Wireless

The Touch Control UI and router that is Wi-Fi compatible can connect to the home internet system. To connect to the internet touch the WIRELESS symbol from the MENU screen and make sure that the Wi-Fi connection is enabled. During the initial setup of the wireless connectivity some information like the serial number and the Media Access Control (MAC) address will be self identifying. The MAC address encodes the manufacturer's registered identification number.

Select the myHVAC connection when the SSID, Service Set Identifier, screen is displayed. By touching in the Security Key area a keyboard will be displayed, use the on screen keyboard to enter the Wi-Fi security key.

The control will inform the user if the connection is successful. If the connection is unsuccessful, touch RETRY and the control will go through the process again. After your control has connected to the network, go to www.myinfinity.carrier.com to register the unit and begin remote access.

Weather

User Interfaces that are Wi-Fi compatible and connected to the network are capable of also displaying the local weather. The forecasted weather can be displayed after the WEATHER symbol is touched. For recently installed UI, the geographical location for the residence must be established in the system. This can be performed by selecting the user's country, limited to the Canada, Mexico and the United States, and by providing the area postal or zip code.

The current day's high and low temperature will be displayed along with the type of weather expected for the day. Future 5-day forecast will display the high and low temperature and a symbol depicting the type of weather expected.

Now complete the Power-Up and Configuration portion of the Quiz, and then check your answers to see how familiar you are with starting up and configuring the Communication Control System.

Service Setup

In this section we will be introducing you to the SERVICE portion of the User Interface display which includes SET-UP menus for the technician. SERVICE is specifically for the service technician to set parameters of the UI and unlike the other menu items, to access this menu the technician must touch and **hold** the SERVICE symbol for ten seconds. An aid to the service technician here is that the SERVICE symbol hat will turn green after the ten seconds elapsed time has been reached. However, there will be no action on the screen after 10 seconds elapse until the technician releases the hold on the SERVICE symbol. If the homeowner touches the SERVICE symbol for less than 10 seconds, a screen will display the technician's company information and logo. None of the SERVICE information is included in the Homeowner's Manual.

Service

The SERVICE menus include EQUIPMENT SUMMARY, INSTALLATION, SETUP, CHECK OUT, SERVICE INFORMATION, SOFTWARE UPGRADE and DEALER LOGO UPLOAD. REFRIGERANT CHARGING will also be displayed for the variable speed heat pump units.

The EQUIPMENT SUMMARY shows all the equipment that the UI understands is installed in the system. This was defined during the system power-up and is also useful for the first time service technician to see what accessories have been installed. However, additional accessories could have been installed, or even removed, by a service technician unfamiliar with the Communicating Control system and this information may have to be updated.

The INSTALLATION Menu provides the technician with the ability to add, change, or uninstall equipment in the system. When activated, the software progresses through a power-up, and then prompts the user for added information. After saving all changes, the display provides a summary of installed equipment. The Communicating Control system will also perform a static pressure and/or duct assessment test after exiting the INSTALLATION menu.

The SETUP Menu allows the technician to alter the default values that define equipment and system operating parameters to match the exact needs of the installation. The SETUP menu displays the equipment that has been identified in the system during Start-Up. In a zone system zoning will be displayed. The thermostat will be set up to meet the needs of the user. The indoor and outdoor units will be set up for the type of unit that was found by the control during power-up.

Equipment CHECK OUT is the technician's tool for troubleshooting the system. The menu choices allow the technician to run an operating test of each piece of equipment in the system – one piece at a time. During each test, the equipment will be run through its sequence of operation and the sequence will be displayed on the UI screen. Default run times of 5 minutes are established for heating and cooling equipment. However, this time may be adjusted up to 120 minutes if desired.

The SERVICE INFORMATION menu displays several categories of useful information to the technician that can be used to troubleshoot the system. The information that can be displayed includes the STATUS of each piece of equipment that is installed into the system, the LAST 10 SYSTEM EVENTS that occurred during operation of the equipment, the RUN/FAULT HISTORY which captures unit operation times, the MODEL/SERIAL NUMBERS and SERVICE PHONE NUMBER for contacts to have the Communicating Control serviced.

For a variable speed heat pump REFRIGERANT CHARGING allows the installing or servicing technician to input the furnace coil model along with the line set length and the vapor line diameter. The system calculates the total refrigerant charge to be weighed into the system as well as the required sub-cool temperature at the service valve and also the system sub-cool temperature in the manual charging mode. The refrigerant charge can also be added manually through the system sub-cool – auto mode.

The UI system SOFTWARE UPGRADE allows the software to be updated as features are added or modified from the original installation. This is performed by connecting by inserting a USB flash device with loaded software into the USB port in the UI.

