Carrier

Installation and Operating Instructions

Part Number 50QE900-250FS

CONTENTS

IMPORTANT: Read entire instructions before starting the installation.

SAFETY CONSIDERATIONS

Read and follow manufacturer instructions carefully. Follow all local electrical codes during installation. All wiring must conform to local and national electrical codes. Improper wiring or installation may damage thermostat.

Recognize safety information. This is the safety alert symbol ⚠. When the safety alert symbol is present on equipment or in the instruction manual, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety alert symbol. DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies a hazard which could result in personal injury or death. CAUTION is used to identify unsafe practices which would result in minor personal injury or property damage.

GENERAL

The commercial, 7-day, programmable thermostats are wall-mounted, low-voltage thermostats which maintain room temperature by controlling the operation of an HVAC (heating, cooling and ventilation) system. Separate heating and cooling set points and auto-changeover capability allow 4 different programming time periods for energy savings.

All thermostats allow up to 4 time/temperature settings to be programmed per 24-hour period. Each thermostat stores programs for 7 independent days. Batteries are not required. During power interruption the internal NEVERLOST™ memory stores programmed schedules for an unlimited time while the clock continues to run for at least 48 hours.

The thermostat can be configured to accept several different equipment configurations, and is provided for heat pump operation.

NOTE: The 50QE900-250FS thermostats have wiring connections for a remote room sensor.

PACKAGE CONTENTS

ITEM	QUANTITY
Thermostat	1
Cutout Template	1
1-in. Screws (Junction Box Installation)	2
1$\frac{1}{2}$-in. Self-Tapping Screws (Non-Junction Box Installation)	2
Plastic Tabs	2
Power Resistor (270 ohm, 10 Watt)	1

INSTALLATION

Select Thermostat Location — The thermostat should be mounted:
- approximately 5 ft from the floor
- close to or in a frequently used room, preferably on an inside partitioning wall
- on a section of wall without pipes or ductwork
- where temperature operating limits are within 32 to 122 F (0° to 50 C)
- where humidity operating range is within 0 to 95% relative humidity, non-condensing

The thermostat should **NOT** be mounted:
- close to a window, on an outside wall, or next to a door leading to the outside
- where exposed to direct light and heat from a lamp, the sun, a fireplace, or any other temperature-radiating object which may cause a false reading
- close to or in direct airflow from supply registers or return air grilles
- in areas with poor air circulation (such as behind a door or in an alcove)

Install Thermostat (With Junction Box)

> ### ⚠ WARNING
> Before installing thermostat, turn off all power to the unit. There may be more than one power disconnect. Electrical shock can cause injury or death.

1. Turn off all power to unit.
2. If an existing thermostat is being replaced:
    a. Remove existing thermostat from the wall.
    b. Disconnect wires from existing thermostat. Do not allow wires to fall back into the wall. As each wire is disconnected, record wire color and terminal connection.
    c. Discard or recycle old thermostat.
    NOTE: Mercury is a hazardous waste and must be disposed of properly.
3. Install 2 x 4-in. junction box (field-supplied) in wall. See Fig. 1.
4. Route thermostat wires through back of junction box. Remove outer sheath from wires for added flexibility. Standard solid or multi-conductor thermostat wire should be used from the thermostat to the unit. **Size and length considerations are as follows: for a maximum distance from unit of 36 ft, use 22 AWG (American Wire Gage) wire; for a maximum distance from unit of 100 ft, use 18 AWG wire.**
5. Adjust wire length and routing to allow proper closure of the thermostat. Strip each wire at the end no more than $1/4$-in. to prevent adjacent wires from shorting together. Match and connect wires to terminals on the thermostat. See Fig. 2-5 and Table 1.

> ### ⚠ CAUTION
> Improper wiring or installation may cause damage to the thermostat. Check to ensure wiring is correct before proceeding with installation of thermostat.

6. Push excess wiring into wall. Seal hole in junction box to prevent drafts.
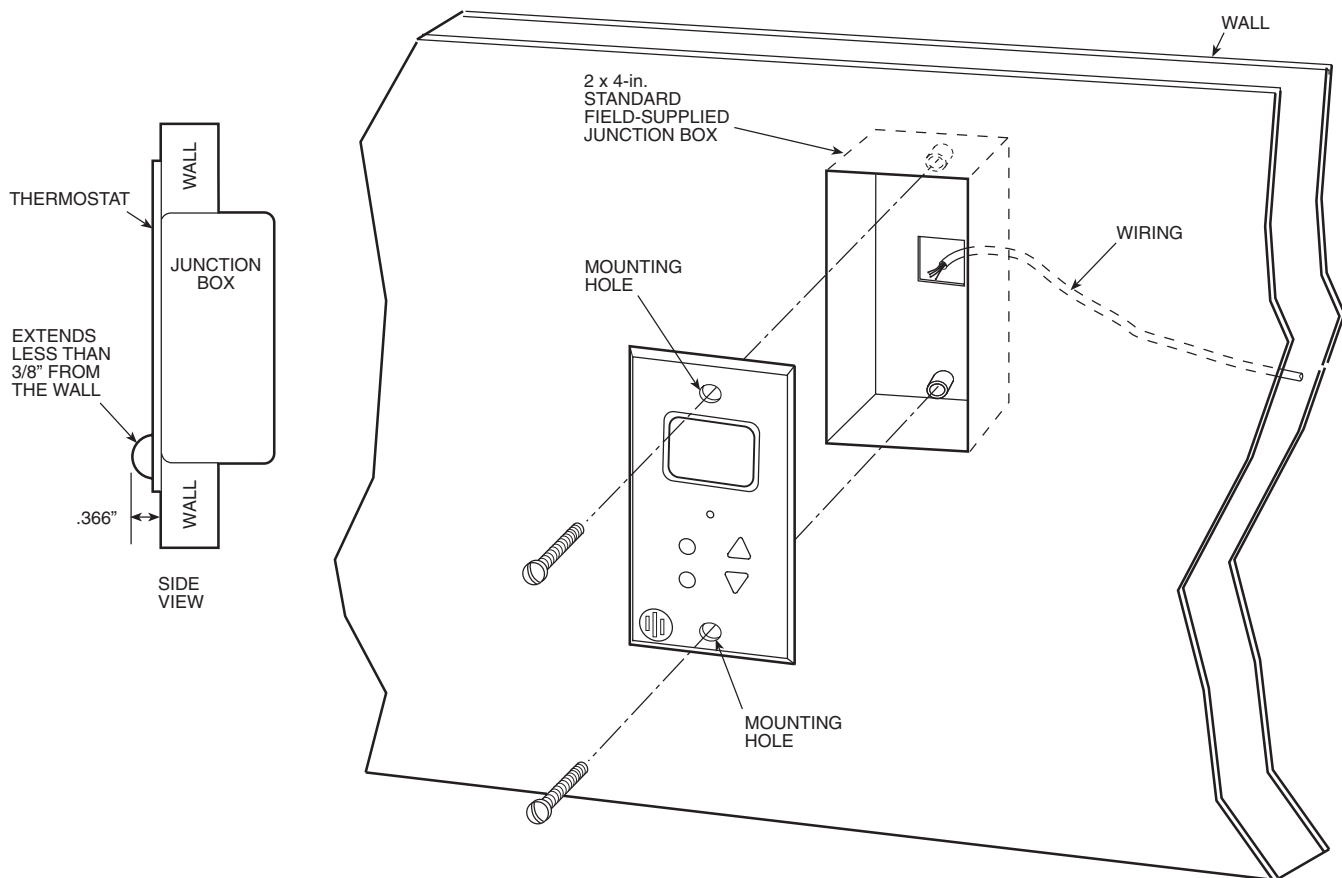7. Attach thermostat to junction box.

