

TH8110U Touch Screen Programmable Thermostats

INSTALLATION INSTRUCTIONS

APPLICATION

The TH8110U Universal Programmable Thermostats provide electronic control of 24 Vac heating and cooling systems or 750 mV heating system. See Table 1 for a general description.

Table 1. TH811 Thermostats Description.

Model	Power Method	Changeover	System Selection	Fan Selection	Comments
TH8110U	Batteries or common wire	Automatic or manual selectable	Heat-Off-Cool-Auto	On-Auto-Circ	System and Fan selection vary based on system type



RECYCLE NOTICE

If this control is replacing a control that contains mercury in a sealed tube, do not place your old control in the trash. Dispose of properly.

Contact your local waste management authority for instructions regarding recycling and the proper disposal of the old control.

INSTALLATION

When Installing this Product...

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

Selecting Location

Install the thermostat about 5 ft. (1.5m) above the floor in an area with good air circulation at average temperature. See Fig. 1.

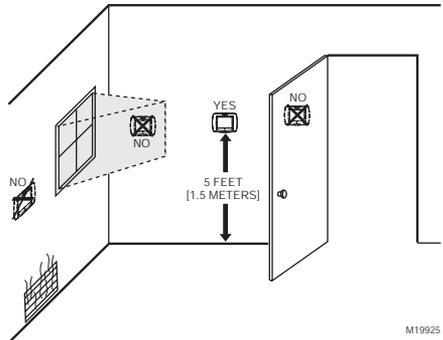


Fig. 1. Selecting thermostat location.

- Do not install the thermostat where it can be affected by:
- Drafts or dead spots behind doors and in corners.
 - Hot or cold air from ducts.
 - Radiant heat from sun or appliances.
 - Concealed pipes and chimneys.
 - Unheated (uncooled) areas such as an outside wall behind the thermostat.



Installing Wallplate

CAUTION

Electrical Hazard.
Can cause electrical shock or equipment damage.
 Disconnect power before wiring.

The thermostat can be mounted horizontally on the wall or on a 4 in. x 2 in. (101.6 mm x 50.8 mm) wiring box.

1. Position and level the wallplate (for appearance only).
2. Use a pencil to mark the mounting holes.

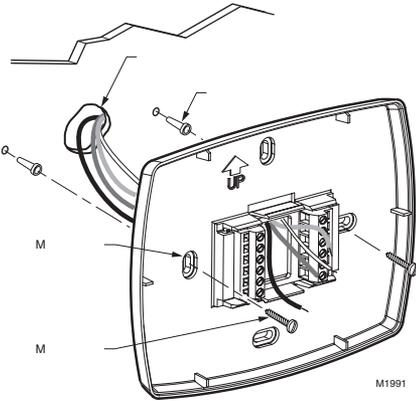


Fig. 2. Mounting wallplate.

3. Remove the wallplate from the wall and, if drywall, drill two 3/16-in. holes in the wall, as marked. For firmer material such as plaster, drill two 7/32-in. holes. Gently tap anchors (provided) into the drilled holes until flush with the wall.
4. Position the wallplate over the holes, pulling wires through the wiring opening. See Fig. 2.
5. Insert the mounting screws into the holes and tighten.

WIRING (FIG. 5-11)

All wiring must comply with local electrical codes and ordinances.

1. Select set of terminal identifications (Table 2) that corresponds with system type (conventional or heat pump) in Fig. 3.
2. Loosen the screws for the appropriate system type selected; see Table 2. Insert wires in the terminal block under the loosened screw. See Fig. 4.

3. Securely tighten each screw.
4. Push excess wire back into the hole.
5. Plug the hole with nonflammable insulation to prevent drafts from affecting the thermostat.

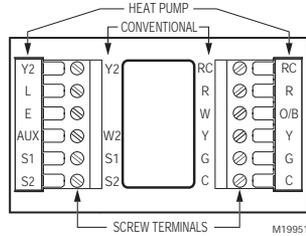


Fig. 3. Selecting terminal identifications for system type.

Table 2. Selecting Terminal Identifications for System Type.

