S1-TTSCCO Residential Communicating Control System

Field Reference Guide

Updated September 2023

Johnson Controls

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Introduction

Introduction S1-TTSCCO

The residential communicating control system provides the equipment owner with the finest climate control available, while providing a wealth of information and system flexibility. For the contractor, the communicating control system simplifies equipment installation, start up, and troubleshooting - while assisting the consumer in the maintenance of the investment in their comfort system.

Touch Screen Control

Features

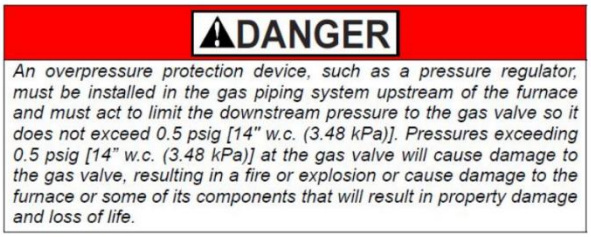
- High-definition color touch screen user interface
- Intuitive on-screen prompts for ease of installation and service
- System diagnostics for ease of troubleshooting
- Detailed system forced operation.
- Complete integration of temperature control, humidity control, and ventilation
- Programmable or non-programmable mode selection
- Advanced or normal mode view selection
- 7-day programmability with 2, 3, or 4 periods per day
- Patented Quick Heat/Quick Cool functionality.
- Day-at-a-glance programming for simplified ease of use
- Seasonal programming
- Easy schedule override
- Simplified vacation schedules
- Programmable fan by period
- On-screen fan speed adjustability
- Maintenance reminder messaging

02

Safety

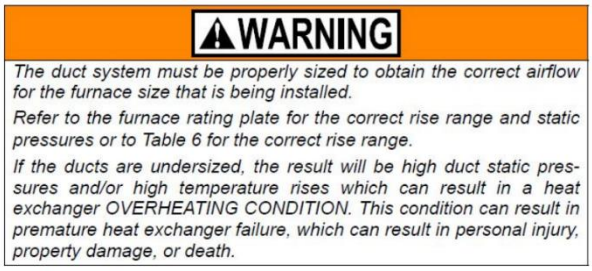
Safety Symbols

Reminder – use this manual in conjunction with the technical literature for each product. This manual Does Not Supersede the Installation Manual and Technical Guide provided with the equipment. Always read and follow all instructions before installing equipment. Understand and pay particular attention to the signal words **DANGER**, **WARNING** or **CAUTION**.



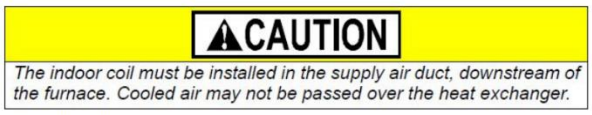
Sample Danger Label

DANGER indicates an imminently hazardous situation which could result in death or serious injury.



Sample Warning Label

WARNING indicates a potentially hazardous situation which could result in death or serious injury.



Sample Caution Label

CAUTION indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It is also used to alert against unsafe practices and hazards involving only property damage.

Safety Specific Rules

Follow these specific safety rules for a safe application:

- Air conditioning systems utilizing gas heating can only use natural gas or propane (LP) gasses as an approved fuel. LP applications require installation of the appropriate LP conversion kit. Refer to the unit rating plate or Installation Manual for information on proper inlet and manifold pressures.
- Install air conditioning systems only in locations and positions as specified in the Installation Manual.
- Provide adequate clearances for service, combustion, and ventilation air to the unit. The recommended clearances are specified in the Installation Manual.
- Test for gas leaks as specified in the Installation Manual.
- Only connect the equipment to a duct system which has an external static pressure within the allowable range as specified in the Installation Manual.
- These unites are not to be used for temporary heating or cooling of buildings or structures under construction. Improper installation will shorten equipment life, reduce product efficiency, and void the warranty.
- Always install the systems to operate within the equipment's intended temperature and operating ranges.
- The size of the unit should be based on an acceptable and approved heat load calculation for the structure being conditioned.

Safety Requirements

Follow these safety requirements for a safe application:

- All equipment should be installed in accordance with all national and local building/safety codes and requirements, local plumbing or wastewater codes, and other applicable codes. In the absence of local codes, install in accordance with the most recent National Electrical Code, National Fuel Gas Code and/or Natural Gas and Propane Installation Code (latest editions). Furnaces have been certified to the latest edition of standard ANSI and CSA standards.
- Only approved heat accessories shall be installed on these air conditioning units local.
- Refer to the unit rating plate for the equipment model number, and refer to the Installation Manual for proper air plenum dimensions.
- Provide clearances from combustible materials as listed under Clearances to Combustibles in the Installation Manual and the equipment rating plate.
- Provide clearances for servicing ensuring that service access is allowed for both the burners and indoor fan motor.
- Provides clearances for servicing.
- Failure to carefully read and follow all instructions in this manual and the equipment Installation Manual can result in equipment malfunction, death, personal injury and/or property damage.
- Check the rating plate and power supply to be sure that the electrical characteristics match. All commercial 15 through 25-ton units distributed in North America use nominal 208/230 volts AC, nominal 460 volts AC, or nominal 575 volts AC 3 Phase, 60-Hertz power supply. DO NOT CONNECT THIS APPLIANCE TO A POWER SUPPLY OR A VOLTAGE OTHER THAN THE RANGE SPECIFIED ON THE UNIT DATA TAG.
- The equipment shall be installed so the access panels are readily available, and the electrical components are protected from water infiltration.
- Installing and servicing HVAC equipment can be hazardous due to the electrical and mechanical components. Only trained and qualified personnel should install, repair, or service HVAC equipment. When working on equipment, observe precautions in the manuals and on the labels attached to the unit and other safety precautions that may apply.
- The Installation manual covers minimum requirements needed to conform to existing national standards and safety codes. In some instances, these instructions exceed certain local codes and ordinances. These instructions are required as a minimum for safe installation and operation.

General Awareness

Safety is ALWAYS the primary concern for everyone. On the job injuries can be significantly reduced when proper guidelines are followed. Always be aware of all company, local, state and/or OSHA (Occupational Safety and Health Administration) regulations.

Jobsite Safety

Keeping the job site clean of trash, extra tools and equipment will significantly reduce the chance for injuries. Since each job is unique and has its own hazards, all new workers to the area should be made aware of the location of hire and first-aid equipment, fire escape routes, and other dangers.

Hazardous Materials

Many different chemicals and compounds are used in the service and installation of HVAC systems. Please read the directions and use caution along with PPDs whenever handling these materials. Read and understand the MSDS for all materials used.

Confined Spaces

Never enter or work in a confined space without taking the appropriate precautions. Have someone available outside the space ready to assist or summon help if necessary. Even spaces that seem relatively safe can quickly become hazardous if a pipe were to break and fill the space with refrigerant, steam, poisonous fumes or other gasses. Welding or brazing in a confined space is especially hazardous.

Pressure

High pressures have always been part of the HVAC profession. Wear the proper personal protective devices including safety glasses and gloves. Proper hose ratings and manifolds are required for high-pressure refrigerants.

Electrical Safety

Jewelry should be removed prior to any electrical work being performed. Ensure that the equipment disconnect switch removes the primary power source prior to taking resistance readings or disconnecting any wires or connections. Removal of system power should be verified with the voltage function of a multimeter. All electrical safety guidelines should be always followed. Only trained, qualified technicians should perform electrical maintenance, installation, inspections and troubleshooting of electrical equipment.

Electrocution occurs when a current as low as 6 to 200mA flows through the heart, disrupting its normal operation and causing death. Electrical shock is an injury that occurs because of exposure to an electrical current. Inspect all extension cords and power tools regularly. Fuses and circuit breakers are designed to protect equipment, not people. For personal electrical protection, GFCI or Ground Fault Circuit Interrupters are highly recommended.

Lock-Out Tag-Out

OSHA Standards cover the servicing and maintenance of machines and equipment, in which unexpected energizing or startup of the machines or equipment, or release of stored energy, could cause injury to employees.

These standards establish minimum requirements for the control of such hazardous energy. To ensure safety, put a lock that is tagged with the technician’s name on the electrical disconnect or breaker of the equipment or circuit which is being serviced.

Be aware of others who may be working on the same circuit or other circuits served by the same electrical panel. The technician should also be aware that other technicians may not have used the proper Lock-Out, Tag-Out procedures.

Fire Safety & Burns

While brazing, keep the area clear of combustible material or use a heat shield to help reduce risk of fire.

Check equipment regularly and never try to modify or repair regulators.

While servicing the refrigeration circuit, improper use of equipment and tools can result in serious burns that are associated with refrigerants. This may include frostbite, which is a deep tissue injury. Proper personal protection devices must be in use when servicing the refrigeration system.

Personal Safety

Personal safety always includes remaining aware of the surroundings, using properly maintained tools, and correct use of items designed for personal protection.

Personal Protection Devices (PPD)

- Hard Hat: Hard hats must be worn when there is a danger of head injury.
- Safety Glasses: Eye protection should be worn at all times while on a job site.
- Gloves: Assist in the prevention of serious injury to the hands from serious cuts as well as injuries from high-pressure gasses such as refrigerants. Rubber gloves can protect the technician's hands from chemicals when inspected and worn properly.
- Safety Shoes: Work shoes with steel toes for foot protection. There are also electrical safety shoes that can aid in protecting the technician against electrical shock and/or electrocution. At a minimum, leather work shoes with rubber soles are required.
- Respirator: Used in a confined space where the air can be dissipated by refrigerant which can cause asphyxiation.
- Safety Harness: Used when working above grade level. Ladders must be tied down. Ensure that PPDs provide the intended protection. They should be inspected regularly, used properly and never altered or modified in any way.

Clothing

Rotating and moving components pose a serious risk. Loose fitting clothing and ties should not be worn when servicing rotating equipment. If any clothing becomes entangled in moving parts, serious injury or death is a likely result.

Jewelry

Serious injury or death can result if jewelry contacts an energized circuit or is caught in moving parts. Leave jewelry at home or in your service bag or service vehicle.

Lifting

To avoid back injuries, always adhere to proper lifting techniques. Be aware of personal limitations and seek help with items that are too heavy to safely lift. A back support belt may provide additional protection.

03

Component Familiarization

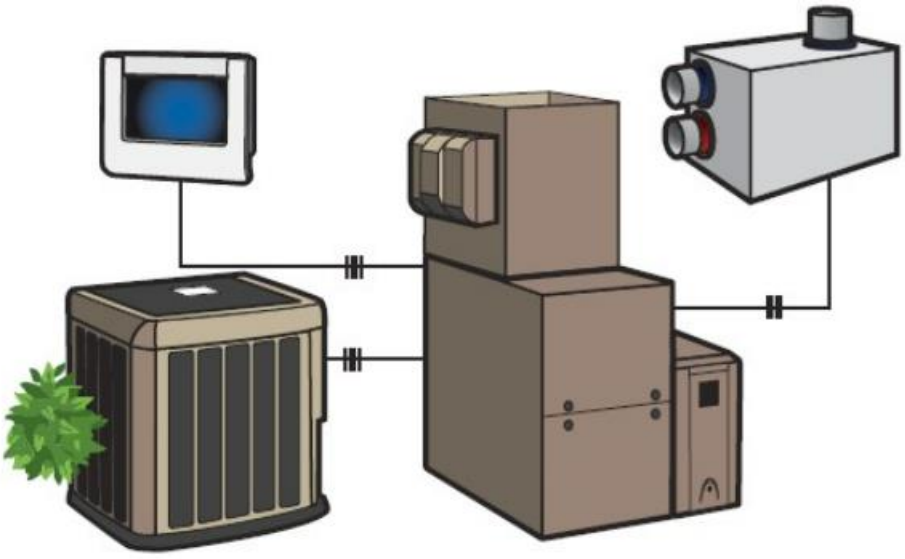
Touch Screen

The touch screen user interface serves as the central point of access for temperature adjustment, scheduling, system configuration, and service access.

Display items may be hidden or customized as required to meet the requirements of the end user. These details are described throughout this manual. The communicating control system is designed to work with communications-capable Unitary Products equipment. Non-communicating Unitary Products equipment (or existing competitive equipment) may be connected to the communicating control system with the use of a "Communicating Interface" control board, which will be described later in more detail. The basic functionality of communications-capable controls has not changed from their non-communicating counterparts.

System components in the communicating system are connected with four wire conductors as shown below.

Touch Screen Control



Communicating System Connections

The residential communicating control system consists of the touch screen control, and compatible communicating equipment as shown.

Control Type	Application
Indoor Auxiliary Control	Single Stage Furnaces, Two Stage Furnaces, Non-communicating Air Handlers, Residential Packaged Units
AC Communicating Control	Single Stage Air Conditioners Two Stage Air Conditioners
Variable Speed Modulating Furnace Control	Variable Speed Modulating Furnace
AV/MV Air Handler Control	Communicating AV/MV Air Handlers
AHV Air Handler Control	Communicating Air Handler A
ERV/HRV Auxiliary Control	Energy/Heat Recovery Venti

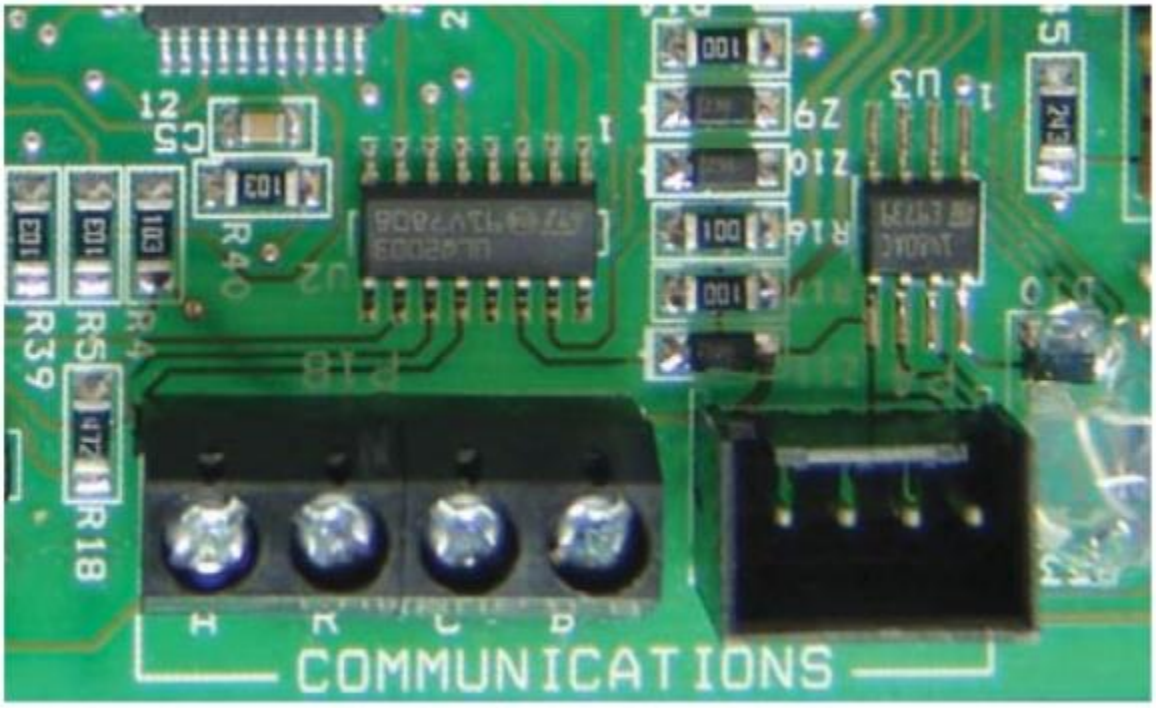
Communications-Capable Air Handlers

AVC/MVC

Many AV/MV air handlers have communications capability. When the unit is communications ready, it will have a "C" digit at the end of the model number. Control boards with COMM capability have a heat sink mounted to the top of the board.

AVC/ MVC Control Board

The communicating air handler control provides improvements in airflow characteristics when operating in "COMM" mode. The "COMM" (communication) values are stored in the control.
The COMM connections include a four-wire terminal block and harness connector. The terminal block is connected terminal-for-terminal to the touch screen control. The harness connector may be left open for connection to a second touch screen control used as a service tool.



COMM Connections

Three "hard jumpers" on the air handler board must be selected in the field:

- Heat/No Heat
- AC/HP
- HUM STAT

The remainder of the jumpers may be configured through the touch screen interface ("soft jumpers").
When establishing desired jumper settings, the last jumper setting changed takes precedence over previous jumper settings. For example, if a "hard jumper" setting is physically changed on the equipment control board, it overrides the corresponding "soft jumper" setting selected from the touch screen. If a "soft jumper" is changed on the touch screen, it overrides the corresponding "hard jumper" setting selected on the equipment control board.

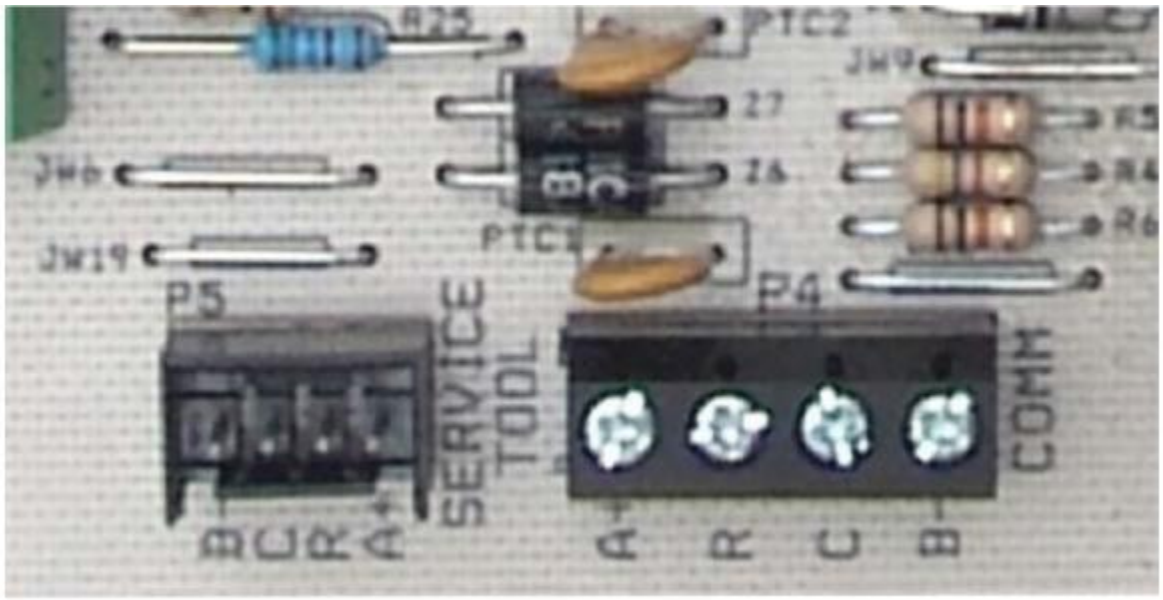
Unit Control	Jumper Setting
Air Handler	Heat/No Heat, AC/HP, Hum Stat
Furnace	Heat Pump, Humidistat, Zone Control
Heat Pump	Fossil Fuel, Hot Heat Pump
Air Conditioner	No Jumpers

AVC

Two "hard jumpers" on the AHV air handler board must be selected in the field:

- AC/HP
- HUM STAT

The remainder of the jumpers may be configured through the touch screen interface ("soft jumpers"). Like the AVC air handler board, when establishing desired jumper settings, the last jumper setting changed takes precedence over previous ones.



Comm Terminals: AVC

Communications-Capable Air Conditioning Outdoor Units

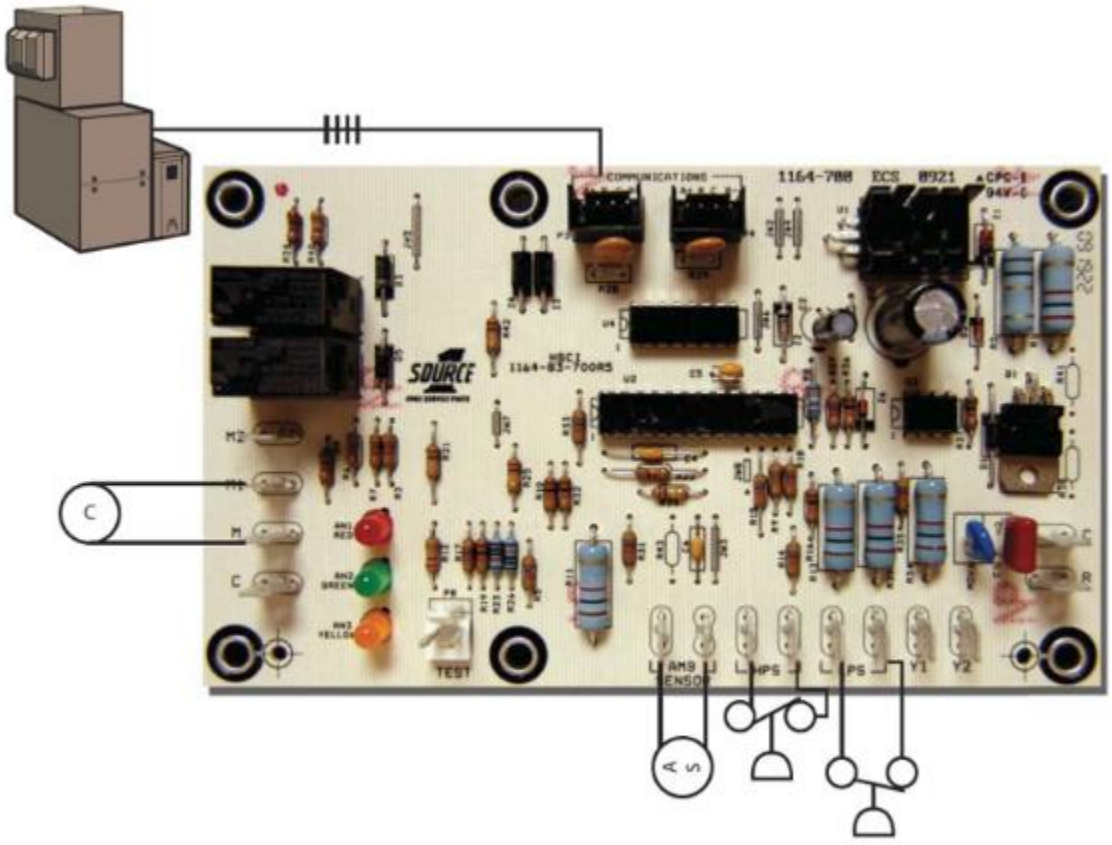
Communications - capable air conditioning models are indicated with a "C" at the end of the model number. The communicating outdoor board replaces the Comfort Alert module, and an outdoor ambient temperature sensor has been added.

The outdoor COMM control board accepts communication or conventional 24-volt AC inputs.
Status and fault LEDs (Light Emitting Diodes) provide operational information at the outdoor unit. A second "COMM" port is available for connecting a touch screen control for use as a service tool.

Communications values are stored in the control, including model and serial number, system ID, airflow information, and dealer information as established through the touch screen control interface.

"COMM" connections are made at the outdoor unit with the harness provided. The four-wire conductor from the indoor unit is connected to the harness wiring with wire nuts. The harness and plug connector are used rather than screw terminals in outdoor units as a UL (Underwriter Laboratories) requirement.

The outdoor ambient temperature sensor provides temperature information to the touch screen control, which is used for outdoor temperature display as well as automatic indoor humidity level adjustment when the system includes a whole house humidifier and dehumidifier.



Communicating AC Control Board

Communications-Capable Heat Pump Outdoor Units

Heat pumps that are communications - capable may be identified with a "C" at the end of the model number.
The "C" model defrost control boards may also be used in non-COMM systems with conventional thermostat inputs. The control is wired for conventional operation from the factory; the thermostat pigtail wiring must be removed for use in "COMM" mode. There have also been some updates to the hardware, including energizing of the HPS (High Pressure Switch) and LPS circuits from the "R" terminal.

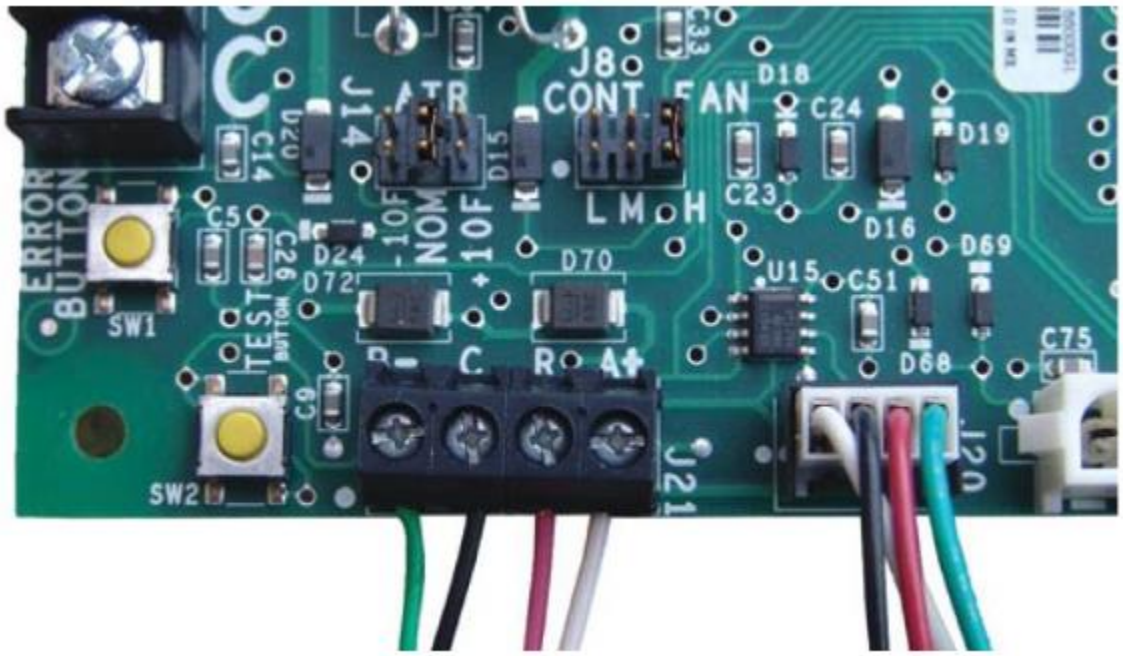
A compressor delay feature (selectable by "hard jumper" or through the touch screen interface) provides smooth transitions in to and out of defrost. The "Hot Heat Pump" operation has been enhanced during defrost operation.

Forcing the control into defrost mode using the test pins also bypasses the compressor delay feature. The "COMM" capable defrost board provides a higher defrost cycle temperature range, an update to the forced second stage exit, and new defrost curves.

The outdoor unit COMM connections are plug connections rather than screw terminals per UL requirements.

Communications-Capable Furnaces

In addition to being able to communicate with the touch screen control, the communications - capable of modulating gas furnace control board has some additional features. This includes pulse width modulation (PWM) control of the gas valve, and stored values related to the furnace model the board is installed in.



Modulating Gas Furnace Control COMM Connections

When connected with a modulating gas ECM (Electronically Commutated Motors) model furnace, the following jumpers must be manually set at the furnace control board:

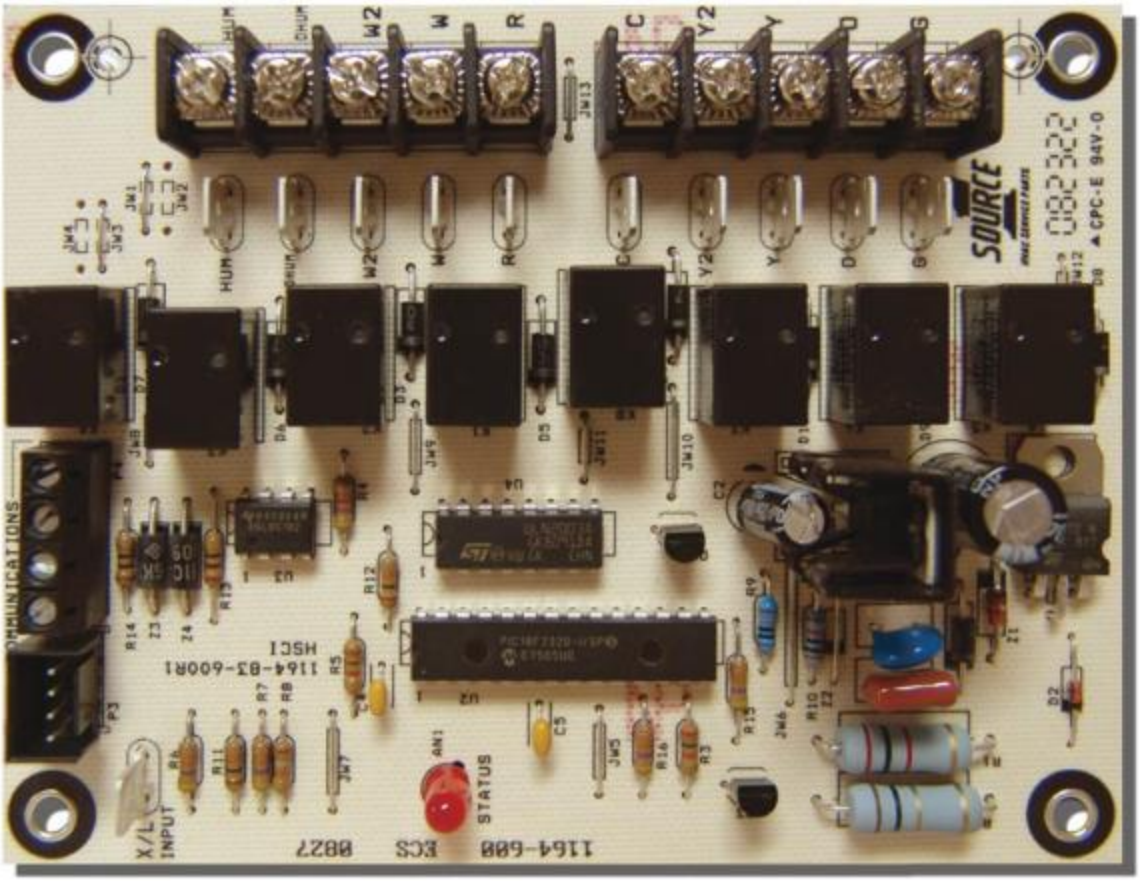
- Heat Pump
- Humidistat
- Zone Control

The remainder of the jumpers may be set by the contractor through the touch screen interface.

Installation with Non-Communicating or Competitive Equipment

The indoor communicating interface board is used with non-communicating or competitive furnaces or air handlers. The indoor interface board terminal strip wires terminal-for-terminal with the terminal strip of the non-communicating indoor equipment.

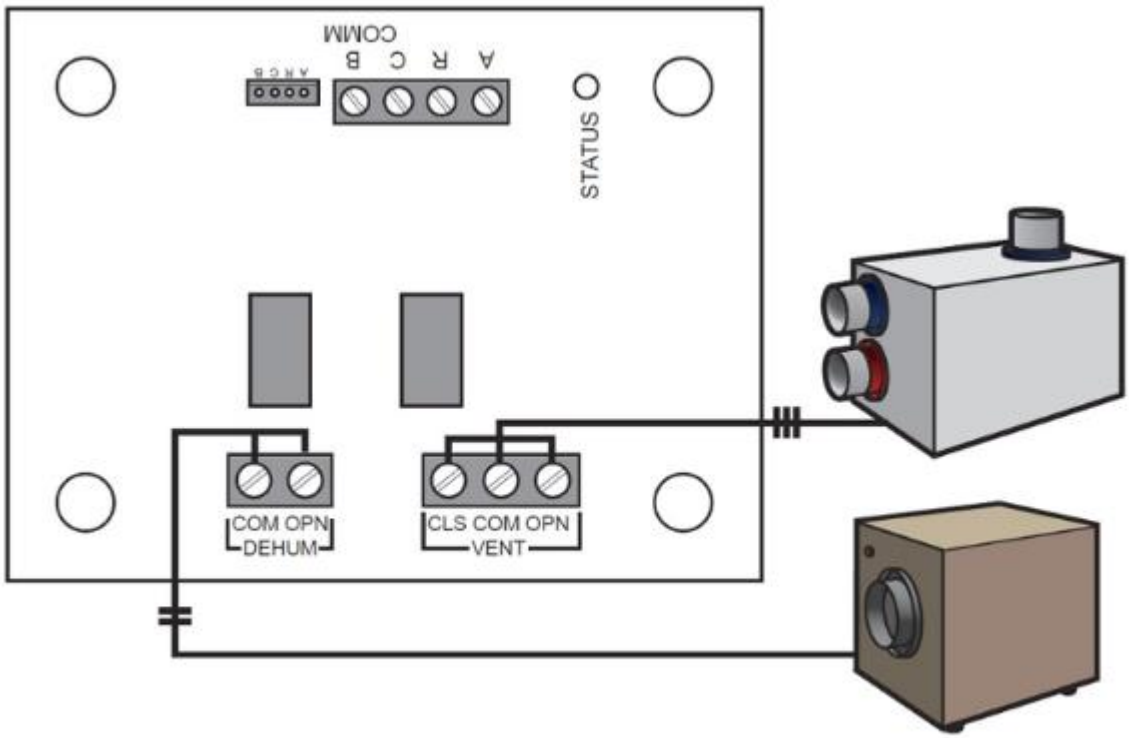
The indoor communicating interface control converts the "COMM" signals to conventional thermostat signals. Screw terminals and quick connect terminals are provided.



Communicating Indoor Interface Board

Installation with ERV (Energy Recovery Ventilators), HRV, Damper, Whole House Dehumidifier

The ERV HRV Ventilation Accessory board allows connection of an ERV, HRV, ventilation damper, or whole house dehumidifier. The board is connected to the network with the four-wire connection, and the accessories are connected to the terminal blocks with three and two conductor connections.



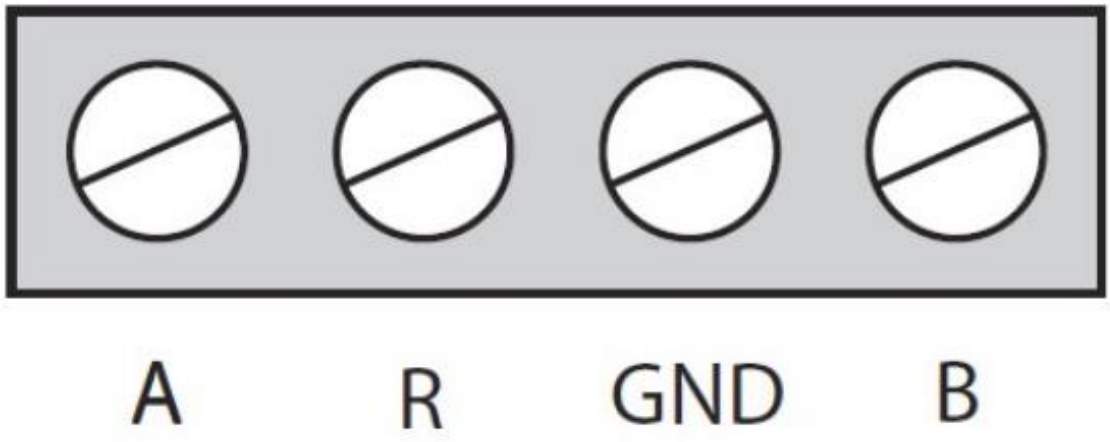
Ventilator and Whole House Dehumidifier Connection

04

System Connection & Setup

External Wiring Connections

Wiring connections to the touch screen control are made at the provided sub-base.



Four Wire Subbase Connection

The screw terminal block accommodates a wire size range of 18 - 22 AWG (solid or stranded conductors).

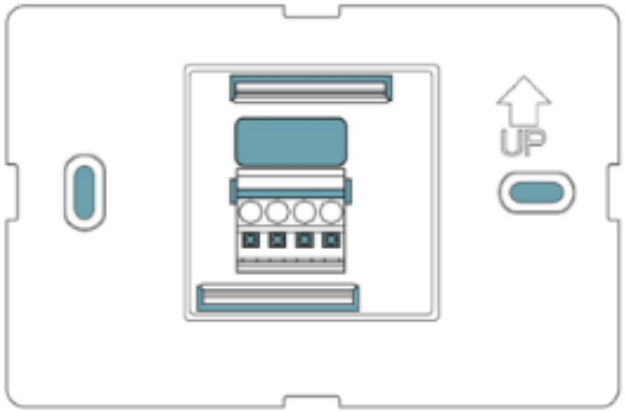
The four-wire connection is made to the terminal block as shown below.

Physical Control Mounting

The mounting plate has a protrusion that is approximately 2" x 2" x 3/8".

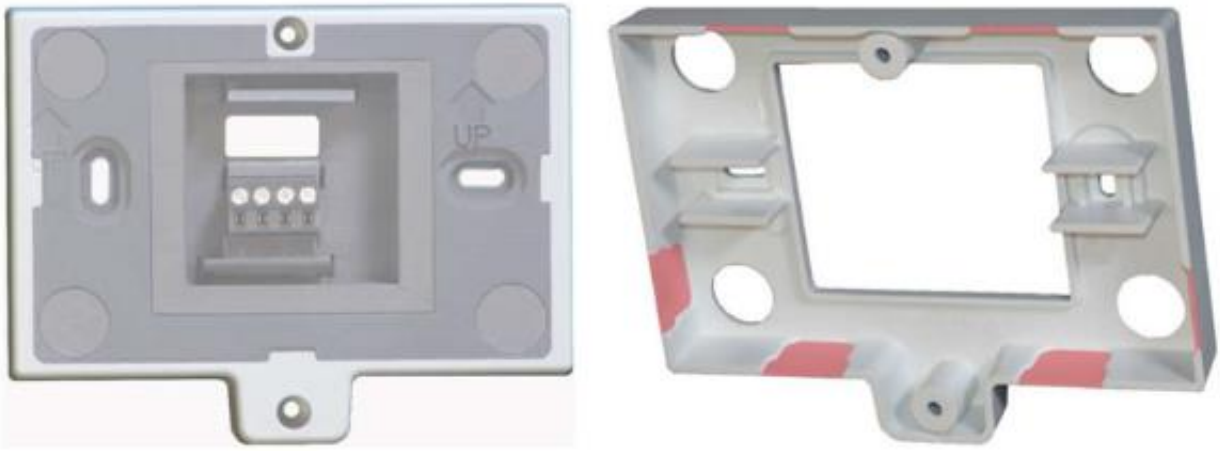
The wall must have a hole to accommodate the protrusion. If surface mounting is required, a "Hard Surface Spacer" is available.

The "Beauty Plate" is used with vertical J-box applications, or when there is wall damage to conceal. The "Hard Surface Spacer" may be used together with the "Beauty Plate" if necessary.



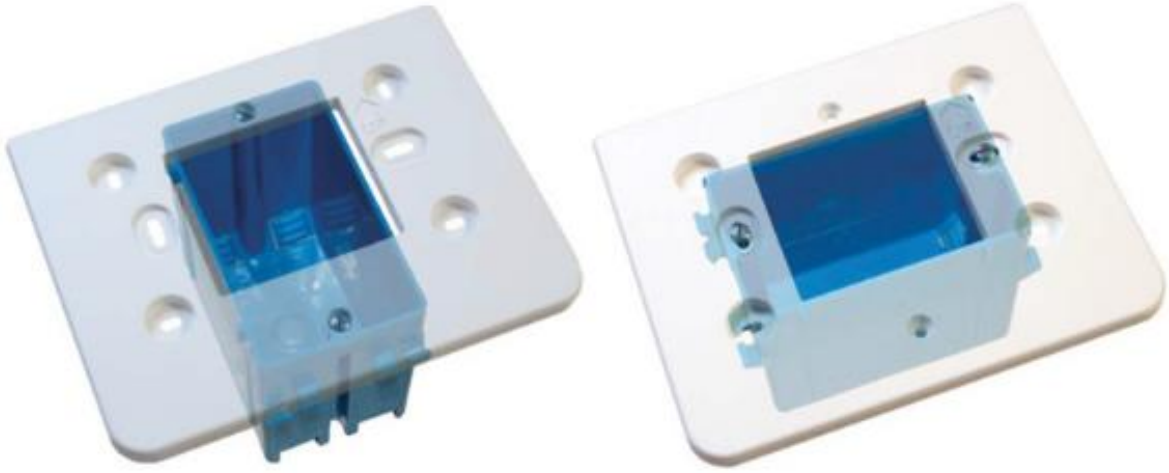
Mounting Plate

The "Hard Surface Spacer" is used to accommodate installations with surface mounted wire mold. There are six wire mold cutout locations provided in the "Hard Surface Spacer" as shown below.



Hard Surface Spacer

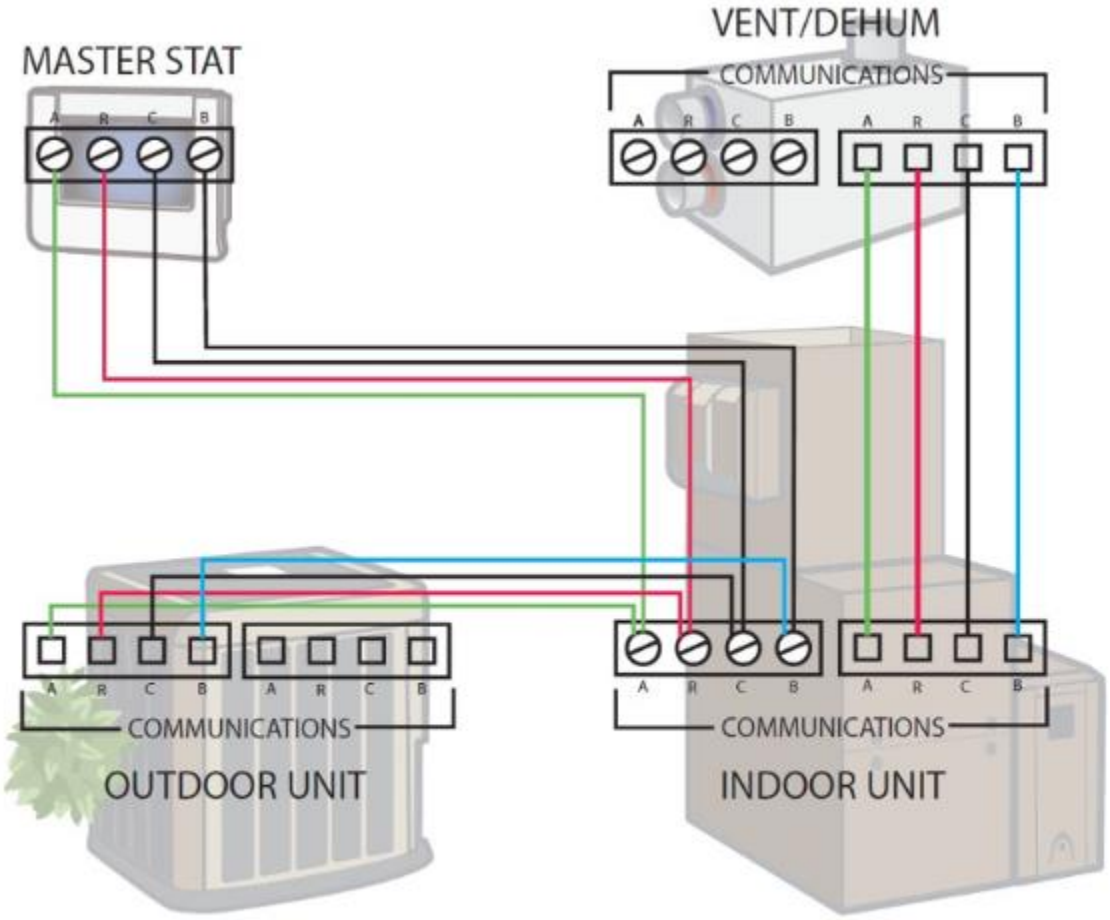
The image below illustrates mounting on a vertical and horizontal J-box. The base plate of the touch screen control has slots that allow direct connection to the box.



Base Plate Mounting To J-Box

A four-wire conductor is run from component to component. They may be connected in any order.

The image below illustrates the typical connection of the four-wire power and communications link. UL (Underwriter Laboratories) requirements dictate that outdoor connections are made with a plug rather than screw terminals. Multiple connections may be made under screw terminal blocks, where present.



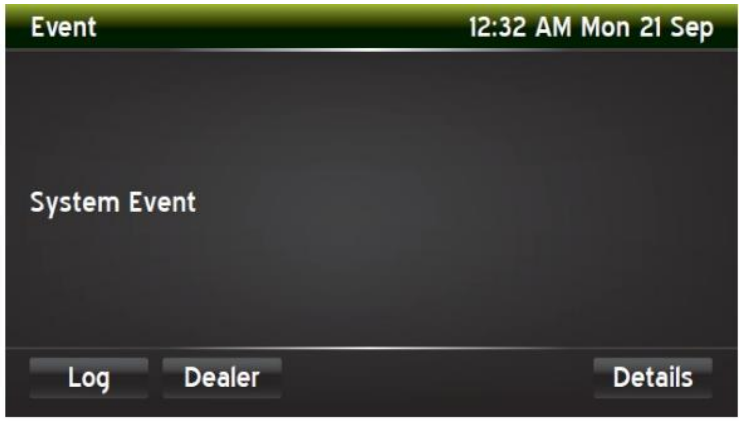
Typical Connection Diagram

Screen and Setup

"End User" screens during normal operation are blue in color.

Sample End User Screen

"Information" and "Alert" screens have a green edge.

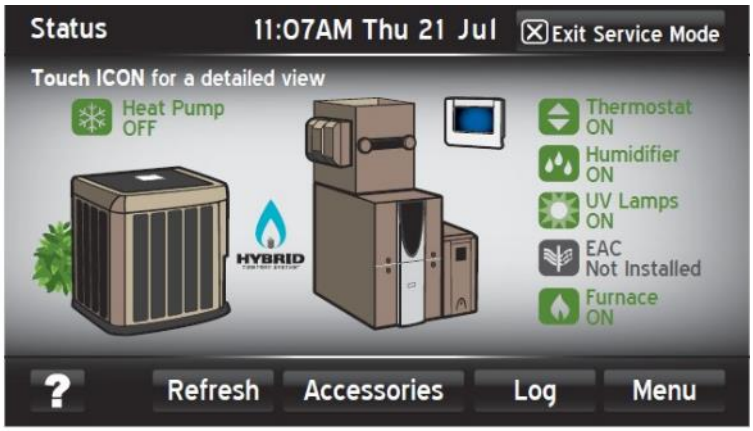


System Event Screen

"Fault" screens have a red edge. The contractor has full control over the type and method of message and alert display to the end user.

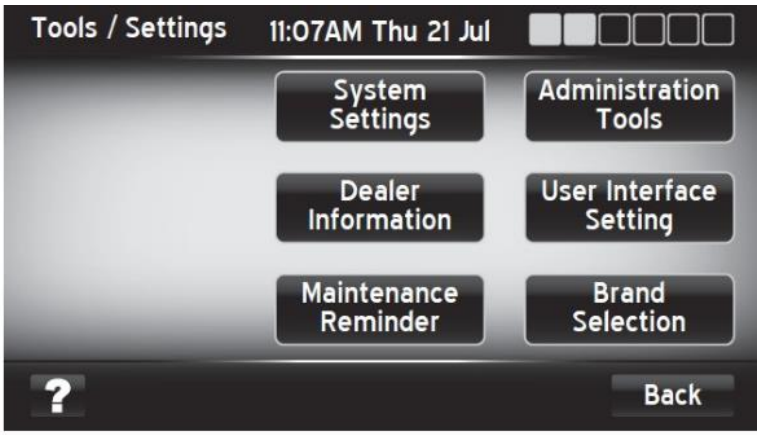
Fault Screen

Contractor screens are grey. This image represents the "Service Mode" screen.



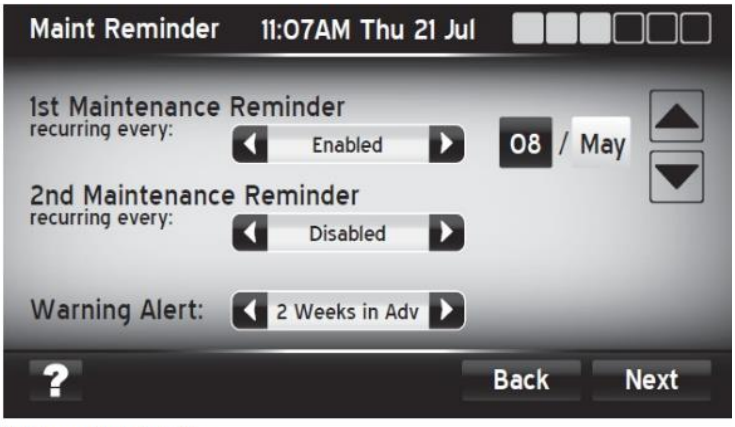
Service Mode Screen

The image below is the Tools>Settings Menu.



Tools>Settings Menu

This image is the "Maintenance Reminder" duration setup screen. These screens will be described in more detail later in the program.



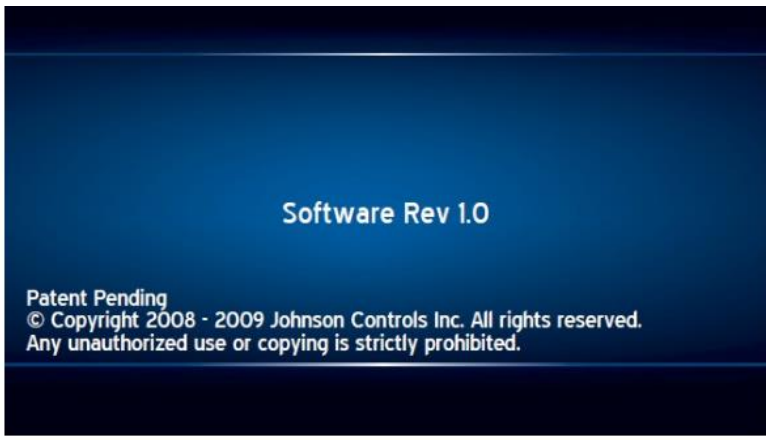
Maintenance Reminder Settings

Example Setup

This section provides information regarding the typical setup of a modulating gas furnace with a heat pump. When the system is initially energized, the touch screen control will prompt the user to set the date and time.

Date & Time Prompt

The current software revision is displayed. The software may be updated as new software becomes available via the mini-USB (Universal Serial Bus) port on the bottom of the control.



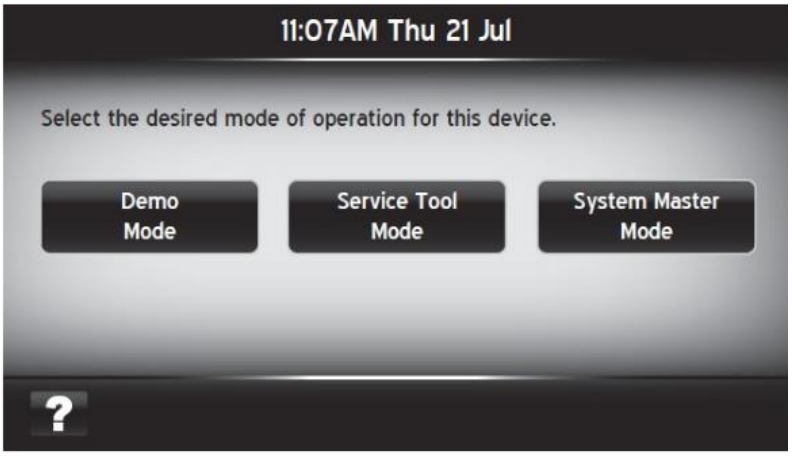
Software Revision Screen

The touch screen control listens for network traffic. This step enables the use of the control as a service tool when a touch screen control is already installed.

Listening For Network Traffic Screen

The installer must select which mode is desired for the touch screen control.

- Demo Mode: The control will operate with no communications and limited functionality to provide a sales tool.
- Service Tool Mode: The control will open in the "Service Mode" screen and have service functionality only (Service Screens and Forced Operation)
- System Master Mode: The control will manage operation of the system.

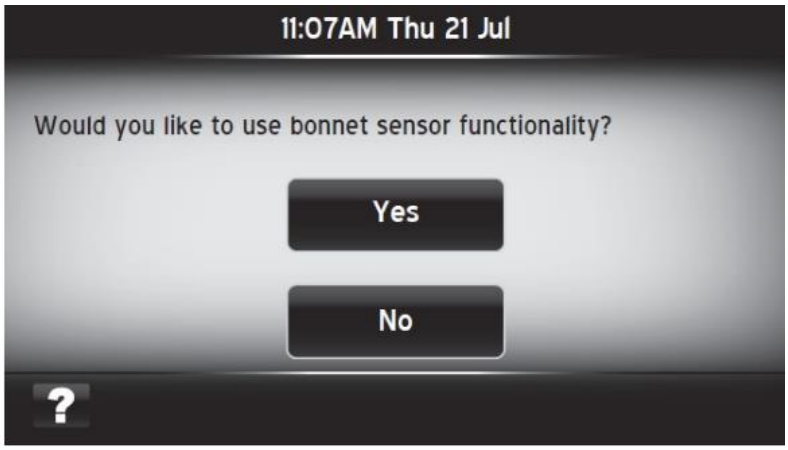


Mode Selection Screen

The touch screen control determines what equipment is on the network to determine how to set up the system.

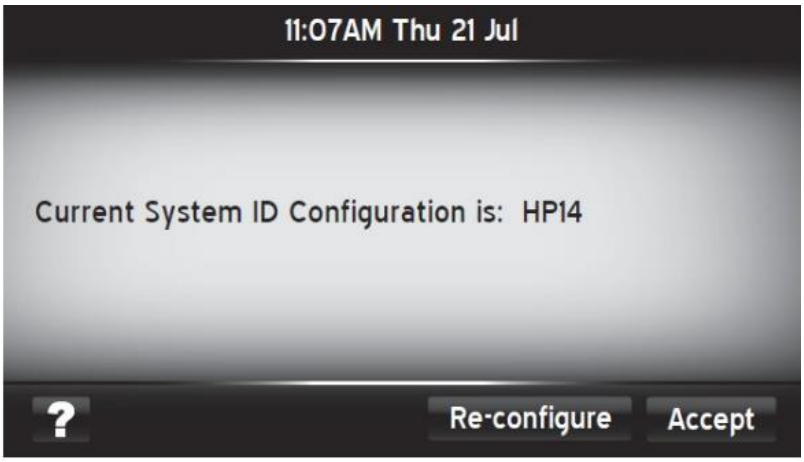
Gathering System Information Screen

When installed with a communicating heat pump, the user is asked if bonnet sensor functionality is used. If the bonnet sensor is connected to the modulating gas furnace control, the installer is given the option to use the bonnet sensor functionality.



