Honeywell

TB8220 Commercial VisionPRO™ Programmable Thermostat

VISIONPRO™ 8000 TOUCHSCREEN

PRODUCT DATA

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.

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.**

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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:
Range:
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.

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

Table 2. Electrical Ratings

Terminal	Voltage (50/60 Hz)	Running Current
W (Heating)	20 - 30 Vac	0.02 - 1.0A
Y (Cooling)	20 - 30 Vac	0.02 - 1.0A
G (Fan)	20 - 30 Vac	0.02 - 0.60A
A (Economizer/TOD)	20 - 30 Vac	0.02 - 1.0A

Table 3. Energy Star Default Program Settings.

Schedule Period	Time	Setpoints		Fan Setting
		Heat	Cool	
Occ1	8:00am	70°F (21°C)	75°F (24°C)	On
Unocc1	10:00pm	55°F (10°C)	85°F (29.5°C)	Auto
Occ2	—	—	—	—
Unocc2	—	—	—	—

Cycle Rates (at 50% Load):
Heating: Selectable 1 - 12 cycles per hour.
Cooling: Selectable 1 - 6 cycles per hour.

Interstage Differential:
Droopless control. Once the first stage is running at 90% load, the thermostat energizes the second stage.

Cool Indication: Displays “Cool On” when Cool is activated.

Heat Indication: Displays “Heat On” when Heat is activated.

Auxiliary Heat Indication: Displays “Aux. Heat On” when Auxiliary Heat is activated.

Clock Accuracy: ±1 minute per month.

Finish:
TB8000: Premier White® color.
C7189U Wall Mount Remote Indoor Sensor: Premier White® color.
T7770A Wall Mount Remote Indoor Sensor: Premier White® color.

Batteries:
Three replaceable AAA alkaline batteries: Power thermostat when 24 Vac common is not used.
Non-replaceable lithium battery with ten-year life: Under normal conditions holds calendar and time settings.

NOTE: Alkaline batteries keep calendar and time if lithium battery is no longer functional.

Resistance Characteristics of Remote Sensors:
C7089U Outdoor Sensor: 10K ohm NTC.
C7189U Remote Indoor Sensor: 10K ohm NTC.
C7772 Flush-Mount Remote Indoor Sensor: 20K ohm NTC.
T7770A1006 Wall-Mount Remote Indoor Sensor: 20K ohm NTC.
T7770A3002 Wall-Mount Remote Indoor Sensor: 10K ohm NTC.

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
   1885 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.

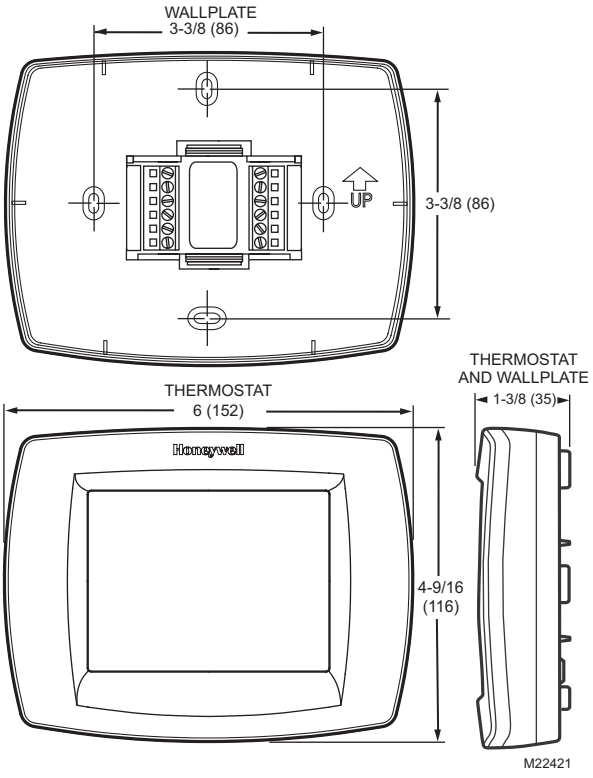


Fig. 1. TB8220 Touchscreen Thermostat dimensions in in. (mm).

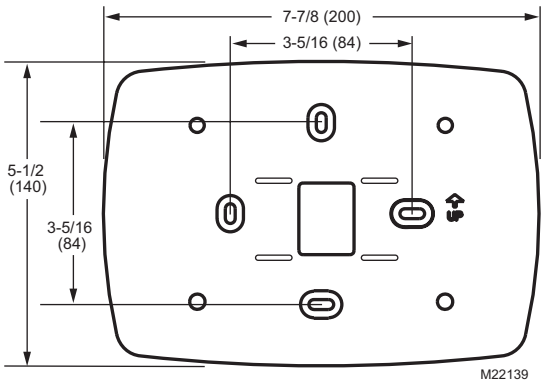


Fig. 2. 32003796-001 Cover Plate dimensions in in. (mm).

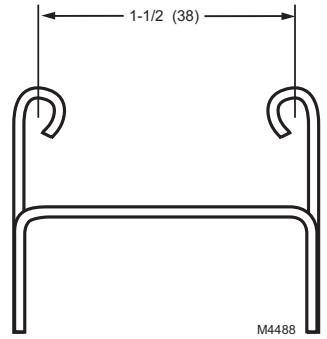


Fig. 3. C7089U Outdoor Sensor Mounting Clip dimensions in in. (mm).

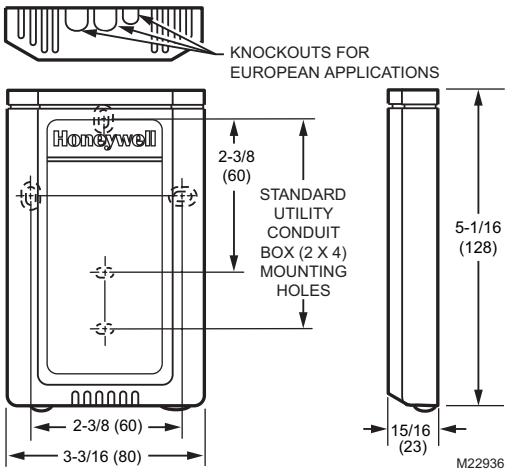


Fig. 4. T7770A dimensions in in. (mm).