System Type	Wallplate Terminal Identifications	Wiring Diagram Reference
Standard Heat/Cool	Conventional	5, 6
Heat Only	Conventional	7
Heat Only with Fan	Conventional	8
Heat Only Series 20	Conventional	9
Cool Only	Conventional	10
Heat Pump with No Auxiliary Heat	Heat Pump	11

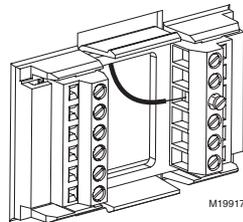
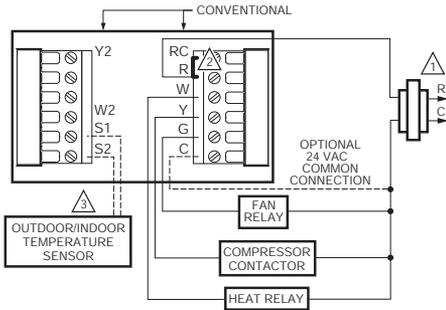


Fig. 4. Inserting wires in terminal block.

IMPORTANT

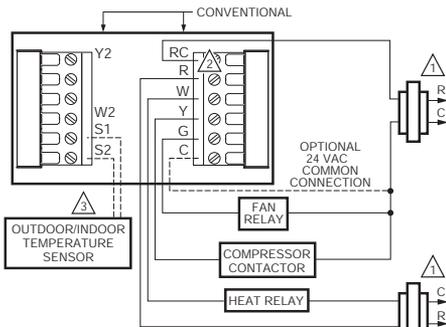
Use 18 gauge thermostat wire.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 FACTORY INSTALLED JUMPER.
- 3 OPTIONAL OUTDOOR OR INDOOR REMOTE SENSOR. AVAILABLE ON SELECT MODELS. WIRES MUST HAVE A CABLE SEPARATE FROM THE THERMOSTAT CABLE.

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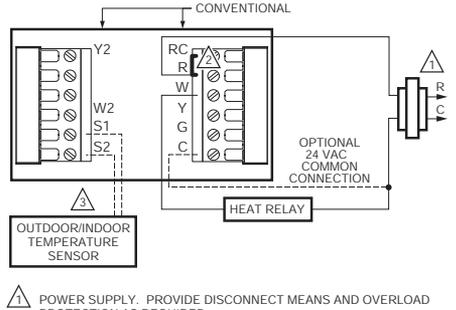
Fig. 5. Typical hookup of conventional single-stage heat and cool system with single transformer (1H/1C conventional).



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 REMOVE FACTORY INSTALLED JUMPER.
- 3 OPTIONAL OUTDOOR OR INDOOR REMOTE SENSOR. AVAILABLE ON SELECT MODELS. WIRES MUST HAVE A CABLE SEPARATE FROM THE THERMOSTAT CABLE.

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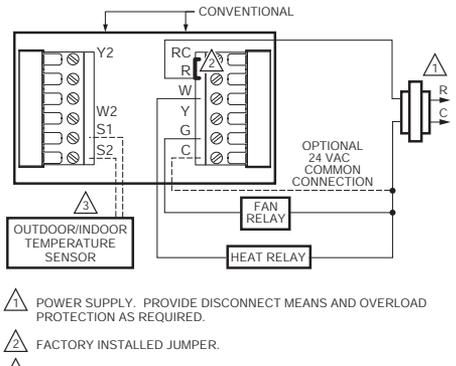
Fig. 6. Typical hookup of conventional single-stage heat and cool system with two transformers (1H/1C conventional).



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 FACTORY INSTALLED JUMPER.
- 3 OPTIONAL OUTDOOR OR INDOOR REMOTE SENSOR. AVAILABLE ON SELECT MODELS. WIRES MUST HAVE A CABLE SEPARATE FROM THE THERMOSTAT CABLE.

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Fig. 7. Typical hookup of heat-only system (1H conventional).



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 FACTORY INSTALLED JUMPER.
- 3 OPTIONAL OUTDOOR OR INDOOR REMOTE SENSOR. AVAILABLE ON SELECT MODELS. WIRES MUST HAVE A CABLE SEPARATE FROM THE THERMOSTAT CABLE.

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Fig. 8. Typical hookup of heat only system with fan (1H conventional).

