Bluetooth Gas Furnace Installation And Commissioning

TRF-13

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Safety Considerations

Recognize These Symbols As A Safety Precaution.

- As a professional installer you have an obligation to know all safety precautions and related items.
- It is your responsibility to install the product safely and to know it well enough to be able to instruct a customer in its safe use.
- If there is a direct conflict between existing practices and the content of this manual, the manual takes precedence.

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Extremely Important

- Install a thermostat that is required for the application
  - Heating only
  - Cooling only
  - Heating and Cooling
- This system does not contain an ‘O’ wire input (reversing valve signal).
- Internal algorithms will control the heat pump.
- Even if a heat pump is installed, the thermostat should be setup for single stage heat (W)/single stage cool (Y)
- Setting thermostat for heat pump control will result in incorrect performance.

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Bluetooth Furnace Agenda

- Quick Start Guide
- Circulator Blower Speeds
- Low Voltage Wiring
- CoolCloudHVAC App
- Menu Navigation And Option Change
- Diagnostics
- Status Codes

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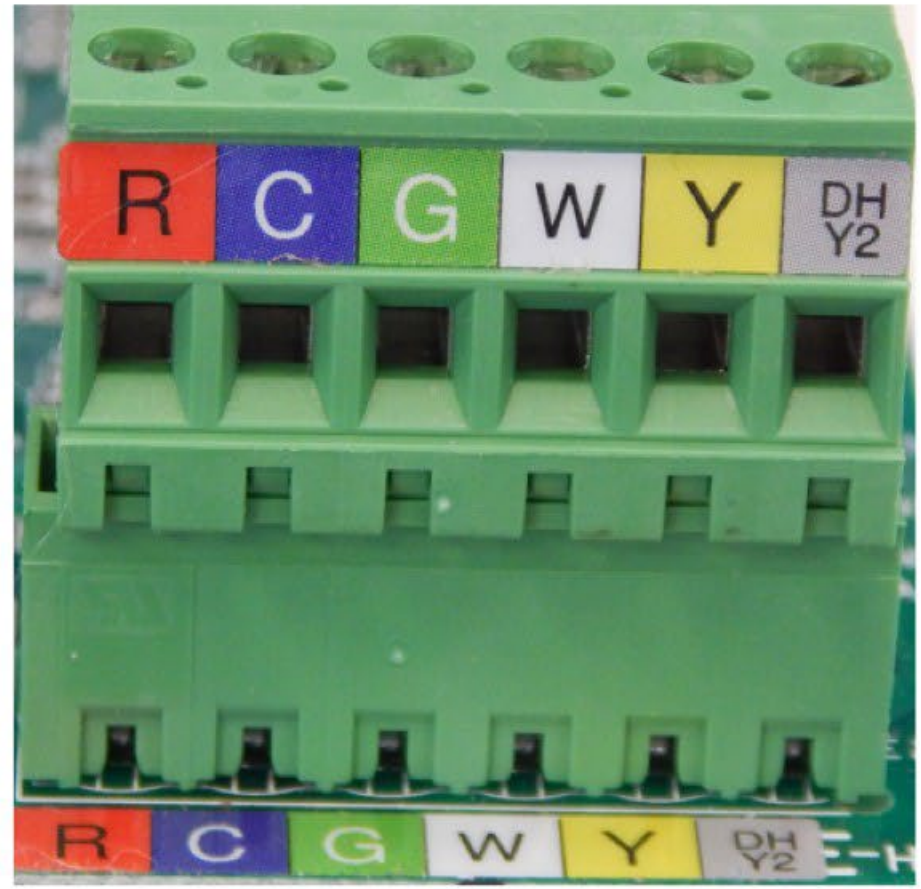
Quick Start Guide

- Connect thermostat wires to the thermostat connector on the furnace control
  - R & C for power
  - Y for Cooling Calls
  - W for Heating Calls
  - G for Fan Calls
  - Dehum for Dehumidification or Y2 Calls.

- Furnace will control staging of indoor unit and outdoor unit automatically based on these inputs.



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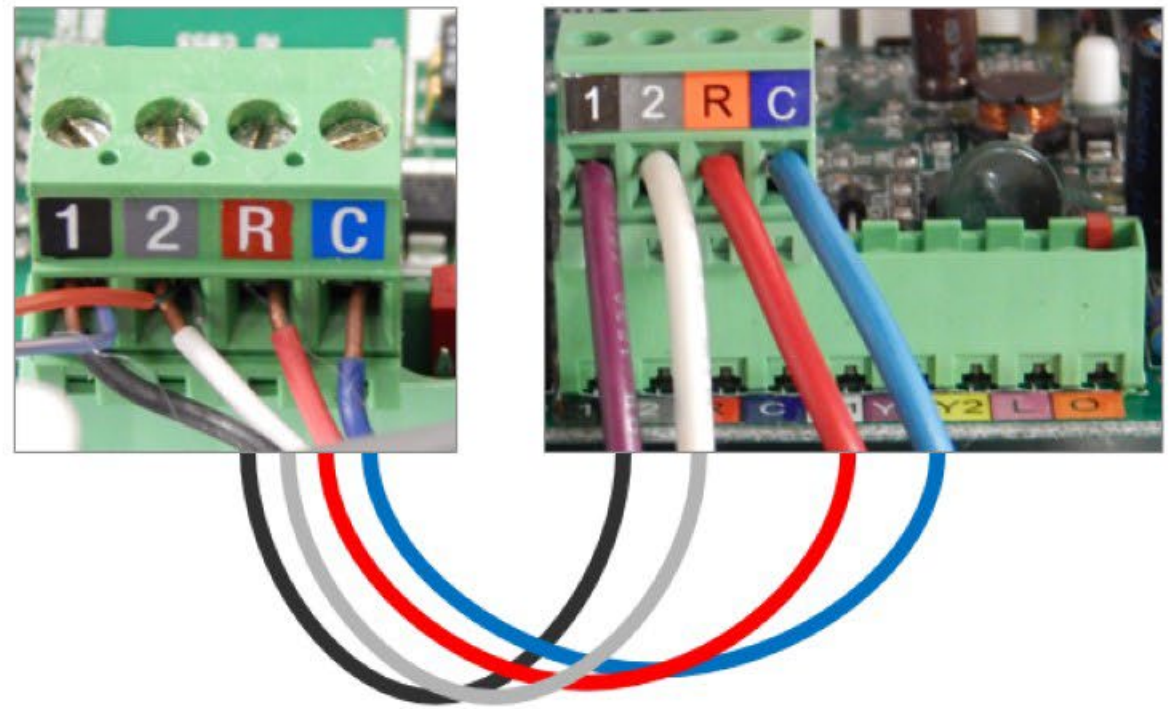
Quick Start Guide

For communicating 2 stage or inverter AC/HP outdoor units

- Connect wires 1 & 2 between the indoor and outdoor unit.
- It is recommended for 2 stage applications that a separate transformer be installed in the outdoor unit to power the outdoor control
- Terminal R & C can be used between the indoor and outdoor in 2 stage AC application but only if there isn't already a transformer installed in the outdoor unit.



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Quick Start Guide

- Confirm thermostat functions properly and the system is turning on in the selected mode.
- System Testing: Download the CoolCloudHVAC Android/iOS application and use it to test all operations of both indoor and outdoor units.

- Note:
  - If a communicating heat pump is installed it will be treated as a priority heat for a W call. To test gas heat only, disconnect communications between the indoor and outdoor unit before running the test.

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Control System – General Information

System Target Runtime

- The furnace contains internal logic to control equipment staging.
- An adjustable target runtime  is available and set through the  menu.
- The system will constantly be adjusting staging in an effort to satisfy the thermostat call for cooling (Y Only) or heating (W Only) as close to the set target runtime as possible.
- It is responding to the P.I.D. parameters
  - Proportional – responds to deviation from set point
  - Integral – eliminates offset
  - Derivative – responds to the rate of change of the controlled variable

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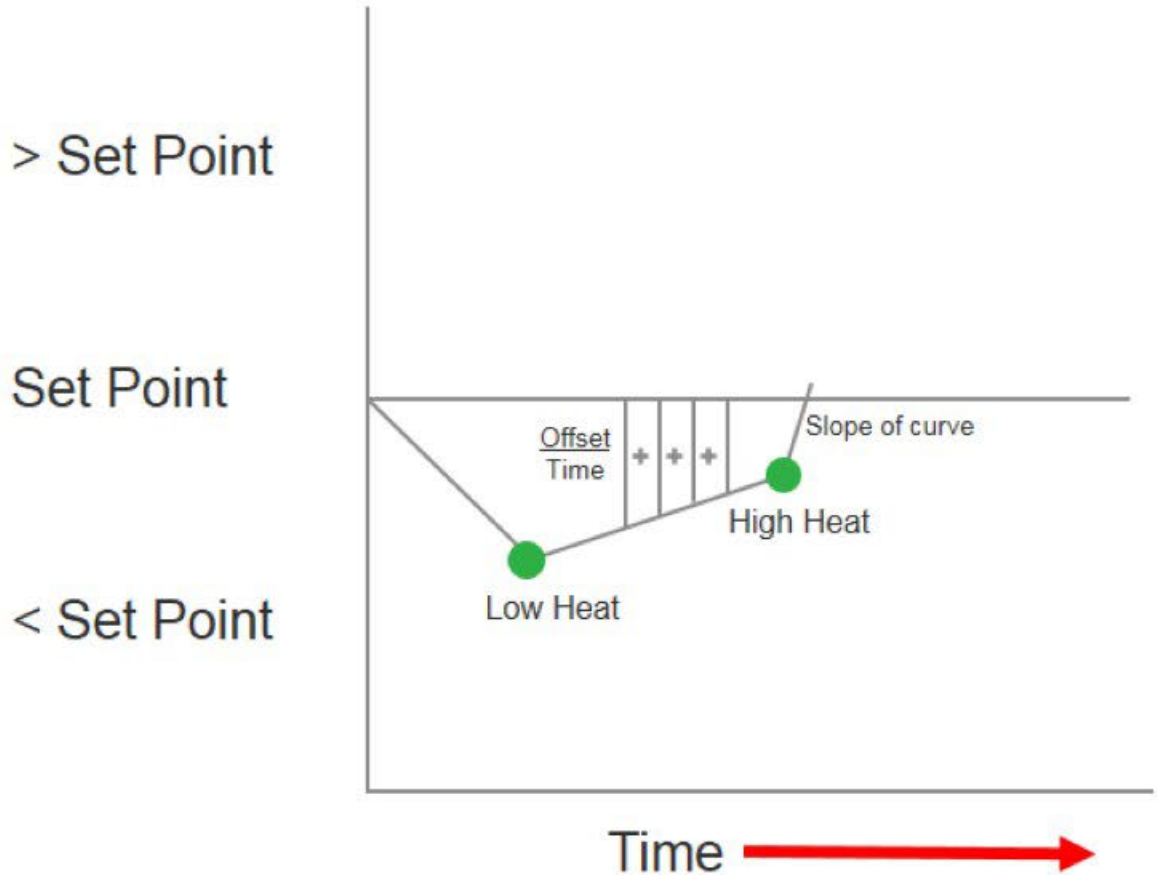
Illustrate PID

Proportional = Distance from SP

Integral = Offset over time

Derivative = Rate of change



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Control System – General Information

Comfort Setting Menu (CFS)

- There are 6 options available in the Comfort Setting Menu which impacts both the System Target Runtime and Dual Fuel Operation.
- Comfort Setting Options 1 – 5 have set values for the System Target Runtime

					
Comfort Setting Option	**Target Time** (Minutes)	**Stage Up Percentage** (%)	**Stage Down Percentage** (%)	**Over Target Threshold** (Strike Count)	**Under Target Threshold** (Strike Count)
1	10	20	20	2	10
2	15	20	20	4	8
3	20	20	20	6	6
4	25	20	20	8	4
5 (Default)	30	20	20	10	2

Comfort Setting Menu (CFS)

Dual Fuel Set Up

- Only applies…
  - if a communicating heat pump is installed
- Based on Target Run Time - Control determines if heat pump can satisfy demand
  - If not…
    - Heat pump is temporarily locked out
    - Secondary heat is used to meet demand
    - Heat pump unlocked when control sees fit

- Four adjustable items associated with Dual Fuel control
  - Stage Up Percent 

  - Over Target Threshold 

  - Stage Down Percent 

  - Under Target Threshold 

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Comfort Setting Menu (CFS)

Dual Fuel Set Up – Options 1 - 5

Stage Up Percent 

Default setting = 20% 

- Setting for how long beyond the target runtime the system should continue running the heat pump before transitioning to the furnace.
  - Example – Target runtime = 25 minutes, SUP = 20%
  - If heat pump cannot satisfy set point within 30 minutes [25+(25*.2)], the furnace will fire up

Over Target Threshold 

Default = 2, 4, 6, 8,10 or 20 Strikes 

- If the heat pump consecutively exceeds the 

setting this number of times, the heat pump is temporarily locked out and the furnace becomes the primary heat source.

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Comfort Setting Menu (CFS)

Dual Fuel Set Up – Options 1 - 5

Stage Down Percent 

Default setting = 20% 

- Applies when the heat pump is in a temporary lockout condition
- Used to determine when to unlock and run the heat pump again.
- Determined by how easily the furnace is able to satisfy the thermostat using Low Stage Gas Heat Only
  - Example – Target runtime 

= 20 minutes, 

= 20%
  - If Low Stage Gas Heat can satisfy the thermostat in less than 16 minutes (20 minutes minus 20% = 16 minutes) then a Strike against the gas furnace is incremented.
    - The strike count is important when looking at the Under Target Threshold 

(next slide)

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Comfort Setting Menu (CFS)

Dual Fuel Set Up – Options 1 - 5

Under Target Threshold  **Default = 2, 4, 6, 8,10 or 20 Strikes**

- The default setting is dependent on the Comfort Setting Option selected
- If furnace satisfies demand using Low Stage Gas Heat Only for the selected number of strikes
  - Heat pump will then be used during the next cycle
  - Heat pump will become the primary heat source again
  - The strike count against the HP will be reset

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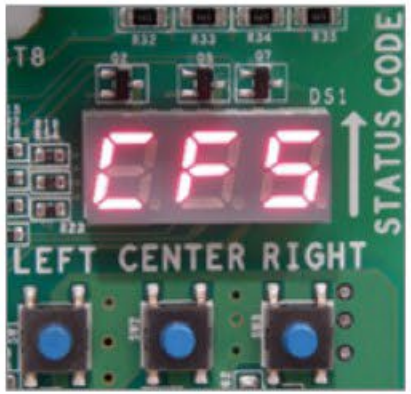
Comfort Setting Menu (CFS)

Dual Fuel Set Up – Option 6

System Target Runtime:



- Option 6 enables additional menus to customize all comfort settings.
- Note: it is critical that these numbers be set properly.
- If Comfort Setting option 3 is desired but a target time of 60 is preferred, select Comfort Setting Option 6 to enable all the adjustable menus, set the Target Time to 60 and make sure the other menus are set to match that of Comfort Setting Option 3.

