

# AprilAire<sup>®</sup>

## Thermostats

**SAFETY & INSTALLATION  
INSTRUCTIONS**

### **Model S84N 1H1C**

Conventional 1 Heat / 1 Cool Thermostat

### **Model S84N SU**

Single Stage Universal Thermostat



**READ AND SAVE THESE INSTRUCTIONS**

## TABLE OF CONTENTS

<b>INSTALLATION</b> .....	3	<b>SETUP AND TESTING</b> .....	16
Installation Location Recommendations ...	3	Installer Setup Wizard and Installer Setting .....	16
Outdoor Temperature Sensor (optional with S84N SU only) .....	4	HVAC Installer System Settings Table.....	17
Remote Temperature Sensor (optional with S84N SU only) .....	6	System Test Menu .....	23
Thermostat Mounting .....	8	<b>QUICK REFERENCE TO CONTROLS AND DISPLAY</b> .....	24
Power and Reset Options .....	9	<b>TROUBLESHOOTING</b> .....	27
Wiring Terminal .....	9	Error Codes.....	29
<b>WIRING DIAGRAMS</b> .....	11	<b>THERMOSTAT FEATURES</b> .....	30
Single Stage Heat/Cool, One Transformer (S84N 1H1C) .....	11	<b>SPECIFICATIONS</b> .....	31
Single Stage Heat/Cool, (Ex: Boiler) Two Transformer (S84N 1H1C).....	12		
Single Stage Heat/Cool, One Transformer (S84N SU) .....	13		
Single Stage Heat/Cool (Ex: Boiler), Two Transformer (S84N SU).....	14		
Single Stage Heat/Pump, One Transformer (S84N SU) .....	15		

## INSTALLATION

### INSTALLATION LOCATION RECOMMENDATIONS

#### Thermostat should be mounted:

- On an interior wall, in a frequently occupied space.
- Approximately 5 feet above floor.
- At least 18" from outside wall.
- Thermostat can be mounted to a vertical junction box.

#### Do not mount thermostat:

- Behind doors, in corners or other dead air spaces.
- In direct sunlight, near lighting fixtures, or other appliances that give off heat.
- On an outside or unconditioned area wall.
- In the flow of a supply register, in stairwells, or near outside doors.
- On a wall with concealed pipes or ductwork.

### OUTDOOR TEMPERATURE SENSOR (OPTIONAL WITH S84N SU ONLY)

Outdoor temperature can be measured by attaching the included 8052 sensor to the T1 and T2 terminals. The outdoor sensor must be enabled in the installer setup menu.

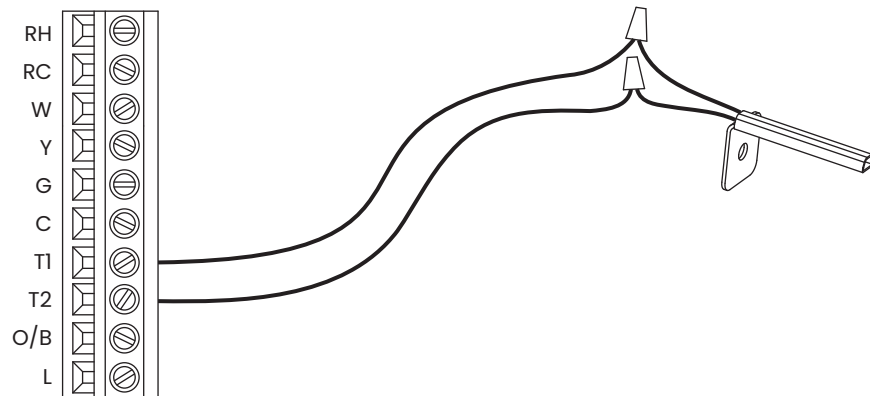
#### Heat pump models can use the outdoor temperature to effectively utilize the heat pump:

- When the outdoor temperature is lower than the Low Balance Point, the heat pump will be locked out and only auxiliary heating will be used to provide heating.
- When the outdoor temperature is higher than the High Balance Point, the auxiliary heating will be locked out and only the heat pump will be used to provide heating.

#### Outdoor temperature sensor should be mounted:

- On side of building out of direct sunlight (north side recommended).
- Above snow line.
- At least 3 feet away from exhaust vents and condensing lines.
- Using less than 300 feet of wire.
- Do not route wires along 120 VAC lines.