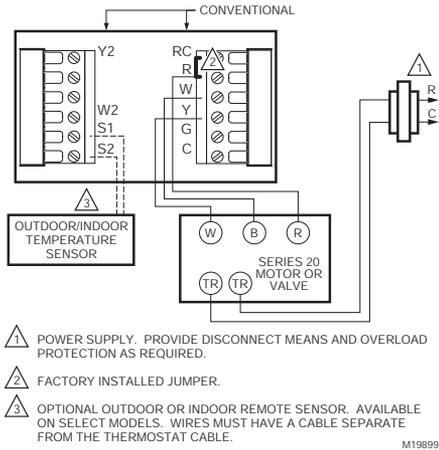


Fig. 9. Typical hookup of heat only Series 20 system.

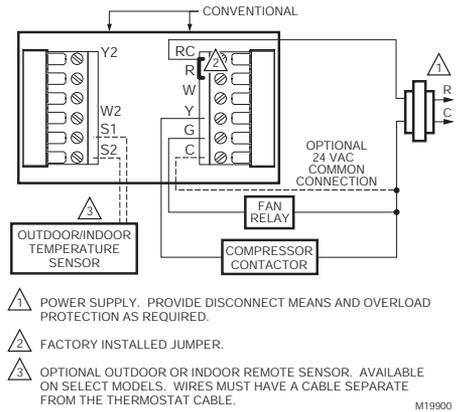


Fig. 10. Typical hookup of cool only system (1C conventional).

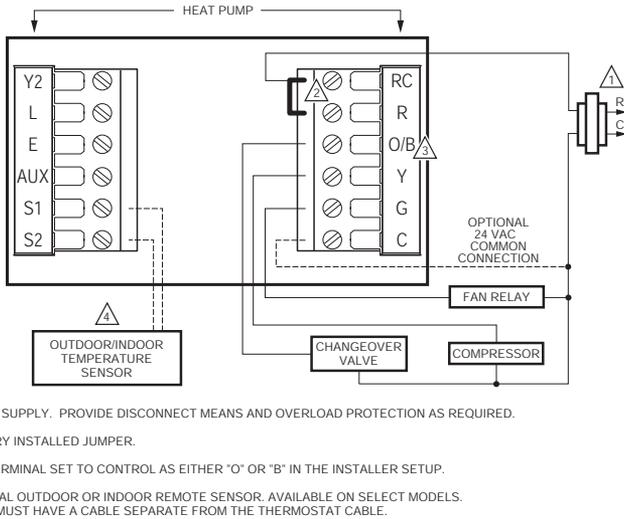


Fig. 11. Typical hookup of single-stage heat pump with no auxiliary/backup heat (1H/1C heat pump).

Powering the Thermostat

There are two different ways to power the thermostat:

- Batteries (three AAA alkaline).
- 24 Vac Common wire.

Wiring 24 Vac Common

Wire the common side of the transformer to the C screw of the thermostat wallplate. When installing in a single transformer system, keep jumper wire between the R and Rc screws. When installed in a two-transformer

system, use the common from the cooling transformer to connect to C screw and remove the jumper wire between the R and Rc screws.

Inserting Batteries (Optional)

If not using a 24 Vac Common to power the thermostat, install three AAA alkaline batteries (included) in the back of the thermostat. Make sure the positive and negative terminals are oriented correctly, as marked on the device. See Fig.12.

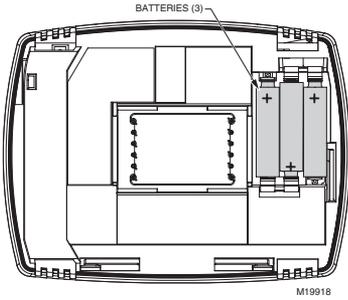


Fig. 12. Installing batteries on thermostat back.

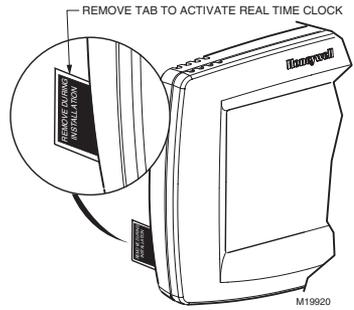


Fig. 14. Removing tab to activate real-time clock.