	Menu	Minimum Value	Maximum Value	Default Value
t9t	**Target Time (t9t)**	1 minute	240 minutes	60 minutes
SUP	**Stage Up Percent (SUP)**	0%	100%	20%
SdP	**Stage Down Percent (SdP)**	0%	100%	20%
Ott	**Over Target Threshold (Ott)**	1 strike	254 strikes	20 strikes
Utt	**Under Target Threshold (Utt)**	1 strike	254 strikes	20 strikes

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Control System – General Information

- The system will automatically make adjustments in an attempt to satisfy the thermostat as close to the selected target runtime as possible.
- After a power cycle or mode change (cooling to heating or heating to cooling) the system will run full capacity for the selected mode during the first thermostat call.
- Based on the selected target runtime and how long the initial cycle takes to satisfy the thermostat, the control algorithm may adjust the system stage times for a communicating 2 stage HP/Furnace or the capacity demand percentage for an inverter HP for the next cycle.
- Note: actual runtimes may change depending on variations of load throughout the day.

Bluetooth Furnace Agenda

Quick Start Guide

Circulator Blower Speeds

Low Voltage Wiring

CoolCloudHVAC App

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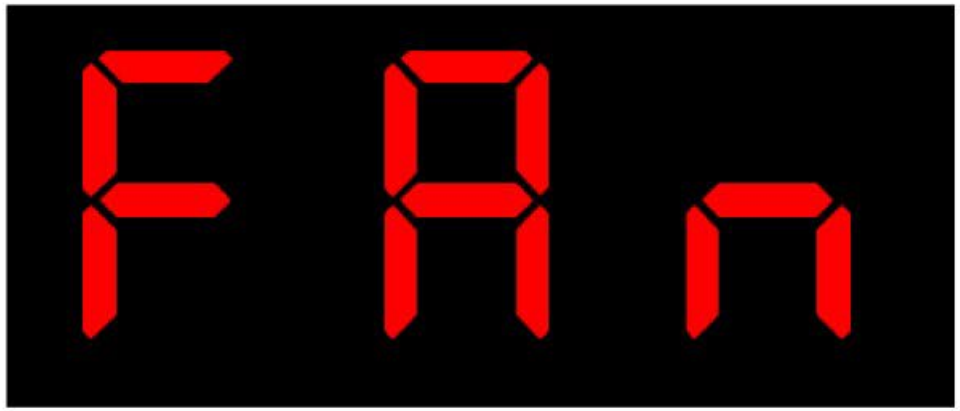
Circulator Blower Speed

- The Airflow quantity is displayed rounded to the nearest 100 CFM.
- The display alternates between airflow and system status.
  - 3 Ton Models 1400 CFM
  - 4 Ton Models 1760 CFM
  - 5 Ton Models 2200 CFM
- Each blower has a ‘Maximum CFM’ determined by motor HP.
- All fan operations are based off of multipliers which are percentages of the Maximum.
  - Adjustable between 25% to 100% with 10% increments.
    - Once incremented to 95%, pressing the right button will increment to 100%. When decrementing, the first click of the left button decrements to 95%. Continued pressing will result in 10% decrements.
  - The default constant fan multiplier is 25%.



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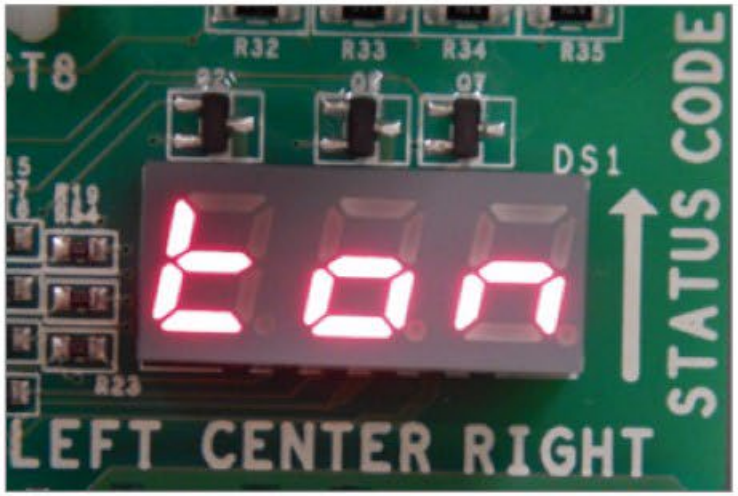
Circulator Blower Speed

For Communicating Outdoor Units

- Main airflow adjustment is not required.
- The Outdoor unit will determine the appropriate amount of indoor airflow to request.
- Airflow Trims can be made if desired.

For Non-Communicating Outdoor Units

- Proper airflow determined based on the outdoor unit tonnage selection
- Enter the Tonnage (ton) menu and select the appropriate Tonnage Selection
- Trim is also available if additional adjustment is required.



Tonnage Selection	Airflow	Tonnage Selection	Airflow	Tonnage Selection	Airflow	Tonnage Selection	Airflow
1	400	2.3	920	3.6	1440	4.9	1960
1.1	440	2.4	960	3.7	1480	5	2000
1.2	480	2.5	1000	3.8	1520	5.1	2040
1.3	520	2.6	1040	3.9	1560	5.2	2080
1.4	560	2.7	1080	4	1600	5.3	2120
1.5	600	2.8	1120	4.1	1640	5.4	2160
1.6	640	2.9	1160	4.2	1680	5.5	2200
1.7	680	3	1200	4.3	1720	5.6	2240
1.8	720	3.1	1240	4.4	1760	5.7	2280
1.9	760	3.2	1280	4.5	1800	5.8	2320
2	800	3.3	1320	4.6	1840	5.9	2360
2.1	840	3.4	1360	4.7	1880	6	2400
2.2	880	3.5	1400	4.8	1920		

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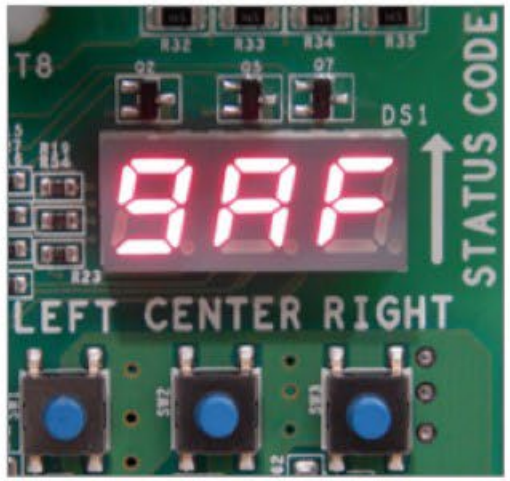
Circulator Blower Speed

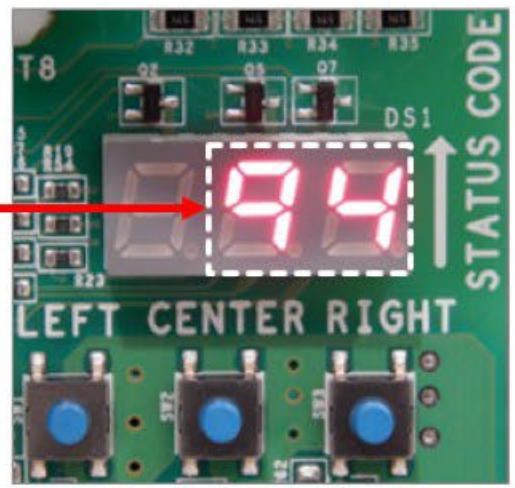
Setup Furnace Airflow

- Adjust the Gas Heating Airflow menu (gAF) setting to the desired percentage of maximum airflow.
- The default setting will provide a temperature rise near the middle of the acceptable range.
- High Stage CFM can be calculated by the following equation: **CFM = Max CFM * Selected Heating Airflow Percentage**



Gas Heat Airflow Multiplier Menu

- The menu is used to select the multiplier for gas heat operation.
- The multiplier will be expressed by the 2nd and 3rd characters of the display as a percentage of max CFM.



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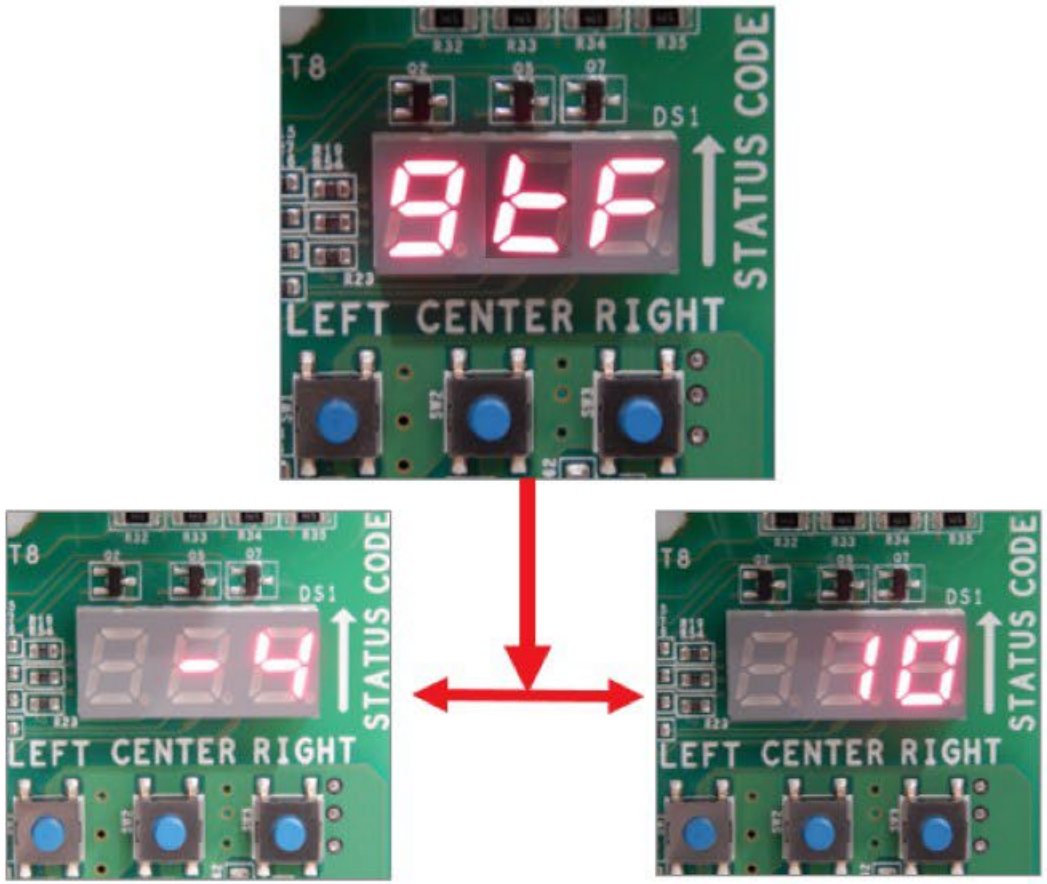
Circulator Blower Speed

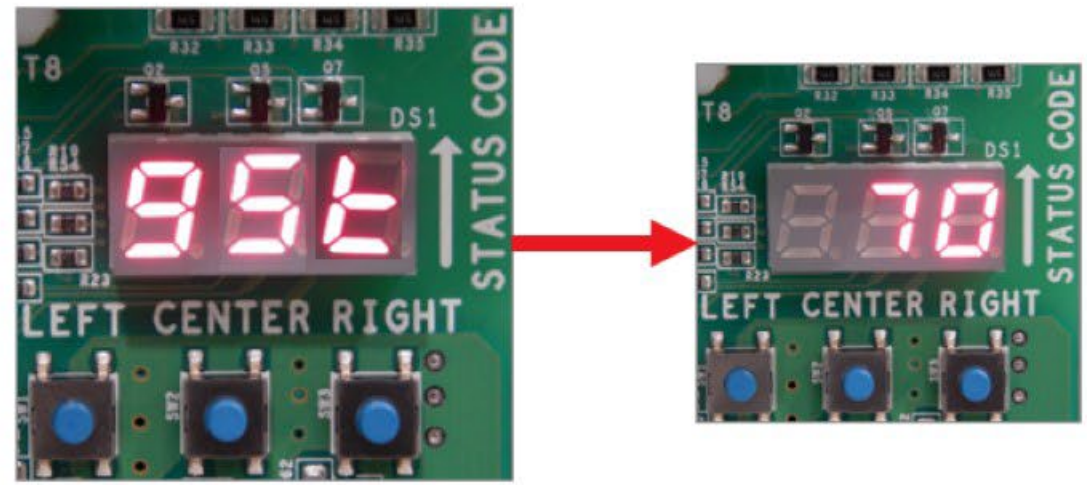
Gas Heat Trim Factor Option Menu

- Gas Heat airflow may be trimmed from -10% to +10% in 2% increments.



Gas Heat Stage Multiplier Menu (CFM)

- This menu allows adjustment of the low fire CFM multiplier.
- The default CFM for low fire is 70% of high fire.



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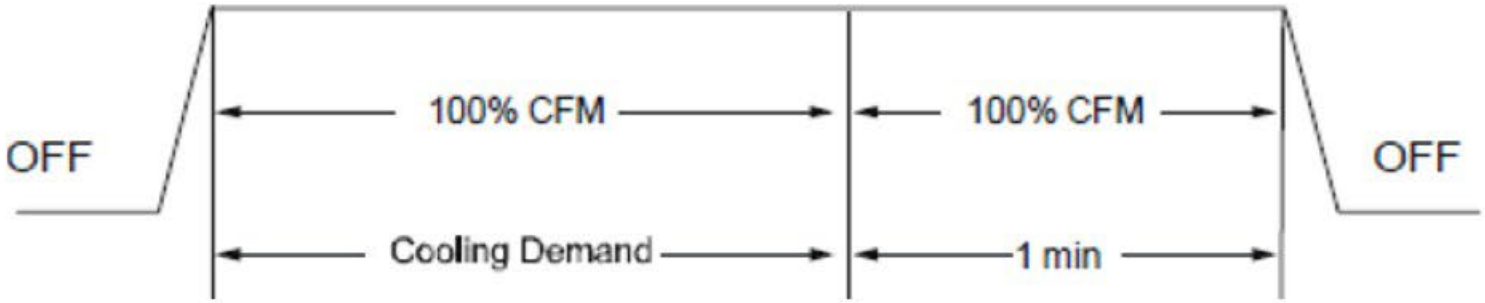
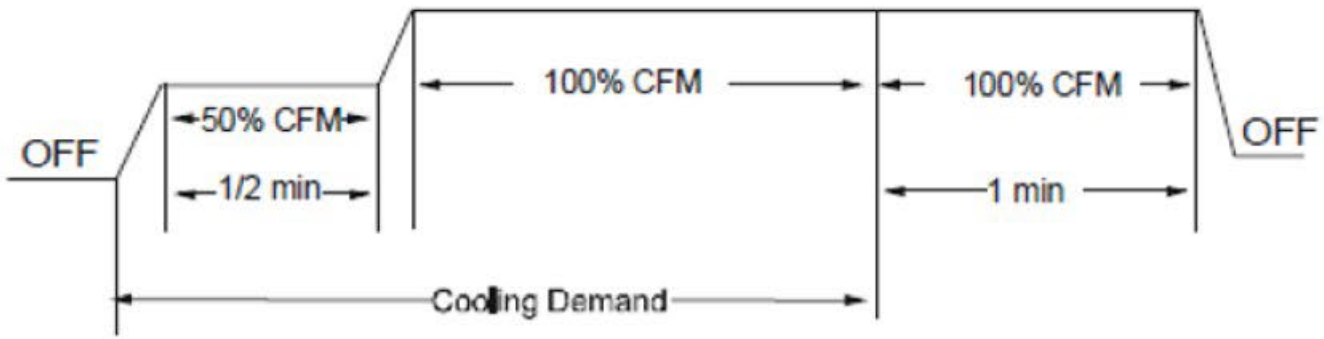
Cooling Airflow Ramping Profiles

- The multi-circulator blower also offers several custom ON/OFF ramping profiles.
- Profile A(1) provides only an OFF delay of one (1) minute at 100% of the cooling demand airflow



- Profile B(2) ramps up to full cooling demand airflow by first stepping up to 50% of the full demand for 30 seconds. The motor then ramps to 100% of the required airflow. A one (1) minute OFF delay at 100% of the cooling airflow is provided.



