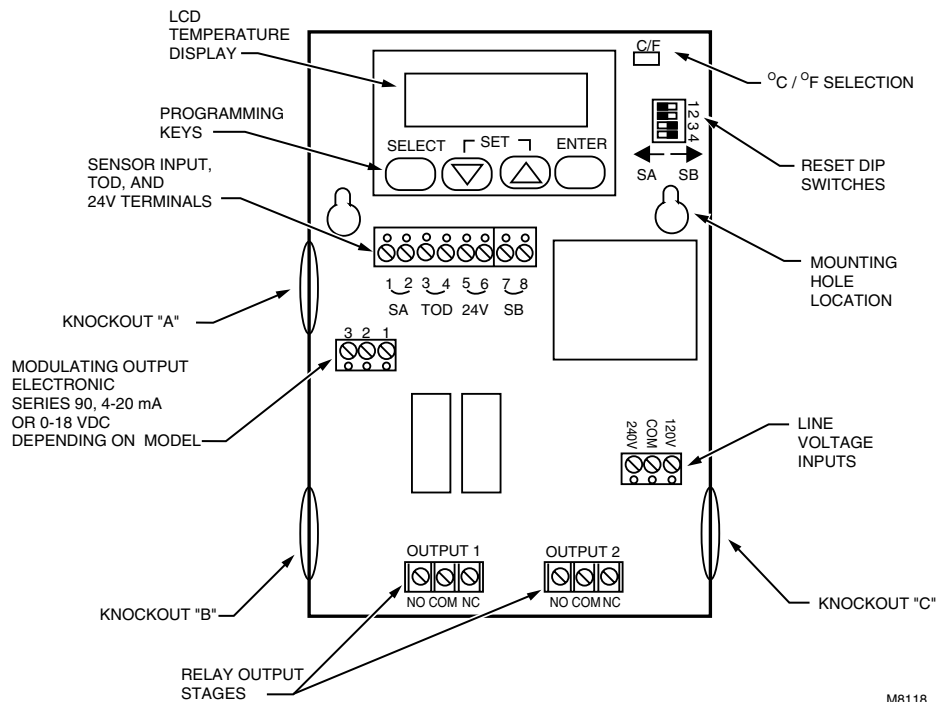
Fig. 5. Feature locations.

IMPORTANT

Erratic temperature readings from the 193987GA Sensor can be caused by poor wiring practices that must be avoided to assure proper operation:

a. *Do not route temperature sensor wiring with building power wiring.*

b. *Do not locate temperature sensor wiring next to control contactors.*

c. *Do not locate temperature sensor wiring near electric motors.*

d. *Do not locate temperature sensor wiring near welding equipment.*

e. *Make sure good mechanical connections are made to both the sensor and the controller.*

f. *Do not mount sensor with leadwire end (wire end) pointing up in an area where condensation can occur.*

g. *Use shielded wiring to connect the sensor to the T775 when an electrically noisy environment exists. See Fig. 6.*

NOTE: DO NOT GROUND SHIELDED CABLE AT SENSOR END.

NOTE: TO MINIMIZE NOISE PICKUP, MAKE CONNECTION FROM SHIELDED CABLE AS CLOSE AS POSSIBLE TO SENSOR BODY.
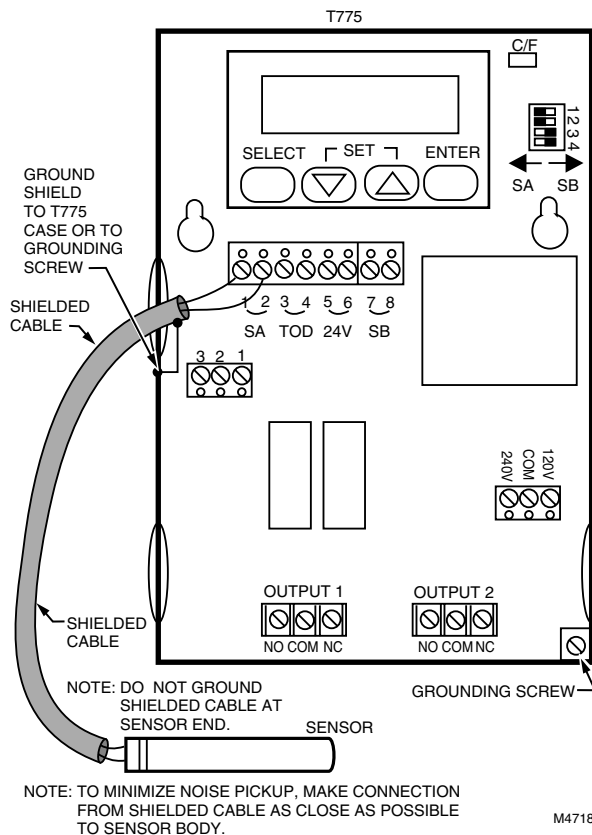
Fig. 6. Using shielded cable for cable runs longer than 25 feet.
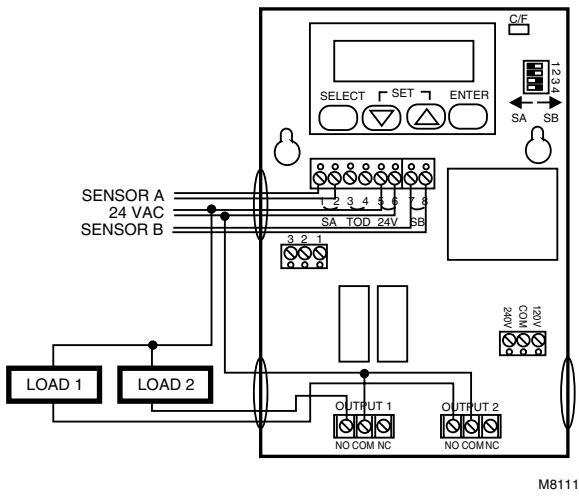
**Fig. 7. Reset control with 24 Vac input,
24 Vac loads.**
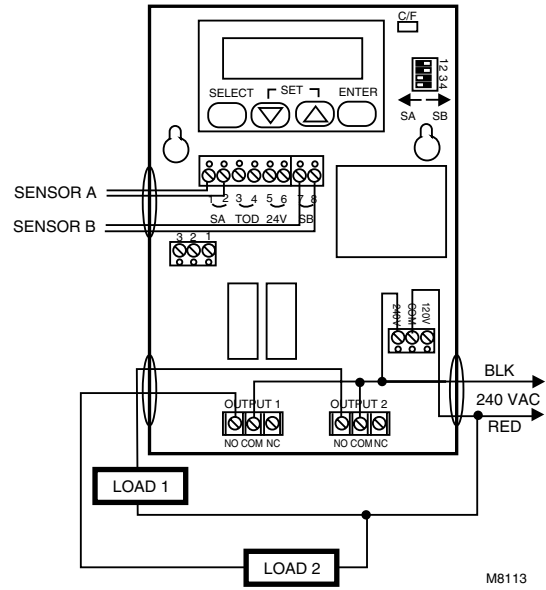
Fig. 9. Reset control with 240 Vac input, 240 Vac loads.
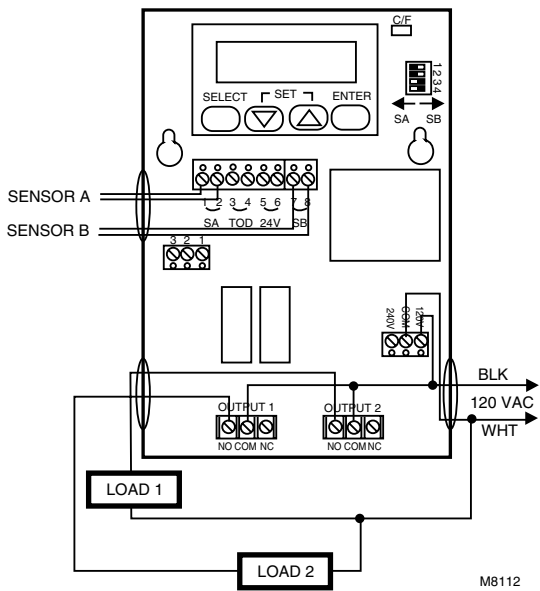
Fig 8. Reset control with 120 Vac input, 120 Vac loads.
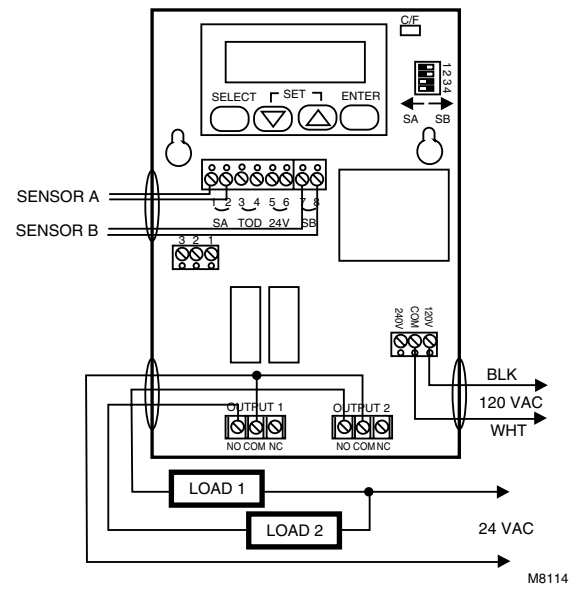
Fig. 10. Reset control with 120 Vac input, 24 Vac loads.
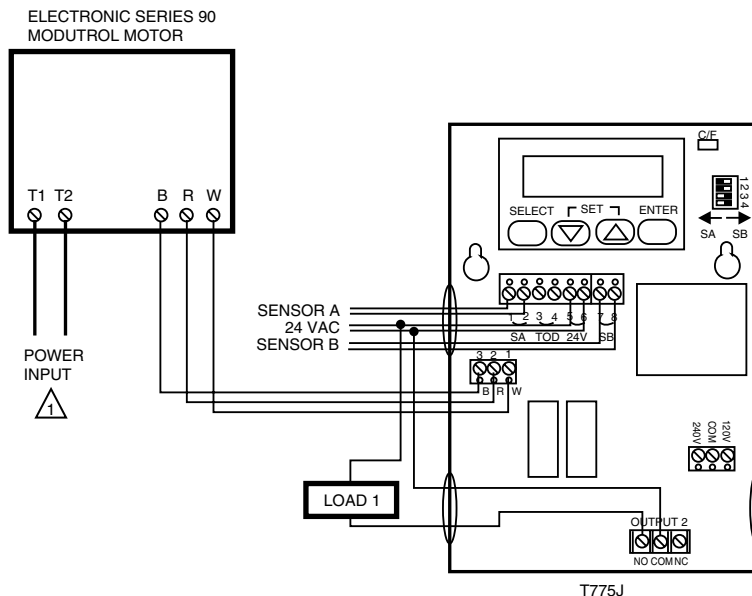
1 USE SEPARATE TRANSFORMER FOR T775 WHEN POWERING FROM 24 VOLTS.

