T8524C,D Multistage Microelectronic Thermostats

TRADELINE®

APPLICATION

The T8524C, D Multistage Microelectronic Thermostat provides electronic control of 24 Vac two-stage heating and two-stage cooling systems. Refer to Table 1 for a general description of the thermostat. All T8524 Thermostats require a common wire to supply power.

Table 1. Description of T8524 Thermostats.

T8524	System	Changeover	System Selection	Fan Selection	Comments
C	Heat-Cool	Manual	Heat-Off-Cool	On-Auto	System and fan selections are done by switches.
D	Heat-Cool	Automatic	Heat-Off-Cool-Auto	On-Auto	System and fan selections are done by keyboard.

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 regarding 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 the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After completing installation, use these instructions to check out the product operation.

⚠ CAUTION

Disconnect power supply to prevent electrical shock or equipment damage.

Location

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

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.

Wallplate Installation

The thermostat can be mounted horizontally on the wall or on a 2 in. x 4 in. wiring box. Position wallplate horizontally on the wall or on a 2 in. x 4 in. wiring box.

1. Position and level the wallplate (for appearance only). The thermostat will function properly even when not level.
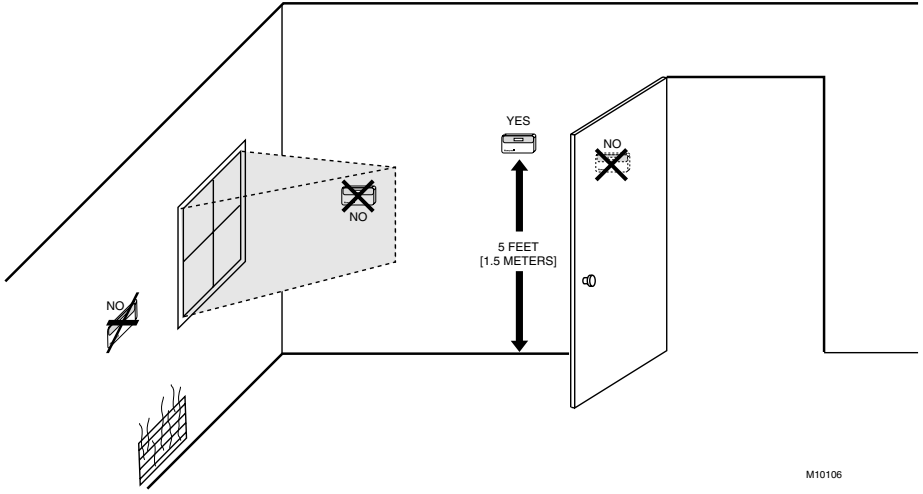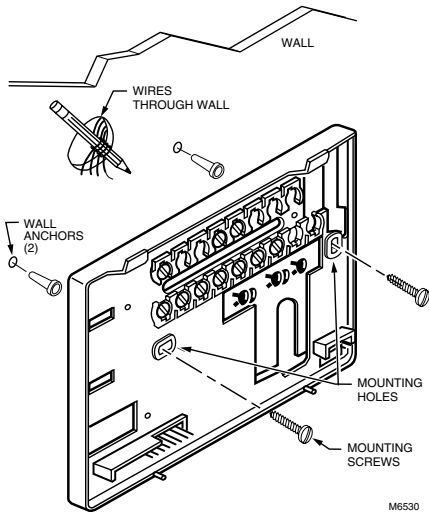
Fig. 1. Typical location of thermostat.

Fig. 2. Mounting the wallplate.

2. Use a pencil to mark the mounting holes. See Fig. 2.

3. Remove the wallplate from the wall and drill two 3/16 inch holes in the wall (if drywall) as marked. For firmer material such as plaster or wood, drill two 7/32 inch holes. Gently tap anchors (provided) into the drilled holes until flush with the wall.