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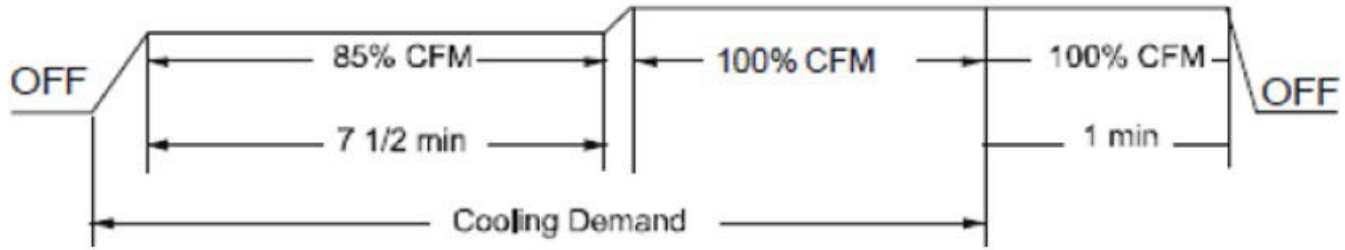
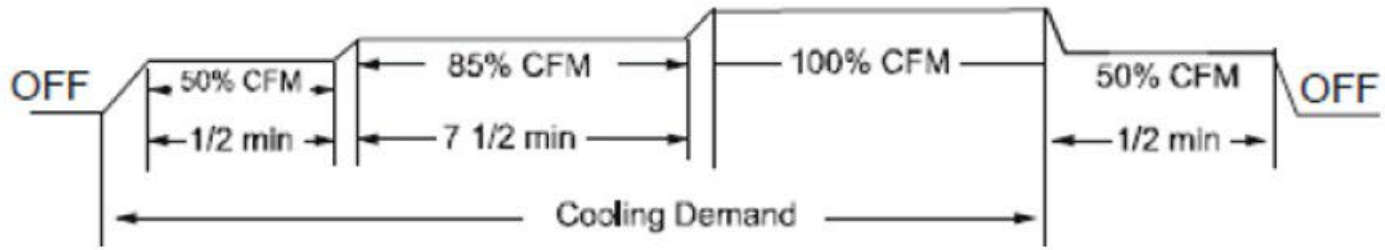
Cooling Airflow Ramping Profiles

- Profile C(3) ramps up to 85% of the full cooling demand airflow and operates there for approximately 7 1/2 minutes. The motor then steps up to the full demand airflow. Profile C also has a one (1) minute 100% OFF delay.



- Profile D(4 or 5) ramps up to 50% of the demand for 1/2 minute, then ramps to 85% of the full cooling demand airflow and operates there for approximately 7 1/2 minutes. The motor then steps up to the full demand airflow. Profile D has a 1/2 minute at 50% airflow OFF delay.



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Bluetooth Furnace Agenda

Quick Start Guide

Circulator Blower Speeds

Low Voltage Wiring

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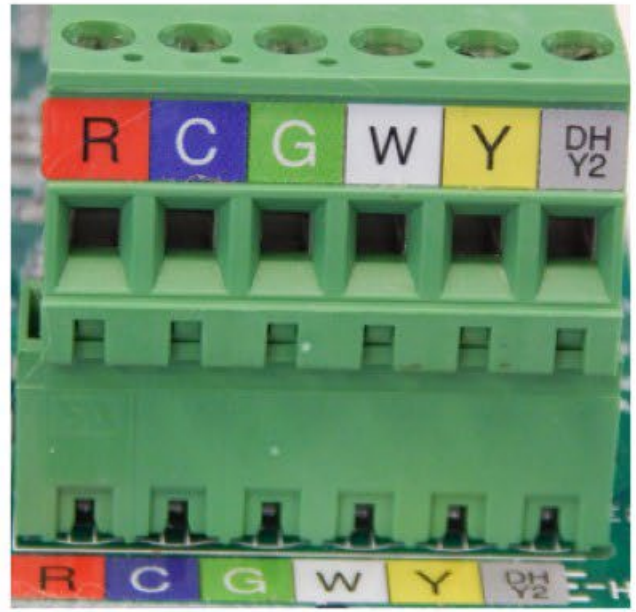
Low Voltage Wiring - General Information

- The Furnace functions with any thermostat that can provide 24VAC on Y, Y2 or W
- Thermostat connections to the control board are R, C, G, W, Y & Dehum/Y2.
  - If no common wire is required, as few as two thermostat wires may be used for heat or cool only systems.
  - A minimum of three thermostat wires may be used for heating and cooling systems (R, W and Y).



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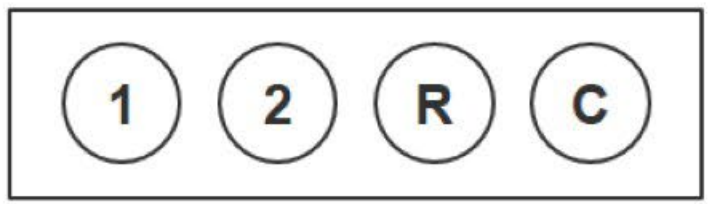
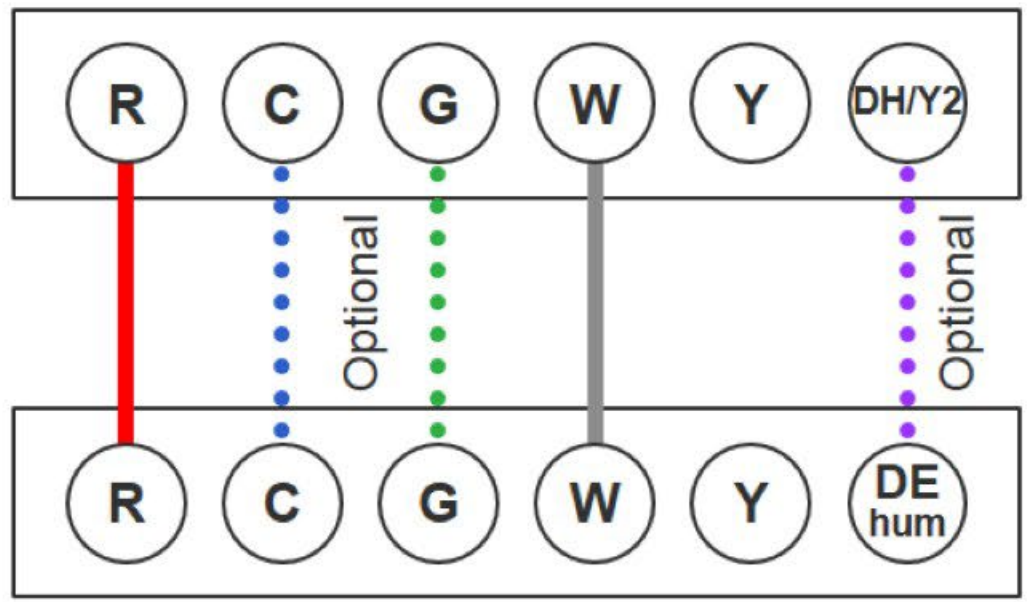
Low Voltage Wiring - General Information

GAS HEAT ONLY

- For gas heat only operations (no outdoor unit installed) the thermostat must be setup to provide a single stage W call when heating is required.

Indoor Board Terminal Connections





24 VAC Thermostat

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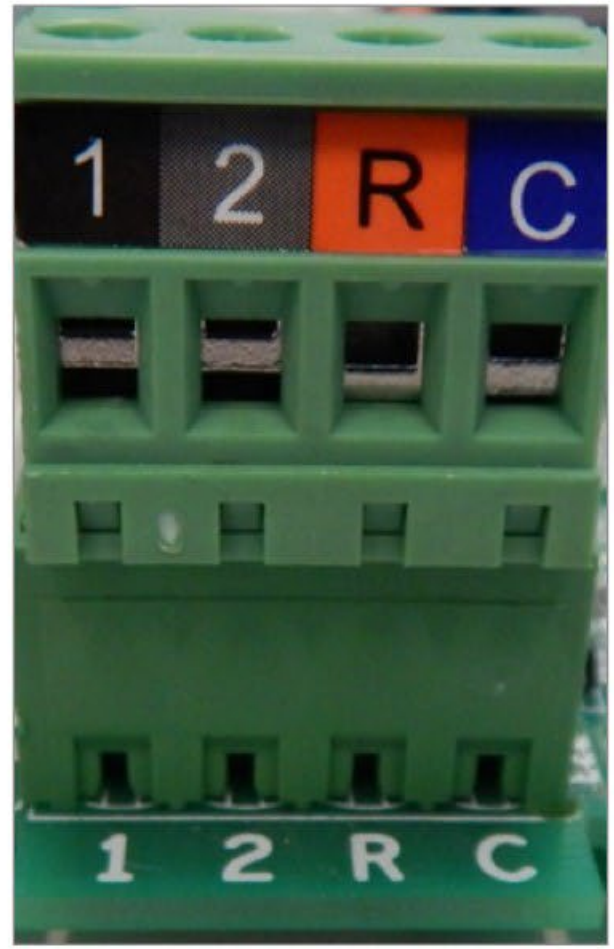
Low Voltage Wiring - Communicating Outdoor Unit

- Internal logic will control staging of all multi stage equipment
  - 2 stage AC/HP units and Inverter AC/HP units
- The thermostat need only provide a single stage heat/cool call and fan or dehumidification call during operation.
- 4 wires (R,C for power and 1, 2 for communications) can be used for AC applications.
- R & C between the IDU and ODU unnecessary
  - If a transformer is providing 24VAC to the outdoor control
  - In this case, just use terminals 1 and 2 for communications.
  - ALWAYS use a 24v transformer in the ODU with communicating equipment.



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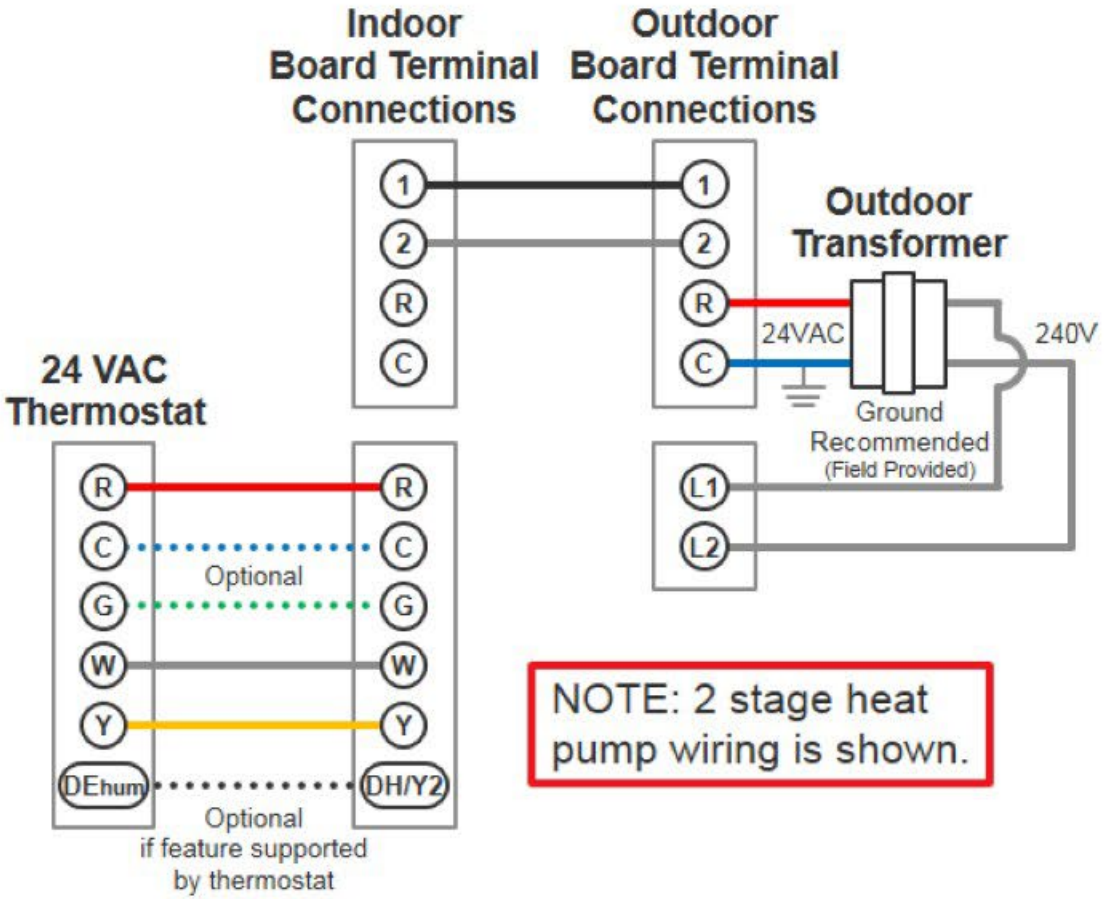
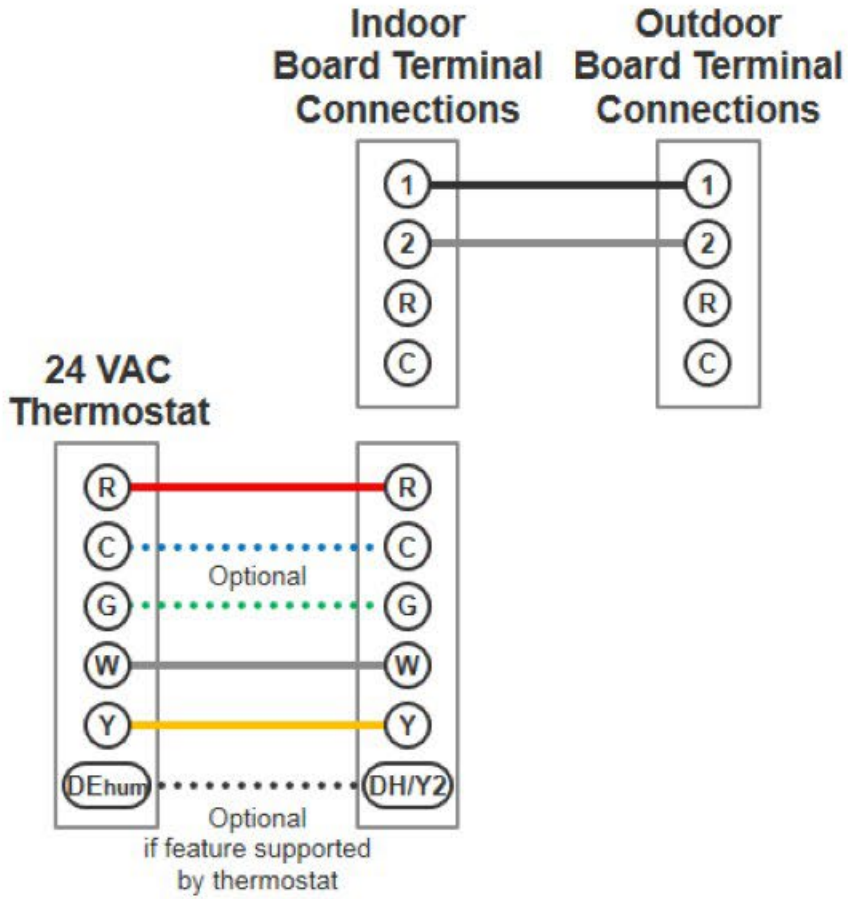
Low Voltage Wiring - Communicating Outdoor Unit

Two Stage-Air Conditioner Or Heat Pump



NOTE: 2 stage heat pump wiring is shown.

