T7100F Microelectronic Conventional or Heat Pump Thermostat

INSTALLATION INSTRUCTIONS

APPLICATION

The T7100F Microelectronic Thermostat provides electronic control of 24 Vac commercial single zone heating, ventilating and air conditioning (HVAC) equipment. It is designed for use with the Q7100A Subbases for conventional heat/cool applications and the Q7100C Subbases for heat pump applications. The T7100F is field configurable for automatic or manual changeover between heating and cooling. All T7100F Thermostats require a common wire to supply power.

NOTE: When Q7100C Subbases are used, Installer Setup Option must be set to 01 (heat pump).

RECYCLING NOTICE

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

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

INSTALLATION

When Installing this Product...

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

CAUTION

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

Mounting and Wiring Q7100 Subbase

Refer to the subbase installation instructions for mounting and wiring information.

Setting Keypad Lockout Switch

The T7100F can be configured for keypad lockout to prevent changes to the temperature or system settings. DIP switch number 1, on the back of the thermostat, activates the lockout feature. See Fig. 1. The DIP switch must be set to the ON position (up) to activate the lockout feature. The factory setting is off (down). Be sure to set the switch before mounting the thermostat on the subbase. When the DIP switch is set to the ON position it disables all of the keys on the thermostat.

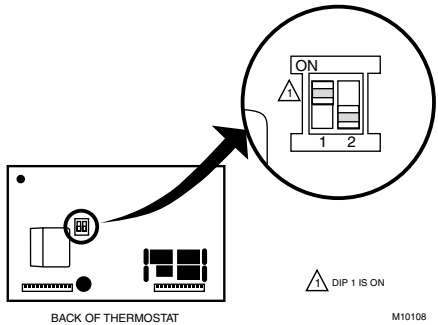

Fig. 1. Setting keypad lockout DIP switch (back of thermostat).

Mounting Thermostat

Mount the thermostat on the Q7100 Subbase after the Q7100 is installed:

1. Engage tabs at the top of the thermostat and subbase. Fig. 2.
2. Press lower edge of the case to close and latch.

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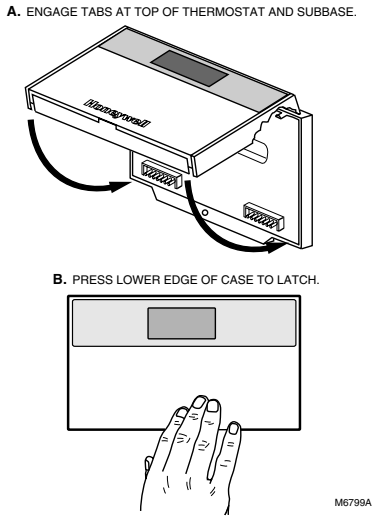

Fig. 2. Mounting thermostat on subbase.

NOTE: To remove the thermostat from the wall, first pull out at the bottom of the thermostat; then remove the top.

Using Thermostat Keys

The thermostat keys are used to:
- Set temperature,
- Display present setting,
- Configure Installer Setup,
- Check Self-Test.

Select models have keys to:
- Temporarily override the temperature,
- Set the system operation,
- Set the fan operation.

See Fig. 3 for key information.

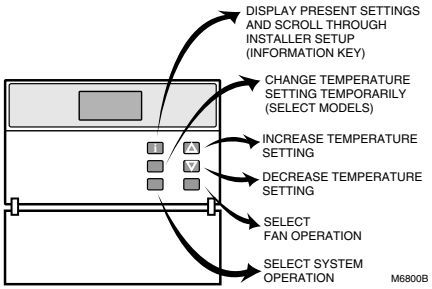

Fig. 3. Thermostat key locations and descriptions.

SETTINGS

System and Fan Settings

System settings control the thermostat operation as follows:

Em Heat (Q7100C only): Emergency heat relay is on continuously. Thermostat cycles highest stage of heat. Cooling system is off. Compressor is de-energized.

Heat: Thermostat controls the heating.

Off: Both the heating and cooling are off.

Cool: Thermostat controls the cooling.

Auto: Thermostat automatically changes between heating and cooling operation, depending on the indoor temperature.

Fan settings control the system fan as follows:

On: Fan operates continuously.

Auto: Equipment controls fan.