FIGURE 1 – OUTDOOR TEMPERATURE SENSOR WIRING



## REMOTE TEMPERATURE SENSOR (OPTIONAL WITH S84N SU ONLY)

A remote temperature sensor can be used for control if the thermostat is to be mounted in a concealed location or a remote sensor can be averaged with the thermostat sensor to control a large space. An 8051 flush mount or 8053 surface mount remote temperature sensor can be attached to the T1 and T2 terminals and mounted in a recommended area. The remote sensor must be enabled in the installer set-up menu, and once enabled will override or be averaged with the thermostat's internal temperature sensor, based on the setting.

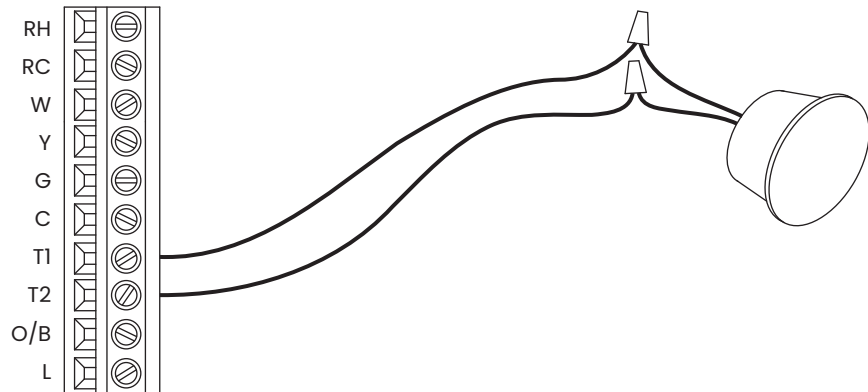
### Remote temperature sensor should be mounted:

- On an interior wall, in a frequently occupied space.
- Approximately 5 feet above floor.
- At least 18" from outside wall.
- Using less than 300 feet of wire.

### Do not mount remote sensor:

- Behind doors, in corners or other dead air spaces.
- In direct sunlight, near lighting fixtures, or other appliances that give off heat.
- On an outside or unconditioned area wall.
- In the flow of a supply register, in stairwells, or near outside doors.
- On a wall with concealed pipes or ductwork.
- Near 120 VAC lines.

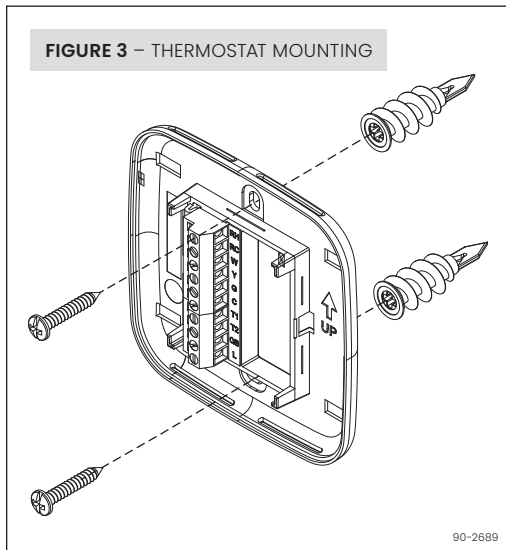
FIGURE 2 – REMOTE TEMPERATURE SENSOR WIRING



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## THERMOSTAT MOUNTING

1. Remove the rear mounting plate from the thermostat.
2. Pull wires through the opening on the back of the rear mounting plate.
3. Position and level the mounting plate of the thermostat on wall and mark the hole locations with a pencil.
4. Insert and tighten supplied self-drilling anchors (drywall only).
5. Place mounting plate over anchors, insert and tighten screws.
6. Seal wire entry holes to prevent drafts affecting temperature readings.



## POWER AND RESET OPTIONS

The thermostat is dual power. It can either be AC or battery powered, or both (to provide backup power for the clock). Batteries are optional if the thermostat was connected to AC power when installed. The thermostat has a memory backup that saves the thermostat settings in case of power interruption. The thermostat can be set back to factory defaults from the installer settings menu. See Installer System Settings section for details.

## WIRING TERMINAL

### WIRE SPECIFICATIONS:

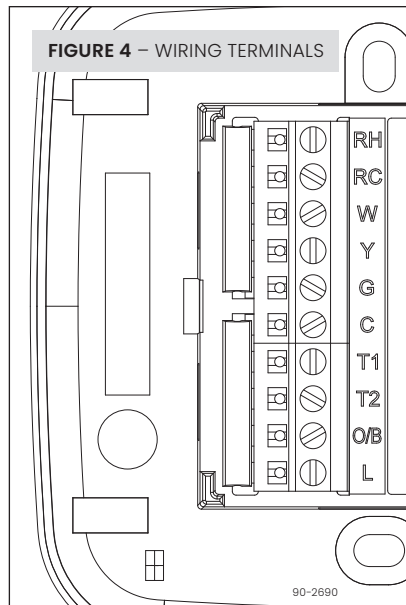
- 18-24 gauge thermostat wire

### INSTALLATION NOTES:

- Ensure power at the HVAC equipment is off.
- Loosen screw terminals, insert stripped wire and re-tighten.
- Push the excess wire back into the opening and plug the wall opening to prevent drafts.

