

## T775A,B,C,D Remote Temperature Controller

The T775 family of Electronic Remote Temperature Controllers provide on-off temperature control for ducts, tanks, chillers, heating and refrigeration units, and other applications where electronic accuracy in addition to remote sensing is desired.

In addition, certain models of the T775 family of controllers provide on-off temperature control of heating, cooling, and ventilating systems in agricultural confinement buildings, storage areas and heavy industrial applications.



T775A,B



T775C,D

- T775A models provide staged on-off control with one temperature input and one to four relay output stages.
- T775B models provide staged on-off control with two temperature inputs and two to four relay output stages.
- T775C models provide staged on-off control with one temperature input and four relay output stages.
- T775D models provide staged on-off control with two temperature inputs and four relay output stages.
- T775C,D models meet National Electrical Code (Article 547) requirements for animal confinement buildings.
- Setpoint temperature range is  $-40^{\circ}$  to  $+220^{\circ}$  F ( $-40^{\circ}$  to  $+104^{\circ}$  C).
- Ambient temperature range is  $-30^{\circ}$  to  $+140^{\circ}$  F for one and two stage models and  $-30^{\circ}$  to  $+125^{\circ}$  F for three and four stage models.
- Linear platinum temperature sensor with T775A,B.
- Water-tight linear platinum temperature sensor with T775C,D.
- Adjustable temperature range and differential.
- LCD indication for mode and output status.
- Keypad provides ease of programming and operation.
- Accuracy is within  $\pm 1^{\circ}$  F (at nominal operating ambient temperature of  $77^{\circ}$  F and voltage input).
- Stage(s) independently programmed for heating or cooling.
- 24/120/240 Vac input voltage.
- Spdt relay outputs.

**IMPORTANT:** The T775 is an operating control, not a limit or safety control. If used in applications requiring safety or limit controls, a separate safety or limit control device should be used in conjunction with the T775.

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# 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 difference in performance can be expected if those conditions are changed.*

**MODELS:** The T775A,B family of Electronic Temperature Controllers for ducts, tanks, chillers, heating and refrigeration units, and other applications where electronic accuracy is desired in addition to remote sensing.

**T775A:** Staged on-off control with one temperature input and one to four relay output stages. Includes one 193987GA Sensor.

**T775B:** Staged on-off control with two temperature inputs and two to four relay output stages. Includes two 193987GA Sensors.

**MODELS:** The T775C,D family of Electronic Remote Temperature Controllers provides on-off temperature control of heating, cooling and ventilating systems in agricultural confinement buildings, storage areas, and heavy industrial applications.

**T775C:** Staged on-off control with one temperature input and four relay output stages. Mounted in NEMA 4X enclosure. Includes one 203401B Remote Sensor.

**T775D:** Staged on-off control with two temperature inputs and four relay output stages. Mounted in NEMA 4X enclosure. Includes two 203401B Remote Sensors.

Model Number	Number of Inputs	Number of Relay Outputs	Maximum Operating Ambient Temperature (°F)
T775A1001	1	1	140
T775A1019	1	2	140
T775A1027	1	3	125
T775A1035	1	4	125
T775B1000	2	2	140
T775B1018	2	3	125
T775B1026	2	4	125
T775C1009	1	4	125
T775D1008	2	4	125

**ELECTRICAL RATINGS:**

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

- For one and two stage units:  
 8 VA maximum at 60 Hz.  
 10 VA maximum at 50 Hz.
- For three and four stage units:  
 13 VA maximum at 60 Hz.  
 20 VA maximum at 50 Hz.

# Ordering Information

When ordering replacement and modernization products from your wholesaler or distributor, refer to the price lists for complete ordering number.

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 Honeywell Home and Building Control Sales Office (check the 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.

**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).

**SENSOR:** Positive coefficient platinum type, 4.8 ohms/ °F, 1000 ft maximum distance between sensor and solid state controller (requires calibration over 400 ft). To maintain NEMA 4X rating, use environmental proof cable and sensor.

**TEMPERATURE ACCURACY:** +/-1°F (at nominal voltage in 77°F [25°C] ambient, nominal sensor value). Accuracy may vary based on deviation from nominal values of input voltage, operating ambient and sensor ambient.

**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.

**SETPOINT ADJUSTMENT RANGE:** -40° to 220°F (-40° to 104°C).

**OPERATING AMBIENT TEMPERATURE:**

- One and Two Stage units: -30° to 140°F.
- Three and Four Stage units: -30° to 125°F.

**OPERATING HUMIDITY:** 5% to 95% relative humidity (RH) noncondensing.

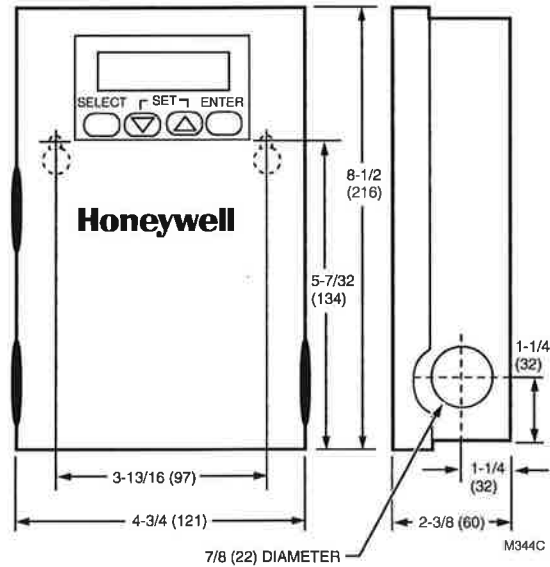
**APPROVALS:**

- Underwriters Laboratories Inc. Listed: File no. E4436.
- Canadian Standards Assoc. certified: File no. LR47125.