Fig. 1 — Thermostat Mounting

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8. Turn on power to unit. The thermostat will receive power from the unit. The thermostat will be powered by 24 v, nominal (18 to 30 vac). Terminals R (+ 24 v), O/W1 (first stage heat or reversing valve), Y1 (first stage cooling), G (fan relay), and C (common) will always be connected. Some applications will use Y2 (second stage cooling) or W2 (second stage heating).

NOTE: The common (C) hook up is required on heat pump applications.
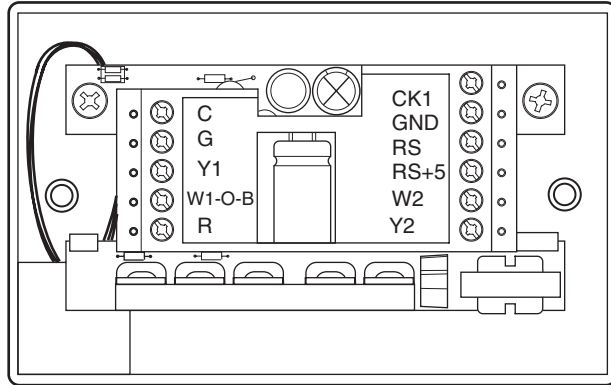
LEGEND

C	—	24 VAC Transformer Common
CK1	—	Dry Contact Switch
G	—	Fan
GND	—	Remote Sensor or Dry Contact Switch Ground
RS	—	Remote Sensor Signal
RS+5	—	Remote Sensor (+5 vdc)
R	—	24 VAC Transformer Power
W1-O-B	—	First-Stage Heat or Reversing Valve
W2	—	Second-Stage Heat
Y1	—	First-Stage Compressor
Y2	—	Second-Stage Compressor

Fig. 2 — Thermostat Wiring

Table 1 — Thermostat Wiring Terminations

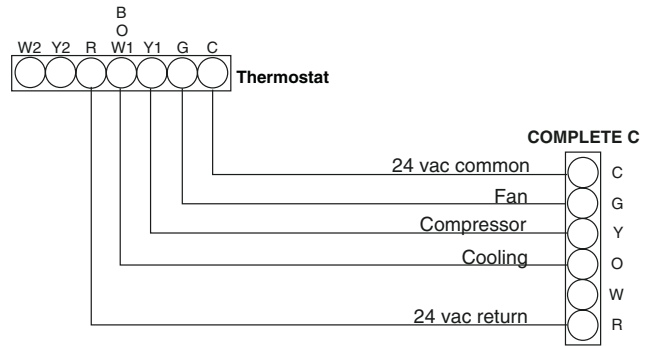| EXISTING WIRE DESIGNATION	FUNCTION	TERMINAL CONNECTION
G or F	Fan	G
Y1, Y, or C	Cooling	Y1
W1, W, or H	Heating	W1-O-B
Rh, R, M, Vr, or A	Power (24 v)	R
C	Common	C
O/B	Reversing Valve	W1-O-B
Y2	Second Stage Cooling	Y2
W2	Second Stage Heating	W2
RS+5	Remote Sensor (5 vdc)	RS+5
RS	Remote Sensor Signal	RS
GND	Remote Sensor Ground	GND
CK1	Dry Contact Switch	CK1

Fig. 3 — Water Source Heat Pumps Equipped with 1 Complete C Control Board for Single-Stage Operation
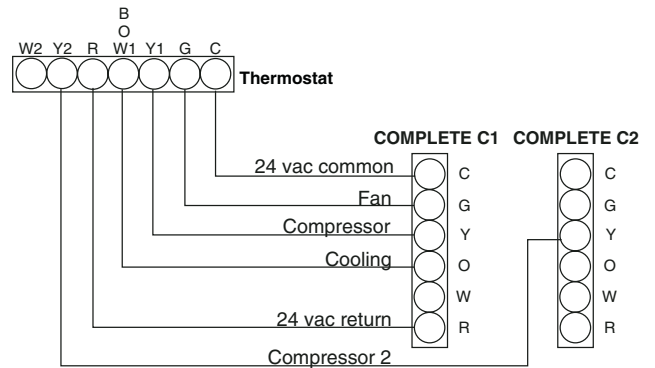