4. Position the wallplate over the holes, pulling wires through the wiring opening.

5. Loosely insert the mounting screws into the holes.

6. Tighten mounting screws.

WIRING

All wiring must comply with local electrical codes and ordinances. Refer to Fig. 3 for typical hookups. A letter code is located near each terminal for identification.

⚠ **CAUTION**
Disconnect power before wiring to prevent electrical shock or equipment damage.

1. Loosen the terminal screws on the wallplate and connect the system wires. See Fig. 4.

IMPORTANT
Use 18 gauge, color-coded thermostat cable for proper wiring.

2. Securely tighten each terminal screw.

3. Push excess wire back into the hole.

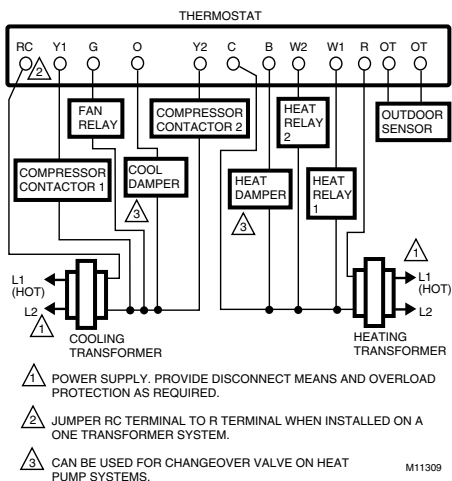**4.** Plug the hole with nonflammable insulation to prevent drafts from affecting the thermostat.

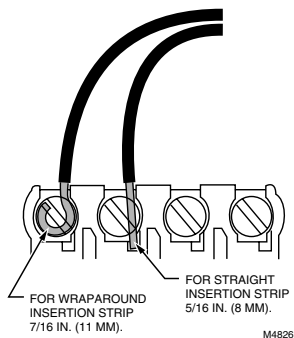**Fig. 3. Typical hookup of T8524 in a multistage heating and cooling system.**

Fig. 4. Proper wiring technique.

Mounting Thermostat

1. Engage tabs at the top of the thermostat and wallplate. See Fig. 5.

2. Press lower edge of case to close and latch.

Using Thermostat Keys
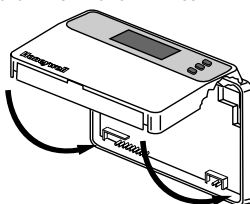
The thermostat keys are used to:
- set temperature,
- display present setting,
- configure Installer Setup,
- check System Test,
- display outdoor temperature (select models).

T8524D has keys to:
- set the system operation,
- set the fan operation.

See Fig. 6 for key information.
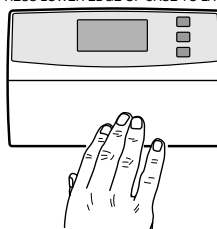
Fig. 5. Mounting thermostat on wallplate.

NOTE: To remove the thermostat from the wall, first pull out at the bottom of the thermostat; remove top last.
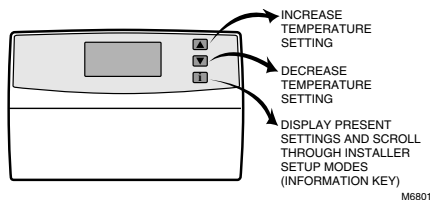
Fig. 6. Thermostat key locations and descriptions.

SETTINGS

System and Fan Settings

System settings control the thermostat operation as follows:

Heat: The thermostat controls the heating.
Off: Both the heating and cooling are off.
Cool: The thermostat controls the cooling.
Auto (T8524D only): The 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 keyboard or system and fan switches, depending on model, to change to the desired settings. See Figs. 7 and 8.

Fig. 7. T8524C system and fan switches location.

⚠ CHECK LIGHT ON SELECT MODELS   M10147

Fig. 8. T8524D system and fan keys location.

NOTE: Always press the system and fan keys with your fingertip or similar blunt tool. Sharp instruments like a pen or pencil point can damage the keyboard.