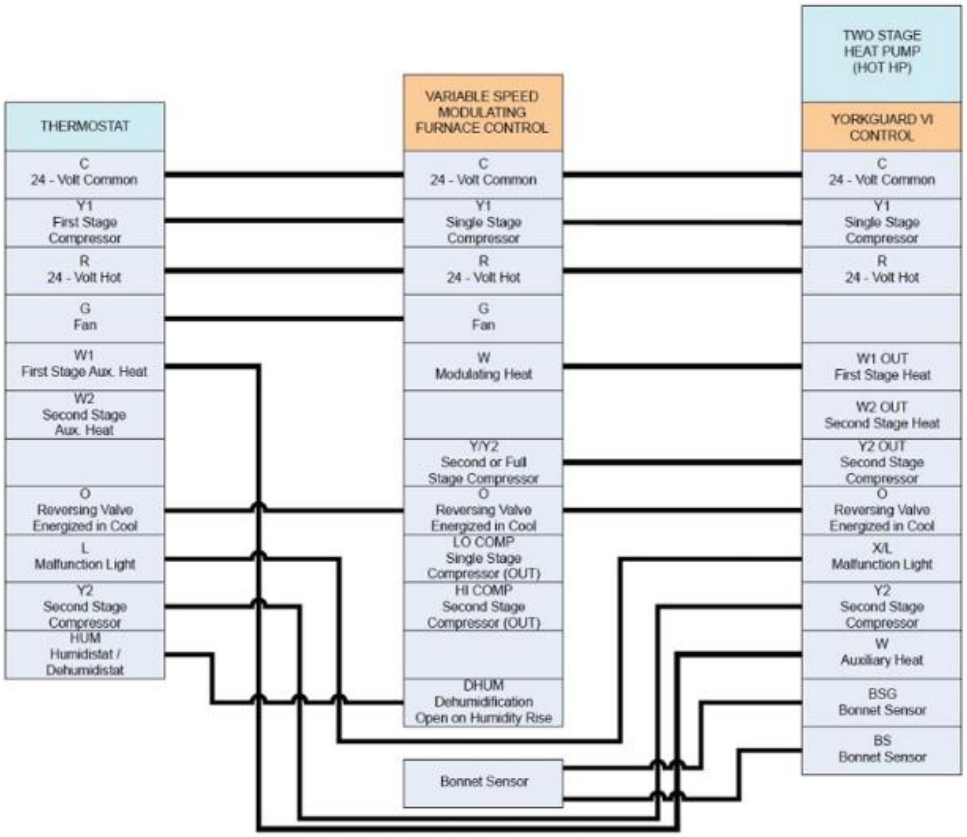
Bonnet Sensor Screen

Because of the selection of the bonnet sensor, the System ID is HP14. If that is not the system ID intended, press "Re-configure", and try again.



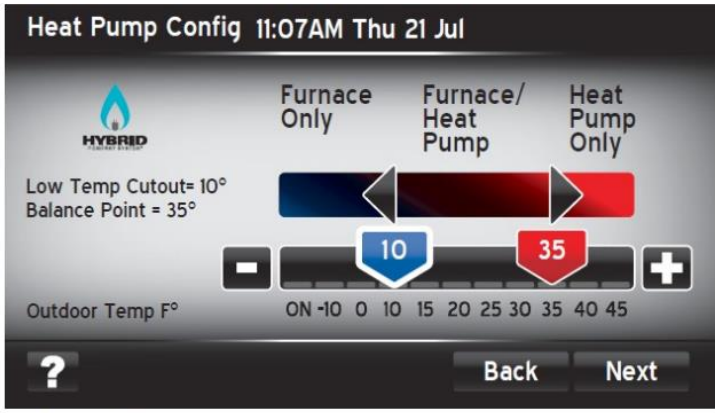
System ID Confirmation Screen

Refer to the system diagrams. This is HP14. The COMM system acts as a conventional system wired in this manner. The physical jumper settings from the equipment control, known as "hard jumpers", are shown. They may be overridden here. The jumper configurations as set from the touch screen interface are known as "soft jumpers". The "last jumper setting" is always used. For example, if a hard jumper setting is changed after the corresponding soft jumper has been set, the hard jumper setting is used.

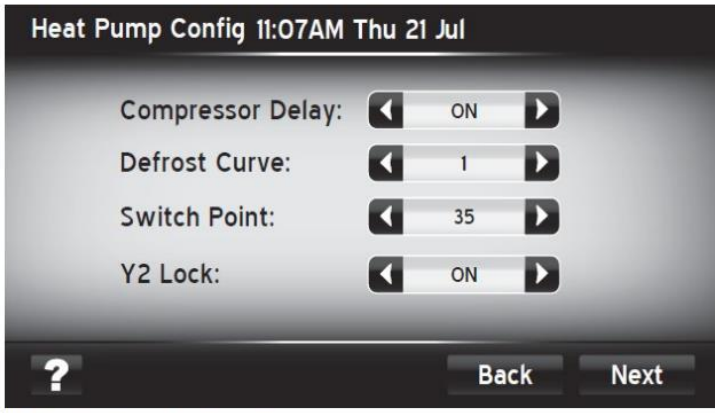


HP14 System Diagram

In a heat pump system, the Low Temp Cutout (LTCO) and Balance Point (BP) can be selected from the touch screen control. The physical jumper settings from the control are indicated on-screen.

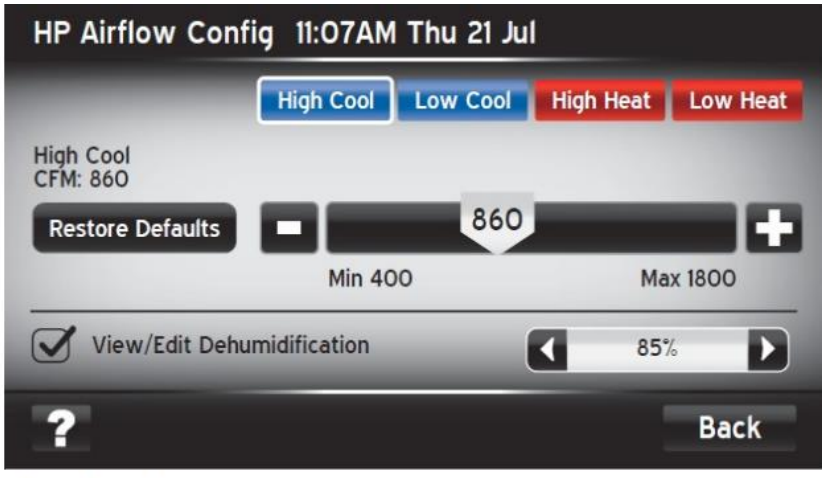


Heat Pump Config Screen



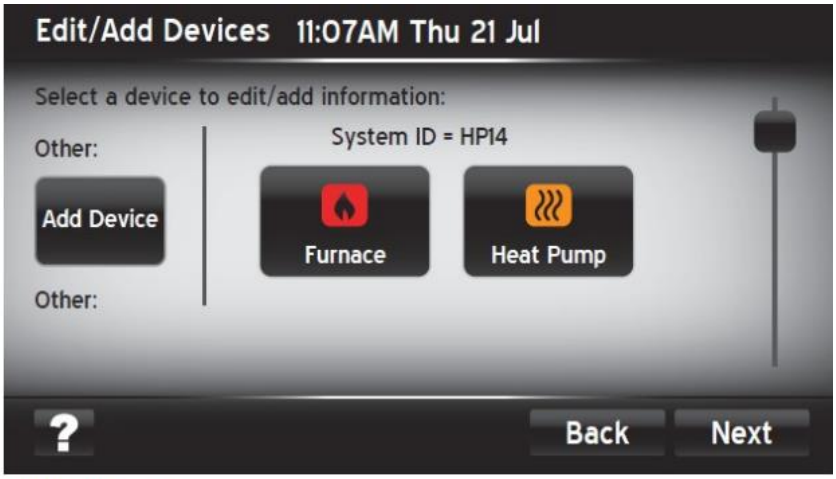
Heat Pump Config Screen "Soft Jumpers"

The summary screen shown below is for an air handler. Airflow for a modulating furnace is not set on the touch screen. The modulating furnace airflow during heating is still controlled by the modulating furnace control board. Pressing the "Air Handler" icon leads to this screen, where airflow may be set for each operational mode.



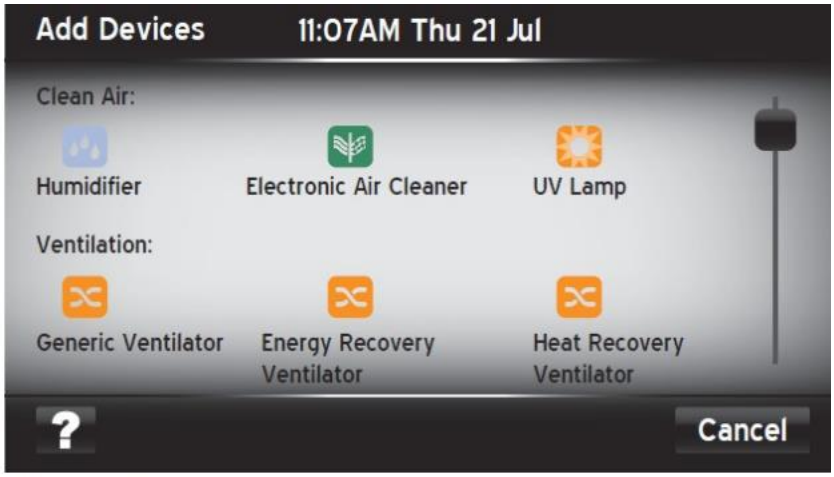
Airflow Configuration Screen

The reduction of airflow for dehumidification is set to 85%, 90%, or 95%. Without COMM equipment installed, this value is always 85%. At this point, the indoor and outdoor equipment is configured and ready to operate. Accessory information is added here if installed. Accessories such as humidifiers, electronic air cleaners, and UV lights are not communicating, and information must be manually entered for the system to know about them. To begin, the "Add Device" icon is pressed.



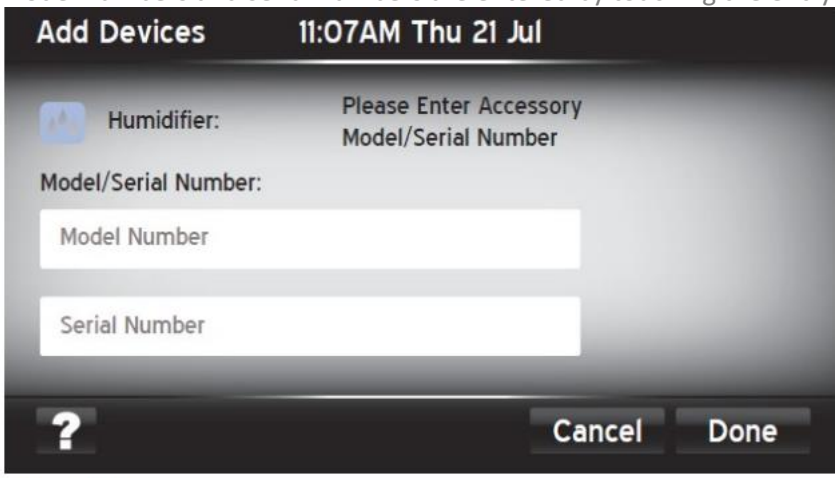
Edit/ Add Devices Screen

Next, select the device added.



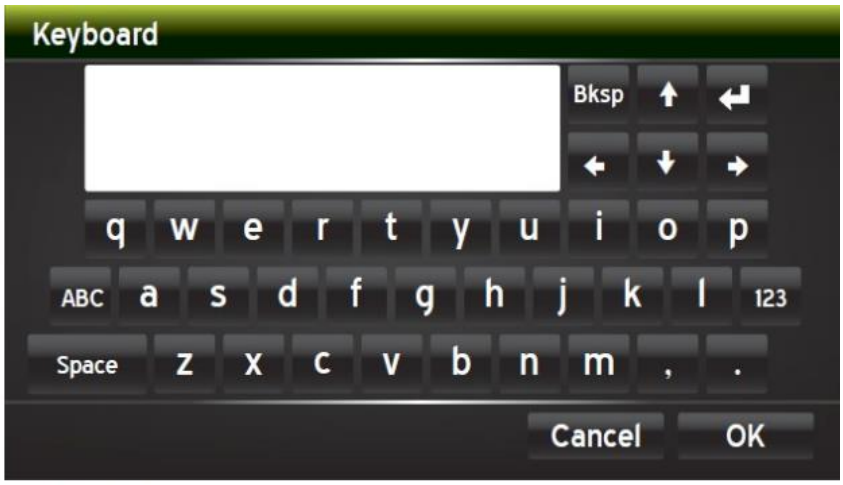
Add Devices Screen

Model numbers and serial numbers are entered by touching the entry fields. The keyboard will then pop up.



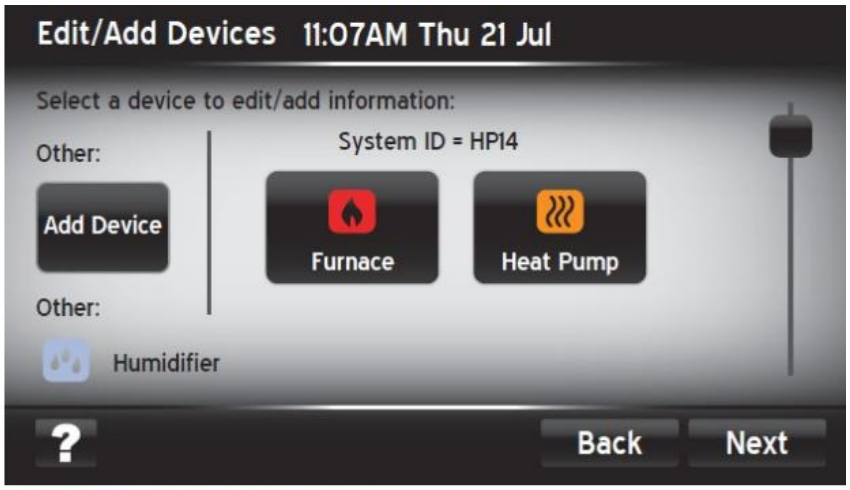
Add Devices Entry Screen

This is the keyboard used when data is entered. Note the ABC key is used for capital letters, and the 123 icon is used for numbers and symbols.



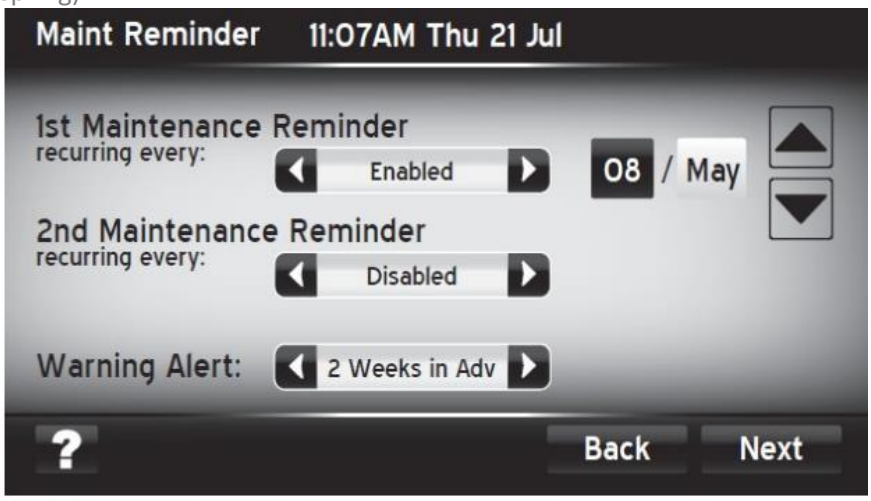
Popup Keyboard

In the image below, a humidifier has been added. Other devices are added in a similar fashion.



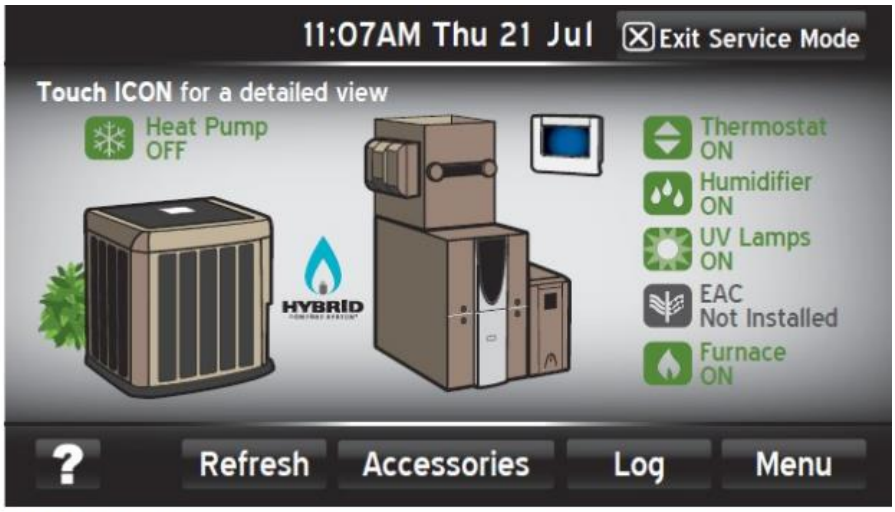
Edit/ Add Devices Screen With Humidifier Added

Next, the "Annual Maintenance Reminder" information is entered. These are set up based on the installer's business plan - should the customer call for maintenance? Two maintenance reminder events may be established, (fall and spring).



Maintenance Reminder Setup Screen

Additional setup changes can be made to the "Service Mode" screen if desired. The required setup has been completed in the previous steps. The remaining are optional.



Service Mode Screen

The system information is then validated. This screen serves as a "live indicator" while preparing the home screen for initial use.

Validating System Information Screen

The system is configured and ready to operate.

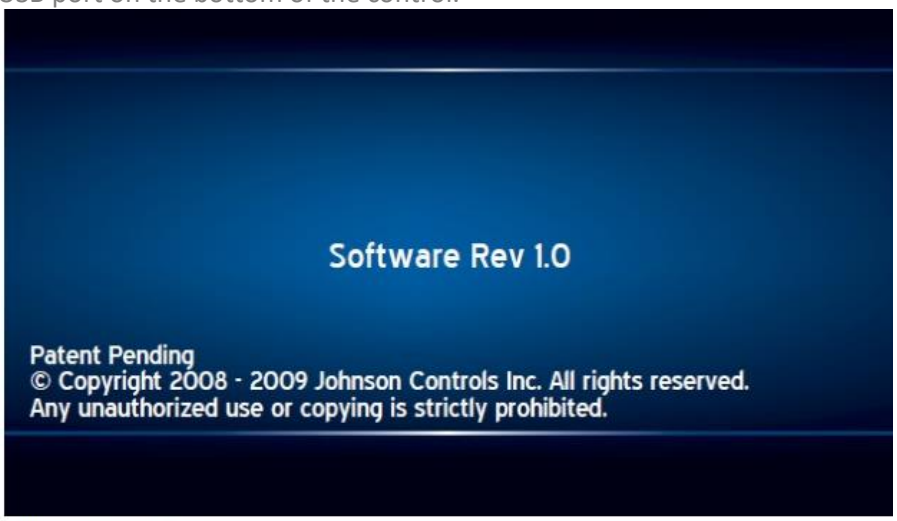
Sleep Screen (York Brand Shown)

Air Handler and Air Conditioner Setup

Just as with the heat pump system, when initially energized, the touch screen control prompts the user to set the date and time.

Time & Date Prompt

Current software revision is displayed. The software may be updated as new software becomes available via the mini-USB port on the bottom of the control.



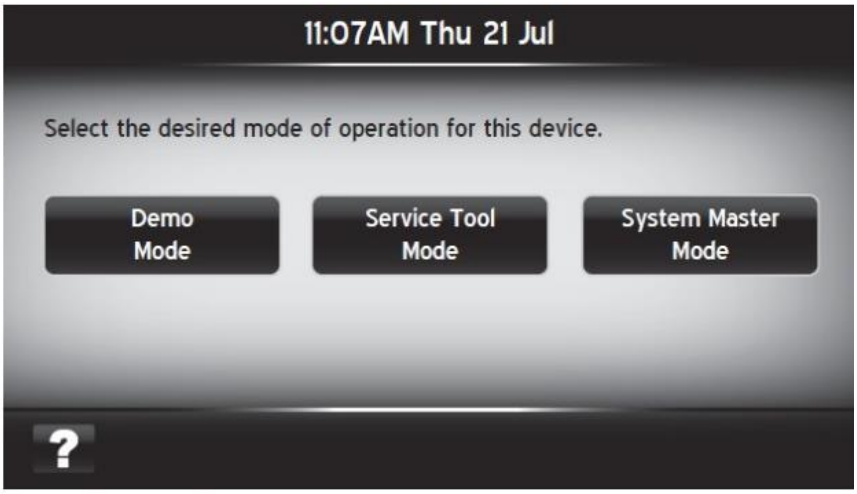
Software Revision Screen

The touch screen control listens for network traffic. This step enables the use of the control as a service tool when a touch screen control is already installed.

Listening For Network Traffic Screen

The installer must select which mode is desired for the System Control.

- Demo Mode: The control will operate with no communications and limited functionality to provide a sales tool.
- Service Tool Mode: The control will operate with service functionality only (Service Screens and Forced Operation)
- System Master Mode: The control will operate the system.



System Mode Selection Screen

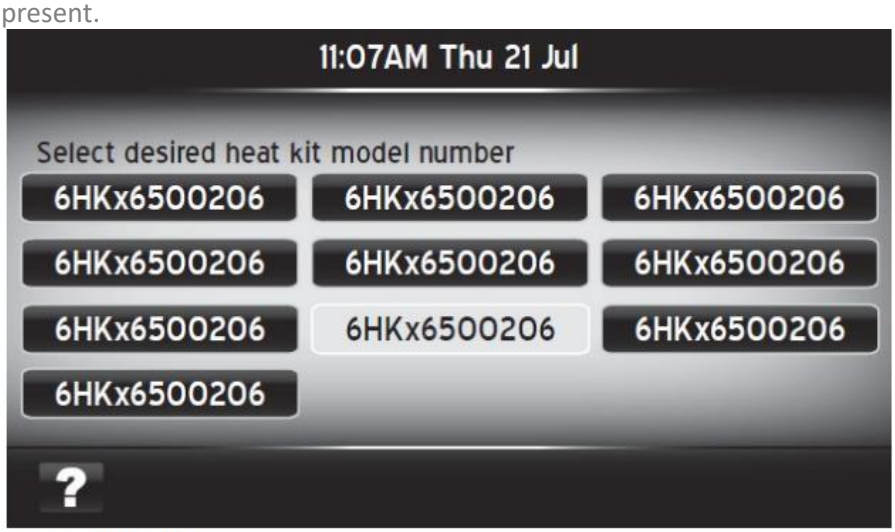
The touch screen control determines what equipment is on the network to determine how to set up the system.

Gathering System Information Screen

Select "Yes" if a heat kit is installed.

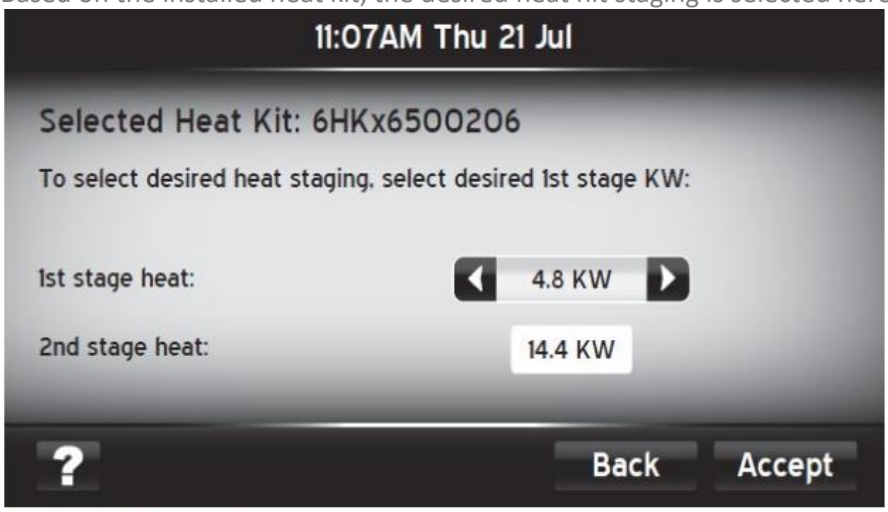
Electric Heat Kit Screen

The installed heat kit model is selected in the screen below. The list is populated based on the air handler model present.



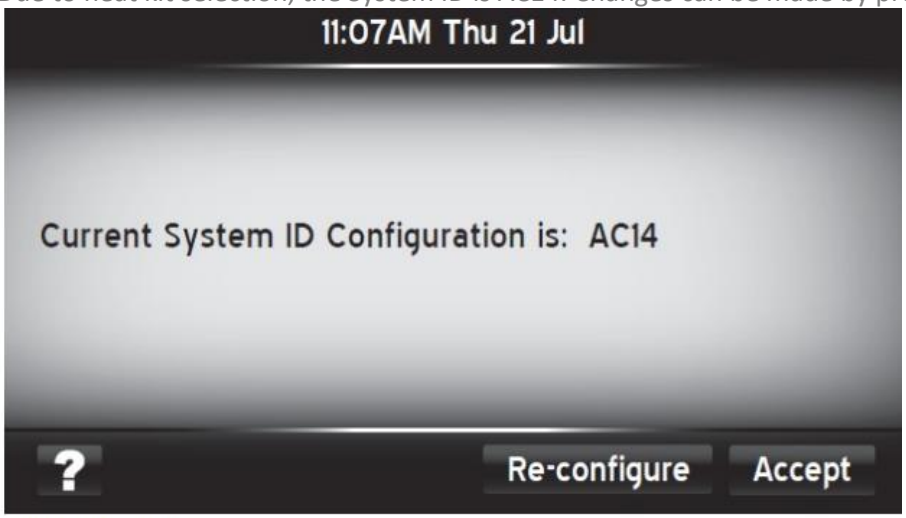
Heat Kit Configuration Screen

Based on the installed heat kit, the desired heat hit staging is selected here.



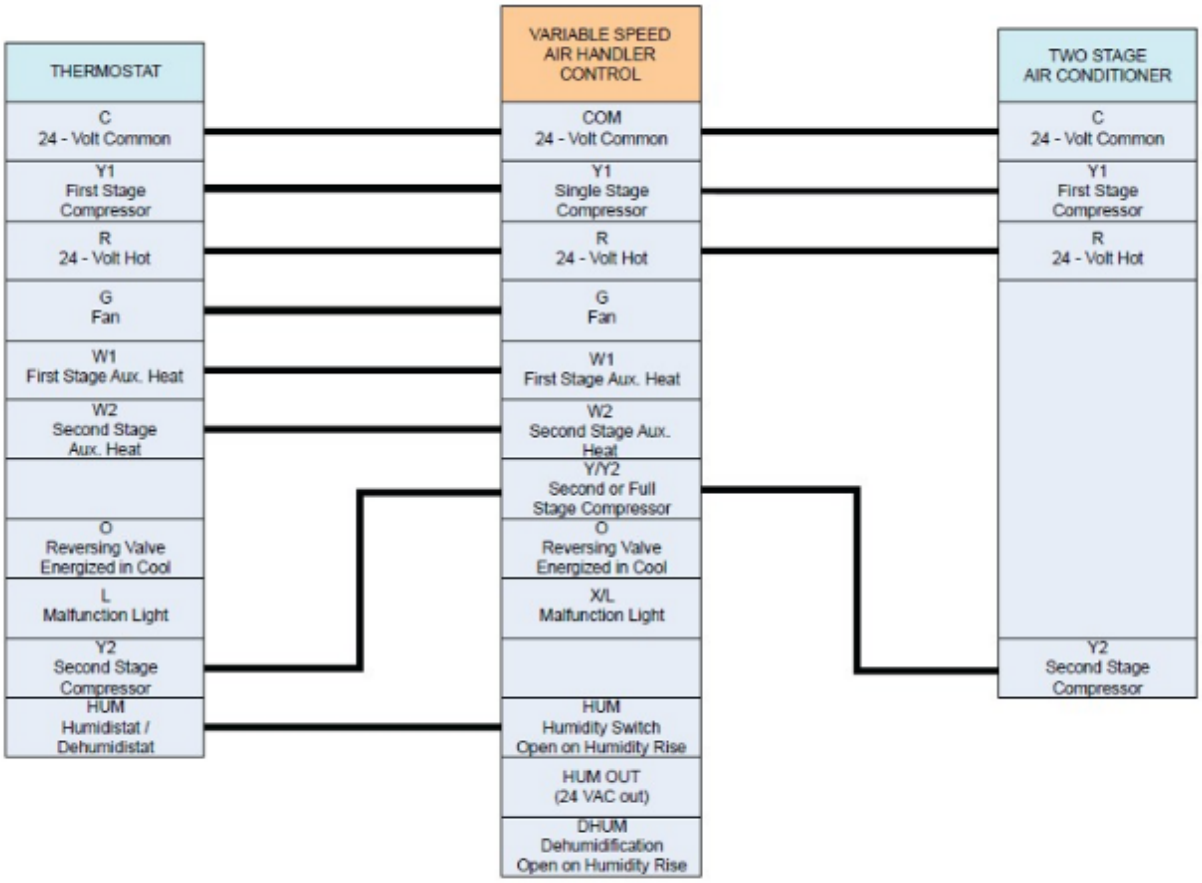
Heat Kit Configuration Screen

Due to heat kit selection, the System ID is AC14. Changes can be made by pressing “Re-configure.”



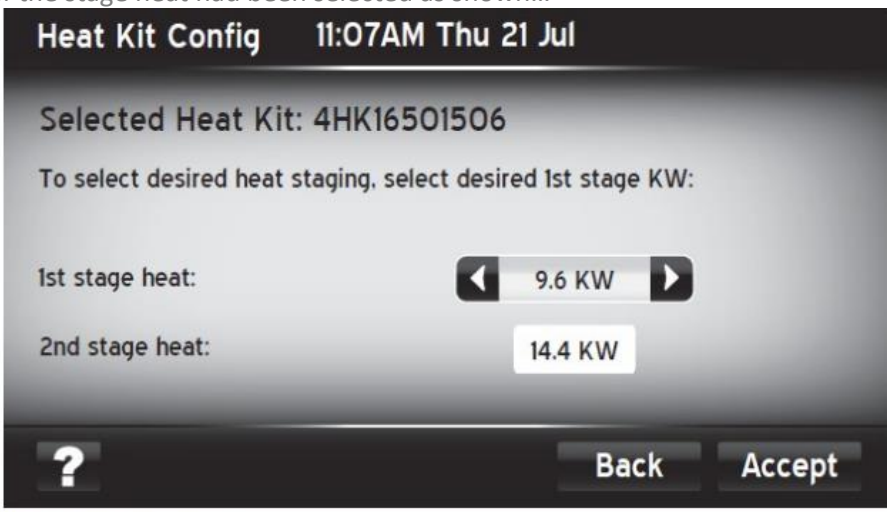
System ID Screen: AC14

The configured “AC14” COMM system will operate exactly as the system shown below with conventional wiring.



AC14 System Wiring

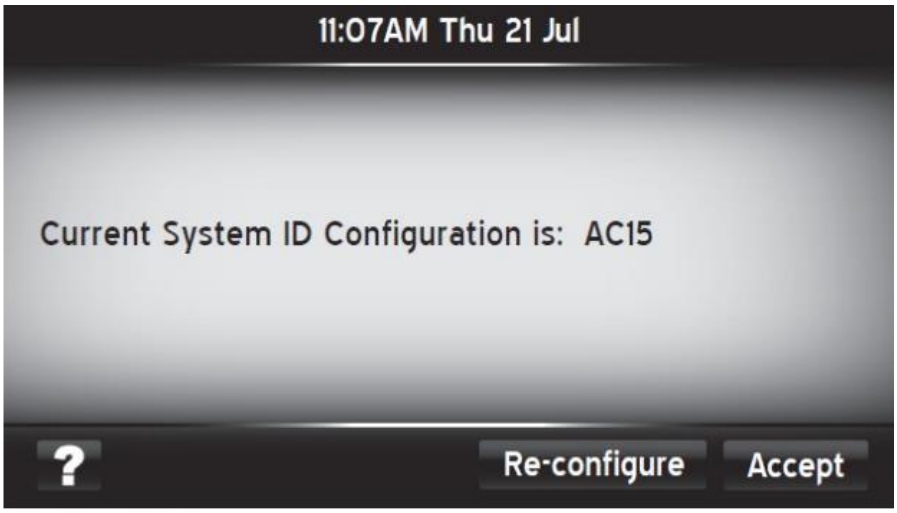
If the stage heat had been selected as shown…



Heat Kit Configuration Screen

…the configuration becomes AC15. Note that “W1” and “W2” have been swapped compared to the previous diagram. This causes two heating elements to be energized instead of one with a first stage heating call.

The touch screen control confirms the configuration selected. Changes can be made by pressing “Re-configure.”

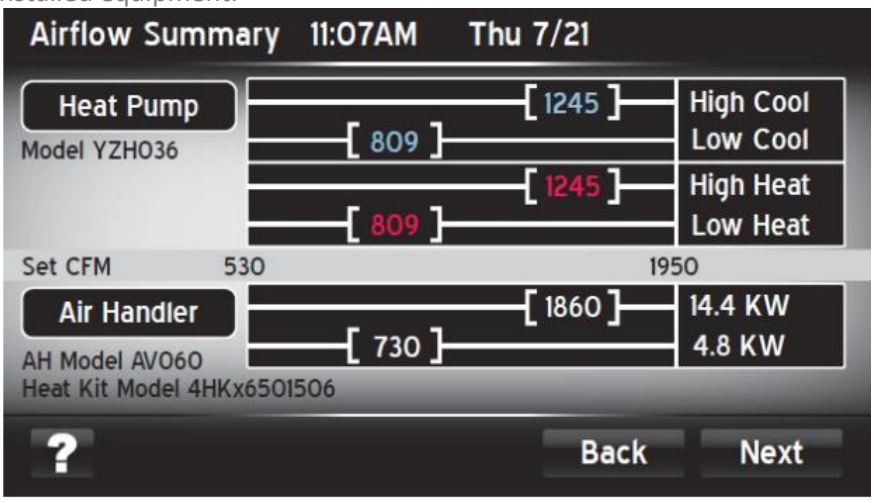


System ID Screen: AC15

Airflow delay profiles are set at this point.

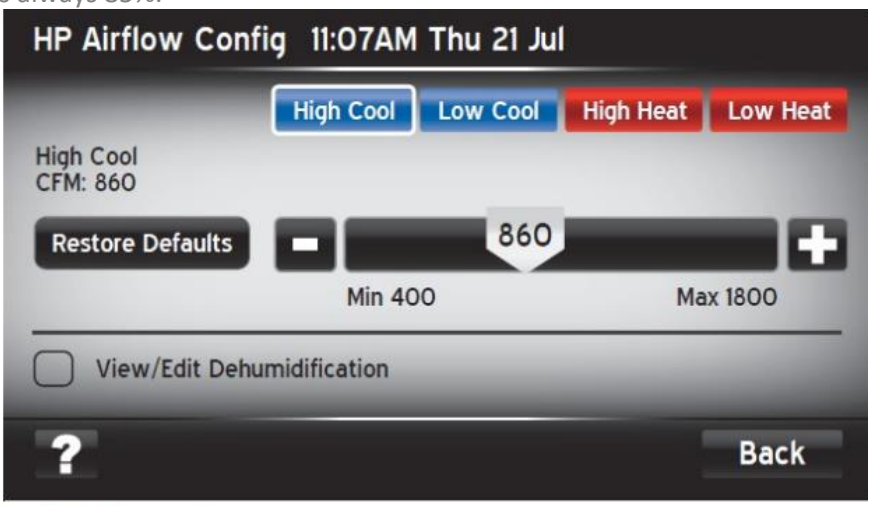
Blower Delay Profiles Screen (ECM Motors Only)

Below is the "Airflow Summary" screen. Desired airflow is established here, within the allowed limitations of the installed equipment.



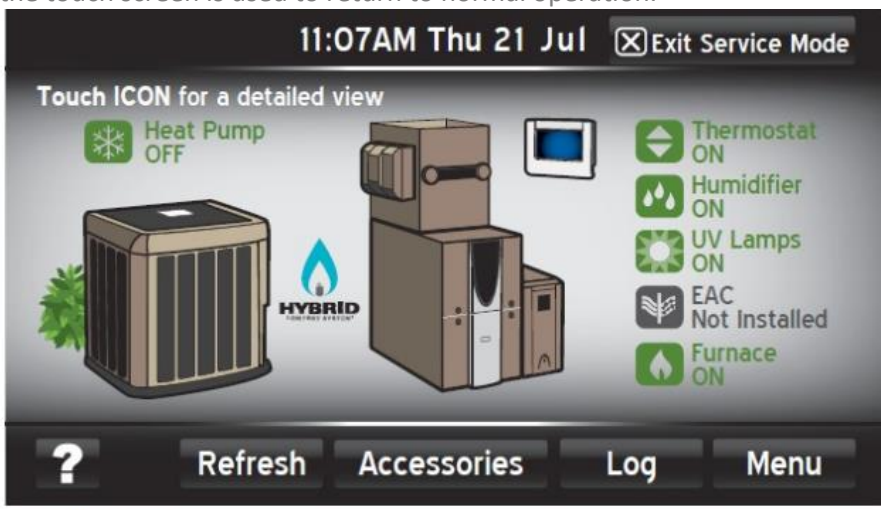
Airflow Summary Screen

The reduction of airflow for dehumidification is set to 85%, 90%, or 95%. Without COMM equipment installed, this value is always 85%.



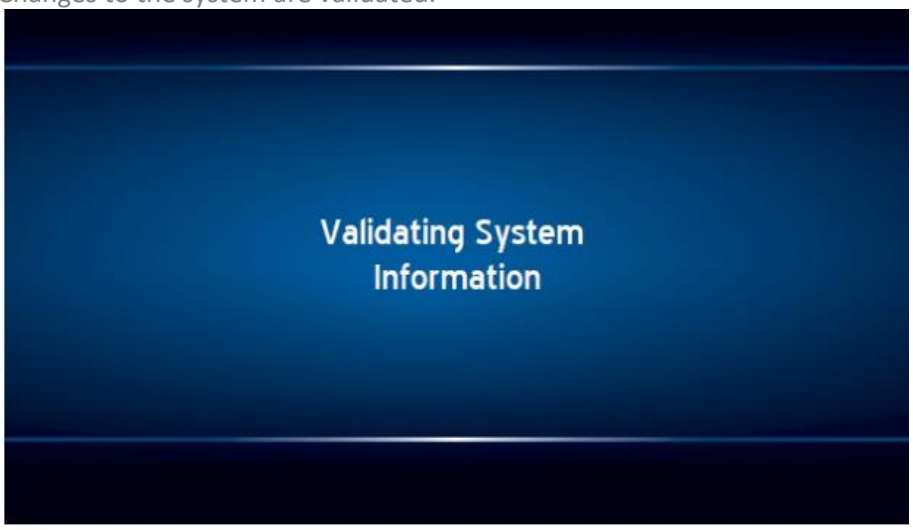
Heat Pump Airflow Config Screen

The “Service Mode” screen then appears. Additional setup changes can be made here if desired. The required setup steps have been completed in the previous steps. The remaining are optional. “Exit Service Mode” in the upper right of the touch screen is used to return to normal operation.



Service Mode Screen

Changes to the system are validated.



Validating System Information Screen

The system is configured and ready to operate.

Sleep Screen (York Brand Shown)

User Interface & Setup

The end user has many options for display, and customization of comfort settings. This is the sleep screen. The York, Coleman, and Luxaire brands are shown.

Sleep Screen (York Brand)

Sleep Screen (Coleman Brand)

Sleep Screen (Luxaire Brand)

Non-Programmable Home Screen

Below is the non-programmable home screen. The Luxaire branded home screen is shown here. The appropriate brand (as selected upon initial setup) will be shown here.

Below is the programmable version of the home screen. The system is running in a program and is in auto changeover mode with a cooling setpoint of 78 and a heating setpoint of 65. The arrow icons allow override of the program which when pressed, cause the “Pick Duration” icon to appear.

Programmable Home Screen

Set the “Pick Duration” icon to select the amount of time to override the program.

The duration of the program override is selected. Override options include until it is canceled, (which is equivalent to a permanent hold), to the next programmed event, or to a specified time.

The user pressed the up arrow to make the set point 73 and selected a 10:00pm duration. An icon to cancel the override is now shown.

Set Duration Screen

The screen below illustrates the “Home” screen in “Advanced Programmable” mode, with a Celsius temperature display. Outdoor temperature is shown with a 0.5-degree accuracy. The three icons on the left indicate that “Advanced Programmable” mode has been selected. The middle icon is pressed to perform a temperature override. This screen appears. When a temperature override is performed, a single setpoint is selected for heating and cooling. The touch screen control uses a dead band and controls this temperature. Quick Cool or Quick Heat causes the system to provide maximum capacity heating or cooling for a timed duration or until canceled.

Home Screen Indicating Temperature Override & Heating Mode Active

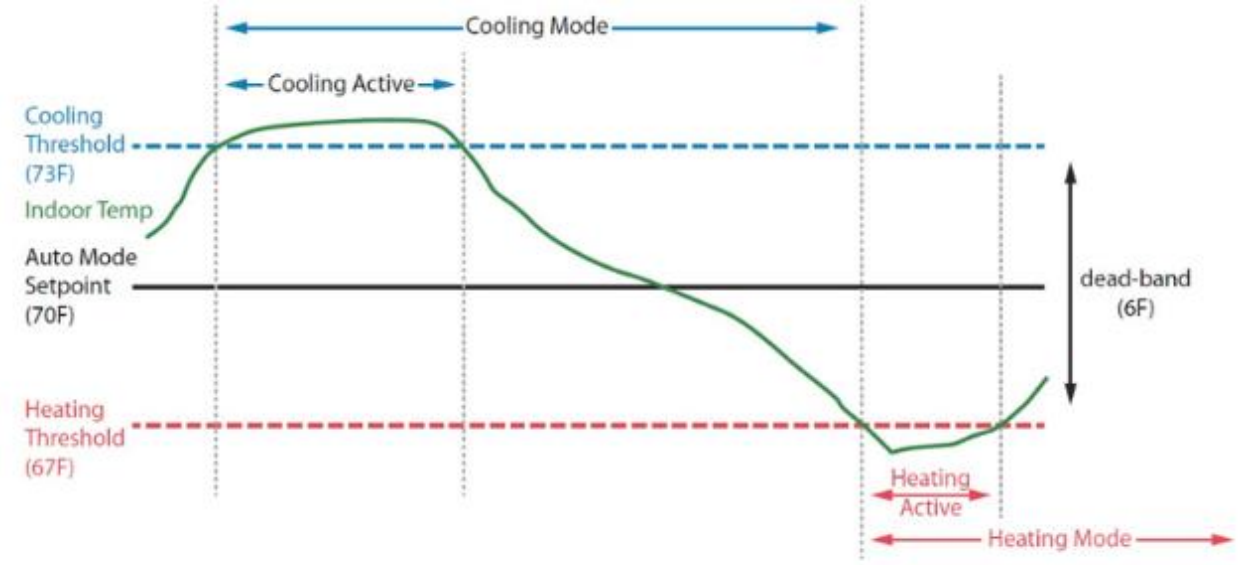
Here, the duration of the program override is selected. Override options include:

- Canceled (equivalent to a permanent hold)
- Next Event
- Specified Time

Home Screen With Celcius Display

Temperature Override Screen - Advanced Programmable Mode

The image illustrates the enforced dead band when in single setpoint override. If the desired setpoint is 70 degrees, cooling will not be activated until the indoor temperature reaches 73 degrees F. Heating will not be activated until the indoor temperature is 67 degrees F.



Dead Band Between Heating & Cooling

The icon on the bottom with the clock symbol allows the user to override the programmed schedule. The settings that are in place “NOW” are extended or the user can change to another period and start it immediately.

Advanced Programmable Home Screen: Override Indicated

Schedule override extends the settings that are active right NOW until the “Return” period. The user can also press the “Set Vacation…” icon and the next screen will appear.

Schedule Override Screen - Advanced Programmable Mode

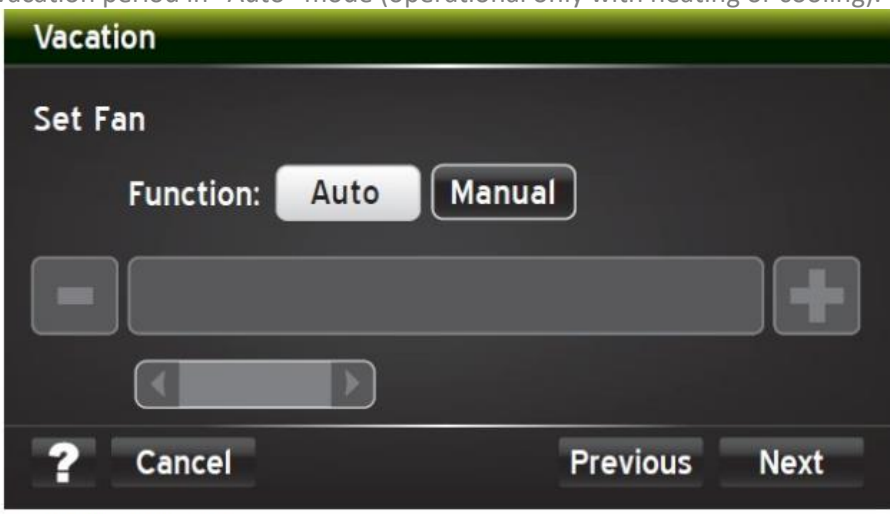
The user can either select the leave and return date or select the number of days from now.

Vacation Duration Selection Screen

The user then selects the temperature setpoints for the vacation period. When heating and cooling temperatures are selected, there is always a two-degree Fahrenheit dead band. If the cooling temperature is moved to two degrees higher than the heating setpoint, reducing the cooling setpoint further will cause the heating setpoint to be reduced to maintain the dead band.

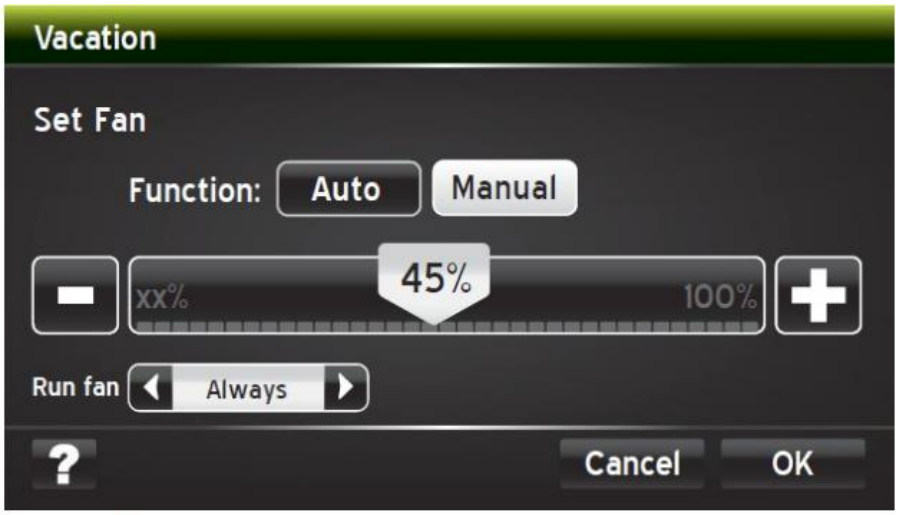
Vacation Temperature Selection Screen

The fan functionally during the “Vacation” period is also specified here. The fan is shown here as running during the vacation period in “Auto” mode (operational only with heating or cooling).



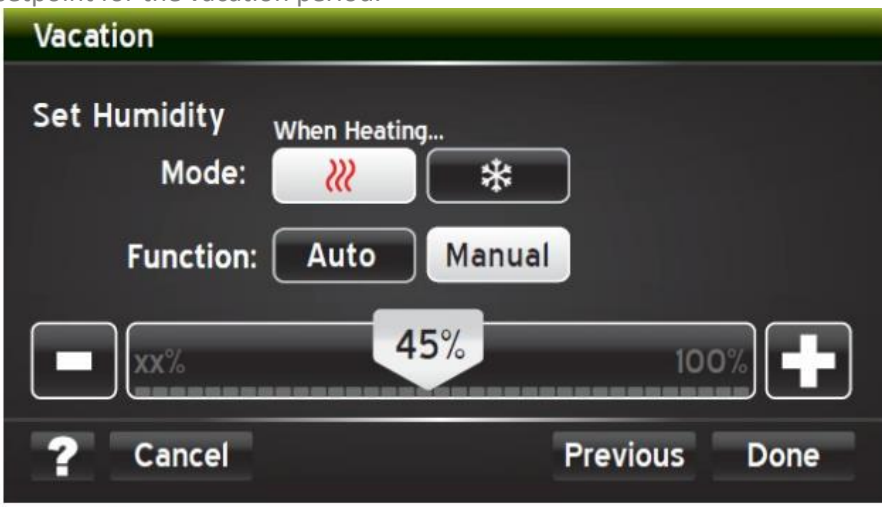
Vacation Fan Selection Screen

The fan is shown below as running during the vacation period in “Manual” mode at 45%. The fan is set to run “Always” but can also set to run a certain number of minutes per hour – (15, 30, 45).



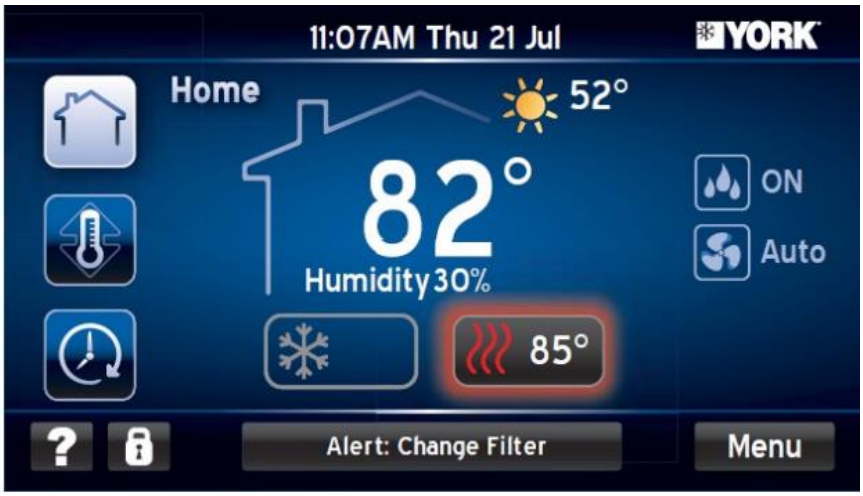
Vacation Fan Selection Screen

The humidity functionality during the “Vacation” period can also be specified. The user selects the heating humidity setpoint for the vacation period.



Vacation Humidity Selection Screen

The “Menu” screen shown here provides the user with many options. Emergency Heat is only present for heat pump systems.



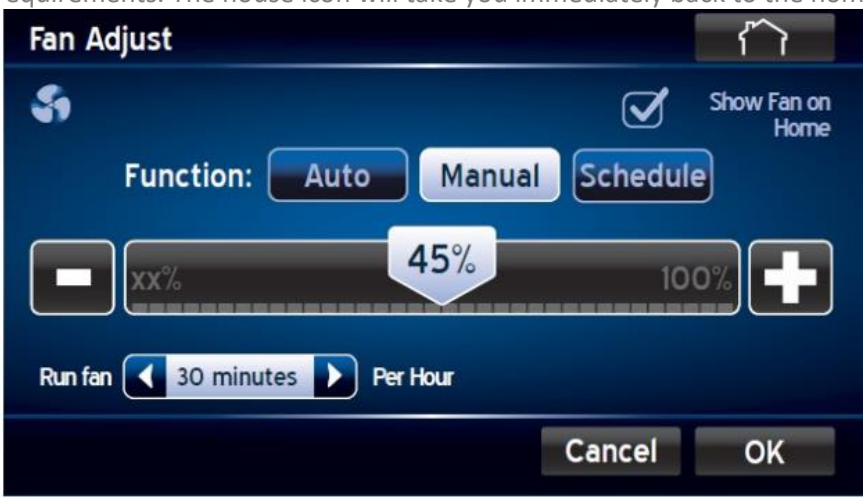
Home Screen - Advanced Programmable Mode

Fan Icon

Pressing the Menu button displays the user menu. When the Fan icon is pressed…

Menu Screen - Fan Icon

…the Fan Adjust screen appears. Run Fan choices are 15 minutes per hour, 30 minutes per hour, 45 minutes per hour, or always. Fan speed is adjusted to 1% increments. The unit capacity and model IED will determine the lowest possible fan setting for the specific unit. Within the control range, the lowest setting will vary depending on the unit and application requirements. The house icon will take you immediately back to the home screen.



Fan Adjust Screen

Humidity Icon

Back at the “Menu” screen, when the “Humidity” icon is pressed…

Menu Screen - Humidity Icon

…the “Humidity Adjust” screen appears. Auto mode uses outdoor temperature to automatically control humidity in heating and cooling.

Humidity setpoints are selected manually for heating and cooling. Note that the “Show humidity level on dash” checkbox is used to turn off the display of humidity information on the home screen.

Humidity Adjust Screen

Status Icon

From the “Menu” screen, when the “Status” icon is pressed…

Menu Screen - Status Icon

… the Status appears. The general status of the equipment is shown by each icon. The “Refresh” icon updates the screen. The screen is not continually updated. Pressing an uninstalled equipment icon will create a popup telling the user to contact the dealer for more information. Icons will pulse to show status.

Status Screen

Settings Icon

From the “Menu” screen, when the “Settings” icon is pressed…

Menu Screen - Settings Icon

… the “Settings” screen is displayed. From the “Settings” screen, when “Date/Time” is pressed…

Settings Screen - Date/ Time Icon

… the date and time can be adjusted. This is also the screen that appears on the initial power-up of the system.