Fig. 4 — Water Source Heat Pumps Equipped with 2 Complete C Control Boards for Two-Stage Operation
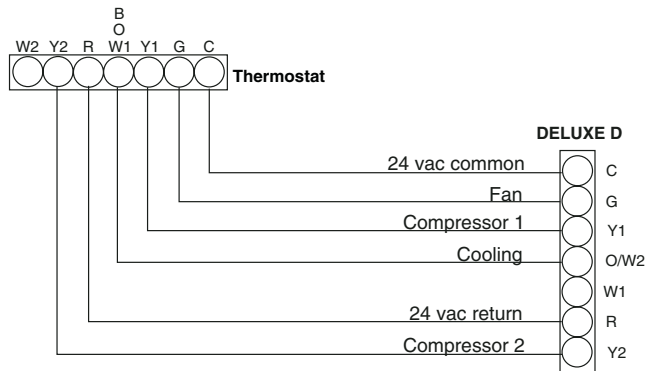

Fig. 5 — Water Source Heat Pumps Equipped with Deluxe D Control Board(s) for Single or Two Stage Operation

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Install Thermostat (Without Junction Box)

⚠ WARNING

Before installing thermostat, turn off all power to unit. There may be more than one power disconnect. Electrical shock may cause injury or death.

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1. Turn off all power to unit.
2. Using cutout template provided, cut hole into wall. See Fig. 6.
   a. If installing on dry wall, use outside of template to mark hole on wall.
   b. If installing on paneling, punch out inside of template and use inside of template to mark hole on wall.
3. Route thermostat wires through hole in wall. Remove outer sheath from wires for added flexibility. Standard solid or multi-conductor thermostat wire should be used from the thermostat to the unit.

   Size and length considerations are as follows: for a maximum wire distance from the unit of 36 ft, use 22 AWG (American Wire Gage) wire; for a maximum distance from the unit of 100 ft, use 18 AWG wire.
4. Adjust wire length and routing to allow proper fit of the thermostat on the wall. Strip each wire at the end no more than $1/4$-in. to prevent adjacent wires from shorting together. Match and connect wires to terminals on the thermostat. See Fig. 2-5 and Table 1.

⚠ CAUTION

Improper wiring or installation may cause damage to the thermostat. Check to ensure wiring is correct before proceeding with installation of the thermostat.

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5. Attach thermostat to wall.

   On paneling installations (see Fig. 7):
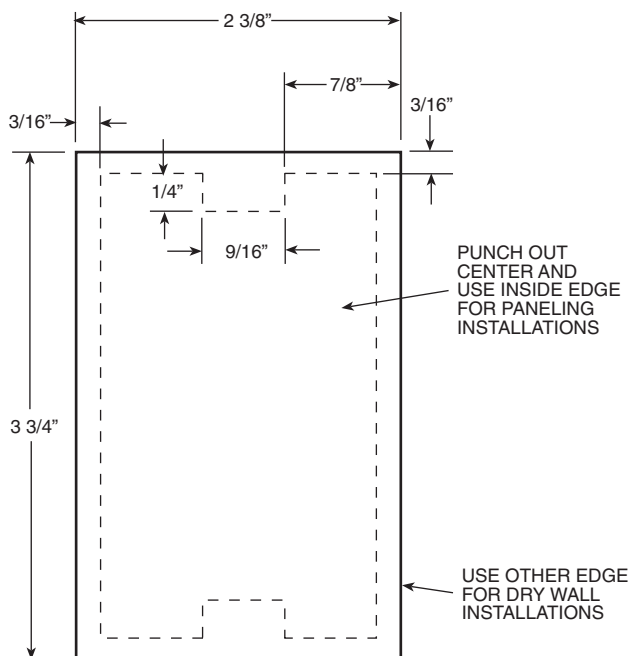   a. Push thermostat into hole in wall. Make sure tabs on paneling match up with mounting holes on thermostat.

   b. Using two $1^1/2$-in. self-tapping screws, attach thermostat to wall. Make sure thermostat cover is flush against wall and covers hole in wall.

   On dry wall installations (see Fig. 8):
   a. Push two $1^1/2$-in. self tapping screws through mounting holes in thermostat.
   b. Attach 2 plastic tabs to 2 mounting screws. Only turn 3 or 4 threads into tabs. Do not fully tighten tabs onto screws.
   c. Rotate screws short sides of tabs are facing out. Push thermostat into hole in wall.
   d. Turn screws $1/2$ turn so long side of plastic tabs face out away from thermostat. Pull thermostat out so tabs are snug against dry wall and will not turn.
   e. Tighten screws until thermostat is snug against wall and tabs are pressed against dry wall.

   NOTE: If thermostat needs to be removed, do not unscrew completely. If screws are removed from tabs inside of wall, tabs may drop into wall and be lost. Loosen screws and turn tabs to remove thermostat.
6. Turn on power to unit. The thermostat will receive power from the unit. The thermostat will be powered by 24 v, nominal (18 to 30 vac). Terminals R (+24 v), W1-O-B (first stage heat or reversing valve), Y1 (first stage cooling), G (fan relay), and C (common) will always be connected. Some applications will use Y2 (second stage cooling), or W2 (second stage heating).

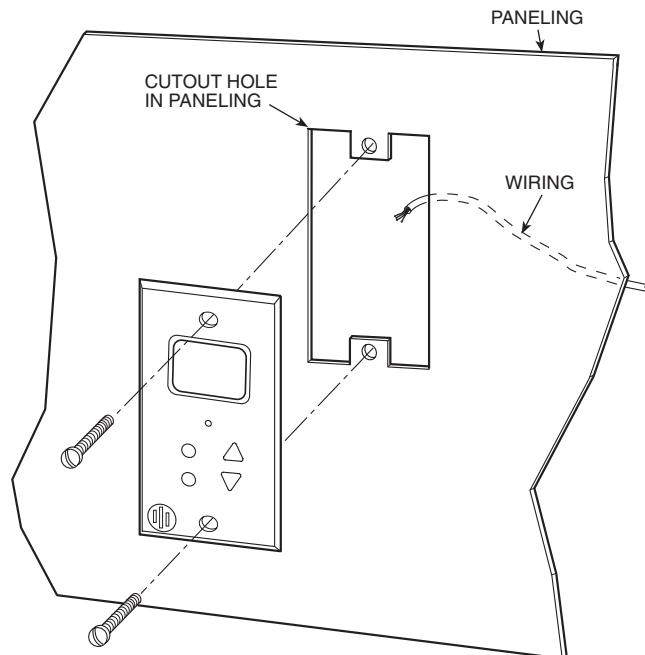   NOTE: The common (C) terminal is required on heat pump applications.

