TB8220 Commercial VisionPRO™ Programmable Thermostat
VISIONPRO™ 8000 TOUCHSCREEN

FEATURES

• Large, clear display with backlight shows the current and set temperature and time—even in the dark.
• Menu-driven programming make setup effortless.
• Beautiful ergonomic design is smart and sophisticated to match your customers’ lifestyle.
• Touchscreen interaction
• Real-time clock keeps time during power failures and automatically updates to daylight savings.
• “Saving Changes” notification lets you know when the schedule changes have been saved.
• Change reminders let you know when to replace the batteries.
• Holiday Override options allow you to override the program schedule, as desired.
• Speedy same-schedule programming—no need to copy multiple days.
• Armchair programming allows you to remove the thermostat from the wall for programming.

APPLICATION

The TB8220 Commercial VisionPRO™ 8000 Touchscreen Programmable Thermostat is an effortless, seven-day programmable thermostat that provides universal system compatibility, precise comfort control and is easy-to-program.

The TB8220 provides temperature control for gas, oil, electric and heat pumps for up to 2 heat, 2 cool systems.
SPECIFICATIONS

Thermostat Description: See Table 1.

Electrical Ratings: See Table 2.

Temperature:
Ratings:
Operating Ambient:
TB8220: 0°F to 120°F (-18°C to 49°C).
C7089U, C7189U: 5% to 95%.
Shipping: -30 °F to 150 °F (-34.4°C to 65.6°C).
Display Accuracy: ±1°F (±0.5°C).
Setpoint:
Heating: 40°F to 90°F (4°C to 32°C).
Cooling: 50°F to 99°F (10°C to 37°C).
Default Settings: See Table 3.

Humidity Ratings (RH, non-condensing):
TB8220 VisionPRO Thermostats: 5% to 90%.
C7089U, C7189U: 5% to 95%.

Table 1. Thermostat Description.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powering methods</td>
<td>• Battery only</td>
</tr>
<tr>
<td></td>
<td>• 24 Vac only</td>
</tr>
<tr>
<td></td>
<td>• 24 Vac with battery backup</td>
</tr>
<tr>
<td>System types (up to 2 heat/2 cool)</td>
<td>• Gas or electric heat with air conditioning</td>
</tr>
<tr>
<td></td>
<td>• Warm air, hot water, high-efficiency furnaces,</td>
</tr>
<tr>
<td></td>
<td>• Heat only</td>
</tr>
<tr>
<td></td>
<td>• Heat only with fan</td>
</tr>
<tr>
<td></td>
<td>• Cool only</td>
</tr>
<tr>
<td>Changeover</td>
<td>Manual or Auto changeover selectable</td>
</tr>
<tr>
<td>System setting</td>
<td>Heat-Off-Cool-Auto</td>
</tr>
<tr>
<td>Fan setting</td>
<td>Auto-On</td>
</tr>
</tbody>
</table>

Table 2. Electrical Ratings

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Voltage (50/60 Hz)</th>
<th>Running Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>W (Heating)</td>
<td>20 - 30 Vac</td>
<td>0.02 - 1.0A</td>
</tr>
<tr>
<td>Y (Cooling)</td>
<td>20 - 30 Vac</td>
<td>0.02 - 1.0A</td>
</tr>
<tr>
<td>G (Fan)</td>
<td>20 - 30 Vac</td>
<td>0.02 - 0.60A</td>
</tr>
<tr>
<td>A (Economizer/TOD)</td>
<td>20 - 30 Vac</td>
<td>0.02 - 1.0A</td>
</tr>
</tbody>
</table>

ORDERING INFORMATION

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

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 Automation and Control Products Sales Office (check white pages of your phone directory).
2. Honeywell Customer Care
   1985 Douglas Drive North
   Minneapolis, Minnesota 55422-4386
In Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Toronto, 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.
Calibration (TB8220, C7089U, C7189U, T7770A):
No field calibration required.

Mounting Means:
TB8220: Direct wall-mount using mounting screws and anchors provided. Fits standard vertical or horizontal 2 in. x 4 in. junction box.
C7089U: Mounts outside of living space with mounting clip and screws provided.
C7189U, T7770A: Mounts directly on the wall using mounting screws and anchors provided. Fits a vertical 2 x 4 in. junction box.

Cover Plate:
32003796-001 Cover Plate is used to cover marks left on the wall by the old thermostat.

Dimensions:
TB8220 Touchscreen Thermostat: See Fig. 1.
C7089U Outdoor Sensor Mounting Clip: See Fig. 3.
C7189U Remote Indoor Sensor: see Fig. 5.
T7770A: See Fig. 4.
32003796-001 Cover Plate: See Fig. 2.
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 ratings given in instructions and on the product to ensure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

CAUTION

Electrical Shock or Equipment Damage Hazard. Can shock individuals or short equipment circuitry. Disconnect power supply before installation.

Select Thermostat Location

Select a location for the thermostat about 5 ft (1.5m) above the floor in an area with good air circulation at average temperature. See Fig. 6.

Install Wallplate (See Fig. 8)

Mount the thermostat horizontally on the wall:

1. Pull the wires through the wire hole on the wallplate.
2. Position the wallplate on the wall with the arrow pointing up. Level the wallplate for appearance only.
3. Use a pencil to mark the mounting holes.
4. Remove the wallplate from the wall and drill two 3/16 in. holes in the wall (if drywall) as marked. For firmer material such as plaster, drill two 7/32 in. holes. Tap the wall anchors (provided) into the drilled holes until flush with the wall.
5. Pull the wires through the wire hole on the wallplate and position the wallplate over the wall anchors.
6. Insert the mounting screws into the wall anchors and tighten.
WIRING

CAUTION
Electrical Shock Hazard. Can cause electrical shock or equipment damage. Disconnect power supply before connecting wiring.

IMPORTANT
— All wiring must agree with applicable codes, ordinances and regulations.
— Use 18 gauge thermostat wire. Shielded cable is not required.

NOTES:
— Refer to Table 5 for terminal designation descriptions.
— See Fig. 12 through 22 for wiring diagrams for specific equipment applications.

1. Select set of terminal identifications that correspond to your system type (conventional or heat pump). See Fig. 9.

2. Loosen screw terminals used for the application.

3. Insert the wires into the terminal block and tighten each screw terminal. See Fig. 10.

4. Push excess wire back into the wall opening and restrict wires to the shaded area. See Fig. 11.

5. Plug the wall opening with nonflammable insulation to prevent drafts from affecting the thermostat.

Table 4. Wiring Diagrams.