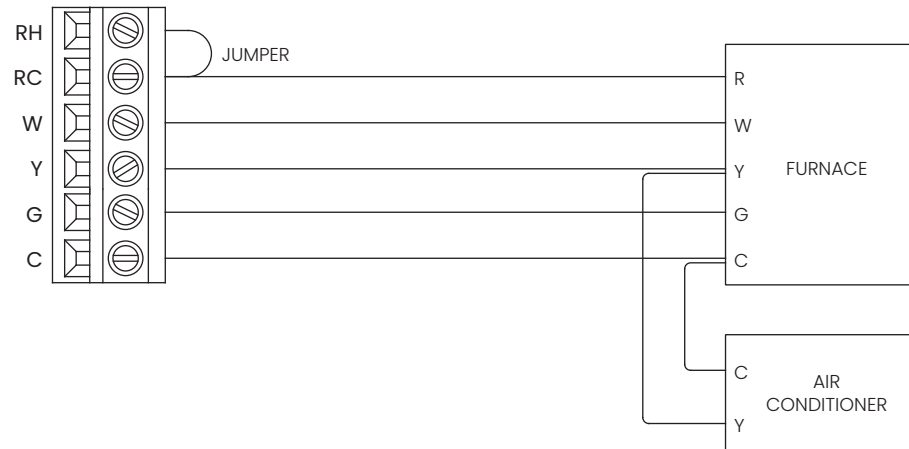
<b>RH</b>	24VAC supply heating*
<b>RC</b>	24VAC supply cooling*
<b>W</b>	First stage heat (conventional) / First stage auxiliary (heat pump S84N SU only)
<b>Y</b>	First stage cooling (conventional) / First stage compressor (heat pump S84N SU only)
<b>G</b>	Fan
<b>C</b>	Common
<b>T1 &amp; T2</b>	Outdoor/remote temperature sensor (S84N SU only)
<b>O/B</b>	Reversing valve (S84N SU only)
<b>L</b>	System fault indicator (S84N SU heat pump configured only)

\*Jumper between RC & RH is used in single transformer systems (see wiring diagrams).