Inverter - Air Conditioner Or Heat Pump



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Low Voltage Wiring - Non-communicating Outdoor Unit

When using the furnace with a single stage non-communicating air conditioner or heat pump;

- With a single stage air conditioner
  - Thermostat must be setup for single stage heating and cooling modes.
- With a single stage heat pump
  - Thermostat must be setup for dual fuel operation where the reversing valve is energized in cooling mode
- In both cases airflow must be selected using the tonnage menu where Airflow = (400 CFM) x (Selected Tonnage).
  - Tonnage values range from 1 to 6 in 0.1 increments.

Tonnage Selec-tion	Airflow	Tonnage Selec-tion	Airflow	Tonnage Selec-tion	Airflow	Tonnage Selec-tion	Airflow
1.0	400	2.3	920	3.6	1440	4.9	1960
1.1	440	2.4	960	3.7	1480	5.0	2000
1.2	480	2.5	1000	3.8	1520	5.1	2040
1.3	520	2.6	1040	3.9	1560	5.2	2080
1.4	560	2.7	1080	4.0	1600	5.3	2120
1.5	600	2.8	1120	4.1	1640	5.4	2160
1.6	640	2.9	1160	4.2	1680	5.5	2200
1.7	680	3.0	1200	4.3	1720	5.6	2240
1.8	720	3.1	1240	4.4	1760	5.7	2280
1.9	760	3.2	1280	4.5	1800	5.8	2320
2.0	800	3.3	1320	4.6	1840	5.9	2360
2.1	840	3.4	1360	4.7	1880	6.0	2400
2.2	880	3.5	1400	4.8	1920		

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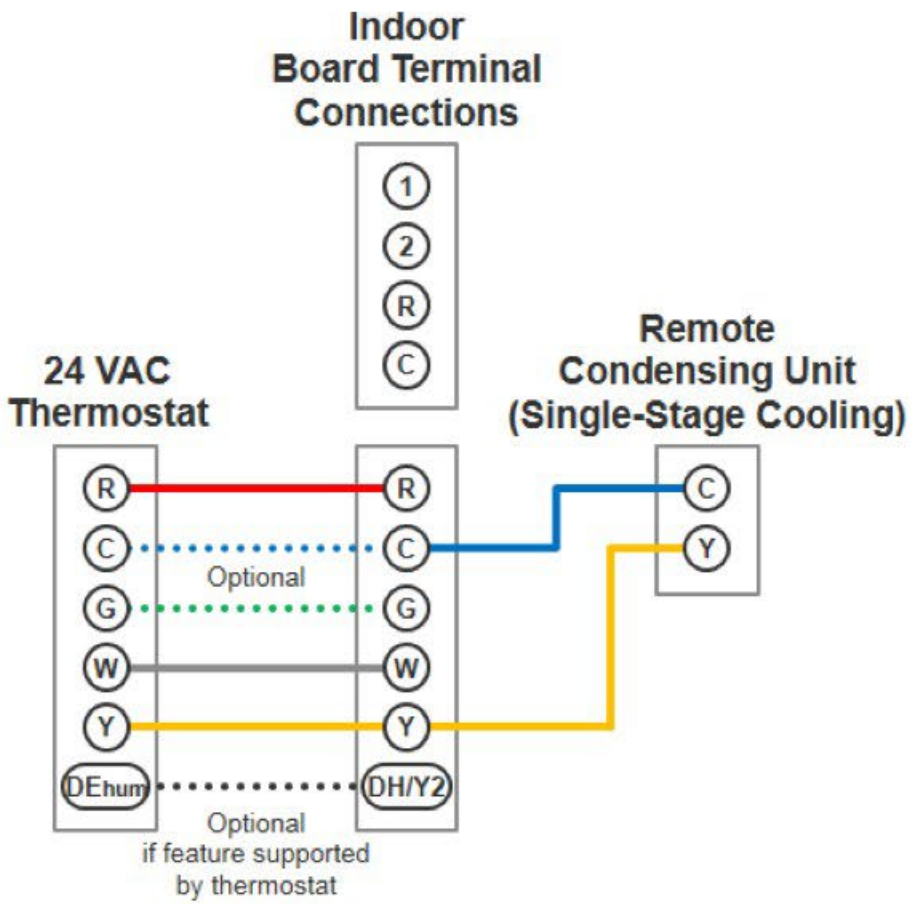
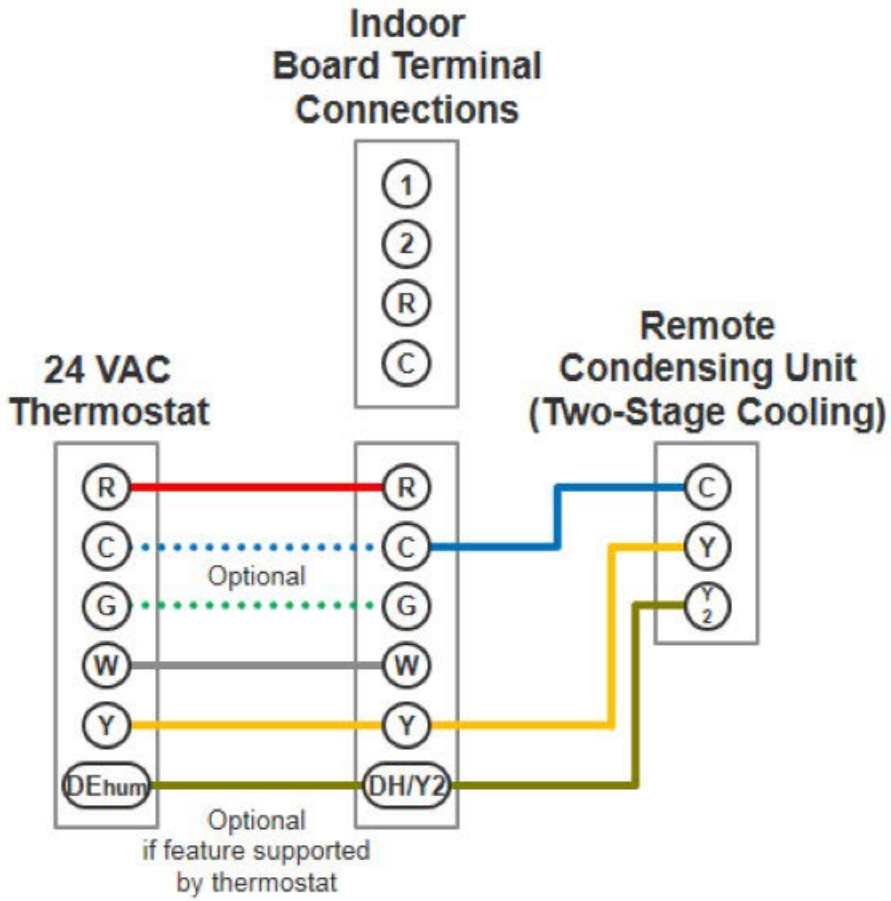
Low Voltage Wiring - Non-communicating Outdoor Unit

Single Stage A/C



Two Stage A/C



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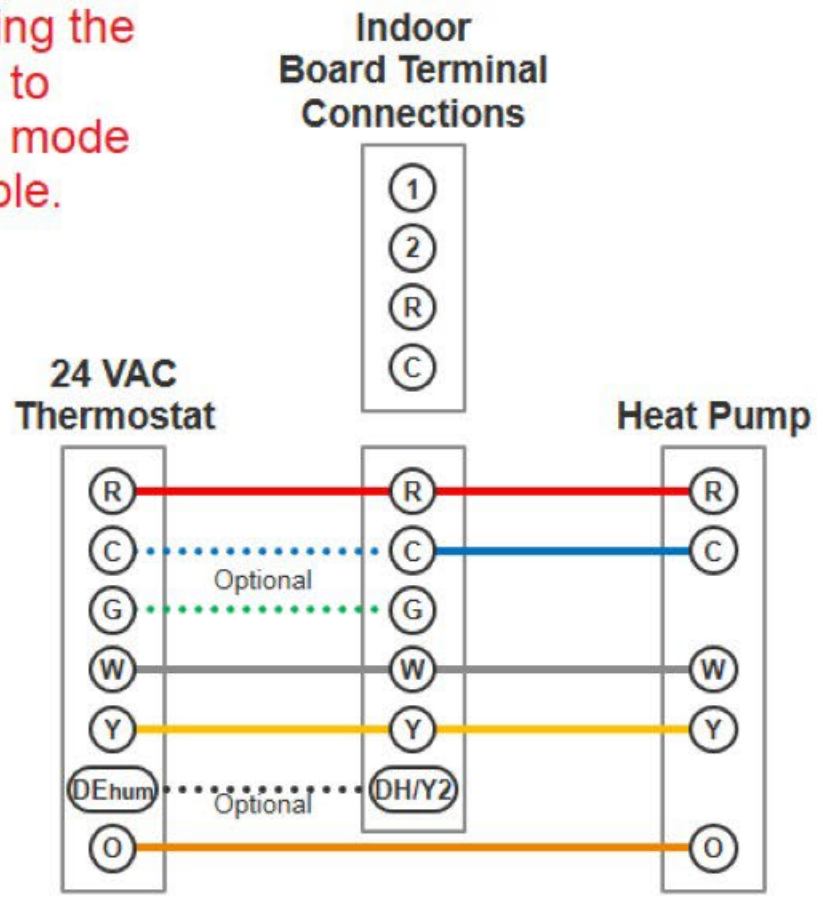
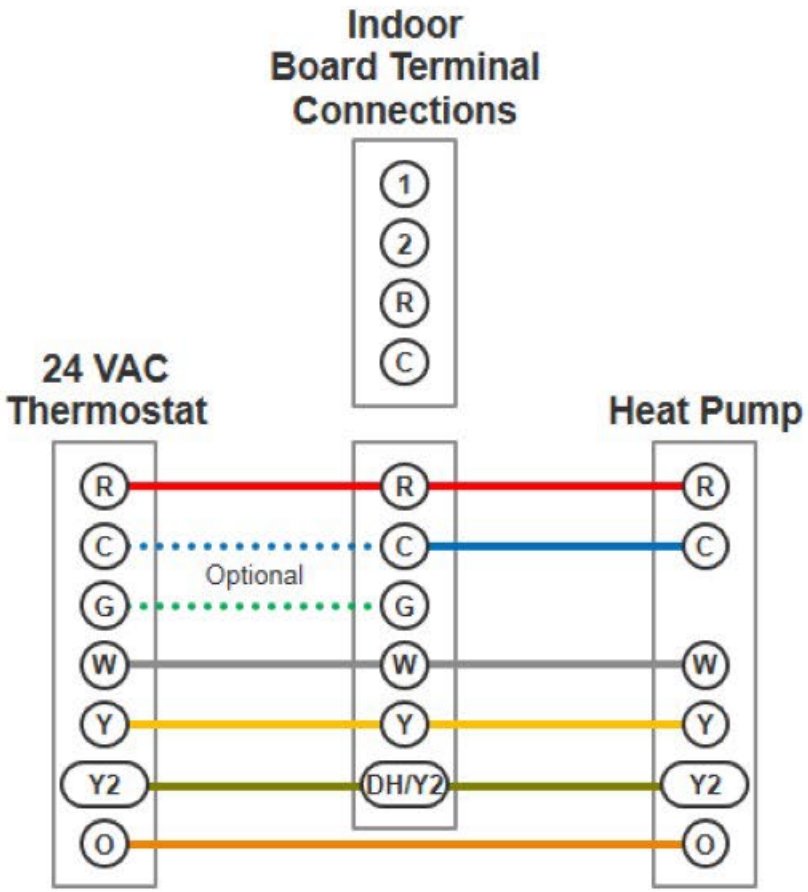
Low Voltage Wiring - Non-communicating Outdoor Unit

Single Stage Heat Pump

This is the only case where setting the thermostat to heat pump mode is acceptable.



Two Stage Heat Pump



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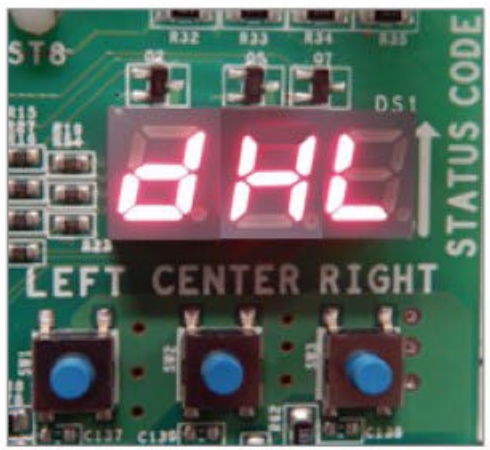
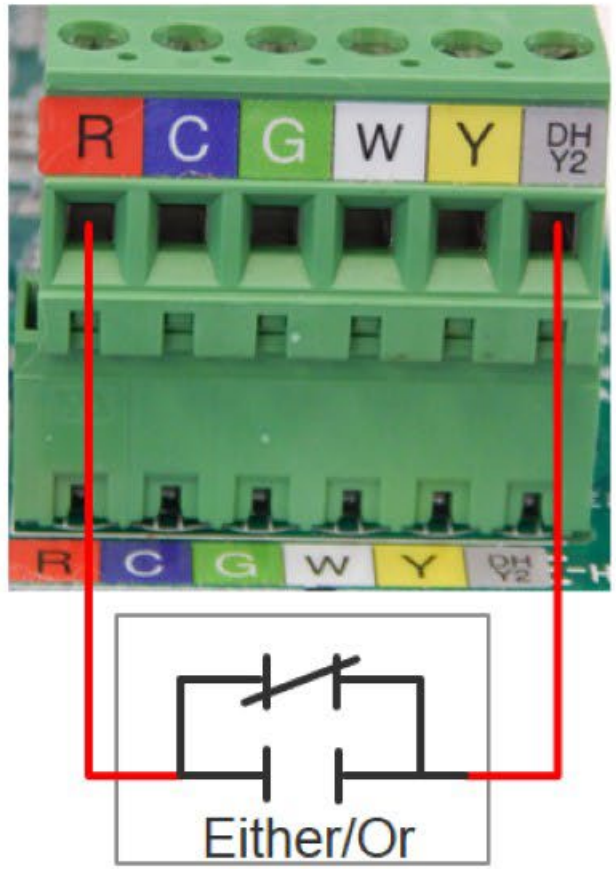
Low Voltage Wiring