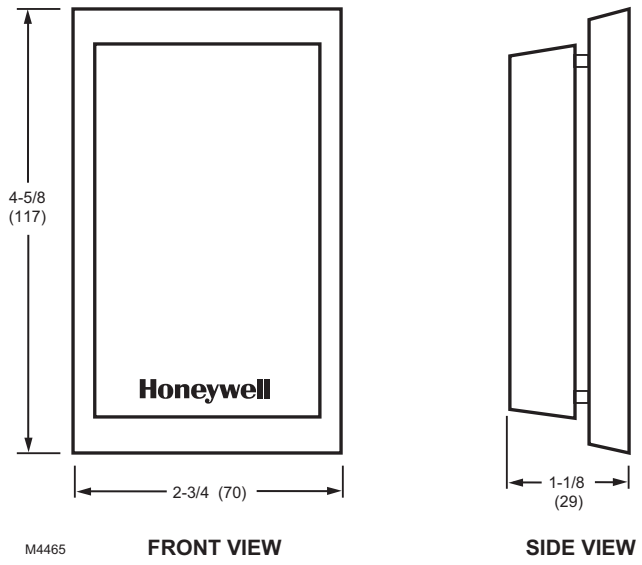


Fig. 5. C7189U Indoor Sensor dimensions in in. (mm).

MERCURY 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 an old control.

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.

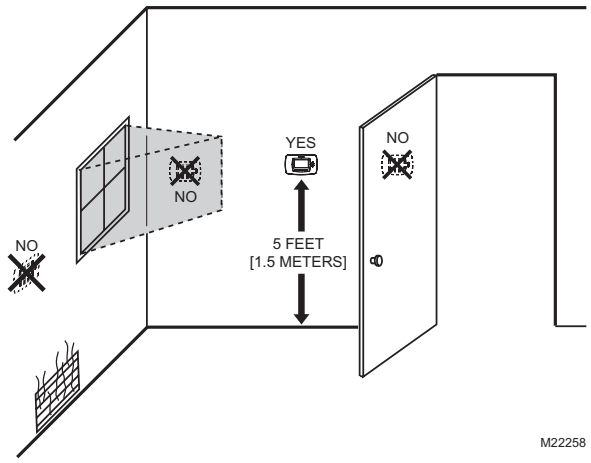


Fig. 6. Select thermostat location.

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.

Separate Wallplate from Thermostat

1. Separate the wallplate from the thermostat. See Fig. 7.

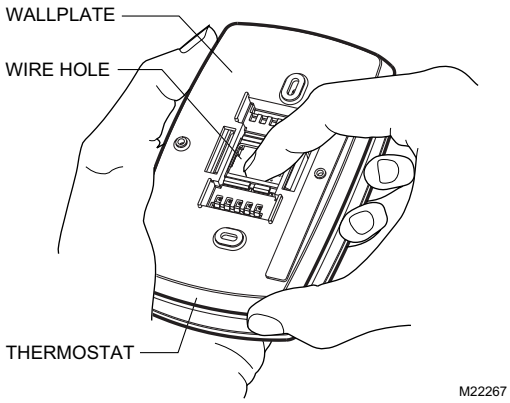


Fig. 7. Separate wallplate from thermostat.

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.

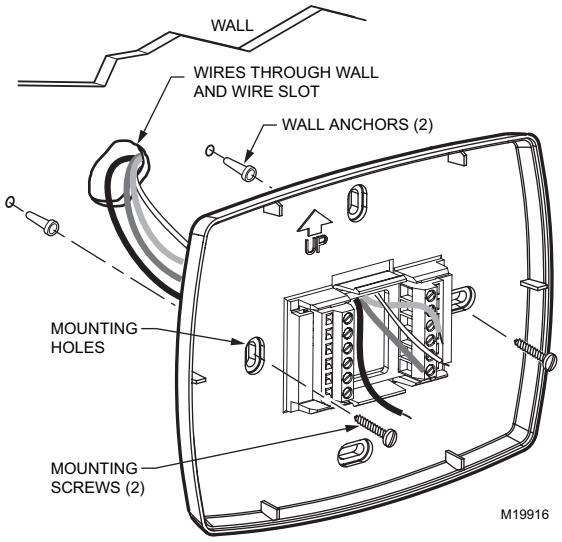


Fig. 8. Install wallplate.

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.

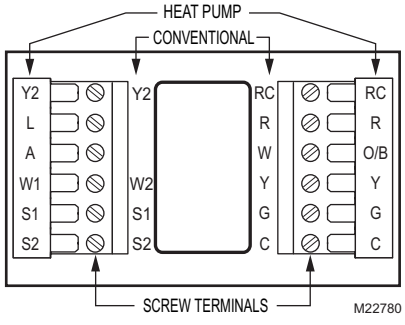


Fig. 9. Terminal identifications for system type.

2. Loosen screw terminals used for the application.
3. Insert the wires into the terminal block and tighten each screw terminal. See Fig. 10.

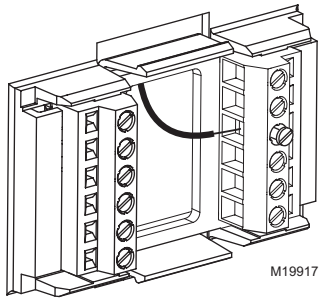


Fig. 10. Insert wires into terminal block.

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.

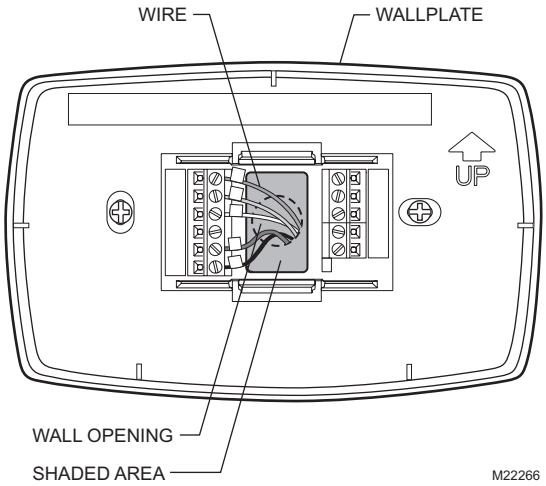


Fig. 11. Restrict wires to shaded area of wire hole.

Table 4. Wiring Diagrams.

System Type	Wallplate Terminal Identifications	Wiring Diagram Figure
Standard Heat/Cool	Conventional	12, 13
Heat Only	Conventional	14
Heat Only with Fan	Conventional	15
Cool only	Conventional	16
Standard Multistage up to 2 Heat/2 Cool	Conventional	17, 18
Heat Pump (No Auxiliary Heat)	Heat Pump	19, 20
Heat Pump (with Auxiliary Heat)	Heat Pump	21, 22
Multiple T7770A Sensors	—	27, 28, 29
Multiple C7189U Sensors	—	30

Table 5. Terminal Designation Descriptions.