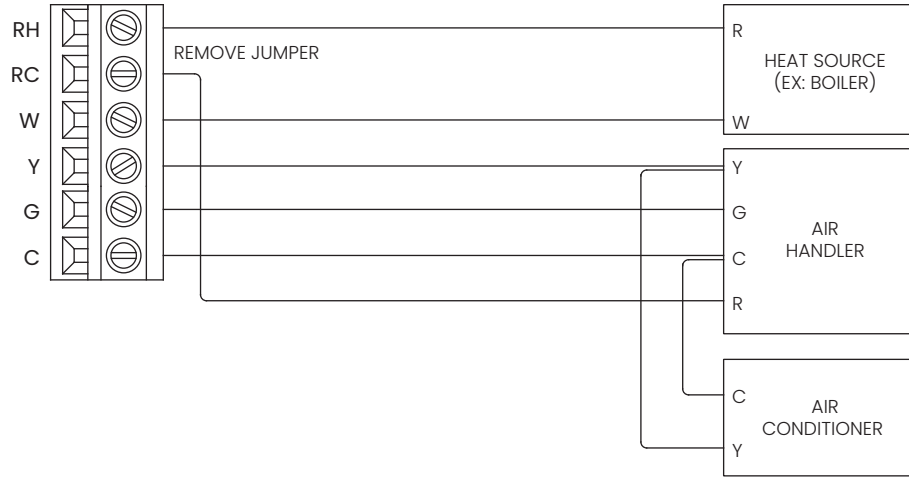


## WIRING DIAGRAMS

**FIGURE 5 – SINGLE STAGE HEAT/COOL, ONE TRANSFORMER (S84N 1HIC)**

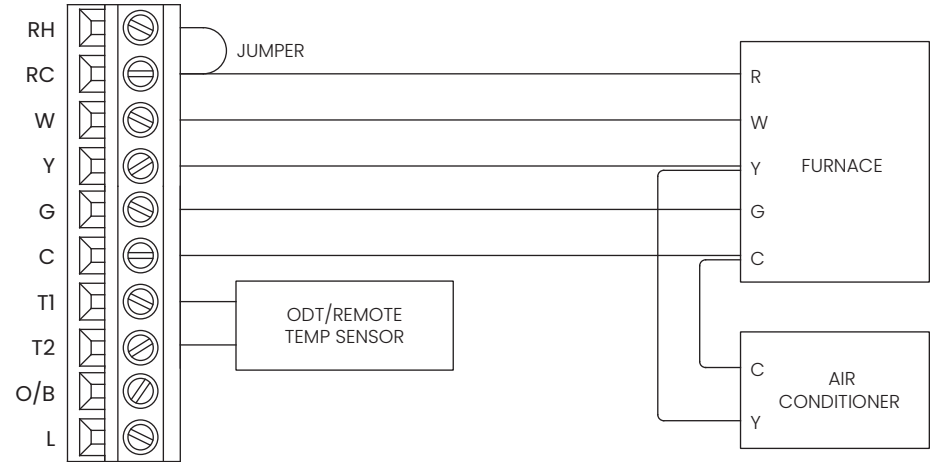


**FIGURE 6** – SINGLE STAGE HEAT/COOL, (EX: BOILER) TWO TRANSFORMER (S84N 1H1C)



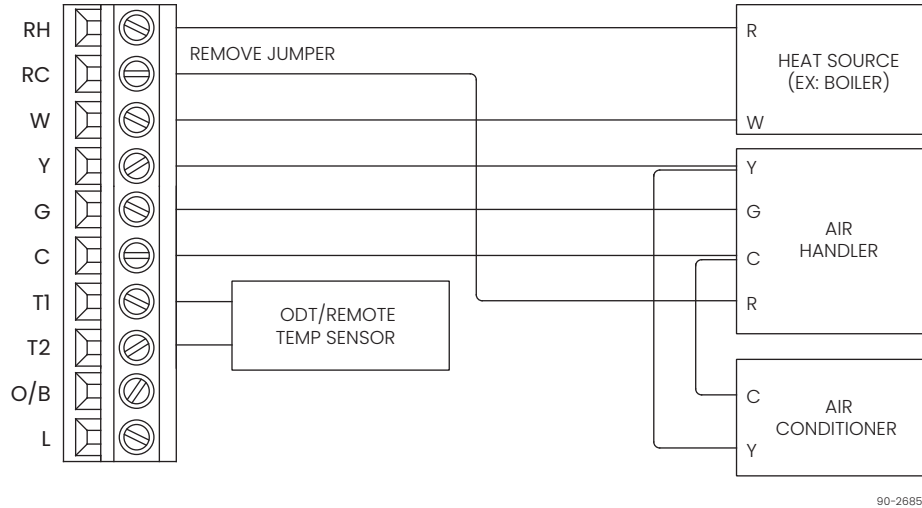
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**FIGURE 7** – SINGLE STAGE HEAT/COOL, ONE TRANSFORMER (S84N SU)

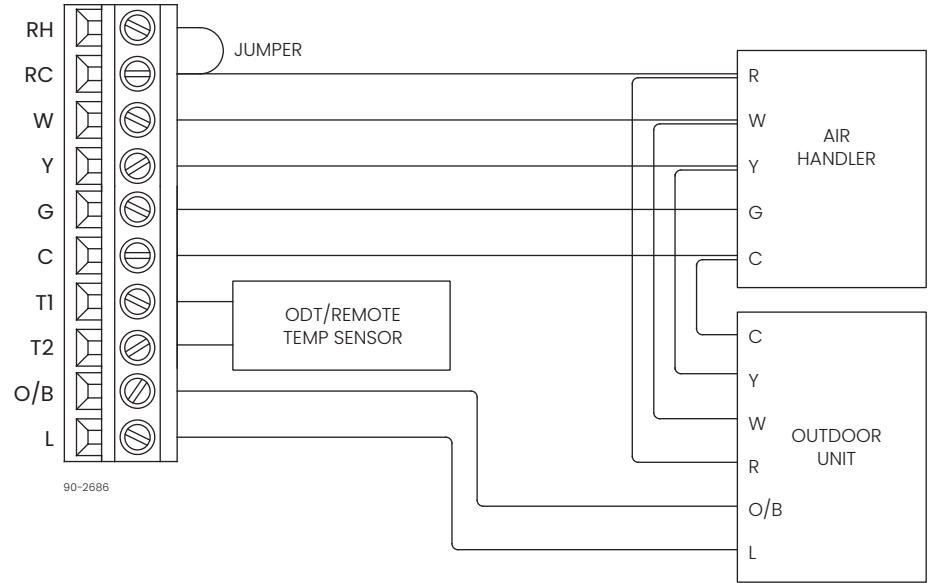


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**FIGURE 8** – SINGLE STAGE HEAT/COOL (EX: BOILER), TWO TRANSFORMER (S84N SU)