<table>
<thead>
<tr>
<th>System Type</th>
<th>Wallplate Terminal Identifications</th>
<th>Wiring Diagram Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Heat/Cool</td>
<td>Conventional</td>
<td>12, 13</td>
</tr>
<tr>
<td>Heat Only</td>
<td>Conventional</td>
<td>14</td>
</tr>
<tr>
<td>Heat Only with Fan</td>
<td>Conventional</td>
<td>15</td>
</tr>
<tr>
<td>Cool only</td>
<td>Conventional</td>
<td>16</td>
</tr>
<tr>
<td>Standard Multistage up to 2 Heat/2 Cool</td>
<td>Conventional</td>
<td>17, 18</td>
</tr>
<tr>
<td>Heat Pump (No Auxiliary Heat)</td>
<td>Heat Pump</td>
<td>19, 20</td>
</tr>
<tr>
<td>Heat Pump (with Auxiliary Heat)</td>
<td>Heat Pump</td>
<td>21, 22</td>
</tr>
<tr>
<td>Multiple T7770A Sensors</td>
<td>—</td>
<td>27, 28, 29</td>
</tr>
<tr>
<td>Multiple C7189U Sensors</td>
<td>—</td>
<td>30</td>
</tr>
</tbody>
</table>
Table 5. Terminal Designation Descriptions.

<table>
<thead>
<tr>
<th>Terminal Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rc (see Note 1)</td>
<td>Power for cooling—connect to secondary side of cooling system transformer.</td>
</tr>
<tr>
<td>R (see Note 1)</td>
<td>Power for heating—connect to secondary side of heating system transformer.</td>
</tr>
<tr>
<td>Y</td>
<td>Compressor output.</td>
</tr>
<tr>
<td>C (see Note 2)</td>
<td>Common wire from secondary side of cooling system transformer.</td>
</tr>
<tr>
<td>W</td>
<td>Heat relay.</td>
</tr>
<tr>
<td>G</td>
<td>Fan relay.</td>
</tr>
<tr>
<td>W2</td>
<td>Second stage heat relay.</td>
</tr>
<tr>
<td>Y2</td>
<td>Second stage cooling.</td>
</tr>
<tr>
<td>O/B (see Note 3)</td>
<td>Changeover valve for heat pumps.</td>
</tr>
<tr>
<td>A (see Note 4)</td>
<td>Economizer/Time-Of-Day (TOD) output—powered via R terminal.</td>
</tr>
<tr>
<td>S1 (See Note 5)</td>
<td>Optional outdoor or indoor remote sensor.</td>
</tr>
<tr>
<td>S2 (See Note 5)</td>
<td>Optional outdoor or indoor remote sensor.</td>
</tr>
<tr>
<td>L</td>
<td>Powers red LED behind plastic in upper right corner of the thermostat.</td>
</tr>
</tbody>
</table>

NOTES:
1. When used in a single-transformer system, leave metal jumper wire in place between Rc and R. If used on a two-transformer system, remove metal jumper wire between Rc and R.
2. Common wire is optional when thermostat is used with batteries. When using separate transformers for heating and cooling, the common must come from the cooling transformer.
3. If thermostat is configured for a heat pump in the Installer Setup, configure changeover valve for cool (O-factory setting) or heat (B).
4. Reference economizer literature for wiring details. When set for economizer operation, the A terminal provides the occupancy signal. (Power indicates occupied.)
5. Sensor wires must have a cable separate from the thermostat control cable.

Terminal “A” Wiring Details for Economizers
— Wire the A terminal to the W7212 “N” terminal, or the W7459 “TR” terminal.
— When using dual transformers at the thermostat, the heating transformer must power the economizer.
— The A signal is powered from the R terminal and energizes the economizer to signal occupied status and drive the damper to the set minimum position.

Conventional System Wiring

![Fig. 12. Typical wiring of single transformer 1H/1C system.]

![Fig. 13. Typical hookup of dual transformer 1H/1C system.]

\[\text{POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.}\]
\[\text{FACTORY INSTALLED JUMPER.}\]
\[\text{WHEN USING BATTERIES, THE 24V COMMON CONNECTION IS OPTIONAL.}\]
Fig. 14. Typical hookup of heat-only system.

Fig. 15. Typical hookup of heat-only system with fan.

Fig. 16. Typical hookup of cool-only system.

Fig. 17. Typical hookup of single transformer multistage system (up to 2H/2C).

Fig. 18. Typical hookup of dual transformer multistage system (up to 2H/2C).
Heat Pump System Wiring

Fig. 19. Typical hookup of single-stage heat pump with no auxiliary heat (1H/1C).

Fig. 20. Typical hookup of multistage heat pump with no auxiliary heat (2H/2C).

Fig. 21. Typical hookup of single-stage heat pump with auxiliary heat (2H/1C).

Fig. 22. Typical hookup of multistage heat pump with auxiliary heat (3H/2C).
POWER THE THERMOSTAT

You can choose from three methods to power the thermostat:
• Batteries only (AAA alkaline).
• 24 Vac direct connection only.
• 24 Vac direct connection with battery backup (AAA alkaline).

Wiring 24 Vac Common
• Single-Transformer System—Connect the common side of the transformer to the C screw terminal of the thermostat wallplate. Leave the metal jumper wire in place between Rc and R.
• Two-Transformer System—Connect the common side of the cooling transformer to the C screw terminal of the thermostat wallplate. Remove the metal jumper wire between Rc and R.

Installing Batteries
1. Install three AAA alkaline batteries on the back of the thermostat as marked. See Fig. 23.

![Fig. 23. Installing batteries.](image)

2. Locate and remove tab labeled Remove. See Fig. 24.

**IMPORTANT**
This tab must be removed in order to set the real-time clock.

![Fig. 24. Remove tab labeled REMOVE from thermostat back.](image)

Locate and Mount C7089U Outdoor Temperature Sensor (Optional)
Mount the sensor where (see Fig. 25):
• cannot tamper with settings.
• there is good air circulation.
• it can measure true outdoor ambient temperature.
• surface is flat.
• wire distance between C7089U and thermostat is less than 200 feet.

Do *not* mount the sensor:
• in direct sunlight.
• where hot or cold air blows on the sensor. Discharge line from an outdoor compressor unit, vent or fan causes inaccurate temperature readings.
• where snow, ice or debris can cover it.

Use the following steps to mount the sensor:
1. Remove the sensor from the mounting clip.
2. Mark the area on the location selected for mounting the sensor mounting clip.
3. Mount the clip.

![Fig. 25. Typical locations for C7089U Outdoor Sensor.](image)

Wire C7089U Outdoor Sensor

**CAUTION**
Electrical Interference (Noise) Hazard.
Can cause erratic system operation.
Keep wiring at least one foot away from large inductive loads such as motors, line starters, lighting ballasts and large power distribution panels.
Use shielded cable to reduce interference when rerouting is not possible.
1. Wire C7089U Outdoor Sensor to S1 and S2 terminals on the thermostat. If leadwire provided is not long enough (60 in.), run a cable to a hole at C7089U location.
   a. Using color-coded, 18-gauge thermostat wire is recommended. For example of general wiring of C7089U, see Fig. 26.
2. Mount C7089U in its mounting clip.
3. Plug wiring hole using nonhardening caulk or putty.

   **NOTE:** Color-coded, 18-gauge wire is recommended.

### Wire Indoor Sensor

**CAUTION**

**Electrical Interference (Noise) Hazard.**

**Can cause erratic system operation.**

Keep wiring at least one foot away from large inductive loads such as motors, line starters, lighting ballasts and large power distribution panels.