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

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

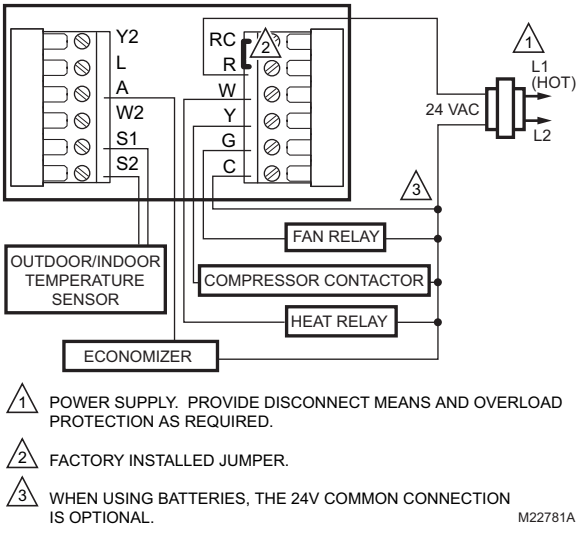


Fig. 12. Typical wiring of single transformer 1H/1C system.

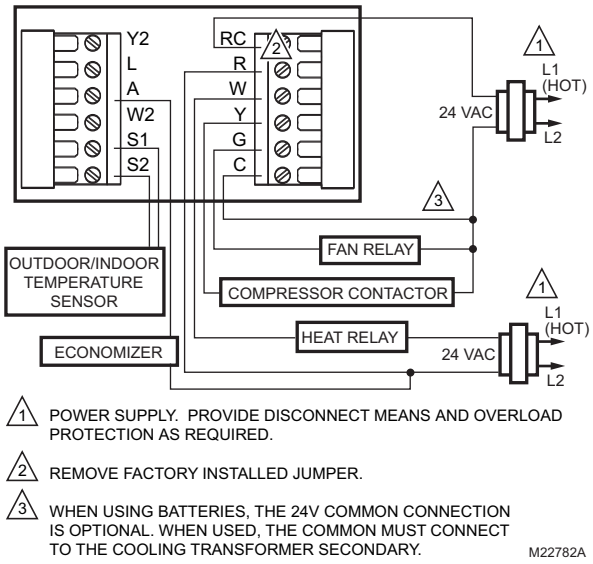
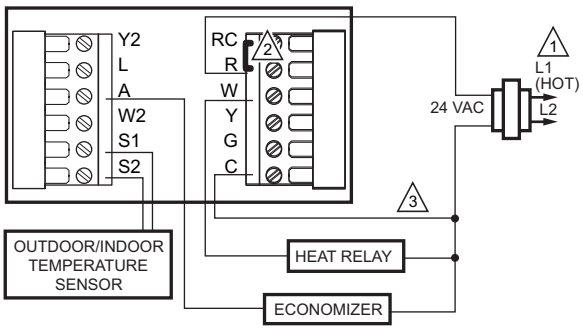


Fig. 13. Typical hookup of dual transformer 1H/1C system.



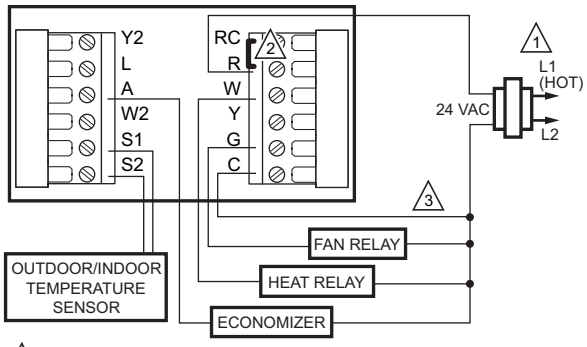
1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 FACTORY INSTALLED JUMPER.

3 WHEN USING BATTERIES, THE 24V COMMON CONNECTION IS OPTIONAL.

M22783A

Fig. 14. Typical hookup of heat-only system.



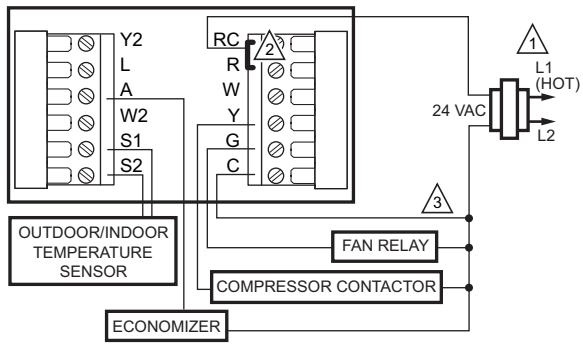
1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 FACTORY INSTALLED JUMPER.

3 WHEN USING BATTERIES, THE 24V COMMON CONNECTION IS OPTIONAL.

M22784A

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



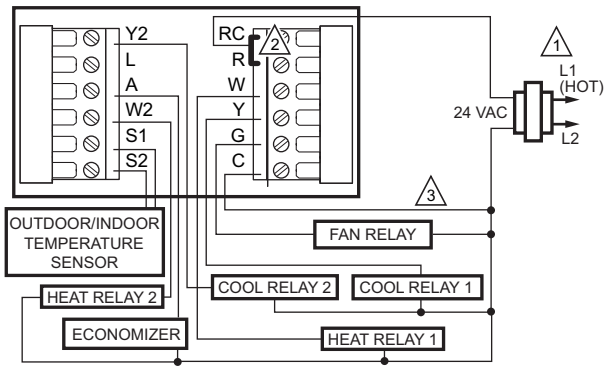
1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 FACTORY INSTALLED JUMPER.

3 WHEN USING BATTERIES, THE 24V COMMON CONNECTION IS OPTIONAL.

M22785A

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



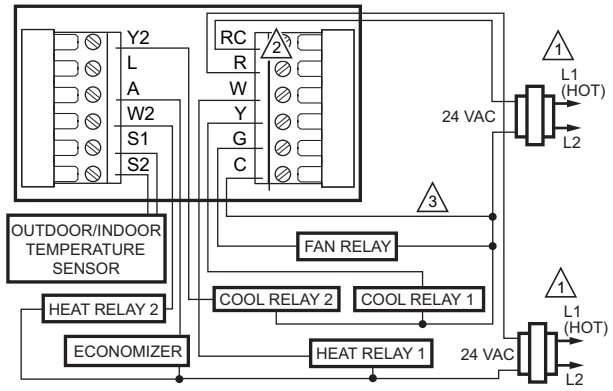
1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 FACTORY INSTALLED JUMPER.

3 WHEN USING BATTERIES, THE 24V COMMON CONNECTION IS OPTIONAL.

M22786A

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



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

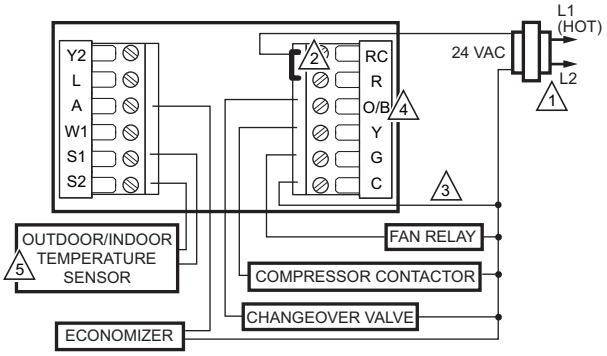
2 REMOVE FACTORY INSTALLED JUMPER.