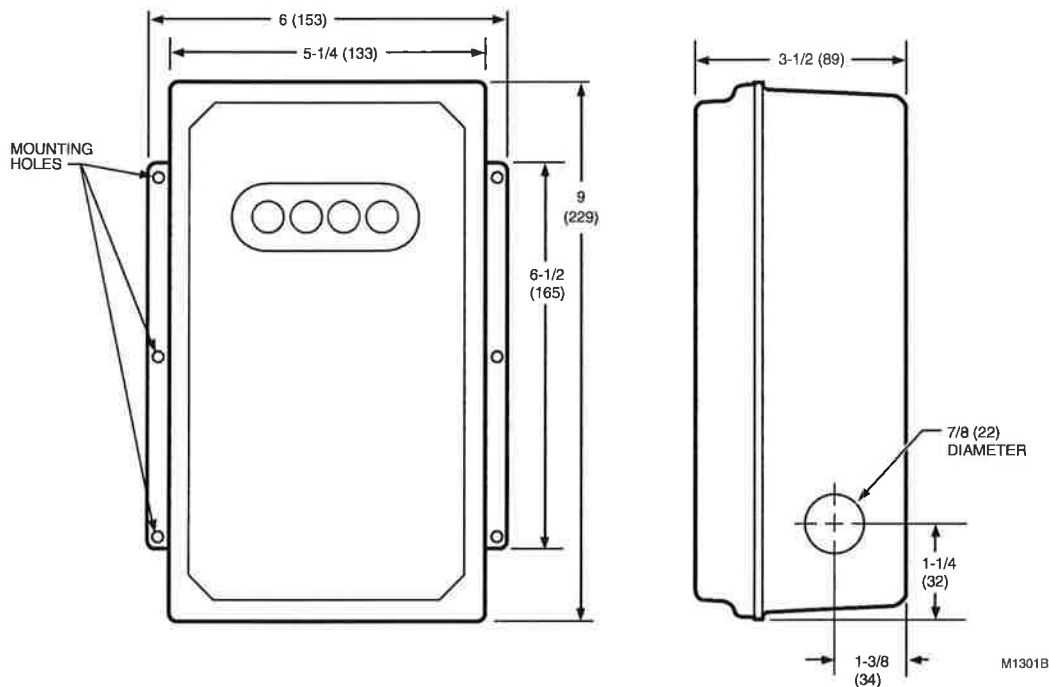
**DIMENSIONS:** See Fig. 1 and 2.

**MOUNTING:** Mounts on any suitable horizontal or vertical surface (see Fig. 3 and 4 for mounting hole locations).

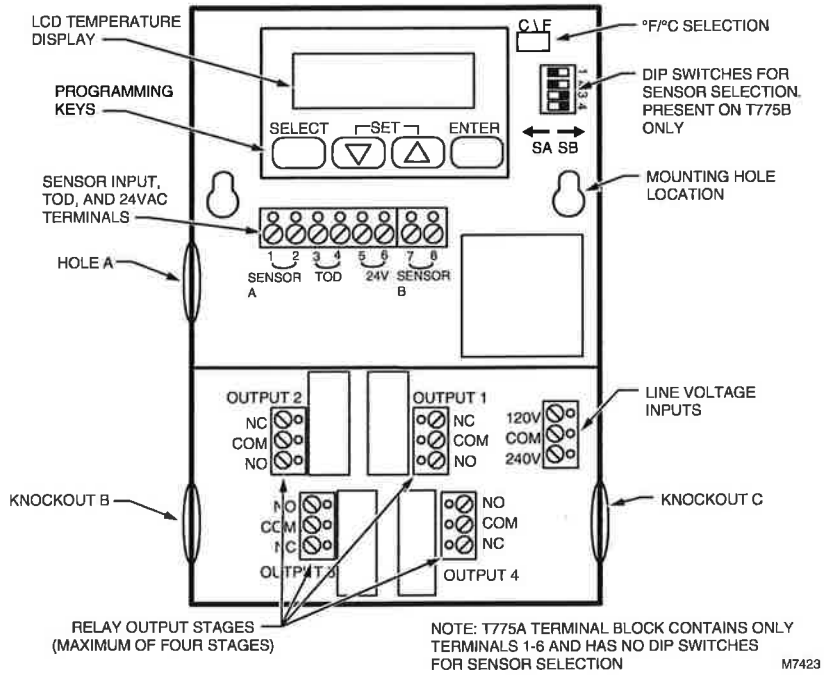
**Fig. 1—Approximate dimensions of T775A,B in in. (mm).**



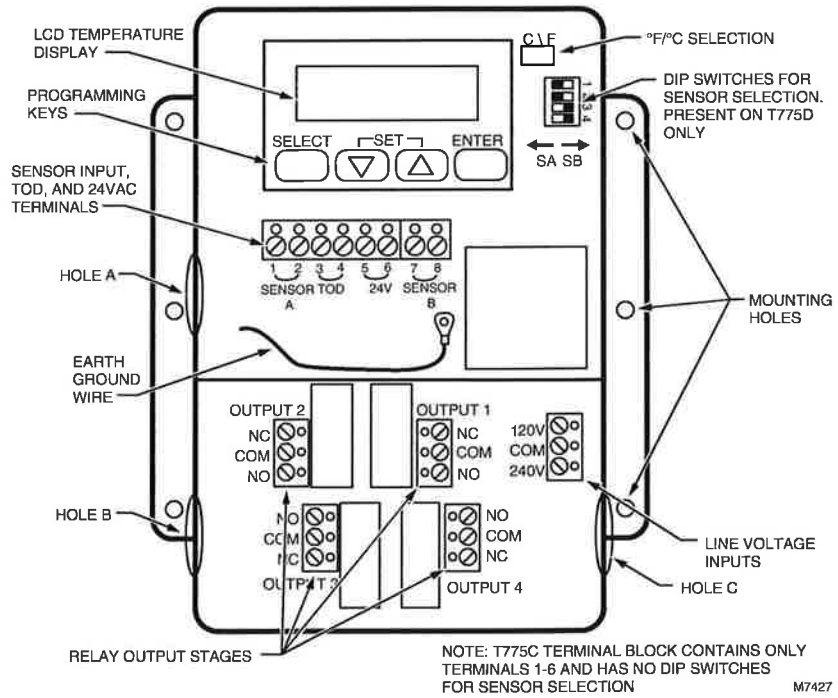
**Fig. 2—Approximate dimensions of T775C,D in in. (mm)**



**Fig. 3—Feature locations for T775A,B.**



**Fig. 4—Feature locations for T775C,D.**



**ACCESSORIES:**

**T775A,B:**

- A775A1003 Temperature Sensor Simulator.
- C7100C Duct Mount Averaging Sensor.
- 198212CA Water Resistant Sensor.
- 203401B Water Tight Sensor.
- T7047C1090 Wall Mounted Sensor Case.
- 107324A Bulb Holder, duct insertion.
- 121371A Copper Immersion Well.
- 121371E Stainless Steel Well.