Fig. 6 — Cutout Template

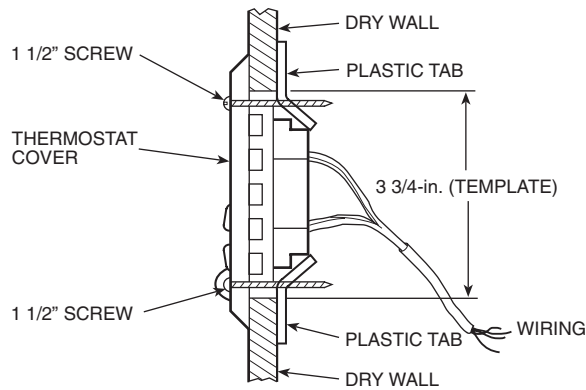**Fig. 7 — Installation on Paneling**

Fig. 8 — Installation on Dry Wall (Side View)

Set Clock — The Set Clock function allows the user to change the time and day displayed on the thermostat. Press and hold the Mode and Override buttons at the same time until the display changes. The display will show the Setup annunciator. The current time will blink on and off. Press the UP ARROW and DOWN ARROW buttons until the correct time is shown. Hold down the buttons to quickly move through the time display. The AM and PM annunciators will automatically change. To scroll through by hours instead of minutes, hold down the Override button while pressing UP ARROW or DOWN ARROW. To ensure the schedules are properly followed, make sure that AM or PM is correct for the time chosen. When the correct time is shown, press the Mode button to modify the day of the week. The current day will blink on and off. Press the UP ARROW and DOWN ARROW buttons until the correct day is shown. Press the and hold the Mode and Override buttons at the same time again to exit the Set Clock mode.

Configure Advanced Setup — To enter the advanced setup screens of the thermostat, press the Mode and Override buttons simultaneously. The display will change. Continue to hold down the buttons for 5 more seconds. If only Advanced Setup Steps 1 and 2 are accessible, then the buttons were not held down long enough. The Advanced Setup Step number is shown in the top right corner of the thermostat screen. Use the Mode button to advance through the steps. There are 19 Advanced Setup Steps. See Table 2. Press the Mode and Override buttons at the same time to exit the Advanced Setup mode.

NOTE: Refer to the Set Clock section for Advanced Setup Steps 1 and 2.

FAN CONFIGURATION (Step 3) — The fan configuration can be set to On or Auto. When the configuration is set to On, the fan will run continuously during the occupied schedule and all other modes except OFF. The fan will be off during the unoccupied schedule except during heating or cooling operation.

If Auto is selected, the fan will run only during heating or cooling operation. The default is Auto.

HEAT PUMP CONFIGURATION (Steps 4 and 5) — The thermostat is provided from the factory in heat pump mode. To set the thermostat for heat pump operation, Advanced Setup Step 4 must be configured to ON. Use the UP and DOWN ARROW buttons to configure the step. The default is ON. Press the mode button to continue to Step 5. Step 5 is used to set the reversing valve polarity for the heat pump. The variable can be set to either "B" or "O." Set the reversing valve polarity to the correct value depending on the application. The default is "O."

NOTE: Step 5 will appear only if Step 4 is set to ON.

Table 2 — Advanced Setup Configuration

STEP	DESCRIPTION	RANGE	DEFAULT
1	Time of Day	12:00 AM - 11:59 PM	12:00 AM
2	Day of the Week	Sunday through Saturday	Monday
3	Fan Operation	Auto/On	Auto
4	Heat Pump	Off/On	On
5	Reversing Valve Polarity	O/B	O
6	Deadband	1 - 6 F	2 F
7	Forced Minimum Temperature Difference	0 - 6 F	2 F
8	Cycles per Hour	d, d1, 2 - 6	6
9	Fan Purge Timer	0:00 - 3:00	0:00
10	Thermoglow™ Backlight	Off/On	On
11	Reset Service Filter Icon	—	—
12	Service Filter Run Time	0-1950 hrs	500 hrs
13	Soft Start	0 - 99	0
14	Temperature Units	F/C	F
15	Outside/Duct Sensor	Yes/No	No
16	Security Level	0 - 3	0
17	Maximum Allowable Heat Set Point	35 - 99 F	80 F
18	Minimum Allowable Cooling Set Point	35 - 99 F	65 F

DEADBAND (Step 6) — The deadband is the difference in temperature above the cooling set point or below the heating set point that the thermostat will wait before turning on the first stage of heating or cooling. For example, if the cooling set point is 82 F (28 C) and the deadband is 2 degrees, the first stage of cooling will not be energized until the temperature reaches 84 F (30 C). The range of values is 1 to 6 degrees. The default is 2 degrees.

SET POINT MINIMUM DIFFERENCE (Step 7) — The minimum difference between heating and cooling set points can be user-configured. The range is from 0 to 6 degrees. The default is 2 degrees. The minimum difference is enforced during Auto-changeover and Program On operation.

CYCLES PER HOUR LIMIT (Step 8) — The number of times that heating or cooling can be energized per hour can be configured. Set the variable to "d" for no limit. Set the variable to "d1" to disable the 5-minute compressor lockout. The variable can also be set from 2 to 6 cycles per hour. The default is 6 cycles per hour.

⚠ CAUTION

Damage to compressor could result if 5-minute compressor lockout is disabled or compressor is allowed unlimited cycles. Do not set thermostat Advanced Setup Step 8 to "d" or "dl" unless specifically recommended for the application.

PRE-OCCUPANCY PURGE TIMER (Step 9) — The preoccupancy purge allows fresh outside air to be brought into the space before the Occupied 1 time period. The timer limits the amount of time that the purge can operate. The timer can be set from 0 to 3 hours with 15-minute intervals. The default is 0 hours (disabled).

BACKLIGHT DISPLAY (Step 10) — The display backlight can be set to ON (always on) or OFF (turn off 8 seconds after usage). The default is ON.