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 present setting. To change between heat and cool, press the Information ⓘ key until the setting to be changed appears.
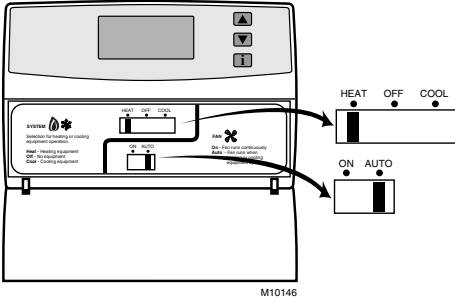
INSTALLER SETUP

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 System Test section.

The Installer Setup is used to customize the thermostat to specific systems. Installer Setup Numbers are listed in Table 2. The table includes all the configuration options available.

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

— To enter the Installer Setup mode, press and hold the Information ⓘ key with the increase ▲ and decrease ▼ keys until the first number is displayed. All display segments appear for approximately three seconds before the number is displayed. See Fig. 9 and 10.
— To advance to the next Installer Setup number, press the Information ⓘ key.
— To change a setting, use the increase ▲ or decrease ▼ key.
— To exit the Installer Setup, press and hold the Information ⓘ key until the display returns to normal (approximately three seconds). The display scrolls the numbers backwards to get to the normal display. The Installer Setup is automatically exited if no key presses are made for five minutes.

IMPORTANT

Only configurable numbers are shown on the device. Example: If the thermostat does not have a system key, Installer Setup Number 12 will not be displayed. Review Table 2 factory-settings and mark any desired changes in the Actual Setting column. When Installer Setup in complete, review the settings to confirm that they match the system.

Fig. 9. Display of all the segments of the LCD.

Fig. 10. Display of Installer Setup mode and setting.

⚠ CAUTION

Electric heat systems must be configured to 01 in Installer Setup 02 to prevent equipment damage caused by the system running without the fan.

Table 2. Thermostat Installer Setup Options.

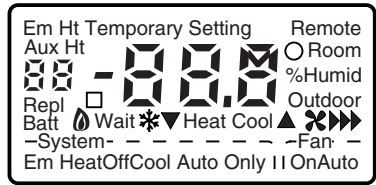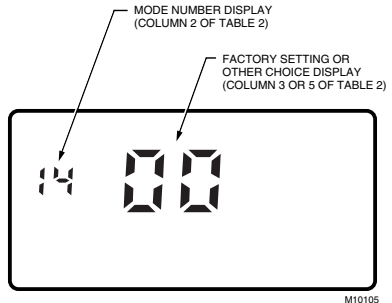| Select	Installer Setup Number (Press ⓘ key to change)	Factory-Setting		Other Choices (Press ▲ or ▼ key to change)		Actual Setting
		Display	Description	Display	Description	
Not used	01	—	—	—	—	—
Fan operation[a]	02	00	Conventional applications where equipment controls fan operation in heat mode	01	Heat pump and electric heat applications where thermostat controls fan operation in heat mode	
Not used	03 and 04	—	—	—	—	—
Stage-two heating cycle rate	05	06	6 cph used for conventional systems	01, 03, or 09	01—1 cph used for radiant floor heat, gravity systems 03—3 cph used for hot water systems or high efficiency furnaces 09—9 cph used for electric heat systems	
Not used	06 thru 11	—	—	—	—	—
Changeover (T8524D only)	12	01	Manual changeover	00	Automatic changeover	
Not used	13	—	—	—	—	—
Degree temperature display	14	00	Temperature is displayed in °F	01	Temperature is displayed in °C	
Not used	15 thru 18	—	—	—	—	—
Extended fan operation in heating[a,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[a]	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	
Not used	21 thru 23	—	—	—	—	—
Outdoor temperature display[a]	24	00	No outdoor temperature is displayed	01	Outdoor temperature is displayed. Needs a C7089B1000 Outdoor Sensor to operate.	
Not used	25 thru 29	—	—	—	—	—
Deadband	30	03	Heating and cooling setpoints can be set no closer than 3°F (1.5°C)	04 thru 10	Heating and cooling setpoints can be set no closer than the chosen value: 04—4°F (2°C) 05—5°F (2.5°C) 06—6°F (3°C) 07—7°F (3.5°C) 08—8°F (4°C) 09—9°F (4.5°C) 10—10°F (5°C)	
Not used	31 and 32	—	—	—	—	—
Minimum off time for the compressor	33	05	5 minute minimum off time for the compressor	00, 01, 02, 03 or 04	Minimum number of minutes (0 thru 5) the compressor will be off between calls for the compressor	