1. Check Installer Setup Number (ISU) 340 to ensure it is set to the desired value. (See Table 6.)
2. Wire sensor to S1 and S2 thermostat terminals.
3. Push excess wire back into the hole. Plug the hole using nonhardening caulk, putty or insulation to prevent drafts from affecting performance.
4. Remove sensor cover.
5. Mount sensor to the wall or junction box using the screws and anchors provided.
6. Level the sensor for appearance only. Device functions correctly even when not level.
7. Install sensor cover.

### Sensor Wiring for Temperature Averaging

**Fig. 26. Wire C7089U Outdoor Sensor to the thermostat.**

**Locate and Mount T7770A or C7189U Remote Indoor Temperature Sensor (Optional)**

Locate and mount the sensor in the same fashion as the thermostat. See the Select Thermostat Location section.

**Fig. 27. Wiring four T7770A1006 (20K ohm) Sensors.**

**Fig. 28. Wiring two T7770A3002 (10K ohm) Sensors to provide a temperature averaging network.**
SET CALENDAR AND TIME

This thermostat is designed to, under normal use, automatically keep current time and day in memory for up to ten years once the calendar is set. There are two ways to set the calendar for this thermostat:

Setting Calendar Once Functioning
See steps 1 through 4, in the Advanced Settings section, to set year, month and day.

Setting Calendar When First Powered
When first powered, the thermostat proceeds through a sequence of screens to set the calendar.

— When first powered, the thermostat proceeds through a sequence of screens to set the calendar. See Fig. 31.
INSTALLER SETUP

Advanced Settings
The thermostat has advanced settings to match the HVAC system. These settings can be adjusted to match specific needs.

Installer Settings (Complete Set)
Access to the installer settings is obtained as follows:
1. From the main screen, press SYSTEM. Five blank touch keys show on the bottom of the screen between DONE and CANCEL.
2. Press and hold the two blank keys on either side of the center blank key for approximately five seconds. (See Fig. 32.)
3. The Setup Number displays to the lower-left area of the screen. It is a four-digit code beginning with zero. The current setting is displayed to the right.

NOTE: To cycle through the Setup Numbers, press the up or down arrow.

User Settings (Simple Set)
Access to the user settings is obtained as follows:
1. From the main screen, press SYSTEM. Five blank touch keys show on the bottom of the screen between DONE and CANCEL.
2. Press and hold the center blank key approximately five seconds.
3. The Setup Number displays to the lower-left area of the screen. It is a four-digit code beginning with zero. The current setting is displayed to the right.

NOTE: To cycle through the Setup Numbers, press the up or down arrow.
INSTALLER SETUP NUMBERS (ISU), SETTINGS, AND TESTS (TABLE 6)

Use the Installer System Test to test the heating, cooling and fan. Refer to the latter portion of Table 6.

**IMPORTANT**

Use Installer System Test to test heating, cooling and fan. The setting chosen for System Type (ISU 0170) can prevent some System Test Numbers from appearing.

**CAUTION**

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

**NOTE:** Unless otherwise noted, setup items are accessible through only the Installer setup and not the User setup.

<table>
<thead>
<tr>
<th>Installer Setup Number</th>
<th>Installer Setup Name</th>
<th>Default Setting</th>
<th>All Settings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0120a</td>
<td>Date (Year Upper)</td>
<td>20</td>
<td>20—20xx</td>
<td>Available year range: 2001 - 2178</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21—21xx</td>
<td></td>
</tr>
<tr>
<td>0130a</td>
<td>Date (Year Lower)</td>
<td>04</td>
<td>00-99</td>
<td>Available year range: 2001 - 2178</td>
</tr>
<tr>
<td>0140a</td>
<td>Date (Month)</td>
<td>6</td>
<td>1-12</td>
<td></td>
</tr>
<tr>
<td>0150a</td>
<td>Date (Day)</td>
<td>15</td>
<td>1-31 (Month Dependent)</td>
<td></td>
</tr>
<tr>
<td>0160a</td>
<td>Schedule Options</td>
<td>4</td>
<td>0—Non-Programmable</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4—Programmable</td>
<td></td>
</tr>
<tr>
<td>0170</td>
<td>System Selection</td>
<td>8</td>
<td>1—1H/1C Conv</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2—1H/1C HP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3—1H w/o fan</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4—1H with fan</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6—1C</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7—2H/1C HP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8—2H/2C Conv</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9—2H/1C Conv</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10—1H/2C Conv</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11—2H/2C HP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12—3H/2C HP</td>
<td></td>
</tr>
<tr>
<td>0175</td>
<td>TOD/Economizer output</td>
<td>0</td>
<td>0—Unused</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1—TOD</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2—Economizer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Economizer energizes A during a call for cool. TOD energizes A during Occupied period, and deenergizes A during Unoccupied.</td>
<td></td>
</tr>
<tr>
<td>0180</td>
<td>Heat Fan Operation</td>
<td>0</td>
<td>0—Fossil</td>
<td>Only shown for conventional system with heat stages and fan capability selected. If heat pump is selected, fan defaults to electric.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1—Electric</td>
<td></td>
</tr>
<tr>
<td>0185</td>
<td>Pre-occupancy Purge Duration</td>
<td>0</td>
<td>0—no duration</td>
<td>Shown only if system has fan and schedule programmable. Pre-occupancy purge enabled by nonzero duration (and sends economizer to minimum position).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1—one hour</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2—two hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3—three hours</td>
<td></td>
</tr>
<tr>
<td>0190</td>
<td>Reversing Valve O/B</td>
<td>0</td>
<td>0—O (O/B On Cool)</td>
<td>Only shown with heat pump system selected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1—B (O/B On Heat)</td>
<td></td>
</tr>
<tr>
<td>0220</td>
<td>Cycles Per Hour (CPH) for first stage compressor</td>
<td>3</td>
<td>1-6</td>
<td>Only shown for system with cool stages. Selection in this stage changes default CPH of second stage cool.</td>
</tr>
<tr>
<td>0230</td>
<td>CPH for second stage compressor</td>
<td>3</td>
<td>1-6</td>
<td>Only shown if two stages of cool selected.</td>
</tr>
<tr>
<td>0240</td>
<td>CPH for first stage conventional heat</td>
<td>5</td>
<td>1-12</td>
<td>Only shown if system is conventional with heat stages. Selection in this stage changes default CPH of second stage heat.</td>
</tr>
<tr>
<td>0250</td>
<td>CPH for second stage conventional heat</td>
<td>5</td>
<td>1-12</td>
<td>Only shown with at least two stages conventional heat or 2H/1C heat pump selected.</td>
</tr>
</tbody>
</table>