Dehumidification

- 24 volt ‘Dehum’ input to be used with a thermostat or de-humidistat.
- Once De-Hum input is closed – fan operates at 85% of calculated rpm
- Select ‘HI’ to enable dehumidification when the thermostat DH terminal is energized.
- Select ‘LO’ to enable dehumidification when the thermostat DH terminal is de-energized. (default = ‘HI’)





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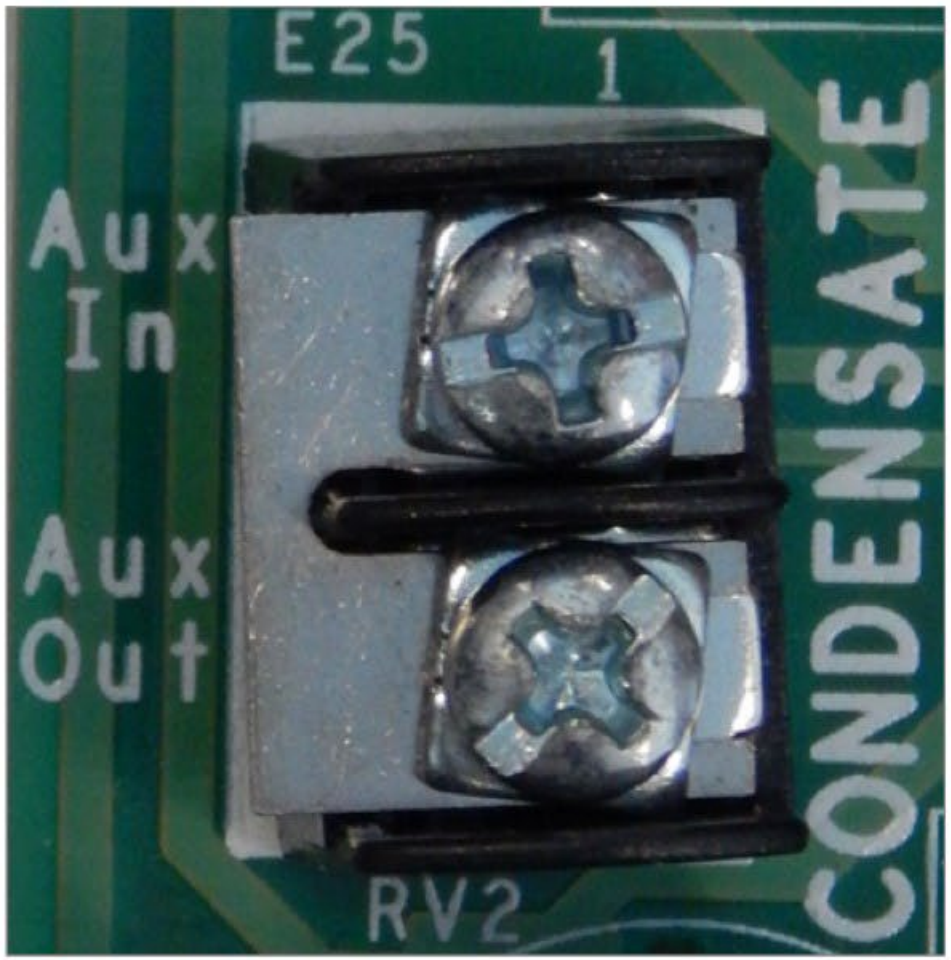
Low Voltage Wiring

24VAC Auxiliary Alarm Switch

- Primarily to be used for a condensate switch input.
- AUX switch is normally closed
  - Opens when the water level in the evaporator coil base pan reaches an undesirable level.
- Compatible with various input devices
- The control will respond by turning off the outdoor condensing unit and displaying EEF.
- If the AUX switch is detected closed for 30 seconds, normal operation resumes and error messages are no longer displayed.



Bluetooth Furnace Agenda

- Quick Start Guide
- Circulator Blower Speeds
- Low Voltage Wiring
- CoolCloudHVAC App
- Menu Navigation And Option Change
- Diagnostics
- Status Codes

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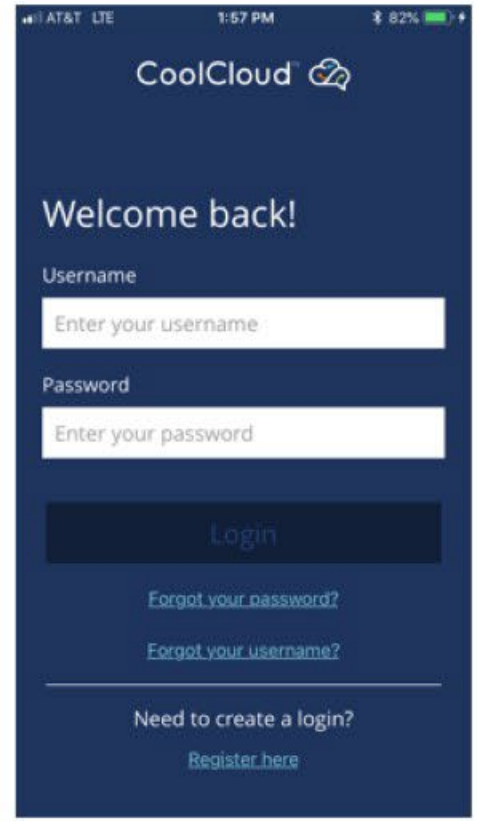
CoolCloudHVAC - App

- Download the CoolCloudHVAC Android/iOS App

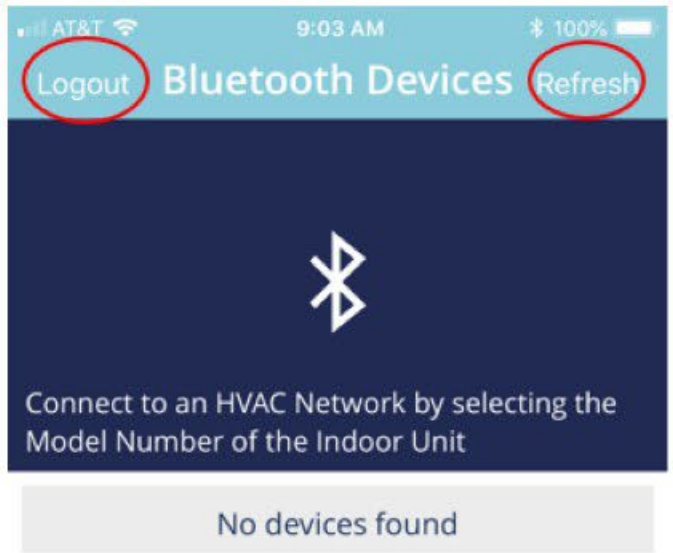
- Create an account to get started.
- Log in where you have a strong cell signal or are on an available Wi-Fi network.



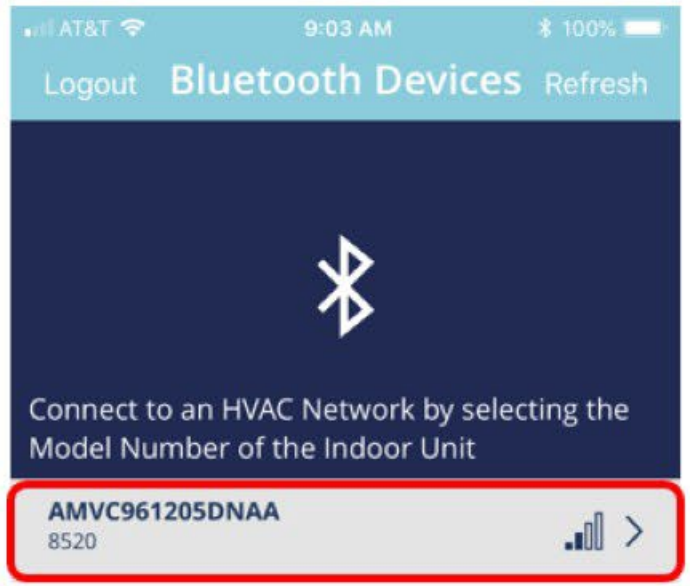
ComfortBridge™ technology

CoolCloudHVAC - App

- If no devices found, press ‘Refresh’
- If you press Logout, you will be logged out and returned to the previous log in screen



- Bluetooth connect screen
  - After logging in, your Android/iOS device will scan for Bluetooth networks from any nearby Goodman/Amana equipment.
  - The name displayed in the app will have the model number of the unit and the last four digits of the serial number.



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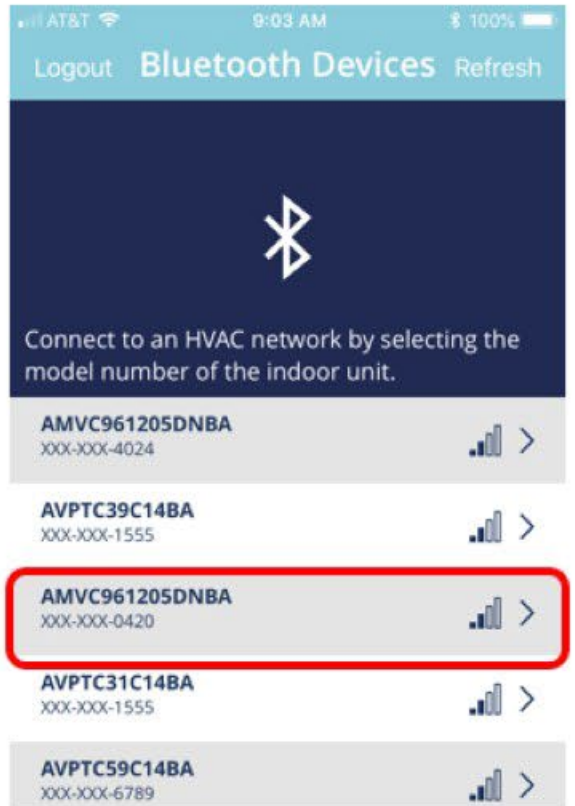
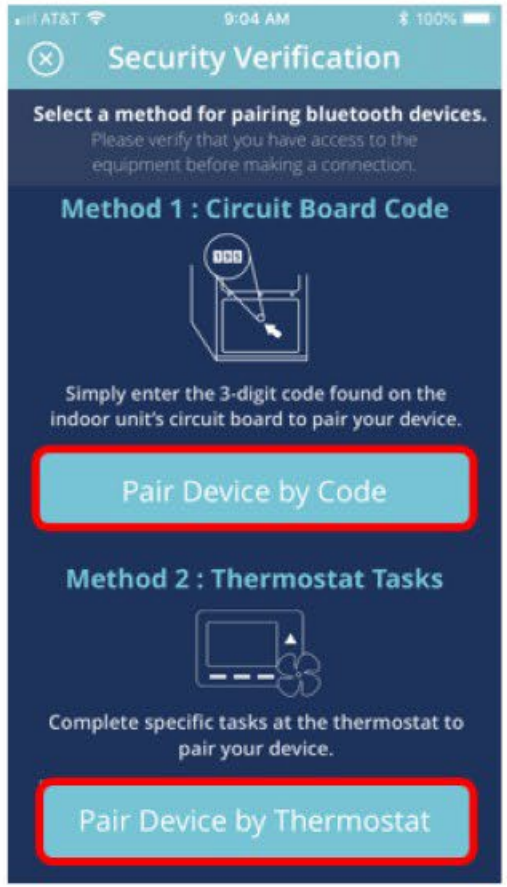
CoolCloudHVAC - App

- Once you select the unit you'd like to connect to, you'll be given two options to authenticate the connection
- You can verify the connection by either finding a code on the display inside the unit or by issuing commands from the thermostat