**FIGURE 9** – SINGLE STAGE HEAT/PUMP, ONE TRANSFORMER (S84N SU)





## SETUP AND TESTING

### INSTALLER SETUP WIZARD AND INSTALLER SETTING

The first time the thermostat is powered up (or after a factory reset) it will enter the **Installer Setup Wizard**. All Installer Settings can be set through this process. The Installer Settings are also accessible in the **Installer Menu**.

#### HOW TO ENTER THE INSTALLER MENU:

1. Press **Select** to enter the **Main Menu**.
2. Use **^** or **v** to navigate to **Settings**, press **SELECT**.
3. Press and hold **^** and **v** for 3 seconds to unlock the **Installer** option.
4. Use **^** or **v** to navigate to **Installer**, press **SELECT**. Refer to the chart at right for options.

INSTALLER MENU OPTIONS	DESCRIPTION
<b>HVAC Settings</b>	Essential HVAC equipment (equipment type, stages, etc.)
<b>HVAC Advanced</b>	Advanced HVAC control (effsets, deadbands, staging, protection, etc.)
<b>Test</b>	Installer test for configured equipment relay outputs
<b>Reset</b>	Reset all settings to factory default

### HVAC INSTALLER SYSTEM SETTINGS TABLE

The following table contains the system settings and their details. Default settings are shown in bold. The availability of some settings is dependent upon the value of other settings.

TABLE 1 – HVAC INSTALLER SYSTEM SETTINGS		
System setting	Description	Factory default setting (bold) and setting range
Equipment Type (S84N SU only)	<b>NOTE:</b> Equipment Type related settings will return to defaults if this is changed.	<b>Heat/Cool</b> Heat Pump
O/B Energized For?	Selects O or B reversing valve operation. (Heat Pump mode only.)	<b>Cooling</b> Heating
Control Setup	Used to lockout heating or cooling outputs. (Heat/Cool mode only).	<b>Heat &amp; Cool</b> Heat Only Cool Only
Heat Pump Auxiliary Type (S84N SU only)	Selects auxiliary type. (Heat Pump mode only.)	<b>Gas/Oil Heat</b> Electric Heat
Fan Control in Heating	Selects thermostat or equipment to control the fan in heating. (Heat/Cool mode only.)	<b>Gas/Oil Heat</b> Electric Heat

TABLE 1 – HVAC INSTALLER SYSTEM SETTINGS		
System setting	Description	Factory default setting (bold) and setting range
Programmable	Non Programmable hides all scheduling features.	<b>Programmable</b> Non Programmable
Wired Temperature Sensor Installed? (S84N SU only)	Selects how the external temperature sensor terminals (T1 & T2) are being used. Choose <b>Outdoor</b> for a wired outdoor sensor or <b>Remote/Remote Average</b> for a wired indoor sensor.	Outdoor Remote (Onboard sensor disabled) Remote Average (Average with onboard sensor) <b>No</b> (No external sensor connected)
Advanced HVAC Settings?	Select <b>No</b> to skip the rest of the thermostat settings.	<b>No</b> Yes
Progressive Recovery	Enables or disables progressive recovery.	Disabled <b>Enabled</b>
Display Heat Blast?	Select if the Heat Blast option is displayed.	<b>No</b> Yes

TABLE 1 – HVAC INSTALLER SYSTEM SETTINGS		
System setting	Description	Factory default setting (bold) and setting range
Heat Blast Offset	Amount of heating when Heat Blast is initiated.	<b>3°F (1.5°C)</b> 4°F (2°C) 5°F (2.5°C)
Extended Fan – Heat	Extends fan operation 90 seconds after heat call ends.	<b>Disabled</b> Enabled
Extended Fan – Cool	Extends fan operation 90 seconds after cool call ends.	<b>Disabled</b> Enabled
Auto Changeover	Enable or disable Auto Changeover mode.	<b>Disabled</b> Enabled
DeadBand	Auto Changeover mode deadband.	<b>3°F (1.5°C)</b> 2 to 9°F (1 to 4.5°C)
Auto Changeover Time	Minimum time between heating and cooling calls.	<b>4 Minutes</b> 1 to 5 Minutes
Temp Sensor Offset	Field adjustment of controlling temperature sensors.	<b>0°F (0°C)</b> -4 to 4°F (-2 to +2°C)
Equipment Minimum On Time	Minimum on time for heating and cooling.	<b>2 Minutes</b> 1 to 5 Minutes