In the same manner a graphic or logo that represents the dealer's company can be uploaded to the UI through DEALER LOGO UPLOAD.

Setup

The SETUP Menu is tailored to the type of equipment that was identified during power-up. All setup parameters have been set at the factory with default values. For this reason a Quick Start can performed by entering a valid date/time and schedule as we explained earlier in this program.

In this example we have chosen a furnace indoor unit, a heat pump outdoor unit applied on a zoned installation. For this equipment the UI identifies that the thermostat, furnace, air conditioner/heat pump and the heat source on the first screen. Touching the DOWN arrow symbol in the bottom-right displays a second screen that identifies zoning, accessories, hydronic airflow and utility curtailment if the system is a cooling only or heat pump.

Since navigating through the screen displays is very intuitive and performed easily, we will explain the different selections without necessarily showing the display in the next screen layer.

It is always recommended to record and store any changes made to the setup values so that this record can be used as a reference when servicing, should there be any operational problems with the system.

We will now cover the SETUP section of the SERVICE menu starting with THERMOSTAT SETUP.

Thermostat – Setup

The THERMOSTAT SETUP menu allows the technician to set the UI to respond as a room thermostat. The technician has the ability to enable the auto mode, with the changeover time, dead band, sensor offsets, reset factory defaults, set scheduling, smart recovery and select English or metric temperatures. THERMOSTAT SETUP and the layers of display screens are identical for all equipment installations.

Thermostat – Auto Mode and Deadband

- Enable/Disable Auto mode
- 5 through 120 minutes changeover time
- Deadband = 0° F to 6° F in 1 ° increments
- 2° F minimum difference between heating and cooling setpoint temperatures

AUTO MODE Setup default from the factory is ENABLED providing automatic heat and cool mode changeover, but it can be disabled if the user wants to take control. If the AUTO MODE is enabled, an UP/DOWN arrow symbol will appear next to the ENABLE symbol to allow the installer to change the 30 minute factory default time differential between the heat and cool modes. Changeover time can be set as low as 5 minutes up to 120 minutes, in 5-minute increments. The 30 minute default time means that 30 minutes must elapse after the system completes a mode before the other mode can occur, for example, from heat to cool.

Similarly, the factory default 2°F deadband between the cooling and heating set points can be changed. The deadband can be set from 0 (zero) to 6°F in 1°F increments. The deadband maintains a minimum difference between the heating and cooling set points. If one set point is moved toward the other set point, it will "push" the other set point in order to maintain this deadband.

Thermostat – Offsets and Reset

- Temperature Offsets
  - -5° F to +5° F, 1° F increments
- Humidity Offset
  - -10% to +10%, 1% increments

OFFSETS, factory defaults of zero, can be used to calibrate the indoor room air sensor, outside air sensor and the humidity sensor. The offset temperature range is from -5 to + 5° F with a humidity offset range from -10 to +10% all with a factory default settings of zero. If a good measuring device reads a difference for one, two or all of these points, the offsets can be changed to display the value that the measuring device reads.

There is always the possibility that someone made a number of changes that are adversely effecting the operation of the HVAC system, and rather than entering and reviewing all of the menus, the technician could start reprogramming the UI by first resetting the factory default values. A nice feature here is that the RESET FACTORY DEFAULTS gives the user a choice to reset the PROGRAM SCHEDULE, USER SETTINGS, INSTALL SETTINGS and the LAST 10 FAULTS. Just choose the defaults that you want reset and change the default from NO by touching YES.

If SCHEDULING is set to ON, the default value, the UI SCHEDULES button is functional and through the SCHEDULES menu the user may program set points for up to five periods of each day of the week, including each zone with a zoned system. When set to OFF, programming schedule is NOT possible. The UI then operates as a non-programmable controller, controlling the system using cooling and heating set points that are independent of clock time and date.

SMART RECOVERY, default ON, is activated to ensure that the space temperature is at its set point when each schedule is activated. SMART RECOVERY starts the system 90 minutes prior to the programmed schedule start time for both cooling and heating modes. In order for SMART RECOVERY to occur, there must be a valid schedule, time and date. OFF turns SMART RECOVERY off and the system will start the schedule at the scheduled time.

The ENGLISH or METRIC Menu allows the installer to select whether the temperature values should be displayed in either Celsius or Fahrenheit, the factory default is ° F, English, but should a system be installed where it is desirable to read the temperature values in ° C, METRIC would be the selected display.