107048 Heat Conduction Compound, 4 ounce.

C7043A1098 Case and Immersion Well for running conduit to sensor.

**T775C,D:**

- 121371A Copper Immersion Well.
- 121371E Stainless Steel Well.
- 107408 Heat Conduction Compound, 4 ounce.
- C7043A1098 Case and Immersion Well for running conduit to sensor.

## Installation

**WHEN INSTALLING THIS PRODUCT...**

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



### WARNING

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

**LOCATION AND MOUNTING**

Mount the controller on any convenient interior location using the two mounting holes provided on the back of the metal enclosure (mounting screws are not provided and must be obtained separately). Use controller dimensions in Fig. 1 (T775A,B) or Fig. 2 (T775C,D) as a guide.

**SENSOR LOCATION**

The 193987GA Sensor can be located up to 1000 feet (304 meters) from the T775 using standard AWG 18/2 unshielded wire. For cable runs greater than 25 feet shielded cable is recommended. See Fig. 5. It may be located on pipes, in an immersion well, in a wall-mounted case or on a bulb holder. See Fig. 6. The 193987GA is not a water tight or water resistant sensor. For wet applications, see the Accessories list in the Specifications section.

Multiple sensors can be parallel-series wired to sense average temperatures in large spaces.

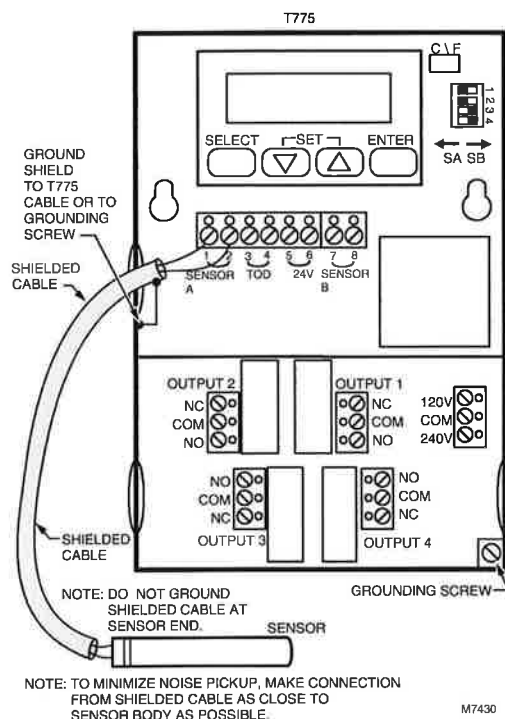
To maintain control accuracy, the number of sensors parallel-series wired must be of the  $n^2$  power (for example, 4, 9, 16, etc.). See Fig. 7.

**SENSOR MOUNTING**

Sensors can be mounted on a wall or panel for sensing space temperature (Fig. 6), strapped to a pipe or inserted in a well (Fig. 8) for hot/cold water sensing, or taped 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 the lead wires exiting the bottom of the sensor.

**Fig. 5—Using shielded cable for cable runs longer than 25 feet.**



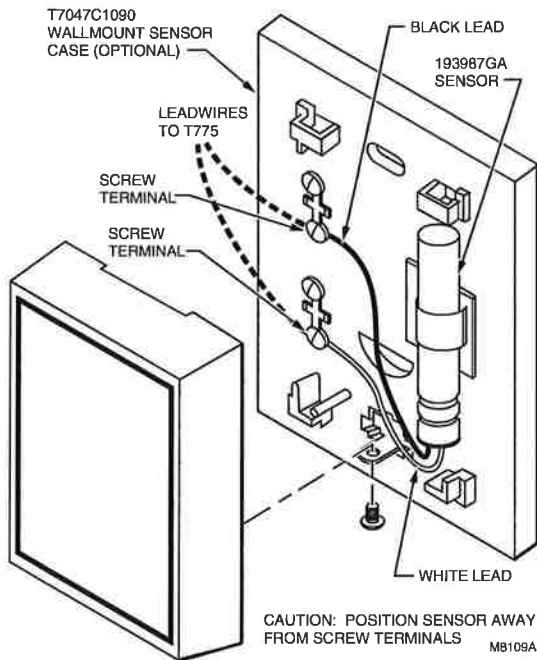
**NOTE:** Use heat conductive compound in immersion wells. See optional Accessories in the Specifications section.



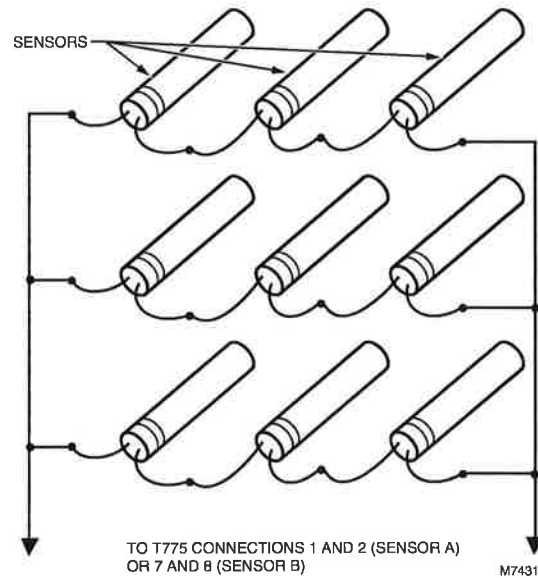
### CAUTION

Make sure that metal tube of sensor does not short against T terminals in wall-mounted case.

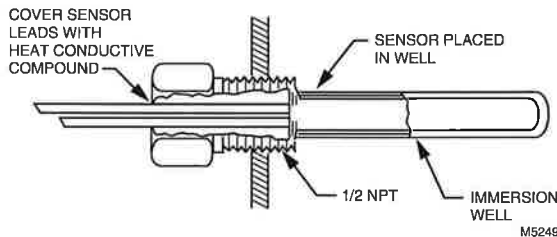
**Fig. 6—Sensor mounted on wall.**



**Fig. 7—Parallel-series wiring of sensors.**



**Fig. 8—Sensor inserted in immersion well.**



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



**WARNING**

Do not use 24 Vac power at terminals 5 and 6 to power any external loads if 120 Vac or 240 Vac is used to power the T775.

**WIRING**



**WARNING**

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

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

Refer to Fig. 3 or 4 for locating the appropriate power inputs, remote sensor input, load output terminals, contact closure input and sensor selection switch. Access to the terminals can be gained through standard conduit knockouts (A through C) located around the perimeter of the enclosure.