The system default setting is Heat and the Fan default setting is Auto. Use the keys to change to the desired settings.

Temperature Settings

The default setpoint for heat is 70°F (21°C) and for cool is 78°F (25.5°C). Press the increase ▲ or decrease ▼ key to change the setting. To change between heat and cool settings, press the Information [i] key until the setting to be changed appears.

Override Temperature Settings (Select Models)

The T7100 temperature settings can be overridden in three ways:
- — Using the T7100 Override key, acting as a toggle.
- — Using a remote setback timer.
- — Using an occupancy sensor.

The temperature settings change based on Installer Setup 27.

NOTE: Installer Setup 27 is factory set at zero degrees so this setting must be changed for the temperature to change.

The Override key changes the current temperature temporarily to a preset offset. The remote timer and occupancy sensor open (temporary setpoint) or close (comfort setpoint) contacts according to the settings. See Table 1.

Always check the display to determine if the thermostat is controlling the comfort, temporary or remote setpoints. Temporary is displayed when the Override key is pressed or the occupancy sensor or remote setback timer is energized.

Table 1. Temperature override.

System Setting	Comfort Setpoint	Installer Setup 27 Setting	Temporary Setpoint
Heat	68°F	10°F	58°F
Cool	74°F	10°F	84°F

INSTALLER SETUP

NOTE: For most applications, the thermostat factory settings do not need to be changed. Review the factory settings in Table 2 and if no changes are necessary go to the Installer Self-Test section.

The Installer Setup is used to customize the thermostat to specific systems. Some of the options include temperature display, remote sensing system, changeover, minimum equipment On time and minimum Off time. Installer modes are listed in numerical order in Table 2. It includes all the configuration options and the factory-settings available for the T7100F.

IMPORTANT

The Installer Setup must be set correctly for the HVAC equipment, thermostat and subbase to operate properly.

A combination of key presses are required to use the Installer Setup feature:

— To enter the Installer Setup mode, press and hold the Information [i] key with the increase ▲ and decrease ▼ keys until the first mode number is displayed. All display segments appear for approximately three seconds before the first mode number is displayed. See Fig. 4 and 5.

— To advance to the next Installer Setup mode, press the Information [i] key.

— To change a setting, use the increase ▲ or decrease ▼ key.

— To exit the Installer Setup mode, press and hold the Information [i] key until the display returns to normal (approximately three seconds). The display scrolls the mode numbers backward to get to the normal display. The Installer Setup mode is automatically exited if no key presses are made for five minutes.

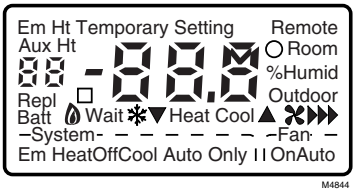

Fig. 4. Display of all LCD segments.

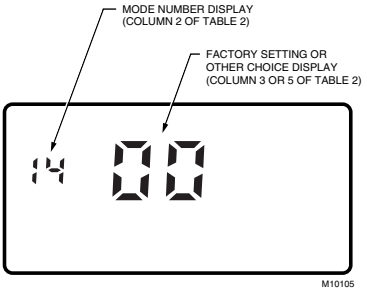

Fig. 5. Display of Installer Setup mode and setting.

⚠ CAUTION

Equipment Damage.

Damage can result when the system runs without the fan.

Configure heat pump and electric heat systems correctly in Installer Setup modes 01 and 02.

NOTE: Only configurable Mode Numbers are shown.

Table 2. Thermostat Installer Setup Options.

Select	Mode Number (Press [i] key to change)	Factory-Setting		Other Choices (Press ▲ or ▼ key to change)	
		Display	Description	Display	Description
Application.	01	00	Conventional equipment application (Q7100A).	01	Heat pump application (Q7100C,D) (fan operation is automatically selected so go to mode number 03).
Fan operation[a].	02	00	Conventional applications where equipment controls fan operation in heat mode.	01	Electric heat applications where thermostat controls fan operation in heat mode.
Output stages of heating.	03	Depends on subbase.	Stages of heat.	01, 02, or 03	01—One stage of heat. 02—Two stages of heat. 03—Three stages of heat.
Heating cycle rate.	04	Depends on model	Stage 1.	03, 04,	03—3 cph used for hot water systems or high efficiency furnaces. 04—4 cph (factory setting for heat pump systems). 06—6 cph used for conventional systems. 08—8 cph (factory setting for conventional systems). 09—9 cph used for electric heat systems and is the factory setting for the emergency heat stage.
	05		Stage 2.	06, 08	
	06		Stage 3 (Q7100C only).	or 09	
	07		Emergency heat (Q7100C only).		