Set Up Furnace

- Furnace Airflow
  - Comfort or Efficiency
- Low Heat Rise ON/OFF
- Air Conditioning and Heat Pump Airflow
  - Comfort, EFF325, EFF350, Maximum, and Quiet
- Heat Pump Heating Airflow
  - Comfort, EFF325, EFF350, and Maximum
- Dehumidification Airflow
  - High and Normal

FURNACE setup from the SETUP menu allows the technician to set the desired airflow for heating, the desired airflow for cooling, set furnace staging for a multiple stage furnace and set the furnace airflow limits. On the second display screen, furnace fan off delay, altitude and dehumidification drain time can be set. The G-terminal feature will be displayed only on furnace and fan coil units.

Airflows

FURNACE AIRFLOW selections are COMFORT and EFFICIENCY. COMFORT is a decreased airflow used to increase the output air temperature and provide increased comfort. EFFICIENCY is the airflow used to meet specified ratings. Additionally, on the furnace with the heat pump, LOW HEAT RISE, will be displayed. LOW HEAT RISE can either be ON or OFF and is usually used in conjunction with a bypass humidifier. In the ON position, the furnace will operate with an increased airflow when in low heat.

Cooling and heat pump heating airflows, AC/HP AIRFLOW, selections are QUIET, COMFORT, EFF325, EFF350 and MAXIMUM. COMFORT, the factory default, airflow provides airflow varying with temperature and humidity demands. This enables full dehumidification and comfort capabilities of the system. When COMFORT is not selected, the unit will not run reduced airflows for dehumidification. QUIET is the minimum cooling airflow that the system can safely run, typically 300 CFM/ton. Use this setting if duct noise is a severe problem. Duct sweating in high humidity environments could be an issue. EFF325 and EFF350 are fixed airflows used to achieve specific ratings, normally 325 and 350 CFM/ton. EFF will have a reduction of airflow for dehumidification and will also vary when applied with a two stage or variable speed outdoor unit. MAXIMUM is 400 CFM/ton.

Heating airflows, AC/HP AIRFLOW, selections are COMFORT, EFF325, EFF350 and MAXIMUM.

Dehumidification airflow selections are HIGH and NORMAL. NORMAL, the factory default, allows the airflow to adjust to a minimum to satisfy dehumidification. On HIGH, the minimum airflow during the cooling and dehumidification mode is increased to reduce duct and register sweating.

Furnace Staging

- Staging
  - Low, Low-Medium, Low-High, Medium, Medium-High, High, Furnace, and System
- Airflow Limits*
  - MIN - Increase minimum capacity
  - MAX – Decrease maximum capacity
- Off Delay
  - 90, 120, 150, and 180 seconds
- Altitude
  - Installed elevation
- Dehum Drain
  - Fan OFF at end of cooling (Continuous Fan Application)

* These only apply to modulating furnaces

Selections for STAGING are SYSTEM, the factory default value, FURNACE, LOW, LOW and MED, LOW and HIGH, MEDIUM, MED and HIGH and HIGH. Selecting SYSTEM will allow the control to determine furnace staging while the others determine the one or two stages limited by the furnace. For example, LOW will limit the staging of the furnace to low heat for a single stage of heat. LOW and MEDIUM will limit the staging of the furnace to low and medium stages of heat for two stages of heat. A two-stage furnace is limited to a LOW or HIGH stage. HIGH STAGE TIMER is the minimum time that the furnace must operate on the lower stage before it is allowed to operate at the higher stage.

FURNACE AIRFLOW LIMITS allow the service technician to restrict the furnace airflows within certain minimum and maximum limits. These airflow limits correspond to unit capacities and modulating furnaces. These limits are not the same zoning minimum and maximum airflow limits. Minimum CFM will increase the minimum operating capacity of the furnace while maximum will decrease the maximum capacity of the furnace. The minimum and maximum default values are the lowest heat capacity and the maximum heat capacity of the furnace.

Furnace unit OFF DELAY is the time that the indoor fan motor is allowed to run after the call for heating is satisfied. This time can be set to 90, 120 the factory default, 150 or 180 minutes.

ALTITUDE is set for the elevation that the furnace is installed. This will allow the furnace to adjust the furnaces' combustion airflow to compensate for the reduced air density realized at that altitude matching the gas flow to the oxygen level. ALTITUDE will also provide a correction

to the units' indoor air flow static correction for the density of the air at that elevation. This is the reason that you will see an input for ALTITUDE on other units, such as a fan coil, as well. The factory default is 0 – 2000 feet and other values are available in 1000 foot increments up to 10,000 feet.

DEHUM DRAIN turns off the continuous fan operation at the end of cooling for a user selected time from 15 minutes, the factory default value, up to 60 minutes. This time will allow the indoor coil condensate water to flow into the condensate drain pan. The fan will only be turned off if there was a dehumidify demand during the cooling cycle. There is also an OFF selection to disable this function.