**NOTE:** Hole A should only be used for sensor, low-voltage and contact closure wiring.

When wiring the input power, only one source of power can be applied to the T775 (for example, 24 Vac or 120 Vac or 240 Vac). Knockouts B and C can be used to gain access to 120 Vac or 240 Vac input terminals and the load relay output terminals.

See Fig. 11 through 14 for typical T775 wiring and applications.

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

- Do not route the temperature sensor wiring with building power wiring.
- Do not locate the temperature sensor wiring next to control contactors.
- Do not locate the temperature sensor wiring near electrical motors.
- Do not locate the temperature sensor wiring near welding equipment.
- Make sure good mechanical connections are made to both the sensor and the controller.
- Do not mount the sensor with the leadwire end (wire end) pointing up in an area where condensation can occur.

If any of the above conditions cannot be avoided, use shielded cable.

NOTE: Ground the cable shield at the T775 connection only, not at the sensor connection ( see Fig. 5).

#### DEVICE SETUP

1. Determine the loads to be controlled and the operating mode (heat or cool) and enter in the Device Programming Worksheet.

For example: Load 1: Compressor 1 (cool)

Setpt 1 \_\_\_\_\_ On at \_\_\_\_\_  
Diff 1 \_\_\_\_\_ Off at \_\_\_\_\_

2. For two sensor models (T775B), determine which loads will be controlled from sensor A or sensor B and enter on the worksheet.

For example: Load 1: Compressor 1 (cool)—Sensor A

Setpt 1 \_\_\_\_\_ On at \_\_\_\_\_  
Diff 1 \_\_\_\_\_ Off at \_\_\_\_\_

3. Determine the setpoint (Setpt) and the switching differential (Diff) for each load and enter on the worksheet.

For example: Load 1: Compressor 1 (cool)—Sensor A

Setpt 1 78°F On at \_\_\_\_\_  
Diff 1 4°F Off at \_\_\_\_\_

4. Refer to the Control Algorithm subsection in Description/Operation section to calculate the load on and off temperatures. Enter them on the worksheet. Remember that the on/off outputs are off at setpoint in both the heating and

cooling operating modes. When in cooling mode, the load will be turned off at setpoint plus the differential. When in heating mode, the load will be turned on at setpoint minus the differential.

For example: Load 1: Compressor 1 (cool)—Sensor A

Setpt 1 78°F On at 82°F  
Diff 1 4°F Off at 78°F



## CAUTION

The T775 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 (1,2,3,4) 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.

5. Remove the T775 cover and enter the values listed on the worksheet and the date in the first column on the label inside the T775 cover.

Device Programming Worksheet			
<b>Load 1:</b>			
SetPt 1 _____	On at _____	Diff 1 _____	Off at _____
<b>Load 2:</b>			
Setpt 2 _____	On at _____	Diff 2 _____	Off at _____
<b>Load 3:</b>			
Setpt 3 _____	On at _____	Diff 3 _____	Off at _____
<b>Load 4:</b>			
Setpt 4 _____	On at _____	Diff 4 _____	Off at _____

#### DEVICE PROGRAMMING

##### Default Values

When power is initially applied to the T775, the control points will be at their default value set at the factory. Default values are:

	Setpoint (°F)	Differential (°F)	Operating Mode
Stage 1	72	2	Heat
Stage 2	70	2	Heat
Stage 3	68	2	Heat
Stage 4	66	2	Heat

1. For the T775B and T775D, assign the loads to the appropriate sensor by setting the DIP switch in the upper right corner of the T775 (see DIP Switch Selection, Fig. 9).
2. Before programming the T775, verify that the °F/°C selection jumper is properly installed. The T775 is shipped from the factory with the jumper installed in the °F position. If °C is desired, remove the jumper.
3. Apply power to the device. The device will begin counting down from 210. This countdown sequence will last for approximately 3-1/2 minutes.
4. Press Select to override this time delay.
5. Press Select and Enter keys simultaneously to begin programming the load operating mode (Heat or Cool).
6. Press the Set (down arrow) to change to cooling. The Set (up arrow) will change back to heating.
7. Press Enter to program the displayed mode into memory.
8. Press Select to go to the next stage.
9. Repeat steps 6 through 9 for additional stages.
10. Press Select after the last stage is set up to return to the display of the sensed temperature.

#### PROGRAMMING STAGE CONTROL VALUES

1. Press Select to display the current stage setpoint.
2. Press Set (up arrow) to increase or Set (down arrow) to decrease to the desired setpoint.
3. Press Enter to enter the displayed value into memory.
4. Press Select to display the current stage switching differential.
5. Press Set (up arrow) to increase or Set (down arrow) to decrease to the desired switching differential.
6. Press Enter to enter the displayed value into memory.
7. Repeat steps 1 through 6 to program each additional stage.
8. For the T775A and T775C, press Select/Select (two times) to return to stage 1 parameters. For the T775B and

T775D, press Select/Select/Select/Select (four times) to return to stage 1 parameters. Scroll through the programming loop a second time to confirm that the appropriate values were entered into memory by pressing Select.

NOTE: The T775B and T775D have three options for displaying the sensed temperature:

1. Sensor A only.
2. Sensor B only.
3. Alternating between Sensor A and Sensor B.

For the T775B and T775D only:

9. Press Select after viewing the switching differential for the final stage to display Sensor A temperature only.
10. Press Select again to display Sensor B temperature only.
11. Press Select again to alternate the display between Sensor A temperature and Sensor B temperature at approximately five-second intervals.
12. Before replacing the cover on the T775, check to see that the control values were recorded on the label on the backside of the cover.

**IMPORTANT:** For the T775A and T775C only: After initial programming, altering the setpoints for stage 1 up or down will result in a change in setpoints 2, 3, and 4 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° to +220°F [-40° to +104°C]) for subsequent stages, 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

## Description/Operation

### CONTROL ALGORITHM

#### On/Off Control

The T775A and T775C operate with one temperature input supplied by the remote sensor while T775B and T775D have two temperature inputs. The T775A,B,C, and D are all capable of providing up to four stages of relay outputs for on/off control. Each stage of the T775A,B,C, and D has its own independent setpoint that can be configured to operate in either the heating or cooling mode. The mode of operation for each stage is user determined by the programming keys.

#### Heating Mode Operation

- Relay outputs are energized at the temperature setpoint minus the differential value.
- Relay outputs are de-energized at the temperature setpoint value.