3 WHEN USING BATTERIES, THE 24V COMMON CONNECTION IS OPTIONAL. WHEN USED, THE COMMON MUST CONNECT TO THE COOLING TRANSFORMER SECONDARY.

M22787A

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

Heat Pump System Wiring



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

2 FACTORY INSTALLED JUMPER.

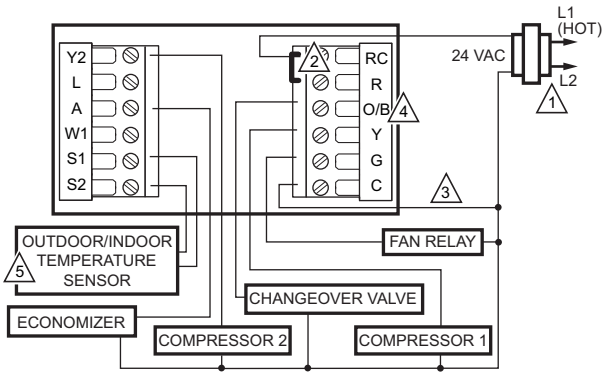
3 WHEN USING BATTERIES, THE 24V COMMON CONNECTION IS OPTIONAL.

4 "O/B" TERMINAL SET TO CONTROL AS EITHER "O" OR "B" IN THE INSTALLER SETUP.

5 OPTIONAL OUTDOOR OR INDOOR REMOTE SENSOR. WIRES MUST HAVE A CABLE SEPARATE FROM THE THERMOSTAT CABLE.

M22788B

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



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

2 FACTORY INSTALLED JUMPER.

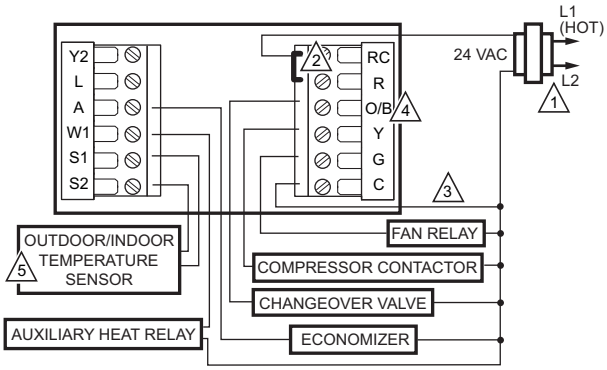
3 WHEN USING BATTERIES, THE 24V COMMON CONNECTION IS OPTIONAL.

4 "O/B" TERMINAL SET TO CONTROL AS EITHER "O" OR "B" IN THE INSTALLER SETUP.

5 OPTIONAL OUTDOOR OR INDOOR REMOTE SENSOR. WIRES MUST HAVE A CABLE SEPARATE FROM THE THERMOSTAT CABLE.

M22789B

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



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

2 FACTORY INSTALLED JUMPER.

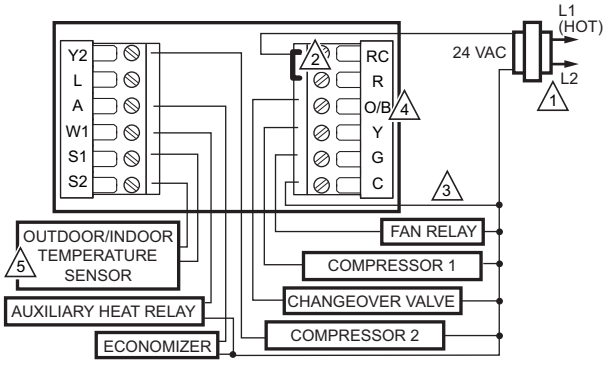
3 WHEN USING BATTERIES, THE 24V COMMON CONNECTION IS OPTIONAL.

4 "O/B" TERMINAL SET TO CONTROL AS EITHER "O" OR "B" IN THE INSTALLER SETUP.

5 OPTIONAL OUTDOOR OR INDOOR REMOTE SENSOR. WIRES MUST HAVE A CABLE SEPARATE FROM THE THERMOSTAT CABLE.

M22790B

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



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

2 FACTORY INSTALLED JUMPER.

3 WHEN USING BATTERIES, THE 24V COMMON CONNECTION IS OPTIONAL.

4 "O/B" TERMINAL SET TO CONTROL AS EITHER "O" OR "B" IN THE INSTALLER SETUP.

5 OPTIONAL OUTDOOR OR INDOOR REMOTE SENSOR. WIRES MUST HAVE A CABLE SEPARATE FROM THE THERMOSTAT CABLE.

M22791B

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.

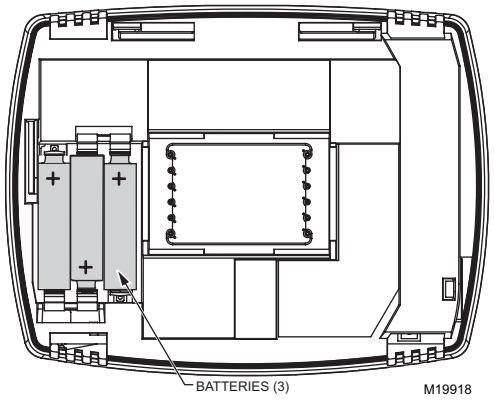


Fig. 23. Installing batteries.

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

IMPORTANT

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

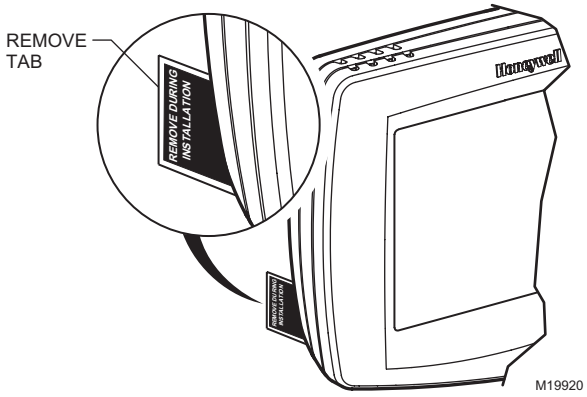


Fig. 24. Remove tab labeled REMOVE from thermostat back.

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.