SERVICE FILTER (Steps 11 and 12) — Step 11 allows the user to reset the Service Filter counter to zero and remove the "SERVICE FILTER" icon (if displayed on the thermostat screen). Press the Override button while in Setup Step 11 and the counter is reset to zero. Press the Mode button to adjust the number of hours the blower will run before the "SERVICE FILTER" icon is displayed. The range is 0 to 1950 hours. Set the variable to 0 to disable this function. The default is 500 hours.

SOFT START (Step 13) — The soft start is used when multiple units are used in an application. The soft start staggers the start-up times of the units in the event of power loss and restart. Each unit should be assigned a unit ID number. The 30-second delay time is multiplied the unit ID number to get the total soft start delay time for each unit. For example, if the unit ID number is 10, set the Soft Start function to 10, the start-up delay time is 30 seconds x 10 = 300 seconds (5 minutes). The range is 0 to 99 (ID numbers). A value of 0 disables the function. The default is 0 (ID number).

FAHRENHEIT/CELSIUS OPERATION (Step 14) — The thermostat can be set to operate in Fahrenheit or Celsius degrees. Set the variable to "F" for Fahrenheit operation. Set the variable to "C" for Celsius operation.

SENSOR TYPE CONFIGURATION (Step 15) — The sensor type configuration can be set to YES or NO. If it is set to NO, any sensor wired to the RS and RS+5 terminals will be automatically detected and used as a remote temperature sensor (thermostat controls to sensor temperature reading). If the sensor type configuration is set to YES, any sensor wired to the RS and RS+5 terminals will be used as an outside or duct sensor (thermostat will not control to sensor temperature reading). The default is NO.

SECURITY LEVEL (Steps 16 to 18) — The Security Level limits the actions that the user can perform at the thermostat. There are 4 security levels. When the security level is set to "0," no security will be in effect. When the security level is set to "1," the set point range is limited by the settings of Steps 17 and 18. When the security level is set to "2," the set point range is limited by the settings of Steps 17 and 18 and the Program thermostat operation mode is always in effect. When the security level is set to "3," the set point range is limited by the settings of Steps 17 and 18, the Program On mode is always in effect, and set point changes are prohibited. The default is 0.

NOTE: The Fan button is ignored when Security levels 2 or 3 are in effect.

Security Maximum Heat Set Point (Step 17) — If the Security Level is not set to 0, the maximum heating set point will be in effect. The user will not be allowed to set the heating set point over the specified value. The range of values is 35 to 99 F (1 to 37 C). The default is 80 F (27 C).

Security Minimum Cool Set Point (Step 18) — If the Security Level is not set to 0, the minimum cooling set point will be in effect. The user will not be allowed to set the cooling set point below the specified value. The range of values is 35 to 99 F (1 to 37 C). The default is 65 F (18 C).

Install Accessories — The following accessories can be used with this thermostat:

- remote temperature sensor with override (33CSSEN-WB)
- wireless remote sensor (33CSRFS-RE, receiver; 33CSRFS-RC, transmitter)
- duct-mounted sensor (33CSSEN-DS)

Refer to the accessory installation instructions for each accessory for more information.

REMOTE TEMPERATURE SENSOR — A remote temperature sensor may be provided to read the temperature from a space. If a remote temperature sensor is connected, the thermostat will ignore the reading of its internal sensor. When the thermostat is using a reading from a remote sensor, the degree symbol above the temperature reading will blink.

NOTE: An outdoor temperature sensor or a duct temperature sensor can be used with the remote temperature sensor wiring connections instead of a remote temperature sensor. However, no matter which sensor is used, the thermostat will ignore the reading of its internal sensor and control to the accessory sensor reading, unless the Sensor Type configuration is set to yes.

Program Thermostat Schedules — Before programming the thermostat, plan the thermostat daily schedule. The schedule is divided into 7 days (Monday through Sunday). Each day has from 2 to 4 time periods (Occupied 1, Occupied 2, Occupied 3, Unoccupied) depending on the configuration of the thermostat. Each occupied time period has a start time, stop time, heating set point, and cooling set point. The unoccupied time period has a heating set point and a cooling set point. The unoccupied time period is active when ever an occupied time period is not active. Fill in Table 3 as an aid to programming the daily schedules.

PROGRAMMING MODE — To program the daily schedules, perform the following procedure:

1. Enter Programming mode by pressing and holding the Mode and UP ARROW buttons. The Occupied 1 annunciator will appear on the thermostat display. Use the UP ARROW and DOWN ARROW buttons to set the maximum number of Occupied periods for each day. The thermostat can be set to 1, 2, or 3. After the number of Occupied periods has been selected, press the Mode button. See Fig. 9.

2. The cooling set point for Occupied 1 will be displayed. Use the UP ARROW and DOWN ARROW buttons to raise or lower the cooling set point until the desired temperature is shown. The range of acceptable values is 35 to 99 F (1 to 37 C). Press the Mode button to continue. See Fig. 9.

3. The heating set point for Occupied 1 will be displayed. Use the UP ARROW and DOWN ARROW buttons to raise or lower the heating set point until the desired temperature is shown. The range of acceptable values is 35 to 99 F (1 to 37 C). Press the Mode button to continue. See Fig. 9.
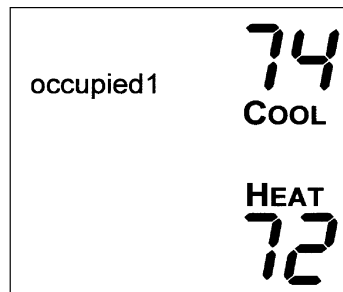

Fig. 9 — Setting Occupied 1 Set Points

4. The cooling set point for Unoccupied will be displayed. Use the UP ARROW and DOWN ARROW buttons to raise or lower the cooling set point until the desired temperature is shown. The range of acceptable values is 35 to 99 F (1 to 37 C) or "OF" (no unoccupied cooling). To configure the Unoccupied Cooling set point to OF, press the UP ARROW button until 99 F is displayed. Press the UP ARROW button again to display OF. Press the Mode button to continue.