Settings - Date/ Time Screen

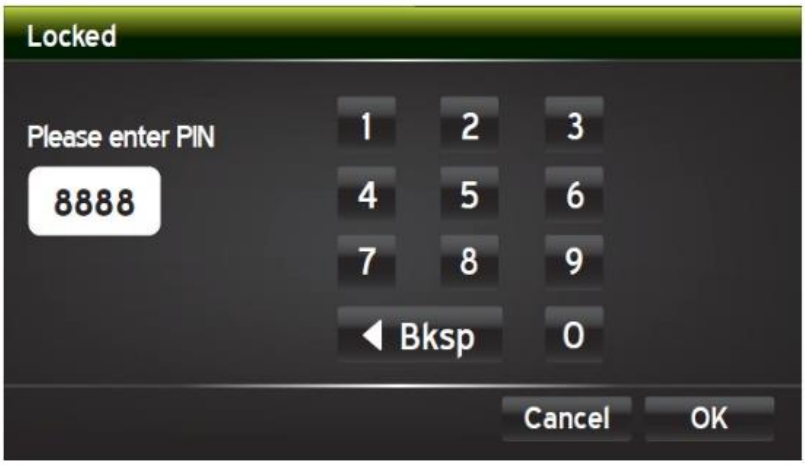
From the “Settings” screen, when the “Security” icon is pressed…

Settings Screen - Security Icon

…security may be enabled or disabled. Security is PIN (PRODUCT IDENTIFICATION NUMBER) protected, and prevents unauthorized adjustment of control setpoints

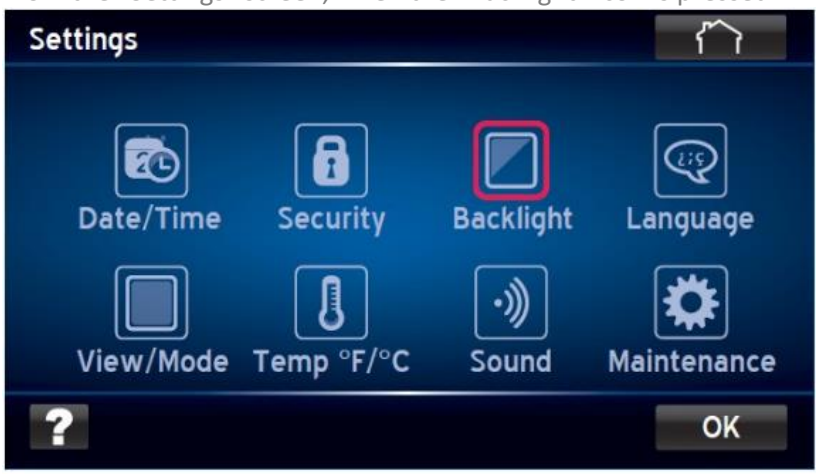
Settings/ Security Screen

The PIN is selected on the screen below and is four digits. If the PIN is forgotten, the code 9999 always allows access.



PIN Entry Screen

From the “Settings” screen, when the “Backlight” icon is pressed…



Settings Screen - Backlight Icon

… the “Settings/Backlight: screen appears. Backlight behaviors are set on this screen. Selecting a lower intensity value will increase the life of the backlight. Note the slider bar that is used to display more information on another screen below.

Settings/ Backlight Screen Part 1

The nightlight feature allows the user to use the touch screen control display as nightlight.

Settings / Backlight Screen Part 2

From the “Settings” screen, when the “Language” icon is pressed…

Settings Screen - Language Icon

…the suer is provided with English, Spanish, and French options for display.

Language Selection Screen

Below is the “Temperature Override” screen in Spanish.

Spanish Temperature Override Screen

Below is an example of a French language screen.

French Advanced Programmable Override Screen

From the “Settings” screen, when the “View Mode” icon is pressed…

Settings / View Mode Icon

…the “Settings / View Mode” screen is displayed. Three viewing modes have been selected. The installer can restrict these if desired. The “slap screen” can be set to display Temp Only, or the Home screen, which provides more information.

Settings / View Mode Screen

Home Screen - Advanced Programmable Mode

Home Screen - Programmable Mode

From the “Settings” screen, when the “Temp” icon is pressed…

Settings Screen - Temp Icon

… the user may select Fahrenheit or Celsius temperature display.

Settings / Temperature F/C Screen

From the “Settings” screen when the Sound icon is pressed…

Settings Screen - Sound Icon

the user may select sound settings; off, beep or click… the volume is selectable.

Settings / Sound Screen

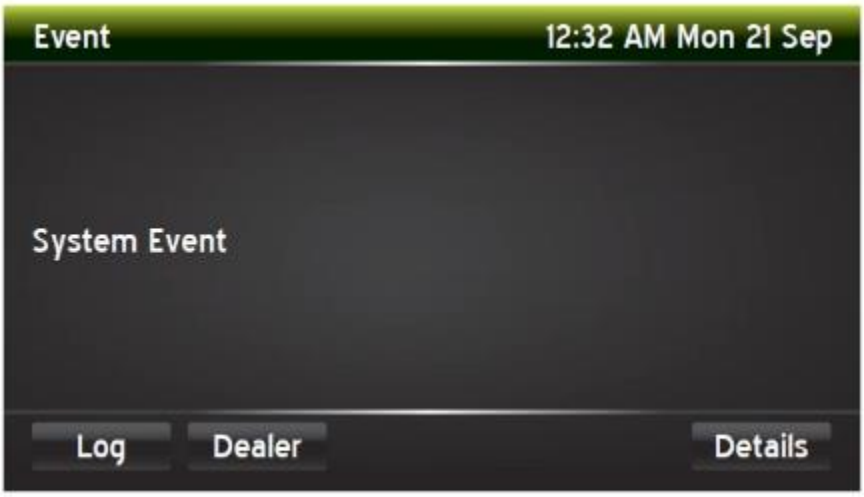
From the “Settings” screen, when the “Maintenance” icon is pressed…

Settings Screen - Maintenance Icon ...

The end user can set the type and length of time to use for the replacement media. This screen illustrates air filter and humidifier pad maintenance intervals. Note the slider which indicates there is more information below.
This screen illustrates UV lamp and electronic air cleaner maintenance intervals.

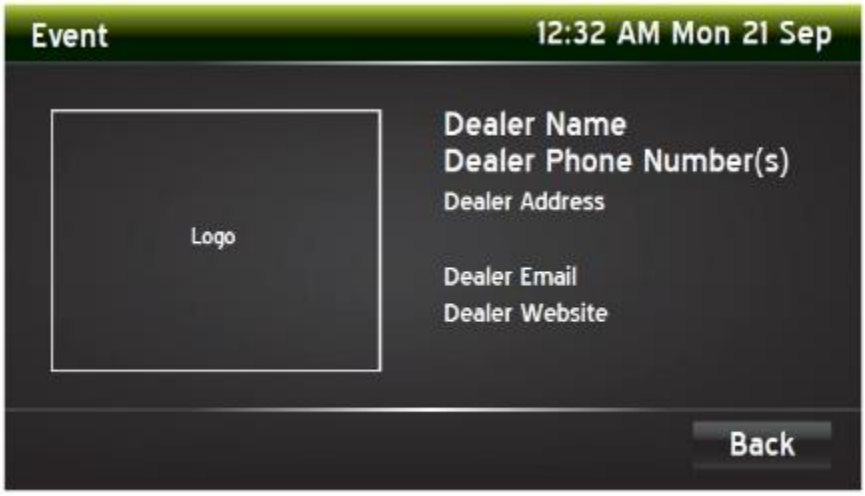
Settings / Maintenance Screen

This screen below illustrates the expiration of a reminder.



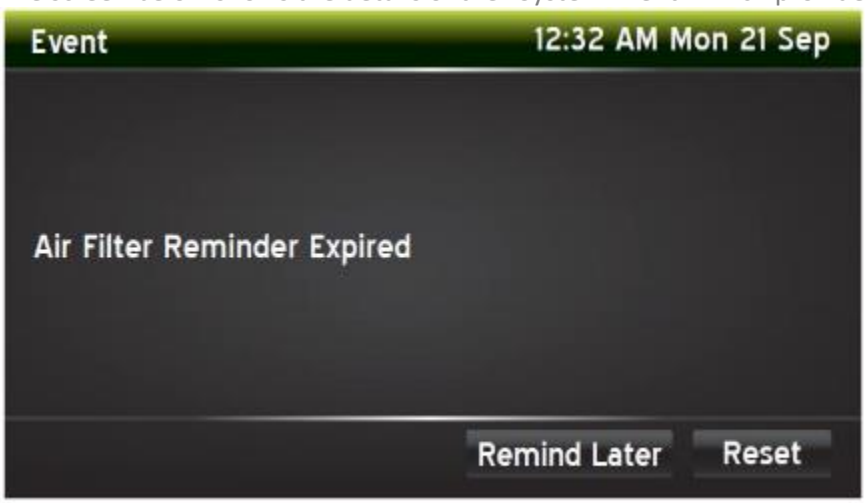
System Event Reminder Screen

The screen below shows the dealer information – accessed from the “System Event” popup.



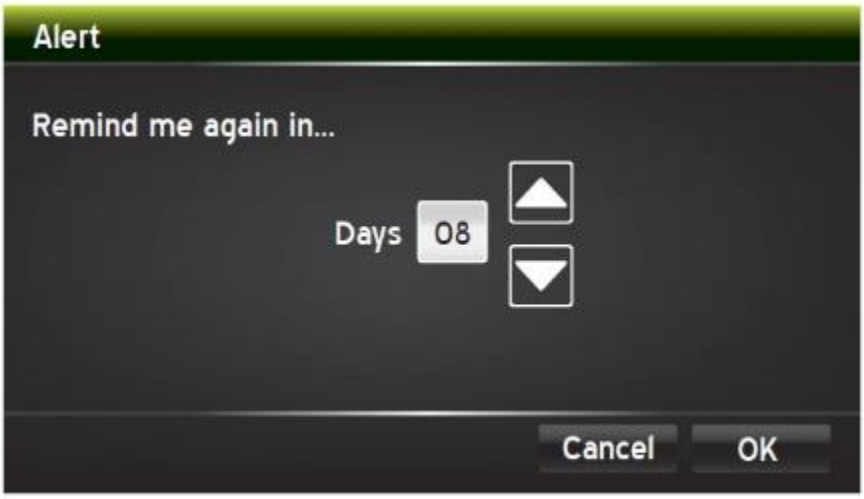
System Event - Dealer Information Screen

The screen below shows the details of the “System Event” which provides options to reset or remind later.



System Event - Maintenance Reminder Screen

This screen below shows the details of the “System Event” – provides options to rest or remind later.



System Event - Maintenance Reminder Reset Screen

From the “Settings” screen, when the “Dealer” icon is pressed…

Settings Screen - Dealer Icon

… the “Dealer Information” screen is displayed. This information is customizable by the contractor.

Dealer Information Screen

When the “Clean” icon is pressed…

Settings Screen - Clean Icon

… the touch screen is disabled, allowing cleaning of the screen.

Clean Screen

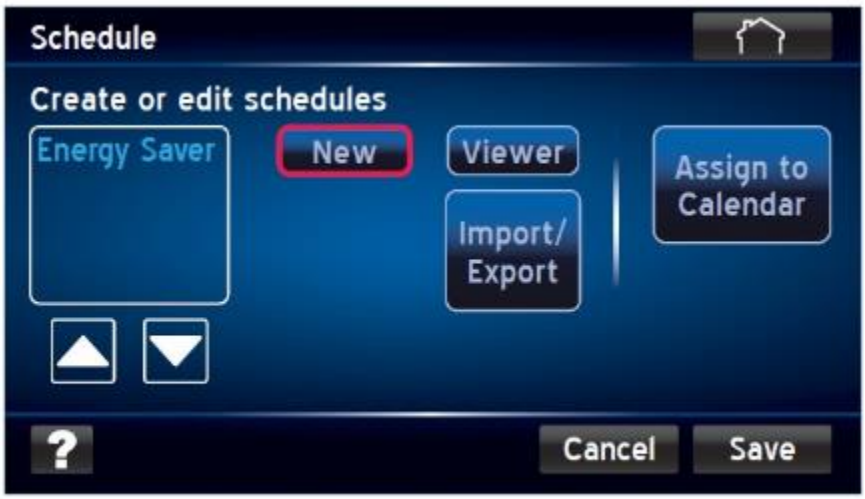
Schedule Setup

Schedule Icon

Schedule Setup Is Accessed By Pressing This Icon.

When the “Schedule” icon is pressed…

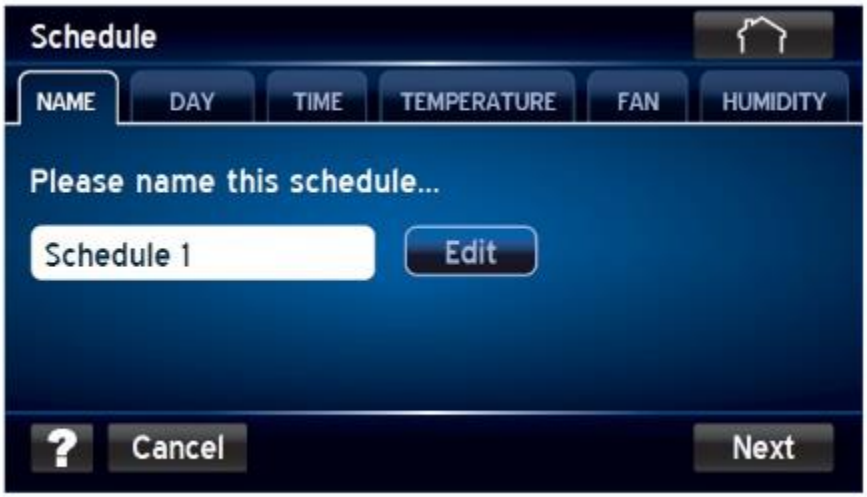
Schedule Setup: New



A New Schedule Is Started By Pressing The “New” Button.

… the “Schedule” screen is displayed. The “New” icon is pressed to create a new schedule. New schedules are automatically created using the Energy Saver settings. “Energy Saver” settings are identical to Energy Star settings. They are modified from there.

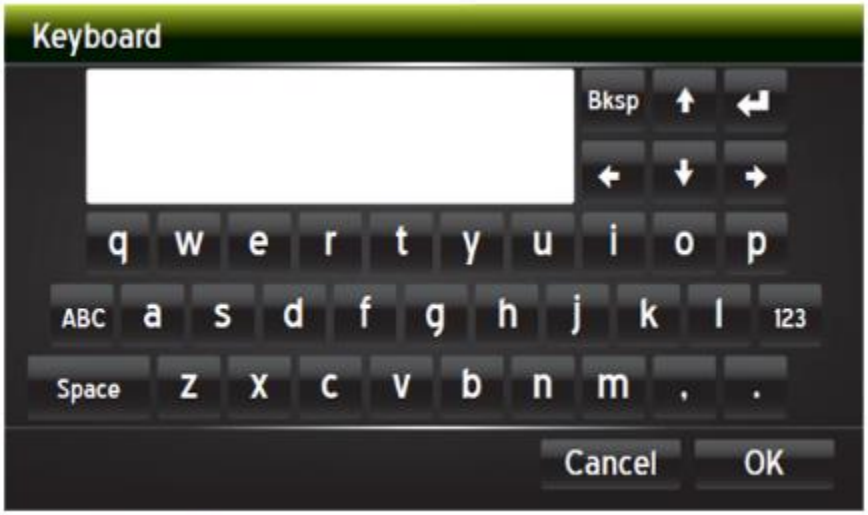
Schedule Setup: Name



A Schedule Is Named On The Name Tab.

The “Name” screen allows custom naming of the schedule. When Edit is pressed…

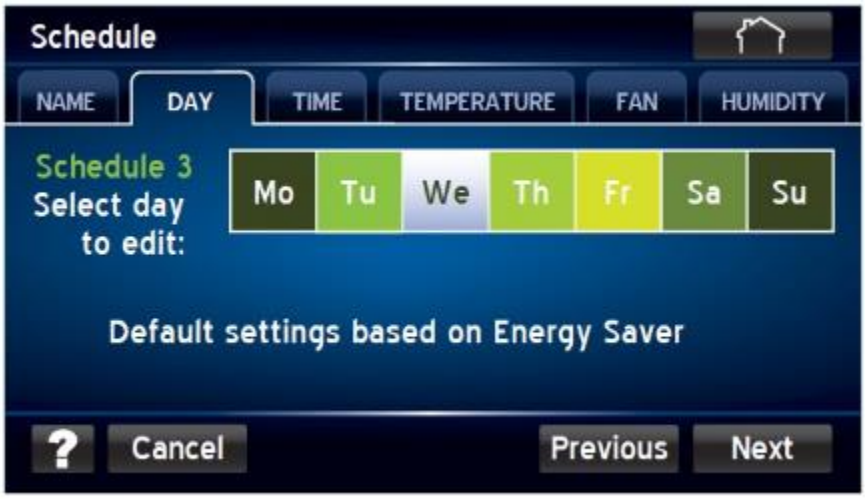
Schedule Setup: Keyboard



On-Screen Keyboard.

… the keyboard appears. This is the keyboard used when data is entered. The ABC key is used for capital letters, and the 123 icon is used for numbers and symbols.

Schedule Setup: Day



Individual Days Within A Schedule May Be Edited.

After the schedule is named, the day to edit is selected. This screen is shown when the selected day is set to Energy Saver settings. Copy is not shown because Energy Saver settings are not copied to another day. Select “Use Energy Saver” when that day is selected. “Use Energy Saver” saver is not shown because the day is already using Energy Saver settings.

Schedule Setup: Time

When 4 Events Per Day Are Selected, “Awake”, “Day”, “Return”, & Sleep” Are The Programmable Time Periods.

The “Time” tab is next in order. Four-day parts are selected on this screen, selectable in 15-minute intervals. Note that the day currently being modified is Wednesday. This screen illustrates the selection of four events during the day…

When 2 Events Per Day Is Selected, “Awake” & “Sleep” Are The Programmable Time Periods

“Awake,” “Day,” “Return,” and “Sleep”.

This screen illustrates the selection of two events during the day… “Awake” and “Sleep.”

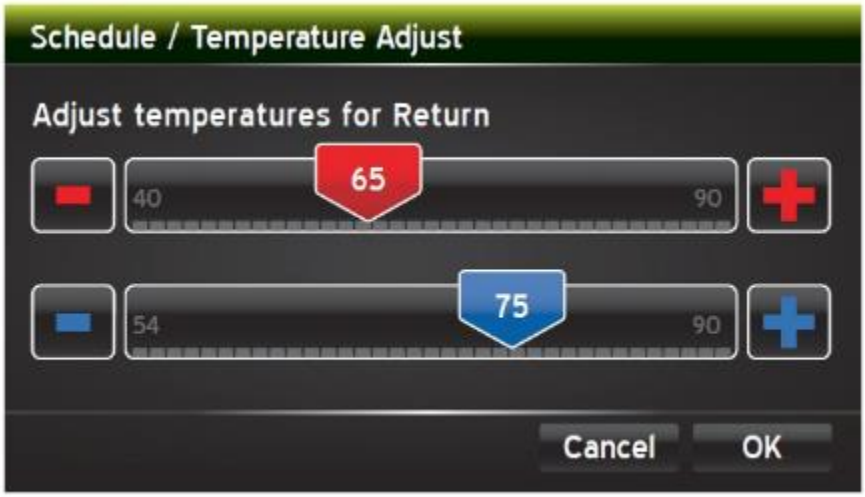
When 3 Events Per Day Are Selected, “Awake”, “Day”, & “Sleep” Are The Programmable Time Periods

This screen illustrates the selection of three events during the day… “Awake,” “Day,” and “Sleep.”

Schedule Setup: Temperature

Temperatures For Each Time Period Are Programmed On The Temperature Tab.

The next tab, Temperature, allows temperatures to be set for each day event selected. Note that if a two or three event schedule were selected, two or three events would be shown here.



Schedule / Temperature Adjust Screen.

This screen represents temperature selection for the Return event. There is a two-degree dead-band between the heating and cooling setpoints.

Schedule Setup: Fan

Fan Settings May Be Established For Each Programmable Time Period.

The next tab, Fan, allows fan functionality to be set for each event. Note that if a two or three event schedule were selected, two or three events would be shown here.

Schedule / Fan Adjust Screen (Auto Mode Selected).

The fan is shown here as running during “Awake” period in “Auto” mode (running only during heating or cooling operation).

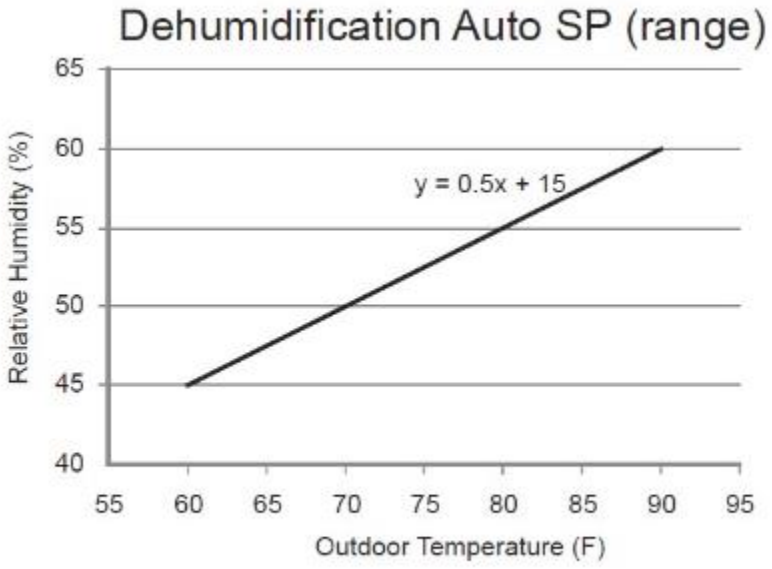
Schedule / Fan Adjust Screen (Manual Mode Selected).

“Manual” mode allows fan speed selection for the event being edited. The fan is shown here as running during “Away” period in Manual mode at 45%. The fan is set to run “Always” but can also be set to run a certain number of minutes per hour (15, 30, or 45).

Schedule Setup: Humidity

Humidity Settings May Be Established For Each Programmable Time Period (Manual Mode Illustrated Here)

The final tab, Humidity, allows humidity settings to be established for the day being edited. The settings selected here will be used for the entire day.



Auto Indoor RH Values Are Determined By The Outdoor Ambient Temperature.

When “Auto” mode is selected, indoor humidity is automatically selected based on the outdoor ambient temperature.

Humidity Settings May Be Established For Each Programmable Time Period.

The selected day has been fully configured (Wednesday in the example shown), pressing “Next” takes the user back to the “Choose Day” screen.

Schedule Setup: Copy Day

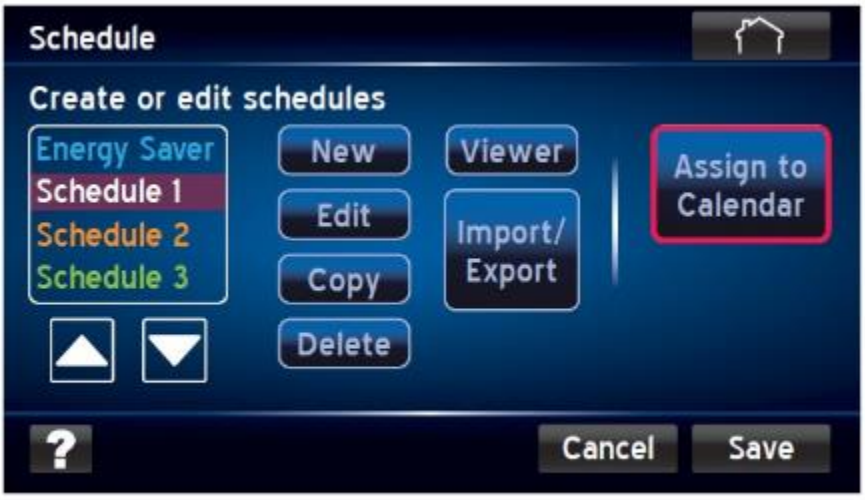
Individual Days In The Schedule May Be Edited, Copied From Another Day, Or Set To The Energy Saver Default Values.

The user can now copy the configured day (Wed) to other days. “Use Energy Saver” allows the user to select settings matching Energy Star settings.

Copy Day To Screen.

This screen shows that the copied day is being applied to Wednesday. The target day or group of days is shown in gray/silver. If “Everyday” is selected, all day indicators will be shown in silver.

Schedule Setup: Assign to Calendar



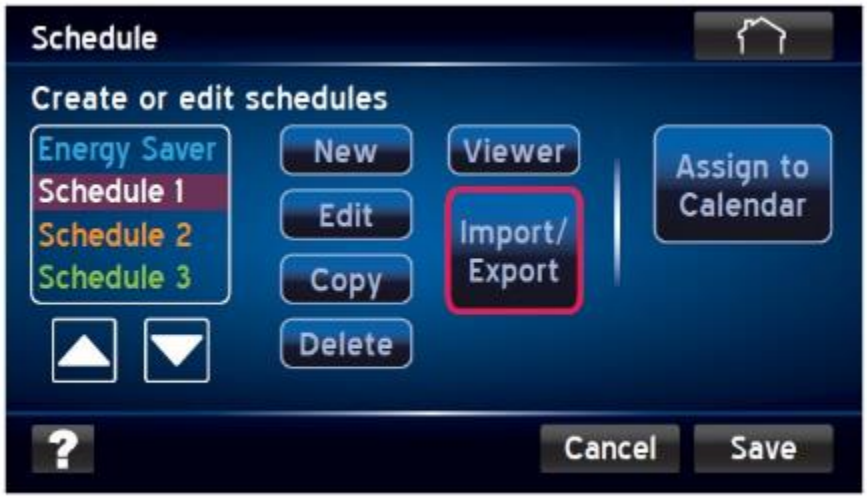
Schedules May Be Established For Certain Times Of Year With Assign to Calendar.

From this screen, schedules are edited after they are created. They are copied to create new schedules, or they are deleted. Each schedule is applied to different times of the year using the “Assign to Calendar” icon.

Sample Assign to Calendar Screen.

On this screen, Schedule 1 has been assigned to January, February, April, June, and October. Schedule 2 has been assigned to July and August.

Schedule Setup: Import / Export



Schedules May Be Imported & Exported Through The Import / Export button.

Schedules may be imported form or exported to a USB flash drive.

Schedules May Be Imported From Or To A USB Drive From The Schedule / Import/ Export Screen.

After selecting “Import / Export,” choose the desired operation.

Schedule Import

Schedule / Import Screen.

Directions for schedule import are displayed onscreen.

Wireless Interface

The Residential Communicating Control System (Generation 2 – S1-TTSCC02) can interface with both Android & Apple mobile devices.

Currently, the control will operate with the following smart phones tablets:

iPhone4s	**iPhone 5**	**iPad**
IPad Mini	**iOS Version 6.0 or later**	**Galaxy SIII & SIV**
Note II	**Galaxy Nexus**	**Nexus 7 & 10**
Motorola Milestone 2	**HTC One**	**EVO**
Galaxy Tab 2.0	**Kindle Fire**	**OS 4.0 or later**

The wireless interface allows the user to adjust control set points and operation mode. In addition, existing programming can be overridden and the system and be forced into Quick Heat or Cool modes from the mobile device. There are two main steps required to set up the Residential Communicating Control System for wireless operation. These include:

- Touch Screen setup for wireless operation and connected to home network.
- The IOS or Android interface must be established to communicate with the control system.

Touch Screen Setup

Home Screen.

On the Home screen, press Menu in the bottom right corner.

Tools Icon.

In the primary Menu screen, select the Tools icon from the list.

Wireless Icon.

From the Tools list, select the Wireless icon.

Refresh Wireless Networks Icon.

Press the Refresh Wireless Network icon to display a current list of available networks.

Network Selection.

Using the up/ down arrows, select the network which will be used for the wireless interface. If the desired network is secure, the Lock symbol will bel visible to the right of the network name.

Network Connection.

After selecting the appropriate network, press the Connect button near the middle of the screen. If the network is secured, a keyboard is presented to enter the network password.

Registration Screen.

When the network connection is established, the Registration screen appears with the populated Touch Screen Communicating Control's unique Device ID.

IMPORTANT!

Document and save the Unique **Device ID** for use during mobile device setup.

Completing Touch Screen Setup.

Press OK on the Registration screen and Tools / Wireless screen to complete Touch Screen setup.

Mobile Device Setup

IntelliComfort App Logo.

IntelliComfort

Download the IntelliComfort app from iTunes or Google Play.

Home Screen

Open the IntelliComfort app on the mobile device and press the Signup button.

Sign Up Screen

Enter the primary user's name, email, password, and country in the Sign-Up screen and press the Sign-Up button.

Email Verification

After signing up, a verification email is sent to the email address provided for the primary user. Press Accept and check the email account for the verification email.

Main Screen Login

On the application Main screen, press the Login button to gain access to the user login page. Enter the email and password of the primary user and press Login.

Add New Device Screen

Enter the unique Device ID received at the completion of the Touch Screen Setup and press the Save button in the upper right corner.

IMPORTANT!

If registration fails, return to the Touch Screen, and re-register the wireless network connection. This will provide a replacement Device ID which is entered into the mobile device application.

Touch Screen Re-Registration

Tools / Wireless Screen.

In the Tools / Wireless Screen, press the Register button at the lower left corner.

Re-Registration Screen.

Press the Yes button on the Re-Registration screen and a replacement unique Device ID is displayed. Document and save this number for entry into the mobile Device.

USB (Universal Serial Bus) Port

The control contains one USB port with a mini-USB connector that supports FAT/FAT32 file systems.
Mini-USB and SD ports are present on the bottom of the touch screen control. Software updates are performed through the mini-USB port, which requires an adapter to connect to USB drives. The SD card port is reserved for future use.

Mini USB Port with Adapter Inserted

Schedule / Import Screen (Import In Progress).

During the Import process, the USB drive must not be removed.

Schedule / Import Screen (Import Complete).

When prompted, the USB drive may be removed.

Schedule / Export

Schedules may also be exported to a USB flash drive.

Schedule / Export Screen.

Follow the onscreen directions for schedule export.

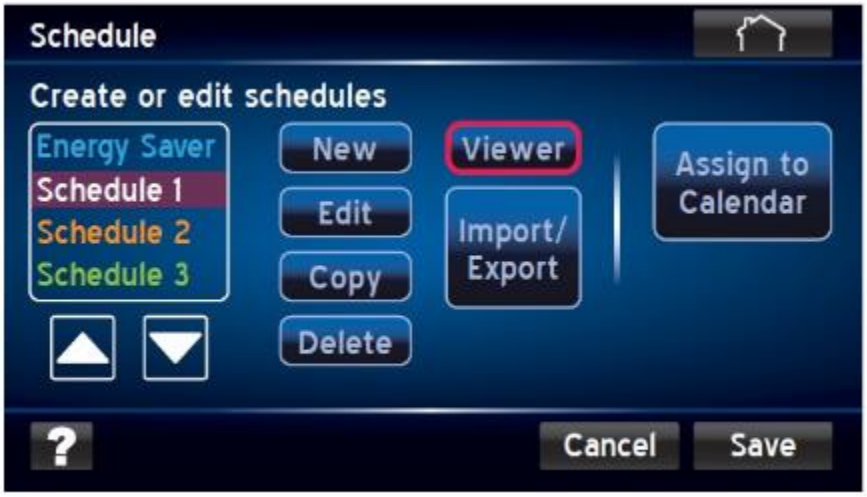
Schedule / Export Screen (Export in Progress).

During the export process, do not remove the USB drive until the export process is complete.

Schedule / Export Screen (Export Completed).

When the schedule export is complete, press “OK,” then remove the USB device.

Schedule Viewer



Programmed Schedules May Be Viewed Through The Viewer Button.

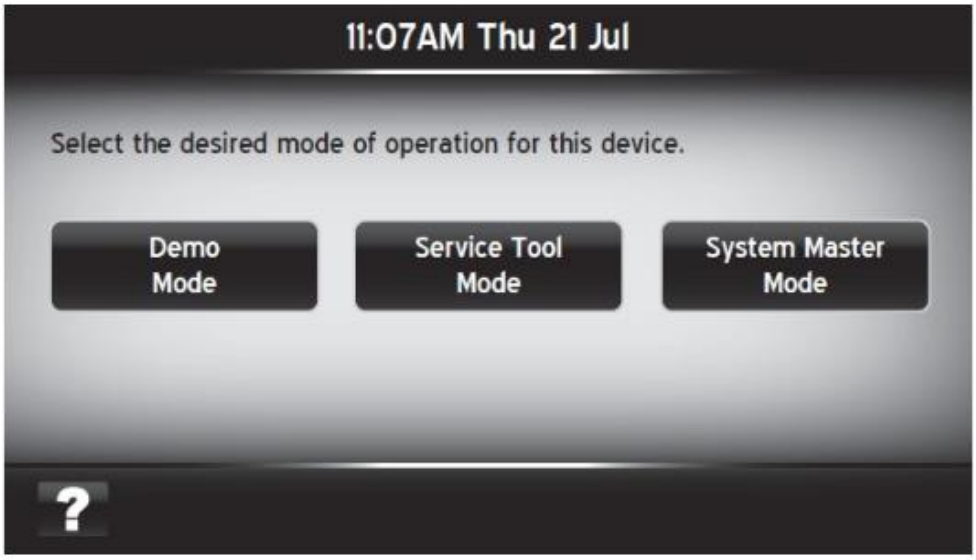
Schedules may be viewed by pressing the “Viewer” icon.

The Schedule Viewer Screen Provides Access To All Programmed Schedules.

The “Schedule Viewer” shows the schedules that are active in the calendar and the settings for the schedule.

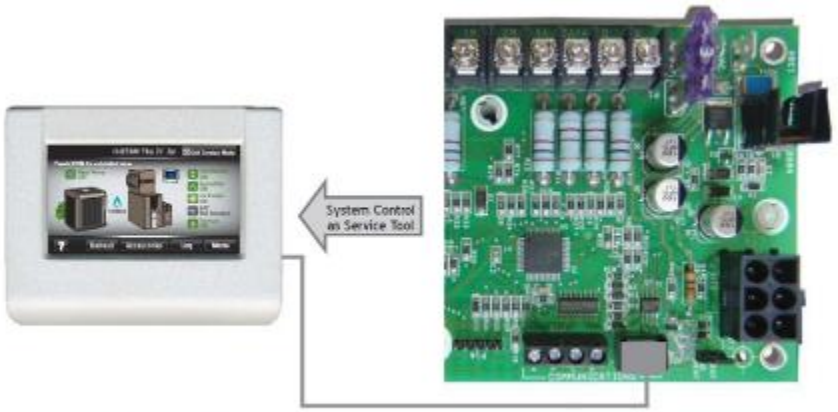
Online Ducted Systems Residential Start-up Form

This segment of the guide covers the contractor's experience, including software setup, service access, and diagnostics.



The Installer Must Select The Mode of Operation For The Touch Screen.

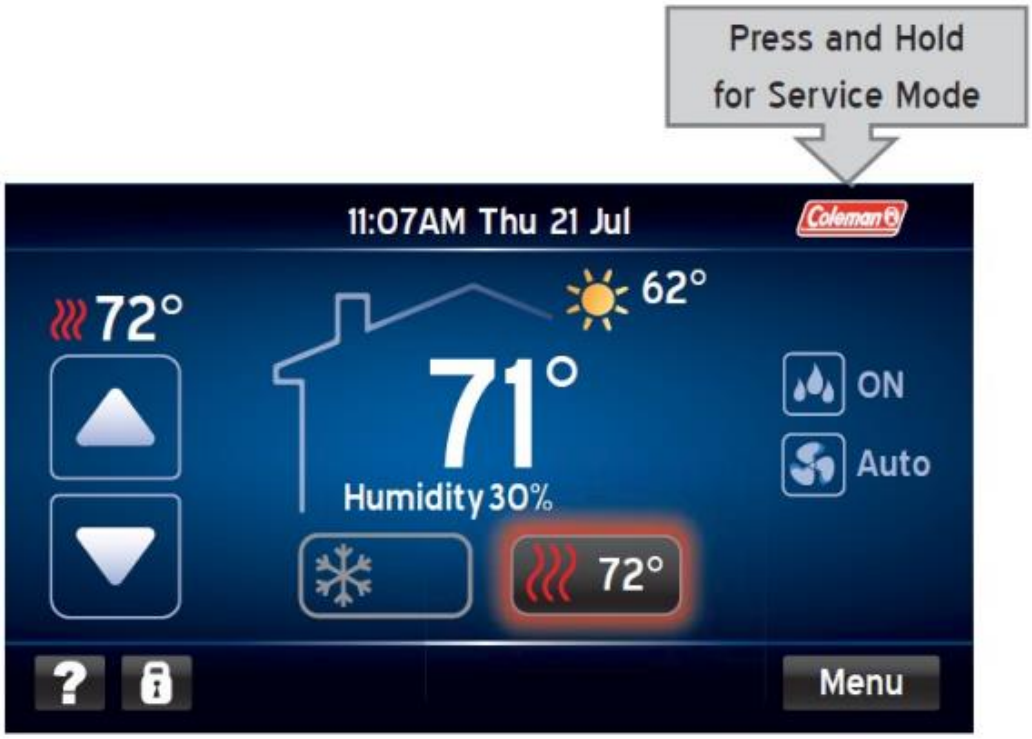
A second touch screen control may be connected at any COMM port in the system and used in Service Tool Mode. This provides system service access and diagnostics from anywhere in the network. Simply connect the four-wire connection from any available COMM port to the second touch screen control.



System Control as Service Tool with Communicating Board.

Service Mode Access

Service Mode provides access to features and details required by the installer or the service technician. This includes system configuration, active operational values, maintenance reminder setup, user interface configuration, and more.



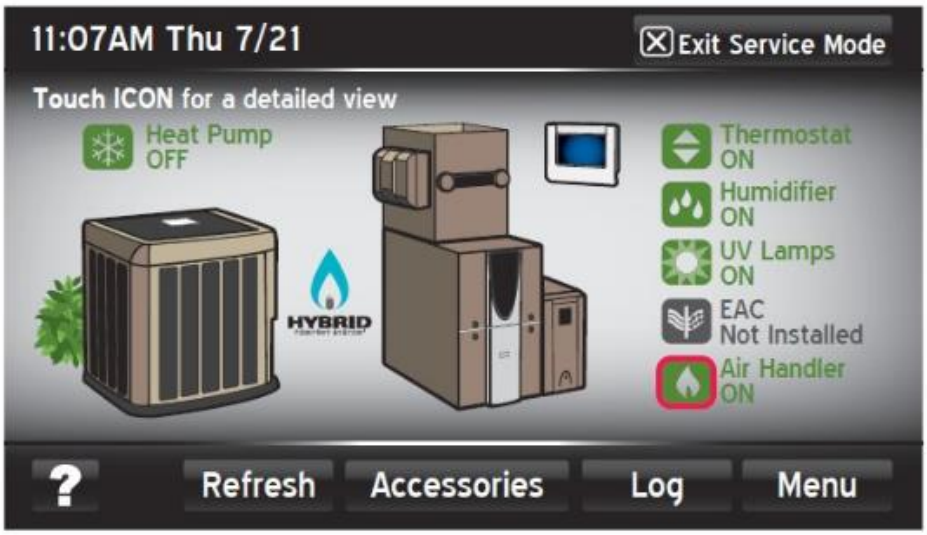
Non-Programmable Mode Home Screen - Coleman Brand Selected

From the “Home” screen, press and hold the logo in the upper right corner to enter “Service Mode.”

Service Mode Screen

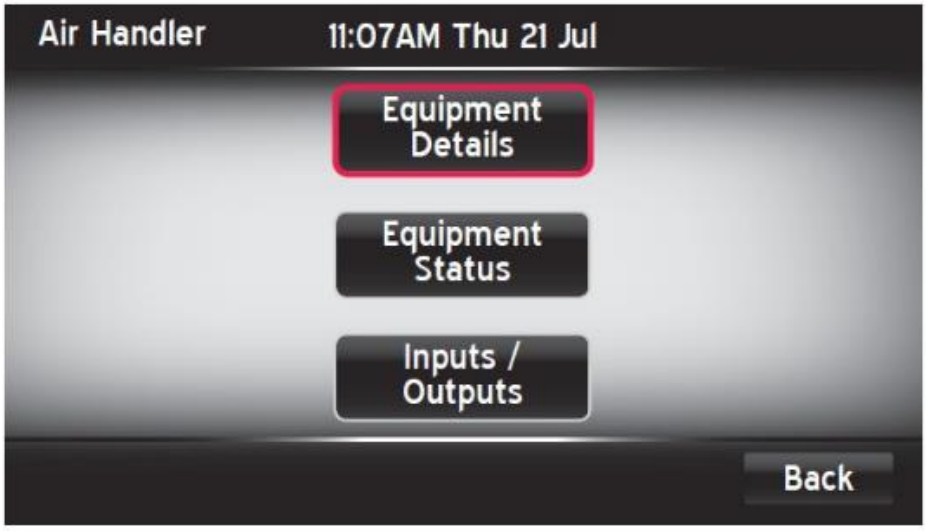
The “Service Mode” screen provides many configuration and information options. Pressing the icon of a particular piece of equipment…

Service Mode > Menu > Air Handler Icon



Pressing An Icon On The Service Mode Screen Provides Detail On That Component

Service Mode > Menu > Air Handler Icon > Equipment Details Button



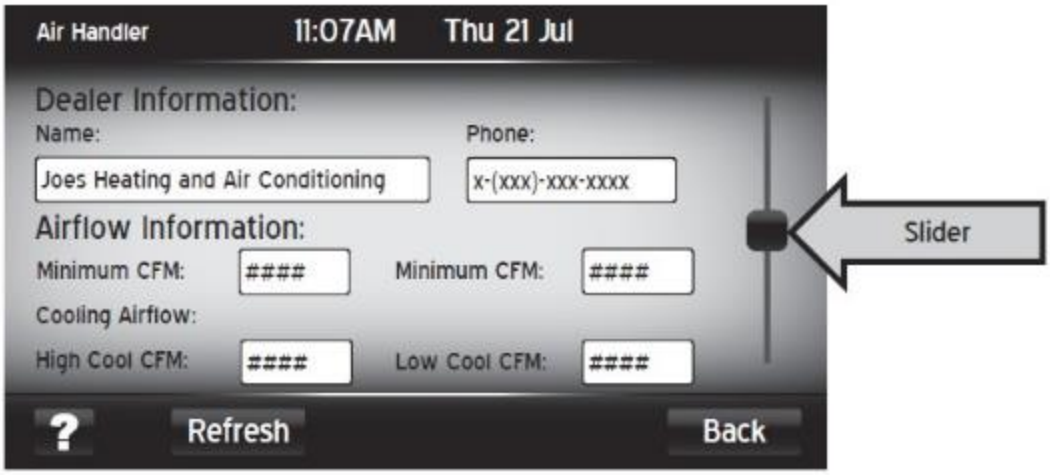
Service Mode>Furnace Icon>Furnace Menu Screen.

… opens the "Menu" screen for that piece of equipment. The example screen illustrated here is for an air handler. Pressing the Equipment Details icon…

Equipment Details Screen

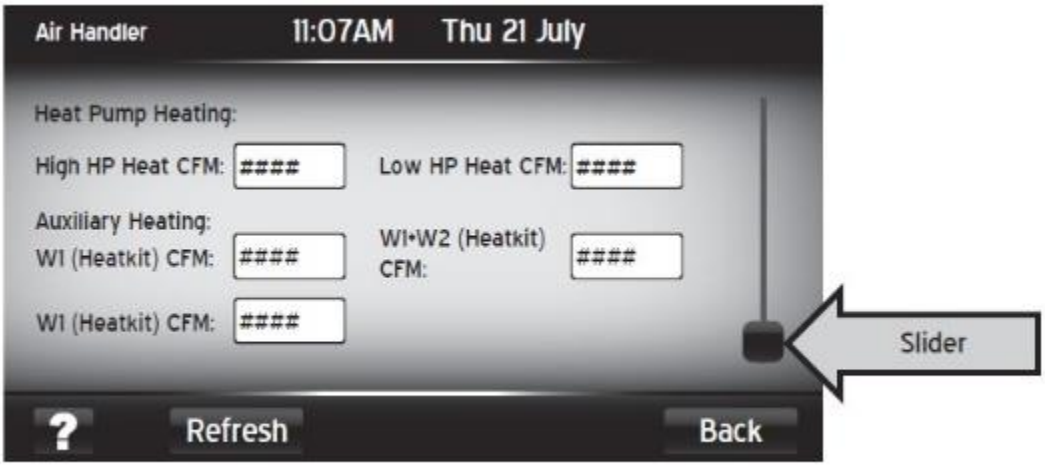
Equipment Details Screen - Air Handler.

…provides information on the connected equipment. Note the slider on the right, indicating that more information is available.



Information Screen - Air Handler.

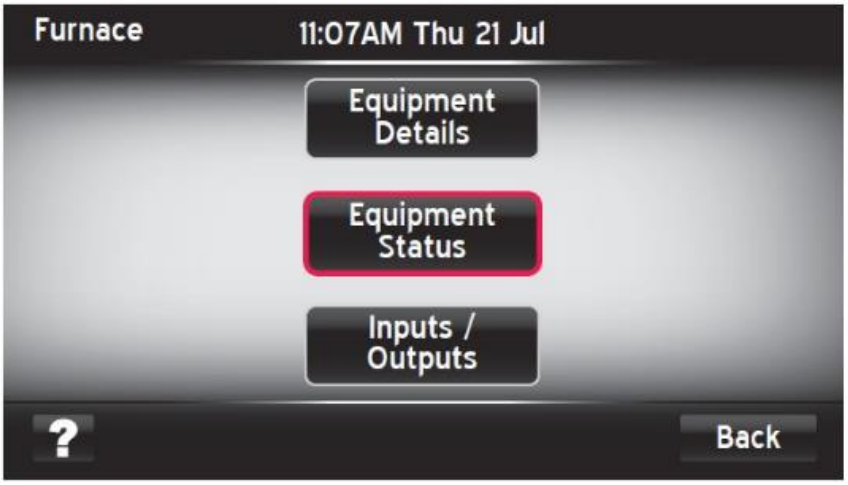
Scrolling the slider down provides additional system information…



Airflow Setup Screen - Heat Pump With Air Handler.

… and more information as the slider is moved to the bottom position.

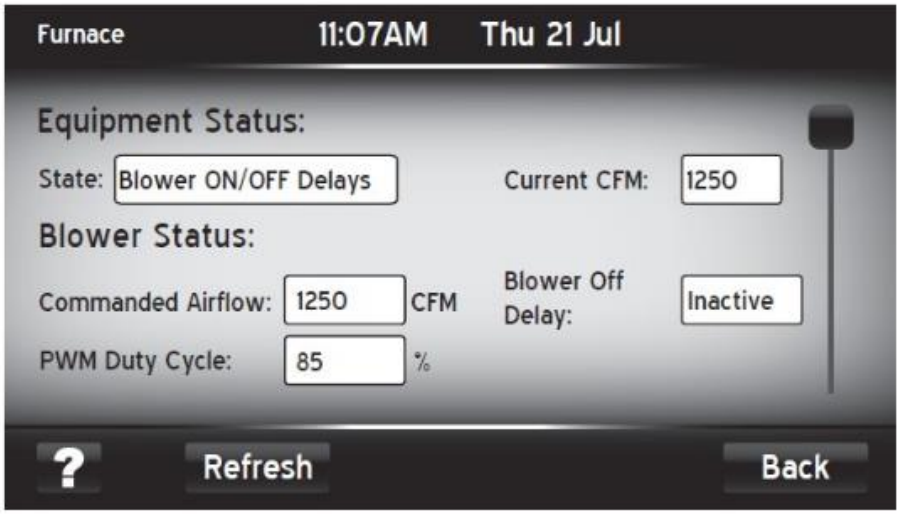
Service Mode > Menu > Furnace Icon > Equipment Status Button



Equipment Status Button.

The example screen illustrated here is for a furnace. Pressing the “Equipment Status” icon…

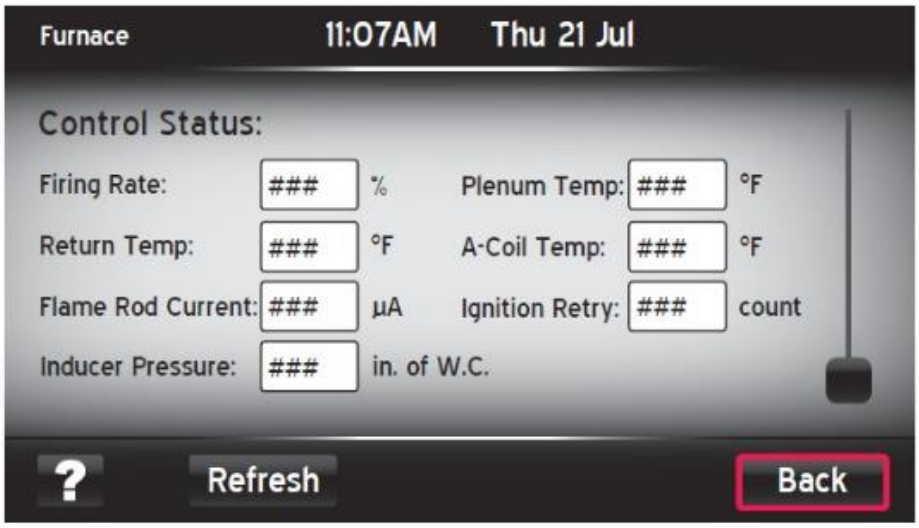
Equipment Status Screen



Equipment Status Screen - Furnace.

…provides current operational information. Note the display of specific airflow information, and the PWM (Pulse Width Modulation) value being sent to the blower.

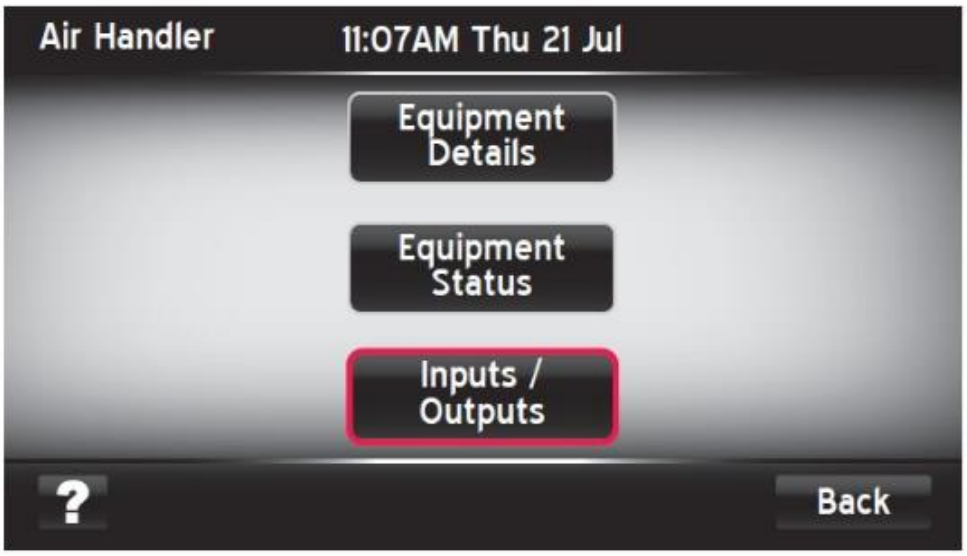
Control Status Screen Modulating Gas Furnace



Control Status Screen - Modulating Gas Furnace.

This is an example from an installation with a modulating gas furnace. The current firing rate, ignition retry count, flame current, inducer pressure, and more are indicated here. Pressing the “Back” icon returns to the “Service Menu” screen.

Service Mode > Menu > Air Handler Icon > Inputs / Outputs Button



Import / Export Options Are Available To The Installer Through This Button.

… opens the Menu screen for that piece of equipment. The example screen illustrated here is for an air handler. Pressing the “Inputs / Outputs” icon…

Inputs Screen

Inputs Screen - Air Handler.

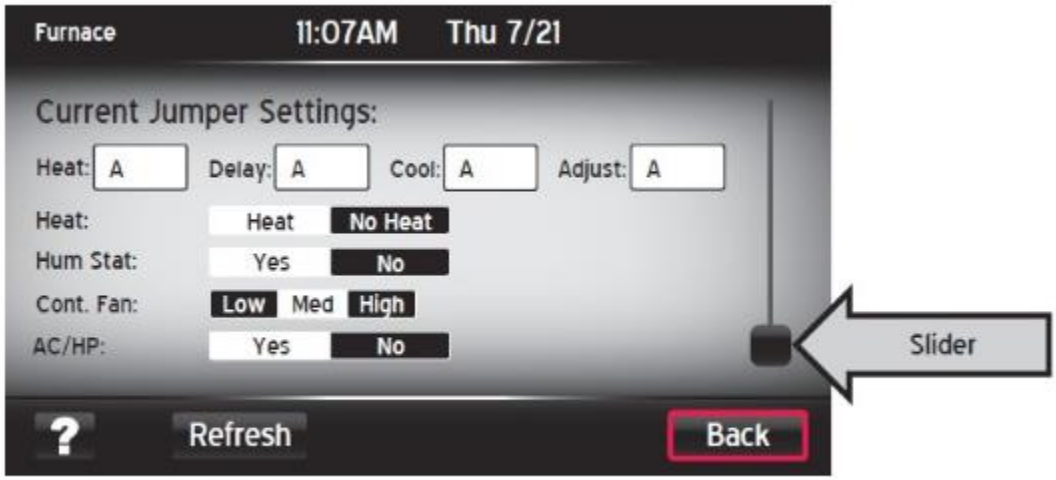
…provides the current inputs. This example is for an air handler. Note the slider, indicating more information is available.

Outputs Screen

Outputs Screen - Air Handler.

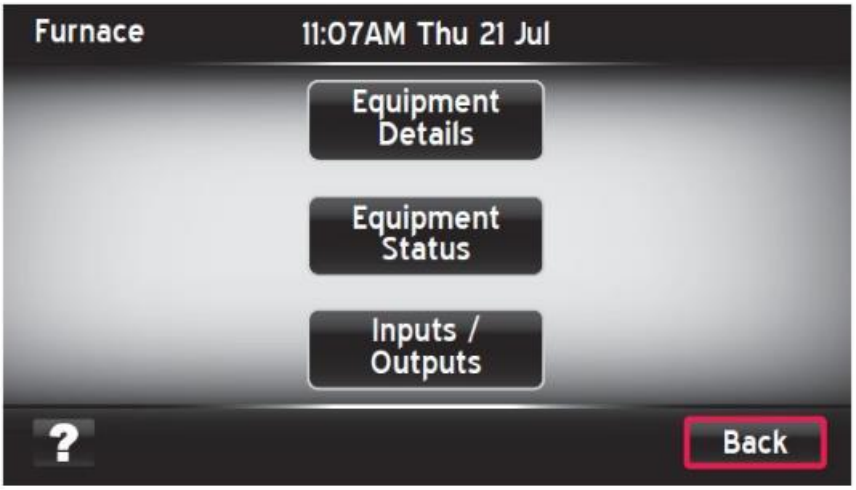
Current outputs are shown here.