* Setting available for modification in both the Installer and User setup modes.
<table>
<thead>
<tr>
<th>Installer Setup Number</th>
<th>Installer Setup Name</th>
<th>Default Setting</th>
<th>All Settings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0260</td>
<td>CPH for third Stage Heat</td>
<td>9</td>
<td>1-12</td>
<td>Only shown if 3H/2C heat pump is selected.</td>
</tr>
<tr>
<td>0270</td>
<td>CPH for Auxiliary Heat</td>
<td>9</td>
<td>1-12</td>
<td>Only shown if multi-stage heat pump is selected (heat pump with more heat than cool stages).</td>
</tr>
<tr>
<td>0280</td>
<td>Continuous Backlight</td>
<td>0</td>
<td>0—No 1—Yes</td>
<td>Always shown. If AC power not present the option is overridden and normal backlight operation occurs.</td>
</tr>
<tr>
<td>0300</td>
<td>Changeover</td>
<td>1</td>
<td>0—Manual 1—Auto</td>
<td>Only shown if system has both heat and cool stages.</td>
</tr>
<tr>
<td>0310</td>
<td>Deadband</td>
<td>3°F (2°C)</td>
<td>2 (1.5)—2°F (1.5°C) 3 (2.0)—3°F (2.0°C) 4 (2.5)—4°F (2.5°C) 5 (3.0)—5°F (3.0°C) 6 (3.5)—6°F (3.5°C) 7 (4.0)—7°F (4.0°C) 8 (4.5)—8°F (4.5°C) 9 (5.0)—9°F (5.0°C)</td>
<td>Only shown if Automatic Changeover Selected</td>
</tr>
<tr>
<td>0320</td>
<td>Temperature Indication Scale</td>
<td>0</td>
<td>0—°F 1—°C</td>
<td></td>
</tr>
<tr>
<td>0330</td>
<td>Daylight Saving</td>
<td>2</td>
<td>0—Disabled 1—Enabled (US 1987) 2—Enabled (US 2007) 3—Enabled (Europe)</td>
<td>Averaging would not include on-board sensor. It is accomplished by series/parallel combinations. 2 applies only to Heat Pump applications (allowing compressor lockout while displaying temperature).</td>
</tr>
<tr>
<td>0340</td>
<td>Remote Temperature Sensor</td>
<td>0</td>
<td>0—None 1—Outdoor for Display 2—Outdoor for Control 3—Remote 10K Indoor 4—Remote 20K Indoor</td>
<td></td>
</tr>
<tr>
<td>0350</td>
<td>Heat Pump Compressor Lockout</td>
<td>0</td>
<td>0—None 15(-9.5)—15°F (-9.5°C) 20(-6.5)—20°F (-6.5°C) 25(-4.0)—25°F (-4.0°C) 30(-1.0)—30°F (-1.0°C) 35(1.5)—35°F (1.5°C) 40(4.5)—40°F (4.5°C) 45(7.0)—45°F (7.0°C)</td>
<td>Only shown for heat pump systems with more heat stages than cool selected and remote sensor selection is outdoor for control. Must enforce a dead band between this and Auxiliary Lockout</td>
</tr>
<tr>
<td>0360</td>
<td>Heat Pump Auxiliary Lockout</td>
<td>0</td>
<td>0—None 40(4.5)—40°F (4.5°C) 45(7.0)—45°F (7.0°C) 50(10.0)—50°F (10.0°C) 55(13.0)—55°F (13.0°C) 60(15.5)—60°F (15.5°C)</td>
<td>Only shown for heat pump systems with more heat stages than cool selected and remote sensor selection is outdoor for control. Must enforce a dead band between this and Heat Pump Compressor Lockout.</td>
</tr>
<tr>
<td>0535</td>
<td>Temporary Occupied Duration Limit</td>
<td>3</td>
<td>0—no duration 1—one hour 2—two hours 3—three hours 4—four hours</td>
<td>0 means no limit</td>
</tr>
<tr>
<td>0540</td>
<td>Number of Periods</td>
<td>4</td>
<td>2—2 Periods 4—4 Periods</td>
<td>Does not appear if Non-programmable is chosen. Applies to all days of the week. With 2 selected the “Cancel Period” option does not appear on the display.</td>
</tr>
<tr>
<td>0580</td>
<td>Minimum Compressor Off Time</td>
<td>5</td>
<td>0—Off 2—2 minutes 3—3 minutes 4—4 minutes 5—5 minutes</td>
<td>Only shown if system has cool stages.</td>
</tr>
<tr>
<td>0600</td>
<td>Heat Temperature Range Stops</td>
<td>90</td>
<td>40 to 90°F (4 to 32°C)</td>
<td>Only shown if system has heat stages.</td>
</tr>
</tbody>
</table>

* Setting available for modification in both the Installer and User setup modes.
### Table 6. Installer Setup Menu. (Continued)

<table>
<thead>
<tr>
<th>Installer Setup Number</th>
<th>Installer Setup Name</th>
<th>Default Setting</th>
<th>All Settings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0610</td>
<td>Cool Temperature Range Stops</td>
<td>50</td>
<td>50 to 99°F (10 to 37°C)</td>
<td>Only shown if system has cool stages.</td>
</tr>
<tr>
<td>0640a</td>
<td>Clock Format</td>
<td>12</td>
<td>12—12 Hour 24—24 Hour</td>
<td></td>
</tr>
<tr>
<td>0650</td>
<td>Extended Fan On time Heat</td>
<td>0</td>
<td>0—Off 90—90 seconds</td>
<td>Not displayed with fan set to fossil or with cool-only systems</td>
</tr>
<tr>
<td>0660</td>
<td>Extended Fan On time Cool</td>
<td>0</td>
<td>0—Off 40—40 seconds</td>
<td>Only shown if system has cool stages.</td>
</tr>
<tr>
<td>0680</td>
<td>Temperature Control Heat</td>
<td>2</td>
<td>1—Less Aggressive 2—Standard 3—More Aggressive</td>
<td>Only shown if system has heat stages. Only integral gains affected. Affects control operation in all control regimes (not just recovery or setpoint change). More Aggressive stops signal prior to reaching the setpoint. (For use with oversized equipment.)</td>
</tr>
<tr>
<td>0685</td>
<td>Recovery Heat Ramp Rate</td>
<td>5</td>
<td>0-20°F/hour</td>
<td>Only shown if system has heat stages. 0 disables ramped recovery (step setpoint change at period start time)</td>
</tr>
<tr>
<td>0690</td>
<td>Temperature Control Cool</td>
<td>2</td>
<td>1—Less Aggressive 2—Standard 3—More Aggressive</td>
<td>Only shown if system has cool stages. Only integral gains affected. Affects control operation in all control regimes (not just recovery or setpoint change). More Aggressive stops signal prior to reaching the setpoint. (For use with oversized equipment.)</td>
</tr>
<tr>
<td>0695</td>
<td>Recovery Cool Ramp Rate</td>
<td>3</td>
<td>0-20°F/hour</td>
<td>Only shown if system has cool stages. 0 disables ramped recovery (step setpoint change at period start time)</td>
</tr>
<tr>
<td>0700</td>
<td>Temperature Display Offset</td>
<td>0</td>
<td>-3 (-1.5)— -3°F (-1.5°C) -2 (-1.0)— -2°F (-1.0°C) -1 (-0.5)— -1°F (-0.5°C) 0 (0.0)—0°F (0.0°C) 1 (0.5)—1°F (0.5°C) 2 (1.0)—2°F (1.0°C) 3 (1.5)—3°F (1.5°C)</td>
<td>This offset applies to both the control temperature and to the display temperature for indoor sensor (and remote indoor sensor)</td>
</tr>
<tr>
<td>0710</td>
<td>Restore Factory Defaults</td>
<td>0</td>
<td>0—No 1—Yes</td>
<td>Resets all Installer Setup parameters to default values and resets the schedule to default. Retains only calendar settings and time.</td>
</tr>
</tbody>
</table>