Mounting the Thermostat

1. Align the terminal screw blocks with the pins on the back of the thermostat.
2. Push the thermostat straight onto the wallplate. See Fig. 13.

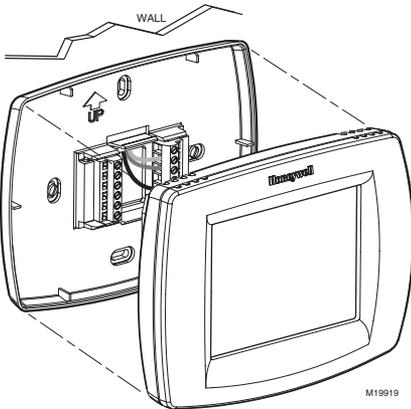


Fig. 13. Mounting thermostat on wallplate.

This thermostat is designed to automatically keep current time and day in memory for up to ten years under normal use after calendar is set. When thermostat is first powered, display is ready to enter calendar date (Fig. 15).

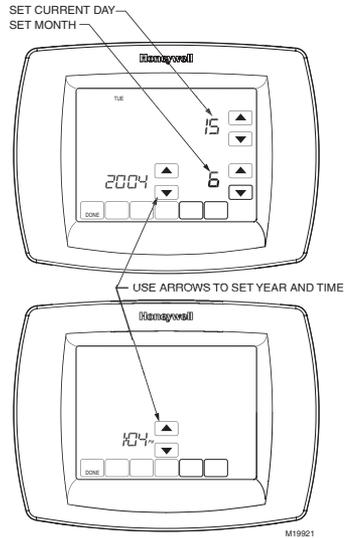


Fig. 15. Setting calendar and time after initial powerup.

IMPORTANT

The tab on back of thermostat in lower-left corner must be removed to activate this feature.

Adjusting Real-Time Clock

Setting Calendar and Time

Locate and remove the tab labeled *Remove* in the lower left corner on the thermostat back. The tab must be removed to activate the real-time clock. See Fig. 14.

Using the Thermostat

The thermostat has a touch screen interface. Words or symbols appear, highlighting keys, as needed, to complete tasks. Press keys with your fingertips. Sharp tips on pens or pencils can damage thermostat.

1. Use arrow keys to set Year, Month and Day (see Fig. 15).
2. Press Done key.
3. Use arrow keys to set current time. See Fig. 15.
4. Press Done key.

OPERATION

System and Fan Settings

The System default setting is Heat and the Fan default setting is Auto.

SYSTEM Settings

Heat: Thermostat controls heating system.
 Off: Both heating and cooling are off.
 Cool: Thermostat controls cooling system.
 Auto: Thermostat automatically changes between heating and cooling systems, depending on indoor temperature. (See Installer Setup section.)

FAN Settings

The Fan setting can be programmed into the thermostat schedule for each period (Wake, Leave, Return, Sleep). See the Owners' Guide for additional information.

Preprogrammed Settings

Table 3 shows the default program settings. See Owners' Guide for complete instructions on changing the program.

Table 3. Default Program Settings.

Schedule Period	Time	Setpoints		Fan Setting
		Heat	Cool	
Wake	6:00AM	70°F (21°C)	78°F (25.5°C)	Auto
Leave	8:00AM	62°F (16.5°C)	85°F (29.5°C)	Auto
Return	6:00PM	70°F (21°C)	78°F (25.5°C)	Auto
Sleep	10:00PM	62°F (16.5°C)	82°F (28°C)	Auto

INSTALLER SETUP

This Universal Thermostat works with many different system types. To operate correctly, the thermostat must be set up to operate the installed heating and/or cooling system.

Installer Setup Menus

Main Menu: Offers the most commonly used options. *It is necessary to enter this menu to set the thermostat to the type of system it is operating. Many applications use only the Main Menu.*

Regional Menu: Offers choices often changed due to a particular area or region. For example, temperature display in Fahrenheit or Celsius is offered in this menu.

Advanced Settings Menu: Offers more settings to fully customize the thermostat. Many of these settings do not require changing from the factory settings.

Entering Installer Setup

1. Thermostat must be powered either with Alkaline AAA batteries or with 24 Vac Common wire.
2. From the home screen, press System key. (Press Done or Cancel key to return to home screen.)
3. Five blank touch keys show on the bottom of the screen between the Done and Cancel keys. Press and hold the two blank keys on either side of the center blank key for approximately five seconds until screen changes. See Fig. 16.