NOTE: T775J1019, T775J1043 PROVIDE ELECTRONIC SERIES 90 OUTPUT THAT WILL NOT DRIVE 135 OHM SLIDEWIRE DEVICES.

PROPER OUTPUT LEVELS CAN BE CHECKED BY MEASURING THE OPEN CIRCUIT VOLTAGE BETWEEN TERMINALS 1 (W) AND 2 (R):
MINIMUM (DRIVE CLOSED): ≤ 0.17 VDC
MAXIMUM (DRIVE OPEN): ≥ 1.7 VDC

M8115A

Fig. 11. Reset control with 24 Vac input, Series 90 and 24 Vac loads.
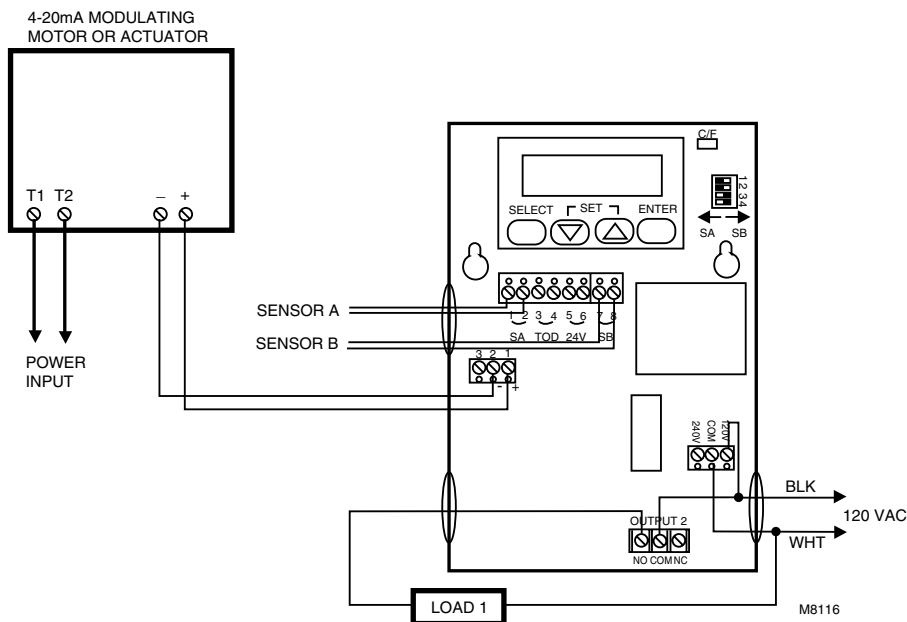
Fig. 12. Reset control with 120 Vac input, 4 to 20 mA and 120 Vac loads.
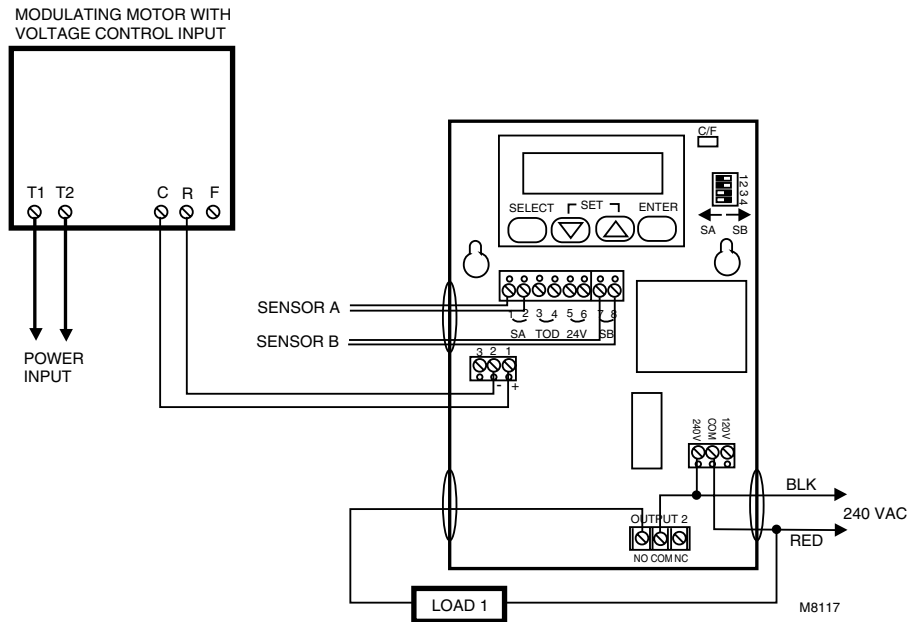
Fig. 13. Reset control with 240 Vac input, 240 Vac and 0 to 18 Vdc loads.
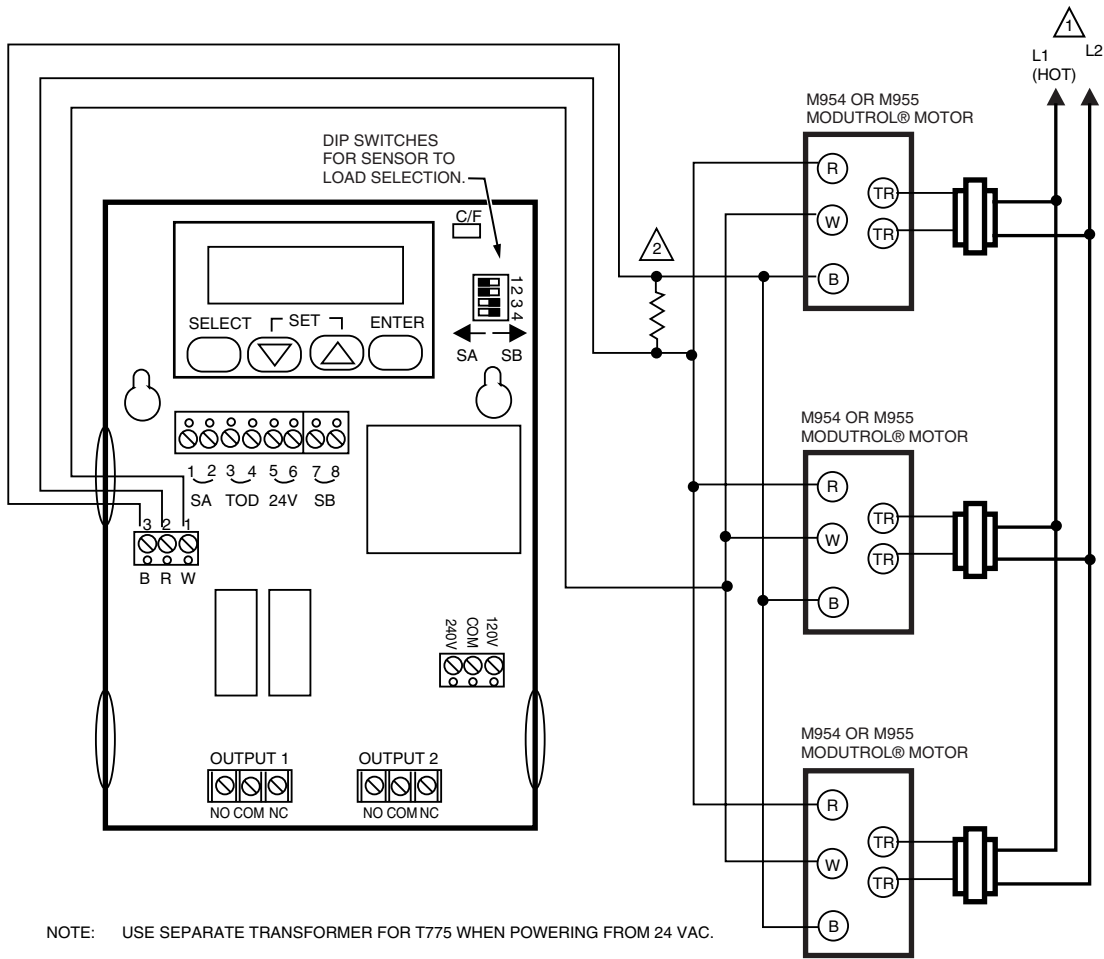
NOTE: USE SEPARATE TRANSFORMER FOR T775 WHEN POWERING FROM 24 VAC.