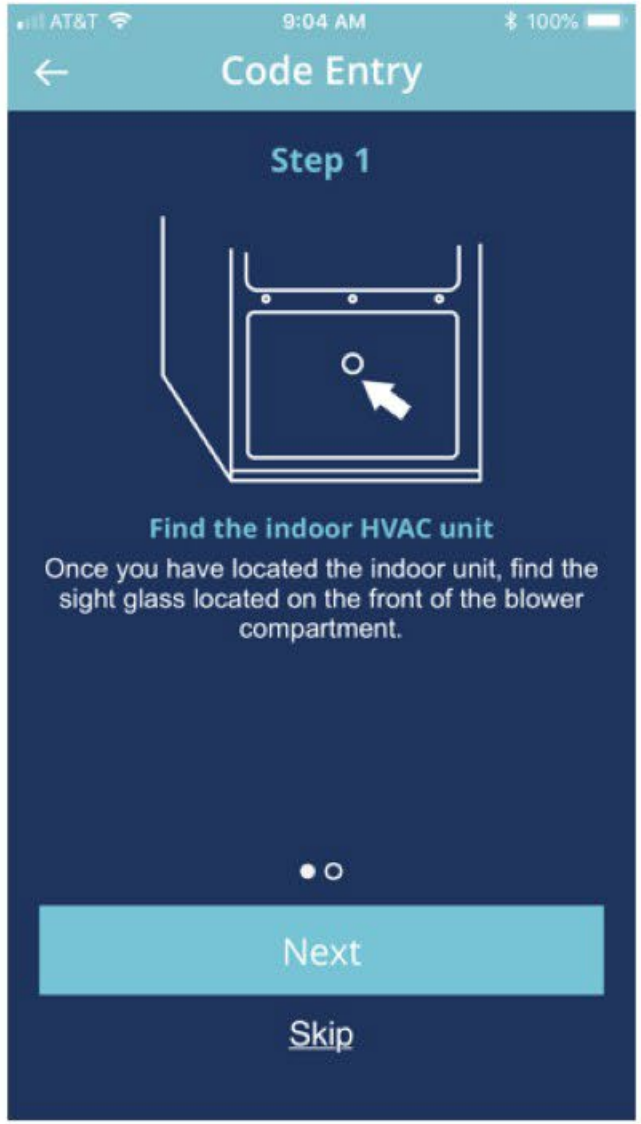


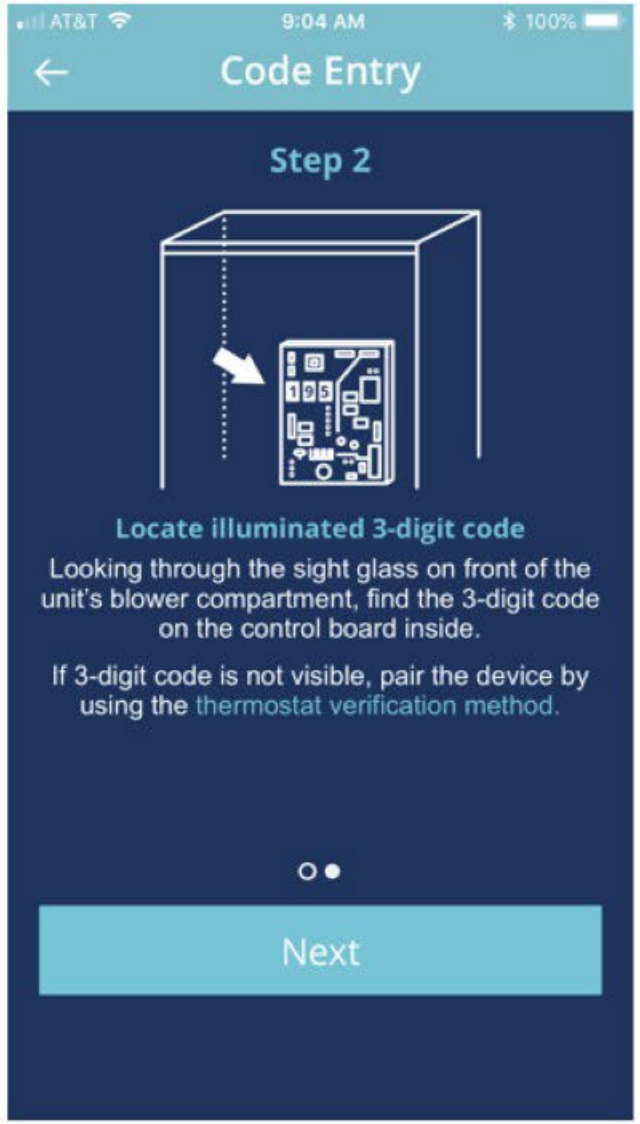


ComfortBridge™ technology

CoolCloudHVAC - App

Connecting Android/iOS App to Furnace with Code Entry





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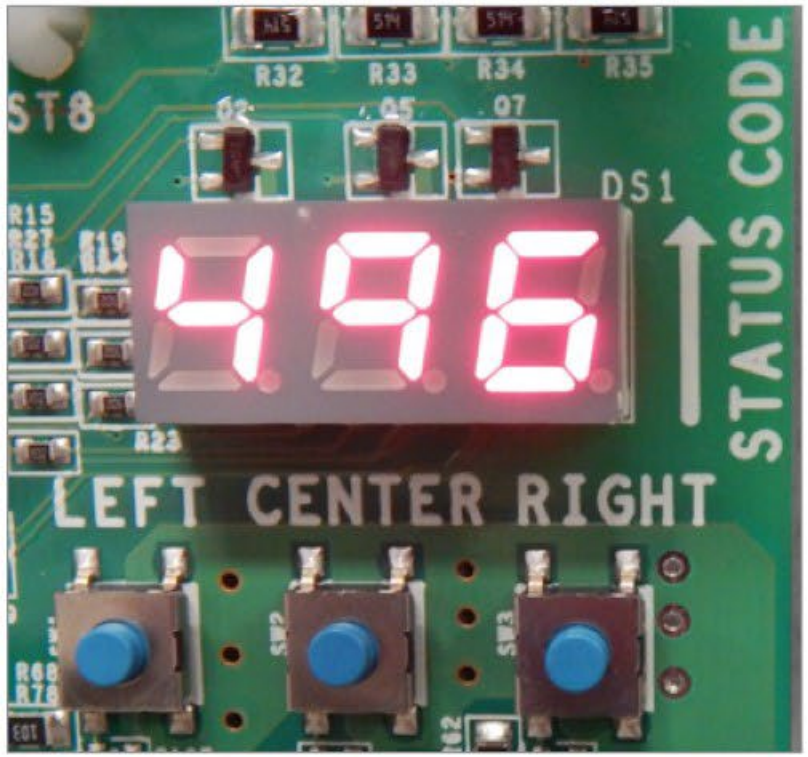
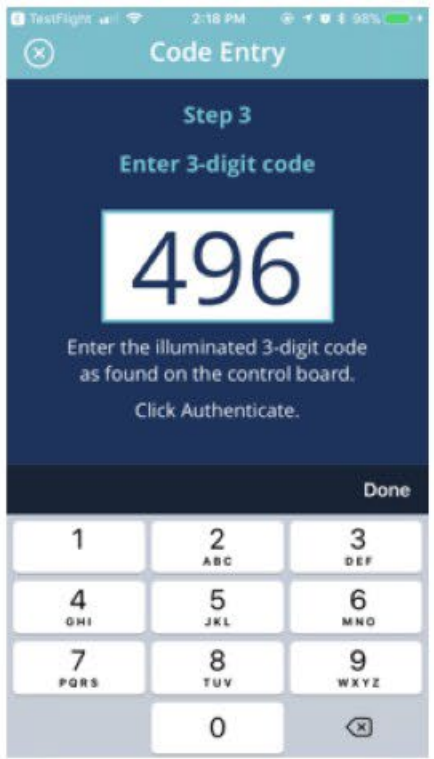
CoolCloudHVAC - App

Connecting Android/iOS App to Furnace with Code Entry

- You will be prompted for a 3 digit access code shown on the three seven segment displays
- A sight glass is located close to the control board for viewing digits.





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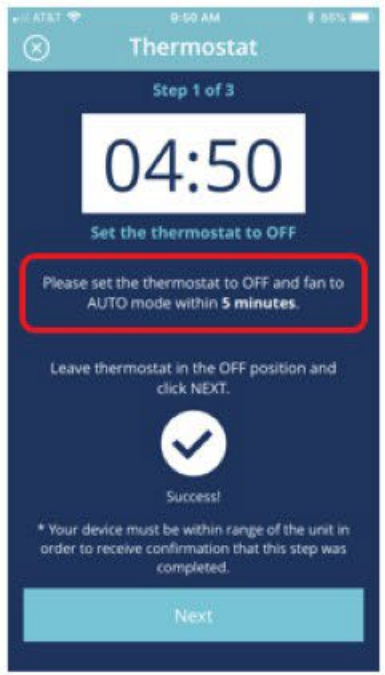
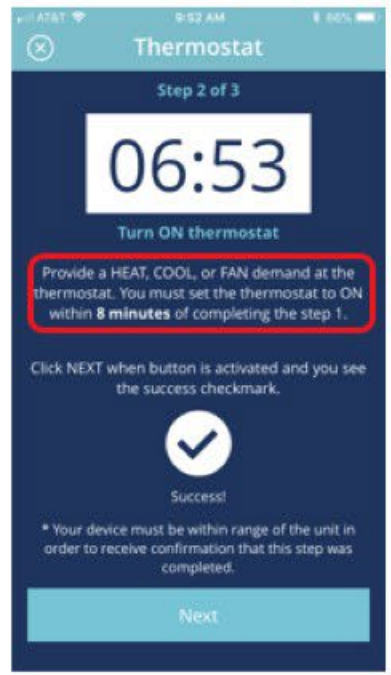
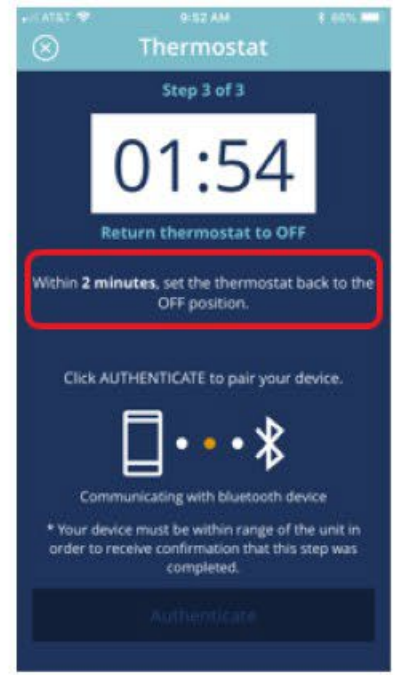
CoolCloudHVAC - App

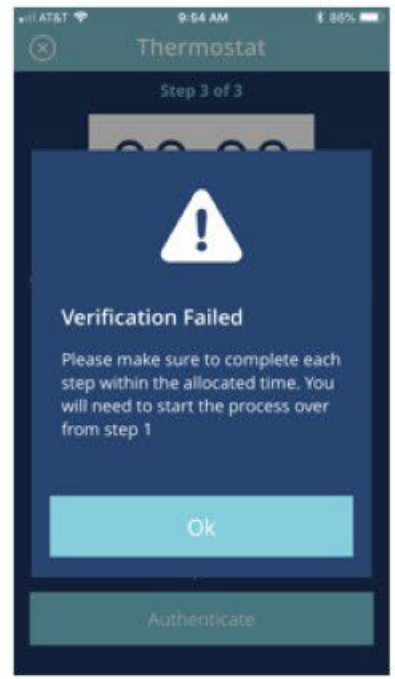
If display is not visible from the sight glass, the user has two options to connect.

- Option 1
  - Perform thermostat task as instructed by the Android/iOS application to gain access.
  - If the Android/iOS remains within Bluetooth range during the process, the user will be notified when each step has been completed and informed about what to do next, or you see – Verification Failed









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CoolCloudHVAC - App

If display is not visible from the sight glass, the user has two options to connect.

Option 2

- Remove furnace door
- Ensure the control has power
- Read/record the 3 digits.
- The code will temporarily remain active after a power cycle so the door can be put back on before making the Bluetooth connection if desirable.
- Note: power will be cycled to the control board with this option. If it is not desirable to cycle power to the unit for diagnostic purposes. Option 1 may be a better method to connect.

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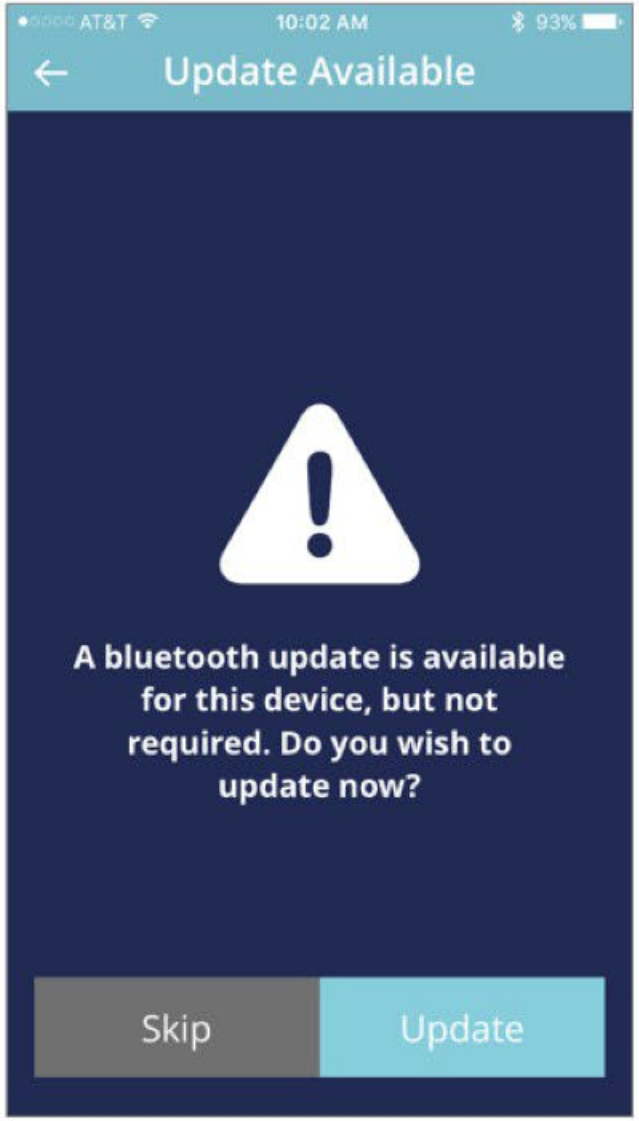
CoolCloudHVAC - App

- Once Authenticated
  - Mandatory/Optional Bluetooth updates may be available
    - Install Mandatory updates before being able to make any other changes.
    - These updates may take a few minutes
    - Review notes for optional software updates and install if necessary.



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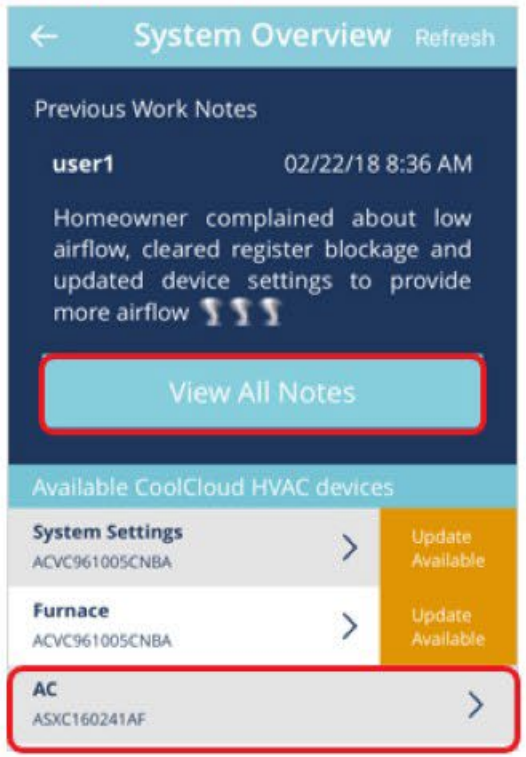
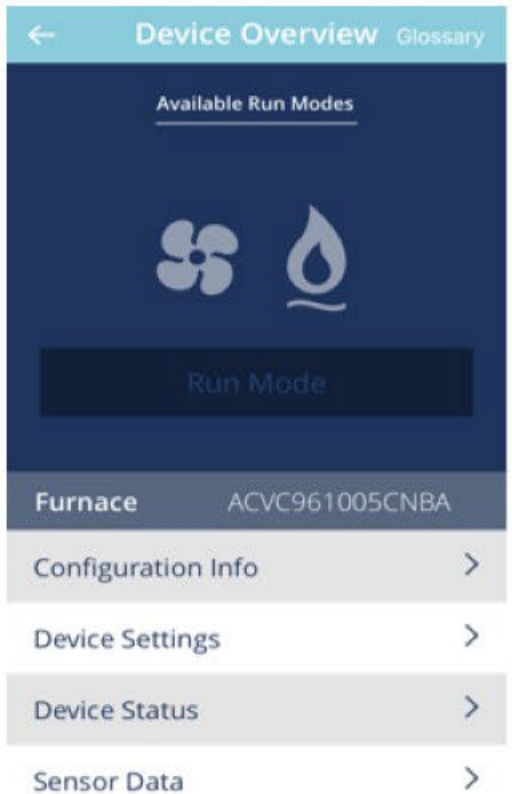
CoolCloudHVAC - App

Once updates completed or skipped

- System Overview Screen appears
- May View All Notes
- Select equipment you want to interface with



- **Device Overview screen appears**
- Can select/start Available Run Modes
- Can view/interact Info/Settings/Status/Data menus