#### INSTALLER SYSTEM TEST ITEMS

| Test 1 | Installer Test Cool | 0 | 0—Off 1—Cool Stage 1 2—Cool Stage 2 |
| Test 2 | Installer Test Fan  | 0 | 0—Off 1—Fan On |
| Test 3 | Installer Test Heat | 0 | 0—Off 1—Heat Stage 1 2—Heat Stage 1 and 2 3—Heat Stage 1, 2 and 3 |
| Test 4 | Installer Test Auxiliary Heat | 0 | 0—Auxiliary Heat Off 1—Auxiliary Heat On |
| Test 8 | Installer Test TOD/Economizer | 0 | 0—TOD/Economizer Off 1—TOD/Economizer On |

* Setting available for modification in both the Installer and User setup modes.

**NOTE:** Press the Done button to exit the Installer System Test.
MAIN SCREEN

Fig. 34. Main screen selections.

Fig. 35. Main screen display.

PROGRAMMING

Table 7 shows default program settings.

Table 7. Energy-saving Default Program Settings.

<table>
<thead>
<tr>
<th>Schedule Period</th>
<th>Time</th>
<th>Setpoints</th>
<th>Fan Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occ1</td>
<td>8:00am</td>
<td>70°F (21°C)</td>
<td>75°F (24°C)</td>
</tr>
<tr>
<td>Unocc1</td>
<td>10:00pm</td>
<td>55°F (10°C)</td>
<td>85°F (29.5°C)</td>
</tr>
<tr>
<td>Occ2</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Unocc2</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Fan Settings

Auto: Fan runs only when heating/cooling system is on. See the Fan Schedule section for more information.

On: Fan runs continuously.

System Settings

Heat: Thermostat controls the heating system.

Off: Both heating and cooling systems are off.

Cool: Thermostat controls the cooling system.

Auto: Thermostat automatically changes between heat and cool operation, depending on indoor temperature.

Programming Heating and Cooling Schedule

The thermostat can control up to four different schedule periods per day:

OCC 1: Work arrival time. Period to keep space at a comfortable temperature.

UNOCC1: Work exit time. Period to keep space at an energy-saving temperature.

OCC 2: Second occupied period.

UNOCC2: Second unoccupied period.

NOTE: Available schedule times are at 15-minute intervals.
Editing Schedule

1. Press SCHEDULE.
2. Press EDIT.

NOTES:
- The first time a change is made, the screen appears mostly blank. (See Fig. 36.)
- Multiple days can be selected.

3. Select any combination of days to edit.

NOTE: Checkmarks appear next to selected days. These are scheduled with identical times and temperatures.

4. Press OCC 1. Once pressed, OCC 1 flashes to show it is selected.
5. Press Up and Down to modify time and temperatures from this screen. (See Fig. 37.)

NOTE: Fan settings for the selected period can be programmed for ON or AUTO. See Fan Schedule section for more information.

6. Press UNOCC1 and repeat step 5.
7. Press OCC 2 and repeat step 5.
8. Press UNOCC2 and repeat step 5.

9. When complete, press DONE. SAVING CHANGES appears on the screen to indicate changes are being saved to the day(s) modified.

NOTE: To schedule the remaining days of the week, repeat steps 1-9.

10. To exit schedule without saving changes, press CANCEL any time.

Cancelling a Schedule Period

To accommodate special needs, a period can be cancelled.

EXAMPLE: A space is always unoccupied during the weekend. Cancel all Saturday and Sunday (occupied and unoccupied) periods. The thermostat then controls to the final Friday UNOCC temperature until Monday OCC 1 period.

1. Press SCHEDULE.
2. Press EDIT.
3. Select the Day(s) of the week desired.
4. Press the schedule period to cancel (OCC 1, UNOCC1, OCC 2 or UNOCC2). Once selected, the period flashes.
5. Press CANCEL PERIOD.
6. The time, temperature(s) and fan setting disappear. The bar above the selected period is removed, indicating the scheduled period was cancelled. (See Fig. 38.)

NOTE: To reinstate a schedule period, press an arrow to set desired time and temperatures.

7. Press DONE.

Fig. 36. Initial schedule edit screen.

Fig. 37. Screen to edit existing settings.

Fig. 38. Screen displayed when a period is cancelled.

Setting Time

1. Press CLOCK.
2. Use arrows to set current time.
3. Press DONE.

IMPORTANT
The current day of the week should already be set correctly. If not, see the Advanced Settings section to set the day.
OPERATION

Setting Temperature Overrides
There are three temperature override options:
— Hold Temperature Until
— Override, and
— Holiday.

HOLD TEMPERATURE UNTIL
Holds the temperature temporarily until the time set by the
user, or the next scheduled period time.

1. Press the Up or Down arrow next to the temperature to
adjust. The Hold Temperature Until time appears on the
screen. The time defaults to the next scheduled period
start time.

   NOTE: Time Up and Down arrows are shown for
   approximately seven seconds. Pressing the
   screen time (where the “Hold Temperature
   Until” time displays) causes arrows to reappear.

2. Press Up or Down arrow next to the hold time to set
desired time for the thermostat to resume schedule.

   NOTE: The installer setup can limit the length of time
   for an override to 1, 2, 3, or 4 hours beyond the
   current time.

3. Press CANCEL or SCHEDULE to cancel “Hold Tempera-
ture Until” and resume the schedule.

   NOTE: Once the Hold Temperature Until time is reached, the
   thermostat displays “Following Schedule” to indicate
   that the Hold (Override) has ended.

OVERRIDE
Changes temperature setting until the next period takes effect.
For use during Unoccupied periods.

1. Press OVERRIDE. The settings change by default to the
next Occupied period.

   NOTE: Changes are limited to those allowed by the
   lockout level.

2. Press Up or Down arrow to change the override time and
temperature.

HOLIDAY
Changes temperature setting for a designated number of days.
Press HOLIDAY. The screen shows “Hold Temperature Until 1
DAYS”.

1. Press Up or Down arrow to change the number of days
desired for the thermostat to override the schedule.

2. Press the Up or Down arrow to change the desired
   temperature for the duration of the holiday.

   NOTE: The DAYS Up and Down arrows appear for approxi-
   mately seven seconds. Pressing the screen just
   below Hold Temperature Until allows the DAYS Up
   and Down arrows to reappear.