Jumper Settings Screen



Current Jumper Settings Screen - Furnace.

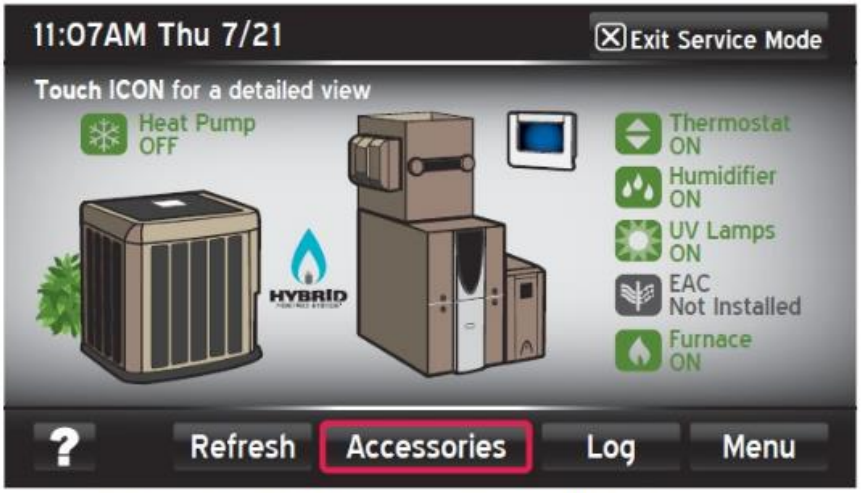
Current jumper settings are displayed here. The “Back” icon opens the “Service Menu” screen once again…



Pressing The “Back” Button Provides Access To The Previous Menu.

…opens the Menu screen for that piece of equipment. The example screen illustrated here is for a furnace. Pressing the "Back" button icon opens the Service Mode once again.

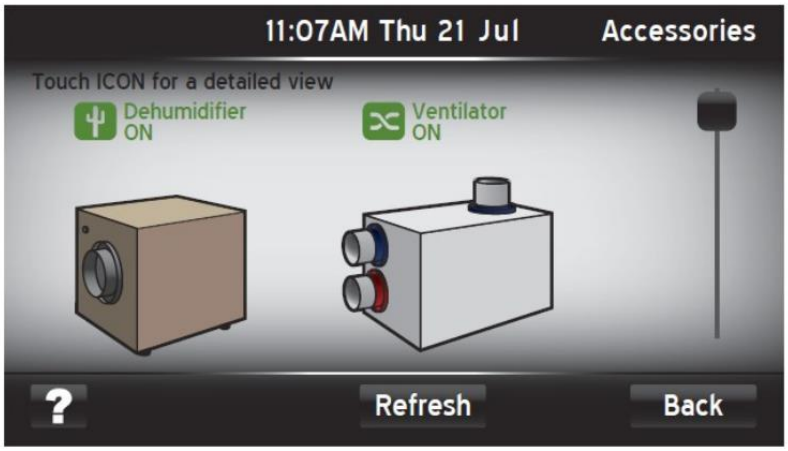
Service Mode > Menu > Accessories Button



Service Mode Screen With The Accessories Button Highlighted

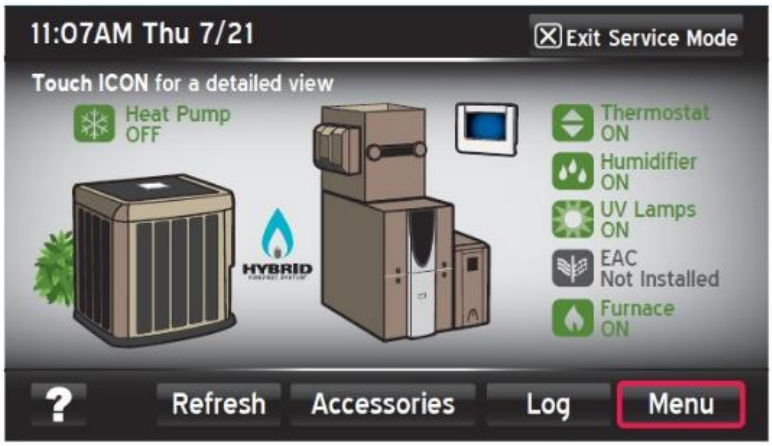
… the Service Mode screen opens once again. Pressing the individual icons or icons leads to more information on that component. For example, the "Accessories" icon…

Accessories Screen



Accessories Screen Illustrating A Whole House Dehumidifier & Ventilator

… shows the accessories that are not shown on the Service Mode screen. Additional accessories are shown below and viewed using the scroll bar on the right. Pressing "Back" returns to the Service Mode screen.



Service Mode>Menu Provides Access To Many Installer Setup & Diagnostic Functions.

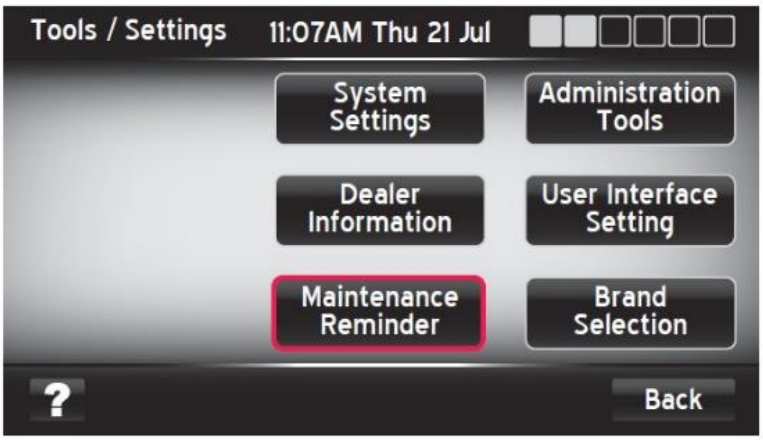
From the “Service Mode” screen, the “Menu” icon provides access to the “Service Menu” Screen.

Service Mode > Menu > Tools / Settings Button

Service Mode Menu. Tools & Settings Are Accessible Through The Tools/ Settings Button.

Additional options are shown. For example, pressing the “Maintenance Reminder” icon…

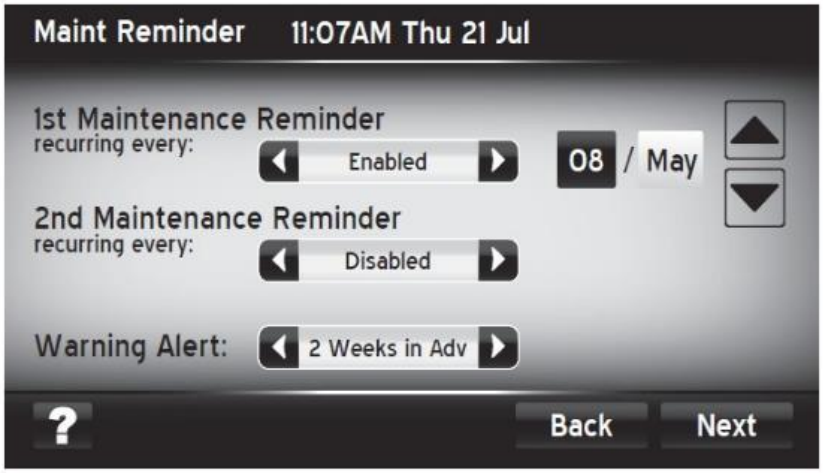
Service Mode > Menu > Tools / Settings Button > Maintenance Reminder Button



Service Mode>Tools/ Settings Menu. Maintenance Reminder Intervals Are Accessible Through The Maintenance Reminder Button.

…additional options are shown. For example, pressing the “Maintenance Reminder” icon…

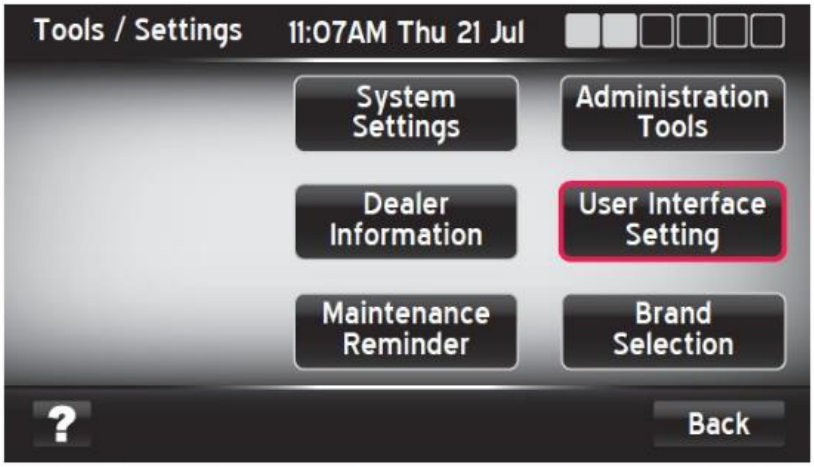
Service Mode > Menu > Tools / Settings Button > Maintenance Reminder Button > Maintenance Reminder Screen



Maintenance Reminders Are Customizable By The Installer

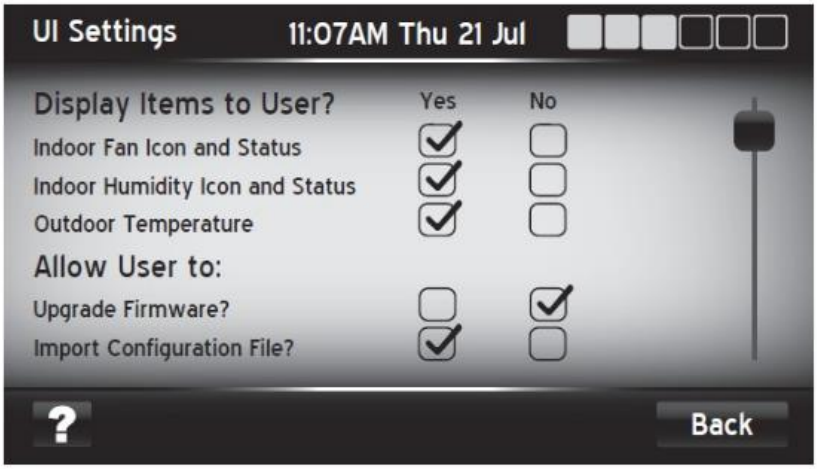
… displays the Maintenance Reminder screen. This option was discussed in the installation section of this guide.

Service Mode > Menu > Tools / Settings Button > Maintenance Reminder Button > User Interface Setting Button



Service Mode>Tools/ Settings Menu. The User Interface Is Accessible Through The User Interface Button.

This powerful feature lets the installer tailor the touch screen control UI (User Interface) and functionally to the homeowner. On this screen, the control is set to display the indoor fan icon and status, indoor humidity icon and status, and outdoor temperature.

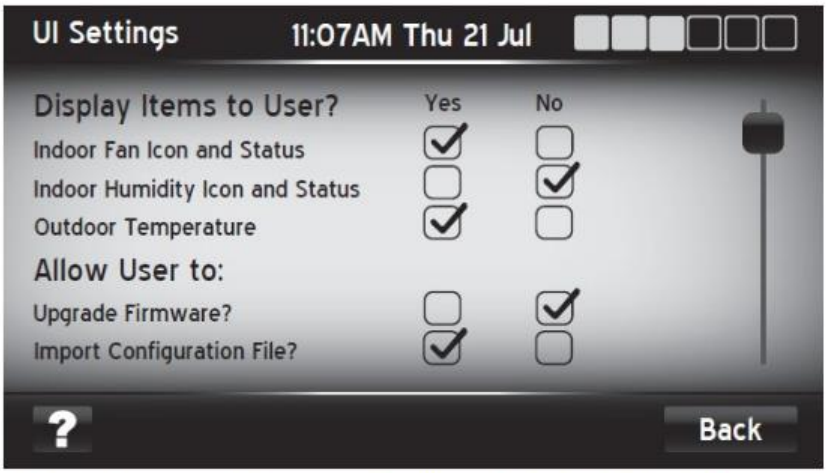


UI Settings Screen (Part 1). "Indoor Humidity Icon & Status" & "Outdoor Temperature" Checked.

On the following screen, select or deselect check boxes to display or hide elements of the user interface and set permissions for system upgrade and configuration.

Home Screen With Selected UI Components Displayed

The selections on the previous screen result in this display.

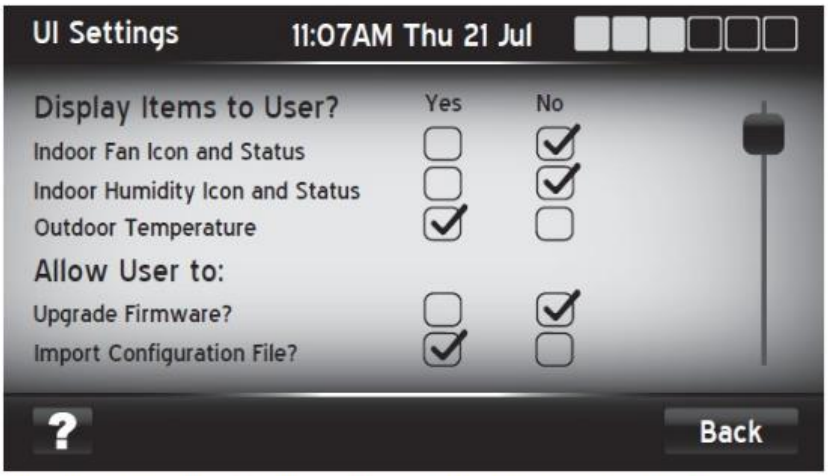


UI Settings Screen (Part 1). "Indoor Humidity Icon & Status" Unchecked & "Outdoor Temperature" Checked.

When the "Indoor Humidity" icon and "Status" checkbox are set to "No" …

Home Screen With Selected UI Components Displayed - Fan Icon Is Hidden.

… the humidity information is no longer displayed but is still accessible through the “Menu.”

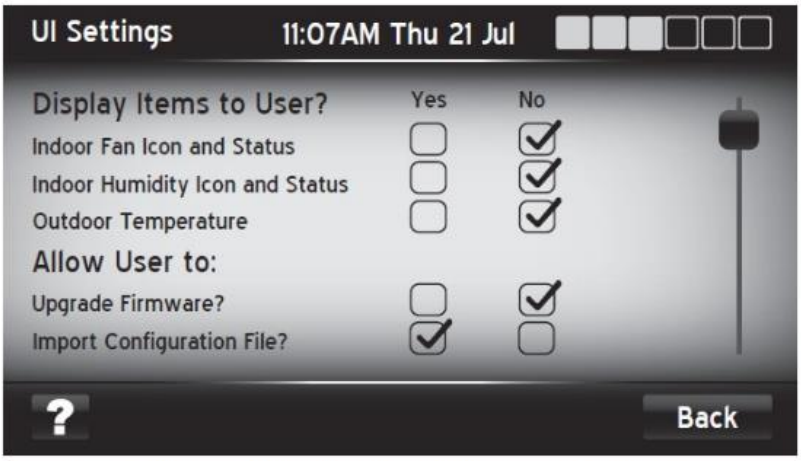


UI Settings Screen (Part 1). “Indoor Humidity Icon & Status” Unchecked & “Outdoor Temperature” Checked

When the “Indoor Fan Icon” and “Status” is set to “No” …

Home Screen With Selected UI Components Displayed - Humidity & Fan Icons Are Hidden.

The fan status information is no longer displayed on the home screen. Fan control is still available through the “Menu” icon.

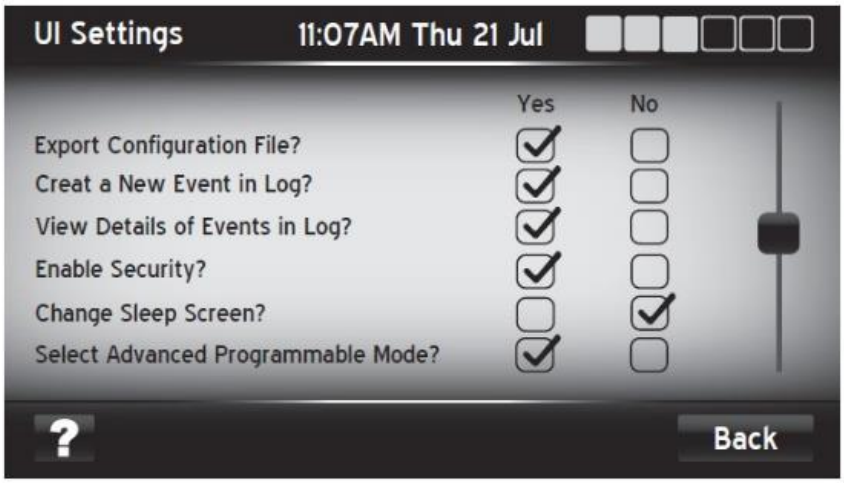


UI Settings Screen (Part 1). "Indoor Humidity Icon & Status" & "Outdoor Temperature" Unchecked

Outdoor temperature display can also be removed.

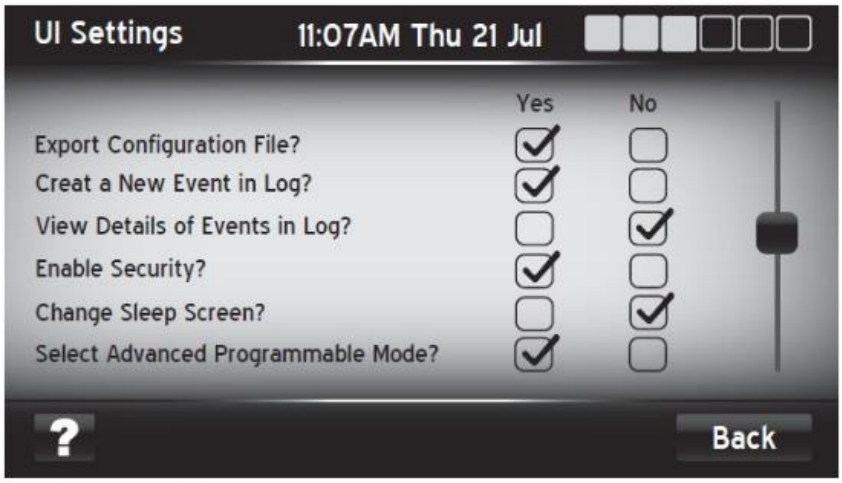
Home Screen With Selected UI Components Displayed - Outdoor Temp, Humidity & Fan Icons Are Hidden.

The display is basic now, but all the functionality remains.



UI Settings Screen (Part 2). "Select Advanced Programmable Mode?" Checked.

Many other features are enabled or disabled by the installer. The installer can even set the control that "Programmable" or "Advanced Programmable" modes cannot even be seen as an option for the homeowner.



UI Settings Screen (Part 2).

This feature addresses the different needs of our customers. Some installers do not want their customers to see the details of a fault code. Others want their customers to be able to see what is wrong, so they know what parts to bring (especially true for those in rural areas). The installer can select their reference here.

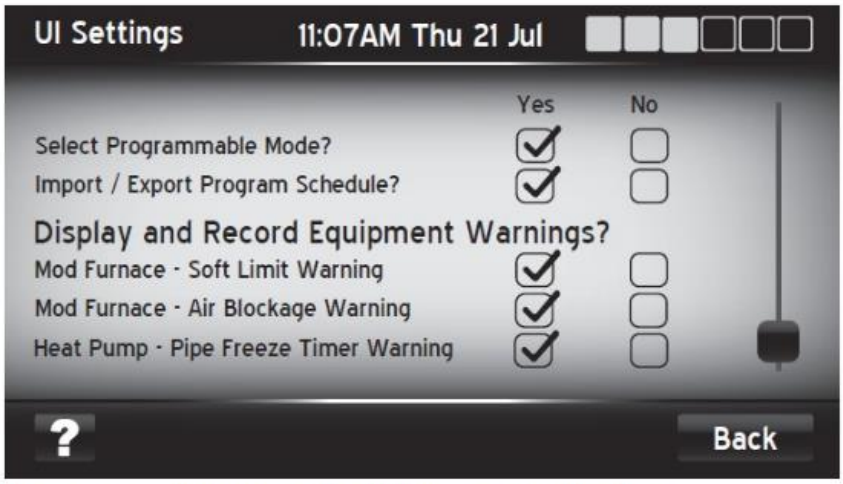
Error Log Screen

Tools / Log Screen.

This is the homeowner “Log” screen that shows the faults that have occurred with the system. If the system has not been configured to show the details of events, this is all the information that the user will see. This screen will be updated to show the most recent event at the top.

Tools / Log screen. When Enabled, Additional Event Detail May Be Viewed By Pressing The Fault.

However, if this feature is enabled, the user can touch the fault and see more details. Even when this is enabled, this feature is not displayed as an icon. Pressing the selected fault…
…provides the following detail. This is an example of the details that will be displayed.



UI Settings Screen (Part 3). "Select Programmable Mode?" Checked.

The "Import/Export Program Schedule" option may be disabled from this screen.

UI Settings Screen (Part 3). "Select Programmable Mode?" Checked.

Three viewing modes have been selected. The installer may hide these options with the checkboxes shown on the previous screens.

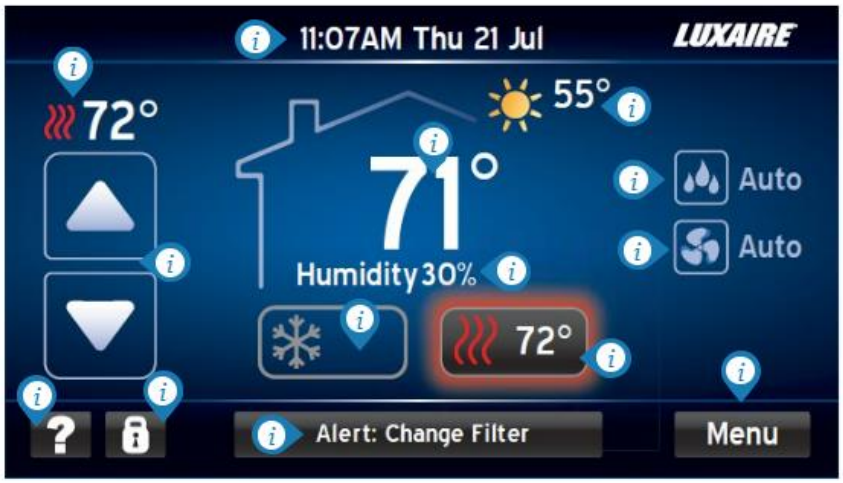
Service Mode > Menu > Tools / Settings Button > Settings > View Mode Screen

Settings / View Mode Screen.

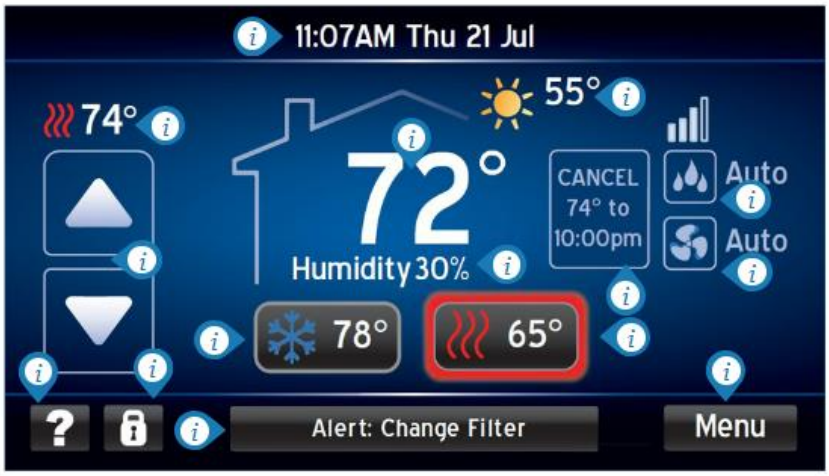
Three viewing modes are selectable. The installer may hide these options with the checkboxes shown on the previous screens.

View / Mode

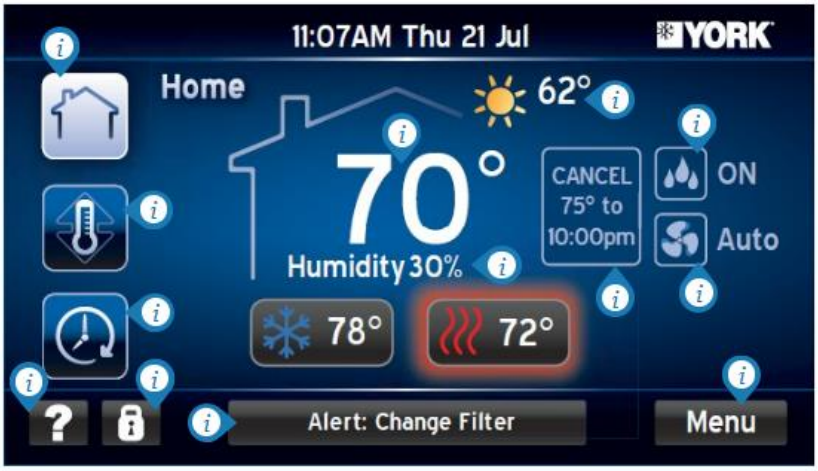
Press **MENU** in the bottom right corner of your screen.
Press **SETTINGS** icon.
Press **View/Mode** icon.
Select mode.
Non-Programmable, Programmable or Advanced Programmable
Select sleep screen – **Home of Temperature Only**



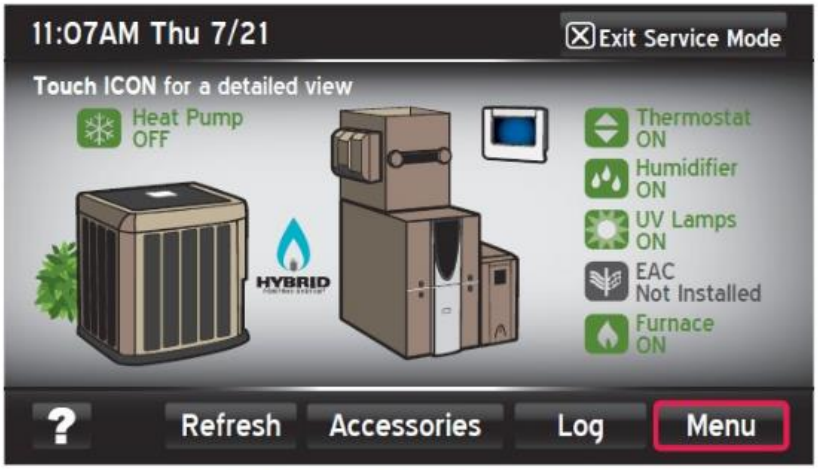
Non-Programmable



Programmable



Advanced Programmable



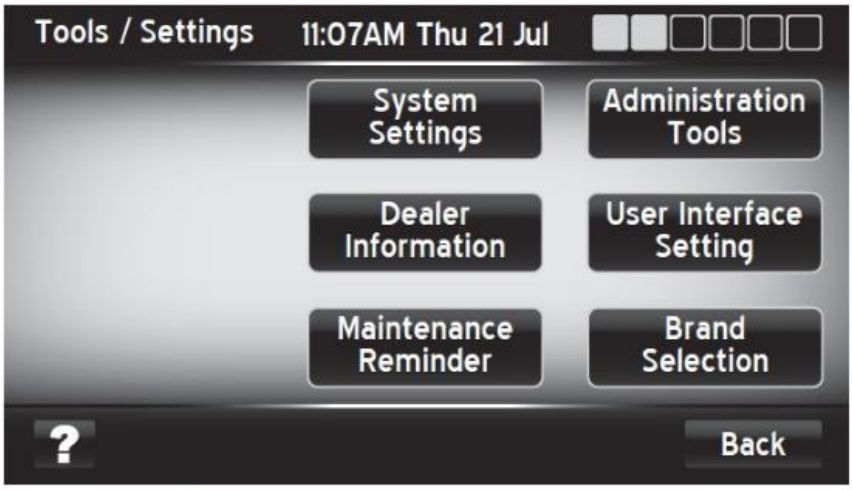
Service Mode>Menu Provides Access To Many Installer Setup & Diagnostic Functions

Return to the “Service Mode” screen then press “Menu” …

Tools / Settings Options Are Available To The Installer Through This Button.

… additional options are shown here. When the “Tools / Settings” icon is pressed…

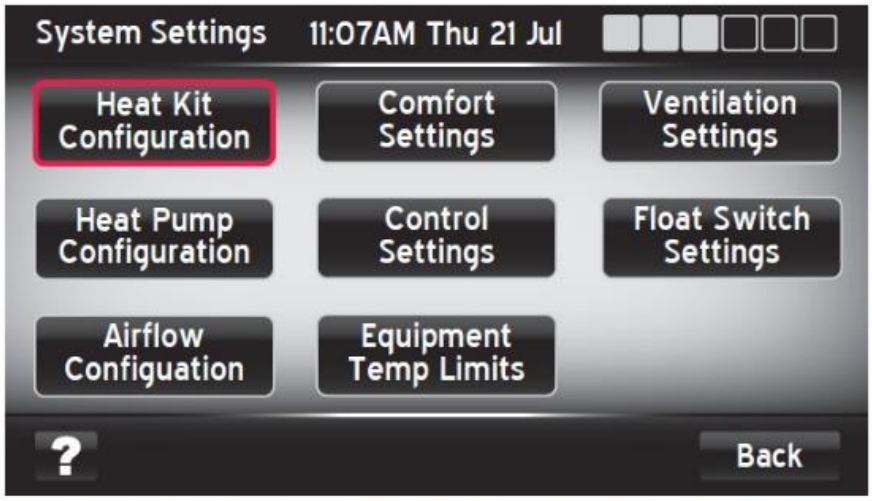
Service Mode > Menu > Tools / Settings Button



Service Mode>Tools/ Settings Menu. Maintenance Reminder Intervals Are Accessible Through The Maintenance Reminder Button.

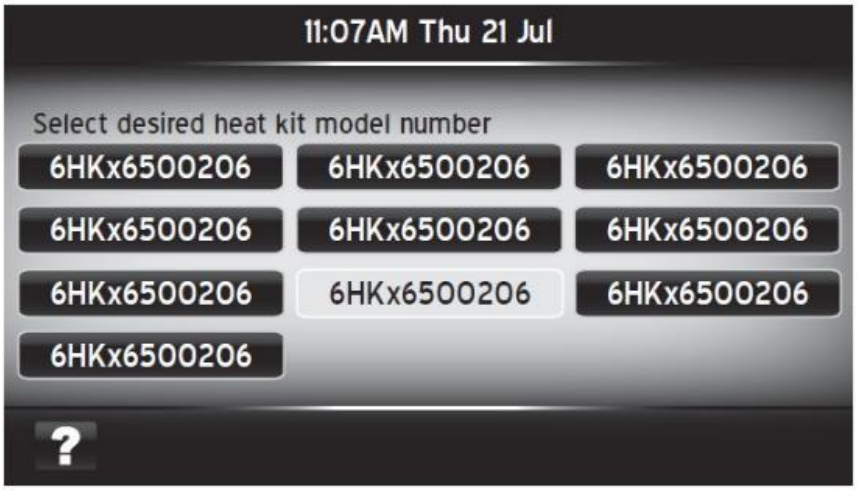
…additional options are shown. For example, pressing the “System Settings” icon…

Service Mode > Menu > Tools / Settings Button > Heat Kit Configuration Button



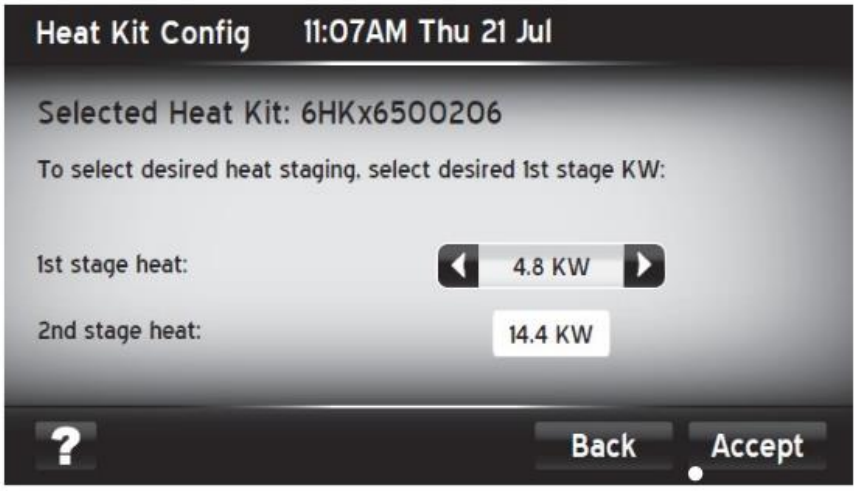
Service Mode>System Settings Menu. Heat Kit Configuration Is Established Through The Heat Kit Configuration Button

… the “System Settings” menu appears. The “Heat Kit Configuration” icon provides access to heat kit selection and desired staging.



Heat Kit Configuration Installer Screen.

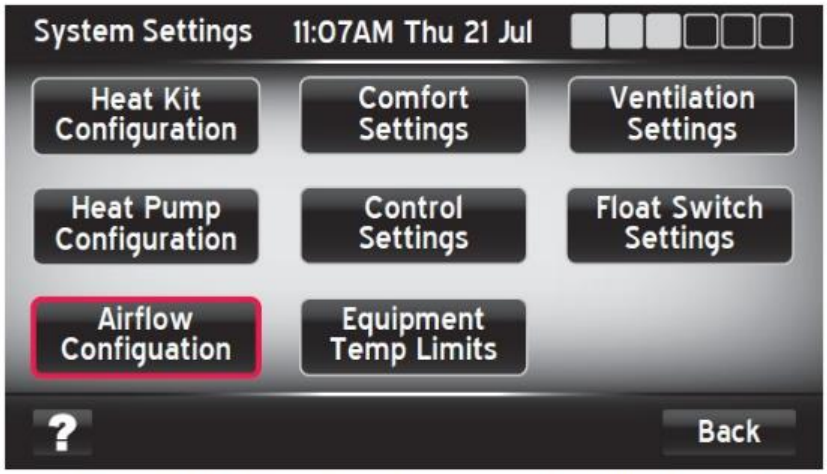
In this example, the 6HKx6500206 kit is selected. Staging may be configured here.



Heat Kit Configuration Installer Screen. Staging Is Established Here.

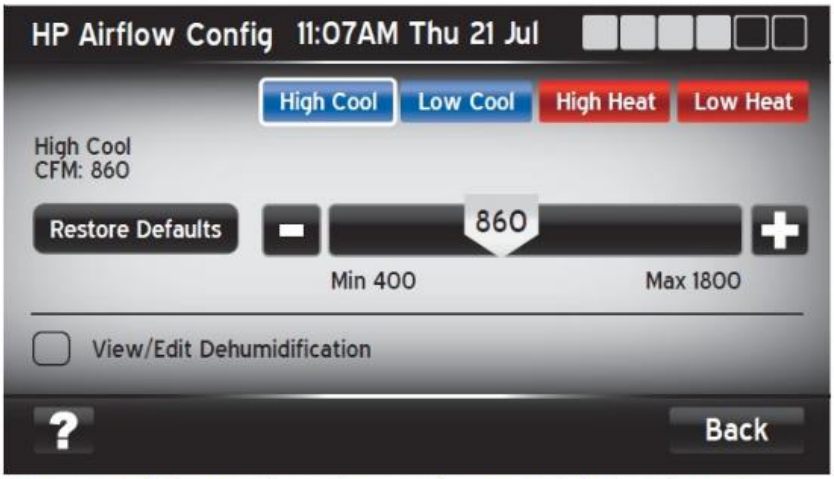
The “System Settings” menu appears, and the “Airflow Configuration” icon provides access to airflow settings.

Service Mode > Menu > Tools / Settings Button > Airflow Configuration Button



Service Mode>System Settings Menu. Airflow Values Are Established Through The Airflow Configuration Button.

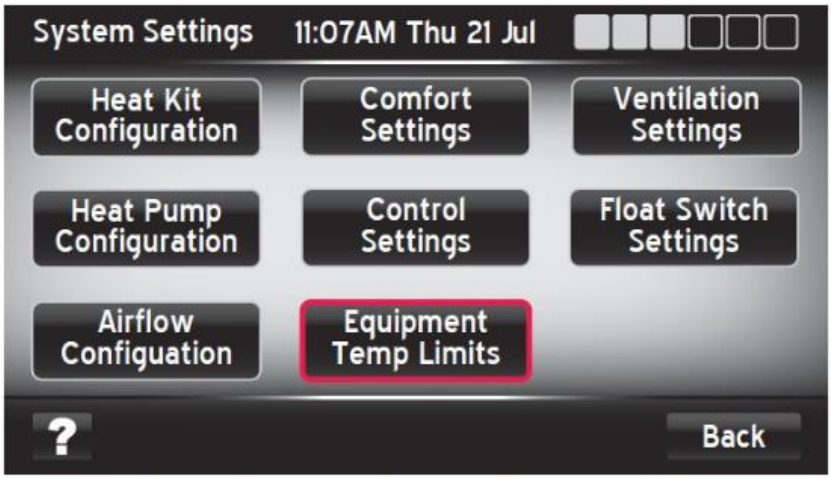
Airflow delay profiles may be set or updated here.



Heat Pump Airflow Configuration Installer Screen (High Cool Setup)

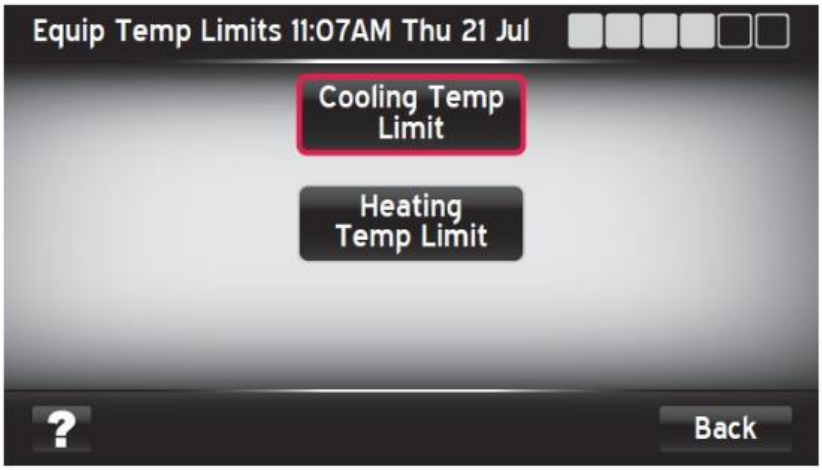
Airflow may be adjusted for each system mode, within the limitations of the equipment.
The airflow adjustment screen also provides the option for airflow reduction for dehumidification.
When checked, the amount of airflow reduction is selectable at 85%, 90%, or 95%. When the “Back” button is pressed…

Service Mode > Menu > Tools / Settings Button > Airflow Configuration Button



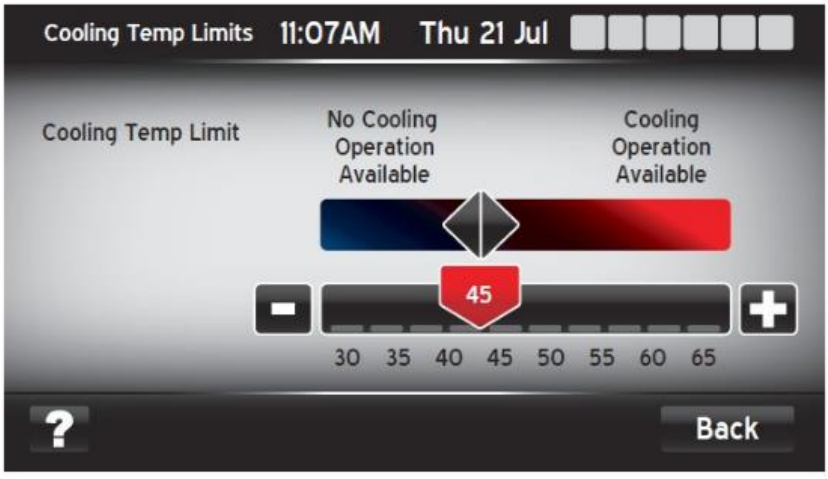
Service Mode>System Settings Menu. Equipment Temperature Limits Are Established Through The Equipment Temp Limits Button

… the “System Settings” menu appears. The “Equipment Temperature Limits” icon provides access to the heating and cooling temperature limits for equipment operation.



Equipment Temp Limits Installer Screen. Pressing This Button Allows Access To The Cooling Temp Limit Setpoint.

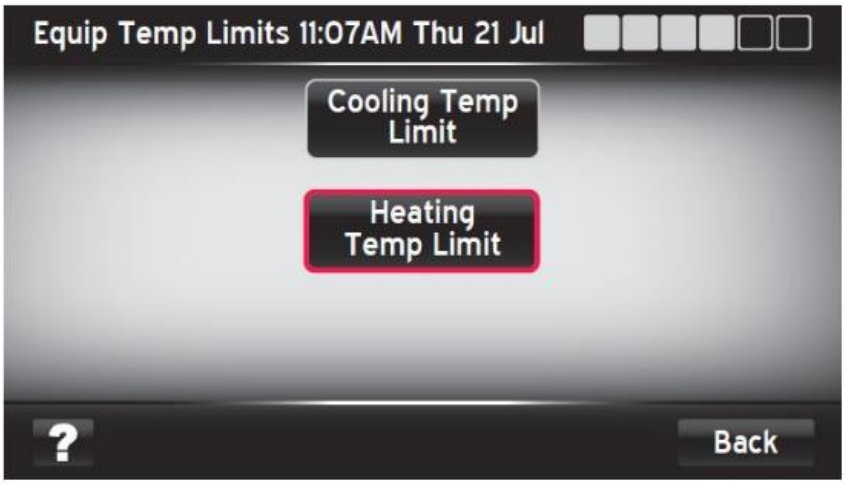
When the “Cooling Temp Limit” icon is selected…



Cooling Temperature Limit Installer Screen.

… the “Cooling Temp Limit” setting is displayed. The chosen temperature is retained in the control and may be enabled or disabled with the left and right arrows.

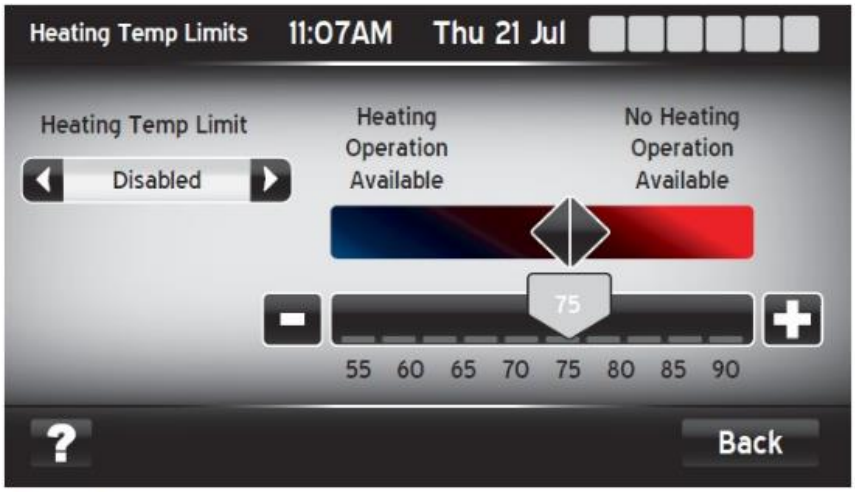
Service Mode > Menu > Tools / Settings Button > Equipment Temp Limits Button > Heating Temp Limit Button



Equipment Temp Limits Installer Screen. Pressing This Button Allows Access To The Heating Temp Limit Setpoint.

When the “Heating Temp Limit” icon is selected…

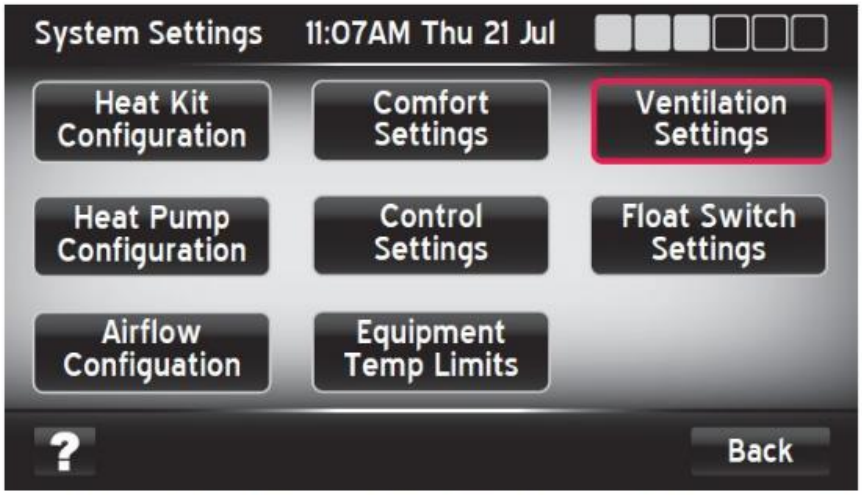
Service Mode > Menu > Tools / Settings Button > Equipment Temp Limits Button > Heating Temp Limit Button > Heating Temp Limit Screen



Heating Temp Limits Screen.

… the “Heating Temp Limit” setting is displayed. The chosen temperature is retained in the control and may be enabled or disabled with the left and right arrows.

Service Mode > Menu > Tools / Settings Button > Equipment Temp Limits Button > Ventilation Settings Button



Service Mode>System Settings Menu. Ventilation Settings Are Established Through The Ventilation Settings Button.

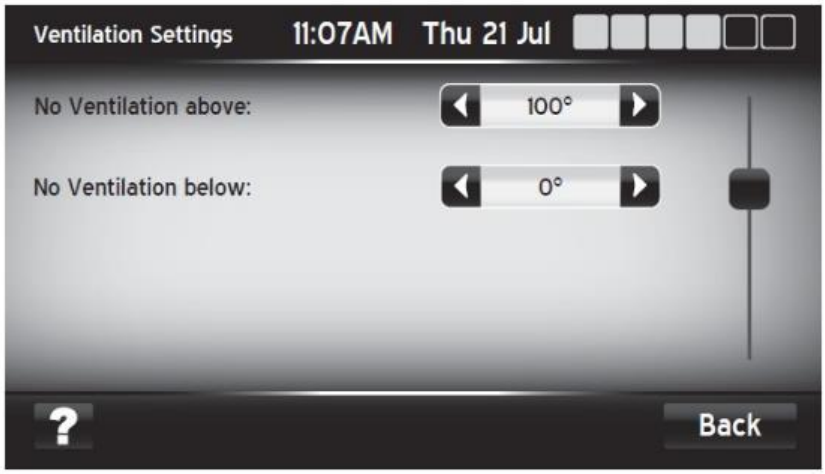
The “Ventilation Settings” icon provides access to time, temperature, and humidity settings for ventilation control.

Service Mode > Menu > Tools / Settings Button > Equipment Temp Limits Button > Ventilation Settings Button > Ventilation Settings Screen

Ventilation Settings Screen - Part 1.

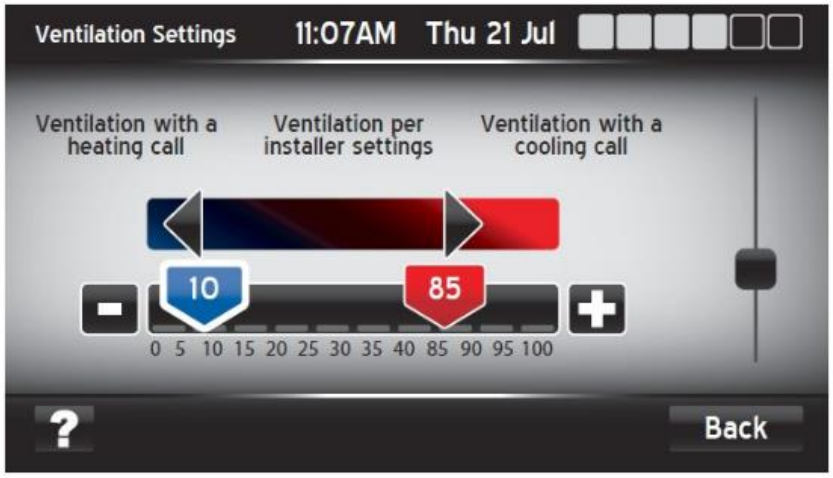
The Ventilation Settings are as follows:

- Ventilation Mode options: Continuous, Timed, OFF
- Runtime per Cycle: 5-55 minutes in 5-minute intervals
- Cycle Time: 1-4 hours in one-hour intervals
- Ventilation Limits only applies to a system with only a ventilation damper (not an ERV/HRN)



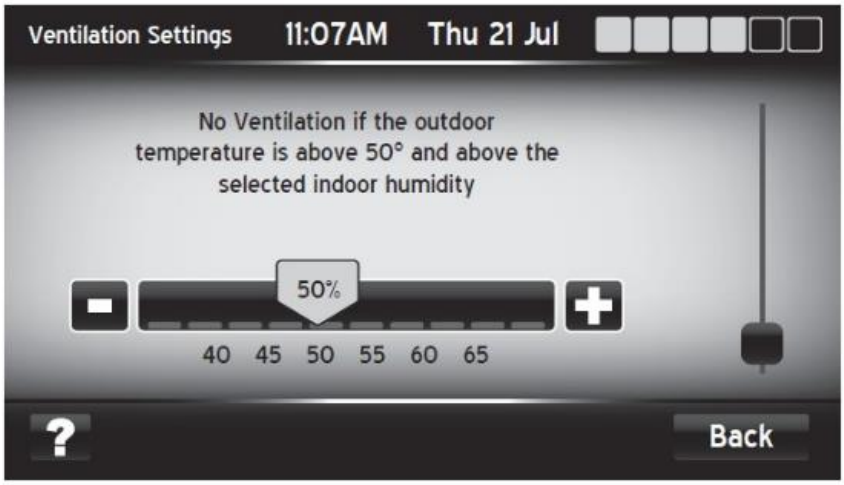
Ventilation Settings Screen - Part 2.

The ventilation temperature limits are shown only for manual mode with damper.



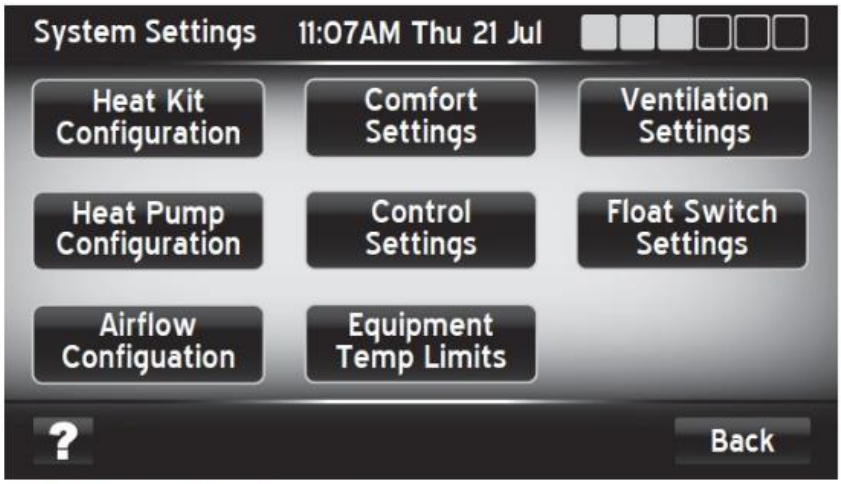
Ventilation Settings Screen - Part 3.

Ventilation limits may be set for both heating and cooling modes, and above or below heating and cooling ventilation limits.



Ventilation Settings Screen - Part 4.

This screen allows configuration of ventilation operation within preset temperature and humidity limits. Pressing the “Back” button…

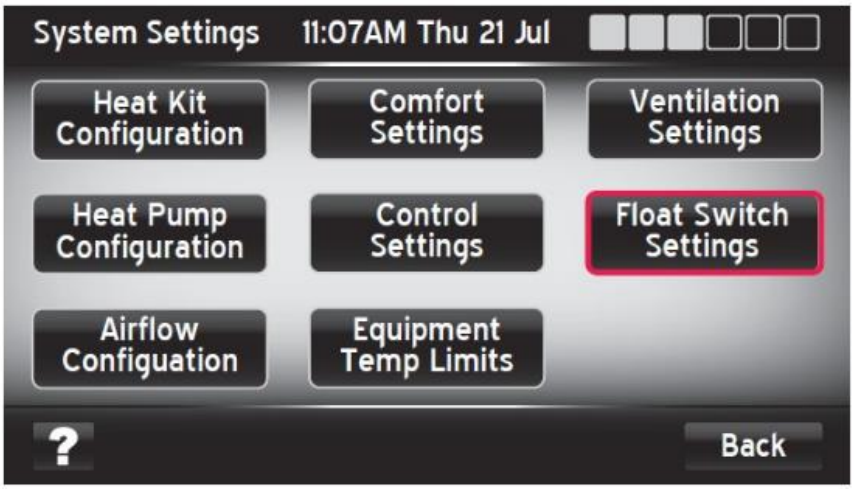


Service Mode>System Settings Menu.

…returns to the “System Settings” menu screen.

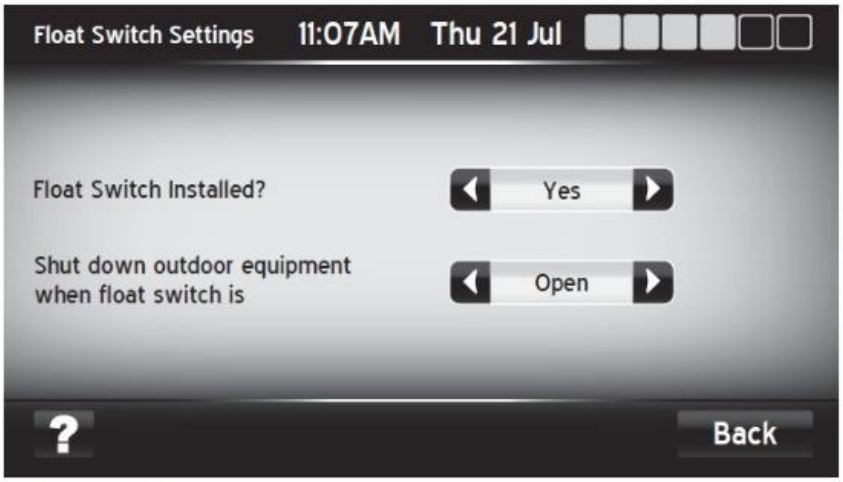
Service Mode > Menu > Tools / Settings Button > Float Switch Settings

The Johnson Controls Residential Communicating Control has float switch logic built into the touch screen. When installed with an AHV air handler, this functionality can be turned on in the System Settings menu.