[a] Available on select models.
[b] Installer Setup Number 02 must be set to 01 to extend fan operation.

Table 2. Thermostat Installer Setup Options (continued).

Select	Installer Setup Number (Press ⓘ key to change)	Factory-Setting		Other Choices (Press ▲ or ▼ key to change)		Actual Setting
		Display	Description	Display	Description	
Heating setpoint range stop[a]	34	90	Heating setpoint can be set no higher than 90°F	40 thru 90	Number can be set anywhere between 40 and 90 in 1°F increments	
Cooling setpoint range stop[a]	35	45[b]	Cooling setpoint can be set no lower than 45°F[b]	45[b] thru 99	Number can be set anywhere between 45[b] and 99 in 1°F increments	
Not used	36	—	—	—	—	—
Temperature display adjustment	37	00	No difference in displayed temperature and actual room temperature	-3 thru 3	1—Display adjusts to 1°F higher than actual room temperature 2—Display adjusts to 2°F higher than actual room temperature 3—Display adjusts to 3°F higher than actual room temperature -1—Display adjusts to 1°F lower than actual room temperature -2—Display adjusts to 2°F lower than actual room temperature -3—Display adjusts to 3°F lower than actual room temperature	

[a] Available on select models.
[b] T8524D is 48°F (9°C).

IMPORTANT
> Review the settings to confirm that they match the system.

INSTALLER SYSTEM TEST

Use the Installer System Test to check the thermostat configurations and operation. Refer to Table 3 for a list of the available system tests.

To start the system test::

NOTE: The minimum off time for compressors is bypassed during the Installer System Test.

Press and hold the increase ▲ and decrease ▼ keys, at the same time, until two zeros appear. All segments of the LCD are displayed before the two zeros appear.

TEST MODE NUMBER

M6792

IMPORTANT
> T8524C models must set the switches to the equipment that is being checked for the equipment to operate.

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

Table 3. Tests Available In The Installer System Test.

Test Number	System Test Description
10-19	Heating equipment can be turned on and off
30-39	Cooling equipment can be turned on and off
40-49	Fan equipment (T8524D only) can be turned on and off.
60-69	System key or system switch position test
70-79	Thermostat information including date code and software versions are displayed

Table 4. Installer System Test Options.

Key to Press	Test Number	Description
Heating Equipment System test		
i	10	Enter heating equipment system test. (Set system switch to HEAT on T8524C.)
▲	11	Stage-one heat comes on. The system fan is also energized.[a]
▲	12	Stage-two heat comes on. Stage-one heat and system fan remain on.
▼	11	Stage-two heat turns off.
▼	10	Stage-one heat and system fan turn off.
Cooling Equipment System test		
i	30	Enter cooling equipment system test. (Set system switch to COOL on T8524C.)
▲	31	Stage-one cool 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 System test (T8524D only)		
i	40	Change from cooling to fan equipment system test.
▲	41	Fan comes on.
▼	40	Fan turns off.
Key or Switch Operation System test ***IMPORTANT*** *Test Numbers will only be displayed when the system is configured for the selected function. EXAMPLE: Numbers 60, 61 and 62 are the only numbers that will be displayed when a system is configured for heat only.*		
SYSTEM KEY OR SWITCH SYSTEM TEST (Move switch to see Test Numbers on T8524C.)		
i	60	Change from cooling or fan to key operation system test.
System	61	Heat Test Number is displayed. (Set system switch to HEAT on T8524C.)
System	62	Off Test Number is displayed. (Set system switch to OFF on T8524C.)
System	63	Cool Test Number is displayed. (Set system switch to COOL on T8524C.)
System	64	Auto Test Number is displayed.
FAN KEY SYSTEM TEST (T8524D only)		
Fan	68	Fan on Test Number is displayed.
Fan	69	Fan off Test Number is displayed.