#### Cooling Mode Operation

- Relay outputs are energized at the temperature setpoint plus differential value.
- Relay outputs are de-energized at the temperature setpoint value.

EXAMPLE: Using a device with one input and one relay output, the corresponding load would be energized at the temperatures following based on the initial settings.

#### Settings

- Setpoint: 68°F
- Differential: 2°F

#### OUTPUTS ENERGIZED

Heating Mode:

- Stage One: Energized at 66°F.

STAGE  
SET  
for  
HEAT  
COOL



**Cooling Mode:**

- Stage One: Energized at 70°F.

The T775B,D have dual sensor inputs and allow two separate controllers to exist within one enclosure. Selection of the stage parameters (operation mode, setpoints, and differentials) is the same as for a single sensor device after each stage is assigned its operating sensor. This assignment is hardware driven via a four position DIP switch. An explanation of the DIP switch assignments appears in Fig. 9. See Fig. 3 and 4 for the DIP switch location.

**CONTACT CLOSURE OVERRIDE INPUT**

A two-terminal input is provided to allow the user to override a relay-energized condition on all outputs by using a contact closure between terminal pins 3 and 4 of the terminal block for the sensor input shown in Fig. 3 and 4. This can be achieved manually or by using an EMS controller or time clock with normally open contacts (W7505 or S7005, for example).

When this override is active, the display will show the number of the stages that would be energized and the words STAGE ENERGIZED will flash on the display. The energized stages will then be de-energized until the override returns to inactive (Off).

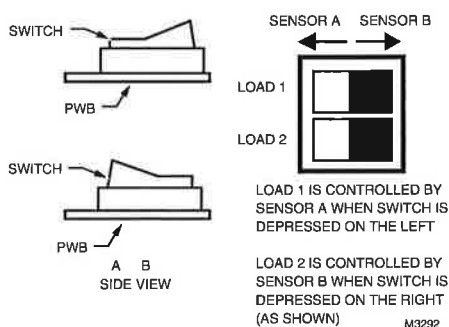
**°F/°C SELECTION**

A single jumper plug controls °F/°C indication of the displayed temperature value. The location of this jumper is shown in Fig. 3 and 4. The unit is shipped with the jumper installed in the °F mode. To operate the device in the °C mode, remove the jumper. Replacing the jumper will restate the °F mode.

**DIP SWITCH SELECTIONS**

On the T775B and D, the DIP switches are provided for assignment of each relay output stage to its operating sensor. If an individual switch is depressed toward its corresponding load number (1 through 4 on DIP switch) or to the right, Sensor B will be the controlling sensor for that output stage. If an individual switch is depressed to the left, Sensor A will be the controlling sensor for the output stage. An example of the switches and their corresponding positioning is shown in Fig. 9.

**Fig. 9—DIP switch settings for sensor selection.**



**KEYPAD PROGRAMMING AND DISPLAY**

The T775 utilizes a Liquid Crystal Display (LCD) for interactive prompting during programming and display of sensed and assigned setpoint and differential values. User programming of the T775 is accomplished through the four programming keys.

**Programming Keys**

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

- Select key sequentially prompts the user about what parameter is being displayed: setpoint, differential, stage energized, heat or cool (operation mode), 1,2,3,4 (indicating assigned stage). After 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 parameter 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 1°C for each time the arrow key is depressed.
- Enter key places the new value into the memory of the microprocessor.

**IMPORTANT:** A control value or operation will not be entered into the memory of the microprocessor until the Enter key is pressed.

- Press the Select and Enter keys at the same time to change the control algorithm from heating to cooling or from cooling to heating. The heating and cooling parameters are not displayed during the normal Select key sequences. The only parameters displayed after pressing the Select and Enter keys at the same time will be the stage indication and the word, heat or cool. To change the operation from heating to cooling or vice versa for a desired output stage, use the arrow keys. Once the mode is changed, pressing 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 programmed, the display will revert back to sensed temperature and load energized status.

Control values and operation selection will remain in the device memory even after the power is removed.

**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 (Sensor A or Sensor B) is being read for two sensor

devices. At any time during the programming procedure, the display will revert back to showing the sensed temperature and stage status indication 60 seconds after the last key closure.

For two sensor applications, the user has three options for what is displayed. The display can be configured to indicate Sensor A and Sensor B sensed temperature at a five second rate or lock onto Sensor A sensed temperature or lock onto Sensor B sensed temperature continuously.

This selection is accomplished by stopping at Sensor A or Sensor B sensed temperature points in the Select screen scrolling loop. To lock on to either sensor, the user must scroll the Select key through the loop to the sensed temperature prompt of interest. The display will remain at that parameter until the Select key is activated to advance the loop. When the loop is stopped at any other prompt, the display will alternatively indicate Sensor A and Sensor B sensed temperature 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 T775. The error Codes flashing on the display are:

#### *SF—Sensor Failure*

If the display shows a flashing SF, this indicates an out-of-range or defective sensor. Make sure that the sensors are connected properly. For T775A,C all loads will be de-energized when this error message is flashing.

For the T775B,D the loads controlled by the out-of-range sensor will be de-energized. The display will flash SF to indicate which sensor is defective or in error. In the event that only one sensor is defective, the remaining sensor and its load(s) will operate normally. Only the load(s) controlled by the defective, out-of-range, or unconnected sensor will be de-energized.

NOTE: Sensor values below -40°F or above 220°F will be out-of-range.

#### *EF—EEPROM Failure*

The values read back from the EEPROM are not the same as written into the EEPROM. This error cannot be field

repaired. Replace the device. The EEPROM is not intended to be field repaired.

#### *CF—Calibration Failure*

A calibration resistor reading was not within the range of the Analog to Digital converter. This error cannot 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 Read Only Memory (ROM) of the microprocessor is defective. This error cannot be field repaired. Replace the device.

#### *AE—RAM error*

The internal Random Access Memory (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. If the length of the sensor wire exceeds 400 feet, recalibration will be necessary to maintain accuracy. The chart that follows shows the corresponding temperature offset to use for different sensor wire lengths. This temperature offset should be added to the desired temperature setpoint for these applications. Refer to programming instructions in the Programming section for entering temperature setpoints.

Sensor Wire Length	Calibration Offset
0 to 399 ft	None required.
400 to 599 ft	1.0 degrees
600 to 799 ft	2.0 degrees
800 to 1000 ft	3.0 degrees

## Checkout

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After the controller is installed and wired, apply power. Make initial adjustments and desired settings.