Service Mode>System Settings Menu. Float Switch Settings Are Established Through The Float Switch Settings Button.

The “Float Switch Settings” icon is used to activate the float switch functionality of the touch screen is turned “On.” When the “Float Switch Settings” icon is pressed…



Float Switch Settings.

… the Float Switch Settings menu is displayed. The Float Switch Settings are as follows:

- Float Switch Installed: Yes, No
- Shut down outdoor equipment: Open, Closed

When the float switch is installed and the float switch opens/closes depending on selection, the following sequence will occur:

- The AHV air handler control board stops sending a call for compressor operation to the outdoor unit.
- The 5-minute ASCD (Anti Short Cycle Delay) begins.
- A “thermostat fault” screen appears on the touch screen.

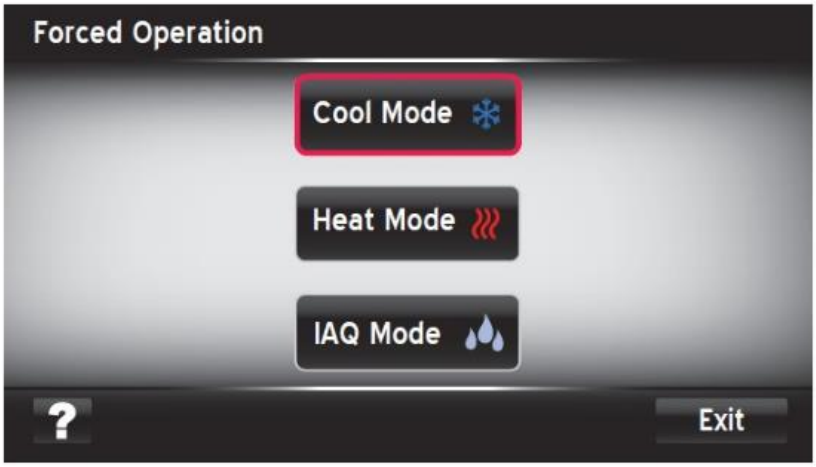
Service Mode > Menu > Tools / Settings > Forced Equipment Operation Button

The Forced Operation Is Available To The Installer Through This Button.

… the Tools / Settings menu is displayed. The “Forced Operation” menu allows operation of the Cooling, Heating, and IAQ (Indoor Air Quality) modes. The “Forced Cooling Operation” menu will be presented next.

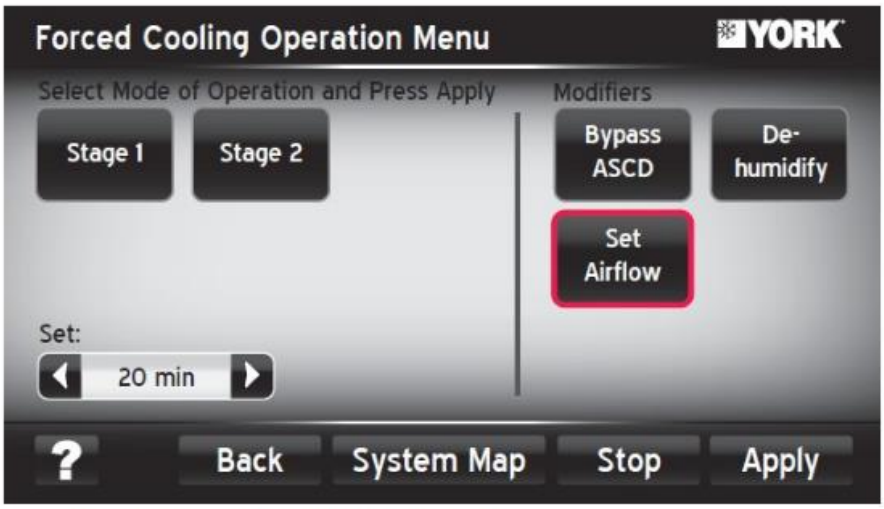
In the “Forced Cooling Operation” menu, available stages of cooling may be run for selected periods of time. The “Select Zone” icon is only present for zoning applications. “System Map” allows the user to leave the system running in “Forced Operation Mode” while using the System Map to view the equipment details, equipment status, etc. “Modifiers” allow adjustment of typical operation for the selected stage of cooling. The set airflow icon allows airflow selection during the forced operation mode.

Service Mode > Menu > Tools > Forced Equipment Operation > Cool Mode Button



Forced Operation Installer Screen (Cool Mode Button Highlighted)

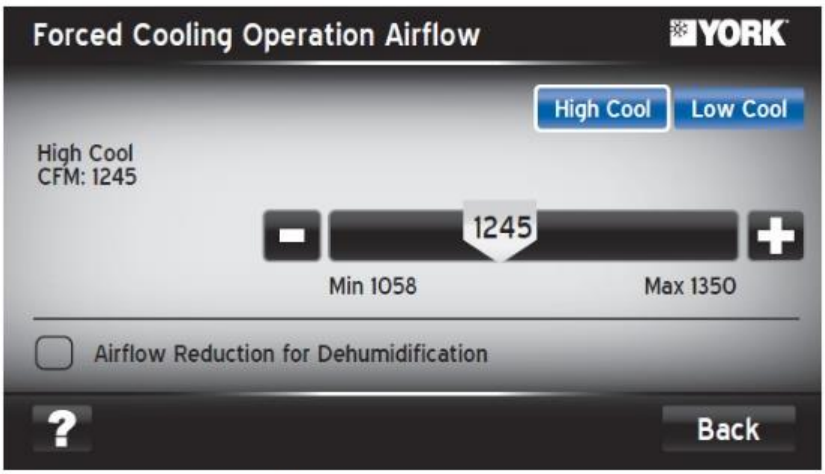
Service Mode > Menu > Tools > Forced Equipment Operation > Cool Mode Button > Forced Cooling Operation Menu > Set Airflow Button



Forced Cooling Operation Menu Installer Screen.

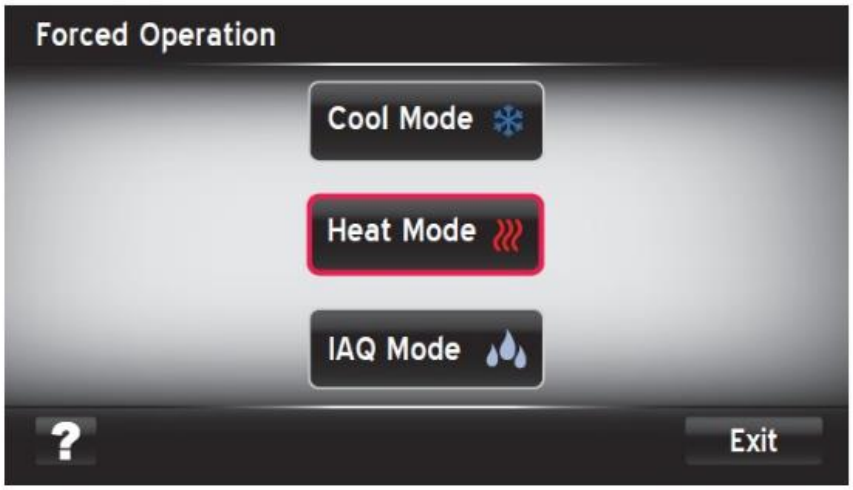
The “Forced Cooling Operation Airflow” menu allows forced airflow adjustment within the allowable equipment parameters.

Service Mode > Menu > Tools > Forced Equipment Operation > Cool Mode Button > Forced Cooling Operation Menu > Forced Cooling Operation Airflow Screen



Forced Cooling Operation Airflow Installer Screen

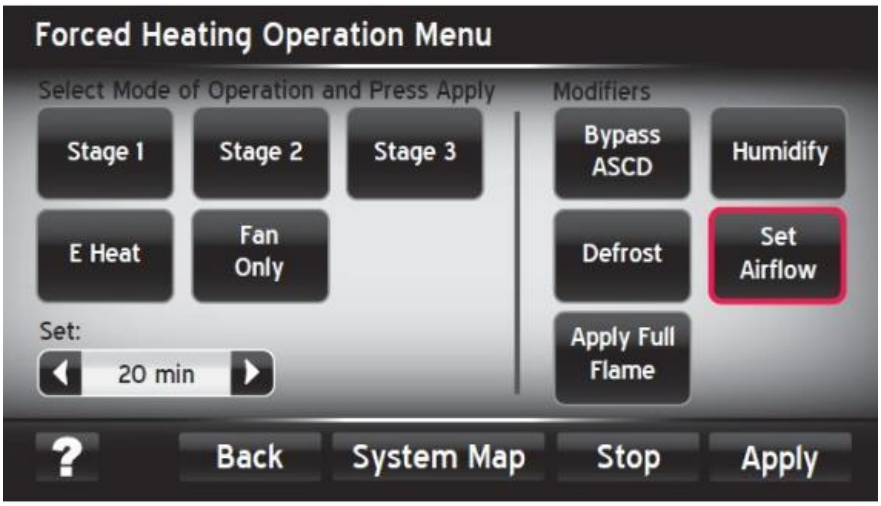
Service Mode > Menu > Tools > Forced Equipment Operation > Heat Mode Button



Forced Operation Installer Screen (Heat Mode Button Highlighted).

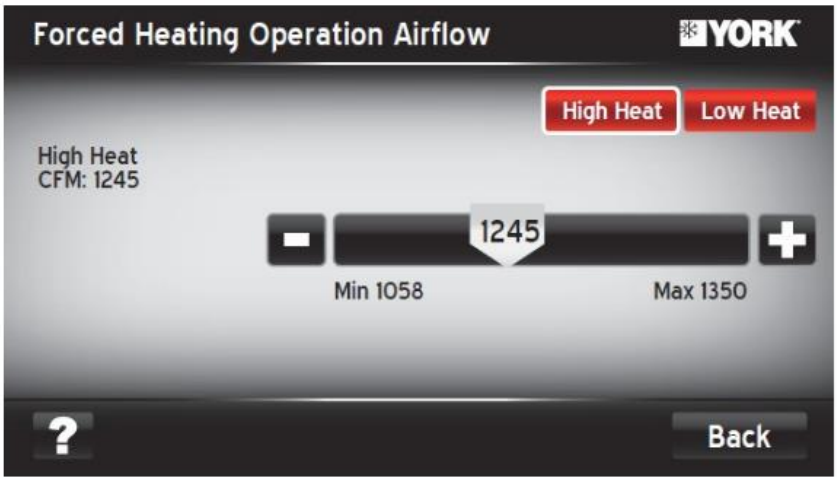
Next, heat mode forced operation is viewed by pressing the “Heat Mode” icon.
In the “Forced Heating Operation” menu, available stages of heating may be run for selected periods of time. The “Select Zone” icon is only present for zoning applications. “System Map” allows the user to leave the system running in “Forced Operation Mode” while using the System Map to view the equipment details, equipment status, etc. “Modifiers” allow adjustment of typical operation for the selected stage of heating. The set airflow icon allows airflow selection during the forced operation mode.

Service Mode > Menu > Tools > Forced Equipment Operation > Heat Mode Button > Forced Heating Operation Menu > Forced Heating Operation Menu > Set Airflow Button



Forced Heating Operation Menu Installer Screen.

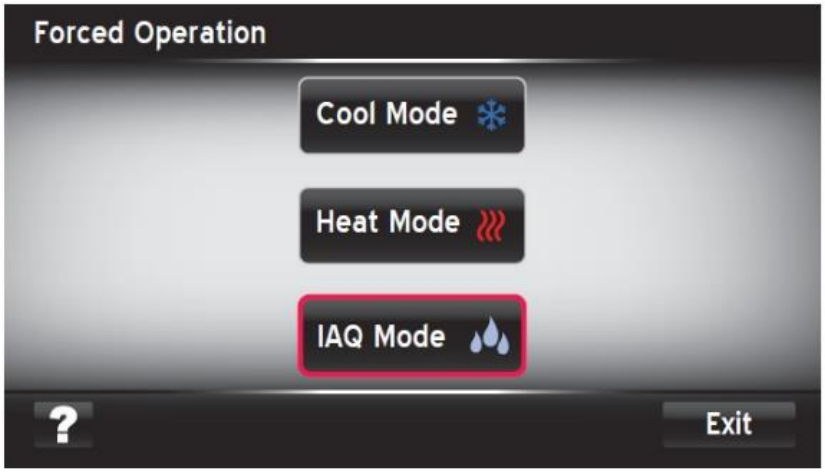
Service Mode > Menu > Tools > Forced Equipment Operation > Heat Mode Button > Forced Heating Operation Menu > Forced Heating Operation Menu > Forced Heating Operation Airflow Screen



Forced Heating Operation Airflow Installer Screen

The “Forced Heating Operation Airflow” menu allows forced airflow adjustment within the allowable equipment parameters.

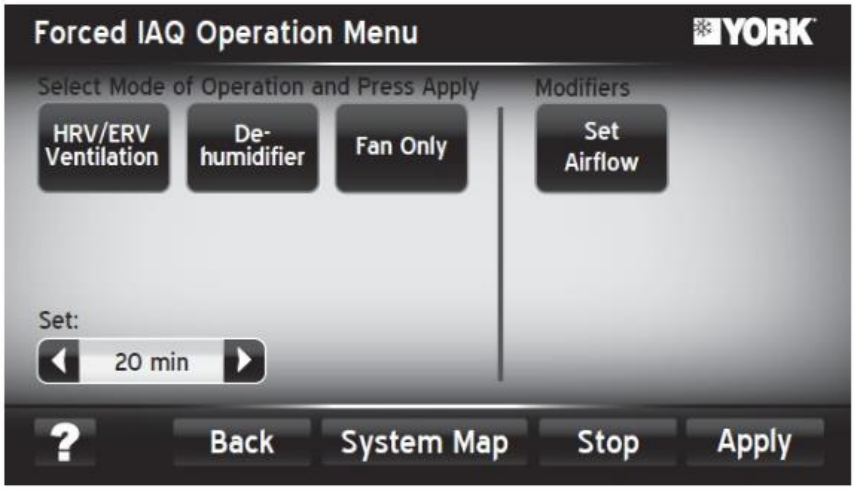
Service Mode > Menu > Tools > Forced Equipment Operation > IAQ Mode Button



Forced Operation Installer Screen (IAQ Mode Button Highlighted).

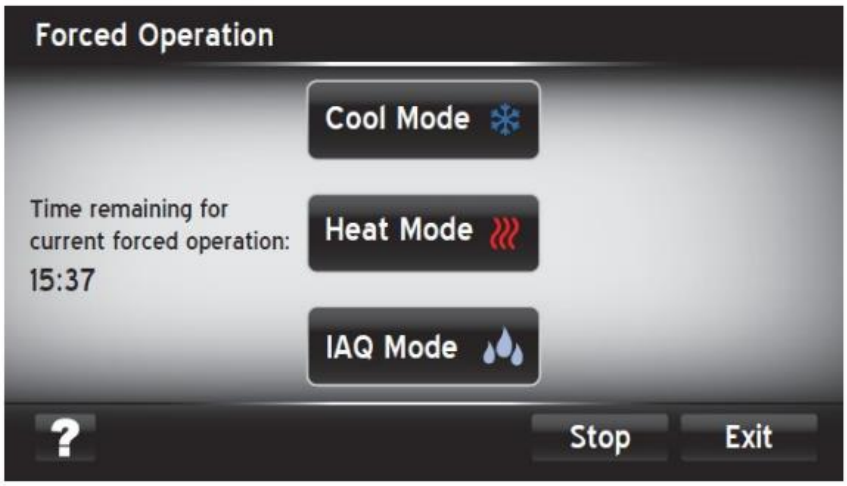
Next, “IAQ Mode” forced operation is viewed by pressing the “IAQ Mode” icon.

Service Mode > Menu > Tools > Forced Equipment Operation > IAQ Mode Button > Forced IAQ Operation Menu



Forced IAQ Operation Menu Installer Screen.

The “Forced IAQ Operation” menu allows cycling of all IAQ devices present for the selected time.



Time Remaining In Current Forced Operation Mode Is Displayed.

Upon exiting the “Forced Operation Menu” screen, this screen is displayed showing the time remaining for the Forced Operation condition.

Service Mode > Menu > Import / Export Button

Import / Export Options Are Available To The Installer Through This Button.

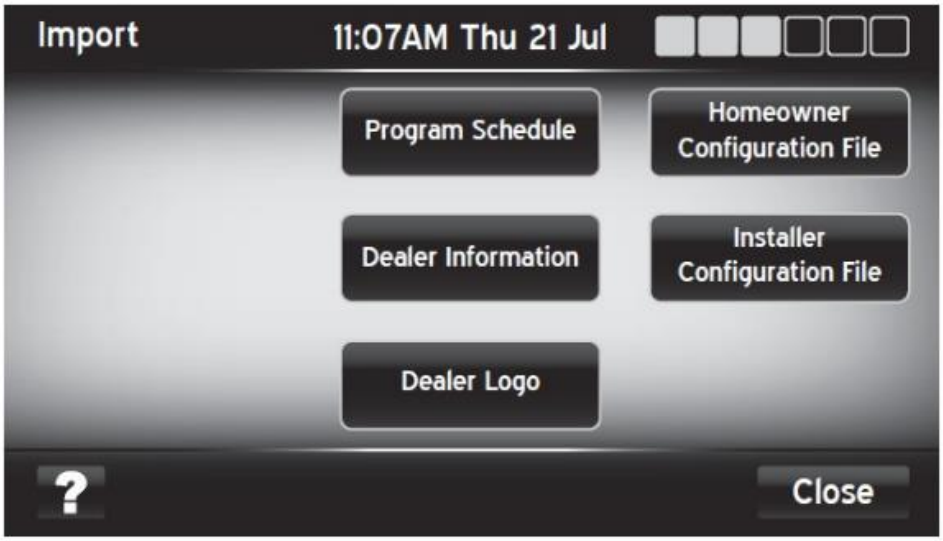
Additional options are shown here. When the “Import / Export” icon is selected…

Service Mode > Menu > Import / Export Button > Import / Export Screen

Import / Export Installer Screen.

… the Import / Export screen is displayed. All Import and Export operations are performed through the mini-USB connection at the bottom of the system control.

Service Mode > Menu > Import / Export Button > Import / Export Screen > Available Import / Export Items Screen



Import / Export Installer Screen.

The items shown here can be imported or exported.

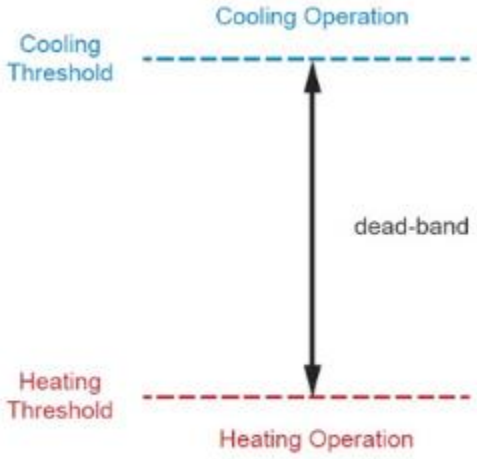
05

Additional Operational Detail

Auto Changeover

In “Heat and Cool” mode, the touch screen control determines if the heat or cool operation is required. If the ambient temperature requires a change in operating mode, the control will automatically change over to the other mode of operation.

Note
All equipment temperature limits (heating/cooling temperature limits), control limits (Low Temperature Cut Out/Balance Point), and timers (minimum on/off timers) is observed in “Heat and Cool” mode.



Auto Mode Deadband Detail.

When “Auto” mode is enabled for temperature control, a dead band with a default value of 3 degrees F (5 degrees F when “Dehumidification with or Without Cooling Demand” dehumidification control mode is selected) is enforced between the heating and cooling setpoints. Conflicts are resolved by adjusting the other setpoint to satisfy the dead band.

Note
If the user adjusts the cooling setpoint downward (violating the dead band), the heating setpoint is adjusted downward to satisfy the dead band. Likewise, if the user adjusts the heating setpoint upward, violating the dead band, the cooling setpoint is adjusted upward to satisfy the dead band.

Quick Heat / Cool

“Quick Heat / Cool” mode allows the user to temporarily maximize equipment output capacity. When “Quick Heat / Cool” is selected, the touch screen control initiates equipment operation at the highest capacity available of the function requested (i.e., heat or cool). The default duration is set by the installer. After the “Quick Heat / Cool” timer has expired, the system returns to the normal operation state prior to “Quick Heat / Cool” operation.

Quick Cool & Quick Heat Buttons

Note
Exit of “Quick Heat/Cool” operation will not impact the program schedule operation.

Duration

The touch screen control allows the installer to set the default duration for the “Quick Heat / Cool” modes. When enabled, the touch screen control commands the equipment to run at full capacity for the installer specified time (i.e., regardless of overshooting).

Note
The touch screen control allows the installer to set two independent durations (i.e. one for “Quick Heat” and one for “Quick Cool”.

Cooling Applications

When "Quick Cool" is selected, the touch screen control initiates compressor operation (i.e., in cool mode for heat pump applications) at the highest capacity available for the user specified time period.

Heat Pump Heating Applications

With Backup Electric Heat

When "Quick Heat" is selected, the touch screen control initiates both electric heat operation at the highest capacity (WI and W2) available and compressor operation in heating mode at the highest capacity (Y1 and Y2) available for the user specified time period.

With Backup Gas Heat

When "Quick Heat" is selected, the touch screen control initiates gas heat operation at the highest capacity (100%) available for the user specified time period.

Note
For gas furnace applications, the touch screen control will not utilize compressor heat operation simultaneously with the gas heat operation.

Without Backup Heat

When "Quick Heat" is selected, the touch screen control initiates compressor operation in heat mode at the highest capacity (Y1 and Y2) available for the user specified time period.

Non Heat Pump Heating Applications

With Backup Electric Heat

When "Quick Heat" is selected, the touch screen control initiates electric heat operation at the highest capacity available (W1 and W2) available for the user specified time period.

With Backup Gas Heat

When "Quick Heat" is selected, the touch screen control initiates gas heat operation at the highest capacity (100%) available for the user specified time period.

Smart Recovery

"Smart Recovery" can be enabled or disabled. If "Smart Recovery" is disabled, the touch screen control initiates equipment operation, if required, at the start time of the program schedule day part. However, if "Smart Recovery" is enabled, the touch screen control initiates equipment operation, if required, before the start time of the program schedule day part. This is done to reach the program schedule event's desired temperature setpoint at the time the event occurs.

Note
“Smart Recovery” will not occur if a program schedule hold/override is active. If the hold is set during “Smart Recovery”, the touch screen control will stop the “Smart Recovery” immediately and follow the new program schedule hold setting.

Humidity Control

The touch screen control contains an internal humidity sensor.

Note
If the indoor humidity is less than the minimum or greater than the maximum, respectively the minimum (i.e. 15%) or maximum (i.e. 85%) is displayed.

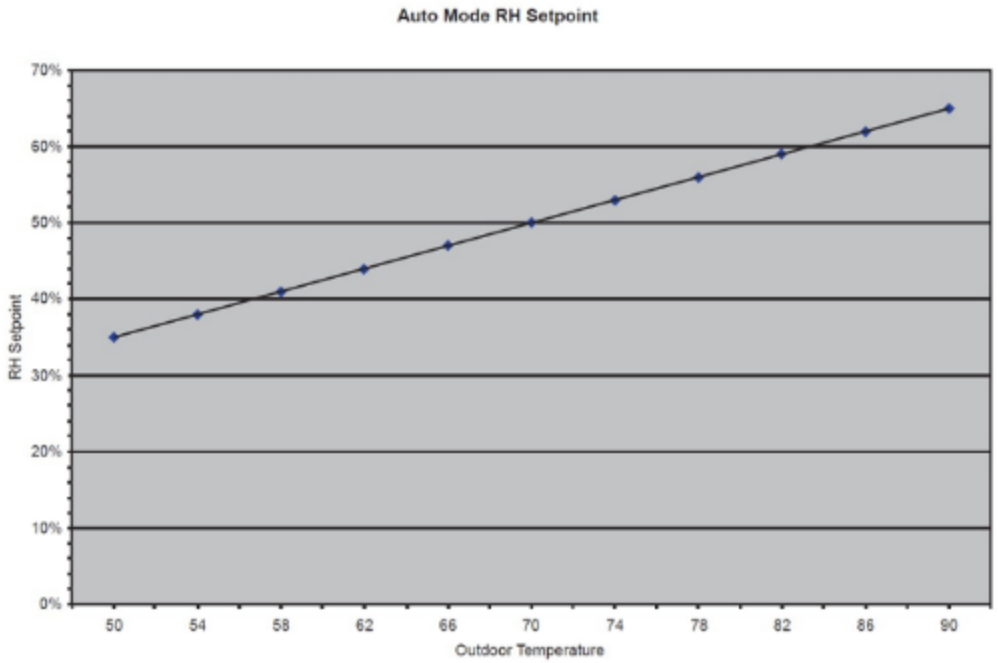
Dehumidification Control Algorithm

The touch screen control utilizes a differential control algorithm to maintain the indoor humidity within the accuracy shown in the table below.

Auto Setpoint Mode (Requires Outdoor Temperature Sensor)

Auto setpoint mode will automatically adjust the indoor humidity setpoint in relation to the outdoor temperature.

Note
The outdoor sensor is present in order to use this mode. If the outdoor sensor fails or is missing, no “Dew Point Control” operation is allowed.



Auto Mode RH Setpoint Is Established Based On The Outdoor Ambient Temperature.

Manual Setpoint Mode

Manual setpoint mode forces the user to manually adjust the dehumidification setpoint.

Dehumidification Control Modes

Dehumidification setpoints range from 35% - 65% RH (Relative Humidity) in 1% RH increments with the default value set at 50%. A 2% RH non-adjustable deadband exists.

When both humidification and dehumidification modes are enabled, a deadband is enforced between the humidification and dehumidification setpoints. Conflicts are resolved by adjusting the other setpoint to satisfy the deadband.

Note
If the user adjusts the dehumidification setpoint downward for a schedule event and violates the deadband, the humidification setpoint is adjusted downward to satisfy the deadband. Likewise, if the user adjusts the humidification setpoint upward for a schedule event and violates the deadband, the dehumidification setpoint is adjusted upward to satisfy the deadband.

The touch screen control allows the installer to select from the following dehumidification control modes.

Note
Each dehumidification mode will operate independent of any other dehumidification mode. Therefore, any combination of the following dehumidification modes can be enabled and operate independently.

Note
The touch screen control commands "O" on the furnace control board for air conditioner applications.

Dehumidification With Equipment Operation (Reduced Airflow)

When a call for dehumidification exists with a cooling call, the call is serviced using a reduced blower speed.

Note
Dehumidification with a cool demand means the touch screen control will NOT continue to run the compressor, overcooling to remove moisture once the cooling setpoint has been attained.

Dehumidification By Overcool

When a call for dehumidification exists, the call is serviced using reduced blower speed while the room temperature is not more than 2°F below the setpoint.

Note
The touch screen control allows the installer to select the amount of overcool with options from 0°F to 3°F (0°C to 1.5°C) in 1°F (0.5°C) increments.

Dehumidification With External Equipment (Whole Home Dehumidifier)

Note
“Dehumidification with External Equipment” mode is only available when a whole home dehumidifier has been installed as an added accessory.

When a call for dehumidification exists without a cooling call, the call is serviced using the continuous airflow CFM.

Airflow Determination

When a call for dehumidification exists, the call is serviced using an installer selected reduced blower speed (i.e., percentage of total blower speed).

Note
Blower off delays will not be utilized after a dehumidification demand is satisfied.

Humidification Setpoint Modes

Auto Setpoint Mode (Uses Outdoor Temperature Sensor)

Auto setpoint mode will automatically adjust the indoor humidity setpoint in relation to the outdoor temperature. "Dew Point Control" helps to minimize condensation on interior window surfaces in colder climates.

Note
The outdoor sensor is present in order to use this mode. If the outdoor sensor fails or is missing, no “Dew Point Control” operation is allowed.

Manual Setpoint Mode

"Manual Setpoint" mode forces the user to manually adjust the humidification setpoint.

Humidification Control Modes

Humidification setpoints range from 15% to 50% in 1% RH increments with the default value set at 45%. A 2% RH non-adjustable deadband exists around the humidification setpoint.

When both humidification and dehumidification modes are enabled, a deadband is enforced between the humidification and dehumidification setpoints. Conflicts are resolved by adjusting the other setpoint to satisfy the deadband.

Note
If the user adjusts the dehumidification setpoint downward for a schedule event and violates the deadband, the humidification setpoint is adjusted downward to satisfy the deadband. Likewise, if the user is adjusting the humidification setpoint upward for a schedule event and violates the deadband, the dehumidification setpoint is adjusted upward to satisfy the deadband.

The touch screen control allows the installer to select from the following humidification control modes.

Humidification can occur with or without an accompanying heating demand, but humidification will always occur with a blower demand. Humidification is never allowed during cooling mode.

Note
Each humidification mode will operate independent of any other humidification mode. Therefore, any combination of the following humidification modes can be enabled and operate independently.

Humidification With Heat Demand

Only calls for humidification while a heating call exists are serviced.

Activate:

- If RH measured is <= (RH setpoint-2%)
- If a heating demand is present

Deactivate:

- If RH measured is >= (RH setpoint +2%) or
- If the heating demand ceases

Fan returns to the state determined by the master zone control, either “OFF”, “Auto”, or “Circulate”.

Humidification With or Without Heat Demand

Calls for humidification will bring on the humidifier and indoor blower to service the humidification call independent of the presence of a heating call.

Activate:

- If RHmeasured is <= (RHSetpoint -2%) and
- If the system is in "Heat" mode

Deactivate:

- If RH measured is >= (RH setpoint +2%) or
- If the system is not in "Heat" mode.

Fan should return to the state determined by the master zone control, either “OFF”, “Auto”, or “Circulate.”

Ventilation Control Modes

Outdoor Temperature Logic Enabled

An outdoor temperature sensor is required for ventilation control with "Outdoor Temperature Logic" enabled. Should the outdoor sensor fail or go missing, the touch screen control displays the Outdoor Temperature Sensor Missing alarm and inhibits ventilation operation until the outdoor sensor fault recovers.

Outdoor Temperature Logic Disabled

When the outdoor temperature logic is disabled for ventilation control, the touch screen control controls ventilation to the installer selectable run times regardless of outdoor temperature.

Fan Control

The touch screen control allows the user to select from the following fan control modes.

Auto

In "Fan Auto" mode, the state of the equipment dictates the fan operation. The blower will run only when the equipment is operating. When "Fan Auto" operation is enabled, the touch screen control will run the fan at the appropriate speed for the desired mode (cooling/heating).

Continuous On

The fan operates continuously. It will run the blower continuously independent of equipment operation.
When equipment operation is inactive, the fan will run at the continuous airflow setting.

Circulate

This function allows the user to cycle the fan for a selectable number of minutes per hour during periods of inactivity of heating/cooling system. The percentage of ON time can be set by the user or installer.

Follow Program Schedule

The fan follows the fan settings of the active program schedule.

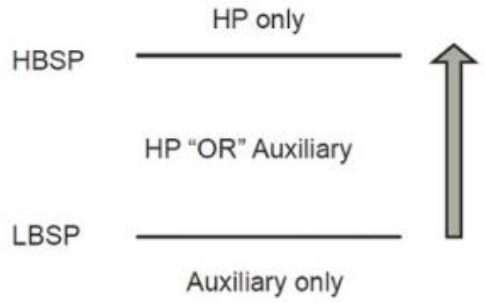
Equipment Control

Heat Pump with Auxiliary Heat Applications Balance Points

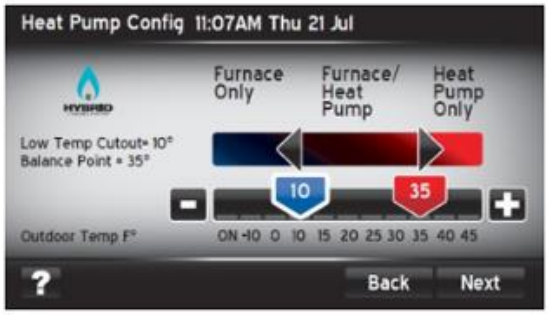
When the touch screen control is controlling a heat pump and gas/oil furnace application, high and/or low balance points can be utilized. High and low balance points are installer selectable with a 3°F enforced deadband.

When the "Low Temperature Cutout" is enabled, only auxiliary heat is utilized when the touch screen control is calling for heat while the outdoor temperature is below the "Low Temperature Cutout" temperature setting. When the outdoor temperature is above the "Low Temperature Cutout", the heat pump is used as the primary heat source and the auxiliary heat is turned on.

When the "Balance Point" is enabled, the heat pump is utilized when the touch screen control is calling for heat while the outdoor temperature is above the "Balance Point" temperature setting. When the outdoor temperature is below the "Balance Point", the heat pump is used as the primary heat source and the auxiliary heat is turned on.



Balance Point Illustration.



Heat Pump Configuration Screen. Low Temp Cutout & Balance Point May Be Set Here.

Electric Heat Applications

Heat Kit Selection

The touch screen control allows the installer to configure heat kit staging for first stage operation in heating mode.

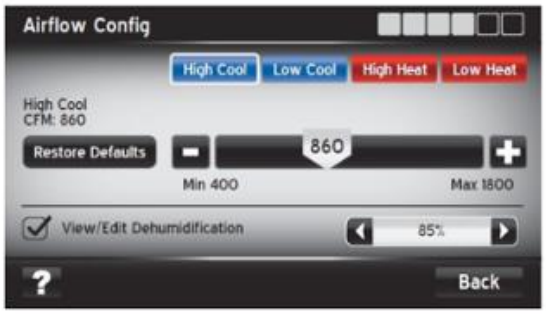
Available first stage selections are:

- W1 = W1 (kW value)
- W1 =W2 (kW value)
- W1=W1 + W2 (kW value)

The touch screen control utilizes the installer selection for all occurrences of first stage operation.

Forced Airflow

The operation of the touch screen control is determined by a series of user inputs. Forced CFM is automatically implemented in a communicating system (excluding the indoor auxiliary board). Using the "Forced CFM" allows the system to self-configure airflow and give the user several options for customizing the system.



Heat Pump Airflow Configuration Screen.

Continuous Fan Operation

The following describes both the touch screen control user interface and the control of continuous fan operation. The figure below provides an example of a fan adjustment screen.

To populate this adjustment screen with appropriate values, the touch screen control enforces a "rule". To determine the "Min Limit of Fan operation", the touch screen control reads the minimum CFM value register in the respective indoor control (air handler or modulating gas furnace). If this value is less than 400 CFM, the control must use 400 CFM as the "Min Limit of Fan operation" and determine the percentages to display using formulas or tables provided below. The screen below is populated based on the model plug of the indoor unit. The percentages are defined in the tables below for both air handlers and furnaces supported in "Communications". While the touch screen control is displaying a percentage on the screen for continuous fan, it is important to understand that the control must still communicate the selected value to the indoor unit in terms of CFM.

The touch screen control will send the adjusted CFM value when a call for continuous fan is present. It is the indoor control's responsibility to send a PWM (Pulse Width Modulation) value to the motor that is closest to the forced CFM value sent from the touch screen control.

Note
Continuous fan operation overrides any off delay.

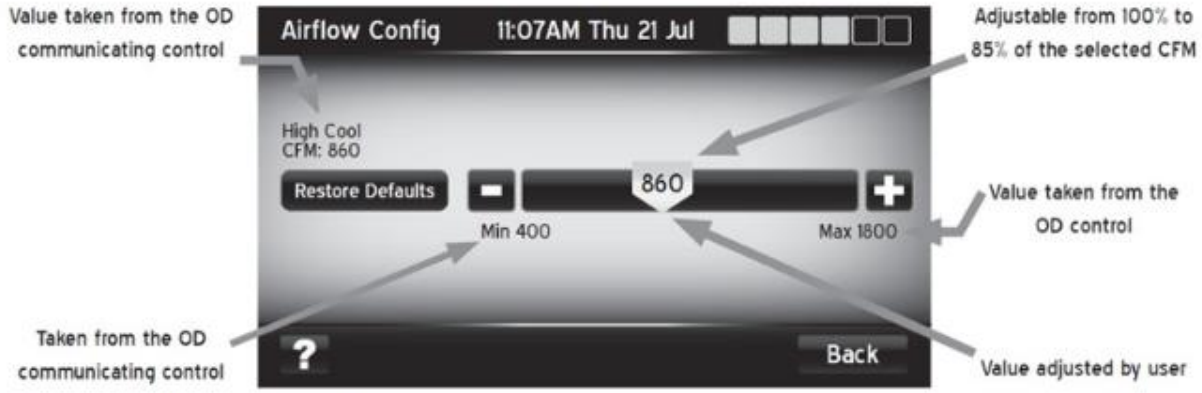
Fan Adjust Screen - Homeowner View.

Displayed Percentage

On the slider bar, there is a percentage shown to the homeowner of the fan speed change within the acceptable limits. This is based on the requirements of the installed system.

Cooling Operation

The following describes both the touch screen control user interface and the control of "Forced CFM" in "Cooling" mode.



Air Handler Airflow Configuration Screen.

The touch screen control populates the user interface for airflow setting. The "min", "max" and "default" CFM values are taken directly from the outdoor unit (values are in multiples of 10). Values between the minimum and maximum are defined below. (10 CFM increments between "min" and "max"). As a backup the touch screen control will also send the adjusted value to the indoor control for saving. For example, if the user is in the "High Cooling CFM" screen, the value is saved in the indoor control. This is used for backup purposes (if the touch screen control fails). This will ensure all the user's airflow preferences are saved. The touch screen control also sends these adjusted values to the indoor control for every thermostat call. The control uses these adjusted values to implement the appropriate delay profiles.

Displayed CFM

For cooling values, there are two CFM selections obtained for communicating systems ("High Cool" and "Low Cool"). On the initial startup, the touch screen control obtains the following values from the outdoor unit control: "High Cool Max", "High Cool Min", "High Cool Default", "Low Cool Max", "Low Cool Min", and "Low Cool Default". These values are used to populate the screen shown above.

Once the outdoor control has been read, the slider can be populated. The user can adjust the CFM values. The resolution for the user is 10 CFM.

Example:

- Min. CFM Value = 750
- Max CFM Value = 1150
- Adjusted CFM Value = 860

The user adjusts the slider bar and can go up to 870, 880, 890,..., 1140, and 1150. The user can adjust the slider bar to go down to 850, 840, 830,..., 740, and 750.

Forced CFM In Normal Operation

The touch screen control must send the adjusted value for each mode of operation to the indoor control saved in the appropriate register in the control. The saved values in the indoor control are strictly used for backup. For that reason, the touch screen control must hold and maintain the forced CFM values for any given call during operation (in this case high and low cooling). The touch screen control uses the adjusted CFM value as a starting point for implementing delay profiles. Besides sending the forced CFM, the touch screen control will send the thermostat inputs associated with the call.

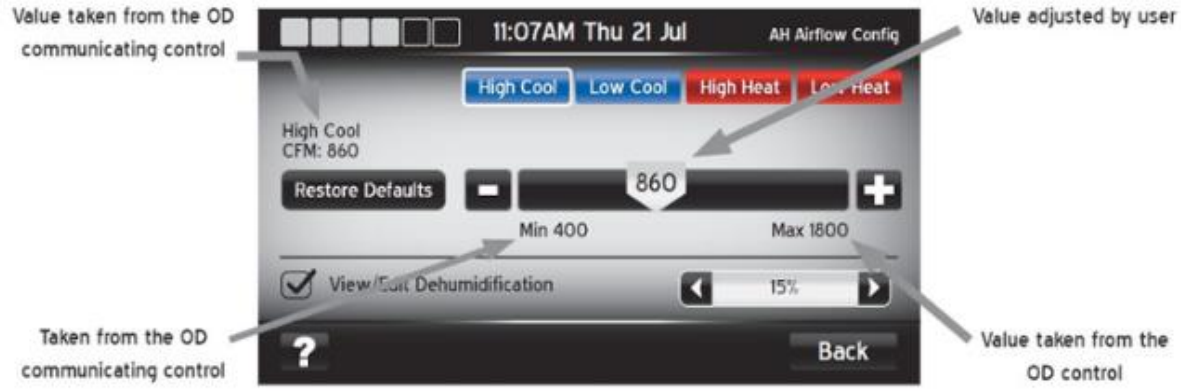
Heat Pump Heating

The following describes both the touch screen control user interface and "under-the-hood" description of how CFM forced in heat pump "Heating" mode is operated and controlled. Heat pump heating is considered as compressor heating with no supplemental (auxiliary) heat added.

While delay profiles are only implemented in cooling mode, the touch screen control enforces a 30 second off delay for any call for heat pump heating. During forced CFM operation the control is responsible for implementing the hot heat pump logic. The touch screen control monitors the "Y2 Out" signal from the outdoor control (YorkGuard VI). Depending on whether the "Y2 Out" is energized, the touch screen control sends the appropriate CFM value. If the "Y2 Out" is energized, the control sends the "High Heat Pump" adjusted CFM value. If the "Y2 Out" is not energized, the touch screen control sends the "Low Heat Pump" adjusted CFM value.

Displayed CFM

The touch screen control shows the adjusted CFM value on a slider bar like in Figure 4-12. The bar is populated from the outdoor unit control data map. The "min." value is directly from the heat pump register dedicated to this value. As is the "max." value. The adjusted value is initially populated with a default value (also stored in the outdoor unit). As the user adjusts the slider, the touch screen control assumes the value for the "call" specified on the screen.



Air Handler Airflow Configuration Screen.

In the event of a call for compressor heating, the touch screen control sends the adjusted CFM value associated with the call (high or low) and applies the slew rate. When the call is satisfied, the touch screen control implements a 30 second delay off period. The delay profiles are not used during "Compressor Heating" calls. The hot heat pump is enabled by monitoring the "Y2 Out" register on the YorkGuard VI. This allows the touch screen control to appropriately enforce hot heat pump.

Auxiliary Heating

Auxiliary heating is heating that does not involve compressor operation. It contains two categories: furnace and electric. For furnace operation, the touch screen control will send a "W" call to the ID control when auxiliary heat is needed (forced CFM will not be used). This allows the furnace to modulate at its normal rate and maintain the comfort algorithm in the furnace board. The touch screen control sends a forced CFM value to the air handler when auxiliary heat is needed. The following describes both the touch screen control user interface and the control of the forced CFM in "Auxiliary Heating" mode.

There are minimum values set for each of the auxiliary heating calls (first stage and second stage). These values are dependent upon the model of the air handler, the size of heat kit applied, and the number of kilowatts applied at each stage of heating. There installer inputs the heat kit that is being applied and how they have physically assigned staging. The touch screen control must set the airflow using these values alone.

Displayed CFM

The CFM value range is defined by the characteristics of the indoor unit. The factory specifies the maximum value and default value placed in the touch screen user interface at startup. These values (min., max., and default) are set and saved in the touch screen control's non-volatile memory. This will enable the control to quickly repopulate the airflow screen after a power loss.

Supplemental Heating

Supplemental heating is the combination of auxiliary heating and compressor heat pump heating operation. It consists of two categories: furnace and electric. Whether the system is gas or electric can be determined by the indoor control "soft jumper" or through the YorkGuard VI "FFUEL" jumper. The following describes both the touch screen control user interface and "under the hood" description of how forced CFM in "Supplemental Heating" mode is operated and controlled.

Fossil Fuel Heating

The thermostat will send a "W" call to the furnace when auxiliary heat is called for through the YorkGuard VI "W1" or "W2OUT". This allows the furnace to modulate at its normal rate and maintain the comfort algorithm in the furnace board. To ensure that there is always the correct airflow sent to the indoor control (even in defrost or LTCO (Low Temp Cutout) situations), the touch screen control monitors the "M" outputs of the YorkGuard VI. This allows the touch screen control to "know" if the compressor is running. If the compressor is not running, and there is a call for furnace operation, the touch screen control will not send "y" signals to the indoor control.

Electric Supplemental Heating

The touch screen control sends a forced CFM value to the air handler when supplemental heat is needed. As with the furnace, the touch screen control monitors the "M" terminals and only sends the forced airflow value for the equipment that is active. There is no slider in the UI (User Interface) for supplemental heating. However, there is a forced CFM attached to the call. The CFM is either taken from the “High Aux. Heating” slide, active airflow, or the “High Heat Pump” slide, active airflow setting.

Rules Enforced by the Touch Screen Control

The screen used to change the supplemental heating value is populated exactly as the auxiliary heating screens. The minimum, maximum, and default value are set with the same exact values as the auxiliary heating screen. The touch screen control sends the values to the air handler board saved in memory. While in default, both supplemental and auxiliary heating are the same, but their adjusted values are independent of each other.

Furnace Heating

To maintain the benefits of modulating furnace, the touch screen control will not implement forced CFM operation when there is a need for furnace heating. This means there are no CFM adjustments possible for either auxiliary heating or supplemental heating values in the furnace. When operating in these modes, the touch screen control will send the appropriate thermostat commands and the furnace will modulate to the requirements of the space.

Delay Profiles

The following describes both the touch screen control user interface and the “under the hood” description of how delay profiles can be selected and how they are enforced during forced CFM operation.

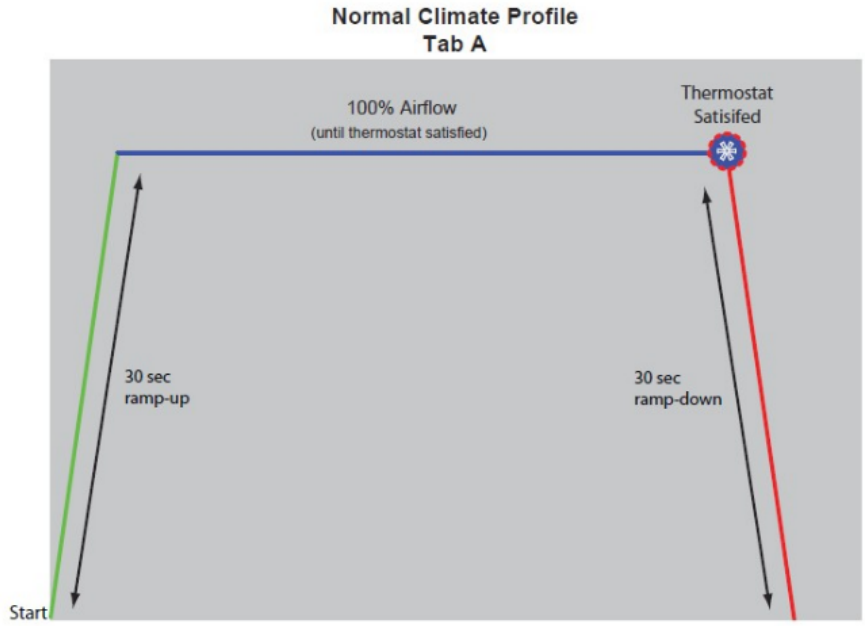
Rules Enforced by the Touch Screen Control

Delay profiles are enforced in cooling operation only. The touch screen control will keep four separate delay profiles change / selected by the user. They are “Normal,” “Humid,” “Dry,” and “Temperate.” These profiles are not dependent upon the model. Each of the profiles is selected by a jumper setting on the indoor control. They are applied in cooling operation with the CFM selected through the process described above. The touch screen control can appropriate the multiplier to obtain the required CFM for a given delay profile “run period,” as well as keep track of time for each period. Currently, all the “run period” times and multipliers are non-adjustable. However, each profile may have different run period times and multipliers.

Delay Profiles

The selectable profiles are identical to those offered through the physical “hard jumper” settings on compatible Unitary Products furnaces and air handlers. They are illustrated here for reference.

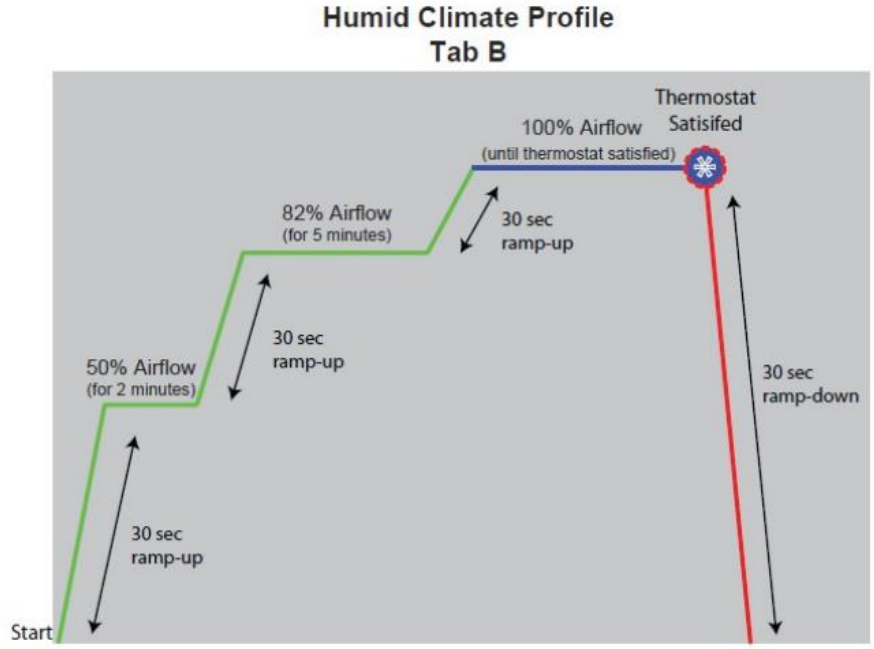
Normal



Blower Ramping Profile Selection - Normal Climate (Profile “A” Illustrated).

The “Default” profile introduces only a ramp up time and ramp down time (30 sec.).

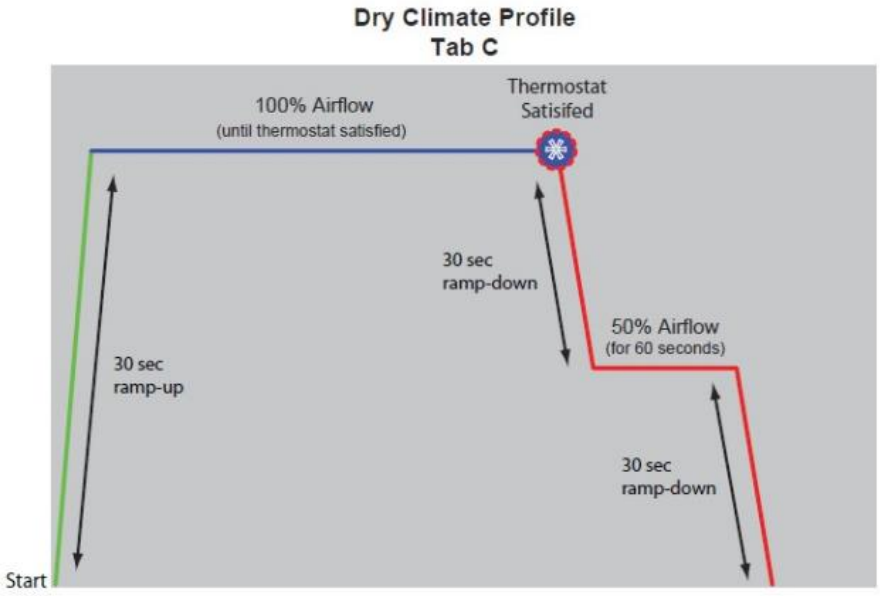
Humid



Blower Ramping Profile Selection - Humid Climate (Profile "B" Illustrated).

The "Humid" profile is designed to reduce airflow in high humidity climates. It introduces both multipliers and timing intervals for the "run" sequences.

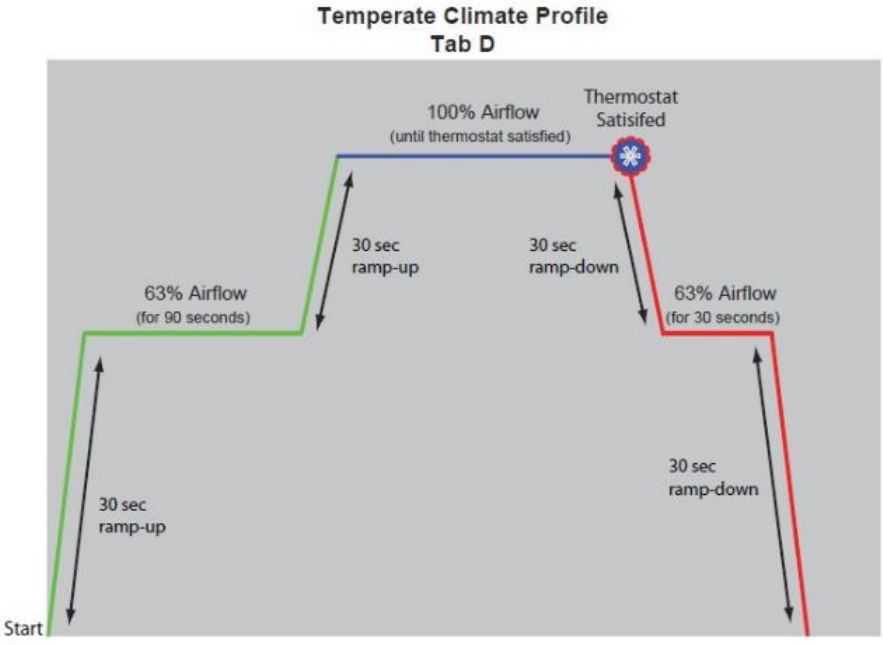
Dry



Blower Ramping Profile Selection - Dry Climate (Profile "C" Illustrated).

The "Dry" profile is designed to accommodate dry climates. It introduces both multipliers and timing intervals for the "run" sequences.

Temperature



Blower Ramping Profile Selection - Temperate Climate (Profile "D" Illustrated).

The "Temperate" profile is designed to accommodate average climates.

Timers

Equipment Protection

Minimum OFF timers are specific to the equipment being controlled and their defaults are set by the installer.

Minimum Off Timer

Once the touch screen control has deactivated equipment operation, the minimum off timer forces the equipment to remain off for the specified amount of time before operation is activated.

Compressor

A5-minute compressor short cycle protection timer is initiated whenever the touch screen control deactivates compressor operation.