1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 USE 1300 OHM RESISTOR FOR 2 MOTORS, 910 OHMS RESISTOR FOR 3 MOTORS. 4047EAU RESISTOR KIT
(SHIPPED WITH M954, M955 MOTORS) INCLUDES 1300 OHM AND 910 OHM RESISTORS.   M4717

Fig. 14. Reset control with Series 90 Modutrol® Motor.
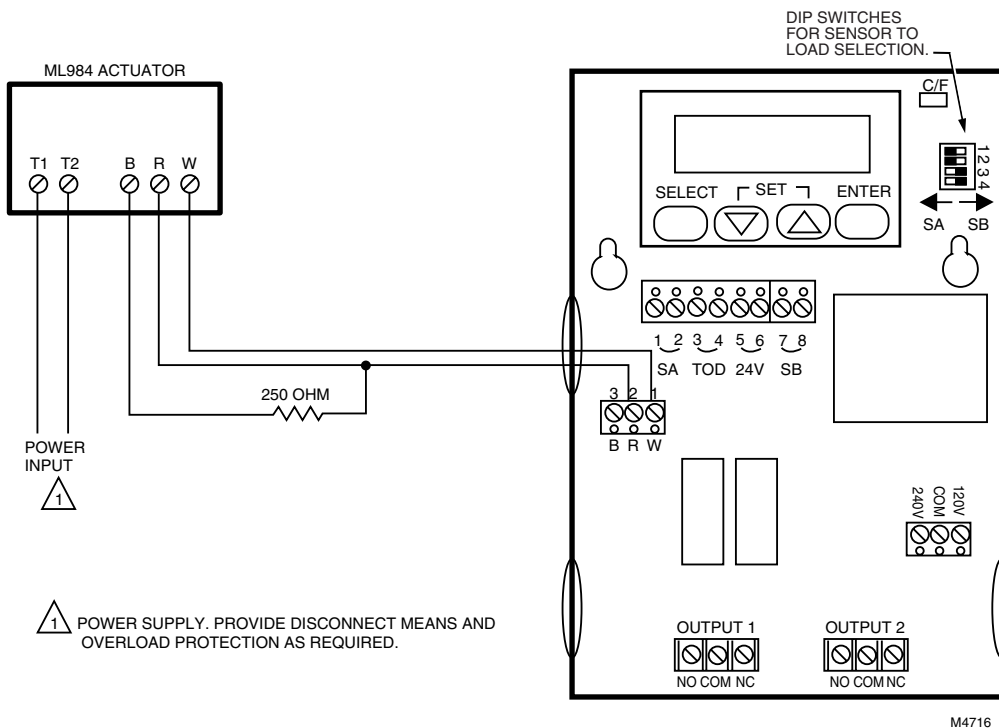
Fig. 15. Reset control with ML984 Valve Actuator.

Use shielded cable if any of the above conditions cannot be avoided.

Device Setup

❶ Determine the loads to be controlled and the operating mode (heat or cool) and enter on the worksheet.

> For example: Load 1: Compressor 1 (cool)
> Setpt 1 _____   On at _____
> Diff 1 _____   Off at _____

❷ Determine the setpoint (Setpt) and the switching differential (Diff) temperatures for each on/off load and enter on the worksheet.

> For example: Load 1: Compressor 1 (cool)
> Setpt 1 _78°F_   On at _82°F_
> Diff 1 _4°F_   Off at _78°F_

❸ Refer to the Control Algorithm section to calculate the load on and off temperatures and enter on the worksheet. Remember that on/off outputs are off at setpoint in both the heating and cooling operating modes. When in cooling mode, the load will be turned on at setpoint plus the differential. When in heating mode, the load will be turned on at setpoint minus the differential.

⚠ CAUTION

The T775J will not allow the user to program for both heating and cooling loads to be energized at the same time.

If this situation results, cooling loads will be energized and heating loads will be prevented from also energizing. The number (1,2) of these nonenergized loads will flash, along with the word HEAT, to indicate a call for both heating and cooling loads controlled by one sensor has occurred and to alert the user to reprogram the affected control values.

❹ To calculate the Reset Ratio to be used, determine the number of degrees the setpoint for the control sensor A should be reset (Reset Ratio A Value) to compensate for a change in the reset compensation sensor B (Reset Ratio B Value). Enter the values on the Device Programming Worksheet (values should be whole numbers from 1 to 30).

⚠ CAUTION

A reset ratio lower than one can result in unstable control. Widening the throttling range and/or differential will minimize this effect.

❺ Determine the desired Reset Direction (up or down) and enter on the Device Programming Worksheet. This will determine if the setpoint for the control Sensor A will be reset up or down.

❻ Determine the desired Reset Compensation Setpoint for Sensor B. Enter the value on the Device Programming Worksheet.

❼ Determine whether the desired Reset Action should occur *above* or below the Reset Compensation Setpoint. Enter abo*ve* or *below* on the Device Programming Worksheet.

❽ Remove the T775J cover and enter the values listed on the worksheet and the date in the first column on the label inside the T775J cover.

```
┌─────────── Device Programming Worksheet ───────────┐
│                                                    │
│   Load 1:                                          │
│   Setpt 1 _____        On at _____      │
│   Diff 1 or Throttling Range __  Off at _____  │
│                                                    │
│   Load 2:                                          │
│   Setpt 2 _____        On at _____      │
│   Diff 2 _____         Off at _____     │
│                                                    │
│   Reset Ratio:                                     │
│   Reset Ratio B Value _____                      │
│   Reset Ratio A Value _____                      │
│                                                    │
│   Reset Direction _____   │
│   Compensation Setpoint Sensor B _____     │
│   ResetAction _____   │
└────────────────────────────────────────────────────┘
```

Device Programming
Factory Default Values
When power is initially applied to the T775J, the control points will be at the factory set default values. Default values are:

Stage	Setpoint	Differential/ Throttling Range	Operating Mode
Stage 1	72°F	2°F	Heat
Stage 2	70°F	2°F	Heat

❶ Set the reset direction determined previously by setting the DIP switch in the upper right corner of the T775 (see Fig. 5). Switch 1 should be open to reset the control point *up* and *closed* to reset the control point *down*.