5. The heating set point for Unoccupied will be displayed. Use the UP ARROW and DOWN ARROW buttons to raise or lower the heating set point until the desired temperature is shown. The range of acceptable values is 35 to 99 F (1 to 37 C) or "OF" (no unoccupied heating). To configure the Unoccupied Heating set point to OF, press the DOWN ARROW button until 35 F is displayed. Press the DOWN ARROW button again to display OF. Press the Mode button to continue.

6. The day of the week will be shown. Use the UP ARROW and DOWN ARROW buttons to change the day of the week until the desired starting day is shown. Possible choices are M (Monday) through S (Sunday). Press the Mode button when the desired day is shown.

7. The Start Time for Occupied 1 will be displayed. Use the UP ARROW and DOWN ARROW buttons to raise or lower the time until the desired Start Time is shown. Press the Mode button to continue. See Fig. 10.

8. The Stop Time for Occupied 1 will be displayed. Use the UP ARROW and DOWN ARROW buttons to raise or lower the time until the desired Stop Time is shown. Press the Mode button to continue.

9. The On/Off icon will be displayed. Use the UP ARROW to turn the Occupied 1 period ON for this day. Use the DOWN ARROW to turn the Occupied 1 period OFF for this day.

10. Repeat Steps 2 through 9 to program the remaining schedule for Occupied periods 2 and 3.

11. The Copy command can be used to copy the previous day's schedule if the schedules are the same. The copy command becomes available after all the occupied periods are programmed in a day. Use the UP ARROW to change the copy command to YES. Use the DOWNAR-ROW to change the copy command to NO. Press the Mode button when the choice has been made. See Fig. 11.

If NO was selected, the schedule will automatically change to the next day and the user must enter the occupied and unoccupied schedules for that day.

NOTE: Occupied 1 schedule heating and cooling set points are the same for each day. Occupied 2 and 3 set points may be set to different values for each day of the week.

If YES was selected, the schedule will be copied to the next day. The schedule copy may be repeated until Sunday is reached. The Sunday schedule cannot be copied to Monday.

12. After all the times and set points for each day have been entered, press and hold the Mode and UP ARROW buttons to exit Programming mode.

NOTE: The thermostat will continue to follow the schedule until a new one is entered.

If only one occupied schedule is selected, the Occupied 2 and 3 schedules are skipped. If the start time is set later in the day than the stop time, the program will run from midnight of that day to the stop time and then from the start time to midnight. If the same start and stop times are programmed for an occupancy schedule, the thermostat will be in Occupied mode for 24 hours. If one occupied period starts or stops within another occupied period, the lower numbered schedule has priority. For example, if schedule Occupied 3 is running for 24 hours and Occupied 2 schedule comes on from 1 to 3 PM, the set points from Occupied 2 are in effect from 1 to 3 PM.

OVERRIDING THE SCHEDULE — The schedule can be overridden by pressing the UP or DOWN ARROW buttons to change the desired temperature. The thermostat will use the new set point until the next scheduled time period starts.
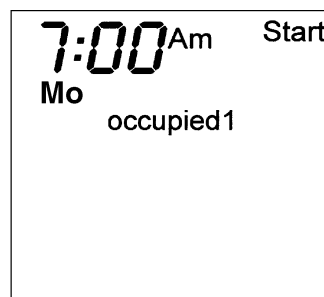

Fig. 10 — Start Time Display

Fig. 11 — Copy Command Display

Table 3 — Daily Schedule Planner

DAY OF THE WEEK	SCHEDULE										
	Occupied 1			Occupied 2			Occupied 3			Unoccupied
	Start / Stop / Heat / Cool			Start / Stop / Heat / Cool			Start / Stop / Heat / Cool			Heat / Cool
Monday	/	/	/	/	/	/	/	/	/	/
Tuesday	/	/	/	/	/	/	/	/	/	/
Wednesday	/	/	/	/	/	/	/	/	/	/
Thursday	/	/	/	/	/	/	/	/	/	/
Friday	/	/	/	/	/	/	/	/	/	/
Saturday	/	/	/	/	/	/	/	/	/	/
Sunday	/	/	/	/	/	/	/	/	/	/

NOTE: The cooling temperature set point must be higher than the heating temperature set point. (The temperature difference may be changed in the advanced setup configuration.)

Factory Defaults — If the thermostat needs to be reset to factory default settings, perform the following procedure:

1. Hold down the Mode button and press the DOWN ARROW button simultaneously for 5 seconds. All of the icons on the display screen will appear.
2. Press and hold the Override button until Fd (factory defaults) appears on the screen.
3. Press the Mode button twice to return to normal display.

NOTE: The occupied and unoccupied schedules will be reset. The schedule will need to be re-entered.

Calibrate Sensor — Every thermostat is factory calibrated. Under normal circumstances there will never be a need to re-calibrate the thermostat. If re-calibration must be done, perform the following procedure:

1. Hold down the Mode and DOWN ARROW buttons for 5 seconds. All of the icons on the display screen will appear. Release the buttons.
2. Press the Mode button. The current temperature will be displayed.
3. Use an accurate thermometer to measure room temperature. Press the UP or DOWN ARROW buttons until the flashing number equals room temperature.
4. Press the Mode button again to return to normal operation.

Check Thermostat Operation — To check thermostat operation, perform the following procedure:

1. Press the Mode button repeatedly until the Heat icon appears on the display. The thermostat is now in Heating mode.
2. Press the UP ARROW button until the heating set point is 10 F (6 C) higher than the current room temperature. Heating and fan should be energized.
3. Press the Mode button repeatedly until the Cool icon appears on the display. The thermostat is now in Cooling mode.
4. Press the DOWN ARROW button until the cooling set point is 10 F lower than the current room temperature. Cooling and fan should be energized.
5. If heating, cooling, or fan operation do not energize, check wiring and consult Table 4.

Final Checklist

1. Put away tools and instruments. Clean up debris and packaging.
2. Review Owner's Guide with occupant or owner.
3. Leave the manuals with owner.