This delay occurs when a power loss occurs, and the system goes in power save. Any instantaneous signal level greater than or equal to 18 volts AC relative to common is interpreted as active.

Note
When compressor protection is ON, the system displays "WAIT" to the user. This message is displayed only if there is cooling or heating call for the compressor.

Reminders

All information concerning reminders is accessible by the installer and the user.

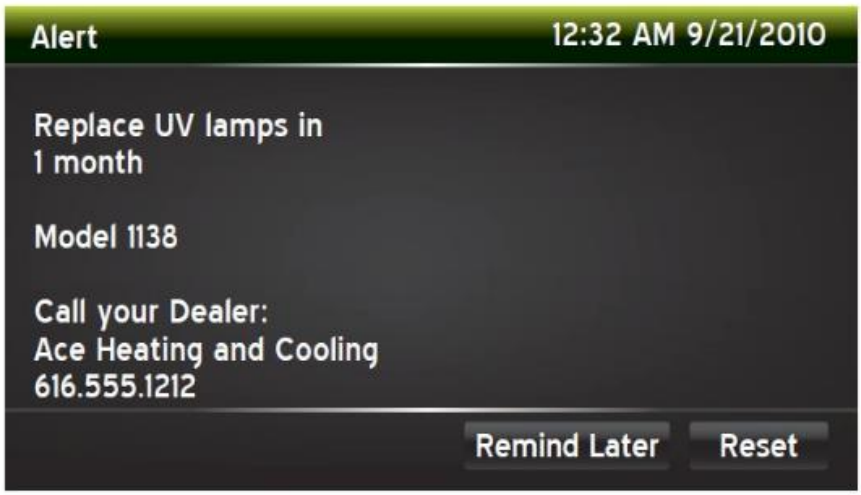
Note
For each reminder, the thermostat allows for enabling/disabling of the advanced warning (i.e., occurs 2 weeks prior to the reminder timer expiration). All reminders are disabled by default.

If a date and/or time change advances the date and / or time beyond the scheduled reminder expiration, the touch screen control displays an alert indicating the reminder has expired. If the date and/or time is set back, the scheduled reminder will remain at its current date/time setting, if enabled.

Consumable Reminders

The touch screen control allows the user to view/edit/reset the reminder setting for consumables (e.g., filter, humidifier pad, and UV bulbs). The user can enable and manually set the time settings for each reminder.

The touch screen control allows the consumable reminders to be set by calendar (months) and run time (cumulative). When consumables are set for run time, the following apply:



Alert Screen - UV Lamp Replacement Reminder.

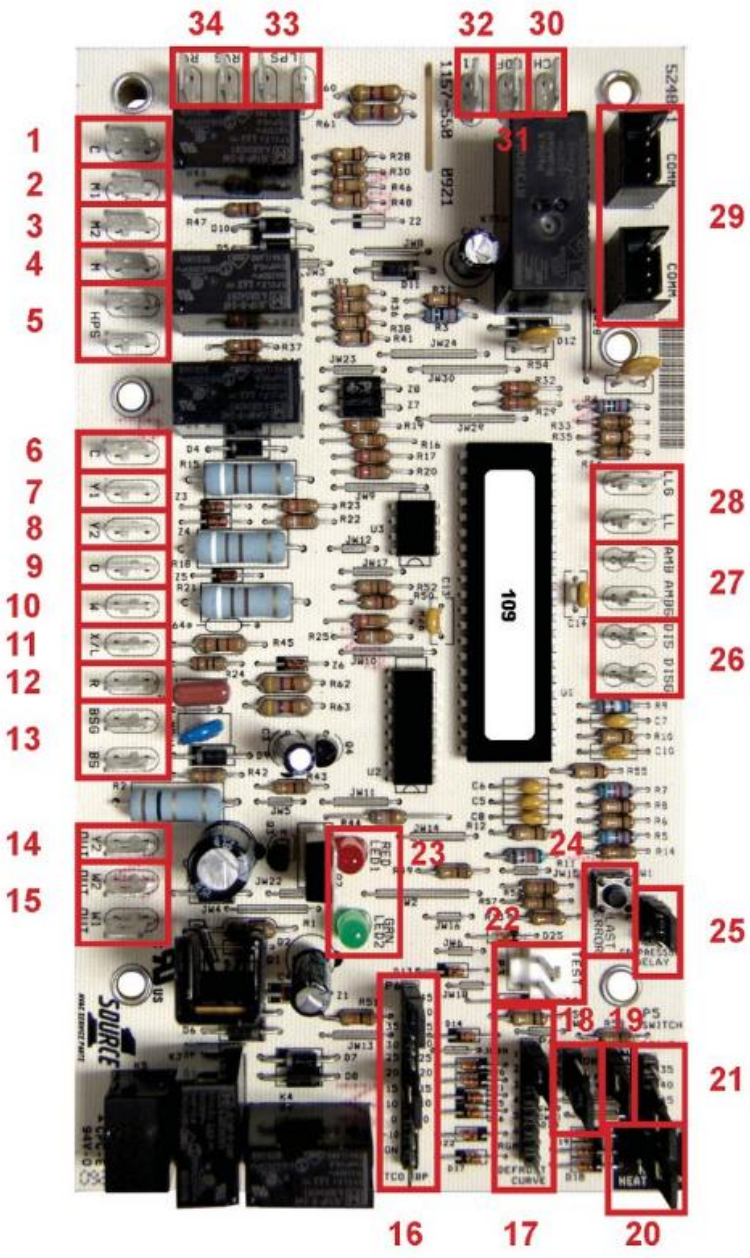
Run Time/ Cumulative Consumables

	Heating	Cooling	Fan	Humidify	Dehumidify
Air Filter Media	X	X	X	X	X
UV Lamp	X	X	X	X	X
Humidifier Pad				X	
Electronic Air Cleaner	X	X	X	X	X

06

Communicating Control Board Detail

YorkGuard VI Defrost Control Board



YorkGuard VI Defrost Control Board

It is important to note that there are multiple versions of the YorkGuard VI defrost control board. Identifying which version is present is essential when servicing the equipment.

1. C-Terminal

24 volts AC common output to the compressor contactor coil and isolation relay. The isolation relay is only used on systems utilizing the two-stage scroll compressor.

2. M1-Terminal

The “M1” terminal is only used to retrofit units that used “twin single” compressors. This terminal should not be used on single stage compressors or two stage scroll compressors.

3. M2-Terminal

Two-stage heat pumps that utilize the UltraTech two-stage scroll compressors provide 24 volts AC to the “M” and “M2” terminals in reference to 24 volts AC common as follows:

- The “M” terminal provides 24 volts AC to energize the contactor for first stage compressor operation.
- The “M2” terminal provides 24 volts AC to energize the isolation relay which provides power to the compressors second stage solenoid valve.

Do not connect any other accessories or components to the “M2” terminal located on the YorkGuard VI defrost control or the system will not operate properly and could be damaged.

4. M-Terminal

24 volts AC power to the compressor contactor coil in reference to 24 volts AC common. The “M” terminal would be energized any time there is a call for compressor operation.

Do not connect any other accessories or components to the “M” terminal located on the YorkGuard VI defrost control or the system will not operate properly and could be damaged.

5. HPS-Terminals

Electrical connections for the high-pressure switch in the discharge line between the compressor and the reversing valve. There will only be voltage present through the “HPS” terminals when there is a “Y1” call present.

6. C-Terminal

The 24 volts AC common input form the control transformer.

7. Y-1 Terminal

The 24 volts AC input from the thermostat for the first stage compressor operation during heating and cooling.

8. Y-2 Terminal

The 24 volts AC input from the thermostat for second stage compressor operation during heating or cooling.

9. O-Terminal

The 24 volts AC input from the thermostat indicates that the system is in cooling operation.

When the YorkGuard VI receives an input to either the “Y1” or “Y2” terminals and an input to the “O” terminal, the board will function in cooling operation. This will energize the reversing valve with a 24 volts AC output from the “RVG” and “RV” terminals. If the board does not receive an “O” input when a “Y” call is present, the unit will operate in the heat pump heating mode.

10. W-Terminal

The 24 volts AC input from the thermostat.

When the board receives an input at the “W” terminal without an input from a “Y1” or “Y2” terminal, the system will operate in emergency heat. The control board will energize “W1 OUT” and “W2 OUT” immediately. Some models may have a 15-minute delay between the “W1 OUT” and “W2 OUT”.

11. X/L Terminal

The 24 volts AC output to an LED (Light Emitting Diodes) or LCD (Liquid Crystal Display) display on the indoor thermostat is used to flash a fault code when a lockout condition exists. This is in addition to the red and green LEDs (Light Emitting Diodes) on the YorkGuard VI defrost control board.

12. R-Terminal

The 24 volts AC hot input from the control transformer. The YorkGuard VI defrost control board receives 24 volts AC between the “R” and “C” terminals each time the indoor unit is energized.

Between terminals “R” and “C,” the defrost board is always monitoring control voltage. If the control voltage drops below 19 volts AC, the energized relays will remain energized, but no extra relays will be allowed to operate. If the control voltage drops below 16 volts AC, tall relays will be de-energized until the problem is repaired.

13. BSG & BS Terminals

The electrical connections in which to wire a bonnet sensor accessory for fossil fuel applications. A bonnet sensor should not be installed on an air handler application with supplemental electric heat.

14. Y2 OUT Terminal

The 24 volts AC output used with systems utilizing an ECM (Electronically Commutated Motors) indoor fan motor and with the hot heat pump jumper option in the “ON” position. This enables the control board to reduce the indoor air flow with the “Y2 OUT” terminal and increase the supply air temperature during heat pump operation.

15. W1 OUT & W2 OUT Terminals

Both are 24 volts AC outputs utilized to provide sequencing of supplementary heat during low outdoor air temperature operation, emergency heat operation, and defrost operation.

16. LTCO/BP Jumper

Low temperature cut out (LTCO) selection is the temperature that causes the unit to de-energize the compressor and provide heat to the structure using only supplementary or auxiliary heat. The “LTCO” is only active during heat pump heating operation and is not recognized during cooling or defrost operation.

When properly configured, the “LTCO” can provide added compressor protection by allowing the compressor to de-energize when the ambient temperature drops to the “LTCO” set point, which can cause oil and refrigerant flow to be reduced below design operating conditions. The “LTCO” pin selection also allows the unit to operate the compressor as long as possible during cool conditions, providing greater heating efficiency.

The YorkGuard VI defrost control board is shipped with the “LTCO” pin selection in the “ON” position. If the “LTCO” pin selection remains in the “ON” position, the compressor will be allowed to operate at any temperature during heating operation. The “LTCO” temperature setting is displayed on the left side of the terminal strip and is represented by the center point of the lower jumper setting. The “LTCO” setting is adjusted during installation when necessary.

Balance Point (BP) restricts the sum of supplemental heat when the ambient temperature sensor rises above the balance point of the structure. The “BP” jumper is shipped from the factory at the 35 degrees Fahrenheit pin setting and is displayed on the right side of the terminal strip. The number is represented by the center point of the upper jumper setting.

For optimal system operation, use the heat loss calculations obtained during equipment sizing to help determine the structure's balance point. After the balance point has been determined, the “BP” pin setting should be placed in the corresponding temperature selection and recorded on the balance point.

The “LTCO” and the “BP” jumper selections will always be separated by at least 10 degrees on the control board.

17. DEFROST CURVE Jumper

The pin selection on the YorkGuard VI defrost control board is factory set to the "PRGM" pin selection for the model and tonnage of equipment installed. The "DEFROST CURVE" pin selection should not have to be adjusted.

If a YorkGuard VI board is used as a replacement on an existing unit, the pin selection on the replacement board must be moved to the appropriate jumper position for the tonnage of the equipment. The proper "DEFROST CURVE" selection can be identified by using the chart in the Installation Manual. An example of the "DEFROST CURVE" jumper positions are listed in the table below.

Defrost Curve Jumper Position	1	2	3	4	5	6
Heat Pump Model	2-Ton 2 ½-Ton	4-Ton 5-Ton	3-Ton 3 ½-Ton	1 ½-Ton	11 min. Max Defrost	13 min. Max Defrost

Example of Defrost Curve Selection Jumper Position Chart

Pins 1 through 4 have a maximum defrost time of 8 minutes.

- Pin selection 1 is used for 2- and 2.5-ton models.
- Pin selection 2 is used for 4 and 5-ton models.
- Pin selection 3 is used for 3- and 3.5-ton models.
- Pin selection 4 is used for 1.5-ton models.
- Pins 5 and 6 have been programmed on the communication capable YorkGuard VI defrost control boards. This feature is not available on some boards.
- Pin 5 has an extended maximum defrost time of 11 minutes for special applications requiring longer defrost cycles.
- Pin 6 has an extended maximum defrost time of 13 minutes for special applications requiring longer defrost cycles.

If the “Compressor Delay” jumper is in the “ON” position, there is a 30-second reduction in each of the maximum defrost timings.

On some legacy models, pin selection 4 was not programmed and should only be used on the 1½-ton heat pump models. If the jumper is missing or has been placed in a selection that is not supported by the board, the control will not energize the compressor and will display a fault code. If the jumper is placed on a pin selection that is supported but is not the proper selection for the model of equipment installed, the control will not operate properly. The defrost cycle can last too long or may not last long enough. Operating in defrost mode for too long will result in increased auxiliary heat run times and greater energy consumption. If the defrost mode does not operate long enough, the ice will not be completely removed from the outdoor coil and equipment damage may occur. The system will also have a reduced heating capacity and eventually will not be capable of heating the structure.

18. Y2 LOCK Jumper

The “Y2 LOCK” jumper is a comfort feature on the control board that is shipped in the "ON" position. This feature can force second stage compressor operation with a high load demand, even if the thermostat is only calling for first stage.

For example, if the control board receives two consecutive second stage cooling calls from "Y1", "Y2" and "O" signals, the third cooling call will energize second stage cooling, even though the thermostat is only calling for first stage cooling at the "Y1" and "O" terminals.

The control board will continue to energize second stage compressor operation with a first stage call until one of the following happens:

- The thermostat satisfies after operating less than 10 minutes in the cooling mode prior to receiving a "Y2" signal from the thermostat.
- The 24 volts AC power to the control is removed.
- The "TEST" pins are shorted together.
- The "Y2 LOCK" pin selection is moved to the "OFF" position.

If the technician places the pin selection in the "OFF" position, the control board will not anticipate second stage cooling operation. When the pin is in the "OFF" position, the only time the compressor will be energized in second stage cooling is with "Y1", "Y2" and "O" signals from the thermostat.

19. FUEL Jumper

The fossil fuel feature on the YorkGuard VI Defrost control board allows the heat pump to operate either with an air handler or a gas furnace. Heat pumps utilizing the YorkGuard VI board are shipped from the factory with the "FFUEL" pin selection in the "OFF" position. In the "OFF" position, the control board will operate with an indoor air handler with electric heat strips for supplemental heat. If the pin selection is moved to the "ON" position, the control board will function as if it were operating with an indoor gas furnace for supplemental heat.

If fossil fuel is to be used on heat pumps, which do not have the YorkGuard VI defrost control board, a field installed "Add-On Fossil Fuel Control Panel or Dual Fuel Kit" will have to be installed. The add-on kits will be discussed later in this Section.

20. HOT HEAT PUMP Jumper

The supply air temperature during conventional heat pump heating operation is cooler than supply air temperatures when utilizing electric heat or gas heating systems. The hot heat pump option offers the customer greater comfort by providing warmer supply air temperatures than those associated with conventional heat pump operation. The hot heat pump feature can be used on both single and two stage equipment.

The unit is shipped from the factory with the "HOT HEAT PUMP" selection in the "OFF" position.

If the supply air temperatures are too cool for the customer's comfort level during heating operation, the hot heat pump selection can be placed in the "ON" position. This reduces the airflow across the indoor coil and increases the temperature of the air being supplied to the conditioned space.

The "HOT HEAT PUMP" setting is only utilized during a heating call and does not affect cooling operation.

21. SWITCH POINT Jumper

A forced second stage feature designed to force second stage compressor operation when the liquid line temperature falls below the switch point, setting continuously for 30 seconds. The control board will force second stage compressor operation even though the thermostat is only calling for first stage.

The "SWITCH POINT" feature ensures that the compressor will operate in the second stage (full capacity) during defrost operation. Operating the compressor in the second stage will help to ensure that the proper amount of hot discharge gas is used to defrost the outdoor coil in the appropriate amount of time.

The "SWITCH POINT" pin selection is shipped from the factory in the 35 degrees Fahrenheit position. Although the "SWITCH POINT" can be adjusted to 35, 40 or 45 degrees, the system will operate at the 35-degree setting if the jumper is removed or misplaced.

22. TEST

Pins are used to force a defrost cycle and bypass the anti-short cycle delay as described earlier in this section.

23. LEDs

The two onboard LEDs are used to identify the mode, status, and fault information.

24. LAST ERROR

Push button which allows access to the last five fault codes stored in the memory by pressing the "LAST ERROR" button once. After the fault has been repaired and the system is operating properly, the "LAST ERROR" button should be held for five seconds to remove the stored faults.

25. COMPRESSOR DELAY Jumper

"ON" position
The YorkGuard VI defrost control board will provide a 30 second delay before and after defrosting if the "Compressor Delay" jumper is in the "ON" position. This means that the compressor will be de-energized for 30 seconds before defrosting while the reversing valve shifts positions and energized during defrost. It will then de-energize for 30 seconds after defrosting to allow the reversing valve to shift again. This reduces noise when shifting the reversing valve and assists in preventing nuisance pressure trips in extreme applications. During this time, the anti-short cycle delay is ignored.

If the "Compressor Delay" jumper is in the "ON" position, there is a 30 second reduction in the maximum defrost timing.

"OFF" position
If the "Compressor Delay" jumper is in the "OFF" position, the compressor will not cycle before, during, or after defrosting unless the thermostat call has been satisfied.

26. DIS & DISG Terminals

Electrical connections for the discharge line temperature sensor (10K thermistor).

27. AMB & AMBG Terminals

Electrical connections for the ambient (outdoor) temperature sensor (10K thermistor).

28. LG & LL Terminals

Electrical connections for the coil (liquid line) temperature sensor (10K thermistor).

29. COMM Connection Terminals

The communicating version of the YorkGuard VI Defrost control board has two 4 pin connectors located at the top of the control board. The 4 pin connections are only used if a Johnson Controls Communicating Control System is installed to control equipment operation. The 4 pins are labeled "A+", "R", "C", and "B-".

A+ pin-communication between the YorkGuard VI defrost control board, the air handler or furnace communicating control board, and the Residential Communicating Control System.

R pin-24 volts AC hot from the transformer to the YorkGuard VI defrost control board.
C pin-24 volts AC common from the transformer to the YorkGuard VI defrost control board.
B-pin-communication between the YorkGuard VI defrost control board, the air handler or furnace communicating control board, and the Residential Communicating Control System.

If the Johnson Controls Residential Communicating Control System is used instead of a conventional thermostat, the electrical wiring harness connected to the thermostat connections on the YorkGuard VI defrost control board must be removed.

30. CCH (Crankcase Heater) Terminal

Used on systems when line voltage is present at the "L1" terminal, and a PSC (Permanent Split Capacitance) outdoor fan motor is used.

The normally closed set of contacts between the "L1" and "CCH" terminals are designed to close and energize the crankcase heater anytime the outdoor fan is not operating.

31. ODF

There is a normally open set of contacts between the "L1" and "ODF" terminals. The normally open points will open and de-energize the outdoor fan motor during defrost or when there is no compressor operation.

If the unit has a PSC or an ECM outdoor fan motor, the fan motor may be de-energized by either of the following conditions:

Condition 1: Breaking one leg of 230 volts AC power to a (PSC) fan motor.

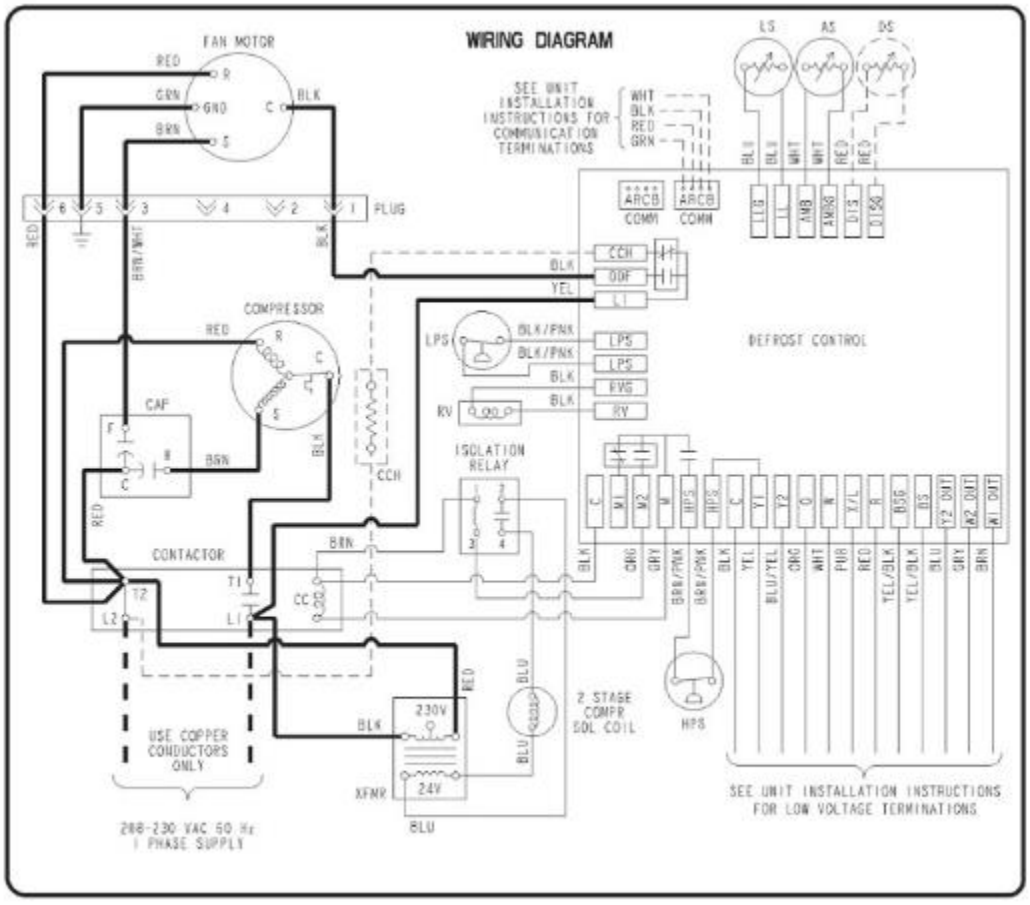


Diagram of YorkGuard VI with CCH & PSC Outdoor Fan Motor

Condition 2: Breaking one leg of 24 volts AC to the (ECM) fan controller module.

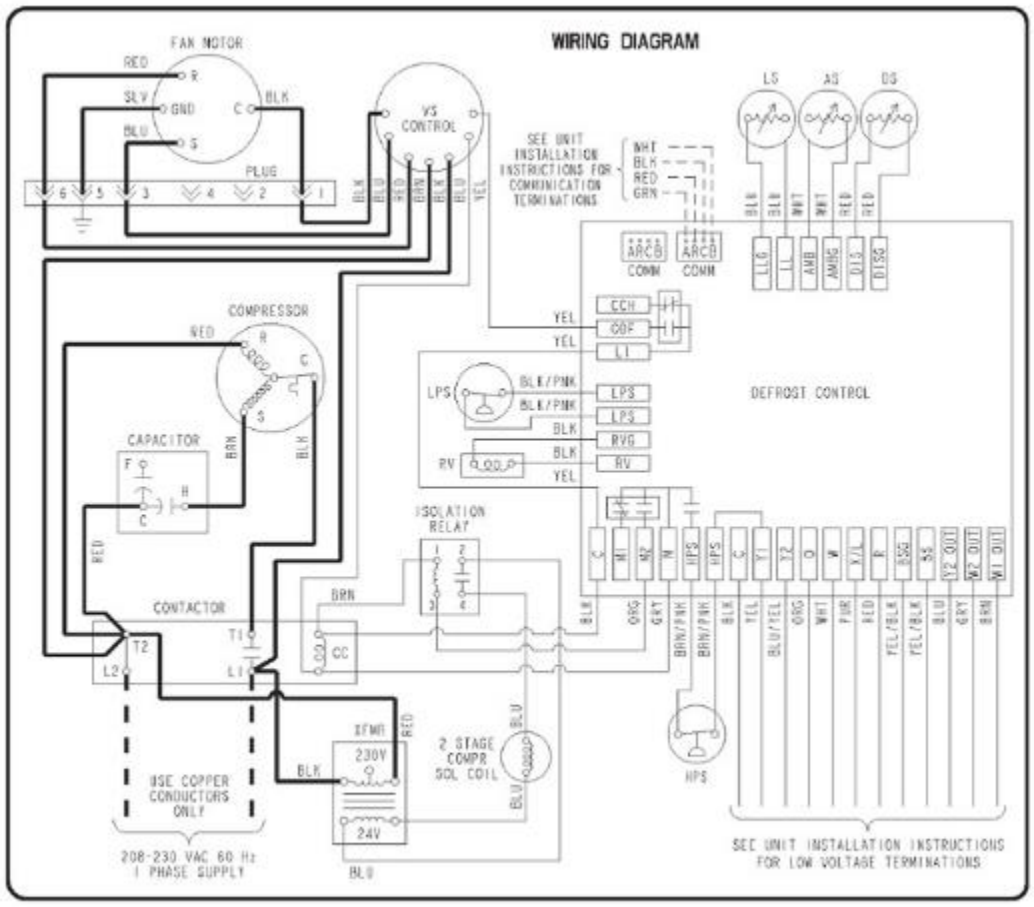


Diagram of YorkGuard VI with ECM Outdoor Fan Motor & No CCH

Although the YorkGuard VI has a "CCH" terminal located on the board, it is not always utilized. The "CCH" terminal must not be used to field install a crankcase heater if the unit is utilizing the "L1" and "ODF" terminals to break the 24 volts AC circuit to an ECM outdoor fan motor.

If the crankcase heater were to be wired to the "CCH" terminal in this example, 120 volts AC would be sent through the crankcase heater to the low voltage connection on the defrost control board resulting in permanent damage.

32. L1 Terminal

This terminal will have one of the following:

- 120 volts AC available for the crankcase heater and a PSC outdoor fan motor
- 24 volts AC available for an ECM outdoor fan motor

33. LPS Terminals

Electrical connections for a low-pressure switch. The low-pressure switch is piped into the liquid line and is used to identify loss of charge.

34. RVG & RV Terminals

Electrical connections that provide 24 volts AC to the reversing valve solenoid during cooling and defrost operation. If the reversing valve is not wired between the designated terminals, the YorkGuard VI will operate in cooling mode only and will not operate as a heat pump.

Pipe Freeze Protection Timer - Fossil Fuel Mode Operation

The YorkGuard VI defrost control board has a pipe freeze protection feature. This feature is designed to prevent the pipes in a structure from freezing if the balance point is set too low and the heat pump cannot heat the home using compressor operation only.

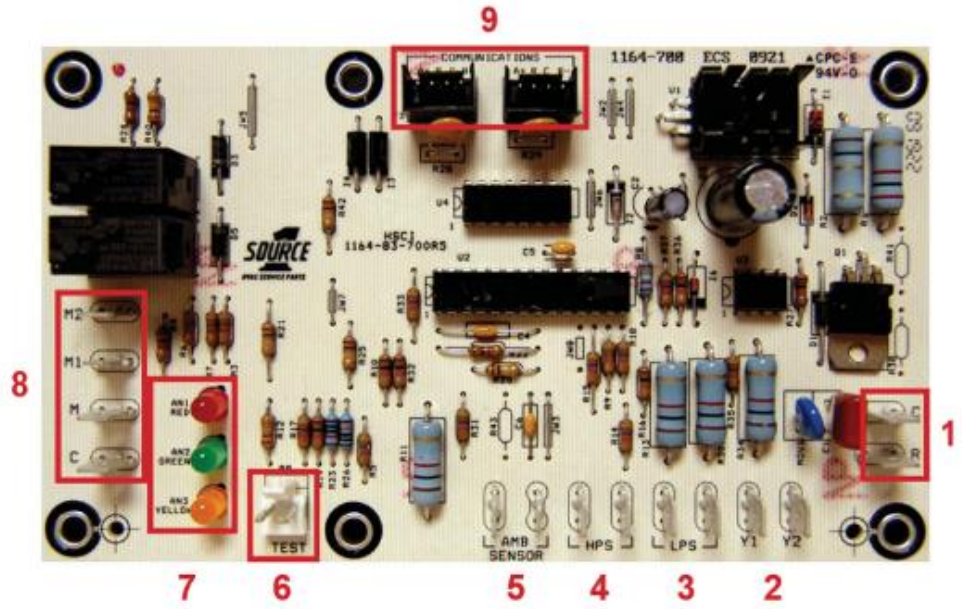
The control starts an internal 4-hour timer when calls for compressor operation and auxiliary heat, "Y1" and "W", are received. If the outdoor temperature is above the balance point, the control will energize the compressor, instead of the auxiliary heat outputs.

If the calls for compressor operation and auxiliary heat are still present after the timer expires, the control will energize "W1 OUT" and "W2 OUT". It will also de-energize the compressor, regardless of the balance point setting. The control will keep the "W1 OUT" and "W2 OUT" signals energized until the "Y1" signal is removed; that is, the control will lock into auxiliary heat furnace operation until the room thermostat is satisfied. The control will store and display a fault flash code when the pipe freeze timer has expired.

Control Voltage Monitoring

The board monitors control voltage, always. If the control voltage drops below 19 volts AC, the energized relays will remain energized, but no extra relays will be allowed to operate. If the control voltage drops below 16 volts AC, all relays will be de-energized until the problem is repaired.

Residential Air Conditioning Communication Control Board



Residential Air Conditioning Communicating Control Board

The Residential Air Conditioning Communicating Control Board is used on several Unitary Products condensing units. The training throughout this chapter will cover systems manufactured with and without the Air Conditioning Communicating Control Board. If an existing Unitary Product is upgraded with the Air Conditioning Communicating Controls Field Kit to allow operation with the Johnson Controls Residential Communicating Control System, the instructions that accompany the kit must be followed to ensure proper operation.

1. "C" & "R" Terminals

"C" terminal - 24 volts AC common input from the control transformer located in the indoor unit.

"R" terminal - 24 volts AC hot input from the control transformer located in the indoor unit. The 24 volts AC is provided to the control board's microprocessor anytime the indoor unit is energized.

The Residential Air Conditioning Communicating Control Board monitors control voltage between the "R" and "C" terminals. If the control voltage drops below 19 volts AC, the energized relays will remain energized, but no extra relays will be allowed to operate. If the control voltage drops below 16 volts AC, all relays will be de-energized until the transformers secondary voltage supplied to the control board has increased to greater than 20 volts AC.

When the control voltage drops, the appropriate flash code will be displayed to the control board's LEDs. Flash codes are published in the Installation Manual.

2. Y2/Y1 Terminals

"y2" terminal-24 volts AC input from the thermostat for second-stage compressor operation with a "Y1" and "Y2" input from the thermostat.

"Y1" terminal - 24 volts AC input from the thermostat for full capacity on single-stage condensing units or first stage compressor operation on two stage condensing units with a "Y1" input from the thermostat.

If a Johnson Controls Residential Communicating Control System is used, the "Y1" and "Y2" terminals are not used. Cooling calls are initiated through the COMM connection terminals.

3. LPS Terminals

Electrical connections for the low-pressure switch, located in the suction line between the suction line service valves and the compressor.

4. HPS (High Pressure Switch) Terminals

Electrical connections for the high-pressure switch, located in the discharge line between the compressor and the condenser coil.

5. AMB SENSOR Terminals

Ambient Temperature Sensor

Electrical connections for the ambient (outdoor) temperature sensor located in the corner post of the condensing unit.

The sensor is used to provide an ambient temperature display to the Johnson Controls Residential Communicating Control System (if used). When a non-communicating thermostat is used the sensor does not provide any information. If the sensor is open or shorted with a non-communicating thermostat, a fault code will be displayed, but the operation of the system will not be affected.

The sensor is a 10K thermistor that has 10,000 ohms of resistance at 77 degrees Fahrenheit. As the outdoor temperature decreases, the resistance increases, and as outdoor temperature increases the resistance decreases. The thermistor resistance at a given temperature can be identified by using the following Table.

Temperature	Resistance	Temperature	Resistance	Temperature	Resistance
-30	235,155	25	40,153	80	9,299
-25	196,871	30	34,367	85	8,250
-20	166,342	35	29,986	90	7,401
-15	138,482	40	26,092	95	6,503
-10	118,108	45	23,013	100	5,774
-5	100,260	50	19,903	105	5,208
0	86,463	55	17,255	110	4,663
5	72,940	60	15,310	115	4,203
10	61,711	65	13,474	120	3,743
15	53,640	70	11,942	125	3,381
20	46,200	75	10,449	130	3,047

Thermistor Temperature & Resistance

6. TEST Pins

Used to bypass the anti-short cycle delay and to clear soft and hard lockouts.
The Residential Air Conditioning Communicating Control Board has a five-minute anti-short cycle delay (ASCD) timer built into the control to prevent the compressor from short cycling. The ASCD timer is active when the control is first powered from the indoor unit thermostat and immediately after a compressor run cycle. The compressor and condenser fan will not operate during the five-minute ASCD. The ASCD can be bypassed by shorting the TEST pins for 3 seconds with a "Y1" signal present at the condensing unit control board.

Duration of connection (seconds)	Control behavior with no touch screen control signals present	Control behavior with touch screen control signals present
Less than 2 seconds	No response	No response
Greater than or equal to 2 seconds	Display compressor type TS, UltraTech, or single stage compressor, ignore LPS	Bypass ASCD (Reduce timer to zero immediately). If Y1 (thermostat or communication) is present and the high-pressure switch is closed, contactor's will be energized.
	Clear soft lockout	Clear soft lockout
	Clear hard lockout	Clear hard lockout
	Reset TS anticipation mode counter to zero for TS systems.	Reset TS anticipation mode counter to zero for TS systems.
		Reduce TS staging delays for TS systems as described below.
Connection removed	Resume normal LED display	
Connection not removed	Nothing more than previously explained	

Test Input Functionality

7. LED Diagnostics
The three onboard LEDs are used to identify the operational mode, status, and fault information.
The operational mode is displayed via the red and green LEDs when there is no call from the thermostat or Residential Communicating Control System, and the TEST pins are shorted. The operational modes are represented as follows:

Residential Air Conditioning Communicating Control Board Operational Modes		
Compressor Type	**LED1 (Red)**	**LED2 (Green)**
Single Stage Compressor	1 flash	---
TS Compressor	2 flashes	---
UltraTech Compressor	3 flashes	---

Residential Air Conditioning Communicating Control Board Operational Modes

When the TEST pin short is removed, the LEDs will return to the normal display.

The status codes are displayed via the red, green, and yellow LEDs. These codes indicate the state of unit operation, but do not represent a fault. The status codes are represented as follows:

Residential Air Conditioning Communicating Control Board Status Codes			
Description	**Required Condition**	**LED 1 Red**	**LED 2 Green**
No power to control	No power to control	OFF	OFF
First-stage compressor operation (TS or UltraTech)	TS M & M1 energized UltraTech M energized Single Stage NA	OFF	ON
Second-stage compressor operation (TS, UltraTech, Single Stage)	TS and UltraTech M & M2 energized Single Stage M energized	ON	ON
Control normal operation - no communication or call for compressor present	No faults active, Y1 or Y2 not present	OFF	2 sec ON 2 sec OFF
Control normal operation - in ASCD period	No faults active, Y1 or Y2 present, ASCD timer not expired	OFF	0.1 sec ON 0.1 sec OFF
Note: Status codes will not be displayed when a fault code is present.			

Residential Air Conditioning Communicating Control Board Status Codes

Residential Air Conditioning Communicating Control Board Status Codes		
Description	**Required Condition**	**LED 3 Yellow**
Control powered with Johnson Controls Communicating Thermostat - active communication present	System is active and presently communicating successfully	0.1 sec ON 0.1 sec OFF
Control powered with conventional thermostat connections	System has 24 VAC present and the microprocessor is active	2 sec ON 2 sec OFF
Note: Operating condition status LED displayed at all times as described above.		

Residential Air Conditioning Communicating Control Board Status Codes

Any fault codes are displayed via the red and green LEDs. When a fault code exists, the control will display the fault code via the LEDs, pause two seconds, and display the fault again. This display will persist until the condition that caused the fault code no longer exists. The fault codes are represented as follows:

Residential Air Conditioning Communicating Control Board Flash Codes		
Operational Faults	**LED 1 Red**	**LED 2 Green**
Control Failure	ON	OFF
Operational Faults		
High-pressure switch fault (not in lockout yet)	1	OFF
System in high-pressure switch lockout	2	OFF
System in low-pressure switch lockout	4	OFF
Low voltage (<19.2 VAC) preventing further relay outputs	5	OFF
Low voltage (<16 VAC) stopped current relay outputs	6	OFF
High-pressure switch fault (with no communication for compressor operation and where Y1 and Y2 are not energized)	9	ON
Sensor or Switch Faults		
Outdoor ambient temperature sensor failure (short)	ON	1
Outdoor ambient temperature sensor failure (open)	ON	2
Wiring Related Faults		
Compressor	1	ON
Y2 present without Y1	2	ON

Residential Air Conditioning Communicating Control Board Flash Codes

8. Compressor Staging Output Terminals

"C" terminal-24 volts AC common outputs:

- Compressor contactor coil for single stage compressor operation
- Compressor contactor for first stage compressor operation on two stage
- condensing units
- Compressor rectifier plug for the compressors second stage solenoid valve on two stage condensing units

"M" terminal - 24 volts AC power to the compressor contactor coil in reference to 24 volts AC common. The "M" terminal will be energized any time there is a call for compressor operation.

- Single stage condensing units use the "M" terminal to energize the contactor coil for compressor operation
- Two stage condensing units use the "M" terminal to energize the contactor coil for the compressors first stage cooling operation when using the UltraTech two stage scroll compressor

"M1" terminal-only used on retrofit units that utilized twin single (TS) compressors. This terminal should not be used on the single stage compressors or two stage UltraTech scroll compressors.
"M2" terminal - 24 volts AC to energize the rectifier plug for the second stage solenoid valve on the UltraTech two stage scroll compressor.

Note
Do not connect any other accessories or components to the "M", "M1" or "M2" terminals located on the Air Conditioning Communicating Control Board. If other accessories or components are installed the system will not operate properly and could be damaged.

9. COMM Connection Terminals

Communications 4 Pin Connector - The Air Conditioning Communicating Control Board has two 4 pin connectors at the top of the control board. The 4 pin connections are only used if a
Johnson Controls Communicating Control System is installed to control equipment operation. The 4 pins are labeled "A+", "R", "C", and "B-".

A+ Pin-communication between the Air Conditioning Communicating Control Board, the Air Handler or Furnace Communicating Control Board, and the Residential Communicating Control System.

R Pin-24 volts AC heat from the transformer to the Air Conditioning Communicating Control Board.
C Pin-24 volts AC common from the transformer to the Air Conditioning Communicating Control Board.
B-Pin-communication between the Air Conditioning Communicating Control Board, the Air Handler or Furnace Communicating Control Board, and the Residential Communicating Control System.

If the Residential Communicating Control System is used instead of a conventional thermostat, the electrical wiring harness connected to the "Y1", "Y2", "C", and "R" terminals on the bottom right side of the Residential Air Conditioning Communicating Control Board must be removed.

Refrigerant Safety Controls

The Residential Air Conditioning Communicating Control Board is equipped with compressor protection lockout capabilities.

The control board has separate high- and low-pressure switch terminals that provide system lockout protection with proper set up, and the board will enter a hard lockout if four soft lockouts occur within a 12-hour period.

Residential Air Conditioning Communicating Control Board Lockouts

High Pressure Switch Lockouts

When the compressor starts following a high-pressure switch fault, the control will start a six-hour timer based on accumulated compressor run time. If the high-pressure switch opens for 160 milliseconds during the six-hour timer, the Residential Air Conditioning Communicating Control Board will enter a soft lockout. If the high-pressure switch opens for less than 160 milliseconds, the compressor will be de-energized, but the unit will not enter a soft lockout. The six-hour timer will reset if the high-pressure switch does not open again within six hours of accumulated compressor run time. If four soft lockout conditions occur during a twelve-hour period, the board will enter a hard lockout. The four soft lockouts can be a combination of faults within a 12-hour compressor run time period, and do not have to be high pressure faults only. For a complete list of faults, refer to the Installation Manual.

Low Pressure Switch Lockouts

If the refrigerant pressure drops below the opening pressure for more than 5 seconds, the control board will enter a soft lockout. When a soft lockout is initiated, the control will display the appropriate fault code using the onboard LEDs and de-energize "M", "M1", and "M2" outputs from the control board.

The Residential Air Conditioning Communicating Control Board will ignore the low-pressure switch input during the following conditions:

- The first two minutes of compressor operation
- The "TEST" mode with a "Y1" or "Y2" input from the thermostat

The technician should refer to the specific equipment model to identify exact fault codes for the system being serviced.

Residential Air Conditioning Communicating Control Board Lockout Reset

The difference between a soft and hard lockout is the requirement to reset the control board once the fault or faults have been removed.

Soft Lockout Reset

A soft lockout is reset when power is cycled to the "R" or "Y1" inputs of the control board. This may occur when the thermostat is satisfied or when power is cycled "OFF" and "ON" at the thermostat. A soft lockout may also be reset when the "TEST" pins are shorted for more than two seconds. The control will stop displaying the fault and resume normal operation when the soft lockout condition has been reset.

Hard Lockout Reset

The control board will enter a hard lockout if four soft lockouts occur within a twelve-hour period. The control board will also provide the appropriate flash codes for the onboard LEDs. A hard lockout is reset by removing the 24 volts AC power supply from the control board "R" terminal, or if the "TEST" pins are shorted for more than two seconds. Cycling the thermostat will not reset a hard lockout. When the fault has been repaired and the hard lockout condition has been reset, the control will stop displaying the fault and will resume normal operation.

Alternative Wiring Options

Directions to Convert from Communicating to Conventional Wiring - Two Stage Air Conditioner

The following steps provide step-by-step directions to convert a communicating two stage air conditioner from using communications to use conventional wiring methods.

- Remove one LPS lead from the control board and attach to the common side of the contactor coil.
- Remove the other LPS lead from the control board, cut the end off, and strip enough insulation off the wire to connect the wire, with a wire nut, to the COMMON wire coming from the thermostat.
- Remove one HPS lead from the control board and attach it to the HOT side of the contactor coil.
- Remove the other HPS lead from the control board, cut the end off, and strip enough insulation off the wire to connect the wire, with a wire nut, to the "Y1" wire coming from the thermostat.
- Remove the M2 lead from the control board, cut the end off, and strip enough insulation off the wire to connect the wire, with a wire nut, to the Y2 wire coming from the thermostat.

Directions to Wire the Control Using Two Wires for Communication

This section describes how a service technician can use a transformer installed in the outdoor unit to power the outdoor communicating interface board to only use two wires for communication.

The technician must install a class II transformer in the outdoor unit and hook up the 24 volts AC up to the "R" and "C" terminals on the control. The technician must attach the common wire to the chassis on the outdoor unit, to have an adequate chassis ground.

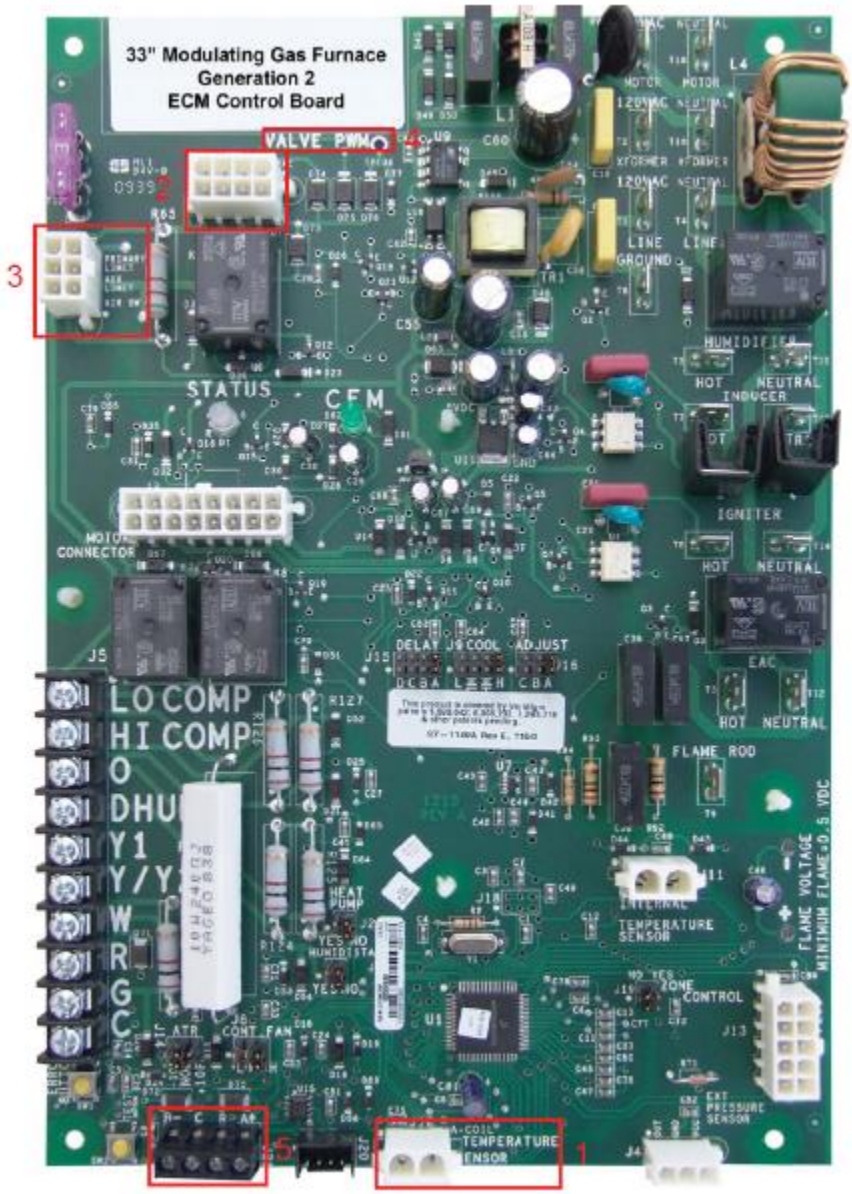
The two wires running between the indoor unit and the outdoor unit must be hooked up to the appropriate "A" and "B" communication terminals.

On the ID unit the technician must attach the common wire from the indoor 24 volts AC class II transformer to the chassis on the ID unit to have an adequate chassis ground.

33” Modulating Gas Furnace Control Board

Generation 2 – Communications Capable

The easiest way to distinguish the Generation 1 ECM control board from the Generation 2 ECM control board is that the Generation 2 control board has an eight-pin plug gas valve connection (J10) instead of the six-pin plug connector – limit strings (Generation 1) changes to a six-pin plug connector (J7) on the Generation 2 board. The following are descriptions of the on-board components that are unique to the ECM version control board (Generation 2).



Modulating Gas Furnace (ECM) Control Board Generation 2

1. A-Coil Temperature Sensor

The A-coil temperature sensor connection plug is included on Generation 2 control boards but is not currently used. In a future release, an input from an A-coil temperature sensor will be provided.

2. Eight Pin Plug Gas Valve Connector

The 8-pin plug is a central connection point for modulating gas valve. The pin functions are as follows:

- Pin 1 (Input)-24 volts AC "hot" provides voltage for the gas valve's internal logic Pin 2 (Input) - RX: Receives a PWM (Pulse Width Modulation) signal from the gas valve.

- Pin 3 (Output) - TX: Transmits a PWM signal to the gas valve Pin 4 (Input) - Ground
- Pin 5 (Input)-24 volts AC from transformer
- Pin 6 (Input) - Ground from transformer
- Pin 7 (Input) - Not used.
- Pin 8 (Output)-24 volts AC gas valve on/off

3. Six Pin Plug Connector - Limits

- Pin 1 (Input) - Receives 24 volts AC "hot" when the air pressure switch is closed Pin 2 (Input) - Receives 24 volts AC "hot" if the rollout switch (and on 97%-98% AFUE (Annual Fuel Utilization Efficiency) models, blocked drain switch) are closed.
- Pin 3 (Input) - Receives 24 volts AC "hot" when the primary limit is closed.
- Pin 4 (Output)-24 volts AC "common" output
- Pin 5 (Output)-24 volts AC "common" output
- Pin 6 (Output)-24 volts AC "common" output

4. Valve PWM pad

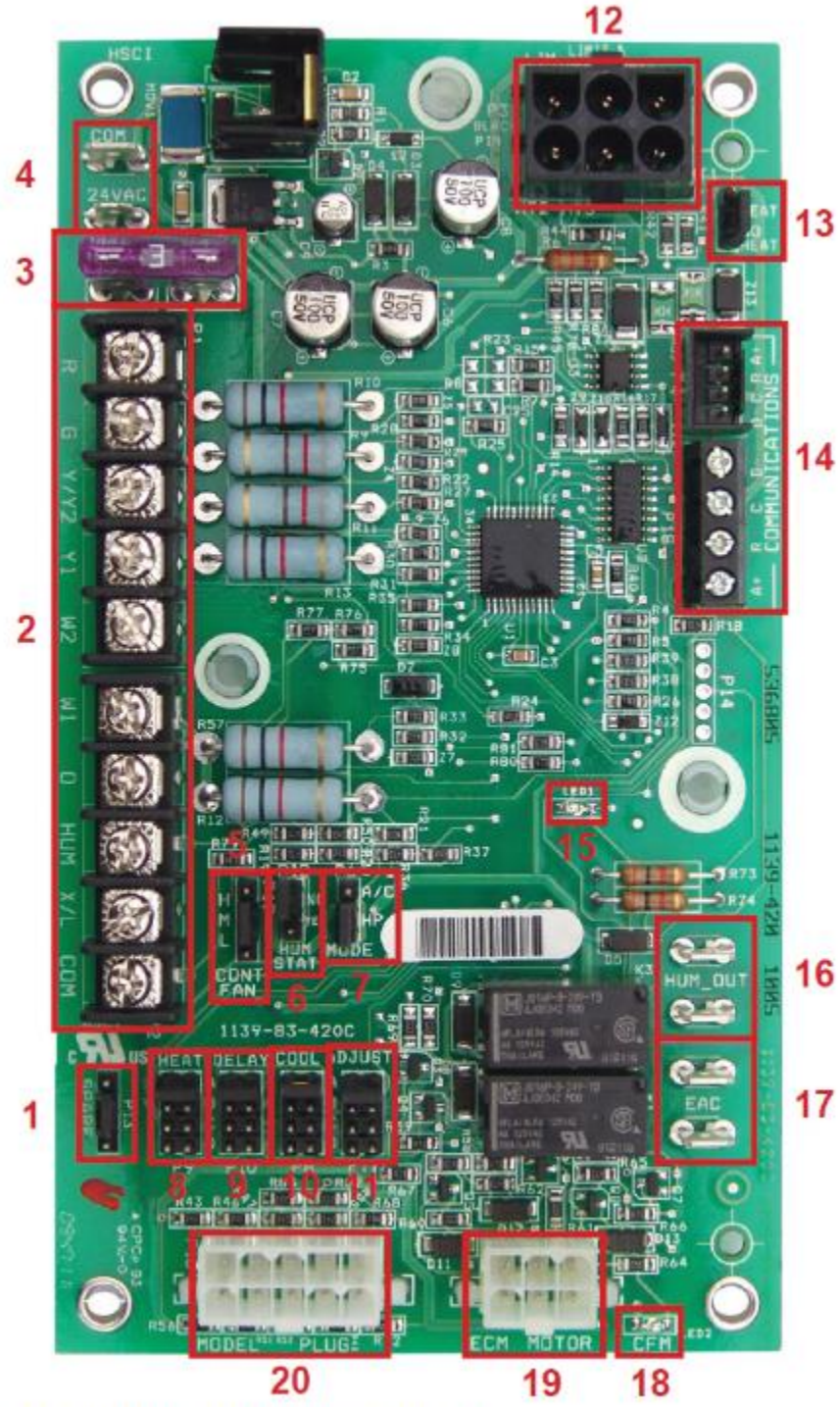
The Valve PWM pad is a small round connection above the eight-pin plug. A measurement between the Valve PWM pad and the Flame Voltage pad provides the pulse width modulation reading which can be converted into an actual desired firing rate using the PWM Firing Rates Table provided in this chapter.

5. COMM Connection Terminals

Connection terminals used with the Johnson Controls Residential Communicating Control system. The four pins are as follows:

Pin 1	B-	Data Out
Pin 2	GND	Ground
Pin 3	R	Power
Pin 4	A+	Data In

Air Handler - AV & MV (Communicating) Control Board Detail



AV & MV (Communicating) Air Handler Control Board

1. Spare Jumper

The control includes a spare jumper that can be used if a jumper is lost. The spare jumper does not have any effect on the operation of the control.

2. Thermostat Connections

The thermostat is connected to the air handler control terminal strip; terminal designations are shown below.

Terminal	Signal	Comment
R	24 Volts AC hot (fused)	
G	Continuous fan operation	
Y/Y2	Second or full stage compressor operation	
Y1	First stage compressor operation	Not used with outdoor units having one stage compressors
W2	Second stage electric heat operation	
O	Reversing valve operation	24 volts AC will be present at this terminal when the MODE jumper is in the AC position this is normal
HUM	Humidity switch input	24 volts AC will be present at this terminal when the HUM STAT jumper is in the NO position. This is normal
X/L	Connection point for heat pump fault indicator	This terminal is a connection point only & does not affect air handler control operation
COM	24 volts AC common	Referenced to cabinet ground

Humidity Switch Input

The air handler control is designed to work with a humidity control that closes when the humidity is below the set-point. The control is open when the humidity is above the set-point. This humidity control may be referred to as a humidistat or a dehumidistat.

The humidity switch controls both humidification and de-humidification operation of the control, and the control provides humidification using the HUM OUT relay output and de-humidification by lowering the blower speed. This is accomplished using the de-humidification input of the motor for variable speed models. The humidity switch should be connected to the R and HUM terminals of the control.

Wiring for specific applications can be found in the Installation Manual and in the Extras of this guide.