❷ Set the reset action determined previously by setting the DIP switch in the upper right corner of the T775J. Switch 2 should be *open* if the reset is to occur when the outdoor temperature is *below* the reset compensation setpoint and *closed* if the reset is to occur when the outdoor air temperature is *above* the reset compensation setpoint.

❸ Before programming the T775J, verify that the °F/°C selection jumper is properly installed. The T775J is shipped from the factory with the jumper installed in the °F position. If °C is desired, remove the jumper.

❹ Apply power to the device. The device will begin counting down from 210. This countdown sequence will last for approximate 3-1/2 minutes.

❺ To avoid this time delay, press Select.

❻ Press Select and Enter keys simultaneously to begin programming the load operating mode (heat or cool). The display will indicate heat or cool and the stage number.

❼ Press Set (down arrow) to change to cooling. Set (up arrow) will change back to heating.

❽ Press Enter to program the displayed mode into memory.

❾ Press Select to go to the next step.

❿ Repeat steps 6 through 8 for additional changes.

Programming Stage Control Values
❶ If you have a 0 to 18 Vdc output T775J, go to the Calibration Procedure for 0 to 18 Vdc Output T775 before continuing to program the stage control values. The Series 90 and 4-20 mA output T775J Controller does not require calibration, so proceed to step 2.

IMPORTANT

> *When programming all stages ,it is important to note that the first stage designated on the LCD display is always the modulating output.*

❷ Press Select to display the current stage setpoint.

❸ Press Set (up arrow) to increase or Set (down arrow) to decrease the display to the desired setpoint.

❹ Press Enter to enter the displayed value into memory.

❺ Press Select to display the current stage throttling range or switching differential.

❻ Press Set (up arrow) to increase or Set (down arrow) to decrease the display to the desired throttling range or switching differential.

❼ Press Enter to enter the displayed value into memory.

❽ Repeat steps 2 through 7 to program each additional stage.

IMPORTANT

> *After initial programming, altering the setpoint up or down for stage 1 will result in a change in setpoint 2 by the same number of degrees and in the same direction. If increasing or decreasing the setpoint for stage 1 results in exceeding the control limits (-40°F to +220°F) for stage 2, the control will not allow the user to enter a value for stage 1 higher or lower than this limit. This will allow for easy sequential output staging to be modified while keeping the margin intact between setpoints.*

Programming Reset Values
❶ Press Select to display the current reset compensation setpoint (Sensor B).

❷ Press Set (up arrow) to increase or Set (down arrow) to decrease the display to the desired setpoint.

❸ Press Enter to enter the displayed value into memory.

❹ Press Select to display the current Reset Ratio B value.

❺ Press Set (up arrow) to increase or Set (down arrow) to decrease the display to the desired Reset Ratio B value.

❻ Press Enter to enter the displayed value into memory.

❼ Press Select to display the current Reset Ratio A.

❽ Press Set (up arrow) to increase or Set (down arrow) to decrease the display to the desired Reset Ratio A value.

⑨ Press Enter to enter the displayed value into memory.

⑩ Press Select four times to return to stage 1 parameters. Scroll through the programming loop a second time to confirm that the appropriate values have been entered into memory.

NOTE: The T775J has three options for displaying the sensed temperatures:
1. Sensor A only.
2. Sensor B only.
3. Alternating between Sensor A and Sensor B.

⑪ Press Select after viewing the switching differential for the final stage to display Sensor A temperature only.

⑫ Press Select again to display Sensor B temperature only.

⑬ Press Select again to alternate the display between Sensor A temperature and Sensor B temperature at approximately five second intervals.

⑭ Before replacing the cover on the T775J, check to see that the control values have been recorded on the label on the back of the cover.

NOTE: The control values programmed into memory will not be lost because of a power failure.

Calibration Procedure for 0 to 18 Vdc Output T775J

NOTE: The 0-18 Vdc Output T775J models have field selectable starting voltages and spans and will require calibration. The Series 90 and 4-20 mA output devices require no calibration.

❶ Disconnect power to the device.

❷ Remove the device cover and disconnect the load from the plus and minus outputs. Connect a dc voltmeter to the plus and minus modulating outputs of the T775J (see Fig. 12).

❸ Loosen the screw in the upper right corner of the T775J approximately six turns with a screwdriver (see Fig. 12).

❹ Rotate the display printed wiring board outward from the device until it is approximately perpendicular to the enclosure (see Fig. 12).

❺ The T775 is factory set to a span of 8 Vdc. To select a different span (3 Vdc, 14 Vdc, or 17 Vdc), change the switch positions on the voltage selection switch by opening the switch for 8 Vdc and closing the switch for the chosen span (see Fig. 12).

❻ Apply power to the device.

❼ Press Select until Sensor A temperature is displayed.

❽ Record the sensed temperature.

❾ Determine the operating mode for stage 1 (Heat or Cool). Choose the appropriate example to follow. Calculate the setpoints to be used for calibrating the device in column B, following the example in column A.

Calibration Setpoint for Cooling Mode (Fig. 13)

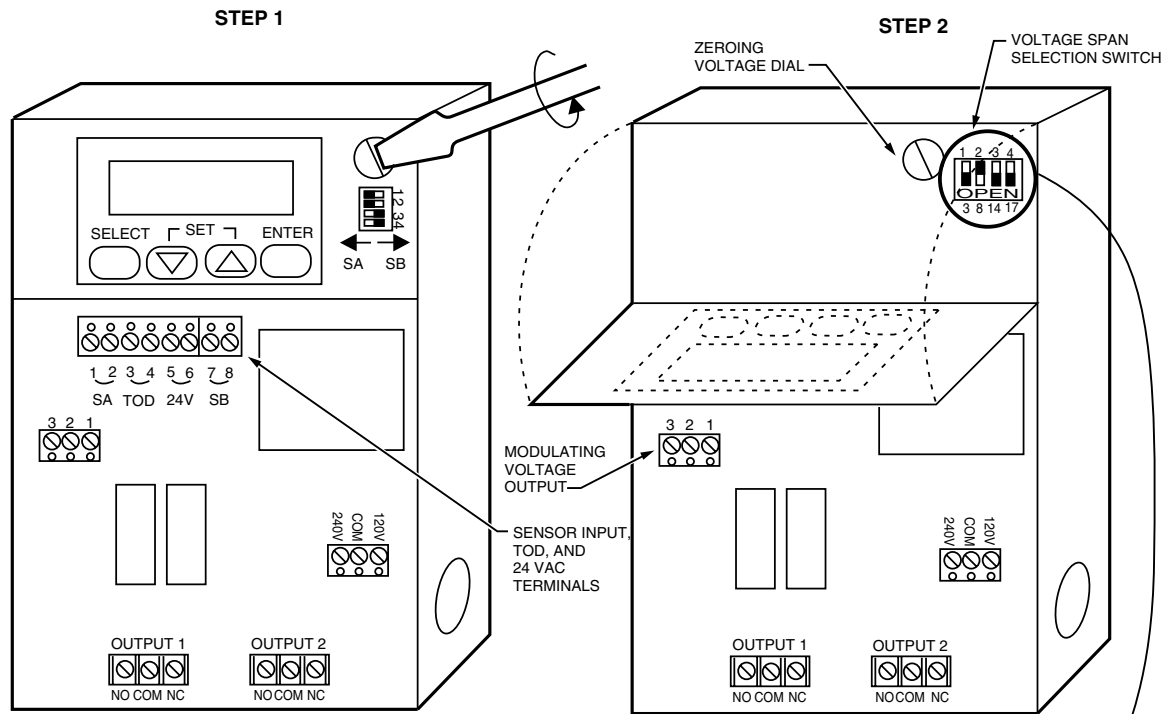Setpoint for calibrating the lower voltage level (closed position):

	A	B
Sensed Temperature	78°	
Add 3° F or C to above:	+3°	
Calibration Setpoint:	81°	