[a] System fan is energized only if set for electric heat.

Thermostat Information

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

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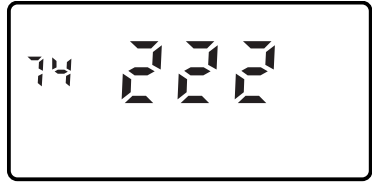
3. Press the increase ▲ key again to display the software identification code. (Example: 02 = software ID code 2)

M4866

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

M6791

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

M4867

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

CHECKOUT

Outdoor Temperature Sensor (Where Applicable)

Allow the outdoor temperature sensor to soak in the outdoor air for a minimum of five 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. Match the thermometer reading to the outdoor temperature display at the thermostat.

TROUBLESHOOTING GUIDE

Symptom	Possible Cause	Action
Display will not come on.	Thermostat is not being powered.	• Check that C terminal is connected to the system transformer. • Check for 24 Vac between C 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 wiring between thermostat and HVAC equipment—replace any broken wires and tighten any loose connections. — If 24 Vac is present, proceed with troubleshooting.
Temperature display is incorrect.	Room temperature display has been reconfigured.	Enter Installer Setup Number 37 and reconfigure the display.
	Thermostat is configured for °F or °C display.[a]	Enter Installer Setup Number 14 and reconfigure the display.
	Bad thermostat location.	Relocate the thermostat.
Temperature settings will not change. (Example: Cannot set the heating higher or the cooling lower.)	The 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) except T8524D cooling limits are 48 to 99°F
	The setpoint temperature range stops were configured.	Check Installer Setup mode numbers 34 and 35 and reconfigure the setpoint stops.

[a] Available on select models.

(Continued)

TROUBLESHOOTING GUIDE (Continued)

Symptom	Possible Cause	Action

Heating will not come on.	No power to the thermostat.	• Check that C terminal is connected to the system transformer.
		• Check for 24 Vac between C 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 thermostat and HVAC equipment—replace any broken wires and tighten any loose connections.
		  — If 24 Vac is present, proceed with troubleshooting.

Heating will 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.	Set system selection to Heat.
	Heating setpoint is below room temperature.	Check heating setpoint. Set heating setpoint to desired temperature.

Cooling will not come on.	No power to the thermostat.	• Check that C terminal is connected to the system transformer.
		• Check for 24 Vac between C 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.

	Thermostat minimum off time is activated.	• Wait up to five minutes for the system to respond. • Enter Installer Setup mode number 33. Reconfigure minimum off time (if required).
	System selection is not set to Cool.	Set system selection to Cool.
	Cooling setpoint is above room temperature.	Check cooling setpoint. Set cooling setpoint to desired temperature.
Heating or cooling comes on momentarily and shuts off	Heat or cool circuit is opening up or becoming high impedance.	Add resistor in parallel with load or install interface relay.
System On indicator is lit, but no heat is being delivered.	Fan operation set for 00 (conventional heat) when it should be set for 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 system test.
Outdoor temperature not displayed[a]	Option not activated.	Enter Installer Setup mode number 24 and set to 01. Thermostat must have OT terminals and a C7089B1000 installed.
Outdoor temperature display is incorrect[a]	Outdoor sensor is connected incorrectly.	Refer to C7089B1000 installation instructions and check wiring between the thermostat and sensor.
	Wrong sensor.	Replace sensor with C7089B1000 sensor.

[a] Available on select models.

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