3. 3 Amp Fuse

The 3-amp fuse protects the control board from damage due to an electrical short or overload. The 3-amp fuse protects the limit switch and all 24-volt circuits including the thermostat terminal strip (R, G, Y/Y2, Y1, W2, W1, O, and HUM). It also protects the HUM STAT jumper and MODE jumper. If the fuse opens, 24 volts AC to the control board is lost, and no flash codes are displayed.

4. 24 Volts AC & Common Connections

24 volts AC and common inputs to the control board. The 24-volt power supply is provided by an internally wired low voltage transformer, which is standard on all models. However, if the unit is connected to a 208-volt power supply, the low voltage transformer must be rewired to the 208 volts tap.

5. CONT FAN Jumper

The "CONT FAN" jumper determines the circulating air blower speed when a call for continuous fan (R-G) is received from the thermostat or communicating control. The jumper positions provided are L (low), M (medium), and H (high).

6. HUM STAT Jumper
The "HUM STAT" jumper configures the control to monitor the humidity switch input. With the jumper in the NO position, the control will energize the HUM terminal with 24 volts AC continually. With the jumper in the YES position, the control will monitor the HUM input to control the HUM OUT output which controls an external humidifier.
If the jumper is not present, the control will operate as if the jumper is in the YES position.

7. MODE Jumper
The "MODE" jumper configures the control to operate properly with an air conditioner (AC position) or heat pump (HP position). With the jumper in the AC position, the control will energize the "O" terminal with 24 volts AC continually. With the jumper in the HP position, the "O" input signal is received from the room thermostat during cooling operation. If the jumper is not present, the control will operate as if the jumper is in the HP position.

8. HEAT Jumper
The "HEAT" jumper is used to program the desired CFM during heat mode. The technician must refer to the Installation Manual for the appropriate jumper settings which apply to the specified model and the desired airflow.

9. DELAY Jumper
Power to the air handler should be OFF when making blower configuration changes, as settings will only be recognized on furnace power up. This control board provides additional comfort control by allowing the technician to select a blower delay profile based on the normal conditions in the climate the air handler is installed in. The set of jumper pins on the control board labeled "DELAY" are used to set these delay profiles for the air handler. Set up of delay taps is discussed in Chapter 5, "Start Up"

10. COOL Jumper
The "COOL" jumper is used to program the cooling mode blower CFM.

11. ADJUST Jumper
The "ADJUST" jumper has four positions which can be used to make further adjustments to the cooling blower airflow. Be sure to use the table in the Installation Instructions for the product being serviced.

12. Six Pin Plug (Electric Heat Kit)
The 6-pin plug is a central connection point for an electric heat accessory kit. The pin functions are as follows:

Pin 1	-	Not Used
Pin 2	Input 2	24 volts DC (Direct Current) (+) through the limit switch for the HT1, HT2 & HT3 relays
Pin 3	Output	24 volts DC (+) to the limit switch
Pin 4	Output	24 volts DC (-) output to the HT1 heat relay
Pin 5	Output	24 volts DC (-) output to the HT3 heat relay
Pin 6	Output	24 volts DC (-) output to the HT2 heat relay

13. HEAT/NO HEAT Jumper

The "HEAT/NO HEAT" jumper configures the control for heat kit operation. The jumper must be in the HEAT position if a heat kit is installed with the air handler.

With the jumper in the NO HEAT position, the control will not energize the heat relay outputs or sense the limit switch input.

If the jumper is not present, the control will operate as if the jumper is in the HEAT position. If the jumper is not present, and a heat kit is not installed, the control will sense an open limit condition and the blower will run continuously.

14. Communications Connection Terminals

Connection terminals used with the Johnson Controls Residential Communicating Control system. There are two connections points available for use with this control system. The screw terminals are used during installation, and the plug connection is left open for use with a service tool.

The four pins are as follows:

Pin 1	B-	Data Out
Pin 2	GND	Ground
Pin 3	R	Power
Pin 4	A+	Data In

Detailed information regarding the Residential Communicating Control System will be available in the Residential Communicating Control System training manual.

15. Status & Fault Indicator LED

The air handler control board has built-in self-diagnostic capability and the LED will display an output to indicate various conditions. The control continuously monitors its own operation and the operation of the system. If a failure occurs, the LED will indicate the proper failure code. The following table provides information regarding LED indications of status, limit faults, wiring related faults, and internal control faults.

Fault or Status Condition	LED1 (RED) Flash Code
Status	
No power to control	OFF
Normal operation	2s ON / 2s OFF
Control in test mode	Rapid Flash
Control failure	ON
Limit Faults	
Limit switch currently open (not in lockout)	1
Multiple limit openings with no call for heat	2
Multiple limit openings during one call for heat	3
Single long duration limit opening	4
Multiple long duration limit openings	5
Fan failure	6
Wiring Related Faults	
Simultaneous call for heating and cooling	7
Internal Control Faults	
Control recovered from internal event	9

16. HUM OUT Push on Terminals

24 volts AC output to drive an external relay coil. The output has a maximum rating of 1 amp pilot duty at 24 volts AC. The HUM OUT output can be used to drive an external relay or solenoid (24 volts AC coil) to control a humidifier. The output is energized when the HUM input is energized, the HUM STAT is in the YES position, and the control has a thermostat call for heating (heat pump or electric heat).

17. EAC Output Push on Terminals

24 volts AC output to drive an external relay coil. The output has a maximum rating of 1 amp pilot duty at 24 volts AC. The EAC output provides 24 volts AC to energize a field-installed relay for control of an electronic air cleaner, UV lamp, etc. This output is present whenever the blower relay on the control is operating.

18. CFM Indicator LED

The green flashing LED indicates the "programmed" CFM of the blower. Example: 8 flashes indicate 800 CFM programmed. It does not indicate actual air flow if the air handler is operating beyond its external static limitations.

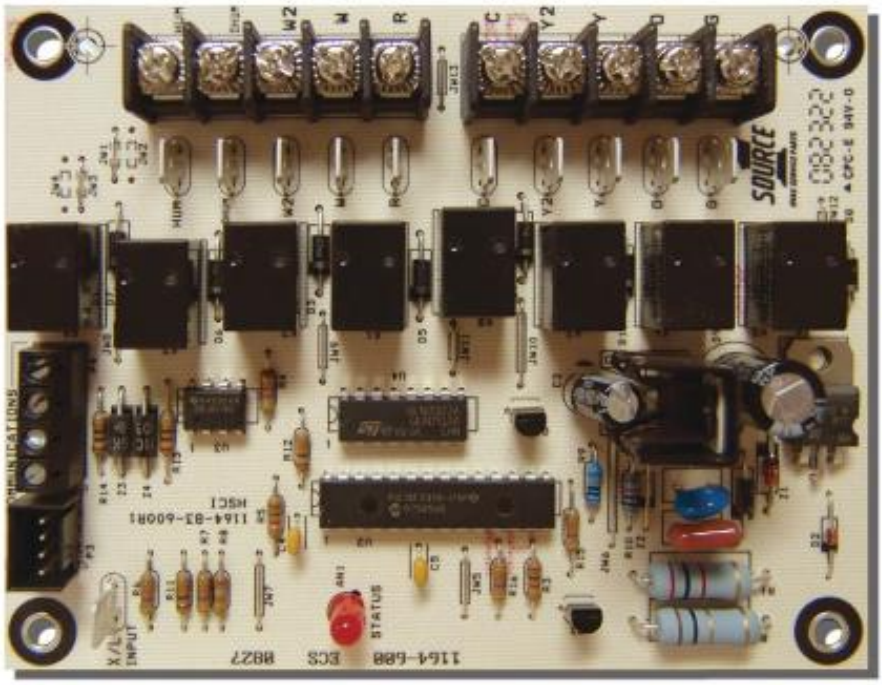
19. Six Pin ECM Plug

Pin 1	-	Common
Pin 2	Output	PMW signal
Pin 3	Input	LED CFM input from motor controller module
Pin 4	Output	Fan output (G)
Pin 5	-	ECM motor controller ground
Pin 6	-	Not used

20. Ten Pin Model ID Plug

The ten-pin model ID plug is used by the control board to identify which model of air handler is being controlled. If the board is replaced, the technician must make sure that the correct ID plug is installed for that specific air handler. Failure to install the correct ID plug will result in loss of efficiency and may result in other operational problems.

Indoor Communicating Interface Board Detail



Indoor Communication Interface Board

General Description

The control functions as an interface board between Johnson Controls Unitary Products serial communication system and a conventional piece of equipment with 24-volt AC thermostat control inputs.

The control functions with Johnson Controls Unitary Products communicating touch screen control in conjunction with one of the following pieces of equipment: outdoor communicating board, communicating YorkGuard VI, or an outdoor unit that is conventionally wired from the indoor communicating interface board to the outdoor unit.

General

The control can sense a low voltage condition. If the voltage drops below 19.2 volts AC (+/- 1.0 volts), the control will not energize any relay outputs. If a relay is already energized, it remains energized unless the voltage drops below 16 volts AC (+/- 1.0 volts). If the voltage drops below 16 volts AC (+/- 1.0 volt), the relays open and de-energize any relay outputs. The control will not re-energize the outputs until the voltage is above 19.2 volts AC (+/- 1.0 volt). Note that the specified voltages are for room temperature conditions. Voltages may vary more than +/- 1.0 volts AC at temperature extremes. If the voltage is between 16 volts AC and 19.2 volts AC and the control changes the outputs based on touch screen control inputs or any other condition changes, the control de-energizes the relay outputs as if the voltage dropped to below 16 volts AC.

The control is designed such that any mis wire of the 24 volts AC inputs or outputs will not result in permanent damage to the control or permanent disabling or bypassing of any of the control's safety functions. This includes any jumper control inputs.

Inputs

Input	Description
COMM	Communications port
COMM	Communications port
X/L	Fault input signal

Fault Input Signal - (X/L INPUT)

The X/L input has a two-second delay between fault code flashes.

Outputs

Output	Description
R	24 VAC system power
C	24 VAC system connection
G	Fan output connection
Y	Single (full) stage compressor output signal
Y2	Second stage compressor output signal
O	Reversing valve output signal (energized in cooling mode)
W	Single (full) stage heat output signal
W2	Second stage heat output signal
HUM	Humidity output signal
DHUM	De-Humidity output signal
LED	LED to display heart beat & communication
COMM	Communications port

System 24 volts AC Power Supply - (R&C)

The control has an "R" terminal sourced from the input "R" terminal and through one leg of the four-pin communication terminal. The control has a common terminal that is sourced from the input common terminal and through one leg of the four-pin communication terminal. It supplies a voltage to the control between 16 to 30 volts AC, 50/60 Hz.

Fan Output Signal - (G)

The control provides a pilot duty 24 volts AC output, to signal a conventional control that a call for fan is desired, based on communication from the touch screen control.

Single (Full) Stage Compressor Output Signal-(Y)

The control provides a pilot duty 24 volts AC output, to signal a conventional control that a call for single stage compressor is desired, based on communication from the touch screen control.

Second Stage Compressor Output Signal-(Y2)
The control provides a pilot duty of 24 volts AC output, to signal a conventional control that a call for second stage compressor is desired, based on communication from the touch screen control.

Reversing Valve Output Signal-(0)
The control provides a pilot duty 24 volts AC output, to signal an indoor unit (furnace or air handler) or a conventional heat pump control that a call for cooling is desired (meaning that the "O" terminal is energized when a call for cooling is desired), based on communication from the touch screen control.

Single (Full) Stage Heat Output Signal - (W)
The control provides a pilot duty 24 volts AC output, to signal a conventional control that a call for single stage heat is desired, based on communication from the touch screen control.

Second Stage Heat Output Signal-(W2)
The control provides a pilot duty 24 volts AC output, to signal a conventional control that a call for second stage heat is desired, based on communication from the touch screen control.

Humidity Output Signal - (HUM)
The control provides a pilot duty 24 volts AC output, to signal a conventional control that a call for humidity is desired, based on communication from the touch screen control.

De-Humidification Output Signal - (DHUM)
The control provides a pilot duty 24 volts AC output, to signal a conventional control that a call for de-humidification is NOT desired, based on communication from the touch screen control.

LED Heartbeat/Communication Indicator - (STATUS)
The control includes one LED that displays a heartbeat when the system is active. The same LED should display a rapid heartbeat during communications. The LED is red in color. The LED displays heartbeat/communication information as specified elsewhere in this document. The LED color and identifier are marked on the board. For instance, LED is labeled "STATUS".

Condition	Heartbeat/ Communication Indicator Behavior
System has 24 volts AC present and the microprocessor is active	2 sec ON 2 sec OFF heartbeat
System is active and presently communicating successfully	0.1 sec ON / 0.1 sec OFF

LED Operation

Fault Code Behavior

Fault Codes
The control will not store fault codes; it populates a register allowing the touch screen to communicate with the control that a fault code has occurred. After the fault code is no longer present and the lockout condition is cleared (as described elsewhere in this document), the control will resume normal operation based on the touch screen control's communication.

Fault Code Display

The control provides fault codes using the STATUS LED. Table 5-11 describes the display of the LED during fault codes. The control continues to populate the appropriate register until the condition that caused the fault condition no longer exists.

Unless otherwise specified, the control provides flashes that are a 1⁄44 second on and second off. The control displays a single fault code on the LED. The control displays the fault code on the LED and populates the appropriate register repeatedly with a 2 second off period between repetitions of the fault code. If multiple fault codes are present at the same time, the LED displays only the most recent fault.

Description	Required Condition	STATUS Flash Code (RED) Display	Control Response
Operational Faults			
Low Voltage (<19.2 VAC) preventing further relay outputs	Further calls for relay outputs prevented based on low voltage	5	See other section.
Low Voltage (<16 VAC) stopped current relay outputs	Relay outputs stopped based on low voltage	6	See other section.

Fault Code Display

X/L Input Behavior

The control determines the number of pulses being received on the "X/L" input terminal and stores this number as specified in another section of this document.

The "X/L" input register will allow the touch screen control to display the service required and allow a service technician to investigate the control generating the "X/L" signal to determine the cause of the fault. The most common use of the "X/L" input will be to communicate to the homeowner that a heat pump compressor is locked out.

If no signal is present at the "X/L" terminal, the register will be populated with 00h. If a constant 24 volts AC signal is present at the "X/L" terminal, the register will be populated with FFh.

General Operation Description

The control operates normally open relays which are controlled by the microprocessor for various outputs to control a conventional control. The control translates thermostat signals that are communicated by the touch screen control via serial communication to the indoor communicating interface board into relay outputs that a conventional control can use to operate the HVAC (Heating Ventilation and Air Conditioning) system.

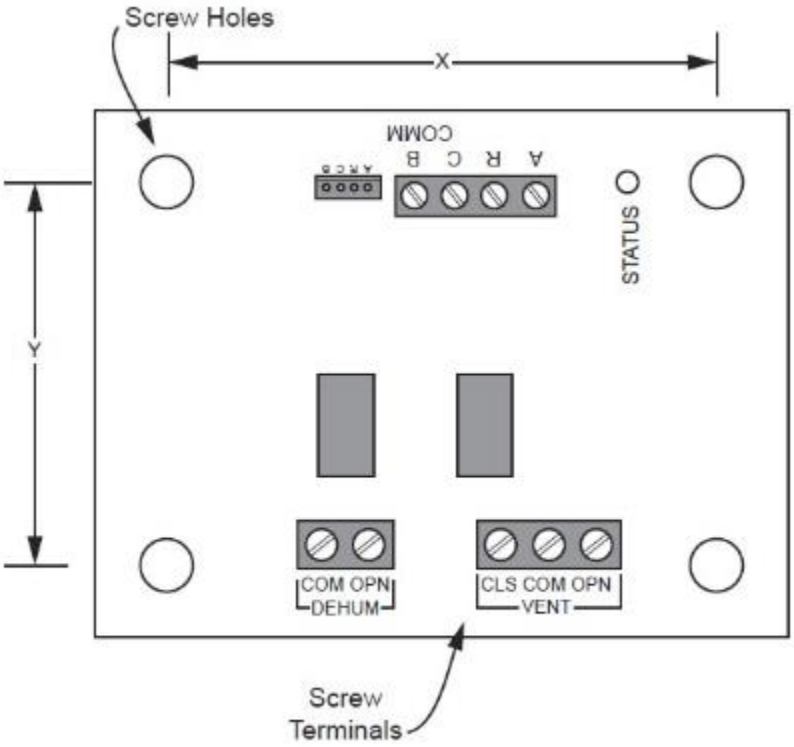
Power Up Operation

When power is first applied to the control, all outputs are turned off.

Power Interruption

If power to the control is interrupted for less than 20 milliseconds, the control resumes operation at the same point in the timing cycle that the interruption began but may not go to any other mode of operation. Power interruptions greater than 100 milliseconds may reset the control as a power-up sequence.

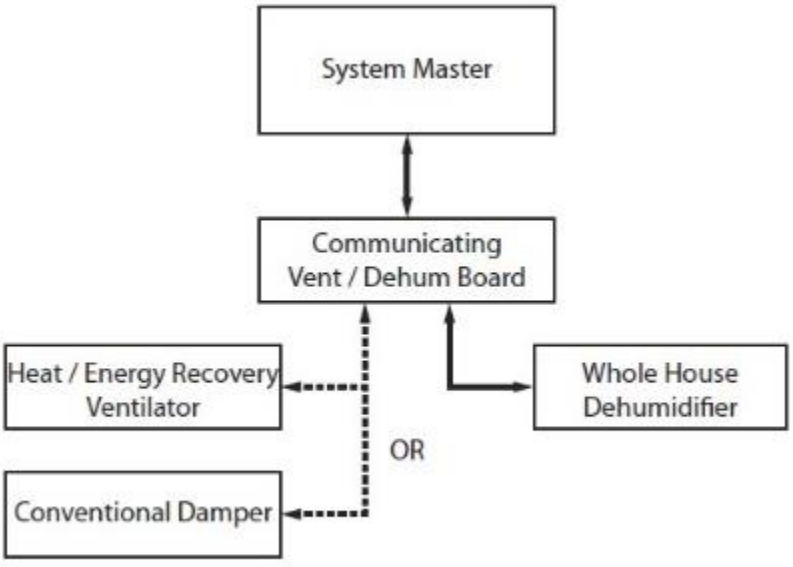
Ventilation & Humidification Interface Board Detail



Accessory Dehumidifier & Ventilator Accessory Board Layout

General Description

The control functions as an interface board between Johnson Controls Unitary Products' serial communication system and conventional supplemental accessories.



Connection Outline for the Accessory Ventilator / Dehumidifier Board.

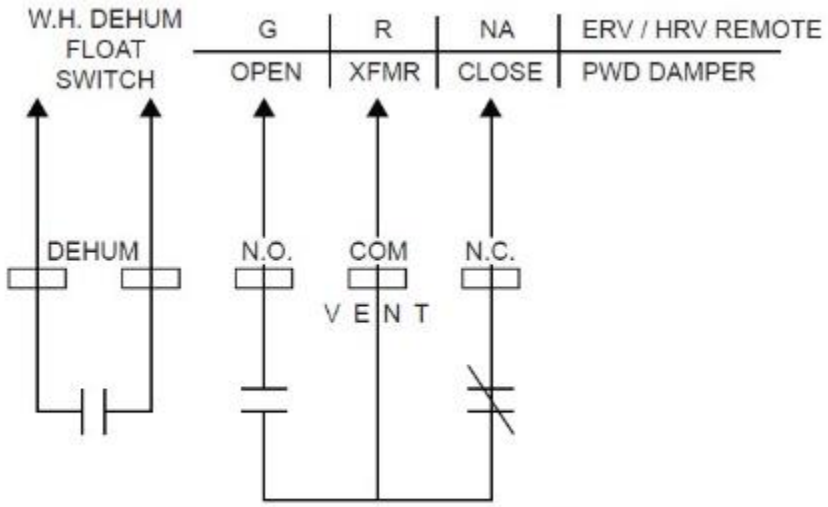
General

The control is designed such that any mis wire of the 24 volts AC inputs or outputs results in neither permanent control damage nor permanent disabling or bypassing of any of the control's safety functions.

Input Chart

Input	Description
COMM	Communications Port
COMM	Communications Port

Outputs



Accessory Dehumidifier & Ventilator Accessory Board Connections -- Internal Connections Shown at the Bottom of the Diagram

Output Chart

Scope	Output	Description
Vent	N.O.	VENT normally open connection
	COM	VENT common connection
	N.C.	VENT normally closed connection
DEHUM	COM	DEHUM common connection
	N.O.	DEHUM normally open connection
Status Indicator	LED1	Red LED heartbeat / communication indicator

Control Outputs

Terminal Identifiers

The terminal Identifiers are marked on the board. The identifier names are used to label the terminals.

VENT Terminal (N.O. & COM)

The control provides a normally open connection between the "COM" and "N.O (Normal Open)." vent terminals. The control closes the circuit when a call for ventilation is desired, based on communication from the touch screen control. The circuit returns to an open state when the call for ventilation is removed. The device which opens/closes the circuit can switch a maximum load of 30 VA at 24 volts AC.

VENT Terminal (N.C. & COM)

The control provides a normally closed connection between the "COM" and "N.C (Normal Close)." terminals. The control opens this circuit when a call for ventilation is desired, based on communication from the touch screen control. The circuit returns to a closed state when the call for ventilation is removed. The ventilator will be connected as shown in Figure 5-10. The device which opens/closes the circuit can switch a maximum load of 30 VA at 24 volts AC.

DEHUM Terminal (N.O. & COM)

The control provides a normally open connection for the "COM" and "N.O." terminals. The control closes the circuit when a call for dehumidification is desired, based on communication from the touch screen control. The circuit returns to an open state when the call for dehumidification is removed. The dehumidifier will be connected as shown in Figure 5-10. The device which opens/closes the circuit can switch a pilot duty load which should not exceed 3 VA at 24 volts AC.

LED Heartbeat/Communication Indicator - (STATUS)

The control includes one LED that displays a heartbeat when the system is active. The same LED should display a rapid heartbeat during communications. The LED is red in color. The LED displays heartbeat/communication information as specified elsewhere in this document. The identifier is marked on the board and may be labeled "STATUS".

Condition	Heartbeat/ Communication Indicator Behavior
System has 24 VAC present and the microprocessor is active	2 sec ON 2 sec OFF heartbeat
System is active and presently communicating successfully	0.1 sec ON / 0.1 sec OFF

LED Operation

Communication

RS485 Bus (ModBus)

External communications are made via a two wire RS485 connection. Additionally, 24 volts AC and ground wire are included. The data wires are marked "+" and "-" and are inverted from each other for differential operation. Data is transmitted on the same wires as received, therefore only one device should enable its output driver at a time and all communication is half-duplex.

Fault Codes

The control will not store fault codes; it populates a register allowing the touch screen to communicate with the control that a fault code has occurred. After the fault code is no longer present and the lockout condition is cleared, the control will resume normal operation based on the touch screen control's communication.

Fault Code Display

The control provides fault codes using the STATUS LED. The table below describes the display of the LED during fault codes. The control continues to populate the appropriate register until the condition that caused the fault condition no longer exists.

Unless otherwise specified, the control provides flashes that are a 4 second on and second off. The control displays a single fault code on the LED. The control displays the fault code on the LED and populates the appropriate register repeatedly with a 2 off period between repetitions of the fault code. If multiple fault codes are present at the same time, the LED displays only the most recent fault.

Description	Required Condition	STATUS Flash Code (RED) Display	Control Response
Operational Faults			
Control Failure	Control failure occurs & can be detected	ON	Notify of failure if possible
Low Voltage (<19.2 VAC) preventing further relay outputs	Further calls for relay outputs prevented based on low voltage	5	See other section.
Low Voltage (<16 VAC) stopped current relay outputs	Relay outputs stopped based on low voltage	6	See other section.

Fault Code Display

General Operation Description

The control opens/close circuits using switching devices which are controlled by the microprocessor. The control translates thermostat signals that are communicated by the touch screen control via serial communication into commands to control pre-defined IAQ (Indoor Air Quality) accessories.

Power-Up Operation

When power is first applied to the control, all outputs remain in their normal positions.

Power Interruption

If power to the control is interrupted for less than 20 milliseconds, the control resumes operation at the same point in the timing cycle that the interruption began but may not go to any other mode of operation. Power interruptions greater than 100 milliseconds may reset the control as a power-up sequence.

07

Zoning

Zoning

This section provides information regarding system configuration when applied to a forced air zoning system and assumes a level of familiarity with the non-zoning Residential Communicating Control System.

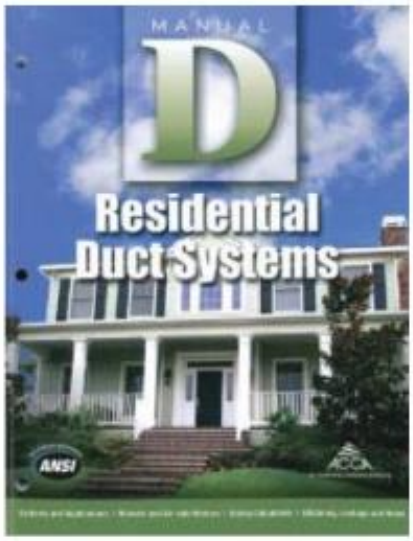
The information presented here does NOT replace fully reading and understanding all provided literature, including but not limited to:

- Installation Instructions
- Technical Guides
- Other Ducted Systems Literature
- Industry Reference Materials

This information is subject to continuous improvement and may be updated at any time without notice and is not inclusive of all design knowledge required to successfully specify and install the airside components of a residential zoning system. We will, however, provide references to these important materials. Capabilities and limitations of zoning are discussed here, with components, installation procedures, and control setup.

The original Residential Communicating Control online course, as well as this course, are available for review on your iPad or other tablet device. Navigate to Mobile Device Central on the ProficienTECH technical training site.

Preparations



ACCA Manual D

When considering zoning in a residential forced air application, close detail is required regarding overall system design. This section provides guidance on areas critical to the proper application of a forced air zoning system.

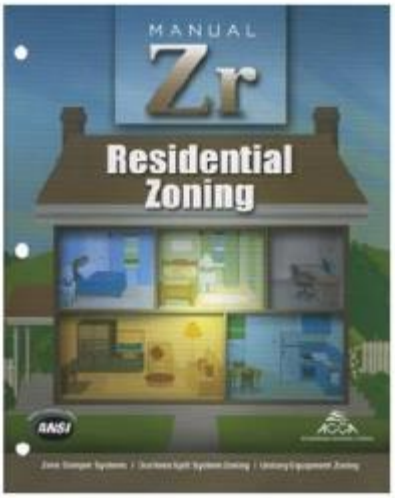
ACCA (Air Conditioning Contractors of America) Manual D (residential duct systems) and ACCA Manual J (residential load calculation) are critical reference documents in the proper specification and installation of airside components, and heating and cooling equipment capacity selection. The system capacity must be sized to match the heat loss and gain of the structure. It is not to be oversized, nor undersized because zoning is being applied to the job.

Properly sized heating and cooling equipment combined with a properly designed and installed air distribution system are the first steps in creating a comfortable, efficient environment for the end user.

In addition, ACCA Manual ZR provides a reference when considering requirements for residential zoning. Many of the industry-accepted methods of airside component selection and installation referenced in this program may be found in this comprehensive manual.

Prior to selecting airside zoning components, this important document should be used as a guideline.

Ducted Systems provides paper copies of installation and user's manuals with the product. They may also be found in pdf format on Solution Navigator under the "Equipment Catalog" section.



ACCA Manual ZR

When selected and installed properly, zoning will provide a more comfortable environment in each of the zones and may reduce operating costs.

Zoning will NOT correct bad duct design or installation. In fact, zoning may amplify bad airside system design issues, and will NOT correct system deficiencies due to equipment that is improperly sized for the application.

Zoning Component Selection & Installation

This section presents the components required in the Residential Communicating Control System: Zoning application.


Pre-planning installation

Component detail is also provided in the Installation Instructions provided with each component.

As with any forced air system, whether zoning or non-zoning, the importance of proper system design.

ACCA Manual J is the resource for load calculation, ACCA Manual Zr and D are to be consulted regarding duct design. During the configuration process through the touch screen, specific CFM values are set by the installer to match the requirements of the zones they will be serving. If these values are unclear or unknown, please take a step back and confirm the required values and that the duct system installed is properly applied and sized to serve the areas they are serving.

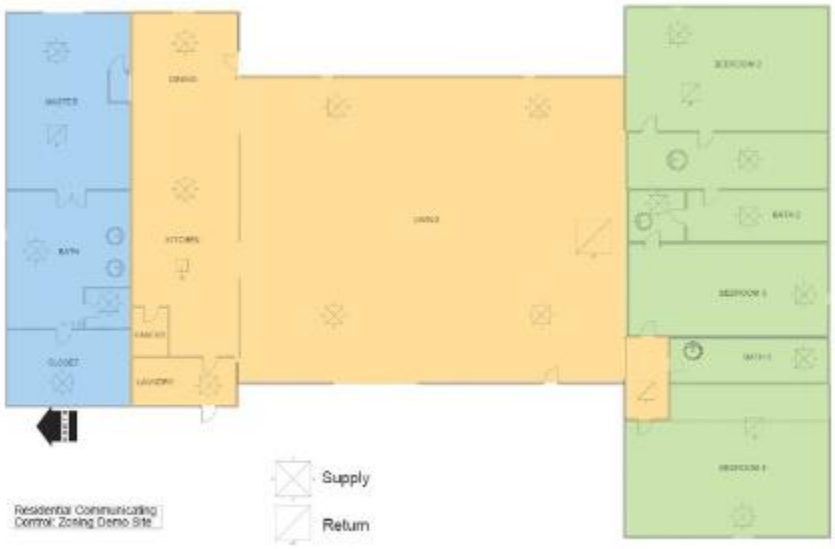
The equipment and duct selection and sizing, when referring to the resources mentioned above, will not differ from a zoned system to a non-zoned system. The difference will be in proper addition of the bypass damper when possible.

Do NOT attempt to oversize or undersize ductwork or undersize system capacity with the logic that it is being installed in a zoning application. These tactics will not result in a satisfactory application.

The Residential Communicating Control System: Zoning application requires both the indoor and outdoor units to be communication capable. The exception to this rule is a Unitary Products communicating furnace with a non-communicating air conditioner. The current modulating models are communications-capable, two stage communicating furnaces will be available soon.

The auxiliary board, which is used to connect non-communicating or competitive indoor equipment to a non-zoning Communicating Control System, may NOT be used in a Communicating Zoning application.

As with any properly designed and applied forced air system, it is important to have a game plan. In advance of the installation, the system configuration must be thoughtfully designed using the industry references mentioned as guidelines.



Sample Zoning Layout

The example referenced here is a 2400 square foot, 4-bedroom home. When considering the zoning application for this structure, the living area, bedrooms, and master suite were selected as independent zones. This represents the floor plan of the sample demonstration site, along with supply diffuser and return grille locations. This is NOT drawn to scale but provides a general overview of how zoning was applied to this application.

In this case, the Master suite (blue area) was selected as Zone 1, with a touch screen control. The Living area (yellow) is configured as Zone 2, also with a touch screen control. Zone 3, the bedrooms on the south end of the home (green), are controlled by a zone display in the most often occupied bedroom.

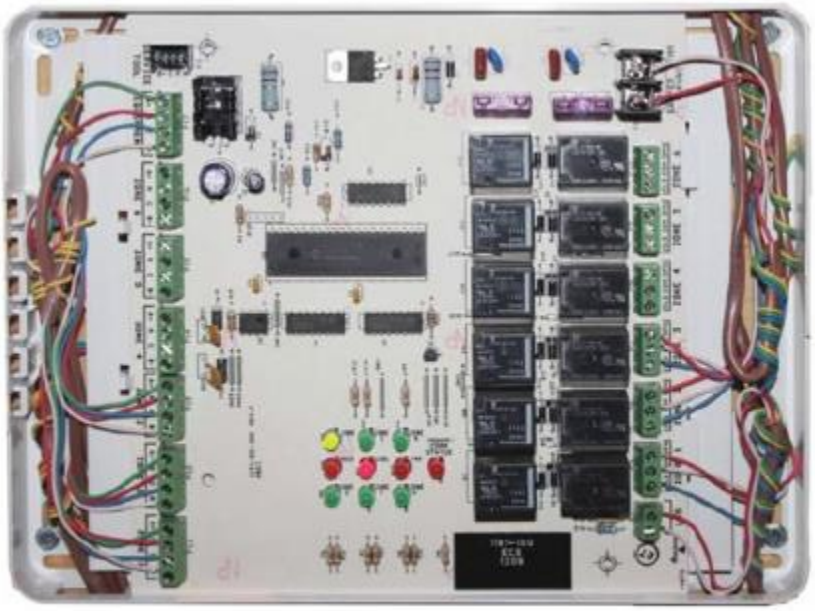
The sample home does not have an abnormal amount of glass and is in the south-central US. The equipment selected includes a four ton, two stage air conditioner. This required airflow for four tons (approximately 1600 cfm) will be distributed to the zones, following industry guidelines for duct sizing and layout, and bypass damper selection and application. More details on these elements will follow later in this program.

Components

Communicating Zoning components include the zone panel, zone sensors (which include touch screen, sensor with display or no display), zone dampers, bypass damper, damper transformer, and leaving air sensor (LAS).

The Communicating Control Zoning Panel serves up to 6 zones and provides connections for the equipment, zone controls, and zone dampers. LEDs (Light Emitting Diodes) provide system status information. A Service Tool connection is provided for connection of a touch screen control for setup and diagnostics.

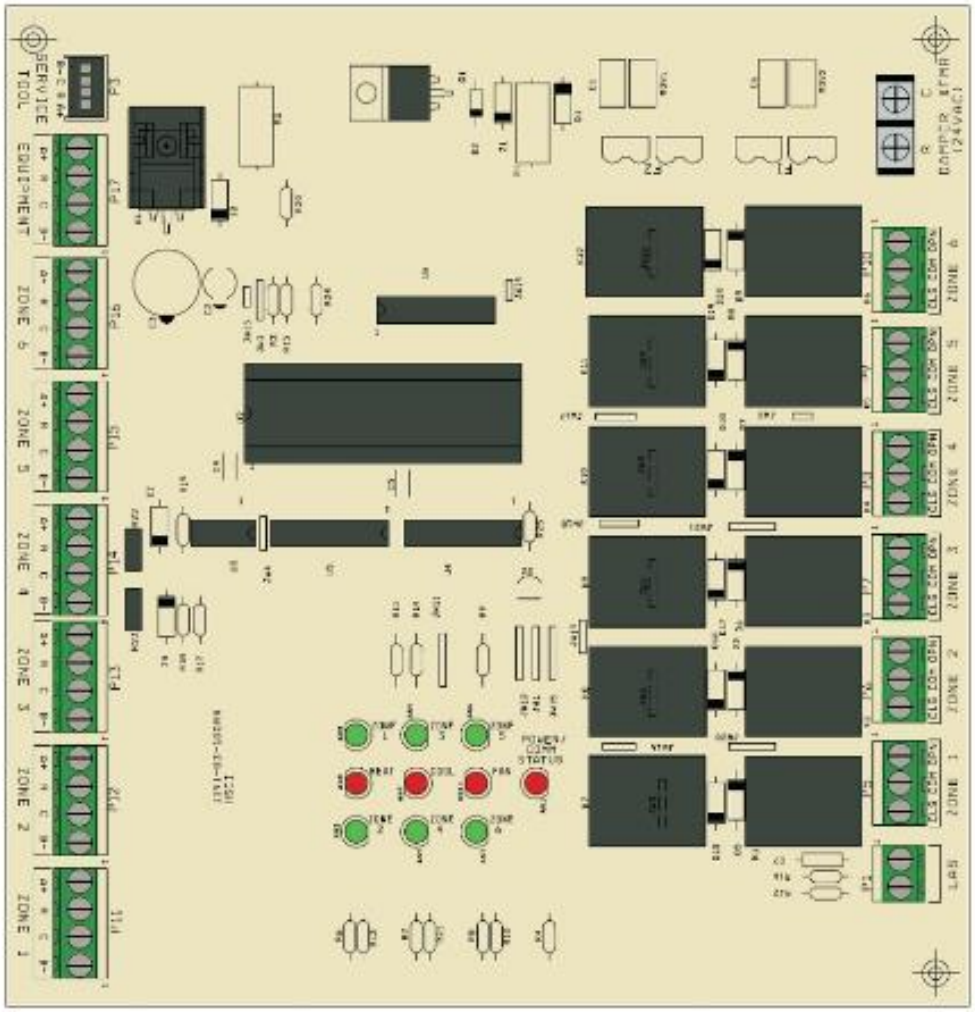
This example application uses three zones. Each zone sensor is connected to the board, with a separate connection to the equipment.



Installed Zone Panel

The Zone Panel kit includes a USB (Universal Serial Bus) drive preloaded with the required touch screen zoning firmware, leaving air sensor, installation instructions, and user's instructions. Instructions on the installation of firmware are provided later in this program.

The zone panel must be mounted on a solid surface, not closer than 3 feet of high voltage lines. It is not to be mounted to the indoor equipment.



Control Wiring

Signal	Definition	Label
Data	Non-inverted signal	A (+)
Low voltage power hot	24 VAC (Hot)	R
Low voltage power common and data ground	24 VAC (Common)	C
Data	Inverted signal	B (-)

Damper Terminal Designations

Signal	Definition	Label
Damper N.C. Output	Damper Normally Closed	CLS
Damper Common Output	Damper Common	COM
Damper N.O. Output	Damper Normally Open	OPN

LED Designations

Power/Comm Status LED	Condition
Slow Blink	Power applied, not communicating
Fast Blink	Power applied, communicating
3 Flashes	Voltage below 19.2 VAC
4 Flashes	Voltage below 16 VAC
5 Flashes	Shorted leaving air sensor
6 Flashes	Open leaving air sensor

Damper Status LED	Condition
On	Damper is fully open
Off	Damper is fully closed
Fast Blink	Damper is opening or closing
Slow Blink	Damper is partially open

Communicating Zone Panel

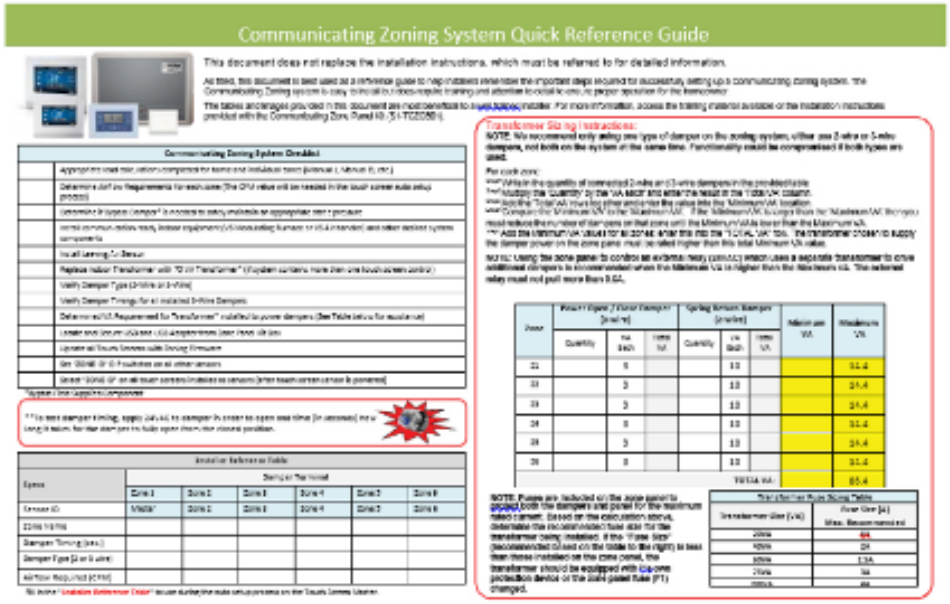
Transformers (Damper & Equipment)

Standard 40VA transformer

When more than one touch screen is installed in the system, it is highly recommended to replace the 40 VA transformer furnace or air handler transformer with a field supplied 75 VA transformer.

The dampers are powered from a separate field-supplied transformer connected to the zone panel. This does NOT refer to the transformer in the furnace or air handler and is a SEPARATE field supplied transformer.

The number and type of zone dampers used will dictate the VA rating minimum. This includes two or more dampers tied in tandem to serve a single zone. A chart is provided in the Quick Reference guide for the installer to calculate the required VA capacity.

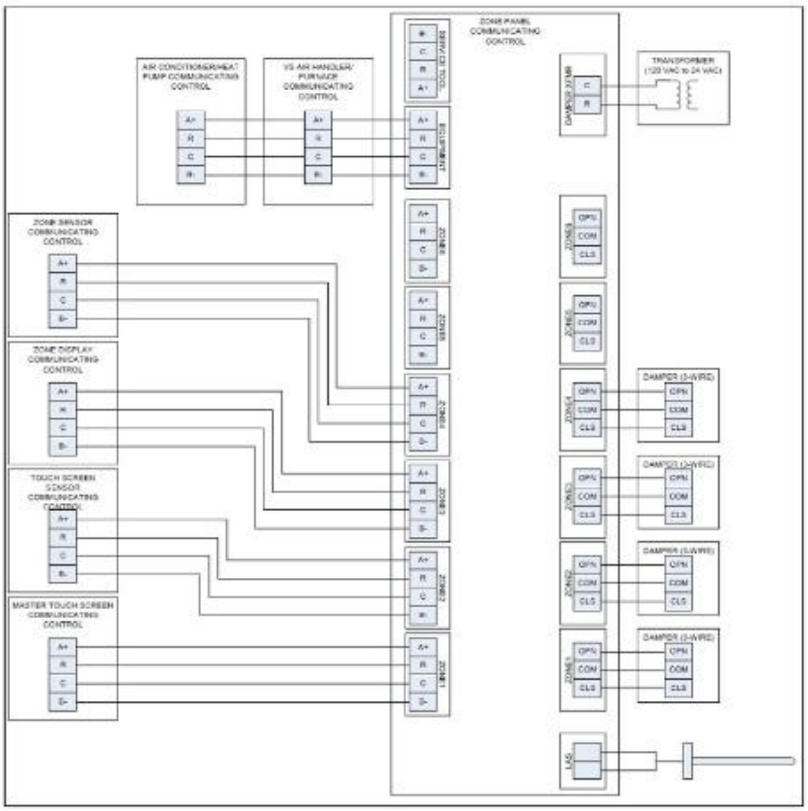


Quick Reference Guide

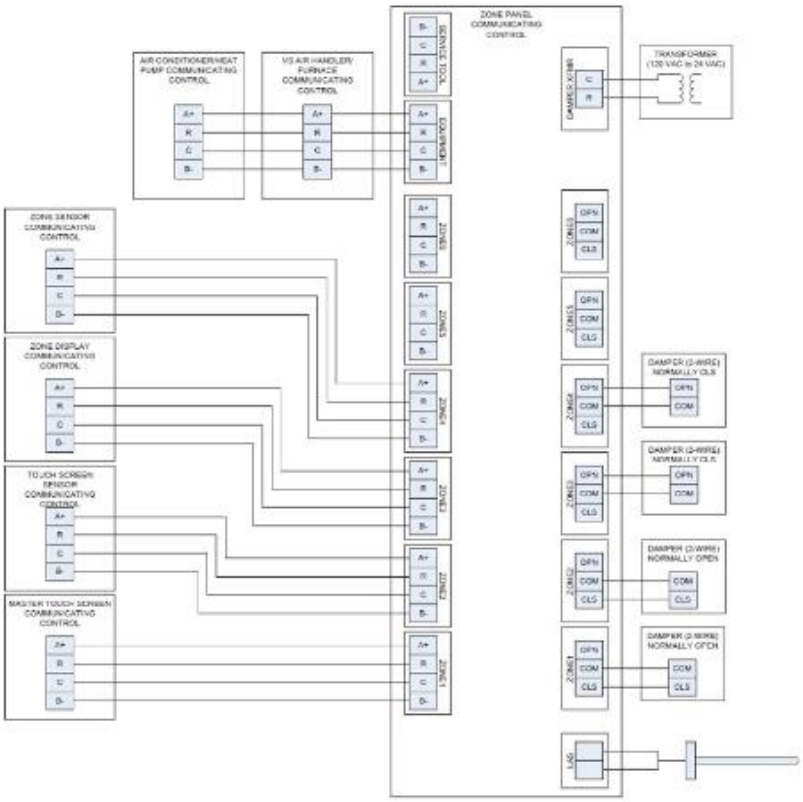
Zone Sensor Wiring

Zone sensors, regardless of type, are wired terminal-for-terminal to the corresponding zone connections on the Zone panel. Though they may be connected in any order, it is considered "best practice" to match the zone sensor to its corresponding place on the Zone Panel... (i.e., the Master is connected to Zone 1, Zone 2 is connected to Zone 2, Zone 3 to Zone 3, etc.).

Zone sensor connections are made with 4 wires - two for power and two for communications. Shielded cable is not typically required. When running system wiring, maintain distance from high voltage or inductive loads that could interfere with system communications. The following pages illustrate system wiring with a communicating indoor and outdoor unit, one with three wire dampers, one with two wire dampers.

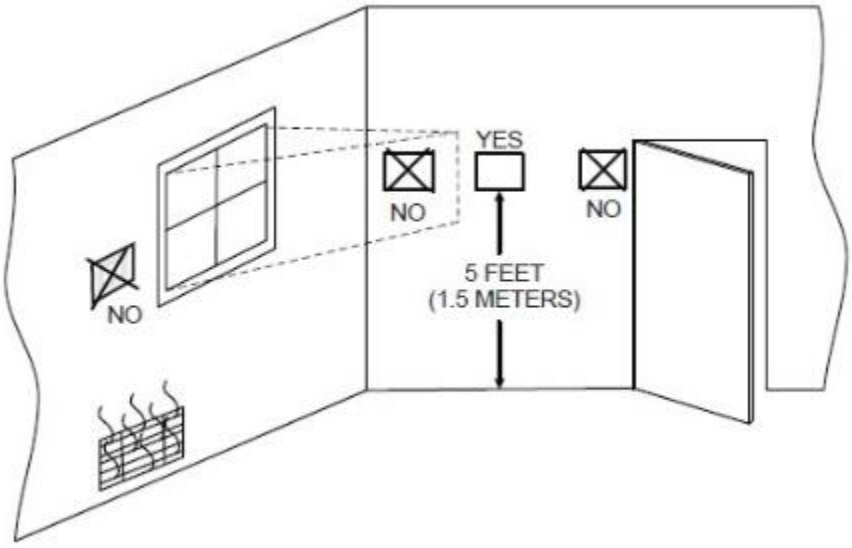


System Wiring with 3-Wire Dampers



System Wiring with 2-Wire Dampers (N/O).

Zone Sensor Locations



Sensor Locations

The location of the touch screen and zone sensors should be the same as any traditional thermostat.

Touch Screen

In a Communicating Zoning system, at least one touch screen zone sensor is required. When only one touch screen is used, it is configured as the Master zone, or Zone 1. The touch screen provides the end user access to adjust the comfort settings, and provides the installer and service technician access to system configuration and diagnostics.

Elements of the touch screen display are illustrated here. This screen represents the "Advanced Programmable" view mode. More basic view modes, along with selectively showing or hiding screen elements, are configured though the Service Menu, just as with the non-zoning Communicating Control System.

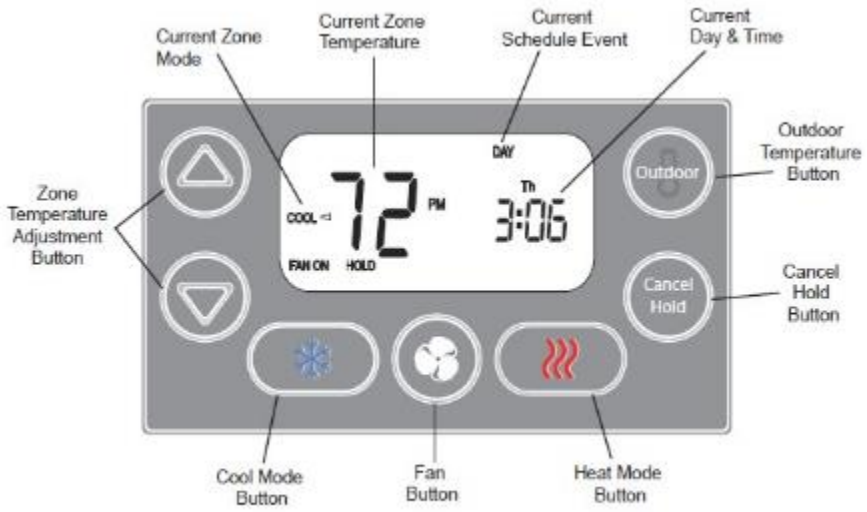
Home Screen

A list in the installation instructions contains USB drives validated to work with the Residential Communicating Control System. Others on this list may or may not be recognized by the system.

The USB drive provided with the Zone Panel kit, of course, is functional with the system. Comfort Studio is available for zoning applications, allowing the installer to pre-populate data to the touch screen via USB device.
Comfort Studio is available for zoning applications, allowing the homeowner to populate data to the touch screen via USB device.

Zone Display

The zone display provides adjustment of the zone temperature setpoint, program override, and fan control. The outdoor temperature may be viewed. The User's Manual provides detail on the display.



Zone Display Elements

Under the hood of the zone display, dip switches are preset that are configured during installation. A chart illustrating switch positions for various zone numbers is provided on the circuit board.

Zone Display Under the Hood

Note
There is an amber transparent plastic covering over the dip switches which may be removed when setting the switch position.

The zone number selected must be sequential based on the total number of zones in the system, and the zone number must be unique. This is required for the zone sensor to be "found" on the network by the Master.

The Zone Display, with all three dip switches in the "OFF" position, is configured as Zone 2.

When the dip switches are configured as shown in the shaded area of the chart, the zone sensor is configured as Zone 3.

Zone Sensor

Zone Sensor Under the Hood

The Zone Sensor does not provide a user interface or means of temperature setpoint adjustment within the zone. The Zone Sensor is often used in areas where adjustment is not desired, such as children's rooms or light commercial applications.

The Zone Sensor is configured in the same manner as the Zone Display.

The Zone Sensor must be properly addressed to be able to communicate with the System Master. Dip switches are present underneath the cover, which allows zone number configuration during setup. A chart with dip switch positions is provided in the Installation Instructions.

Note
There is an amber transparent plastic covering over the dip switches which may be removed when setting the switch position.

Leaving Air Sensor (LAS)

The leaving air sensor (LAS) is included in the zone panel kit and is field installed into the plenum.

The sensor is a 10K ohm NTC thermistor and serves as protection for the equipment. Limit settings in both heating and cooling modes are configured through the touch screen control.

Leaving Air Sensor (LAS).

Dampers

Three Wire Damper Actuator

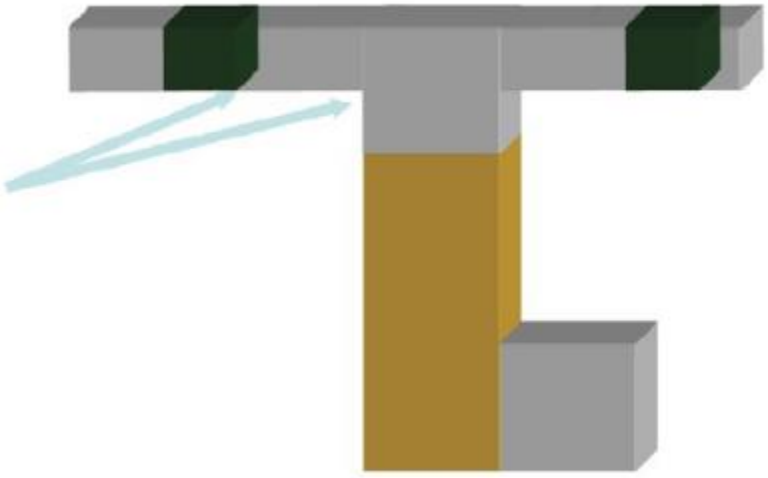
Dampers are matched to the duct size required for the total design CFM the zone served. If the "bleeding" functionality is required, 3 wire dampers are required.

Whether 2 or 3 wire dampers are selected, all system dampers must be of the same type. Do not mix 2 and 3 wire dampers in the same system.

Three wire dampers are wired to the "OPN", "COM", and "CLS" damper terminals on the zone control board. The LED (Light Emitting Diodes) indicate damper position. Red indicates closed (blinking red is closing), green indicates open (blinking green is opening).

Third party two wire (power open, spring close or power close, spring open) dampers may be used with the Communicating Control Zoning System. Two wire dampers that are power open are connected to the "COM" and "OPN" damper terminals on the zone control panel. Power close dampers are connected to the "COM" and "CLS" damper terminals on the zone control panel.

It is NOT recommended to mix three and two wire dampers in the same system. All dampers should be of the same type.



Damper Locations - Minimum Three (3) Feet From Plenum

Dampers should be installed a minimum of 3' from the plenum. This will reduce turbulence and will allow zones to receive the proper CFM as designed.

Regardless of the number of zones calling, adequate airflow must be maintained through the equipment (furnace or air handler).

Bypass (Excess Air Management)

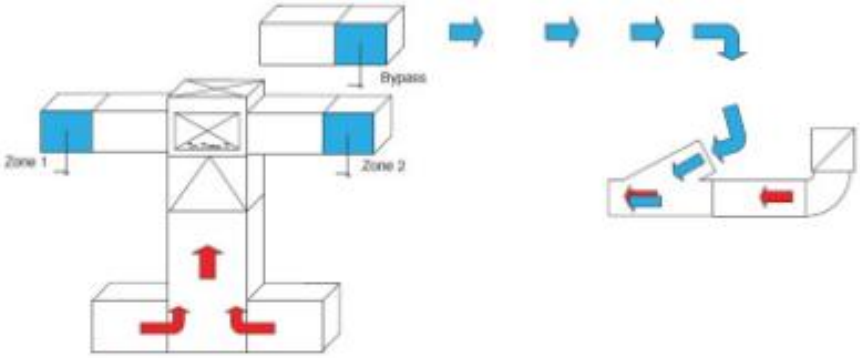
The bypass damper, dump zone, or bleeding algorithm are used to manage excess air in the zoning system. The following provides illustration of sample applications of bypass, dump zone, and bleeding.

Bypass damper sizing and proper application is critical to the comfort of the end user, operational sound levels, and equipment efficiency. The goal with the bypass damper is to allow maintenance of proper airflow through the furnace or handler, even when the smallest zone is calling. This includes honoring the limitation of residential equipment to deliver its rated airflow at up to .5" w.c. external static pressure.

When the smallest zone is calling, the remainder of the required airflow must be bypassed, maintaining the system external static pressure at or below the .5" w.c. equipment rating. **The total system CFM minus the smallest zone cfm provides the basis of sizing the bypass damper.** ACCA Manual Zr contains in-depth information regarding bypass selection and application.