Calibration Setpoint for Heating Mode:

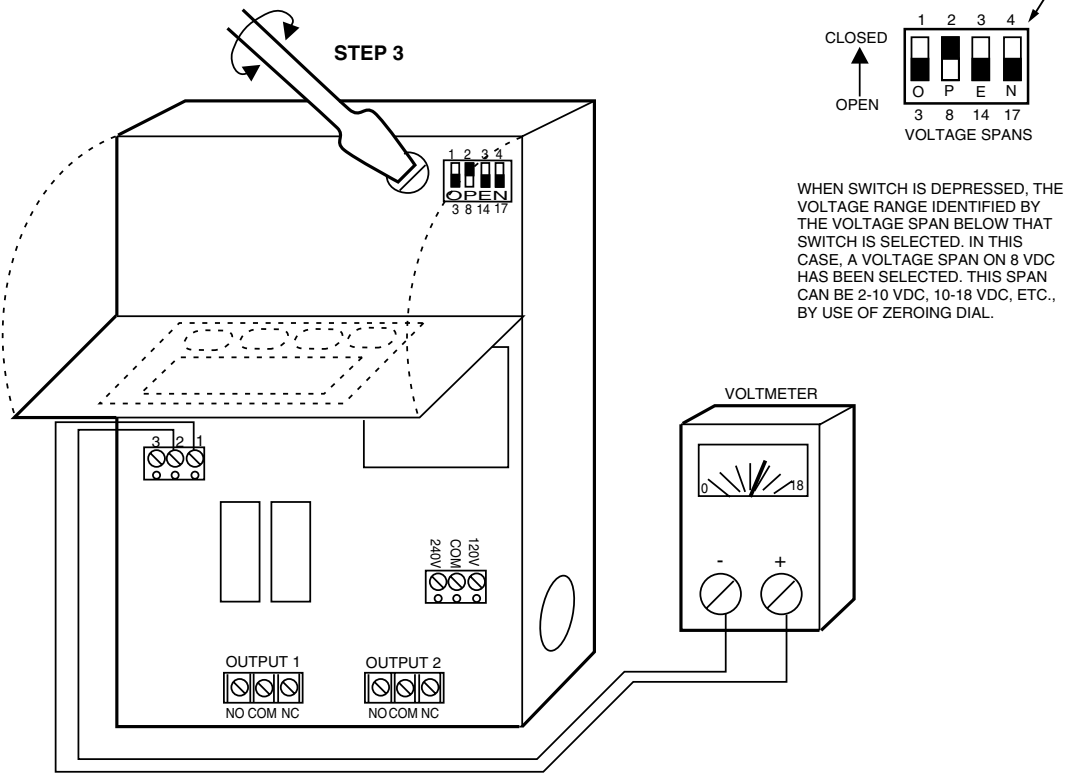|	A	B
Sensed Temperature:	78°	
Subtract 3° F or C from above:	-3°	
Calibration Setpoint	75°	

Calibrate the Lower Voltage Level (Closed Position).

❶ Read displayed temperature of sensor that is controlling stage 1.

❷ Press Select until the setpoint for stage 1 is displayed.

❸ If stage 1 is in the HEAT mode, press Set (down arrow) until the setpoint is at least three degrees below the temperature in step 1.

❹ If stage 1 is in the COOL mode, press Set (up arrow) until the setpoint is at least three degrees above the temperature in step 1.

❺ Press Enter to enter this value into memory.

❻ Press Select once so that the throttling range is displayed.

❼ Press Set (up arrow) or Set (down arrow) until the throttling range is two degrees.

❽ Press Enter to enter this value into memory.

❾ Connect voltmeter as shown in Fig. 8.

❿ Press Select until Sensor A is displayed (if the sensed temperature has drifted from step 1, you may need to repeat steps 2 through 8).

⑪ Turn the zeroing voltage potentiometer with a screwdriver until the desired lower voltage (i.e., 2V, 6V, etc) is displayed on the voltmeter.

⑫ Confirm upper voltage level:
- Record the sensed temperature for sensor controlling stage 1.
- Press Select until stage 1 setpoint is displayed.
- If stage 1 is in the HEAT mode, press Set (up arrow) until setpoint is at least three degrees above the sensed temperature.
- If stage 1 is in the COOL mode, press Set (down arrow) until setpoint is at least three degrees below the sensed temperature.
- Press Enter to enter this value into memory.
- Record the (desired) upper voltage level.
- If the value is not correct, make sure the correct span switch is depressed and the stage is in the correct mode of operation (HEAT or COOL). Verify which sensor is controlling stage 1.

⑬ Rotate the display printed wiring board back into the device and tighten the screw in the upper right corner.

⑭ Disconnect the voltmeter from the modulating outputs and connect the load to the plus and minus terminals of the modulating terminal block.

⑮ Return to Programming Stage Control Values to enter the desired stage control values.

STEP 1

STEP 2

ZEROING
VOLTAGE DIAL

VOLTAGE SPAN
SELECTION SWITCH

SELECT ⌐ SET ⌐ ENTER

1 2 3 4
SA SB

SENSOR INPUT,
TOD, AND
24 VAC
TERMINALS

1 2 3 4 5 6 7 8
SA TOD 24V SB

3 2 1

MODULATING
VOLTAGE
OUTPUT

3 2 1

240V
COM
120V

240V
COM
120V

OUTPUT 1
NO COM NC

OUTPUT 2
NO COM NC

OUTPUT 1
NO COM NC

OUTPUT 2
NO COM NC

REMOVE FRONT COVER AND LOOSEN SCREW
IN UPPER RIGHT CORNER OF DEVICE WITH A
SCREWDRIVER.

GENTLY PULL THE TOP PWB UPWARDS AROUND
ITS HINGE. STOP WHEN THE PWB IS
PERPENDICULAR TO THE ENCLOSURE.

STEP 3

1 2 3 4
OPEN
3 8 14 17

1 2 3 4
CLOSED

O P E N

OPEN

3 8 14 17
VOLTAGE SPANS

WHEN SWITCH IS DEPRESSED, THE
VOLTAGE RANGE IDENTIFIED BY
THE VOLTAGE SPAN BELOW THAT
SWITCH IS SELECTED. IN THIS
CASE, A VOLTAGE SPAN ON 8 VDC
HAS BEEN SELECTED. THIS SPAN
CAN BE 2-10 VDC, 10-18 VDC, ETC.,
BY USE OF ZEROING DIAL.

1 2 3 4
OPEN
3 8 14 17

3 2 1

240V
COM
120V

VOLTMETER

0 18

− +

OUTPUT 1
NO COM NC

OUTPUT 2
NO COM NC

CONNECT THE MODULATING VOLTAGE OUTPUT
TO A VOLTMETER. USING A SCREWDRIVER,
ADJUST THE LOWER LIMIT OF THE VOLTAGE TO THE
DESIRED LEVEL ACCORDING TO THE STEPS
OUTLINED IN CLAIBRATION PROCEDURE FOR
0 TO18 VDC OUTPUT.

M1345B

Fig. 16. Voltage span selection.