G Terminal

- G Terminal (Furnace and Fan Coil)
  - Switch or relay between "R" and "G" terminal
- Fan Speed
  - Low
  - Medium
  - High
- Shutdown
  - N.O. contact
  - N.C. contact

The G TERMINAL option is a feature used only on fan coils and furnaces with the control system. The indoor unit control board used in the furnace and fan coil includes functionality to the "G" terminal when the Communicating Control system is used. By the addition of a relay or switch with its contacts connected between the R and the G terminal on the board, a change of state of the switch will send a signal to the board to perform a predetermined function.

The selectable functions are FAN, to set the fan at a preselected fan speed, or SHUTDOWN, to turn the entire unit off. When FAN is selected, a new line will be display below G TERMINAL allowing the selection of a LOW, MEDIUM or HIGH motor speed. When SHUTDOWN is selected, a new line will be displayed below G TERMINAL allowing the technician to indicate whether normally open or normally closed contacts are used on the switch. The addition of a relay or switch should never be used in conjunction with a safety circuit.

The UI displays SYSTEM MALFUNCTION on the screen and registers a G terminal shutdown event in Last 10 System Events.

Outdoor Unit Setup Display 1

- Cooling Lockout
  - None, 45, 50 or 55° F
- Defrost Interval (Heat Pump)
  - 30, 60, 90, 120 minutes and Auto
- Low Ambient Cooling
  - Yes or No
  - Cooling Lockout

By selecting AC/HEAT PUMP on the third line of the SETUP menu, these screens will be displayed.

COOLING LOCKOUT is the temperature limit which the system will not allow the unit to operate in mechanical cooling. These limits are 45, 50, 55° F and NONE, the factory default value. NONE allows the system to utilize low ambient cooling.

DEFROST INTERVAL is user selectable from 30-minutes to 120-minutes in 30-minute intervals. The Communicating Control system is also capable of AUTO defrost Ideal Defrost, which is a smart defrost interval selection made by the control. AUTO is the default setting used with a Communicating Control heat pump, while 120-minutes remains to be the default setting in a non-communicating heat pump system.

LOW AMBIENT COOL is available with the Communicating Control system. Under this menu the low ambient cooling default value of NO can be changed to YES to enable low ambient cooling. It will also be necessary to use a Communicating Control Series-B System outdoor unit to realize this feature. A low ambient cooling kit is not necessary when this feature is on. Also when LOW AMBIENT COOLING is selected, ensure that the COOLING LOCKOUT is set to NONE and not to one of the other three temperature settings.

Outdoor Unit Setup Display 2

- Quiet Shift
  - On or Off
- AC/Heat Pump rpm max
  - Only functions with variable-speed compressor
- High Cool Latch
  - System in control
  - High cool latch above (Temperatures between 80 to 110° F)
  - Low cool only
- High Heat Latch
  - System in control
  - High heat latch below (Temperatures between 20 to 50° F)
  - Low heat only

QUIET SHIFT can either be turned ON or OFF, the factory default position, will allow the outdoor fan to be turned on after the completion of the defrost cycle.

AC/HEAT PUMP RPM MAX sets the maximum speed of the compressor in a variable speed compressor system.

HIGH COOL LATCH is the outside air temperature in cooling above which only the high stage of a 2-stage compressor will operate. Selections are OFF, ON, or DISABLE. If the HIGH COOL LATCH is set to ON, a temperature selection is available, above which, the system will only run in high stage cooling. If DISABLE is selected, high stage cooling will not be used.

HIGH HEAT LATCH is the outside air temperature in heating below which only the high stage of a 2-stage compressor will operate. This prevents the unit from operating, trying to heat on first stage, when the outdoor ambient temperature is very low. Selections are OFF, ON, or DISABLE. If the HIGH HEAT LATCH is set to ON, a temperature selection is available, below which, the system will only run in high stage heating. If DISABLE is selected, high stage heating will not be used.

Outdoor Unit Setup Display 3

- Defrost Fan Delay
  - With accessory electric heaters
  - Shown only if entered
  - Not shown if self-identified
- Brownout Disable
  - Voltage detection feature
- Energy Efficiency
  - Off, On (Temperatures between 20 to 50° F)

DEFROST FAN DELAY turns the outdoor unit fan on at the end of a defrost cycle for approximately 12 seconds to help reduce any nuisance refrigerant noise caused by reversing valve changing its internal position. This feature is only available on communicating heat pumps.

BROWNOUT DISABLE will turn off the voltage detection function in the outdoor unit control. It is recommended to leave this at NO.