1. As shown in Fig. 8, record the sensed temperatures for both Sensor A and Sensor B as displayed on the device. Use the Select key to advance through the programming loop to determine and then write on the Checkout Table which loads are controlled by each sensor.

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

3. Write the sensed temperature for each load on the Sensed Temp. line.

4. Write the differential for each load on the Differential line.

5. Write the setpoint for each stage (Off temperature). Calculate the On temperature for each stage. (On temperature is setpoint plus differential for cooling and is setpoint minus differential for heating.)

6. Plot the on and off (open/closed) values at which the device will energize and de-energize each output load, (Refer to the Device Programming Worksheet.)

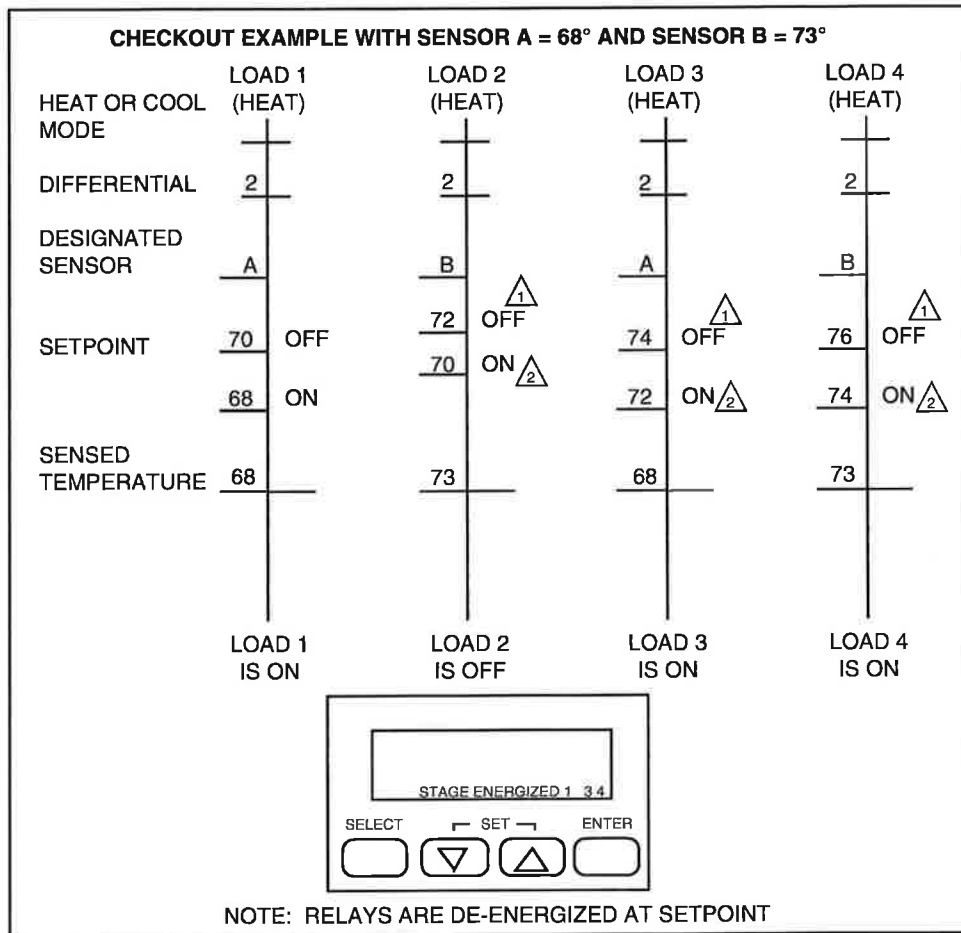
7. Verify which loads are energized by using the Checkout Table. As shown in the example, the display will indicate, in the lower right corner, which stages are energized. If no stages are energized, the words "stage energized" will not appear.

NOTE: If the sensed temperature is between the On and Off temperatures, the load may either be energized or de-energized. Refer to the Control Algorithm section for further explanation.

8. If an error message flashes, refer to the description of these messages. If SF flashes, check the sensor connections. If properly connected and SF continues to flash, check the sensor location to make sure it is located in an ambient condition that is within the sensor capability (-40° to +220°F).

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

Fig. 10—Checkout Table and checkout example with Sensor A = 68°F and Sensor B = 73°F.



**CHECKOUT TABLE**

	LOAD 1	LOAD 2	LOAD 3	LOAD 4
HEAT OR COOL SETPOINT	—	—	—	—
DIFFERENTIAL	—	—	—	—
DESIGNATED SENSOR	—	—	—	—
SETPOINT	—	—	—	—
SENSED TEMPERATURE	—	—	—	—

<sup>1</sup> INDICATES LOAD STATUS WHEN SENSED TEMPERATURE REACHES SETPOINT.  
<sup>2</sup> INDICATES LOAD STATUS WHEN SENSED TEMPERATURE REACHES SETPOINT MINUS DIFFERENTIAL (HEAT MODE).

M7426

Fig. 11—Two-stage control, 24 Vac input, 24 Vac load.