3. To cancel the Holiday Override early, press CANCEL.

   NOTE: When the number of Holiday Override days expires,
   the screen shows “Following Schedule” to indicate
   that the Holiday Override has ended.

Fan Schedule
Press FAN while in the SCHEDULE screen to program the
system fan. Choices available from the SCHEDULE screen:

AUTO (default position): Fan runs with equipment.

Programmable for all SCHEDULE periods:
   OCC 1, UNOCC1, OCC 2, and UNOCC2.

ON: Fan runs continuously.

Programmable for all SCHEDULE periods).

Fan Status Displayed on Main Screen
If the fan program is scheduled, the scheduled mode (AUTO or
ON) appears. When the thermostat is running the fan, the fan
blade symbol \( \times \) appears next to FAN to indicate the
thermostat has the fan on.

   NOTE: If the thermostat is not controlling the fan—typical for
   many gas, forced-air heating systems—the fan blade
   symbol \( \times \) will not appear even though the fan may
   be running.

Manual Override of Fan Schedule
AUTO—fan is automatically following the FAN schedule
choices are AUTO and ON).

ON—overrides FAN schedule. The fan is continuously on.

Replacing Batteries
Not all thermostat models require batteries. If the thermostat
has batteries, a low battery warning (see fig) flashes on the
main screen for approximately 30 days.

NOTES:
— If batteries are not replaced when the Low Battery
   warning is flashing, the LO batt screen displays
   continuously and the thermostat stops operating
   until batteries are replaced.
— The thermostat has a low battery indicator.
   However, it is recommended that the batteries be
   replaced once each year. Do this to prevent
   leakage and prevent the thermostat and HVAC
   system from shutting down due to lack of
   thermostat battery power.

Fig. 39. Low battery signal.
Replace the batteries as follows:
1. Remove the thermostat from the base by pulling it straight out. (See Table 40.)
2. Install three new AAA alkaline batteries with proper polarization.

NOTES:
— Always use AAA alkaline batteries.
— All programming (Schedule, Date and Time) information is retained during battery replacement.

3. Place thermostat back on subbase by aligning terminal screw blocks with the pins on the back of the thermostat. (See Table 41.)
4. Push the thermostat straight onto the base.

Cleaning Thermostat Screen
The thermostat has a touch screen interface. Follow these steps to clean the screen without making thermostat changes:
1. Press SCREEN. Thermostat locks out the keypad for 30 seconds to allow for cleaning.

IMPORTANT
Do not spray any liquid directly on the screen. If using household glass cleaner, spray cleaner on cloth. Then use the cloth wipe the screen clean.
2. Use damp cloth slightly moistened with water or household glass cleaner to clean the screen.
3. Repeat above steps, as necessary.
4. Press DONE to return to the main screen and normal operation.

NOTE: If no button is pressed for two minutes, the device automatically returns to the main screen.

Reading Remote Indoor Temperature
If connected to an installed remote indoor temperature sensor, the thermostat displays the indoor temperature from the remote sensor(s).

NOTE: If connected to an installed remote indoor temperature sensor, the thermostat internal sensor is not used.

ONE REMOTE INDOOR SENSOR INSTALLED
If one remote indoor temperature sensor is used, the screen showing the Inside temperature reading displays the temperature at the indoor remote sensor location.

MULTIPLE REMOTE INDOOR SENSORS INSTALLED
If more than one remote indoor sensor is used, the screen showing the Inside temperature reading displays the average of all the remote indoor sensors.

Reading Outdoor Temperature
If connected to an outdoor sensor, the thermostat displays the Outside temperature.

VIEW OUTSIDE TEMPERATURE
The Outside temperature is located in the lower right corner of the main screen. If it is not on the main screen, view the outdoor temperature by pressing MORE until the outside temperature shows.
Screen Locked

Portions of the touch screen interface can be fully or partially locked. See the Advanced Settings section for information to use these features. When the thermostat displays SCREEN LOCKED, the touch screen interface is either fully or partially locked.

Fully Locked Screen

In this mode, the entire interface is locked and not functional. To unlock screen, see the Advanced Settings section. The screen continuously displays SCREEN LOCKED.

Partially Locked Screen

When partially locked:
— Pressing a locked key prompts the screen to indicate SCREEN LOCKED for five to seven seconds.
— Pressing an unlocked key with SCREEN LOCKED active removes SCREEN LOCKED from the display.

PARTIAL LOCKOUT 1

This mode locks all keys except HOLIDAY, OVERRIDE, and temperature Up/Down arrows:
— User can change the temperature setpoint, but cannot change schedule settings.
— The temporary temperature change lasts until next scheduled period. The screen displays that time.
— User can change the temperature setpoint, but cannot change schedule settings.
— Pressing HOLIDAY sets the temperature to the Unoccupied setting for the selected period of time. The next Occupied period switches back to the program settings.
— Pressing OVERRIDE sets the temperature to the Occupied setting for the selected period of time. The next Unoccupied period switches back to the program settings.
— To cancel the temperature override and follow the programmed schedule, press CANCEL.
— To unlock the screen, see Advanced Settings section.

PARTIAL LOCKOUT 2

This mode locks all keys except HOLIDAY and OVERRIDE:
— Pressing HOLIDAY sets the temperature to the Unoccupied setting for the selected period of time. The next Occupied period switches back to the program settings.
— Pressing OVERRIDE sets the temperature to the Occupied setting for the selected period of time. The next Unoccupied period switches back to the program settings.
— To cancel the temperature override and follow the programmed schedule, press CANCEL.
— To unlock the screen, see Advanced Settings section.

Temperature Recovery

The thermostat is equipped with a feature to eliminate guesswork when setting a schedule. That is, the user need not know the amount of time for the HVAC system to bring the space to temperature (without overshoot) prior to the scheduled time. The thermostat manages that automatically.

Simply set the program schedule to the desired time to have the space at comfort temperature. In addition, program the temperature to this comfort temperature. The thermostat activates the heating or cooling at the proper time to reach the scheduled temperature at the scheduled time.

NOTE: The setpoint changes gradually to use economical stages and avoid overshoot.

For example—the space will be occupied at 8:00 AM and the desired temperature is 70°F. Set the OCC 1 period for 8:00 AM and 70°F. The thermostat turns on the heat prior to 8:00 AM to raise the temperature to 70°F by 8:00 AM.

The thermostat provides an alert that the heating or cooling system is coming on before a scheduled time by displaying “Recovery” on the screen.

Minimum-Off Timer Compressor Protection

The thermostat has an adjustable Minimum-Off Timer that can be set from zero to five minutes (Factory Setting—five minutes). The Minimum-Off Timer can be bypassed through the Installer System Test or it can be bypassed permanently by setting the Minimum-Off Timer to 0 minutes in the Installer Setup. The Minimum-Off Timer is activated after the compressor turns off:
— If the thermostat is system powered (common wire), the Minimum-Off Timer is also activated upon initial startup and after power interruptions.
— If there is a call for cooling or heating during the Minimum-Off Time, the thermostat displays “Wait.”
— When the Minimum Off Timer expires, “Cool On” or “Heat On” (heat pumps only) appears solidly in the display and the compressor and fan turn on.