ENERGY EFFICIENCY allows the user to input the SEER rating and HSPF rating for energy tracking purposes.

LO AIR MULTIPLIER is only displayed on a non-communicating two-stage units which adjusts the low airflow speed. For an outdoor unit with a Copeland scroll compressor choose 0.8, the factory default value. For outdoor units with a Bristol compressor, choose 0.65.

Heat Source Lockout

Outdoor heat pump units installed with an indoor gas furnace will allow the system to operate as a hybrid heat units allowing the system to heat using either the heat pump or the gas furnace. The user can set the outdoor air temperature below which the heat pump cannot operate, as well as, the outdoor air temperature above which the furnace cannot operate. For the heat pump, the upper limit can be as high as 55° F and as low as -20° F. There is even a selection of NONE if the user does not want to lockout the heat pump. The furnace lower limit can be as low as 5° F and as high as 55° F. There is also a NONE selection for the furnace if the user does not want to lockout the furnace.

When either the heat pump lockout temperature is decrement upward or the furnace lockout temperature is decremented downward it will also decrement the other setting up or down so that the heat pump lockout temperature can never be above the furnace lockout temperature, nor can the furnace lockout temperature be below the heat pump lockout temperature. Additionally, the user can select whether to perform the heat pump defrost with the furnace or without the furnace.

Zoning

As mentioned earlier in this program, ZONING will only be displayed in the SETUP menu on a zoned system. Selecting ZONING will allow the user to DISABLE ZONING should it be necessary, set ZONE OFFSETS, which essentially recalibrates the zone temperature sensors, set the zone AIRFLOW LIMITS, and the DUCT ASSESSMENT TIME can be changed. In the Communicating Control system, the DUCT ASSESSMENT time will initially be set at 1:00 PM, the factory default time. This time can be changed in one-hour increments over a 24-hour period of time if the user determines that there is a better time in their application.

In the SETUP/ZONING menu, the technician can enable zoning with NO, the factory default value, or disable zoning, with YES. If zoning is disabled, all zone dampers open and the system operates as a single zone using the Zone 1 room sensor.

The SETUP/ZONING menu section can also be used to calibrate each individual room sensor, plus or minus 5° F, this is called ZONE OFFSETS.

Zone Airflow Limits

- Airflow Limits
  - No bypass damper
  - Duct assessment sets each zone **assessed** airflow
  - Set zone % **assessed** airflow
    - LOW - 100%
    - MED-LOW - 138%
    - MED - 176%
    - MED-HIGH - 214%
    - HIGH - 250% (default)
    - MAX - Maximum cfm

AIRFLOW LIMITS for each zone based on the cooling airflow assessment performed by the UI when it ran the DUCT ASSESSMENT routine during system Start Up. Setting zone airflow selects the maximum allowable noise and airflow relationship to minimize noise or improve comfort conditions within a zone. The selections are based upon a percentage increase over the duct airflow taken during the duct assessment.

Zone airflow limits are determined by the following equation: 450 × (ODU tonnage) × Airflow Limit × (Zone% + Leak%)

Example: 5 ton ODU, zone% = 35%, leakage% = 12%, airflow limit is Medium

$$450 \times 5 \times 1.76 \times (.35 + .12) = 1{,}861 \text{ CFM}$$

There is also a MAX selection, which removes the restriction for the maximum CFM.

The CFM associated for each limit is shown on the screen and this value should be compared with the equipment's low stage CFM value to ensure that the equipment will operate for each zone.

Accessories

Beginning here with ACCESSORIES, the system screens all begin to look the same again; the only difference between systems is that each system will display the installed accessories under Equipment Summary. That is some systems will have one accessory while others may have multiple accessories. Systems with a filter may either have a media filter, electrostatic air cleaner filter or even an air purifier.

All systems will display ACCESSORIES and all systems will be limited to indoor air FILTER type, installed HUMIDIFIER, installed ULTRA VIOLET LIGHTS, and installed VENTILATOR.

Filter Type

- Change service interval notification to user
  - Replace or clean filter
    - 1 to 18 months
    - Default 3 months

When the accessories filter SETUP is selected there will be three different types to select from. AIR FILTER, ELECTRONIC AIR CLEANER and AIR PURIFIER. An interval reminder can be set so that when the selected time has elapsed, the UI will display a message for the user indicating to change or clean the filter. This time can be set from one month to 18 months in one month increments. If the homeowner does not want this reminder display, NEVER is also a selection at this point.

If the air filter is going to be changed or cleaned frequently, PRESSURE MONITOR can be turned off by setting it to DISABLE, otherwise, PRESSURE MONITOR should be left ENABLED to monitor the load on the filter.