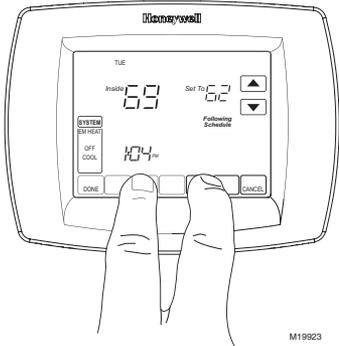


Fig. 16. Entering Installer Setup.

4. The Installer Setup Number is displayed in the lower left. It is a four-digit code beginning with zero. The factory setting or other choice selection is displayed in the lower right. See Fig. 17. This is a two-digit code shown in the Option column of Table 4.

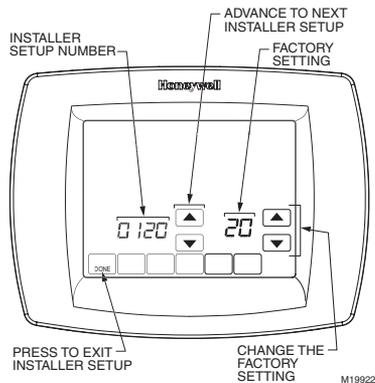


Fig. 17. Installer Setup Number and factory setting selection locations.

Changing Installer Setup Selections

1. Advance to the next Installer Setup Number by pressing the up and down arrow keys to the right of the four-digit Installer Setup Number. See Fig. 17.
2. Change the factory Setting Options by pressing the up and down arrow keys right of the two-digit code selection. See Fig. 17.

Exiting Installer Setup

1. Press Done key to exit Installer Setup screen.

IMPORTANT

The three Installer Setup Menus (Tables 4-6) show all available options. These options customize themselves as you make selections to Installer Setup. So not all Installer Setup Selections are shown or are available to change.

Table 4. Main Installer Setup Menu.

Select	Installer Setup Number	Factory Setting		Other Choices		Comments
		Option	Description	Options	Description	
Not used.	1 thru 0099	—	—	—	—	—
Date (Year Upper)	0120	20	Set first two digits of current calendar year (20 for year 2005, etc)	21	21 —first two digits of current calendar year (21xx)	2000 -2178 available
Date (Year Lower)	0130	04	Represents last two digits of current calendar year (2004).	00 -99	Select last two digits of current calendar year.	2001-2178 available
Date (Month)	0140	6	Digit(s) represents current calendar month.	1-12	Select number that represents current calendar month.	—
Date (Day)	0150	15	Digit(s) represents current calendar date.	1-31	Select number that represents current calendar date.	—
Schedule Options	0160	4	7-day programming	0	0 —nonprogrammable	—
System Type Selection	0170	1	1 Heat/1 Cool Conventional System	1-6	1—1 heat/1 cool 2—single-stage heat pump (no aux. heat) 3—heat only (no fan) 4—heat only (with fan) 5—hot water Series 20 (3-wire or normally open zone valves) 6—cool only	Available options and defaults vary by thermostat. System selection automatically modifies some default settings and/or hides other Installer Setup options.
Fan Operation	0180	0	Conventional applications where equipment controls fan operation in heat mode.	1	Heat pump or electric heat applications where thermostat controls fan operation in heat mode.	Only shown if conventional system is selected. If heat pump is chosen, fan defaults to electric.
Reversing Valve (O/B) Operation	0190	0	O/B terminal is energized for reversing valve in cooling	1	O/B terminal is energized for reversing valve in heating	Only shown if heat pump system is chosen.