Economizer/TOD Logic (Table 8)

<table>
<thead>
<tr>
<th>Effective Occupancy</th>
<th>Call for Cool</th>
<th>Terminal A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupied</td>
<td>—</td>
<td>Energized</td>
</tr>
<tr>
<td>Unoccupied</td>
<td>Yes</td>
<td>De-energized</td>
</tr>
<tr>
<td>Override</td>
<td>—</td>
<td>Energized</td>
</tr>
</tbody>
</table>

Heat Pump Temperature Lockouts

Dual Fuel Heat Pump and Outdoor Temperature Sensor

In this operation, there is no external fossil fuel kit (dual fuel kit) installed; the thermostat controls this function:
1. Choose correct heat pump application in ISU 0170.
3. Choose appropriate Balance Point Temperature in ISU 0350.

OPERATION IN HEAT MODE ABOVE BALANCE POINT (OUTDOOR TEMPERATURE)

When the outdoor temperature is above the selected Balance Point Temperature (ISU 0350), only the compressor operates and the fan (G terminal) energizes when the thermostat calls for heat.

OPERATION IN HEAT MODE BELOW BALANCE POINT (OUTDOOR TEMPERATURE)

When the outdoor temperature is below the selected Balance Point Temperature (ISU 0350), only the Fossil Fuel (auxiliary heat) operates and the fan (G terminal) does not energize when the thermostat calls for heat.
Heat Pump with Auxiliary (Backup) Heat and Outdoor Temperature Sensor

1. Choose correct heat pump application in ISU 0170.
2. Choose Outdoor Temperature Sensor for Control Option in ISU 0340.
3. Choose Compressor Lockout Temperature in ISU 0350.

NOTE: There is a 5°F deadband between Compressor and Auxiliary Heat lockout temperatures.

Operation in Heat Mode

When the outdoor temperature is:
— Below Compressor Lockout Temperature: only Auxiliary Heat operates.
— Above Auxiliary Lockout Temperature: only the Compressor operates. See Fig. 31.
— Between the two temperatures: both the Compressor and Auxiliary Heat operate.

Operating Sequence

The thermostat energizes specific terminal(s), depending on the demand for heating, cooling or fan. The thermostat screen shows the time, inside temperature, system and fan selections. Additional indicators are shown when the heating, cooling or fan is energized. See Tables 9 and 10 for specification information.

Table 9. Sequence of Operation for Conventional Systems.

<table>
<thead>
<tr>
<th>System Setting</th>
<th>Fan Setting</th>
<th>Call for Action</th>
<th>Energize Terminals</th>
<th>Screen Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Auto</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Cool</td>
<td>Auto</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Cool or Auto</td>
<td>Auto</td>
<td>Stage 1 Cooling</td>
<td>Y, G</td>
<td>Cool On</td>
</tr>
<tr>
<td>Cool or Auto</td>
<td>Auto</td>
<td>Stages 1 and 2 Cooling</td>
<td>Y, Y2a, G</td>
<td>Cool On</td>
</tr>
<tr>
<td>Heat</td>
<td>Auto</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Heat or Auto</td>
<td>Auto</td>
<td>Stage 1 Heating</td>
<td>W, Gb</td>
<td>Heat On</td>
</tr>
<tr>
<td>Heat or Auto</td>
<td>Auto</td>
<td>Stages 1 and 2 Heating</td>
<td>W, W2c, Gb</td>
<td>Heat On</td>
</tr>
</tbody>
</table>

a If Installer Setup System type is set to two stages of cooling.
b G energizes only if Installer Setup 0180 is set to Electric.
c If Installer Setup System type is set to two stages of heating.

Table 10. Sequence of Operation for Heat Pump Systems.

<table>
<thead>
<tr>
<th>System Setting</th>
<th>Fan Setting</th>
<th>Call for Action</th>
<th>Energize Terminals</th>
<th>Screen Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Auto</td>
<td>—</td>
<td>O/Ba</td>
<td>—</td>
</tr>
<tr>
<td>Cool</td>
<td>Auto</td>
<td>Stage 1 Cooling</td>
<td>Y, G, O/Ba</td>
<td>Cool On</td>
</tr>
<tr>
<td>Cool or Auto</td>
<td>Auto</td>
<td>Stages 1 and 2 Cooling</td>
<td>Y, Y2b, G, O/Ba</td>
<td>Auxiliary Heat On</td>
</tr>
<tr>
<td>Heat</td>
<td>Auto</td>
<td>None</td>
<td>O/Ba</td>
<td>—</td>
</tr>
<tr>
<td>Heat or Auto</td>
<td>Auto</td>
<td>Stage 1 Heating</td>
<td>Y, G, O/Ba</td>
<td>Heat On</td>
</tr>
<tr>
<td>Heat or Auto</td>
<td>Auto</td>
<td>Stages 1, 2 and 3 Heating</td>
<td>Y, Y2b, W1d, G, O/Ba</td>
<td>—</td>
</tr>
</tbody>
</table>

a Configure O/B in Installer Setup. Based on last piece of equipment called (cooling = O; heating = B).
b If Installer Setup System Type is set to 3Heat/2Cool Heat Pump with Auxiliary Heat.
c If Installer Setup System Type is set to 2Heat/1Cool Heat Pump with Auxiliary Heat.
d This terminal does not energize if Installer Setup System type is set to 2 Heat/2 Cool Heat Pump with no Auxiliary Heat.

Second Stage Heat and Cool Control

While maintaining setpoint, several factors affect when 2nd stage energizes such as load conditions, environmental conditions, P+I control, and home insulation. The second stage energizes when the thermostat senses 1st stage is running at 90% capacity. This operation is droopless control.

Temperature Sensor Operation and Checkout

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.

NOTE: The C7089U, C7189U, and T7770A Temperature Sensors are calibrated at the factory and cannot be recalibrated in the field.

C7089U Outdoor Temperature Sensor

Operation

When installed with Thermostat ISU 0340 set to 1 or 2, the thermostat can display outside temperature.

Checkout

Allow C7089U Outdoor Sensor to absorb outdoor air for a minimum of twenty minutes before taking a reading.

With an accurate thermometer (±1°F [0.5°C]) measure the temperature at the sensor location, allowing time for the thermometer to stabilize before reading.

To verify sensor resistance, remove one wire from one of the C7089U 60-in. leadwires. Use an ohmmeter to measure the resistance across the sensor. Then compare sensor accuracy with the temperature/resistance curve in Fig. 43.
C7189U Remote Indoor Temperature Sensor

Operation
When installed with Thermostat ISU 0340 set to 3, the remote inside temperature is displayed on the Thermostat Home Screen as Inside Temperature. The thermostat internal temperature sensor is not used.

The C7189U can be used to provide one remote sensor input or as a temperature averaging network with multiple C7189U Sensors connected, as shown in Fig. 30.

Checkout
For best results, allow C7189U Wall Mount Temperature Sensor to absorb the air moving through the room for a minimum of twenty minutes before taking a resistance measurement.