HEATING MODE

MODULATION

SENSED TEMPERATURE = 78°F

DEAD BAND

CALIBRATION SETPOINT 75°F

MODULATION

THROTTLING RANGE

* DEADBAND IS 1/8 OF THE THROTTLING RANGE

COOLING MODE

CALIBRATION SETPOINT 81°F

MODULATION

SENSED TEMPERATURE = 78°F

DEAD BAND

MODULATION

THROTTLING RANGE
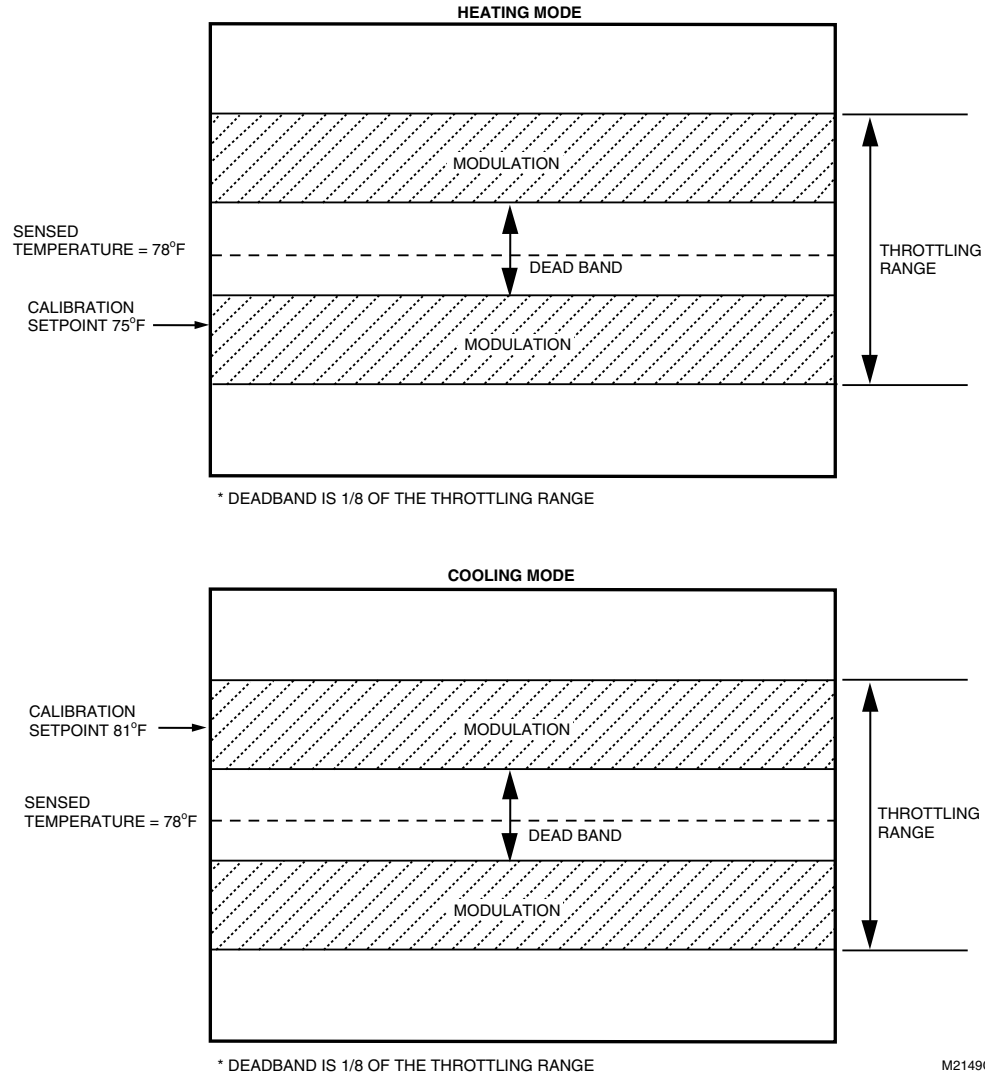
* DEADBAND IS 1/8 OF THE THROTTLING RANGE

M2149C

Fig. 17. Explanation of calibration setpoints for heating and cooling modes.

DESCRIPTION/OPERATION

Control Algorithm

Reset Control

The T775J operates as a reset controller with two sensor inputs. The outdoor sensor is designated Sensor B and the control medium sensor is Sensor A. Sensor B is wired to pins 7 and 8 of the input terminal block, while Sensor A is wired to pins 1 and 2. The T775J is capable of providing modulating or relay outputs for reset control. Each stage of the T775J has its own independent setpoint that can be configured to operate in the cooling or heating mode. The mode of operation for each stage is user determined by the programming keys.

For reset control with two outputs, one of which is modulating,

the modulating output will be designated as stage 1 on the LCD display. Although the modulating output is designated as stage 1, it can be programmed to energize after the second stage is energized.

The T775J offers four different reset configurations and an adjustable reset ratio between 30 to 1 and 1 to 30.

The reset ratio expresses the amount of change in the heating or cooling medium control point caused by a change in the outdoor temperature. It is the ratio of outdoor temperature change to heating or cooling control point change (Sensor B/Sensor A). The reset ratio can be an inverse ratio (when the outdoor temperature goes down, the control point goes up) or a direct ratio (when the outdoor

temperature goes down, the control point goes down). The type of ratio is selected by using the two DIP switches provided.

The four possible reset operating configurations are illustrated and explained in Fig. 18. Switches 1 and 2 are shown but switches 3 and 4 are unused; however, the location of these DIP switches is shown in Fig. 5.

⚠️ **CAUTION**
A reset ratio lower than one can result in unstable control. Widening the throttling range and/or differential minimizes this effect.
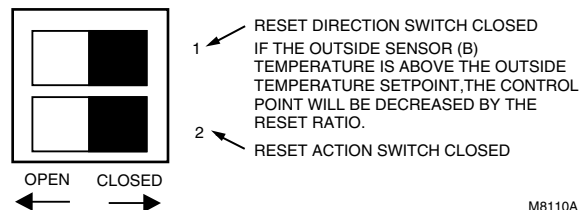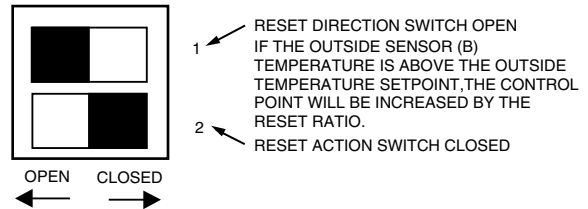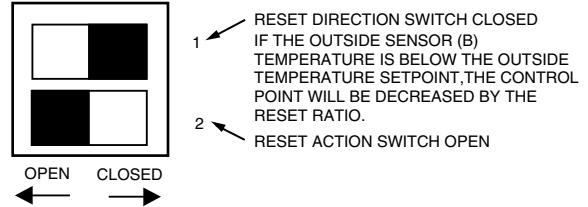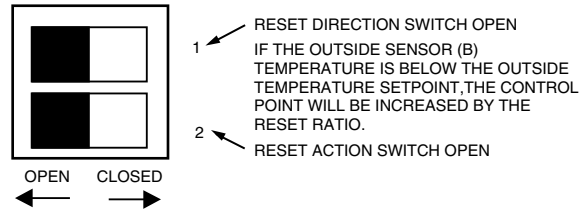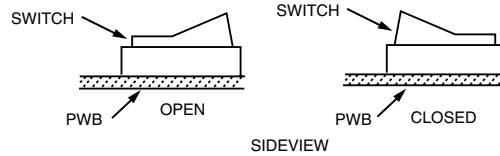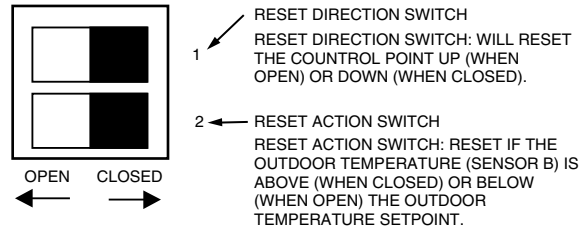
Proportional + Integral Modulating Control

Proportional + Integral (P+I) control provides fast, responsive operation of the controlled devices in reacting to temperature changes by providing an output signal proportional to the deviation between setpoint and actual temperature. An integral proportion also provides a time dependent output signal that is dependent on the length of time of the deviation between actual set point and sensed temperature.

The P + I algorithm places the control setpoint in the middle of the throttling range. A deadband around setpoint exists and is proportional to the throttling range. For the T775, this deadband is 1/8 of the throttling range.

There are three modulation options available for the T775J (see Fig. 20 for modulating output connecting terminals).

Fig. 18. Reset switch configuration.

1 — RESET DIRECTION SWITCH
RESET DIRECTION SWITCH: WILL RESET THE COUNTROL POINT UP (WHEN OPEN) OR DOWN (WHEN CLOSED).

2 — RESET ACTION SWITCH
RESET ACTION SWITCH: RESET IF THE OUTDOOR TEMPERATURE (SENSOR B) IS ABOVE (WHEN CLOSED) OR BELOW (WHEN OPEN) THE OUTDOOR TEMPERATURE SETPOINT.

SWITCH / PWB / OPEN
SWITCH / PWB / CLOSED
SIDEVIEW

OPEN   CLOSED

1 — RESET DIRECTION SWITCH OPEN
IF THE OUTSIDE SENSOR (B) TEMPERATURE IS BELOW THE OUTSIDE TEMPERATURE SETPOINT,THE CONTROL POINT WILL BE INCREASED BY THE RESET RATIO.