Table 4. Main Installer Setup Menu. (Continued)

Select	Installer Setup Number	Factory Setting		Other Choices		Comments
		Option	Description	Options	Description	
Cycles per hour (cph) for 1st Stage Compressor	0220	3	Compressor Stage 1 cycles per hour (cph)	1-6	1-6 available; 3 is recommended.	—
Cycles per hour (cph) for 1st Stage Conventional Heat	0240	5	Conventional Heat Stage 1 cycles per hour (cph)	1-12	1-12 available; typical settings: 1 —1 cph used for steam or gravity system. 3 —3 cph used for hot water systems or high efficiency (90% or better) fossil fuel forced air systems. 5 —5 cph used for standard fossil fuel forced air systems. 9 —9 cph used for electric forced air heat systems.	Not shown if system selection is heat pump. Selection in this stage changes default cph for 2nd stage heat.
Continuous Backlight	0280	0	Backlight not on continuously. Thermostat backlight comes on with each key press.	1	Backlight is on continuously (thermostat must have a common wire attached for this function).	Option is always shown; however, continuously on backlight works only if thermostat is wired with 24 vac Common.
Additional Menu Choices	0290	0	Only main menu options are shown. Installer Test Options shown next (Table 7).	1,2	1 —Main Menu and Regional Settings are shown plus Installer Test (Tables 5 and 7 only). 2 —All remaining Menu/Options shown plus Installer Test (Tables 5, 6 and 7).	The majority of application require only the Main Menu Options.

Table 5. Regional Settings Menu.

Select	Installer Setup Number	Factory Setting		Other Choices		Comments
		Option	Description	Options	Description	
Changeover	0300	0	Manual changeover	1	1—auto changeover	—
Deadband	0310	3	Heating and cooling setpoints can be set no closer than 3 °F (1.5 °C)	2 thru 9	Heating and cooling setpoints can be set no closer than chosen value: 2—2 °F (1 °C) 3—3 °F (2 °C) 4—4 °F (2.5 °C) 5—5 °F (3 °C) 6—6 °F (3.5 °C) 7—7 °F (4 °C) 8—8 °F (4.5 °C) 9—9 °F (5 °C)	Shown only if automatic changeover is selected.
Temperature Indication Scale	0320	0	Temperature is displayed in °F.	1	Temperature is displayed in °C.	—
Daylight Savings	0330	1	Daylight savings enabled (United States).	0	0—daylight savings is disabled.	Set to 0 in areas that do not follow daylight savings.
Remote Temperature Sensor (Outdoor or Indoor)	0340	0	No remote temperature sensor	1,3	1—outdoor temperature sensor for display only. 3—indoor temperature sensor	Defaults and Options depend on System Type selected. Indoor Temperature Sensor uses an averaging network and does not include on-board sensor.

Table 6. Advanced Settings Menu.

Select	Installer Setup Number	Factory Setting		Other Choices		Comments
		Option	Description	Options	Description	
Furnace Filter Change Reminder	0500	0	Furnace filter change reminder off	1-6	1—10runtime days 2—30runtime days 3—60runtime days 4—90runtime days 5—120runtime days 6—365runtime days	Run time based on call for fan.
Humidifier Pad Replacement Reminder	0510	0	Humidifier pad replacement reminder off	1-3	1—90calendar days 2—180calendar days 3—365calendar days	—
UV Lamp Replacement Reminder	0520	0	UV Lamp replacement reminder off	1	1—365 calendar days	—
Adaptive Intelligent Recovery™	0530	1	Adaptive Intelligent Recovery™ control is activated (system starts early so setpoint is reached by start of program period).	0	0—conventional recovery (system starts recovery at programmed time)	—
Number of Periods	0540	4	Four periods available (Wake, Leave, Return, Sleep)	2	Two periods available (Wake and Sleep)	Not shown in non-programmable is selected. 2 or 4 applies to all days of the week.
Minimum Compressor Off Time	0580	5	Five minute minimum off time for compressor	0, 2, 3, 4	Minimum number of minutes compressor is off between calls for compressor	—
Heat Temperature Range Stop	0600	90	Highest heating setpoint.	40 to 89	Temperature range (1°F increments) of heating setpoint.	Shown in 1/2 °C.
Cool Temperature Range Stop	0610	50	Lowest cooling setpoint.	51 to 99	Temperature range (1°F increments) of cooling setpoint.	Shown in 1/2 °C.
Clock Format	0640	12	12-hour clock format	24	24-hour clock format	—
Extended Fan on time Heat	0650	0	No extended fan operation after call for heat ends	90	Fan operation is extended 90 seconds after call for heat ends.	Not shown if fan operation is set to fossil fuel or in Cool Only Systems
Extended Fan on time Cool	0660	0	No extended fan operation after call for cool ends	90	Fan operation is extended 90 seconds after call for cool ends.	Not shown in Heat Only Systems.