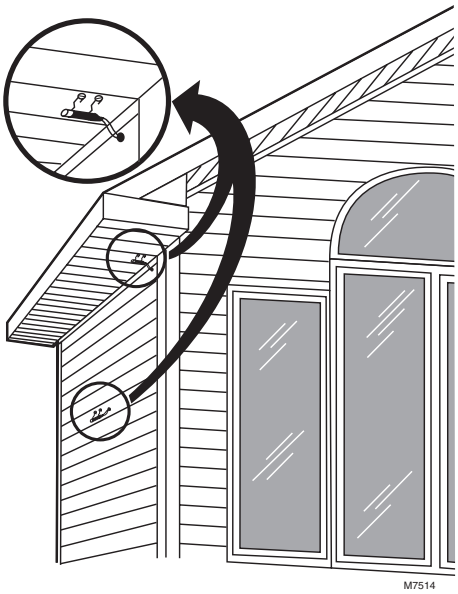


Fig. 25. Typical locations for C7089U Outdoor Sensor.

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 S1and 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.

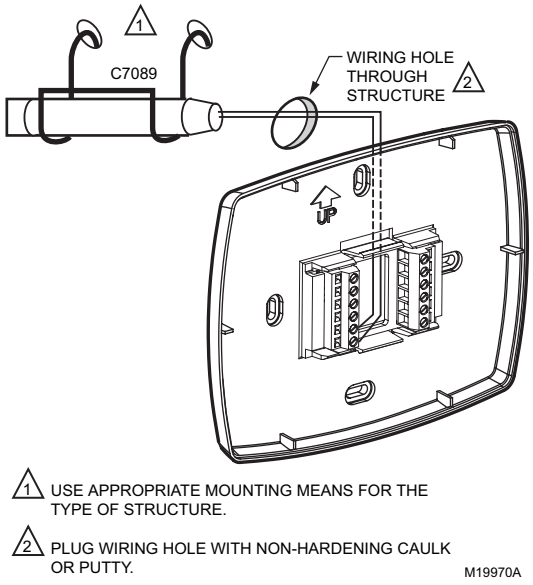


Fig. 26. Wire C7089U Outdoor Sensor to the thermostat.

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.

Sensor Wiring for Temperature Averaging

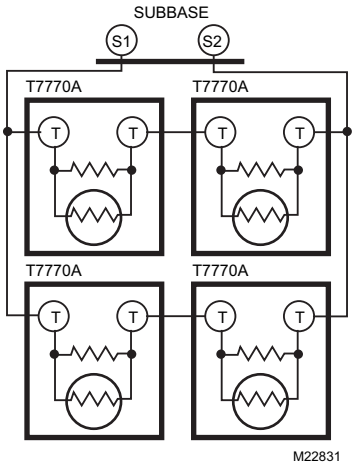


Fig. 27. Wiring four T7770A1006 (20K ohm) Sensors.

Consider the following as well:

1. Be sure wire distance between sensor and thermostat is less than 200 feet.
2. Mark the area on the wall selected for mounting the sensor or junction box.
3. Sensor wire must be separate from the thermostat cable.
4. Run wire cable to a hole at the selected wall location.
5. Pull approximately three inches of wire through the opening.

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 S1and 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.

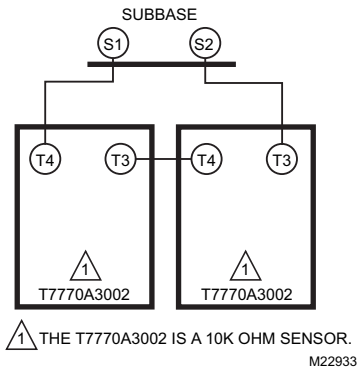


Fig. 28. Wiring two T7770A3002 (10K ohm) Sensors to provide a temperature averaging network.

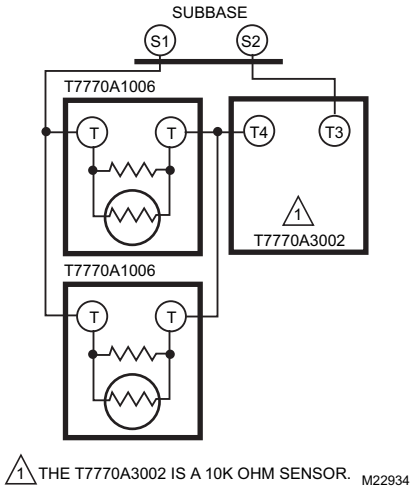


Fig. 29. Wiring two T7770A1006 (20K ohm) Sensors and one T7770A3002 (10K ohm) sensor to provide a temperature averaging network

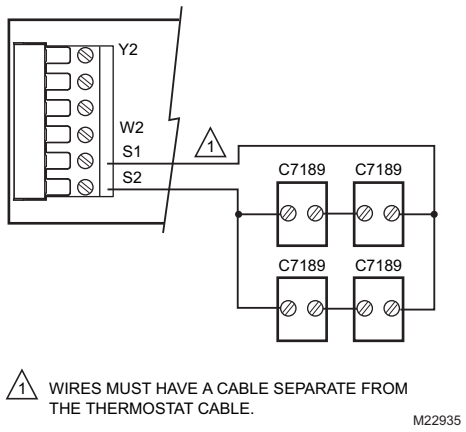


Fig. 30. Wiring four C7189U (10K ohm) Sensors to provide a temperature averaging network.

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.

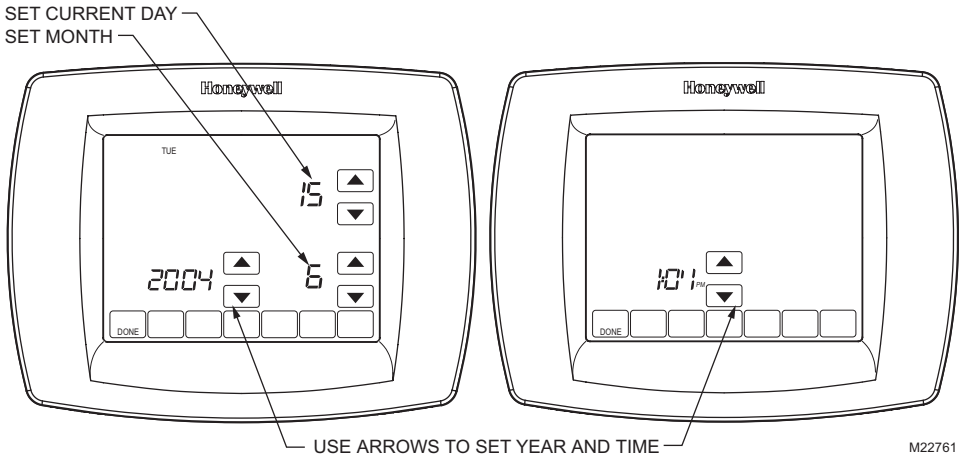


Fig. 31. Setting calendar and time when thermostat is first powered.

INSTALLER SETUP

Advanced Settings

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

There are two different groups of settings:
— A complete set designed for the installation use.
— A simple set to limit accessibility for typical users.