There are two primary methods of bypass, which are bypass from supply to return, and bypass to "dump zone". For each method of bypass, there are two types of bypass dampers available, barometric, and static pressure sensing (modulating). Application and installation methods of the bypass damper are as critical as sizing.

The image below illustrates one method of bypass application.



Bypass Into Return Air

Bypass (Supply to Return)

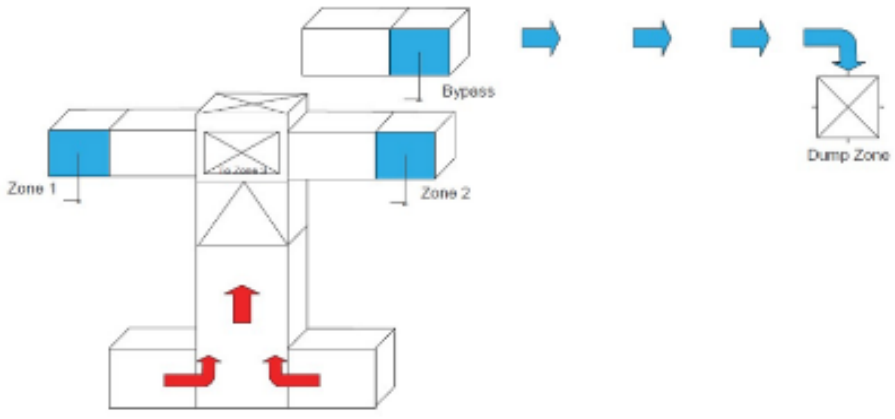
The bypass damper provides air passage to the return air stream. This connection is downstream of the return airflow from the return grilles. The conditioned air is mixed with the non-conditioned air from the living space. As a result, the return air temperature will not create equipment operational concerns (i.e., shutting down on limit controls) in cooling or heating modes.

The Residential Communicating Control Zoning System uses a leaving air sensor (LAS) which has setpoints that are configurable through the touch screen display.

Bypass (Dump Zone)

Another means of bypass air handling is the "dump zone". This is an area where temperature control is not critical, which could be an unfinished partition or basement, to dump excess conditioned air. A properly sized barometric bypass damper or three wire modulating dampers with an added static pressure sensor may be used.
The barometric relief damper reacts to static pressure and is adjusted by moving a counterweight on the damper arm. Reaction time is fast to changing static pressure.

The barometric relief damper is a mechanical device not controlled by the Communicating Control System. This fact emphasizes the importance of proper selection and setup for the application.
Source 1 carries barometric bypass dampers in both rectangular and round configurations.



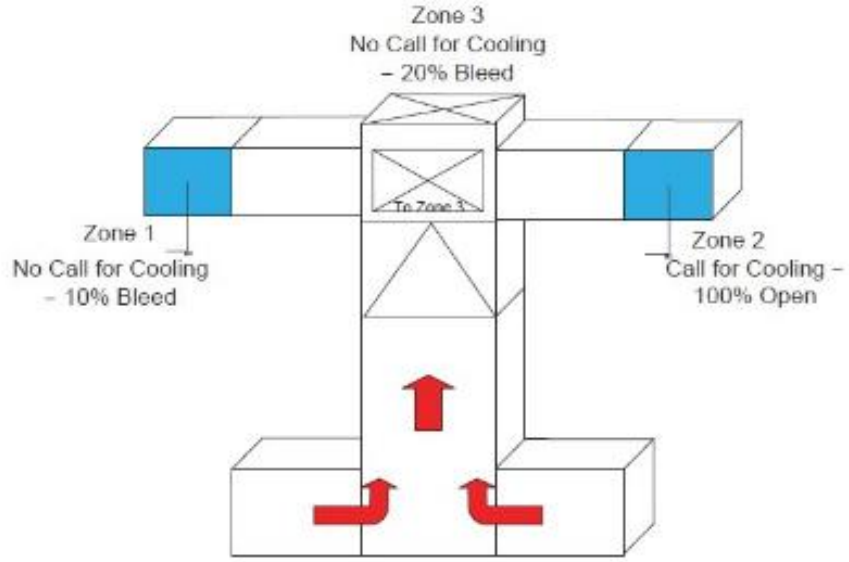
Bypass Dump Zone Application

A modulating three wire damper may be used in combination with a Static Pressure Switch.
As zone dampers open and close, the Static Pressure Switch modulates the three-wire damper to maintain between .2" and .3" supply static pressure. The modulating damper/static pressure switch combination is not controlled nor monitored by the Communicating Control System in any way. This fact emphasizes the importance of proper selection and setup for the application.

When zoning variable speed furnaces or air handlers, an increase in air pressure will occur every time a zone damper closes. This will cause the blower to speed up, additional noise and potential draft in the open zones. This condition is explained in detail in ACCA Manual Zr. A slow-reacting modulating bypass damper with a damper time set to match the damper time of the system dampers will minimize this effect.

Bleeding

Bleeding is an available function of the Residential Communicating Control Zoning System when 3 wire dampers are used. This may be used in areas where bypass is not possible or is not permitted per local code.



Zone Bleeding

This image illustrates a scenario where Zone 2 is calling for cooling, therefore is 100% open. Zones 1 and 3 are also in cooling mode but are not actively calling. Based on an internal algorithm and the installer-selected CFM value to the zones 1 and 3, the dampers bleed a percentage of air into the non-calling zones.

Bleeding is not appropriate for all applications. It could reduce comfort level for some applications by over-conditioning non-calling zones.

Sample Zoning Layout & CFM Requirements

With the example used earlier, Zone 1 is designed for 400 cfm, Zone 2 is 750 cfm, and Zone 3 is 500 cfm. With the smallest zone calling (Zone 1-400 cfm) and a first stage cooling call (1050 cfm required through the evaporator coil), 1050-400 = 650 cfm that must be bled into the remaining two zones.

When second stage cooling is initiated, the bleeding requirement is 1250 cfm (1650 cfm - 400 cfm). In this three-zone application, it is apparent that if bleeding is used exclusively rather than bypass, there is a good possibility of over-conditioning Zones 2 and 3.

There are many factors that determine how the bleed feature functions in a particular application.
The most significant factor that an installer can control is the proper selection of cfm setup in the Zoning Airflows screen, which will be reviewed in the next section. Setting higher values than required or more than the system can deliver will result in a higher percentage of bleeding with a greater potential to over- condition zones being bled into.

Airflow Bleeding Options

Zone Bleed Permissions

Bleeding permissions may be configured (or disabled) by the installer via the Zone Settings screen in Service Mode. This screen is only present when 3 wire dampers are selected.

Bleeding is implemented in order shown top to bottom. Options include:

- Allow same mode airflow bleeding (always enabled)
- Allow Master to bleed excess air into zones that are operating in the same mode (heating or cooling) but not calling for conditioning.
- Allow off mode airflow bleeding.
- Allow Master to bleed excess air into zones that are in Off mode (not heating or cooling mode)
- Allow opposite mode airflow bleeding.
- Allows Master to bleed excess air into zones that are in opposite mode (heating when in cooling mode or vice versa) but not calling for conditioning.

The Zone Sequence is only utilized in scenarios where all other variables in all zones are equal.

Firmware Update & System Setup

This section reviews firmware update on an existing zoning system with a modulating gas furnace and two stage air conditioners. This is used as a basis to view many of the screens that an installer will encounter. Screens will vary based on installed detected, but the overall flow is similar.

Accessing Service Mode

To enter Service Mode, press and hold the logo in the upper right corner of the screen.

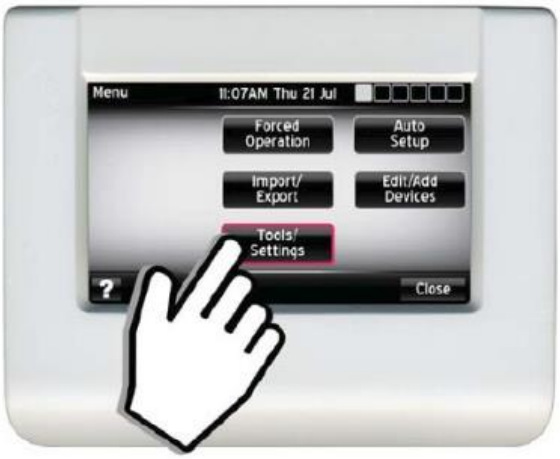
Entering Service Mode

A warning will be issued if an end user tries to access service settings.

The warning shown is to discourage end users that may attempt to access Service Mode without proper system knowledge.

Service Mode Menu Button

From the Service Mode Screen, touch “Menu.”



Service Mode Menu > Tools/Settings

…then “Tools/Settings.”

Service Mode Menu > Tools/ Settings > Administrator Tools

From the Tools / Settings menu, touch “Administration Tools.”

Select “Firmware.”

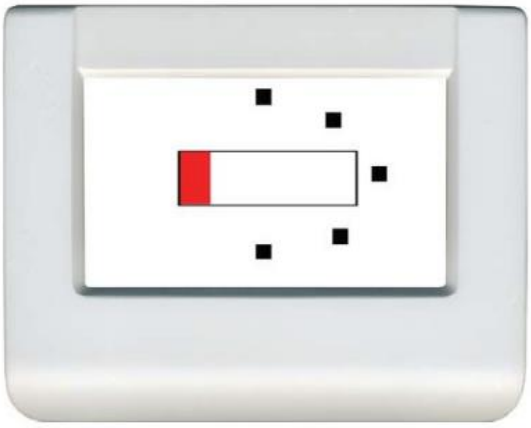
Service Mode Menu > Tools/ Settings > Administrator Tools > Firmware

If the USB drive containing the firmware is already attached, this screen will appear and disappear quickly. Otherwise, a prompt is provided to insert the USB drive.

Upgrade Firmware Prompt

Loading Upgrade Screen

When the firmware installation starts, this screen is shown.



Loading Firmware Progress Bar

During firmware installation, (approximately 3 minutes), a progress bar is shown with animated squares.

Note
If loading firmware to an earlier model touch screen, the loading screen appearance may differ.

Loading Firmware Final Screen

This screen indicates that eh firmware is now being loaded. This takes approximately 1 minute, 15 seconds. The USB drive should be removed at this point.

Note
If the USB drive is not removed at this time, at the end of the loading cycle, the touch screen will indicate that a ".hex" file has been found and will prompt the installer to proceed through the loading process.

Set Time & Date

When loading is complete, the system prompts the time and date. This information is only entered on the system Master (zone 1) control and is sent via the communications bus to the other zones.

Software Revision Screen

The software revision is displayed. The “z” indicates that zoning software is installed. “nz” is for non-zoning applications.

Listening for Network Traffic Screen

The system Master then listens for network traffic. This includes other zone sensors, zone control boards, and communicating equipment.

Selection of Touchscreen Operational Mode

This is Zone 1 and is considered the System Master. System Master mode is selected.

Gathering System Operation Screen

Knowing that this touch screen is the System Master, other sensors are being detected.

Confirm Setup of Zone Sensors Screen (Master Touchscreen)

When this message is presented, it is time to verify that all other zone sensors are properly installed and configured. Do not pass this message until this has been verified.

Communication Error Screen

This is a normal error message during setup, as this zone sensor (Zone 2) has not yet been configured and cannot communicate with the Master.

To configure Zone 2, Service Mode will have to be accessed. Touch and hold the logo (upper right corner of the touch screen).

Tools/ Settings

Service Mode is now available on the Zone 2 touch screen. From here, select “Tools/Settings.”

Tools/ Settings

From the Tools / Settings menu, select Administrator Tools.

Tools/ Settings > Firmware

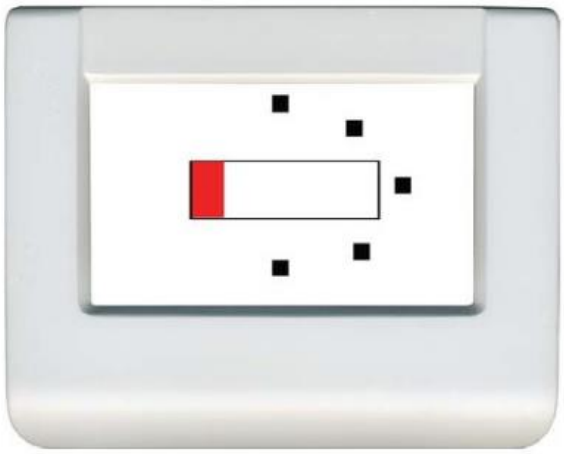
From this menu, select “Firmware.”

Upgrade Firmware Screen

If the USB drive containing the firmware is already attached, this screen will appear and disappear quickly. Otherwise, a prompt is provided to insert the USB Drive.

Loading Software Screen

When the firmware installation starts, this screen is shown.



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Note
If the USB drive is note removed at this time, at the end of the loading cycle, the touch screen will indicate that a ".hex" file has been found and will prompt the installer to proceed through the loading process.

Set Time & Date

After firmware loading, the zone sensor prompts date and time entry. This information was already entered on Zone 1 Master, and it is not necessary to enter again. The time and rate for zones 2+ will be updated via the system bus.

Software Revision Screen

The software revision is displayed. The “z” indicates that zoning software is installed. “nz” is for non-zoning applications.

Listening for Network Traffic Screen

The Zone 2 touchscreen then listens for network traffic. This includes other zone sensors (including Masters), zone control board, and communication equipment.

Operational Mode Screens

There is only one System Master, which is always Zone 1. If a Master is already present and is communicating, the two-button screen will be presented. This also appears when a touch screen is connected in Service Tool mode. For Zone 2, Sensor Mode is the correct selection.

Zone ID Screen

This screen allows establishment of the Zone ID. This is Zone 2, so the Zone ID already on the screen is correct. Zone IDs are unique – duplicate zone IDs are not permitted.

Network Traffic Detected Screen

At this point, the Zone 2 sensor is waiting for approval from the System Master and confirms configuration as Zone 2. If changing the Zone ID is necessary, it can be done through the “Reconfigure” button.
For now, we will return to the System Master.

Zone Sensor Configuration Confirmation Screen

The Zone 2 touch screen has been configured, and Zone 3 has already been configured as Zone 3 via dip switches on the Zone Display.

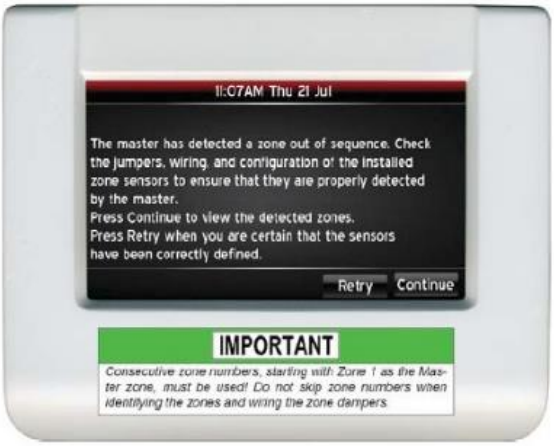
Press “Ok” to continue.

Gathering System Information Screen

The system is polled again for the presence of zone sensors, zone panel, and communicating equipment.

Validating System Information Screen

The system information obtained is then validated.



Zone Out of Sequence Screen

This message will occur with zones not configured properly, such as a gap in the zone addresses.
If this occurs, follow the on-screen instructions, and select “Retry.”

Repair Part Detected Screen

When the firmware updates and configurations, touchscreen is viewed as a “repair part.” Select “Continue.”

Change Settings Confirmation Screen

This screen confirms that the previous configuration will now be loaded to the “new part,” or in this case the System Master with updated firmware. Select “Continue” …

Climate Selection Screen

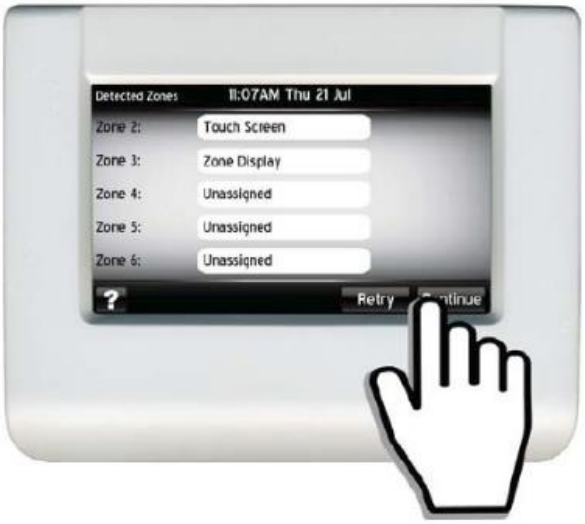
Climate selection is presented on this screen. Select the climate description that is most accurate. This will alter the blower ramp timing in cooling mode.

After selection, touch “Next.”

Airflow Summary Screen

The Airflow Summary screen is based on connected communicating equipment.

In this case, a four ton, two stage communicating air conditioner is installed in this system, with 1650 cfm being delivered in High Cool (second stage cooling), and 1050 cfm delivered in Low Cool (first stage cooling). These values may be adjusted by touching the cfm values on-screen. These values are correct for this application, they will not be adjusted in this example.



Detected Zones Screen

From this screen, confirm that all zones are recognized as they were configured.

In this application, Zone 2 is a touch screen, and Zone 3 is a zone display. If changes are necessary, make them at the zone(s) requiring changes, then press “Retry.” Otherwise, if all are correct, select “Continue.”

Zoning Configuration Screen

The zones have already been established, here the damper types and heat/cool changeover time are selected. Power open / power closed dampers are 3 wire dampers. Power open / spring close or Power close / spring open dampers are 2 wires. It is important to use only one type of damper in a particular system.

Heat / cool changeover time specified the length of time allowed in a particular mode if there is an opposite mode calling.

Damper Times Screen

The damper times must match the specification of the dampers selected. This is the time that dampers will be driven to open / close. They may be changed here.

The damper times determine damper position when airflow bleeding is active. The Zone Control does not receive position feedback from the dampers.

Make sure that the damper time selected here reflects the actual dampers installed. Then, touch “Next.”

Zoning Airflows Screen

The zoning airflows are set to match the requirements of the space as calculated by the load calculations and selected duct configuration. The values entered here are used to calculate bleeding percentages and are important if the bleeding feature is enabled.

This screen will allow values to be entered that exceed system airflow capacity, but this will not affect the cfm being moved through the equipment. Regardless of demand, the equipment must always have proper airflow maintained through it.

Setting Master CFM

This screen modified the airflow for Zone 1, the Master. Airflow values are modified by adjusting the slider up or down, or by use of the (+) or (-) symbols.

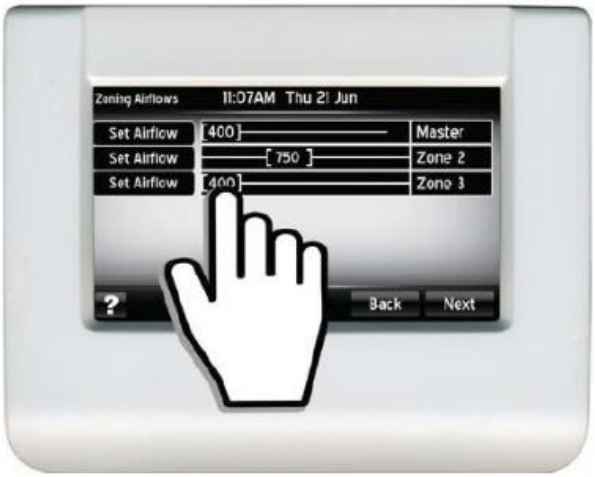
Using the test button forces the system to close all other dampers except the zone being configured. The system will then run the selected cfm on the indoor equipment (no outdoor equipment operation) which allows the installer to check this airflow setting on this zone (static pressure, noise, velocity). NOTE: The cfm being delivered to the zone will be delayed by the timing selected for the dampers, so that the dampers can actuate. When finished, touch “Back.”

Zoning Airflows Screen

Back at the Zoning Airflows screen, the Master airflow will reflect changes made. In this case the cfm is set to 400 cfm. By touching the Zone 2 cfm value, it can be updated as well.

Zone 2 Set Airflow Screen

Zone 2 airflow is established here and must be set to match the design requirement of Zone 2. Zone 2 is a larger zone and has a cfm requirement of 750. When finished, touch “Back.”



Zoning Airflows Summary Screen (Zones 1 & 2 Set)

Back at the Zoning Airflows screen, the Zone 2 airflow reflects the update from 400 cfm to 750 cfm. By touching the Zone 3 cfm value, it can be updated as well.

Set Zone 3 Airflow Screen

Zone 3 airflow is established here and must be set to match the design requirement of Zone 3. Zone 2 is a larger zone and has a cfm requirement of 500. When finished touch “Back.”

Zone Airflows Screen

All zone airflows are now set. They may be changed by selecting a zone’s cfm value.
Otherwise, touch “Next.”

Airflows Exceed Capacity

If total airflow specified for all zones exceeds 150% of the maximum airflow of indoor unit, a message will indicate that the system may not be able to deliver requested airflows.

Event: Bleeding May Occur

A warning is provided stating that airflow will bleed into non-calling zones if the system's required airflow is greater than the total airflow of the calling zones. Note that the bleeding feature may be disabled if desired and is typically disabled when a properly selected bypass damper is present in the system.

Zone Names

Meaningful zone names may be entered here. We will come back to that, for now, we will proceed with setup by touching "Next."

LAT Setpoint (Cooling)

The Leaving Air Temperature Safety (Cooling) value is set here. This is the temperature at which cooling operation will be interrupted. Using the scroll bar on the right, the Heating setpoint is accessed.

LAT Setpoint (Heating)

The Leaving Air Temperature Safety (Heating) value is set here. This is the temperature at which the heating operation will be interrupted.

If this were a dual fuel system, the Leaving Air Temp Safety for Heat Pump Heating would be set below. This system does not contain a heat pump.

Edit / Add Devices

From the Add/Edit Devices screen, the System ID is shown (in this case, AC8). Non-communicating devices, such as an air cleaner, humidifier, and ultraviolet lamps.
When finished, touch “Next.”

Maintenance Reminder

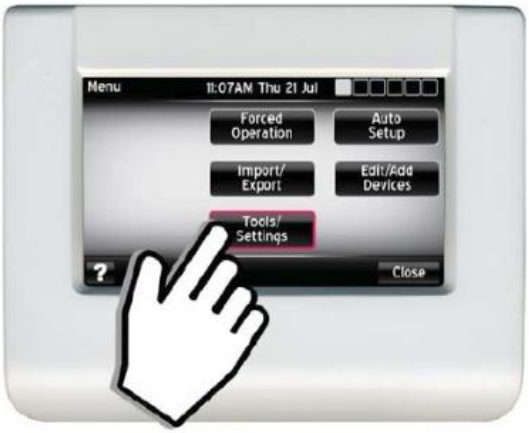
The configuration of maintenance reminder for the end user is set here. When finished, touch “Next.”

Dealer Information

If dealer information had been entered previously, it will be shown here. Otherwise, it may be edited from this screen by selection “Edit.” When finished, touch “Next.”

Service Mode Screen

The Service Mode screen then appears. Selecting the Menu will allow changes to the configuration entered on the previous screens.



Service Mode > Menu > Tools / Settings

In this example, more meaningful zone names are desired. Touch “Tools / Settings.”

Service Mode > Menu > Tools / Settings > System Settings

Select “System Settings.”

…then touch “Zoning Configuration.”

Tools / Settings > System Settings > Zoning Configuration

Tools / Settings > System Settings > Zoning Configuration > Zone Names

…then “Zone Names.”

Zones Names Screen

Touching a zone name allows renaming of that zone. In this example, Zone 2 will be renamed.

Popup Keyboard

A popup keyboard appears. Zone 2 is being renamed to “Living Room”. When finished, touch “Ok.”

Touchscreen Zone 2 (Living Room)

From the Zone 2 touch screen, the new Zone 2 name appears, “Living Room”. This name is now used throughout the system in reference to this zone.

Selecting “Menu” from the Living Room (Zone 2) touch screen provides system adjustment capability.

Manage Zones Icon

By selecting the “Manage Zones” button, non-service-related changes may be made.

Manage Zones

From the Manage Zones screen, all zone actual temperatures and setpoints (if the system mode is set to heating or cooling) are shown. Notice that this sample three zone system now has Zone 3 renamed to “Kids Rooms”. Touching a zone icon allows adjustment of the zone’s setpoints.

End User Experience

The end user experience with the zoning software is like that of the non-zoning software. The installer may select the brand, icons visible, and more.

Sleep Screen

This page illustrates the “sleep” screen for the Master touch screen. An indoor temperature of 72 degrees is shown, with an outdoor temperature of 55 degrees. The zone name is shown in the upper left corner of the screen.

Touchscreen Zone 2

From the user interface, touching the Menu button…
… then Settings…

Menu > Settings Screen

Menu > Settings > Zoning icon

...then Zoning...

Zoning Configuration (End User View)

...allows adjustment of the zone names.

Service Operations

Forced Operation

Forced Operation is accessed during the system setup and during troubleshooting.
Heating, cooling, and IAQ (Indoor Air Quality) modes may be operated in all stages from the Master (Zone 1), or with another touchscreen configured as a Service Tool.

This example will use the latter, connected to the Zone Control panel to run the system through its paces.
Connect a touchscreen to the Service Tool connector on the Zone Panel. “Service Tool Mode” is selected.

Touchscreen Connected as Service Tool

Service Mode Menu Button

Press “Menu” on the Service Mode interface.

Service Mode Menu: Forced Operation

Select “Forced Operation.”

Forced Operation Menu

Select the desired mode for forced operation.

Forced Operation - Heating Menu

This image shows the forced operation menu for heating mode on this system. Available forced operation modes will differ depending on the equipment installed.

Stage of heating and fan operation are selectable, with options to bypass short cycle (ASCD (Anti Short Cycle Delay)), humidity, defrost, set airflow, apply full flame, and select zone. When the selections are made, touch “Apply” to initiate the selected forced operation. “Stop” may be used at any time to halt forced operation modes applied.

The bottom left of the screen contains a forced operation timer. When this setting expires, normal system operation will resume.

Non-Zoning Mode

The master touch screen enters non-zoning mode during fault conditions, or when the end user selects non-Zoning mode at the Zoning Configuration screen.

In non-zoning mode the master touch screen commands the dampers to the open position for all zones and functions as a single zone system. The touch screen displays “non-Zoning” in the zone name field while in non-zoning mode.
The touch screen sensors on zones 2 and below continue to display the zone name and are active. However, user interaction with the touch screen sensors or zone displays has no effect on the system's operation.

08

Appendix

QUICK REFERENCE GUIDE

TOUCH SCREEN ZONING COMMUNICATING CONTROL

Model Number: S1-TCZCB

- High Definition Colors
- Touch Screen
- 4 Wire Connections
- Auto Configuration
- Advanced Trouble Shooting

York International Corp., 5005 York Drive, Norman, OK 73069

Managing Multiple Zones

In a Communicating Zoning System, any zone containing a Touch Screen Communicating Control can be used to make changes in any other zone in the house.

To view/update other zones from your Touch Screen Communicating Control, select the "Manage Zones" button from your Menu screen.

The Manage Zones screen provides an overview of each zone's current temperature and set points.

Once a zone is selected, you will be able to make changes to the zone based on the sensor type installed in the zone.

Zone Sensor Usability

A Zone Sensor offers whole home control in a small, functional package.

Change the set points and continuous fan of the Zone Sensor using the Touch Screen Communicating Control's "Manage Zones" feature.

Select the zone that contains your Zone Sensor and a screen will be displayed that will allow you to make changes to that zone. The zone name is displayed in the upper left corner of the screen to remind you of the zone being viewed.

Zone Display Sensor Usability

A Zone Display Sensor allows the user to make simple changes from the installed location and provides the flexibility to be viewed / updated from any installed Touch Screen Communicating Control

To make changes to the zone from the Display Sensor, reference the graphic below.

To make changes to a zone containing a Zone Display Sensor from a Touch Screen Communicating Control. Access the zone containing the Zone Display Sensor from the "Manage Zones" feature.

Touch Screen Sensor Mode Usability

If you have a Touch Screen Communicating Control installed in Sensor mode, you have full access to all zones and can make changes to temperature set points in any zone of the house.

While some of the touch screens communicating control's features are limited in Sensor mode, using one to control a zone enables features that are not available with the other sensor types.

As with the Master Touch Screen, a Touch Screen Communicating Control installed in Sensor mode contains the "Manage Zones" feature.

The Touch Screen Communicating Control contains a Humidity sensor that allows for more comfort settings and control in its installed zone, even when in Sensor mode.

Schedule Setting for Multiple Zones

The Communicating Zoning System allows different schedules to be applied to different zones. This allows maximum comfort in all areas of the home at any given time of day.

After defining your desired schedules, you can assign them separately to each zone by pressing the "Assign to Calendar" button.

Simply select the zone you would like to apply the schedule to, press "OK" and you will be directed to select schedules and assign months for the previously selected zones.

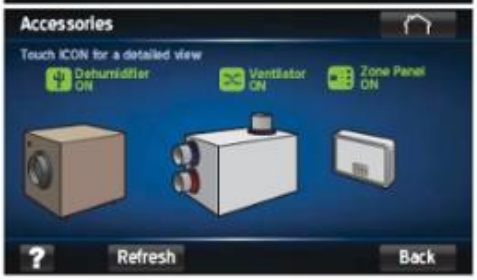
Be sure to repeat for all zones to ensure that the desired schedules and months are selected and that your zones are properly programmed.

Zone Status (System Map) Screen

With the Zone Status Screen, the thermostat Icon now unveils all of your zone sensors' statuses.

Access the sensor status by pressing the thermostat icon.

Access the Zone Panel Status by pressing the Accessories Icon.



Continuous Fan in a Zoning System

Because your system is optimized for airflow in every zone, the continuous fan must be controlled differently than a non-zoned system.

The fan can be operated in three different modes:

Auto Mode: Only runs the fan when the zone is calling for condition (heating or cooling).

Manual Mode: Will circulate air in the zone when no other zone is calling for conditioning.

NOTE: Any percentage setting selected will be automatically designated to all zones and override all zone schedules. This is done to ensure that there are no conflicting airflows at a given time.

Schedule Mode: Runs the fan according to settings as defined in the programmed schedule assigned for the current day part.

Customizing Your Different Zone Names

The Communicating Zone System allows for custom names to be created and displayed on Touch Screen Communicating Controls.

Selecting descriptive names for each zone allows for easier navigation when making changes or settings from multiple locations in the home.

Access this feature through the menu settings screen under "Zoning".

Once at the screen, you can view and change each installed zone name.

Another feature available in the zone settings screen is "Not Zoned" mode. This setting allows you to have the system operate according to the master zone's temperature and set point while keeping all zone dampers open.

Whole Home Humidity Control

The Communicating Zone System has the ability to control each zone's humidity with separate set points. This allows you to customize your comfort throughout your home.

When a Touch Screen Communicating Control is installed in a zone as a sensor, it is constantly tracking your humidity levels for the installed zone.

The Master Touch Screen uses this information to control equipment and airflow in that zone to the settings desired.

Navigate to the humidity settings screen from the menu or the short cut humidity icon in the zone (or from the Master Touch Screen) to view or make changes to this setting.

Vacation Mode for your Zoning System

In addition to having the ability to run a schedule as assigned per zone, the Communicating Zone System can be easily set up to control every zone to the same set point for a predetermined amount of time.

Vacation mode is accessed from the Advanced Programmable View / Mode home screen. Select the schedule button and press "Set Vacation".

This will bring up the vacation wizard which will instruct you to set your "Leave" / "Return" date and time, Temperature set points, Fan settings and Humidity settings.

The thermostat will control all zones to these settings without requiring setup at any other zone sensors.

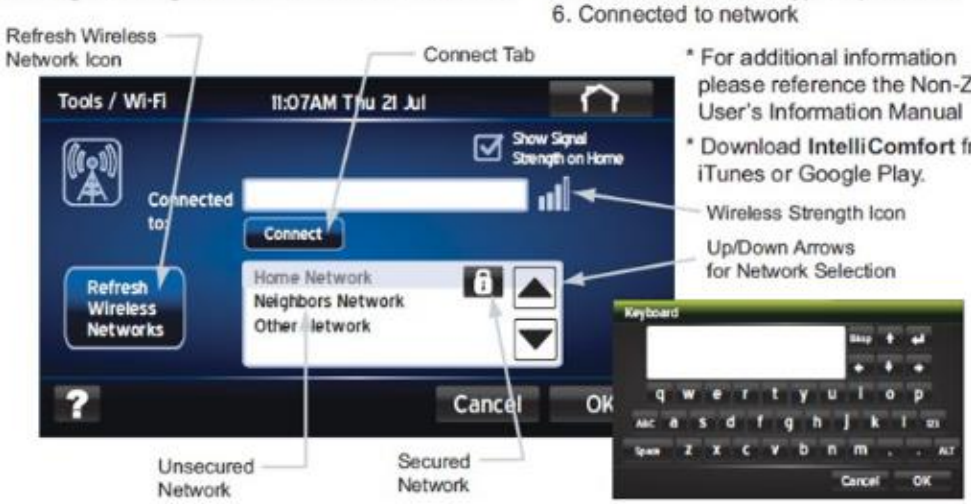
Connecting to Wireless

Touch Screen must be connected to router before you can register the device.

- For secured networks requiring a password a lock will be present.
- Router signal strength will be shown once connected.

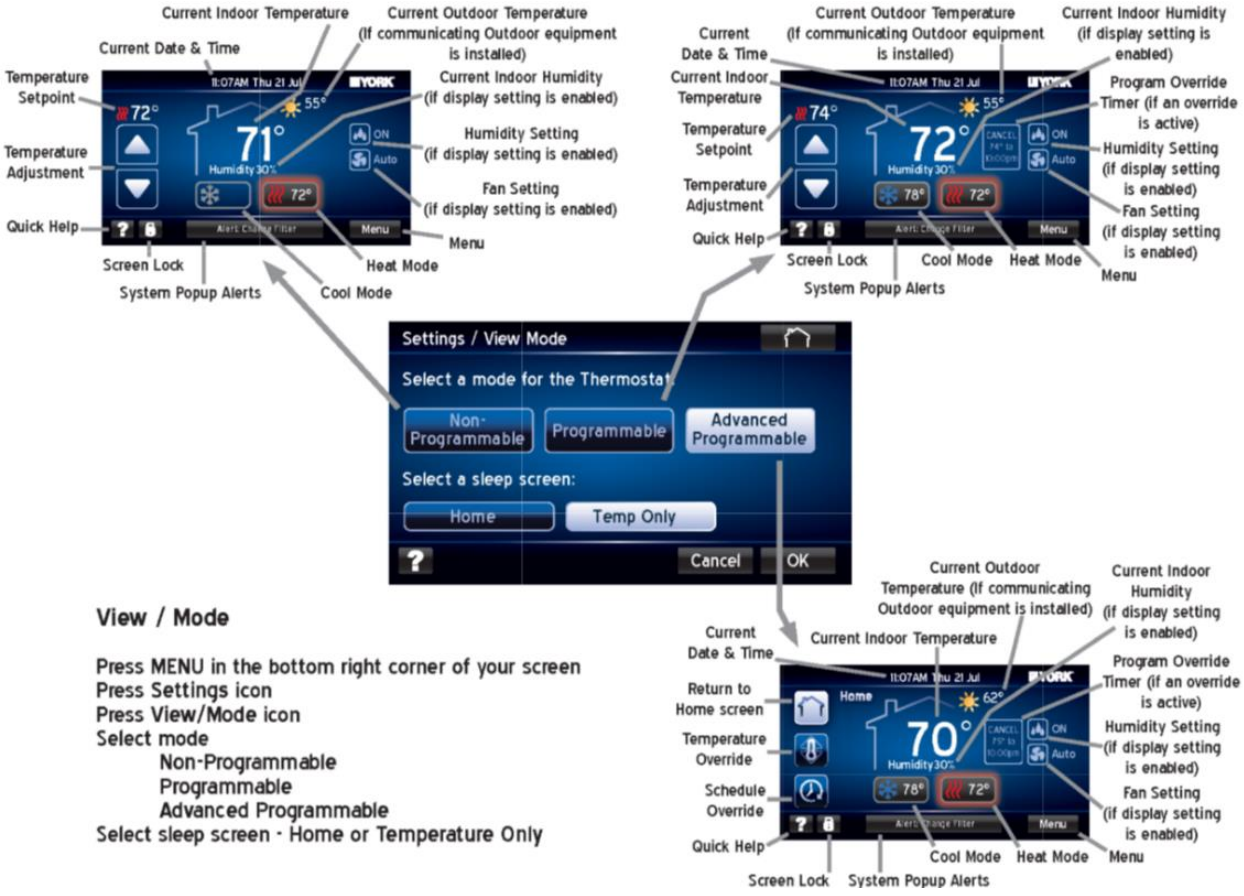
Steps to connect to wireless

1. Press select menu, select tools, select wireless.
2. Press refresh wireless network icon.
3. Select wireless network with Up/Down arrows.
4. Select connect.
5. If network is secure, type in password.
6. Connected to network



* For additional information please reference the Non-Zoning User's Information Manual

* Download **IntelliComfort** from iTunes or Google Play.



View / Mode

Press MENU in the bottom right corner of your screen
Press Settings icon
Press View/Mode icon
Select mode
- Non-Programmable
- Programmable
- Advanced Programmable

Select sleep screen - Home or Temperature Only

Settings

Press MENU in the bottom right corner of your screen
Press Settings icon

Menu

Press MENU in the bottom right corner of your screen

Control	Description of fault in data map	Log / message box display description	Detailed displayed text	Generic displayed text
Touch screen control / system fault codes				
Touch Screen Control	No Active Fault Code	"No Active Faults"	Not Selectable	Not Selectable
	In startup mode (verification), the touch screen control could not find one or more previously configured devices	"System Fault"	"MISSING DEVICE"	Display "call dealer" information
	In startup mode, the touch screen control found an invalid configuration (e.g. no indoor unit, etc)	"System Fault"	"MISSING REQUIRED DEVICE"	Display "call dealer" information
	There was no response from the device within 10 seconds of the touch screen control's query after having communicated prior	"System Fault"	"COMMUNICATIONS ERROR - <DEVICE>"	Display "call dealer" information
	DEVICE detects hardware problem.	"System Fault"	"CONTROL FAILURE"	Display "call dealer" information
	Parameter out of range	"System Fault"	"PARAMETER OUT OF RANGE"	Display "call dealer" information
	Difference Between Temperature Readings (Primary / Secondary)	"Thermostat Fault"	"DIFFERENCE BETWEEN TEMPERATURE READINGS (PRIMARY / SECONDARY)"	Display "call dealer" information
	Difference Between Temperature Readings (Primary / Humidity Temperature Sensor)	"Thermostat Fault"	"DIFFERENCE BETWEEN TEMPERATURE READINGS (PRIMARY / HUMIDITY MODULE)"	Display "call dealer" information
	Primary Temperature Sensor Shorted	"Thermostat Fault"	"PRIMARY TEMPERATURE SENSOR SHORTED"	Display "call dealer" information
	Primary Temperature Sensor Open	"Thermostat Fault"	"PRIMARY TEMPERATURE SENSOR OPEN"	Display "call dealer" information
	Secondary Temperature Sensor Shorted	"Thermostat Fault"	"SECONDARY TEMPERATURE SENSOR SHORTED"	Display "call dealer" information
	Secondary Temperature Sensor Open	"Thermostat Fault"	"SECONDARY TEMPERATURE SENSOR OPEN"	Display "call dealer" information
	Humidity Module Temperature Sensor Shorted	"Thermostat Fault"	"HUMIDITY MODULE TEMPERATURE SENSOR SHORTED"	Display "call dealer" information
	Humidity Module Temperature Sensor Open	"Thermostat Fault"	"HUMIDITY MODULE TEMPERATURE SENSOR OPEN"	Display "call dealer" information
	Temperature measurement is greater than ??? (±1°F)	"Thermostat Fault"	"TEMPERATURE READING TOO HIGH"	Display "call dealer" information
	Temperature measurement is less than ??? (±1°F)	"Thermostat Fault"	"TEMPERATURE READING TOO LOW"	Display "call dealer" information
	Humidity measurement is out of range (includes open & short sensor)	"Thermostat Fault"	"HUMIDITY SENSOR FAILURE"	Display "call dealer" information

Control	Description of fault in data map	Log / message box display description	Detailed displayed text	Generic displayed text
Touch Screen Control	Humidity measurement is greater than ??? (+/-5%)	"Thermostat Fault"	"HUMIDITY READING TOO HIGH"	Display "call dealer" information
	Humidity measurement is less than ??? (+/-5%)	"Thermostat Fault"	"HUMIDITY READING TOO LOW"	Display "call dealer" information
	Low Voltage < 19.2 VAC	"Thermostat Fault"	"LOW VOLTAGE (<19VAC)"	Display "call dealer" information
	Low Voltage < 16.0 VAC	"Thermostat Fault"	"LOW VOLTAGE (<16VAC)"	Display "call dealer" information
	Float Switch Sensor Activated	"Indoor Equipment Fault"	"FLOAT SWITCH ACTIVATED"	Display "call dealer" information
Unit Control Fault Codes				
Indoor Communicating Interface Board	No Active Fault Code	"No Active Faults"	Not Selectable	Not Selectable
	Control Fault	"Indoor Equipment Fault"	"CONTROL FAILURE THAT STILL ALLOWS FAULT CODE OUTPUT"	Display "call dealer" information
	Low Voltage < 19.2 VAC	"Indoor Equipment Fault"	"LOW VOLTAGE (<19VAC) PREVENTING FURTHER RELAY OUTPUTS"	Display "call dealer" information
	Low Voltage < 16.0 VAC	"Indoor Equipment Fault"	"LOW VOLTAGE (<16VAC) STOPPED CURRENT RELAY OUTPUTS"	Display "call dealer" information
Communicating AC Board	No Active Fault Code	"No Active Faults"	Not Selectable	Not Selectable
	High pressure switch currently open	"Outdoor Equipment Fault"	"HIGH PRESSURE SWITCH FAULT (NOT IN LOCKOUT YET)"	Display "call dealer" information
	High pressure Lockout	"Outdoor Equipment Fault"	"HIGH PRESSURE SWITCH FAULT (NOW IN LOCKOUT)"	Display "call dealer" information
	Control Fault	"Outdoor Equipment Fault"	"CONTROL FAILURE THAT STILL ALLOWS FAULT CODE OUTPUT"	Display "call dealer" information
	Low pressure - Lockout	"Outdoor Equipment Fault"	"LOW-PRESSURE SWITCH LOCKOUT"	Display "call dealer" information
	Low Voltage< 19.2 VAC	"Outdoor Equipment Fault"	"LOW VOLTAGE (<19VAC) PREVENTING FURTHER RELAY OUTPUTS"	Display "call dealer" information
	Low Voltage < 16.0 VAC	"Outdoor Equipment Fault"	"LOW VOLTAGE (<16VAC) STOPPED CURRENT RELAY OUTPUTS"	Display "call dealer" information
	Ambient Sensor Shorted	"Outdoor Equipment Fault"	"OUTDOOR AMBIENT SENSOR FAILURE (SHORT)"	Display "call dealer" information
	Ambient sensor open	"Outdoor Equipment Fault"	"OUTDOOR AMBIENT SENSOR FAILURE (OPEN)"	Display "call dealer" information
	Compressor mis-wiring error	"Outdoor Equipment Fault"	"COMPRESSOR MIS-WIRING ERROR"	Display "call dealer" information

Control	Description of fault in data map	Log / message box display description	Detailed displayed text	Generic displayed text
Communicating AC Board	Y2 present without Y1-soft lockout	"Outdoor Equipment Fault"	"Y2 PRESENT WITHOUT Y1 (SOFT LOCKOUT)"	Display "call dealer" information
	HPS open with no call for compressor	"Outdoor Equipment Fault"	"HPS OPEN WITH NO CALL FOR COMPRESSOR"	Display "call dealer" information
Air Handler Board (AVG / MV)	Normal Operation	"No Active Faults"	Not Selectable	Not Selectable
	Limit Switch open, no lockout	"Indoor Equipment Fault"	"LIMIT SWITCH CURRENTLY OPEN (NOT IN LOCKOUT)"	Display "call dealer" information
	Multiple limit open with no call for heat	"Indoor Equipment Fault"	"MULTIPLE LIMIT OPENINGS WITH NO CALL FOR HEAT"	Display "call dealer" information
	Limit open 4 or more times in one call for heat	"Indoor Equipment Fault"	"MULTIPLE LIMIT OPENINGS DURING ONE CALL FOR HEAT"	Display "call dealer" information
	Limit open more than 80 sec.	"Indoor Equipment Fault"	"SINGLE LONG DURATION LIMIT OPENING"	Display "call dealer" information
	Limit open more than 80 sec. more than once	"Indoor Equipment Fault"	"MULTIPLE LONG DURATION LIMIT OPENINGS"	Display "call dealer" information
	Limit open twice after 1 hour reset (Hard Lockout)	"Indoor Equipment Fault"	"LIMIT OPEN TWICE AFTER 1 HOUR RESET (HARD LOCKOUT)"	Display "call dealer" information
	Call for heat and cool at the same time	"Indoor Equipment Fault"	"CALL FOR HEAT AND COOL AT THE SAME TIME"	Display "call dealer" information
	Internal fault self-corrected, attempting normal operation	"Indoor Equipment Fault"	"CONTROL RECOVERED FROM INTERNAL FAULT"	Display "call dealer" information
	Control Failure	"Indoor Equipment Fault"	"CONTROL FAILURE THAT STILL ALLOWS FAULT CODE OUTPUT"	Display "call dealer" information
	Control in Test Mode	"Indoor Equipment Fault"	"CONTROL IN TEST MODE"	Display "call dealer" information
Air Handler Board (AHV)	Blank with no text displayed	N/A	N/A	N/A
	Simultaneous call for heating and cooling	"Indoor Equipment Fault"	Yes (AC/HP jumper = HP) No (AC/HP jumper = AC)	"Heat Cool calls same time"
	ID plug is not present or not connected properly Check for loose plug or loose wires in plug	"Indoor Equipment Fault"	Yes	"No Model ID plug inserted"
	Control recovered from internal error	"Indoor Equipment Fault"	Yes	"Control failure recovery"
	Control failure	"Indoor Equipment Fault"	Yes	"Control failure"
	Control in test mode	"Indoor Equipment Fault"	Yes	"Control in Test Mode"

Control	Description of fault in data map	Log / message box display description	Detailed displayed text	Generic displayed text
YorkGuard VI	No Active Fault Code	"No Active Faults"	Not Selectable	Not Selectable
	High pressure switch currently open	"Outdoor Equipment Fault"	"HIGH PRESSURE SWITCH FAULT (NOT IN LOCKOUT YET)"	Display "call dealer" information
	High pressure in heat pump- lockout	"Outdoor Equipment Fault"	"HIGH PRESSURE SWITCH LOCKOUT (LAST MODE OF OPERATION WAS HEAT PUMP)"	Display "call dealer" information
	High pressure in defrost- lockout	"Outdoor Equipment Fault"	"HIGH PRESSURE SWITCH LOCKOUT (LAST MODE OF OPERATION WAS DEFROST)"	Display "call dealer" information
	Control fault	"Outdoor Equipment Fault"	"CONTROL FAILURE THAT STILL ALLOWS FAULT CODE OUTPUT"	Display "call dealer" information
	Low pressure- lockout	"Outdoor Equipment Fault"	"LOW-PRESSURE SWITCH LOCKOUT"	Display "call dealer" information
	Low Voltage < 19.2 VAC	"Outdoor Equipment Fault"	"LOW VOLTAGE (<19VAC) PREVENTING FURTHER RELAY OUTPUTS"	Display "call dealer" information
	Low Voltage < 16.0 VAC	"Outdoor Equipment Fault"	"LOW VOLTAGE (<16VAC) STOPPED CURRENT RELAY OUTPUTS"	Display "call dealer" information
	Pipe freeze timer expired	"Outdoor Equipment Fault"	"PIPE FREEZE TIMER PROTECTION EXPIRATION"	Display "call dealer" information
	Ambient sensor shorted - lockout	"Outdoor Equipment Fault"	"OUTDOOR AMBIENT SENSOR FAILURE. (SHORT)"	Display "call dealer" information
	Ambient sensor open - lockout	"Outdoor Equipment Fault"	"OUTDOOR AMBIENT SENSOR FAILURE. (OPEN)"	Display "call dealer" information
	Liquid line sensor shorted - lockout	"Outdoor Equipment Fault"	"LIQUID LINE SENSOR FAILURE. (SHORT)"	Display "call dealer" information
	Liquid line sensor open - lockout	"Outdoor Equipment Fault"	"LIQUID LINE SENSOR FAILURE. (OPEN)"	Display "call dealer" information
	High discharge temperature - lockout	"Outdoor Equipment Fault"	"HIGH DISCHARGE LINE TEMPERATURE"	Display "call dealer" information
	Low discharge temperature - lockout	"Outdoor Equipment Fault"	"LOW DISCHARGE LINE TEMPERATURE"	Display "call dealer" information
	Discharge line sensor shorted - lockout	"Outdoor Equipment Fault"	"DISCHARGE LINE SENSOR FAILURE. (SHORT)"	Display "call dealer" information
	Bonnet sensor shorted - lockout	"Outdoor Equipment Fault"	"BONNET SENSOR FAILURE (SHORT)"	Display "call dealer" information

Control	Description of fault in data map	Log / message box display description	Detailed displayed text	Generic displayed text
YorkGuard VI	Fossil fuel configuration error	"Outdoor Equipment Fault"	"FOSSIL FUEL CONFIGURATION ERROR"	Display "call dealer" information
	Compressor mis-wiring error	"Outdoor Equipment Fault"	"COMPRESSOR MIS-WIRING ERROR"	Display "call dealer" information
	Y2 present without Y1-soft lockout	"Outdoor Equipment Fault"	"Y2 PRESENT WITHOUT Y1 (SOFT LOCKOUT)"	Display "call dealer" information
	HPS Open with no tstat call	"Outdoor Equipment Fault"	"HPS OPEN WITH NO CALL FOR COMPRESSOR"	Display "call dealer" information
	O thermostat input in AC mode	"Outdoor Equipment Fault"	"O THERMOSTAT INPUT IN AC MODE"	Display "call dealer" information
	W thermostat input in AC mode	"Outdoor Equipment Fault"	"W THERMOSTAT INPUT IN AC MODE"	Display "call dealer" information
	W & O in AC mode	"Outdoor Equipment Fault"	"W & O THERMOSTAT INPUT IN AC MODE"	Display "call dealer" information
	W & O in HP mode	"Outdoor Equipment Fault"	"W & O THERMOSTAT INPUT IN HP MODE"	Display "call dealer" information
	No defrost curve selected	"Outdoor Equipment Fault"	"NO DEFROST CURVE SELECTED"	Display "call dealer" information
33" Modulating Gas Furnace Control Board	Normal Operation	"No Active Faults"	Not Selectable	Not Selectable
	Flame	"Indoor Equipment Fault"	"FLAME IS PRESENT WITH NO POWER BEING SUPPLIED. CAN BE CAUSED BY A SLOW OR LEAKY GAS VALVE"	Display "call dealer" information
	Air zero	"Indoor Equipment Fault"	"STUCK CLOSED PRESSURE SWITCH. CAN BE CAUSED BY FAULTY SWITCH OR MIS-WIRING OF PRESSURE SWITCH"	Display "call dealer" information
	Air flow	"Indoor Equipment Fault"	"STUCK OPEN PRESSURE SWITCH. INDICATES THAT THE PRESSURE SWITCH IS OPEN WHEN IT IS CLOSED"	Display "call dealer" information
	Primary limit	"Indoor Equipment Fault"	"HIGH LIMIT SWITCH OR 24 VOLT FUSE IS OPEN. CAN BE CAUSED BY RESTRICTED AIRFLOW OR OPEN FUSE"	Display "call dealer" information

Control	Description of fault in data map	Log / message box display description	Detailed displayed text	Generic displayed text
33" Modulating Gas Furnace Control Board	Auxiliary limit	"Indoor Equipment Fault"	"ROLLOUT OR AUXILIARY SWITCH OPEN. RESET ROLLOUT SWITCH IF POSSIBLE. CHECK LIMIT SWITCH IN AIR BLOWER HOUSING"	Display "call dealer" information
	Modulation valve	"Indoor Equipment Fault"	"CURRENT FAILURE ON MODULATING GAS VALVE"	Display "call dealer" information
	Ignition	"Indoor Equipment Fault"	"LOCKOUT DUE TO NO IGNITION. CHECK GAS SUPPLY, IGNITOR, GAS VALVE, AND FLAME SENSOR"	Display "call dealer" information
	Flame drop out	"Indoor Equipment Fault"	"LOCKOUT DUE TO TOO MANY FLAME RECYCLES. CAN BE CAUSED BY FAULTY GAS VALVE, LOW GAS PRESSURE, OR DIRTY FLAME SENSOR"	Display "call dealer" information
	Reverse polarity	"Indoor Equipment Fault"	"REVERSED LINE POLARITY OR IMPROPER GROUNDING. CHECK THE POLARITY OF INCOMING POWER AND GROUNDING CHECK TRANSFORMER"	Display "call dealer" information
	Gas valve	"Indoor Equipment Fault"	"GAS VALVE CIRCUIT SHORTED. CHECK GAS VALVE WIRING. IF CORRECT, REPLACE GAS VALVE"	Display "call dealer" information
	Blower	"Indoor Equipment Fault"	"MAIN BLOWER FAILURE. INDICATES THE BLOWER MOTOR OR BLOWER WHEEL HAS FAILED"	Display "call dealer" information
	ID plug	"Indoor Equipment Fault"	"ID PLUG IS NOT PRESENT OR NOT CONNECTED PROPERLY. CHECK FOR LOOSE PLUG OR LOOSE WIRES IN PLUG"	Display "call dealer" information
	Soft limit warning	"Indoor Equipment Fault"	"SOFT LIMIT WARNING"	Display "call dealer" information
	Air blockage warning	"Indoor Equipment Fault"	"AIR BLOCKAGE WARNING"	Display "call dealer" information
	System Failure	"Indoor Equipment Fault"	"UNKNOWN FAILURE"	Display "call dealer" information
	Flame rod aged warning	"Indoor Equipment Fault"	"FLAME ROD AGE WARNING"	Display "call dealer" information

Control	Description of fault in data map	Log / message box display description	Detailed displayed text	Generic displayed text
33" Modulating Gas Furnace Control Board	Jumper Error	"Indoor Equipment Fault"	"JUMPER ERROR"	Display "call dealer" information