Table 6. Advanced Settings Menu. (Continued)

Select	Installer Setup Number	Factory Setting		Other Choices		Comments
		Option	Description	Options	Description	
Keypad Lockout	0670	0	Unlocked keypad	1, 2	1—partially locked keypad 2—fully locked keypad	Unlocked—all functions are available. Partially locked—only temperature up and down keys and ability to enter and modify Installer Setup mode are available. Fully locked—only ability to enter and modify Installer Setup mode are available.
Temperature Control in Heat	0680	2	Standard temperature control in heating	1, 3	1—less aggressive temperature control (could cause temperature undershoot) 3—more aggressive temperature control (could cause temperature overshoot)	Applies to recovery ramp and use of auxiliary heat during recovery. Choose 1 if getting temperature overshoot. Choose 3 if getting temperature undershoot.
Temperature Control in Cool	0690	2	Standard temperature control in cooling	1, 3	1—less aggressive temperature control (could cause temperature undershoot) 3—more aggressive temperature control (could cause temperature overshoot)	Applies to recovery ramp. Choose 1 if getting temperature overshoot. Choose 3 if getting temperature undershoot.
Temperature Display Offset	0700	0	No difference in displayed temperature and actual room temperature	-3, -2, -1, 0, 1, 2, 3	-3°F (-1.5°C) -2°F (-1°C) -1°F (-.5°C) 0°F (0°C) 1°F (.5°C) 2°F (1°C) 3°F (1.5°C)	—
Reset Thermostat	0710	0	No thermostat reset.	1	Resets all Installer Setup Options to default values and resets schedule to default setting.	Only calendar settings and time are retained.

SYSTEM CHECKOUT

Installer System Test

The Installer System Test mode is used to test the HVAC system(s). See Table 7. While in System Test mode, minimum off -time for compressors is bypassed.

The Installer Test is part of Installer Setup options. Enter Installer Setup screen and press Down arrow key to bring up test selection(s) quickly. See Fig. 16.

ADVANCED FEATURES

Outdoor or Indoor Temperature Sensor

Allow outdoor or indoor temperature sensor to absorb the air for a minimum of five minutes before taking a reading. See the Sensor instructions for more information.

! **CAUTION**

Equipment Damage Hazard.
Minimum compressor off-time is bypassed during Installer System Test.
 Avoid cycling compressor quickly.

Table 7. System Test(s).

Select	Installer Setup Number	Factory Setting		Other Choices		Comments
		Options	Description	Options	Description	
Installer Test Cool	Test 1	0	Cool is off	1	0—cool off 1—cool stage 1 turns on	System selection determines tests available and number of stages shown.
Installer Test Fan	Test 2	0	Fan is off	1	0—fan off 1—fan turns on	
Installer Test Heat	Test 3	0	Heat is off	1	0—heat off 1—stage 1heat on	

TROUBLESHOOTING (SEE TABLE 8)

Table 8. Troubleshooting.

Symptom	Possible Cause	Action
Display does not come on.	Thermostat is not being powered.	Check for 24 Vac between C and Rc. Verify AAA batteries installed correctly and good.
Temperature settings do not change.	The upper or lower temperature limits were reached.	Check temperature setpoints. Check Installer Setup Numbers 0600 and 0610; modify.
	The keypad is fully locked.	Check Installer Setup Number 0670 to change keypad lock options.
Heating or cooling does not come on.	Thermostat minimum off-time is activated.	Wait up to five minutes for the system to respond.
	System selection is not set to Heat or Cool.	Set system Selection to correct position.
	O/B terminal is not set correctly (Heat Pumps only).	Check Installer Setup Number 0190 and set correctly.
	System type Selection is incorrect.	Check Installer Setup Number 0170 and make sure correct System type is chosen.
Thermostat is calling for Heat (Heat on) or Cool (Cool on) but no heating or cooling is running.	Heating or cooling equipment is not operating.	Check wiring. Check Installer Setup Number 0170; verify correct system type is chosen. Verify equipment operation in System Test mode.
Thermostat does not respond when touchpad is pressed.	The keypad is locked.	Check Installer Setup Number 0670 to change keypad locked options.

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