Humidifier

- Change service interval notification to user
  - Replace or clean filter
    - 1 to 24 months
    - Default 12 months

The same will happen with the HUMIDIFIER setup. If no humidifier is installed and NO is selected, the UI simply does not display an installed humidifier in EQUIPMENT SUMMARY. But, when a humidifier is installed and YES

is selected, a CHANGE PAD time can be set from one month to 24-months, with 12-months set as the factory default value. And like the clean filter interval time, when the humidifier pad interval time elapses, the UI will display a message to change the humidifier pad.

Also through this UI display, the HUMIDIFY WITH FAN can be set, with YES, so that the humidifier turns on if there is a humidifier demand present in the heating mode. If the fan speed is set to Auto, the fan will operate on its LOW speed. The factory default value is NO.

UV Lights

- Change service interval notification to user
  - Change UV lights
    - 6 to 48 months
    - Default 12 months

Ultra violet lights are displayed in the same manner. When a UV light is installed and YES is selected, a CHANGE INTERVAL time can be set from 6-months to 48-months, with 12-months set as the factory default value. And like the clean filter interval time and the humidifier change pad interval time elapsed, the UI will display a message to change the UV light.

Ventilator

- Change service interval notification to user
  - Clean ventilator prefilter
    - 60 to 180 days
    - Default 90 days

VENTILATOR will only be displayed in the ACCESSORY SETUP menu if a unit ventilator, an HRV or ERV, is installed into the system. The time interval to clean the ventilator pre-filter can be set so that the reminder is displayed at the UI. The time interval can be set from 60-days to 90, 120 or 180 days with the factory default value of 90-days.

Utility Curtailment

- Available only on cooling units and heat pumps
- Requires input from power company
- Limited to:
  - First-stage capacity
    or
  - Turn off
- Will shut off compressor
  - Hybrid Heat or Hydronic Heat
- Curtailment <u>not available</u> for electric heating operation

UTILITY CURTAILMENT will only be displayed on air conditioning units and on heat pump units including the hydronic heat, heat pump and the hybrid heat, heat pump. Utility curtailment is only applied to one and two-stage cooling and one and two-stage heat pump heating systems and will require a utility saver input. A signal is usually sent from the power company to the utility saver which will respond to the input when applied.

Although a system is capable of utility curtailment, the system may be applied in a critical environment that cannot afford to have cooling turned down or turned off, for example where equipment could overheat and shut down a process if cooling is not provided around the equipment. In this case, the UTILITY CURTAILMENT would be disabled

The selections available when the utility saver is applied are TURN OFF, to shut down the equipment, and LOW STAGE, which allows a two-stage compressor to operate on first stage capacity only. On Hybrid Heat, in the heating mode, Hydronic Heat, in the heating mode, and two-stage heat pumps, in the heating mode, UTILITY SAVER can allow the heat pump to operate on its first stage when LOW STAGE is selected. Or it can shut down the equipment, when TURN OFF is selected. However, UTILITY SAVER will never shut the compressor off in the heating mode and drive the heat pump to electric.

Hydronic Heat

Hydronic Heating

- Hydronic Heat Kit: KFAIF0101HWC
- Consists of a circuit board, relay, and wire harness
- Relay wires into Hydronic Heat System
- Recognized by Communicating Control as Hydronic Heat
- Displays HYDRONIC HEAT
- Requires fan coil board HK38EA012 or newer

A kit can be applied to the fan coil so that the system can be applied to a current Communicating Control fan coil unit that will allow the use of a hot water heat exchanger to provide heat in an air conditioning or heat pump system. This is known as the Hydronic Heat Kit, part no. KFAIF-0101HWC. The kit simply consists of a rectifier circuit board with a 22 vdc relay along with a wiring harness that is pre-wired to the relay and terminated with a 12-pin AMP, Inc. Mate-N-Lock® connector. The relay is also fitted with two 16-gage wire leads that connect into the hydronic system control circuit. When the circuit board and relay are mounted in the fan coil unit and wired into the system, the Communicating Control recognizes that the fan coil unit has Hydronic Heat and will display HYDRONIC HEAT.

The current Communicating Control UI must be used and the FE Fan Coil must have the hydronic heat FE fan coil board, part no. HK38EA012 installed. Fan coil units manufactured compatible or newer with the Control System will have the new fan coil boards. Older FE3 and FE4 fan coils will require system changes to use Hydronic Heat. Contact your local equipment distributor for details on making the necessary changes to these units.