TABLE 1 – HVAC INSTALLER SYSTEM SETTINGS		
System setting	Description	Factory default setting (bold) and setting range
Heating Minimum Off Time	Minimum off time for heating.	<b>2 Minutes</b> 1 to 5 Minutes
Compressor Minimum Off Time (S84N SU only)	Minimum off time for compressor protection.	<b>5 Minutes</b> 1 to 5 Minutes
Outdoor Temperature High Balance Point (heat pump S84N SU only)	Enable or disable high balance point. (Available if an ODT is installed.)	<b>Enabled</b> Disabled
High Balance Point Temperature (heat pump S84N SU only)	If outside temperature is above the high balance point the aux heat operation is not allowed. (Available if high balance point is enabled.)	<b>65°F (14.5°C)</b> 0 to 80°F (-18 to 22°C)
Outdoor Temperature Low Balance Point (heat pump S84N SU only)	Enable or disable low balance point. (Available if an ODT is installed.)	<b>Enabled</b> Disabled

TABLE 1 – HVAC INSTALLER SYSTEM SETTINGS		
System setting	Description	Factory default setting (bold) and setting range
Low Balance Point Temperature (heat pump S84N SU only)	If outside temperature is below the low balance point the compressor operation is not allowed. (Available if low balance point is enabled.)	<b>20°F (-8°C)</b> 0 to 60°F (-18 to 12°C)
Stage Rate	Accumulation of difference from setpoint over time in staging determination.	<b>Enabled</b> Disabled
Stage Rate Factor	1 = more rapid staging of equipment (comfort), 5 = slower staging of equipment (economy).	<b>2</b> 1 to 5
First Stage Differential	First stage differential.	<b>1°F (0.5°C)</b> 1 to 9°F (0.5 to 4.5°C)
Second Stage Differential (S84N SU only)	Second stage differential.	<b>1°F (0.5°C)</b> 1 to 9°F (0.5 to 4.5°C)
Service HVAC Reminder	Enable or disable the HVAC Service reminder message.	<b>Disabled</b> Enabled

TABLE 1 – HVAC INSTALLER SYSTEM SETTINGS		
System setting	Description	Factory default setting (bold) and setting range
Recurrence	Select number of months between Service HVAC messages.	<b>Disabled</b> Enabled
Air Cleaner Installed?	Selects if an air cleaner is installed. (If set to <b>No</b> , no other air cleaner settings will be available.)	<b>No</b> Yes
Air Cleaner Reminder	Enable or disable the Change Air Filter message.	<b>Disabled</b> Enabled
Recurrence	Select number of months between Change Air Filter messages.	<b>12 Months</b> 1 to 12 Months
Max Heat Setting	Select the maximum heating set point temperature allowed.	<b>90°F (32°C)</b> 40 to 90°F (4.5 to 32°C)
Min Heat Setting	Select the minimum heating set point temperature allowed.	<b>40°F (4.5°C)</b> 40* to 90°F (4.5 to 32°C)
Max Cool Setting	Select the maximum cooling set point temperature allowed.	<b>99°F (37°C)</b> 50 to 99°F (10 to 37°C)
Min Cool Setting	Select the minimum cooling set point temperature allowed.	<b>50° (10°C)</b> 50 to 99°F (10 to 37°C)

## SYSTEM TEST MENU

The system test menu is used to test a system after installation. The Installer Test can be accessed from the Installer Menu. All equipment outputs that are configured in the installer settings can be turned on and off for testing equipment. Minimum on and off times are not enforced while in this mode. The instructions below show how to enter the test mode and turn outputs on and off.

### ENTER THE SYSTEM TEST MENU

1. Press **Select** to enter the **Main Menu**.
2. Use **^** or **v** to navigate to **Settings**, press **SELECT**.
3. Press and hold **^** and **v** for 3 seconds to unlock the **Installer** option.
4. Use **^** or **v** to select **Installer**, press **SELECT**.
5. Use **^** or **v** to select **Test**, press **SELECT**.