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.

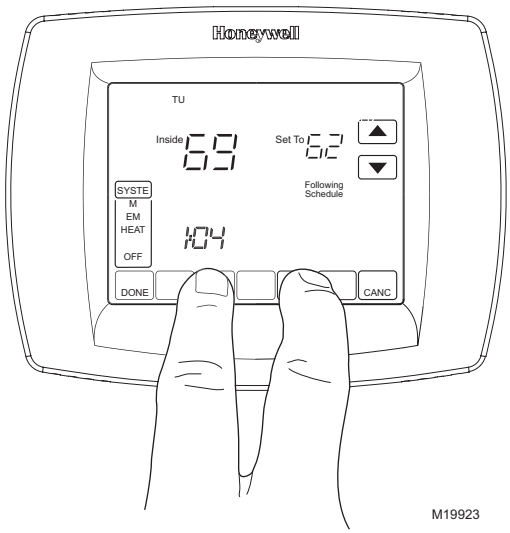


Fig. 32. Entering Installer Setup.

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.

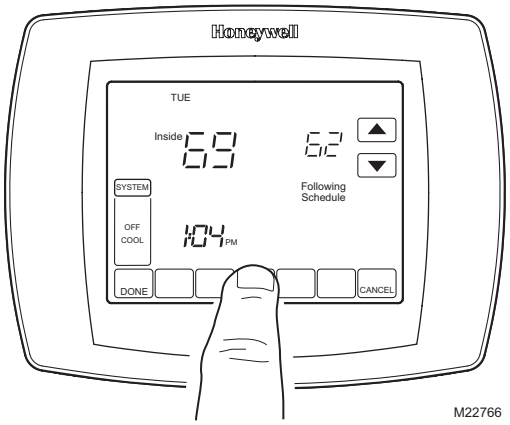


Fig. 33. Entering User Setup.

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.

⚠ CAUTION

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

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.

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

Table 6. Installer Setup Menu.

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

[a] Setting available for modification in both the Installer and User setup modes.

Table 6. Installer Setup Menu. (Continued)

Installer Setup Number	Installer Setup Name	Default Setting	All Settings	Notes
0260	CPH for third Stage Heat	9	1-12	Only shown if 3H/2C heat pump is selected.
0270	CPH for Auxiliary Heat	9	1-12	Only shown if multi-stage heat pump is selected (heat pump with more heat than cool stages).
0280	Continuous Backlight	0	0—No 1—Yes	Always shown. If AC power not present the option is overridden and normal backlight operation occurs.
0300	Changeover	1	0—Manual 1—Auto	Only shown if system has both heat and cool stages.
0310	Deadband	3°F (2°C)	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)	Only shown if Automatic Changeover Selected
0320[a]	Temperature Indication Scale	0	0—°F 1—°C	
0330[a]	Daylight Saving	2	0—Disabled 1—Enabled (US 1987) 2—Enabled (US 2007) 3—Enabled (Europe)	
0340	Remote Temperature Sensor	0	0—None 1—Outdoor for Display 2—Outdoor for Control 3—Remote 10K Indoor 4—Remote 20K Indoor	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).
0350	Heat Pump Compressor Lockout	0	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)	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
0360	Heat Pump Auxiliary Lockout	0	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)	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.
0535	Temporary Occupied Duration Limit	3	0—no duration 1—one hour 2—two hours 3—three hours 4—four hours	0 means no limit
0540[a]	Number of Periods	4	2—2 Periods 4—4 Periods	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.
0580	Minimum Compressor Off Time	5	0—Off 2—2 minutes 3—3 minutes 4—4 minutes 5—5 minutes	Only shown if system has cool stages.
0600	Heat Temperature Range Stops	90	40 to 90°F (4 to 32°C)	Only shown if system has heat stages.

[a] Setting available for modification in both the Installer and User setup modes.

Table 6. Installer Setup Menu. (Continued)

Installer Setup Number	Installer Setup Name	Default Setting	All Settings	Notes
0610	Cool Temperature Range Stops	50	50 to 99°F (10 to 37°C)	Only shown if system has cool stages.
0640[a]	Clock Format	12	12—12 Hour 24—24 Hour	
0650	Extended Fan On time Heat	0	0—Off 90—90 seconds	Not displayed with fan set to fossil or with cool-only systems
0660	Extended Fan On time Cool	0	0—Off 40—40 seconds	Only shown if system has cool stages.
0670	Keypad Lockout	0	0—Unlocked 1—Partial Lockout 1 2—Partial Lockout 2 3—Fully Locked	Unlocked: All functions accessible. Partial 1: Locks all but Holiday, Override, and Up/Down. Partial 2: Locks all but Holiday and Override. Full: Entire interface locked/non-functional.
0680	Temperature Control Heat	2	1—Less Aggressive 2—Standard 3—More Aggressive	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.)
0685	Recovery Heat Ramp Rate	5	0-20°F/hour	Only shown if system has heat stages. 0 disables ramped recovery (step setpoint change at period start time)
0690	Temperature Control Cool	2	1—Less Aggressive 2—Standard 3—More Aggressive	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.)
0695	Recovery Cool Ramp Rate	3	0-20°F/hour	Only shown if system has cool stages. 0 disables ramped recovery (step setpoint change at period start time)
0700	Temperature Display Offset	0	-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)	This offset applies to both the control temperature and to the display temperature for indoor sensor (and remote indoor sensor)
0710	Restore Factory Defaults	0	0—No 1—Yes	Resets all Installer Setup parameters to default values and resets the schedule to default Energy Star. Retains only calendar settings and time.
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	

[a] 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

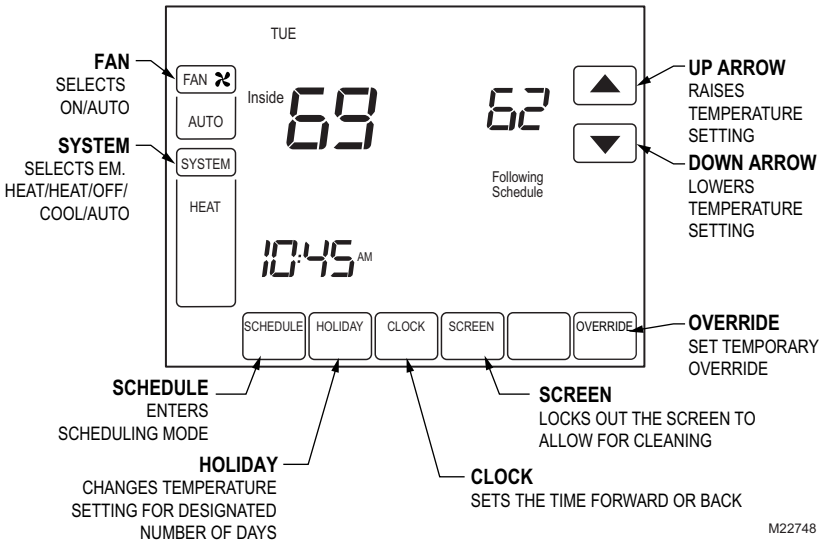


Fig. 34. Main screen selections.