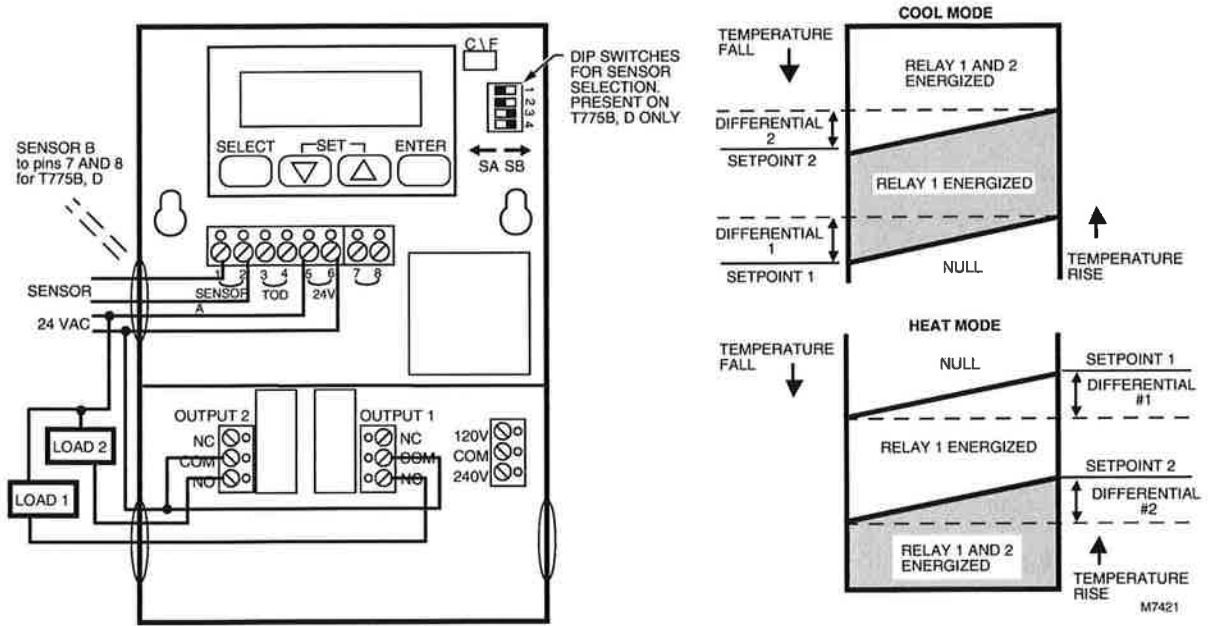


Fig. 12—Two-stage control, 120 or 240 Vac input; 120 or 240 Vac load.

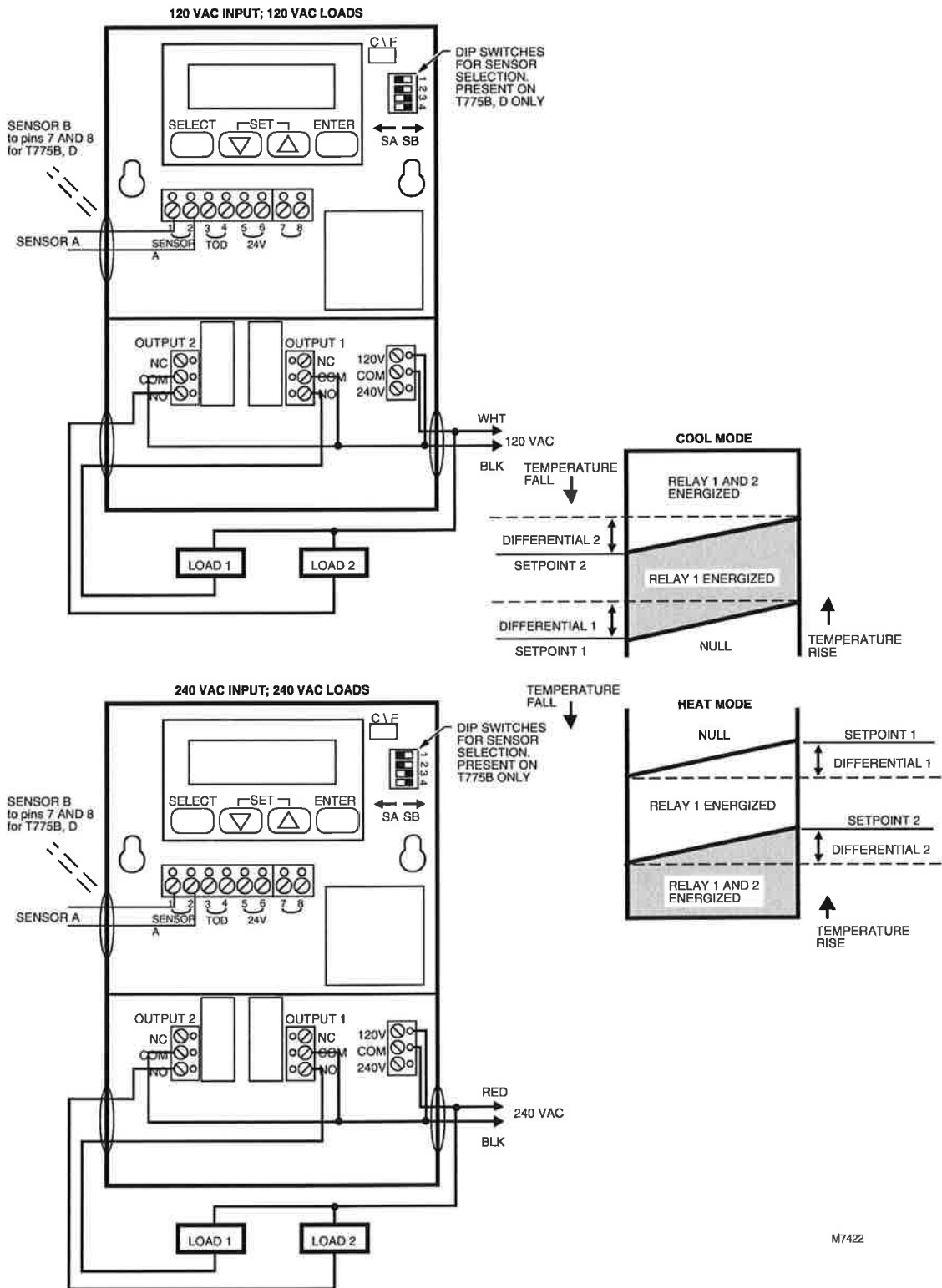
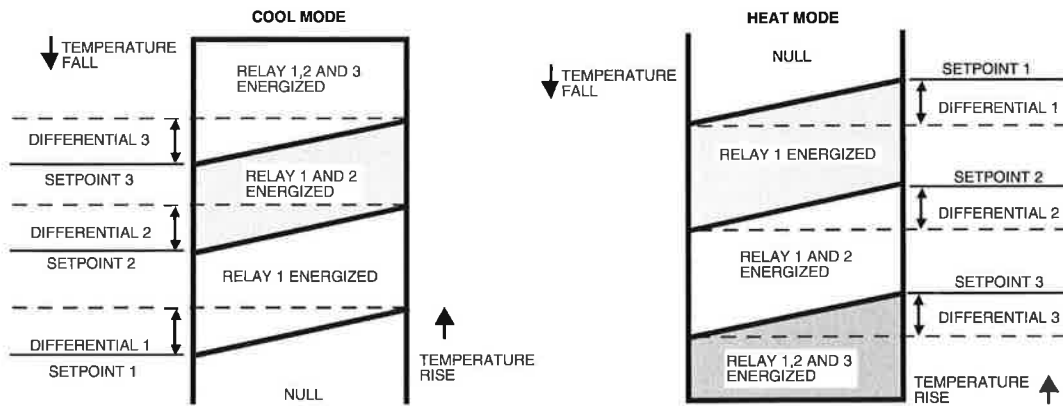
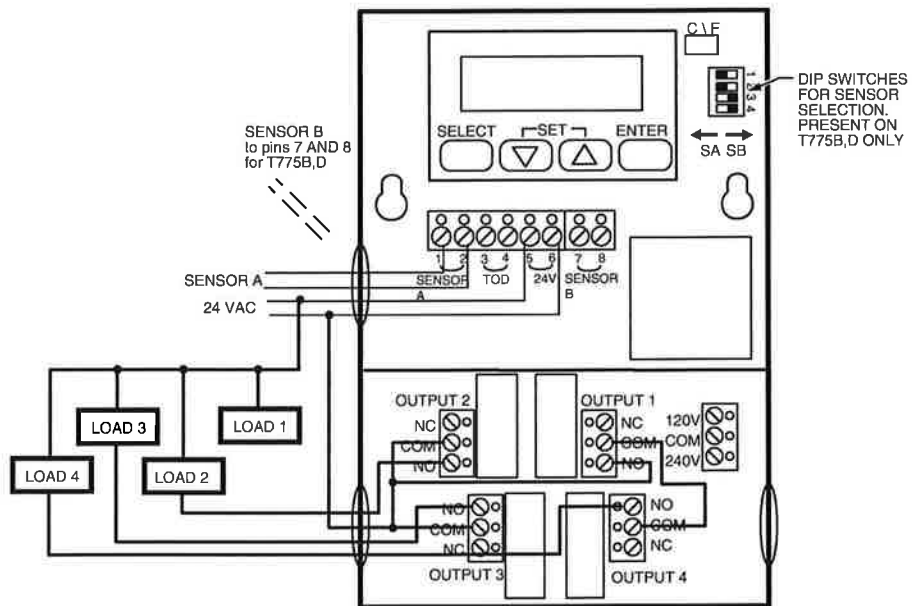