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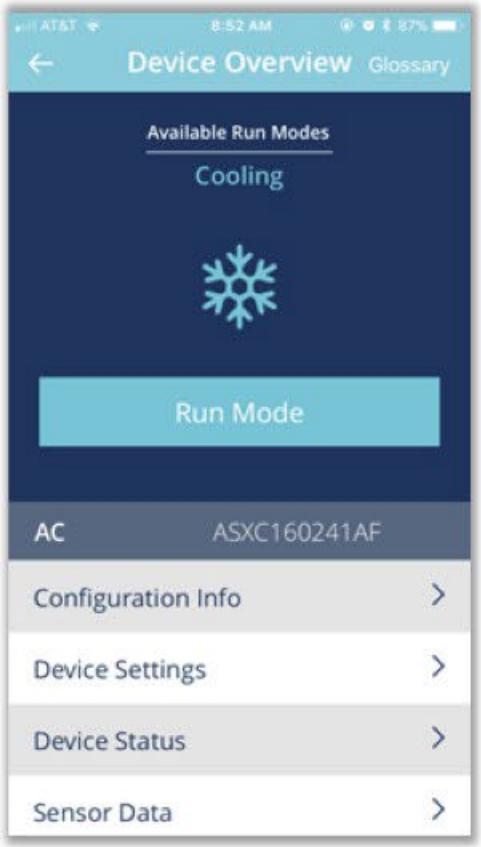
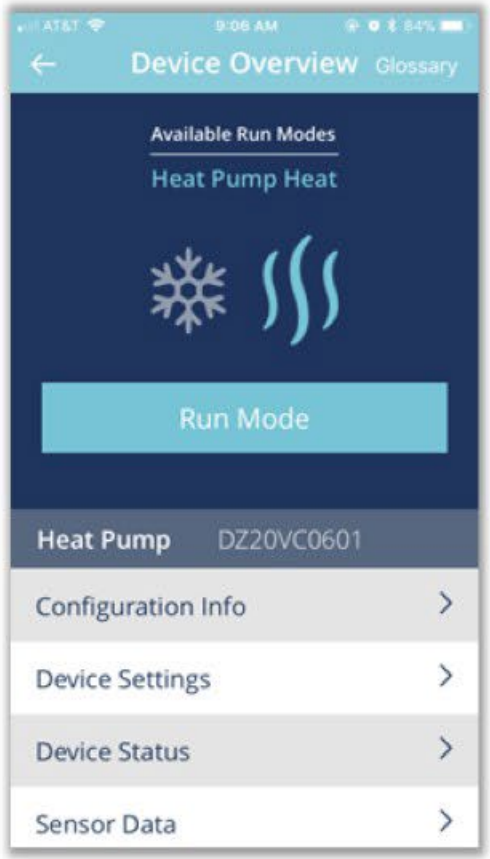
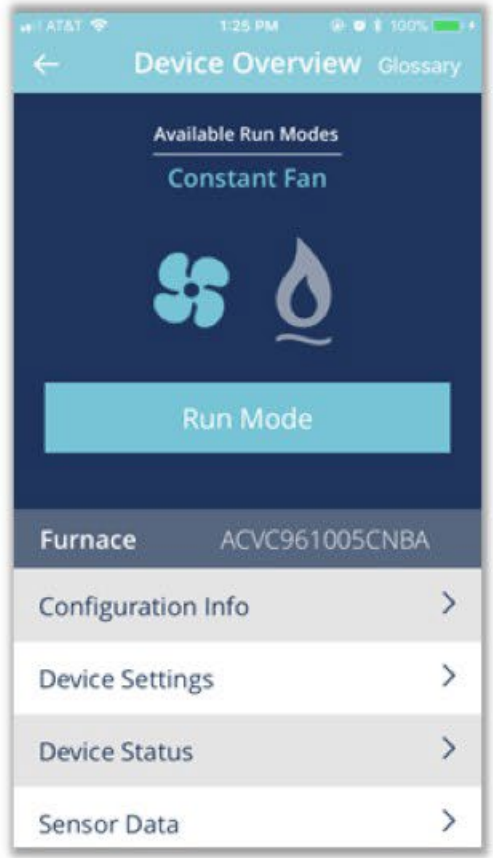
CoolCloudHVAC – App

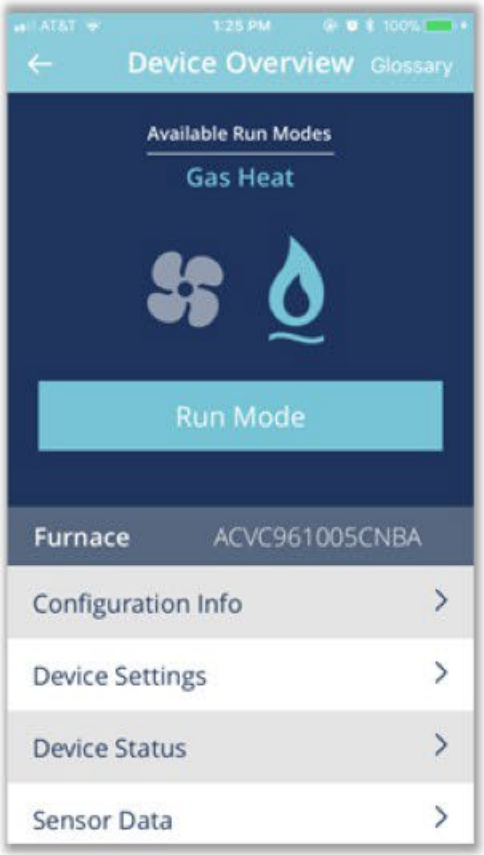
Available Run Modes

- Select Desired Mode by touching its icon, then touch Run Mode









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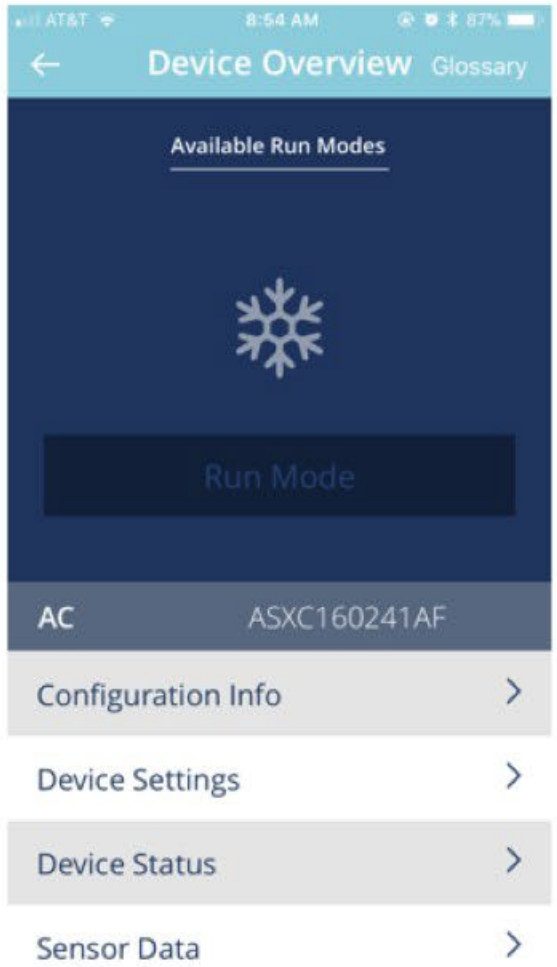
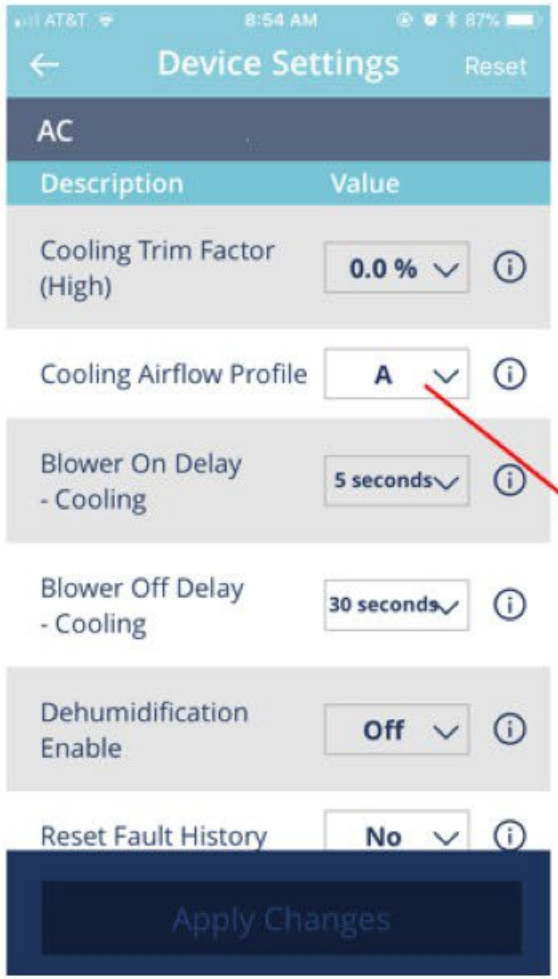
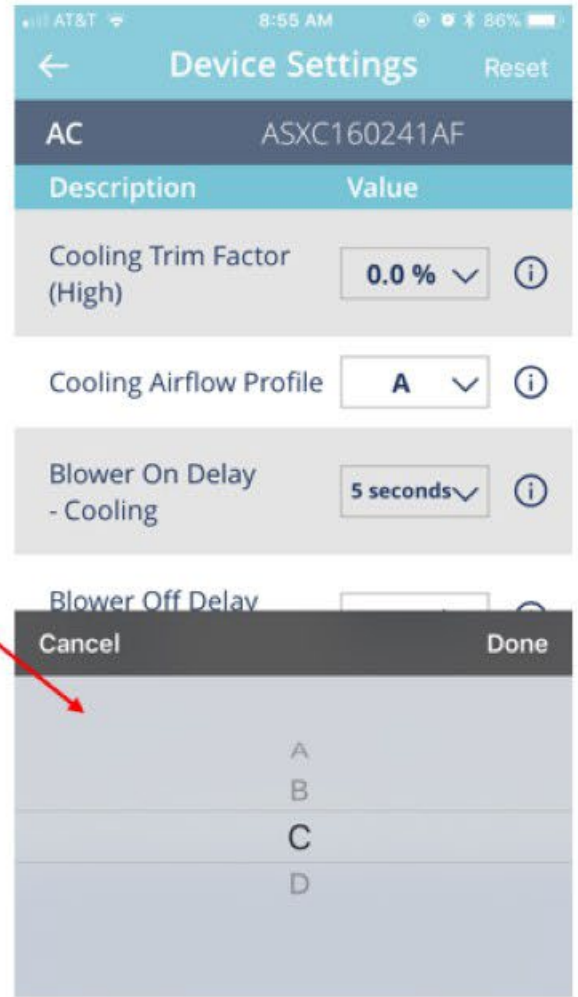
CoolCloudHVAC – App (Communicating Only)

Menu Items

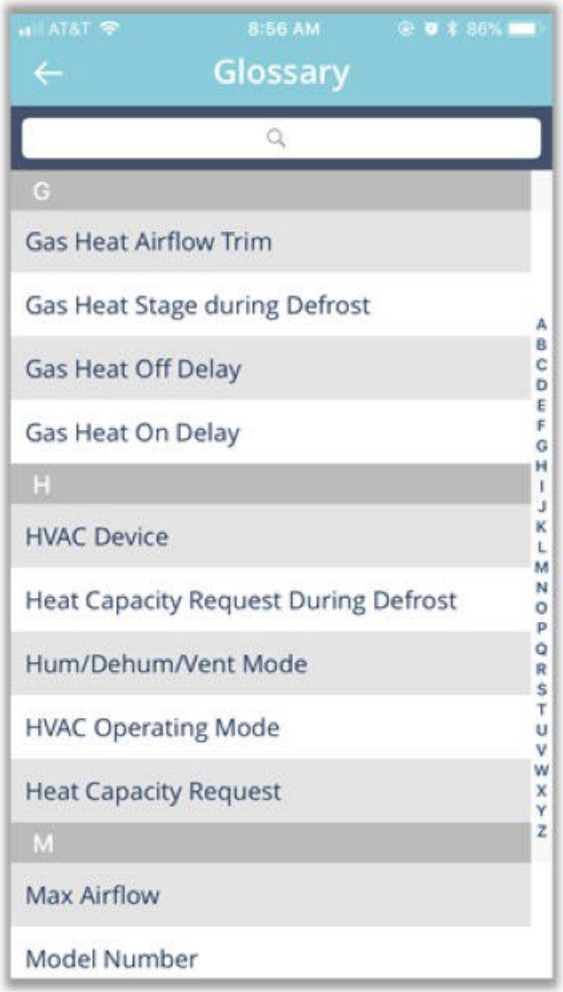


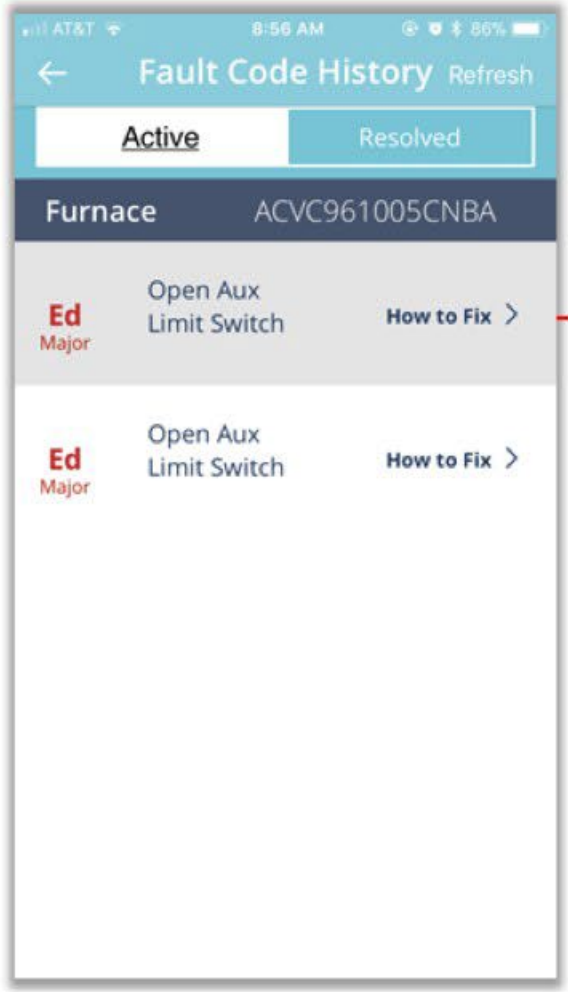


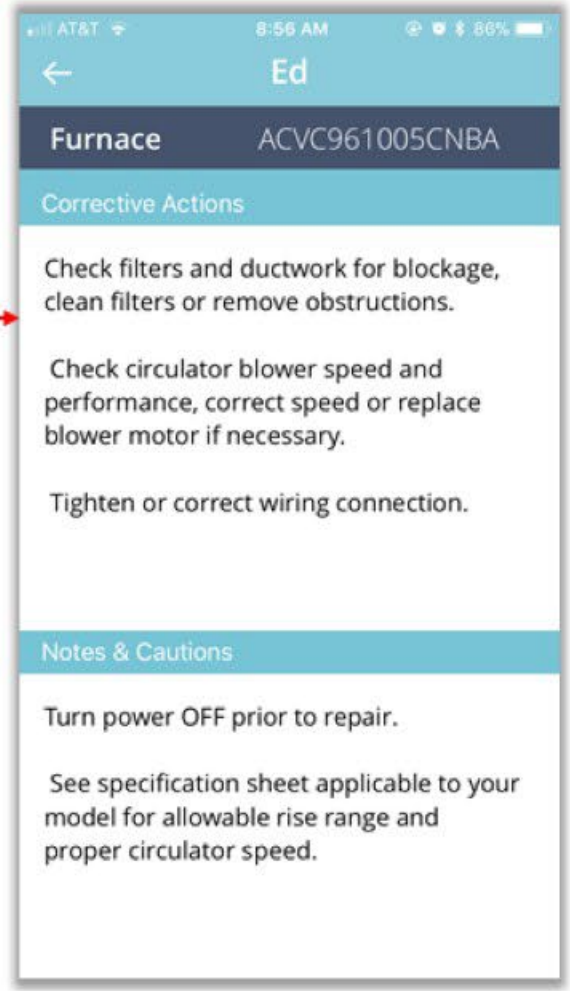


CoolCloudHVAC – App (Communicating Only)

- Additional Menus







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Bluetooth Furnace Agenda

- Quick Start Guide
- Circulator Blower Speeds
- Low Voltage Wiring
- CoolCloudHVAC App
- Menu Navigation And Option Selection
- Diagnostics
- Status Codes