[a] Mode 01 must be 00 to allow a selection in this mode.

(continued)

Table 2. Thermostat Installer Setup Options (Continued).

Select	Mode Number (Press i key to change)	Factory-Setting		Other Choices (Press ▲ or ▼ key to change)	
		Display	Description	Display	Description
Output stages of cooling.	08	02	Two stages of cool.	00 or 01	00—No cooling. 01—One stage of cool.
Cooling cycle rate.	09	04	Stage 1.	03	3 cph.
	10	04	Stage 2.		
Not used.	11	—	—	—	—
Changeover (T7100F only).	12	00	System setting key is operational.	01 or 02	01—Manual changeover 02—Auto only.
Not used.	13	—	—	—	—
Degree temperature display.	14	00	Temperature is displayed in °F.	01	Temperature is displayed in °C.
Displaying temperature.	15	00	Temperature is displayed.	01	Temperature is not displayed.
Not used.	16 - 18	—	—	—	—
Extended fan operation in heating[b].	19	00	No extended fan operation after the call for heat ends.	01	Fan operation is extended 90 seconds after the call for heat ends.
Extended fan operation in cooling.	20	00	No extended fan operation after the call for cool ends.	01	Fan operation is extended 90 seconds after the call for cool ends.
Fan key adjustment.	21	00	Fan setting key is operational.	01	Fan setting key is continuously in the Auto position.
Remote sensing.	22	00	Remote sensing not activated.	01	Remote sensing activated.
Temperature averaging network[c].	23	00	Temperature averaging disabled.	01	Temperature averaging between local sensor and remote sensor(s) activated.
Not used.	24	—	—	—	—
Keypad lockout level.	25	0	No lockout.	01 - 02	01—View setpoint only. 02—Lockout all keys.
Not used.	26	—	—	—	—
Heating/cooling override.	27	00	No temperature change when override key is pressed.	01 - 15	°F the temperature setting is changed when the override key is pressed. Temporary is displayed.
Not used.	28 - 29	—	—	—	—
Deadband.	30	02	Heating and cooling setpoints can be set no closer than 2°F.	03 - 10	Heating and cooling setpoints can be set no closer than the chosen value.
Interstage control point (select models).	31	01 (Conventional) or 02 (Heat pump).	Temperature has to change 1°F or 2°F before the system calls for the next stage.	00 - 12	Temperature has to change the chosen value before the system calls for the next stage.
Minimum On time.	32	02	2-minute minimum On time for heating and cooling.	00 or 01	No minimum On time or 1 minute minimum On time for heating and cooling.
Minimum Off time for the compressor.	33	04	4-minute minimum Off time for the compressor.	00, 01, 02, 03 or 05	Minimum number of minutes (0 thru 5) the compressor will be off between calls for the compressor.

[b] Mode 01 or 02 must be 01 to extend fan operation.

[c] Mode 22 must be set to 01 and remote sensor(s) must be installed.

(continued)

Table 2. Thermostat Installer Setup Options (Continued).

Select	Mode Number (Press i key to change)	Factory-Setting		Other Choices (Press ▲ or ▼ key to change)	
		Display	Description	Display	Description
Temperature range stops in heating (T7100F only).	34	90	Highest heating setpoint allowed.	40 - 89	Temperature range for (1°F increments) heating setpoint.
Temperature range stops in cooling (T7100F only).	35	45	Lowest cooling setpoint allowed.	46 - 99	Temperature range for (1°F increments) cooling setpoint.
Not used.	36	—	—	—	—
Temperature display adjustment.	37	00	No difference in displayed temperature and actual room temperature.	01 - 06	01—Display adjusts to 1°F higher than actual room temperature. 02—Display adjusts to 2°F higher than actual room temperature. 03—Display adjusts to 3°F higher than actual room temperature. 04—Display adjusts to 1°F lower than actual room temperature. 05—Display adjusts to 2°F lower than actual room temperature. 06—Display adjusts to 3°F lower than actual room temperature.
Minimum Off times in heating.	38	02	2-minute minimum Off time.	00, 01, 03, 04 or 05	Minimum number of minutes (0 thru 5) the heating equipment is off between calls for heat.