OPERATION

The Mode button selects the operating mode of the thermostat. If OFF is selected, the thermostat will not enter Heating or Cooling mode. If HEAT is selected, the thermostat will only enter Heating mode (if the room temperature is below the heating set point). If COOL is selected, the thermostat will only enter Cooling mode (if the room temperature is above the cooling set point). If AUTO is selected, the thermostat will enter Heating or Cooling mode based on the room temperature and the heating and cooling set points. If PROGRAM ON is selected, the stored schedule is enabled and the thermostat will follow the Occupied and Unoccupied schedules stored in its memory.

Auto-Changeover — When the thermostat mode is set to AUTO, the thermostat will provide automatic changeover from Heating to Cooling mode and Cooling to Heating mode when required. The thermostat will automatically switch to maintain the desired temperature setting. The thermostat does not need to be manually changed from heating to cooling or cooling to heating operation.

Two-Stage Operation — The second stage of heat or cool is turned on when the first stage has been on for a minimum of 2 minutes and the temperature differential from the set point is equal to or greater than the set point plus the deadband plus 2 degrees.

Clock Backup — In the event of a power loss, the thermostat will keep time for a minimum of 48 hours without external power or batteries.

Fan Operation — If Fan On is selected, the fan will run continuously during occupied schedule and Heat, Cool, and Auto modes. The fan will be off during unoccupied schedule except during heating or cooling operation.

If Fan On is not selected, the fan will only operate during heating or cooling operation.

NOTE: The Fan button is ignored when Security levels 2 or 3 are in effect.

Emergency Heat — Emergency heat is available for heat pump applications. To turn on emergency heat, press and hold the Override button. While holding the Override button, press the UP button. An "EH" will be displayed. During emergency heat, the fan will operate and the second stage of heat will be energized (locking out the first stage compressor). To exit emergency heat, press and hold the Override button. While holding the Override button, press the UP button. During emergency heat, only OFF and HEAT modes are available.

Holiday Mode — When the thermostat is in Holiday mode, the thermostat will operate under Unoccupied set points. To configure and activate the Holiday mode, press the Mode and UP ARROW buttons simultaneously to enter into Programming mode. Press the Override button to enter into Holiday Programming mode. The "HOL" icon will be displayed along with the remaining days of Holiday mode operation. Press the UP or DOWN ARROWS to select the number of days that the holiday schedule will be in effect. A value of 0 disables Holiday mode. The duration can be set from 1 to 99 days. The thermostat will enter Holiday mode on midnight of the next day after the mode has been activated. Holiday mode will remain in effect until midnight of the last configured day.

If the Holiday mode is in effect, the number of days remaining will blink on and off and the "Unoccupied" icon will be displayed. The Override button will be active during Holiday mode. The Dry Contact Switch is ignored.

To turn off the Holiday mode before the remaining configured days have passed, press the Mode and UP ARROW buttons simultaneously to enter into Programming mode. Press the Override button to enter into Holiday Programming mode. Press the DOWN ARROW to set the number of days to zero. Holiday mode will be disabled.

Remote Temperature Sensor — A remote temperature sensor is available to read the temperature from a space. If a remote temperature sensor is connected, the thermostat will ignore the reading of its internal sensor. When the thermostat is using a reading from a remote sensor, the degree symbol above the temperature reading will blink.

NOTE: An outdoor-rated temperature sensor or a duct temperature sensor can be used with the remote temperature sensor wiring connections instead of a remote temperature sensor. However, no matter which sensor is used, the thermostat will ignore the reading of its internal sensor and control to the accessory sensor reading unless the Sensor Type configuration is set to yes.

Keypad Lock — To prevent unauthorized use of the thermostat, the front panel buttons can be disabled. To disable or lock the keypad, press and hold the Mode button. While holding down the Mode button, press the UP and DOWN ARROW

buttons simultaneously. The "Locked" icon will appear on the display.

The thermostat is unlocked by performing the same procedure. Press and hold the Mode button. While holding down the Mode button, press the UP and DOWN ARROW buttons simultaneously. The "Locked" icon will be removed from the display.

Dry Contact Switch/External Control — A dry contact switch is provided to allow an external device to force the thermostat into Unoccupied mode. When the thermostat is forced into Unoccupied mode via the dry contact closure, the Unoccupied icon will blink each second. The external device is wired to contacts CK1 and GND. See Fig. 12.

NOTE: Twenty-four v power is not required for CK1 and GND.

When using the auxiliary input or controlling multiple HVAC units with a single thermostat, it is possible to encounter transformer phasing problems that will interfere with thermostat operation.

Connecting transformers that are not phased correctly may result in a direct short, which could damage transformers and/or the thermostat. Phasing problems are likely if the units share a common ground with secondary grounded transformers.

⚠ CAUTION

Determining proper phasing can be difficult without the help of an electrician (especially across different building transformers). Damage to equipment can result if phasing is improperly done. The use of isolation relays is recommended before attempting phasing.

⚠ CAUTION

Do not attempt to rewire equipment internally to phase units. Damage to unit components may occur.

To avoid this problem, if possible, phase all HVAC units together. If phasing is impractical, isolation relays may be used to isolate the transformers. To isolate the auxiliary input, use a separate transformer for the auxiliary control device (usually a timeclock). Connect the device to an isolation relay coil. Connect one set of isolated contacts to each thermostat at CK1 and GND.

To prevent phasing problems when controlling multiple HVAC units with one thermostat, phase the HVAC units or use isolation relays to isolate the unit transformers. One unit will be connected directly to the thermostat and the unit will power the thermostat. All other units will require one set of isolated contacts for each of the following: Heat, Cool, Fan, and Reversing Valve (if required).

Units that are phased will have the high voltage legs to the 24 VAC power transformer in common. This requires identifying which terminals from the high voltage input lugs are providing power to the transformer. Do not assume that the same terminals will always provide power to the transformer. For each unit, check the unit wiring diagram. See Fig. 13.

SOFT START — When multiple thermostats are controlled by the same external device, a Soft Start option can be used to stagger the turn on times of the HVAC equipment. This feature may cause a delay in operation after entering Unoccupied mode.

10-Watt Resistor — A 10-watt, 270-ohm resistor is provided with the thermostat. This resistor should only be used in applications where it is necessary to use 4 wires in a power-stealing mode when the common wire (C) is not available. It is recommended that a common wire be used whenever possible. Refer to the Troubleshooting section for more information on resistor use and wiring.