Hydronic Heat Setup

- Hot Water Lockout – YES or NO
  - YES, 5 to 55° F
- Heat Pump Lockout – YES or NO
  - YES, 5 to 55° F
- Defrost with Water – YES or NO
- Heating Airflow
  - Off, 500 CFM (MIN) to 400 CFM/TON
- Blower On Delay
  - 0 to 240 seconds
- Blower Off Delay
  - 0 to 240 seconds

When HYDRONIC HEAT is selected in the SETUP menu, the HYDRONIC HEAT SETUP menu shown here is displayed.

HOT WATER LOCKOUT temperature locks out the hot water so that hot water heat would not be utilized above a selected outdoor temperature, while HEAT PUMP LOCKOUT temperature locks out the heat pump so that it will not operate below a selected temperature. HOT WATER LOCKOUT temperature is ignored during the defrost cycle. When NO is selected for either lockout temperature, it changes to a temperature value that can be set from 5° to 55° F in 1° increments.

The DEFROST W/WATER selection provides hot water heat during defrost with YES and prevents it from operating during defrost with NO. Keep in mind that selecting NO will result in a "cold blow" during a defrost cycle. This selection only appears if the outdoor unit is a heat pump otherwise this will be displayed.

AIRFLOW allows for the selection of the desirable airflow during hydronic heating. The selections available are OFF, 500 CFM which is the minimum allowed, up to a maximum of 400 CFM per ton of cooling in 50 CFM increments, with a factory default value of 350 CFM per ton. OFF can be used for standalone radiant heat in a space, but during defrost the airflow will still be on.

BLOWER ON DELAY allows the user to select the amount of time that the indoor fan will wait until it turns on after hot water heating is initiated This selection allows the hydronic heat exchanger to warm up sufficiently providing warm airflow during fan operation. Settings that can be selected are from zero (0) seconds to 240 seconds in 30-second intervals, with 30 seconds as the factory default value.

BLOWER OFF DELAY allows the user to select the amount of time that the indoor fan waits to turn off after the heating with hot water is terminated. Selections are zero (0) to 240-seconds in 30-second increments with the factory default value of zero (0). Since the hydronic heat exchanger is still warm when heating is terminated, the heated residence is capable of capturing some of this heat to continue to heat the residence until the hydronic heat exchanger cools down.

Hydronic Heat Airflow

- Requires Hydronic Heat Kit
- Selectable airflow values
  - OFF
  - 500 CFM
  - Up to 400 CFM/TON
  - Factory default 350 CFM/TON

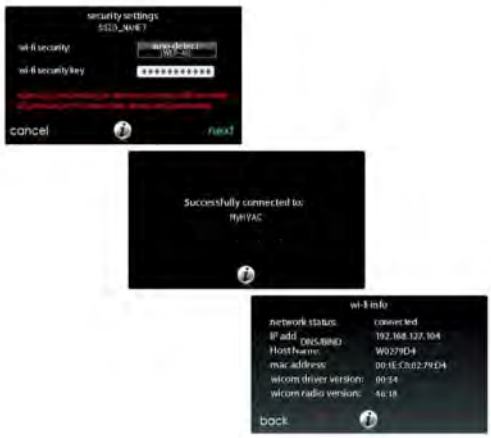
HYDRONIC AIRFLOW is the desired airflow during Hydronic Heating. The selectable airflows are OFF, 500 CFM, the minimum CFM, up to 400 CFM/ton cooling in 50 CFM increments. The factory default is 350 CFM/ton cooling airflow. The OFF selection does not turn off airflow if the heat pump is in the defrost mod.

Wi-Fi Setup

Touching the WIRELESS symbol will display the Wi-Fi setup screen; Wi-Fi should be ENABLED. After Wi-Fi is enabled touch the words SETUP A WI-FI CONNECTION, then touch the words SCAN FOR AVAILABLE ACCESS POINTS, and the system control will scan for an available Wi-Fi access.

The available Wi-Fi networks will be displayed after the networks are detected. This can take from a few seconds to a few minutes. Select by touching the myHVAC from the AVAILABLE WI-FI NETWORKS list. Once selected the box will be highlighted and the next button will be displayed. Touch on NEXT to proceed to the security settings screen.

Wi-Fi Setup Continued



The Wi-Fi security key must be entered. Touch the ******** area after WI-FI SECURITY KEY. A keyboard will be displayed, using the keyboard, enter the Wi-Fi security key, the password, from the back of the router. Touch the 123 key to change the keyboard from alpha to numeric. After entering the Wi-Fi security key, touch NEXT. The touch screen will show that connecting is in progress. This process may take up to two minutes. It cannot be interrupted or stopped. If successful then the Wi-Fi info screen will appear indicating that the NETWORK STATUS is CONNECTED. If unsuccessful or if the connection to the router is not active, the NETWORK STATUS will show as NOT CONNECTED. Retry to connect again.