INSTALLER SELF-TEST

Use the Installer Self-Test to check the thermostat configurations and operation. Refer to Table 3 for a list of the available Self-Tests.

NOTE: The minimum Off time for compressors is bypassed during the Installer Self-Test.

To start the Self-Test:

Press and hold the increase ▲ and decrease ▼ keys, at the same time, until two zeros appear. All segments of the LCD are displayed for three seconds before the two zeros appear. Refer to Fig. 6 and 7.

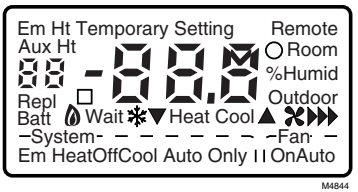

Fig. 6. Display of all LCD segments.

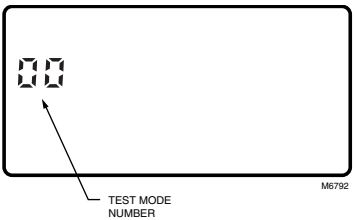

Fig. 7. Display of Test Mode number.

Table 3. Installer Self-Test Mode Tests.

Test Number	Self-Test Description
10-19	Heating equipment can be turned on and off.
20-29	Emergency heat (Q7100C only) equipment can be turned on and off.
30-39	Cooling equipment can be turned on and off.
40-49	Fan equipment can be turned on and off.
60-69	Keyboard keys test.
70-79	Thermostat information including date code and software versions is displayed.

Refer to Table 4 for the directions and results of the specific tests.

NOTE: Press and hold the increase ▲ and decrease ▼ keys for three seconds to exit the Self-Test mode. Self-Test times out after five minutes without any key presses.

Table 4. Installer Self-Test Options.

Key to Press	Test Mode Number	Description
Heating Equipment Self-Test		
i	10	Enter heating equipment Self-Test.
▲	11	Stage-one heat comes on. When Installer Setup mode number 01 is 01 or mode number 02 is 01, the system fan is also energized.
▲	12	Stage-two heat comes on. Stage-one heat and system fan remain on.
▲	13	Stage-three heat comes on (heat pump configuration). Stage-one and stage-two heat remain on.
▼	12	Stage-three heat turns off.
▼	11	Stage-two heat turns off.
▼	10	Stage-one heat and system fan turn off.
Emergency Heating Equipment Self-Test (with select Q7100C Subbase models)		
i	20	Change from heating to emergency heating equipment Self-Test.
▲	21	Emergency heat comes on.
▼	20	Emergency heat turns off.
Cooling Equipment Self-Test		
i	30	Change from heating or emergency heating to cooling equipment self-test.
▲	31	Stage-one cooling and system fan come on.
▲	32	Stage-two cool comes on. Stage-one cool and system fan remain on.
▼	31	Stage-two cool turns off.
▼	30	Stage-one cool and system fan turn off.
Fan Equipment Self-Test		
i	40	Change from cooling to fan equipment Self-Test.
▲	41	Fan comes on.
▼	40	Fan turns off.
KEY TEST[a]		
i	60	Displays 2.
▲	60	Displays 4.
▼	60	Displays 3.
Override	60	Displays 5.
System[a]	60	Displays 0.
Fan[a]	60	Displays 1.

[a]Available on select models.

Thermostat Information

1. Press the Information i key to access the thermostat information.

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2. Press the increase ▲ key to display the production date code. The first two large digits are the month and the third digit is the last digit of the year. (Example: 026 = February 1996)

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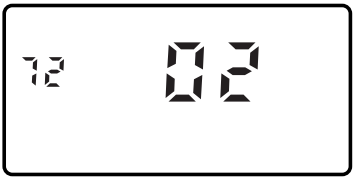
3. Press the increase ▲ key again to display the software identification code.
(Example: 02 = software ID code 2)



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4. Press the increase ▲ key again to display the software revision number.
(Example: 001 = revision number 1)

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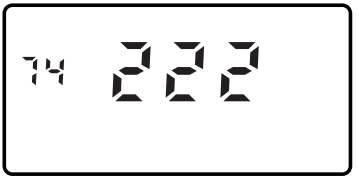
5. Press the increase ▲ key again to display the EEPROM identification code.
(Example: 222 = EEPROM ID 222)



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6. Press and hold both the increase ▲ and the decrease ▼ keys, until the room temperature is displayed, to exit the Self-Test. The Self-Test times out after five minutes without any key presses.