2 — RESET ACTION SWITCH OPEN

OPEN   CLOSED

1 — RESET DIRECTION SWITCH CLOSED
IF THE OUTSIDE SENSOR (B) TEMPERATURE IS BELOW THE OUTSIDE TEMPERATURE SETPOINT,THE CONTROL POINT WILL BE DECREASED BY THE RESET RATIO.

2 — RESET ACTION SWITCH OPEN

OPEN   CLOSED

1 — RESET DIRECTION SWITCH OPEN
IF THE OUTSIDE SENSOR (B) TEMPERATURE IS ABOVE THE OUTSIDE TEMPERATURE SETPOINT,THE CONTROL POINT WILL BE INCREASED BY THE RESET RATIO.

2 — RESET ACTION SWITCH CLOSED

OPEN   CLOSED

1 — RESET DIRECTION SWITCH CLOSED
IF THE OUTSIDE SENSOR (B) TEMPERATURE IS ABOVE THE OUTSIDE TEMPERATURE SETPOINT,THE CONTROL POINT WILL BE DECREASED BY THE RESET RATIO.

2 — RESET ACTION SWITCH CLOSED

OPEN   CLOSED

M8110A

Fig. 19. Summary of action/direction switches.

SETPOINT "B" (OUTSIDE TEMPERATURE)

BELOW **ABOVE**

RESET DIRECTION SWITCH
RESET ACTION SWITCH

A B
C D

RESET DIRECTION SWITCH
RESET ACTION SWITCH

A B
C D

RESETS CONTROL SETPOINT A UP WHEN SENSOR B (OUTSIDE TEMPERATURE) IS BELOW SETPOINT.

RESETS CONTROL SETPOINT A UP WHEN SENSOR B (OUTSIDE TEMPERATURE) IS ABOVE SETPOINT.

UP

DOWN

RESETS CONTROL SETPOINT A DOWN WHEN SENSOR B (OUTSIDE TEMPERATURE) IS BELOW SETPOINT.

RESETS CONTROL SETPOINT A DOWN WHEN SENSOR B (OUTSIDE TEMPERATURE) IS ABOVE SETPOINT.

RESET DIRECTION SWITCH
RESET ACTION SWITCH

A B
C D

RESET DIRECTION SWITCH
RESET ACTION SWITCH

A B
C D

A. SWITCH 1 CONTROLS THE RESET DIRECTION.
LEFT RESETS SENSOR A CONTROL POINT (BOILER OR CHILLER WATER TEMPERATURE UP; RIGHT RESETS IT DOWN.

B. SWITCH 2 CONTROLS THE RESET ACTION.
LEFT RESETS AS SENSOR B (OUTDOOR TEMPERATURE) DROPS BELOW SETPOINT B; RIGHT RESETS AS IT RISES ABOVE IT.

C. SWITCHES 3 AND 4 ARE NOT USED.

M4719

- 4-20 mA: This is a general purpose current mode output that can drive a 600 ohm maximum load without output current

degradation. This modulation output can be used with Honeywell Inc Modutrol IV™ Motors that accept an input signal of 4-20 mA or other Honeywell Inc motors with the use of resistor kits.

- 0-18 Vdc (voltage ranging): This output mode is intended as a general purpose voltage output capable of driving a 2 kohm load minimum. The span of voltage output is user selectable via a DIP switch (see Fig. 14). The spans offered are 3, 8, 14 and 17 volts. A zero adjustment dial is provided to allow the user to select common ranges such as 4-7 Vdc, 6-9 Vdc, 2-10 Vdc, 10.5 -13.5 Vdc, 14.5-17.5 Vdc, 1-15 Vdc, and 1-18 Vdc. This modulation output can be used with Modutrol IV™ Motors that accept a voltage span comparable to any of the above. The device is factory set at the 2 to 10 Vdc span.

Heat Operation Mode

- Throttling range is centered around the setpoint.
- Modulating outputs are at the minimum or closed position at setpoint plus one-half of the throttling range.
- Modulating outputs are at the maximum or open position at setpoint minus one-half of the throttling range.
- Relay outputs are energized at setpoint minus differential and de-energized at setpoint.

Cooling Operation Mode

- The throttling range is centered around the setpoint.
- Modulating outputs are at the minimum or closed position at setpoint minus one-half of the throttling range.
- Modulating outputs are at the maximum or open position at setpoint plus one-half of the throttling range.
- Relay outputs are energized at setpoint plus differential and de-energized at setpoint.

Contact Closure Override Input

A two terminal input is provided to allow the user to override a relay energized condition of all outputs. When used with modulating devices, a contact closure override input causes the output to return to its minimum position. This function is generated by a contact closure between terminal pins 3 and 4 of the terminal block for sensor input shown in Fig. 4. This can be achieved manually or by using an EMS controller or time clock with normally open contacts; i.e., W7505, S7005.

When contact closure override is active, the display will show the number of stages that would have been energized and "STAGE ENERGIZED" will flash.

°F/°C Selection

A single jumper plug controls °F/°C indication of the displayed temperature value. The location of this jumper is shown in Fig. 5. The unit is shipped with the jumper installed in the °F mode. Remove the jumper plug for the °C mode. Remove and reapply power if the jumper is removed with the device powered.

DIP Switch Selections

DIP switches, see Fig. 18, are provided for assignment of the reset configurations.

A second set of DIP switches provides voltage range selection for 0 to 18 Vdc modulating devices. The span corresponding to each switch is given on the printed wiring board below each switch. Fig. 16 shows the location of this switch, the zeroing dial, and how to set the voltage span. See Fig. 19 for a summary of action/direction switches.

Keypad Programming and Display

The T775J uses a liquid crystal display (LCD) for interactive prompting during programming and display of sensed temperatures and assigned setpoint and differential values. User programming of the T775J is through four programming keys.
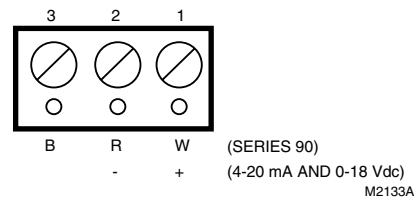

Fig. 20. Modulating output terminals.

Programming Keys

The four programming keys are Select, Up arrow, Down arrow and Enter.

- Select key sequentially prompts the user for what parameter is being displayed: setpoint, differential, stage energized, heat or cool (operation mode), 1, 2 (indicating assigned stage). Once the last parameter value is viewed, pressing the Select key will again display the control values from the beginning of the display loop.
- Up and Down arrow keys allow the displayed parameters to be increased or decreased. After pressing the Select key, a control value can be changed by using the arrow keys. Control values will be increased or decreased by 1° F or C each time the arrows are depressed.
- Enter key places the new value into the memory of the microprocessor. A control value or operation will not be effective in the memory until the Enter key is depressed. Control values and operation selection will remain in the device memory even after power is removed.
- The Select and Enter keys must be pressed simultaneously to change the control algorithm from heating to cooling or from cooling to heating. These parameters (heat and cool) are not displayed during normal Select key sequences. The only parameters displayed after pressing the Select and Enter keys at the same time are stage indication and Heat or Cool. To change the operation from heating to cooling or vise versa for a desired output stage, use the arrow keys as required. Once the mode is changed, depressing the Enter key is necessary to enter this change into the microprocessor memory. The next stage of heat or cool assignment will appear after the Select key is pressed. When all stages are selected, the display will revert back to sensed temperature and load energized status.

Display

Once power is applied or restored to the device, the display will count down from 210 until the display reads zero, during which time any previously energized outputs will be de-energized. This is intended to protect compressors in the event of a power outage.

To avoid viewing this entire countdown, press the Select key. The LCD display will now show what it normally reads: load (sensed) temperature, stages energized, and which Sensor (A or B) is being read. At any time during the programming or review procedure, the display will revert back to showing the sensed temperature and stage status indication 60 seconds after the last key closure.

The user has three display options to select. The display can be configured to alternately indicate Sensor A and Sensor B sensed temperature at a five second rate or the display can be locked on to sensor A or sensor B to sense temperature continuously.