With an accurate thermometer (±1°F [0.5°C]) measure the temperature at the sensor location, allowing time for the thermometer to stabilize before reading.

To verify sensor resistance, remove one wire from one of C7189U wiring terminals. Use an ohmmeter to measure the resistance across the sensor. Then compare sensor accuracy with the temperature/resistance curve in Fig. 43.

T7770A Remote Temperature Sensor

Operation
When installed with Thermostat ISU 0340 set to 3 or 4, the remote inside temperature is displayed on the Thermostat Home Screen as Inside Temperature. The thermostat internal temperature sensor is not used.

The T7770A can be used to provide one remote sensor input or as a temperature averaging network with multiple T7770A Sensors connected, as shown in Fig. 27 through 29.

Checkout
For best results, allow T7770A Wall Mount Temperature Sensor to absorb the air moving through the room for a minimum of twenty minutes before taking a resistance measurement.

With an accurate thermometer (±1°F [0.5°C]) measure the temperature at the sensor location, allowing time for the thermometer to stabilize before reading.

To verify sensor resistance, remove one wire from one of the wiring terminals. Use an ohmmeter to measure the resistance across the sensor. Then verify the sensor accuracy with the temperature/resistance in Fig. 44.

Fig. 43. 10K ohm sensor resistance versus temperature.

Fig. 44. 20K ohm sensor resistance versus temperature.
# Troubleshooting (Table 11)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display does not come on.</td>
<td>Thermostat is not being powered.</td>
<td>Check for 24 Vac between C and Rc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check that AAA batteries are installed correctly and are good.</td>
</tr>
<tr>
<td>Temperature settings do not change.</td>
<td>The upper or lower temperature limits were reached.</td>
<td>Check temperature setpoints.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check ISU 0600 and 0610; modify as needed.</td>
</tr>
<tr>
<td></td>
<td>The keypad is fully locked.</td>
<td>Check ISU 0670 to change keypad locked options.</td>
</tr>
<tr>
<td>Heating or cooling does not come on.</td>
<td>Thermostat minimum off-time is activated.</td>
<td>Wait up to five minutes for the system to respond.</td>
</tr>
<tr>
<td></td>
<td>System selection is not set to Heat or Cool.</td>
<td>Set system Selection to correct position.</td>
</tr>
<tr>
<td></td>
<td>System type Selection is incorrect.</td>
<td>Check ISU 0170 and make sure correct System type is chosen.</td>
</tr>
<tr>
<td>Thermostat is calling for Heat (Heat on) or Cool (Cool on) but no heating or cooling is running.</td>
<td>Heating or cooling equipment is not operating.</td>
<td>Check wiring.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check ISU 0170 and make sure correct system type is chosen.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verify operation of equipment in System Test mode.</td>
</tr>
<tr>
<td>Heat does not turn on (Heat On is solid in the display).</td>
<td>Heating equipment failure.</td>
<td>Check for 24 Vac at the equipment on the secondary side of the transformer between power and common. If voltage is not present, check the heating equipment to find the cause of the problem.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check for 24 Vac between the heat terminal (W) and transformer common. If 24 Vac is present, the thermostat is functional. Check the heating equipment to find the cause of the problem.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loose or broken wire connection between thermostat and heating equipment.</td>
</tr>
<tr>
<td>Cooling does not turn on (Cool On is solid in the display).</td>
<td>Cooling equipment failure.</td>
<td>Check for 24 Vac at the equipment on the secondary side of the transformer between power and common. If voltage is not present, check the cooling equipment to find the cause of the problem.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check for 24 Vac between the cool terminal (Y) and transformer common. If 24 Vac is present, the thermostat is functional. Check the cooling equipment to find the cause of the problem.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loose or broken wire connection between thermostat and cooling equipment.</td>
</tr>
<tr>
<td>Fan does not turn on in a call for heat (electric furnace).</td>
<td>Fan Control in Heating is set to Gas or Oil Furnace (Setting 0180).</td>
<td>Set Fan Control in Heating to Electric Furnace (Setting 0180).</td>
</tr>
<tr>
<td>Heat pump puts out cool air in the heat mode and warm air in the cool mode.</td>
<td>Changeover Valve (ISU 0190) is not configured to match the changeover required by the installed heat pump.</td>
<td>Set Changeover Valve (ISU 0190) to match the changeover required by the installed heat pump.</td>
</tr>
<tr>
<td>Both the heating and cooling equipment are running at the same time.</td>
<td>The heating equipment is not a heat pump but the System Type (ISU 0170) is set to Heat Pump.</td>
<td>Set System Type (ISU 0170) to match the installed heating and/or cooling equipment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heating and cooling wires are shorted together.</td>
</tr>
</tbody>
</table>
### Table 11. Troubleshooting. (Continued)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating equipment is running in the cool mode.</td>
<td>Heating equipment is not a heat pump but System Type (ISU 0170) is set to Heat Pump.</td>
<td>Set System Type (ISU 0170) to match the installed heating and/or cooling equipment.</td>
</tr>
<tr>
<td>Heating equipment does not turn off and heat temperature setting is set below room temperature (Heat On is not in the display).</td>
<td>Heating equipment is not a heat pump but System Type (ISU 0170) is set to Heat Pump.</td>
<td>Set System Type (ISU 0170) to match the installed heating and/or cooling equipment.</td>
</tr>
<tr>
<td>Cannot set the system setting to Heat.</td>
<td>System Type (ISU 0170) is set to Cool Only.</td>
<td>Set System Type (ISU 0170) to match the installed heating and/or cooling equipment.</td>
</tr>
<tr>
<td>Cannot set the system setting to Cool.</td>
<td>System Type (ISU 0170) is set to Heat Only or Heat Only with Fan.</td>
<td>Set System Type (ISU 0170) to match the installed heating and/or cooling equipment.</td>
</tr>
<tr>
<td>Heat On is not in the display.</td>
<td>System setting is not set to Heat and/or temperature setting is not set above room temperature.</td>
<td>Set the system setting to Heat and set the temperature setting above the room temperature.</td>
</tr>
<tr>
<td>Cool On is not in the display.</td>
<td>System setting is not set to Cool and/or the temperature setting is not set below room temperature.</td>
<td>Set the system setting to Cool and set the temperature setting below the room temperature.</td>
</tr>
<tr>
<td>Wait is in the display.</td>
<td>Compressor minimum off timer is active.</td>
<td>Wait up to five minutes for the cooling or heating (heat pump) equipment to turn on.</td>
</tr>
<tr>
<td>“Screen Locked” appears on the screen and all or some of the keys do not respond.</td>
<td>The keypad is fully or partially locked.</td>
<td>Check ISU 0670 to change keypad locked options.</td>
</tr>
</tbody>
</table>

### Perchlorate Material
This thermostat contains a Lithium battery which may contain Perchlorate material.

The following statement is required:
Perchlorate Material—special handling may apply.
See www.dtsc.ca.gov/hazardouswaste/perchlorate

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