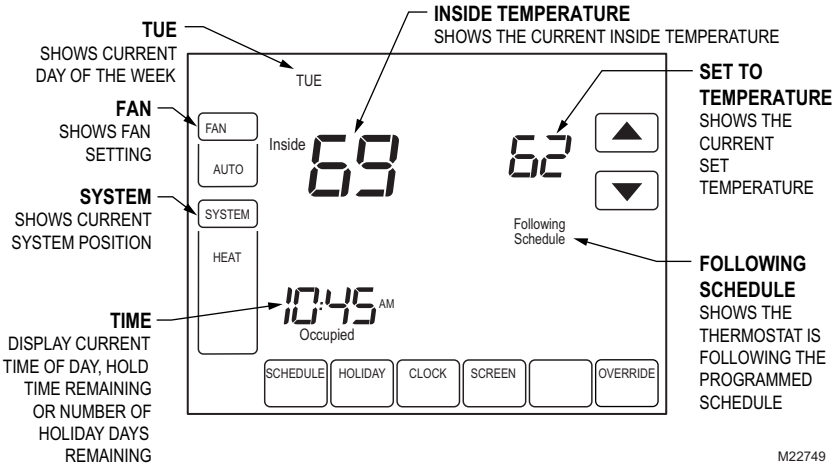


Fig. 35. Main screen display.

PROGRAMMING

Table 7 shows default program settings.

Table 7. Energy Star Default Program Settings.

Schedule Period	Time	Setpoints		Fan Setting
		Heat	Cool	
Occ1	8:00am	70°F (21°C)	75°F (24°C)	On
Unocc1	10:00pm	55°F (10°C)	85°F (29.5°C)	Auto
Occ2	—	—	—	—
Unocc2	—	—	—	—

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.

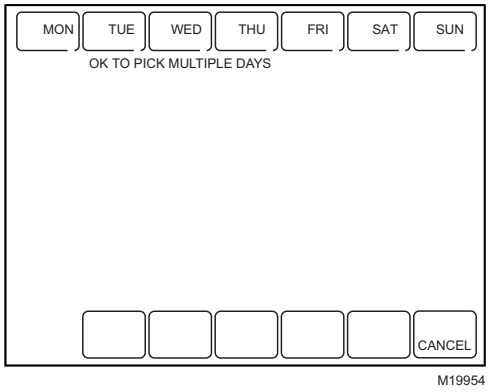


Fig. 36. Initial schedule edit screen.

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.

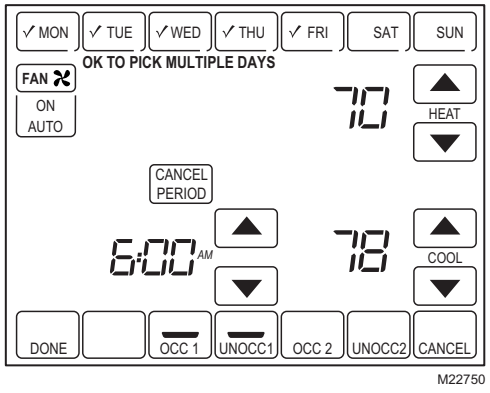


Fig. 37. Screen to edit existing settings.

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 UNNOC 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.

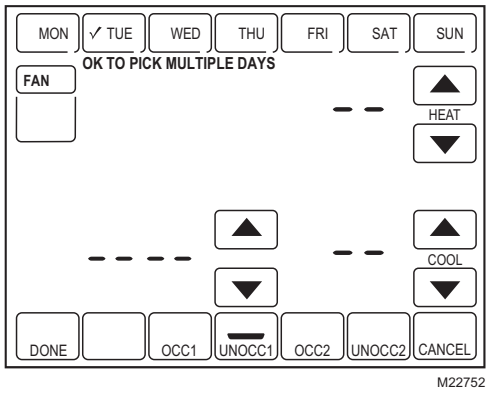


Fig. 38. Screen displayed when a period is cancelled.

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 Temperature 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 approximately 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 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 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.

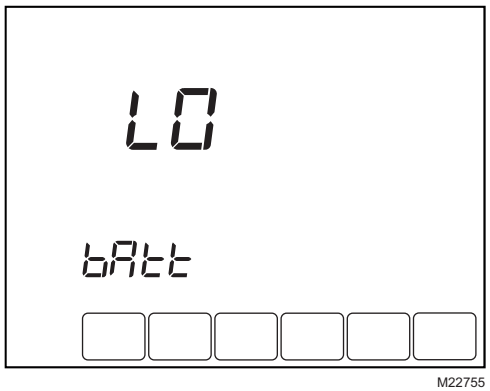


Fig. 39. Low battery signal.

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.

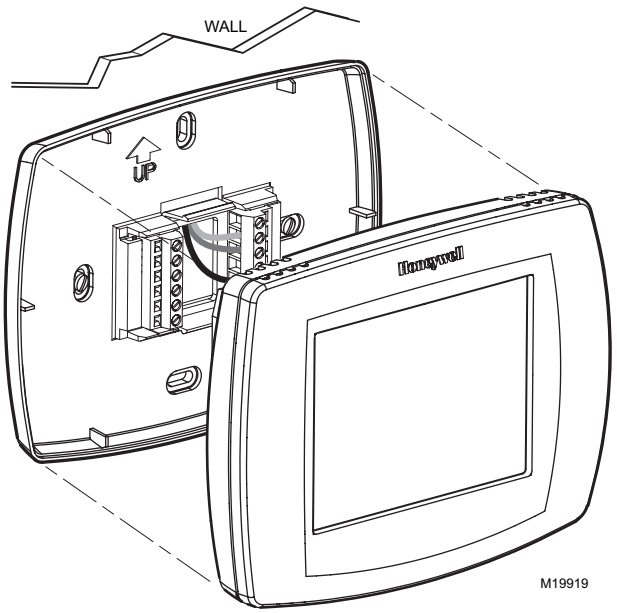


Fig. 40. Removing thermostat from subbase.