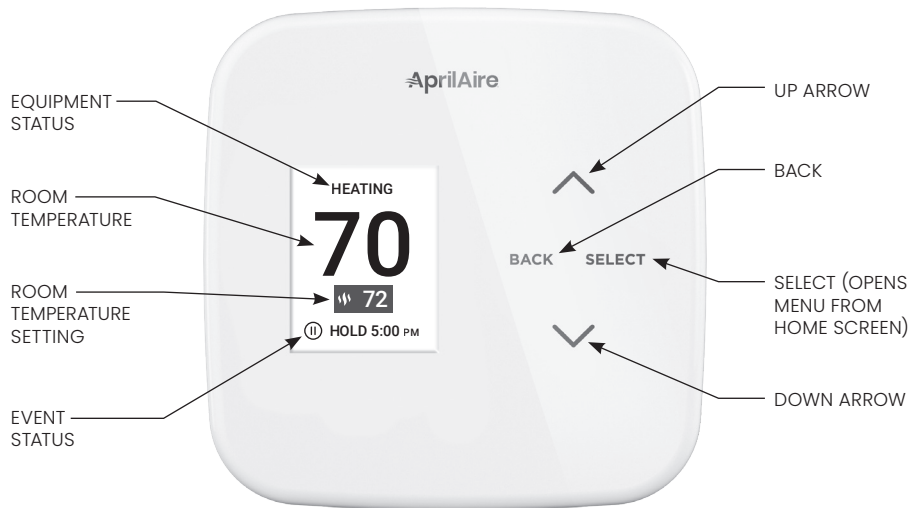
### SYSTEM TEST STEPS

1. Heating equipment test.
2. Cooling equipment test.
3. Fan equipment test.

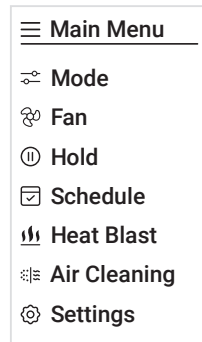


## QUICK REFERENCE TO CONTROLS & DISPLAY

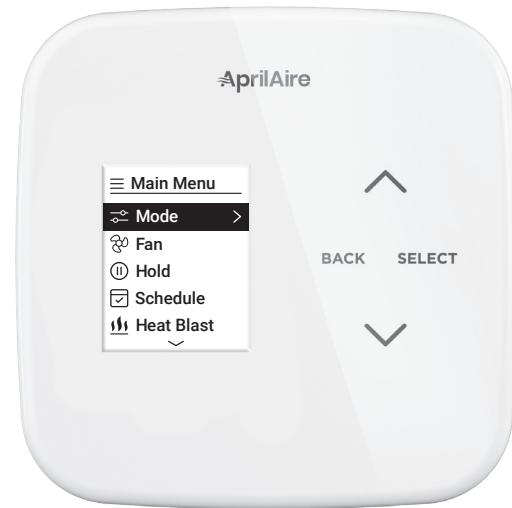
### HOME SCREEN



### MAIN MENU

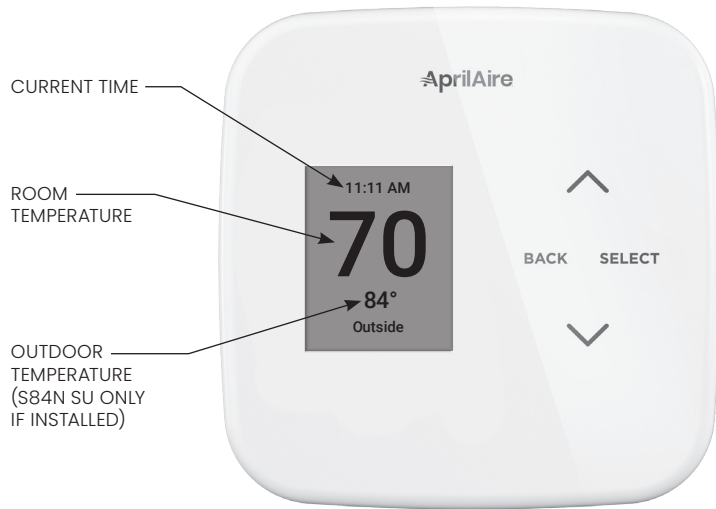


*Item availability based on installed options.*



## SCREEN SAVER

Starts 45 seconds after inactivity, press any button to wake the screen. **NOTE:** Screen saver is not available on thermostat installations that are not connected to C wire and run on battery power only.



## TROUBLESHOOTING

### DISPLAY IS BLANK

- Check circuit breaker and reset if necessary.
- Make sure power switch at heating & cooling system is on.
- Make sure furnace door is closed securely.