TROUBLESHOOTING GUIDE

Symptom	Possible Cause	Action
Display does not come on.	Thermostat is not powered.	• Check that X terminal is connected to the system transformer. • Check for 24 Vac between X and R or RH terminals. — If missing 24 Vac: — Check if the circuit breaker is tripped—reset the circuit breaker. — Check if the system fuse is blown—replace the fuse. — Check if the power switch on the HVAC equipment is in the Off position—set to the On position. — Check the wiring between the thermostat and the HVAC equipment—replace any broken wires and tighten any loose connections. — If 24 Vac is present, proceed with troubleshooting.
	Thermostat microprocessor is locked up.	Remove the thermostat from the subbase for 2 minutes. After 2 minutes, replace the thermostat on the subbase.
Temperature display is incorrect.	Room temperature display has been reconfigured.	Enter Installer Setup 37 and reconfigure the display.
	Thermostat is configured for °F or °C display (select models).	Enter Installer Setup 14 and reconfigure the display.
	Bad thermostat location.	Relocate the thermostat.
	Display shows two dashes and a degree sign.	Installer Setup 22 is set for remote sensing and the sensor is missing or the circuit is open or shorted.
Temperature settings will not change. (Example: Cannot set heating higher or cooling lower.)	Upper or lower temperature limits were reached.	Check the temperature setpoints: • Heating limits are 40 to 90°F (7 to 31°C). • Cooling limits are 45 to 99°F (9 to 37°C).

(continued)

TROUBLESHOOTING GUIDE (Continued)

Symptom	Possible Cause	Action
Heating does not come on.	No power to the thermostat.	• Check that X terminal is connected to the system transformer. • Check for 24 Vac between X and R or RH terminals. — If missing 24 Vac: — Check if the circuit breaker is tripped—reset the circuit breaker. — Check if the system fuse is blown—replace the fuse. — Check if the system switch at the equipment is in the Off position—set to On position. — Check wiring between the thermostat and the HVAC equipment—replace any broken wires and tighten any loose connections. — If 24 Vac is present, proceed with troubleshooting.
	Thermostat minimum Off time is activated and wait indicator is displayed.	• Wait up to five minutes for the system to respond. • Enter Installer Setup 38. Reconfigure minimum On time (if required).
	System selection is not set to Heat.	Set system selection to Heat.
Cooling does not come on.	No power to the thermostat.	• Check that the X terminal is connected to the system transformer. • Check for 24 Vac between X and R or RC and Y terminals. — If missing 24 Vac: — Check if the circuit breaker is tripped—reset the circuit breaker. — Check if the system fuse is blown—replace the fuse. — Check if the system switch at the equipment is in the Off position—set to the On position. — Check wiring between thermostat and HVAC equipment—replace any broken wires and tighten any loose connections. — If 24 Vac is present, proceed with troubleshooting.
Cooling does not come on (continued)	Thermostat minimum Off time is activated and wait indicator is displayed.	• Wait up to five minutes for the system to respond. • Enter Installer Setup 33. Reconfigure minimum Off time (if required).
	System selection is not set to Cool.	Set system selection to Cool.
System On indicator is lit, but no heat is being delivered.	Fan operation set to 00 (conventional heat) when it should be set to 01 (electric heat).	Enter Installer Setup mode number 02 and reconfigure the fan operation.
	Conventional heating equipment turns on the fan when the furnace has warmed up to a setpoint.	Wait a minute after seeing the On indicator and then check the registers.
	Heating equipment is not operating.	Verify operation of heating equipment in Self-Test.
24V is present on all terminals.	When thermostat is powered but is not connected to heating/cooling equipment, arc suppression will be present (24V ghost voltage)	Connect heating/cooling equipment to the thermostat. Voltage will drop to zero.