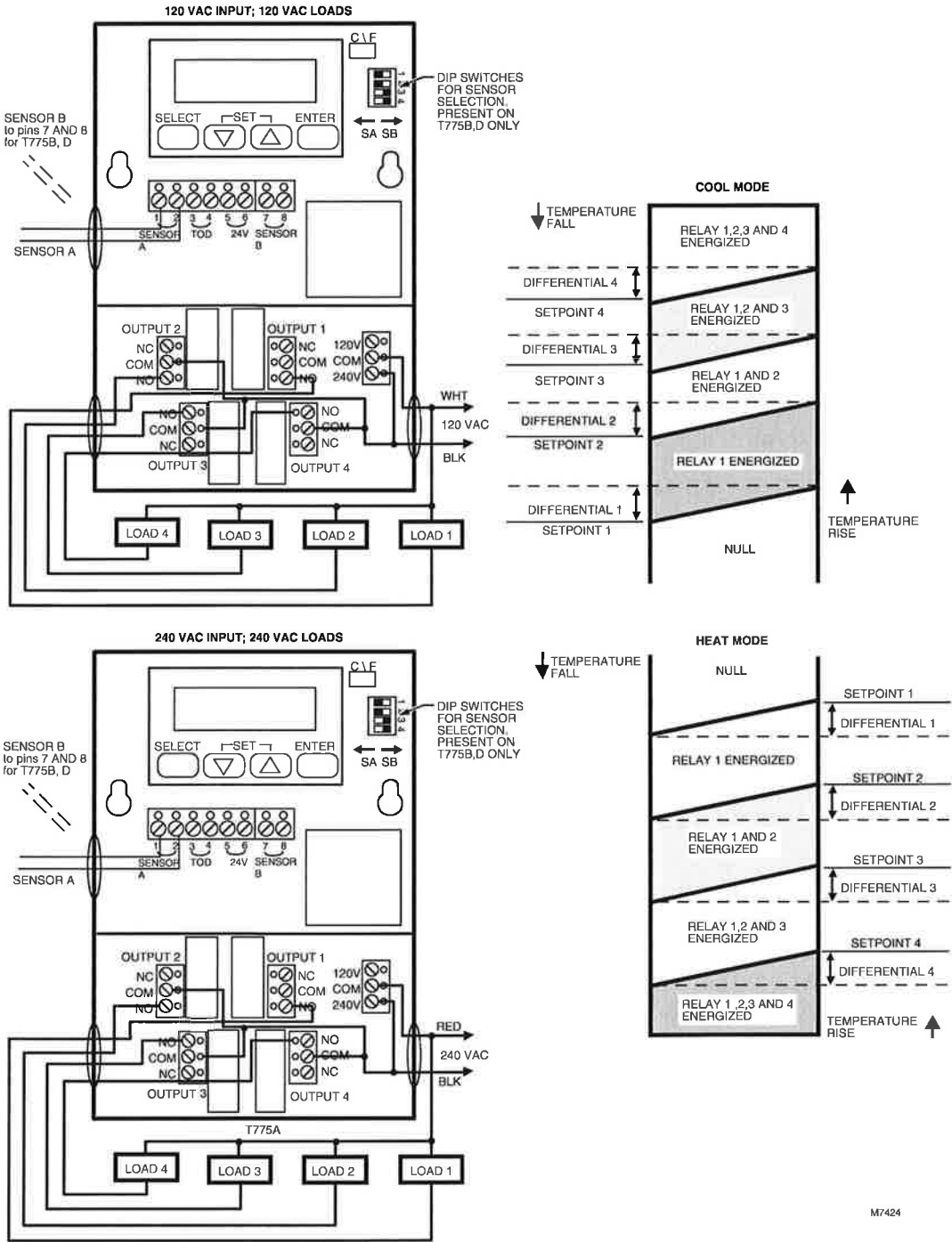
Fig. 13—Four-stage control, 24 Vac input; 24 Vac load.



NOTE: FOR THERMOSTAT APPLICATIONS, CONNECT NO CONTACT OF COOLING STAGE TO Y1 (AND SECOND STAGE TO Y2)  
CONNECT NO CONTACT OF HEATING STAGE TO W1 (AND SECOND STAGE TO W2).

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Fig. 14—Four stage control, 120 or 240 Vac input, 120 or 240 Vac load.



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