### HEATING SYSTEM DOES NOT RESPOND ("HEATING" APPEARS ON SCREEN)

- Check for 24VAC 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 24VAC between the heat terminal (W) and the transformer common. If 24VAC is present, the thermostat is functional. Check the heating equipment to find the cause of the problem.
- Check for loose or broken wires between the thermostat and the heating equipment.

### TEMPERATURE SETTINGS DO NOT CHANGE

- Make sure heating and cooling temperatures are set to acceptable ranges:
  - **Heat:** 40° to 90°F (4° to 32°C).
  - **Cool:** 50° to 99°F (10° to 37°C).

### COOLING SYSTEM DOES NOT RESPOND ("COOLING" APPEARS ON SCREEN)

- Check for 24VAC 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 24VAC between the cooling terminal (Y) and the transformer common. If 24VAC is present, the thermostat is functional. Check the cooling system to find the cause of the problem.
- Check for loose or broken wires between the thermostat and the cooling equipment.

#### **FAN DOES NOT TURN ON IN A CALL FOR HEAT**

- Check System Setting (Fan Control in Heating), to make sure the fan control is properly set to match the type of system (see page 17).

#### **HEAT PUMP ISSUES COOL AIR IN HEAT MODE, OR WARM AIR IN COOL MODE (S84N SU ONLY)**

- Check System Setting (O/B Operation) to make sure the reversing valve operation matches the heat pump.

#### **HEAT/COOL BOTH ON AT SAME TIME**

- Check System Setting (Equipment Type), to make sure it is set to match the installed heating/cooling equipment (see page 17).
- Check to make sure heating and cooling wires are not shorted together.

#### **HEATING EQUIPMENT IS RUNNING IN COOL MODE**

- Check System Setting (Equipment Type), to make sure it is set to match the installed heating/cooling equipment (see page 17).

#### **“HEATING” IS NOT DISPLAYED**

- Check System Setting (Control Setup) is set correctly.
- Change the System Mode to Heat, and set the temperature level above the current room temperature.

#### **“COOLING” IS NOT DISPLAYED**

- Check System Setting (Control Setup) is set correctly.
- Change the System Mode to Cool, and set the temperature level below the current room temperature.

#### **ERROR CODES**

If the thermostat enters an error mode, all outputs are turned off. The thermostat attempts to recover every 10 minutes.

<b>Error Code</b>	<b>Message</b>	<b>Error Description</b>
<b>E01 &amp; E02</b>	Sensor Error	Internal temperature sensor failure
<b>E03</b>	EEPROM Error	Error in permanent memory
<b>E06</b>	Remote Sensor Error	Open remote temperature sensor circuit
<b>E07</b>	Remote Sensor Error	Shorted remote temperature sensor circuit

## THERMOSTAT FEATURES

- Event-Based™ air cleaning.
- Heat Blast® raises the room temperature 3°F to 5°F.
- Easy to read, color graphical display.
- Easy to use installer settings, no codes.
- 7 day programmability.
- Displays room temperature and temperature setting.
- Displays outdoor temperature (S84N SU only).
- Air filter HVAC service reminders.
- Programmable fan control with fan circulation mode.
- Easy to use temperature control can override program schedule at any time.
- Progressive recovery ensures proper room temperature at the start of a program event.
- Built in compressor protection prevents damage to your equipment.
- System test mode.
- Installer adjustable set point limits.

## SPECIFICATIONS

ENVIRONMENT	
Temperature	<b>Operating:</b> 32° to 120°F (0° to 48.9°C) <b>Shipping:</b> -30° to 150°F (-34.4° to 65.5°C)
Relative humidity	<b>Operating:</b> 5% to 90% R.H. (non-condensing)
ELECTRICAL	
Operating voltage	24VAC (18-30VAC)
Current	<b>Maximum:</b> 2.5A (total), 1.0A (single output) <b>Maximum surge current:</b> 5A
THERMAL	
Outdoor & Remote temperature sensor (S84N SU only)	<b>Maximum distance:</b> 300 feet
Room temperature measurement	<b>Display range:</b> 32° to 99°F (0° to 40°C)
Outdoor temperature measurement	<b>Display range:</b> -40° to 130°F (-40° to 55°C)
Setpoint temperature range	<b>Heat:</b> 40° to 90°F (4° to 32°C) <b>Cool:</b> 50° to 99°F (10° to 37°C)



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U.S. Patent Numbers 8,146,376, 8,596,078, 9,874,366 and other patents pending.

AprilAire reserves the right to change specifications without notice.

The logo for AprilAire, featuring a stylized 'A' with three horizontal lines to its left, followed by the word 'AprilAire' in a bold, sans-serif font.