This selection is accomplished by stopping at Sensor A or Sensor B sensed temperature points in the Select key scrolling loop. To lock on to either sensor, the user must scroll the Select key through the loop to select the sensed temperature prompt desired. The display will stick to that parameter until the Select key is activated to advance the loop. When the loop is stopped at any other prompt, the display will alternately indicate Sensor A and Sensor B sensed temperatures after 60 seconds from the last key closure or immediately after the Select key is pressed at the end of the programming sequence.

Error Messages

There are seven error messages that can be displayed in response to software or hardware problems with the T775J. The error codes that may be seen flashing on the display are:

SF—Sensor Failure.

The display flashing SF indicates an out-of-range sensor. Make sure the sensors are properly connected. For the T775J, stage 2 load will be de-energized when this error message is flashing for Sensor B. When this message is flashing for Sensor A only, stage 1 will *not* be de-energized.

EF—EEPROM Failure.

The values read back from the EEPROM are not the same as written into the EEPROM. The EEPROM is not intended for field repair. Replace the device.

CF—Calibration Failure.

A calibration resistor reading was not within the range of the Analog to Digital converter. This error message can not be field repaired. Replace the device.

OF—Stray interrupt Failure.

An unused interrupt occurred. This error cannot be field repaired. Replace the device.

CE—Configuration Error.

The device hardware was configured to a nonexistent device. This error cannot be field repaired. Replace the device.

OE—ROM Error.

The internal ROM of the microprocessor is defective. This error cannot be field repaired. Replace the device.

AE—RAM Error

The internal RAM of the microprocessor is defective. This error cannot be field repaired. Replace the device.

Setpoint Calibration

To maintain temperature accuracy, sensor wires should be 18 AWG two-conductor (18/2). If the length of the sensor wire exceeds 400 feet, recalibration will be necessary to maintain accuracy (see Fig. 21). Table 2 shows the corresponding temperature offset that should be used for different sensor wire lengths. This temperature offset should be added to the desired temperature setpoint for these applications.
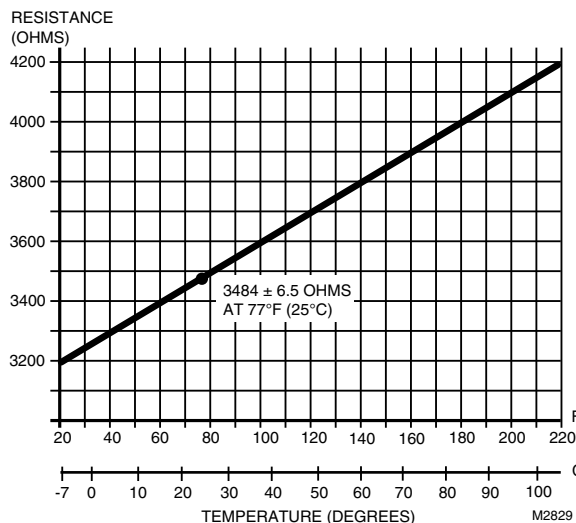

Fig. 21. Resistance versus temperature performance characteristics.

Table 2. Sensor Wire Length/Calibration Offset (Using 18 Awg Wire).

Sensor Wire Length (ft)	Calibration Offset (°)
0-399	None required.
400-599	1
600-799	2
800-1000	3

CHECKOUT

After the controller is installed and wired, apply power. Using the programmed control values, verify device operation after completing Table 3.

❶ As illustrated in the example, record the sensed temperatures for both Sensor A and Sensor B as displayed on the controller. Sensor A senses the temperature for loads 1 and 2. Sensor B senses the temperature that determines the amount of reset.

❷ Write the operating mode for each stage in the Checkout Table (heat or cool).

❸ Write Sensor A temperature for each load on the *Sensed Temp* line.

❹ Write Sensor B temperature in the space indicated in the Checkout Table.

❺ Press Select until Setpoint B is displayed.

❻ Write Setpoint B in the space indicated in the Checkout Table.

❼ Determine the reset direction (up or down) from the Device Programming Worksheet in the Installation section and enter in the space indicated in the Checkout Table.

❽ Determine the reset action (above or below) from the Device Programming Worksheet and enter in the space indicated in the Checkout Table.

❾ Plot the programmed on and off (open/closed) values at which the device will energize and deenergize each output load by referring to the Device Programming Worksheet.

❿ Calculate the amount of reset that exists using Formula 1.
  a. Subtract setpoint B from Sensor B and enter the result as Temp Diff.
  b. If the result is negative, reset will occur only if the Reset Action Switch is set for reset below setpoint. If the result is positive, reset will occur if the Reset Action switch is set for reset above setpoint.
  c. Determine if a reset condition exists.
  d. If no reset condition exists, On/Off Control Values have not been changed.
  e. Go to step 11.
  f. If a reset condition exists, calculate the amount of reset using Formula 2.

  g. Divide Reset Ratio B value by Reset Ratio A value.
  h. Multiply the result in step g. by Temp Diff (step a.).
  i. If Reset Direction Switch is set to increase, disregard any negative signs and add the amount of reset calculated in step h. to the on/off values.
  j. If the Reset Direction Switch is set to decrease, disregard any negative signs and subtract the amount of reset calculated in step h. from the on/off values.
  k. Plot the new values on the appropriate Reset Load in the Checkout Table.

⓫ Verify which loads are energized by using the Checkout Table. As shown in the example, the display will indicate which stages are energized in the lower right-hand corner. (NOTE: If no stages are energized, the words *stage energized* will not appear.)

NOTE: If the sensed temperature is between the on and off temperatures, the load may be either energized or deenergized. Refer to the Control Algorithm subsection of Description/Operation section for further explanation.

⓬ If an error message flashes, refer to the description of these messages in Error Messages subsection. If SF flashes, check the sensor connections. If they are properly connected and SF continues to flash, check the sensor location to assure it is located in an ambient condition that is within the sensor's ambient capability (-40°F to +220°F).

⓭ If an error message other than SF flashes, the device cannot be field repaired. Replace the device.

For the Electronic Series 90 output (T775J1019 and T775J1043), proper output levels can be checked by measuring the open-circuit voltage between terminals 1(W) and 2(R):
  Minimum (Drive Closed) signal ≤0.17 Vdc.
  Maximum (Drive Open) signal ≥1.7 Vdc.

Table 3. Checkout Table.

Checkout Table					Checkout Table Example				
Heat or Cool	**Load 1**	**Load 2**	**Reset Value Load 1**	**Reset Value Load 2**	**Heat or Cool**	**Load 1 Heat**	**Load 2 Heat**	**Reset Value Load 1**	**Reset Value Load 2**
Sensor A ____ Sensor B ____ Sensed Temp					Sensor A 80° Sensor B 10° Sensed Temp	80° Off 76° On	80° 78° Off 74° On	120° Off 116° On 80°	118° Off 80°

Setpoint B _____   Reset Direction _____
Sensor B _____   Reset Action _____
Reset Ratio A _____   Reset Ratio B _____

Setpoint B   30°   Reset Direction   Increase
Sensor B   10°   Reset Action   Below
Reset Ratio A   1   Reset Ratio B   2

FORMULA 1:

$$\frac{\text{Sensor B}}{-\text{Setpoint B}}$$

Temp Diff = _____

FORMULA 1 EXAMPLE:

$$\frac{\text{Sensor B} = 10°F}{\text{Setpoint B} = 30°F}$$

Temp Diff =   -20°F

FORMULA 2:

Amount of Reset = $\dfrac{\text{Reset Ratio B}}{\text{Reset Ratio A}}$

FORMULA 2 EXAMPLE:

Amount of Reset = $\dfrac{2}{1}$ x (-20) = -40

Honeywell

Home and Building Control

Honeywell Inc.
1985 Douglas Drive North
Golden Valley, MN 55422

Home and Building Control

Honeywell Limited-Honeywell Limitée
740 Ellesmere Road
Scarborough, Ontario
M1P 2V9

Helping You Control Your World

QUALITY IS KEY

63-2248—4   Rev. 9-95   Printed in U.S.A.

www.honeywell.com/building/components

Free Manuals Download Website

http://myh66.com

http://usermanuals.us

http://www.somanuals.com

http://www.4manuals.cc

http://www.manual-lib.com

http://www.404manual.com

http://www.luxmanual.com

http://aubethermostatmanual.com

Golf course search by state

http://golfingnear.com

Email search by domain

http://emailbydomain.com

Auto manuals search

http://auto.somanuals.com

TV manuals search

http://tv.somanuals.com