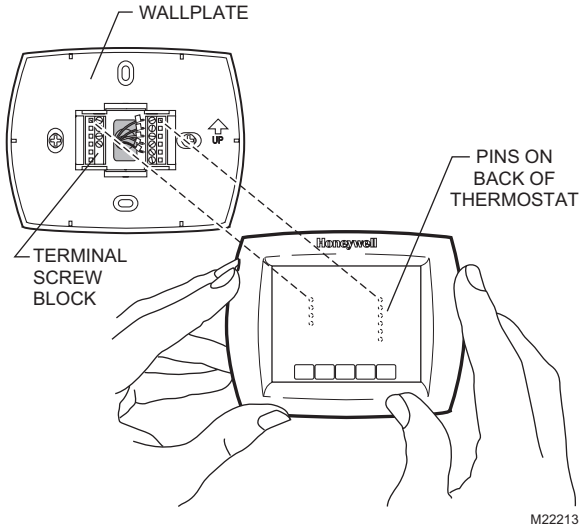


Fig. 41. Placing thermostat back onto subbase.

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 8. Operation of Terminal A.

Effective Occupancy	Call for Cool	Terminal A	
		Economizer	TOD
Occupied	—	Energized	Energized
Unoccupied	Yes	Energized	De-energized
	No	De-energized	De-energized
Override	—	Energized	Energized

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.
2. Choose **Outdoor Temperature Sensor for Heat Pump Temperature Lockouts Option** in ISU 0340.
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.
4. Choose **Auxiliary Lockout Temperature** in ISU 0360.

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.

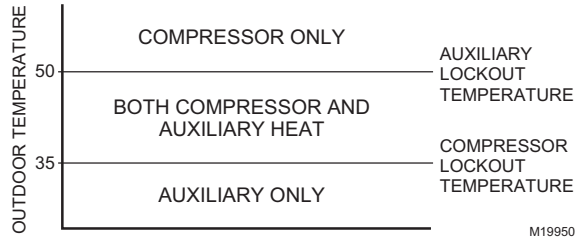


Fig. 42. Heat Pump Operation with Lockout Temperatures Set.

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.

System Setting	Fan Setting	Call for Action	Energize Terminals	Screen Message
Off	Auto	—	—	—
Cool	Auto	—	—	—
Cool or Auto	Auto	Stage 1 Cooling	Y, G	Cool On
Cool or Auto	Auto	Stages 1 and 2 Cooling	Y, Y2[a], G	Cool On
Heat	Auto	—	—	—
Heat or Auto	Auto	Stage 1 Heating	W, G[b]	Heat On
Heat or Auto	Auto	Stages 1 and 2 Heating	W, W2[c], G[b]	Heat On

[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.

System Setting	Fan Setting	Call for Action	Energize Terminals	Screen Message
Off	Auto	—	O/B[a]	—
Cool				
Cool or Auto	Auto	Stage 1 Cooling	Y, G, O/B[a]	Cool On
		Stages 1 and 2 Cooling	Y, Y2[b], G, O/B[a]	
Heat	Auto	None	O/B[a]	—
Heat or Auto	Auto	Stage 1 Heating	Y, G, O/B[a]	Heat On
		Stages 1 and 2 Heating	Y, W1[c], G, O/B[a]	Auxiliary Heat On
		Stages 1, 2 and 3 Heating	Y, Y2[b], W1[d], G, O/B[a]	

[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.

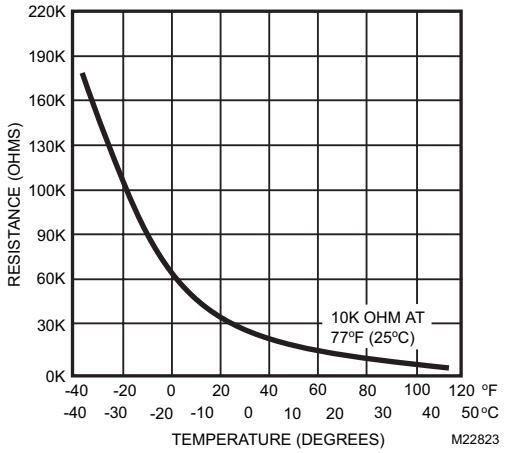


Fig. 43. 10K ohm sensor resistance versus temperature.

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.

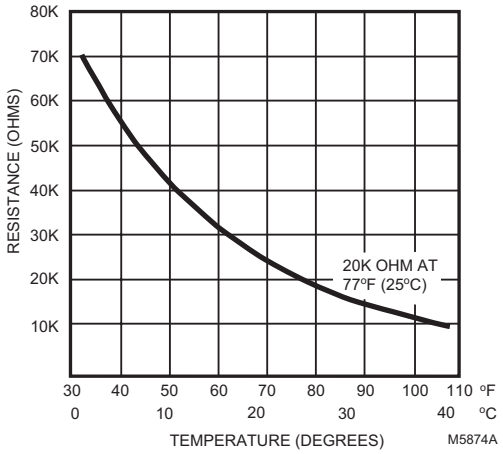


Fig. 44. 20K ohm sensor resistance versus temperature.

TROUBLESHOOTING (TABLE 11)

Table 11. Troubleshooting.

Symptom	Possible Cause	Action
Display does not come on.	Thermostat is not being powered.	Check for 24 Vac between C and Rc. Check that AAA batteries are installed correctly and are good.
Temperature settings do not change.	The upper or lower temperature limits were reached.	Check temperature setpoints. Check ISU 0600 and 0610; modify as needed.
	The keypad is fully locked.	Check ISU 0670 to change keypad locked 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.
	System type Selection is incorrect.	Check ISU 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 ISU 0170 and make sure correct system type is chosen. Verify operation of equipment in System Test mode.
Heat does not turn on (Heat On is solid in the display).	Heating equipment failure.	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. 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.
	Loose or broken wire connection between thermostat and heating equipment.	Check for 24 Vac between the heat terminal (W) and transformer common. If voltage is not present, check wire connection (loose or broken) between the thermostat and the heating equipment.
Cooling does not turn on (Cool On is solid in the display).	Cooling equipment failure.	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. 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.
	Loose or broken wire connection between thermostat and cooling equipment.	Check for 24 Vac between the cool terminal (Y) and transformer common. If voltage is not present, check the wire connection (loose or broken) between the thermostat and the cooling equipment.
Fan does not turn on in a call for heat (electric furnace).	Fan Control in Heating is set to Gas or Oil Furnace (Setting 0180).	Set Fan Control in Heating to Electric Furnace (Setting 0180).
Heat pump puts out cool air in the heat mode and warm air in the cool mode.	Changeover Valve (ISU 0190) is not configured to match the changeover required by the installed heat pump.	Set Changeover Valve (ISU 0190) to match the changeover required by the installed heat pump.
Both the heating and cooling equipment are running at the same time.	The heating equipment is not a heat pump but the System Type (ISU 0170) is set to Heat Pump.	Set System Type (ISU 0170) to match the installed heating and/or cooling equipment.
	Heating and cooling wires are shorted together.	Separate the shorted heating and cooling wires.

Table 11. Troubleshooting. (Continued)

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

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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