Outside Temperature Sensor (Optional) — An optional outside temperature sensor may be provided to sense outdoor-air temperature. Press and hold the Mode button for 5 seconds to display outdoor-air temperature. The "outside" temperature annunciator will be displayed. Press the Mode button again to exit the Outside Temperature display.
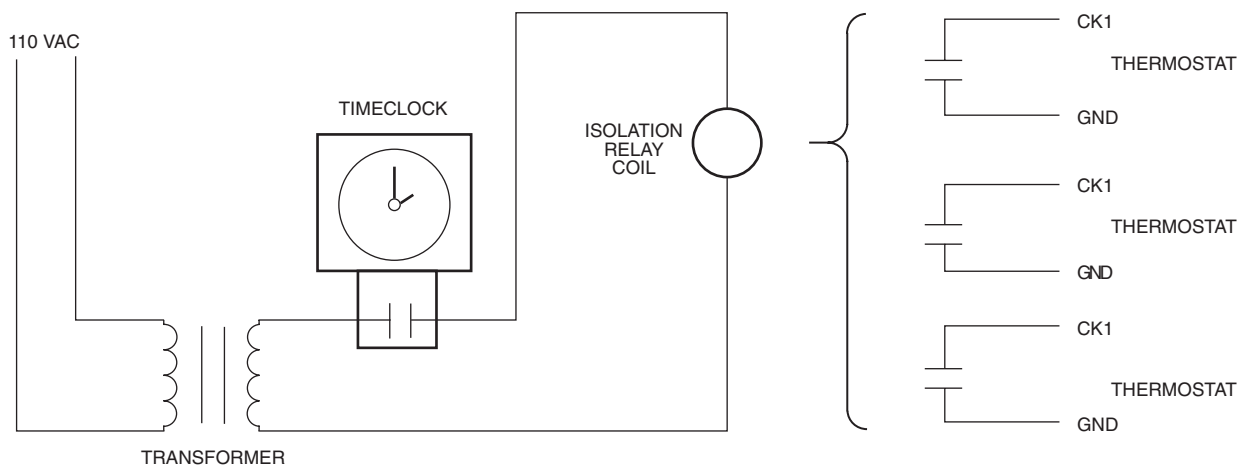
NOTE: Additional relays may be used. Relay coils must be connected in parallel.

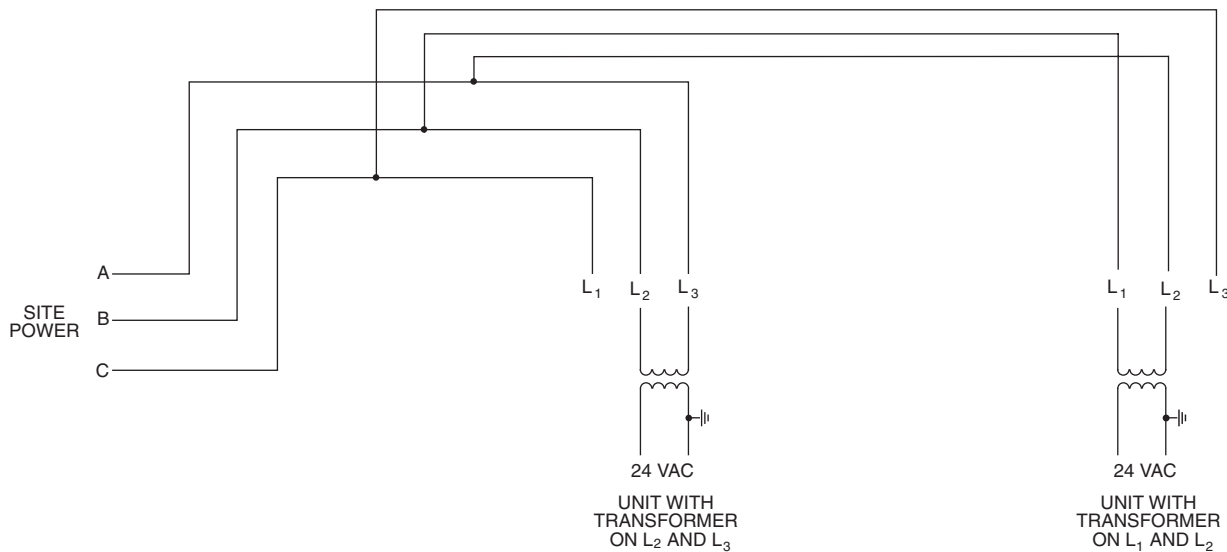**Fig. 12 — Typical Dry Contact Switch Wiring**

Fig. 13 — Example of Unit Phasing

TROUBLESHOOTING

Table 4 — Thermostat Troubleshooting

PROBLEM	SOLUTION
Display on thermostat not illuminated	Check for 24 vac at the R terminal connection. Terminal R must be connected for proper thermostat operation.
"Service Filter" is displayed on thermostat	After the configured number of blower operating hours, the Service Filter message will be displayed. This reminds the owner to replace the filter. Reset the Service Filter feature to reset the blower operation timer to 0 hours.
Cooling will not energize	Select Cooling mode. Decrease cooling set point to 10 degrees below room temperature. Check for 24 vac at Y1 terminal. If present, thermostat is operating correctly and problem is with wiring or equipment. If 24 vac is not present, replace the thermostat. Check for Compressor Cycle per Hour Limit. Cooling may be locked out.
Heating will not energize	Select Heating mode. Increase heating set point to 10 degrees above room temperature. Check for 24 vac at W1-O-B terminal. If present, thermostat is operating correctly and problem is with wiring or equipment. If 24 vac is not present, replace the thermostat.
When controlling a heat pump, heat comes on during cooling cycle.	Configure thermostat for heat pump operation (Table 2, Step 4).
The thermostat temperature display rises to 99 F.	There is not enough voltage to the thermostat. Check wiring and power supply.
The resistor labeled "L3" on the thermostat is burned out and brown. Thermostat will not work.	The thermostat has been wired incorrectly and the circuit board is burned out. Thermostat must be replaced.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

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