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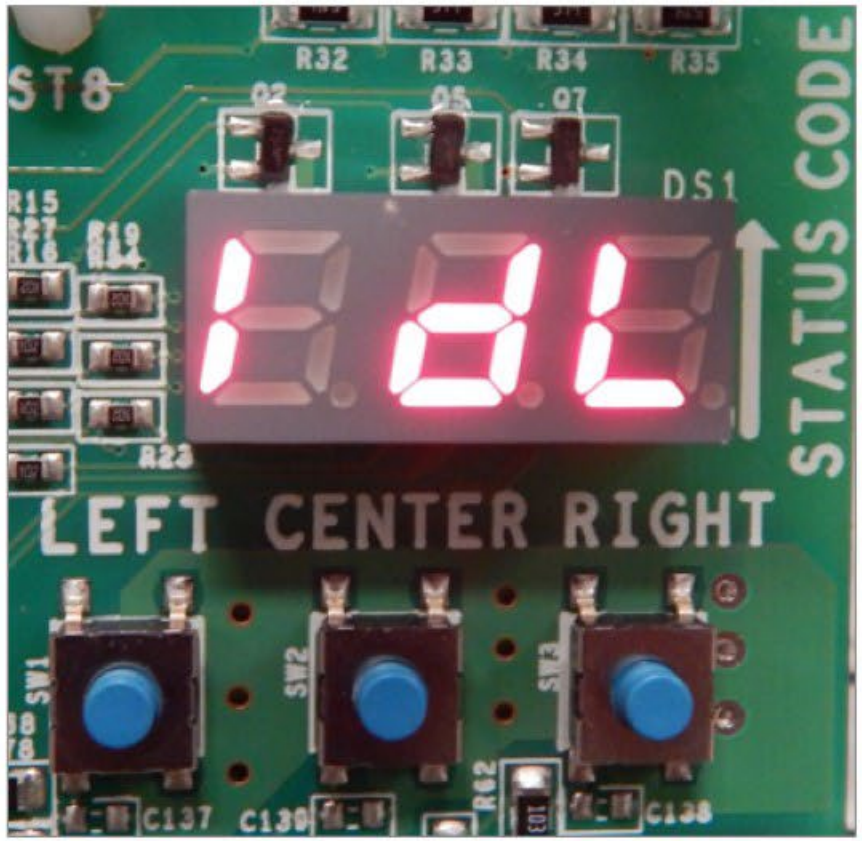
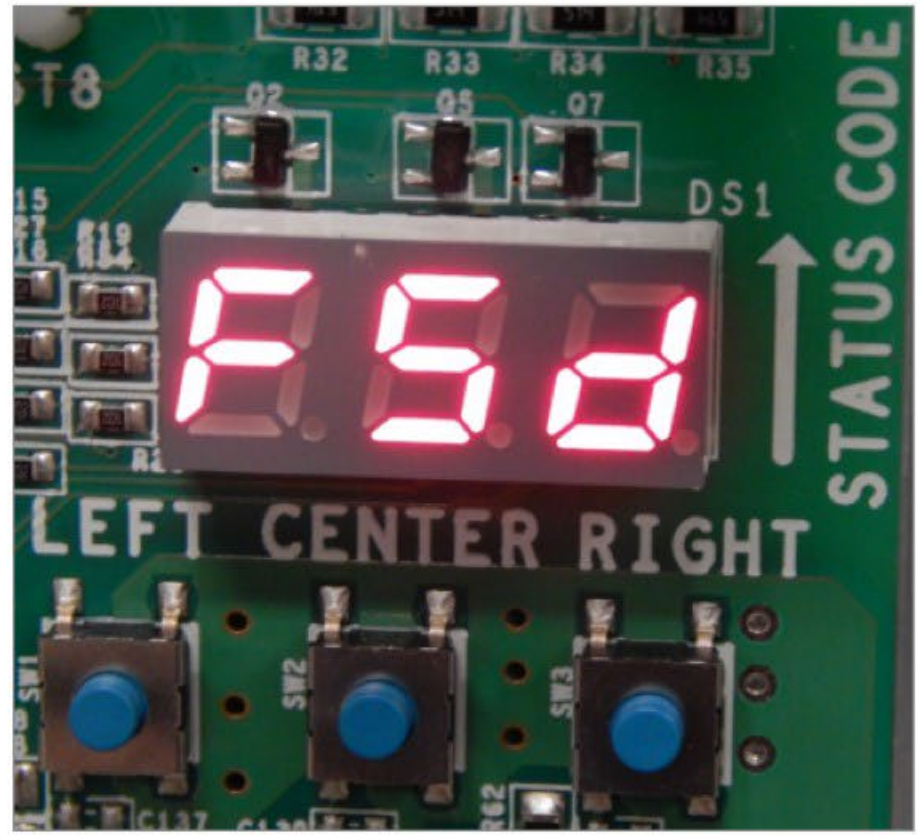
Menu Navigation and Option Selection

- When looking at the Furnace Control, the three 7 Segment displays (located just above the push buttons) will be displaying system status.
- System status includes the current modes of operation, airflow and any active error codes.





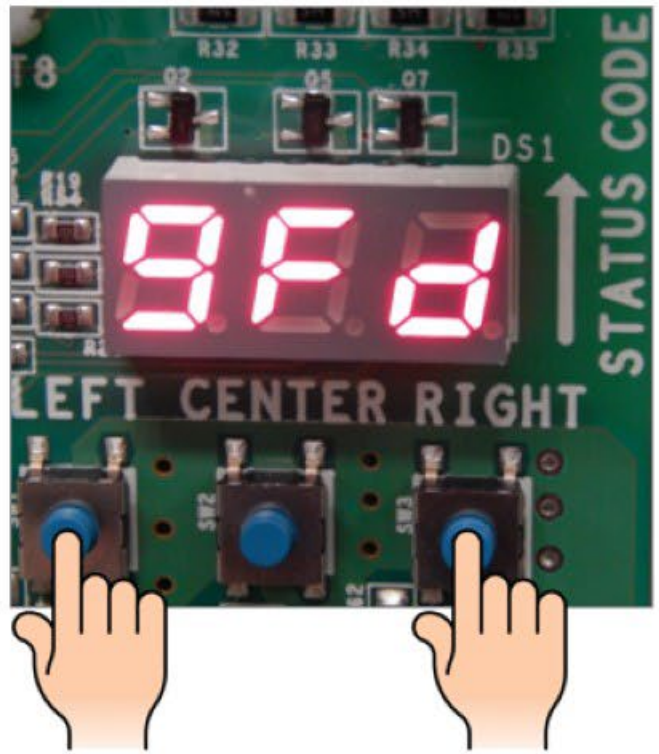
Menu Navigation and Option Selection

- While navigating through options; if no push buttons are pressed during a 30 second time period, the display will time-out and return to the Status Menu.

- Simultaneously pressing & releasing any two push buttons will also return the furnace control back to the Status Menu.

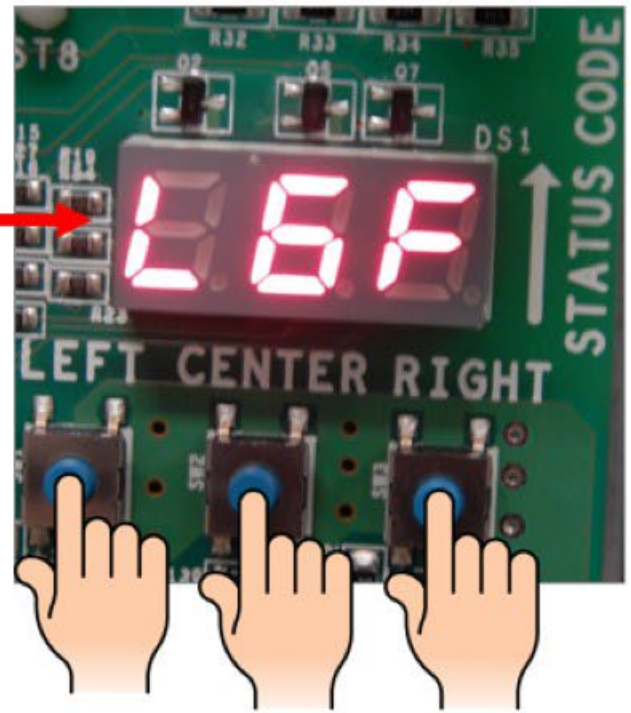
Status Codes

LED Display	Description of System Status
1AC	Compressor Cooling, Low Stage (non-communicating units)
2AC	Compressor Cooling, High Stage (non-communicating units)
1HP	Compressor Heat, Low Stage (non-communicating units)
2HP	Compressor Heat, High Stage (non-communicating units)
AC	Compressor Cooling, Single-Stage (single stage non-comm. units)
AC 1	Compressor Cooling, Low Stage (communicating units)
AC2	Compressor Cooling, High Stage (communicating units)
dF 1	Defrost, Low Stage Gas Heat
dF2	Defrost, High Stage Gas Heat
dHU	Dehumidification
FAn	Constant Fan
GH 1	Gas Heat, Low Stage
GH2	Gas Heat, High Stage
HP	Compressor Heat, Single-Stage (single stage non-comm. units)
HP 1	Compressor Heat, Low Stage (Communicating Units)
HP2	Compressor Heat, High Stage (Communicating Units)
I dL	Idle
uAC	Inverter Cooling
uHP	Inverter Heating



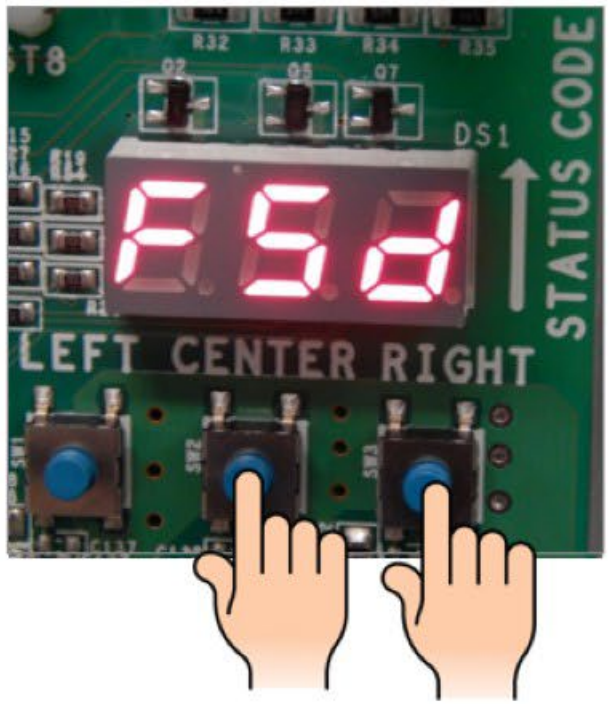
Push Button Menu Option Selection

- Press and release the Right or Left Button
  - Cycles through the menus in that direction.
- Press right button to display Menu L6F (Last 6 Faults).
- Continue pressing and releasing the Right/Left Button until you see Menu you want
- Press and release the Center Button. The center button is used to enter menus and make selections within menus.



Push Button Menu Option Selection

- Press the center button, if you want to enter this menu – ‘Constant Fan Speed’
- Select the indoor blower airflow at constant fan mode
  - Adjustable between 25% to + 100% with 10% increments. Default is 25%.
  - Press Right/Left button to increase/decrease % - Numbers will be flashing
  - To select new value, press center button again. Numbers stop flashing
  - To finalize the selection
    - Press center button once more
    - Returns to FSd display
- Follow similar process for all menus



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Bluetooth Furnace Agenda

Quick Start Guide

Circulator Blower Speeds

Low Voltage Wiring

CoolCloudHVAC App

Menu Navigation And Option Selection

Diagnostics

Status Codes

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Diagnostic Codes

Additional Codes in Manual

Symptom	LED Status	Fault Description	Corrective Actions
Induced draft blower and circulator blower runs continuously No furnace operation	EE4	Flame sensed with no call for heat Short to ground in flame sense circuit Lingering burner flame Slow closing gas valve	Correct short at flame sensor or in flame sensor wiring Check for lingering or lazy flame Verify proper operation of gas valve
No furnace operation	EE5	Open fuse Short in low voltage wiring	Replace fuse Locate and correct short in low voltage wiring
Normal furnace operation	EE6	Flame sense micro amp signal is low Flame sensor is coated/oxidized Flame sensor incorrectly positioned in burner fame Lazy burner flame due to improper gas pressure or combustion air	Clean flame sensor if coated or oxidized Inspect for proper flame sensor alignment Check inlet air piping for blockage, proper length, elbows, and termination Compare current gas pressure to rating plate and adjust as needed

Bluetooth Furnace Agenda

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Status Codes

There are 4 distinct types of Code displays

Status Codes

- Displayed on the furnace control's PCB

System Status Displays

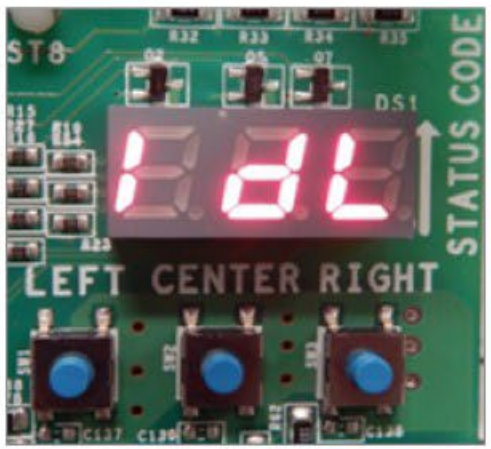
- Displayed on communicating devices
  - Thermostats
  - CoolCloudHVAC app

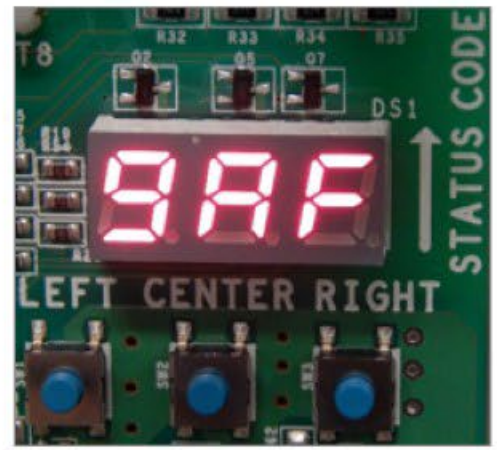
Push Button Menu Codes

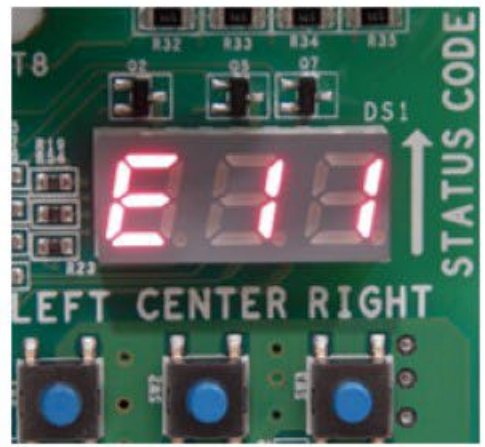
- Displayed on the furnace control's PCB
- Allows configuration of equipment

Troubleshooting Codes

- Refers technician to explanation in manual







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System Status Codes

Additional Codes in Manual

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