If the Wi-Fi security key is not correct, the SECURITY MISMATCH notice will be displayed. If the Wi-Fi security key entered is less than 8 characters, the UNABLE TO CONNECT screen is displayed instead of the SECURITY MISMATCH screen.

After the control system has made the connection, the WI-FI SETUP menu will show DISCONNECT as the available option rather than SETUP A WI-FI CONNECTION.

If the wrong Wi-Fi address was connected, touching disconnect will allow the user to connect to a different wireless router. Because of compatibility issues, it is not recommended that you try to connect to a different router than the one that was shipped with the touch control. Some wireless access points can cause the UI to continue trying to connect and will not allow you to scan for networks. If this happens, you must cycle power off to the UI and then navigate to the WI-FI SETUP screen.

Weather Setup

Weather can be viewed only after the WI-FI SETUP has been completed. Touch the WEATHER symbol to bring up a screen that displays VIEW WEATHER FORECAST and CHANGE CURRENT LOCATION. The first time that WEATHER is accessed the location must be identified. This is performed by touching CHANGE MY CURRENT LOCATION which will display a screen to enter your country and zip code for the United States or postal code for Canada.

Touch on SAVE and go to VIEW WEATHER FORECAST to view the weather forecast.

Complete the Service Setup portion of the Quiz and then check your answers to see how familiar you are with the service setup of the Communicating Control system.

Checkout

Checkout menus are intended for use by the technician and not the homeowner. These menus allow the technician to perform checks on the operation of the system whether it is heating, cooling, defrost and even the accessories. SERVICE provides the diagnostic elements to help the technician see faults that may have occurred since the last service call or to help the technician find the cause of a symptom that may be bothering the homeowner.

Checkout Equipment

Equipment CHECKOUT in the SERVICE menu is the technician's tool for troubleshooting the system. The menu choices allow the technician to run an operating test of each piece of equipment in the system – one piece at a time. During each test, the equipment will be run through its sequence of operation and the sequence will be displayed on the UI screen. Default run times of 5 minutes are established for heating and cooling equipment. However, this time may be adjusted up to 120 minutes if desired. CHECKOUT can be stopped any time during operation of the equipment.

Checkout operation can be made for a furnace, heat pump in cooling mode or heating mode, air conditioner, electric heat and humidifier accessories and an installed heat recovery or energy recovery ventilator. On a zoned system, CHECKOUT can perform a zoned duct assessment, check zone sensors and dampers and check zoned airflow limits.

Before some equipment checks are performed, reminders will appear on the screen of the UI.

Furnace Check

The furnace check can be performed both on the low stage as well as the high stage of a two stage furnace. If only the low heat furnace check is performed, the test will can run

for 5 minutes to allow conditions to stabilize. If it is determined that a 5-minute time will not be long enough, this time can be increased up to 120-minutes using the UP/ DOWN button symbols . The furnace will begin its ignition start-up sequence and after the gas valve and inducer motor turn on, the screen will automatically change to FURNACE CHECK and the sequence of operation will be displayed on the UI screen.

The STOP button is functional during heating checkout operation and can be used to stop the test at any time.

If a heat pump with a fan coil is installed instead of a furnace and if a hot water coil is installed in the fan coil, HYDRONIC HEAT check can be performed in the same manner as the furnace check is performed.

Heat Pump Check

When the heating checkout of the heat pump is performed, both high heat and low heat checkout will operate for a minimum time of 5 minutes, each, but this time can be increased up to 120 minutes if necessary. DEFROST cycle is also selectable with a 5-minute minimum operational time, the factory default time, and this time is selectable up to 120-minutes. During checkout, the heat pump airflows are performed in the EFFICIENCY mode. If other airflows need to be checked, the heat pump must be placed into operation with a heating or cooling demand.

The heat pump low cool and high cool checks can be made independent of each other. When the cooling checkout of the heat pump is performed, both high cool and low cool checkout will operate for a minimum time of 5 minutes, each. However, if it is determined that a 5 minute time will not be long enough, this time can be increased up to 120 minutes. During cooling checkout, the heat pump airflows are performed in the EFFICIENCY mode. If other airflows need to be checked, the heat pump must be placed into operation with a heating or cooling demand.

For a variable speed heat pump compressor, the compressor speed can also be selected as a percentage of maximum speed.

Humidifier and Ventilator Check

The operation of the humidifier can be checked by selecting ON from the HUMIDIFIER CHECK display. The furnace will turn on and the humidifier will also turn on even if there is no call for humidifying.

The operation of the ventilator can be checked in a similar manner by selecting fan speed. From the VENTILATOR CHECK display select by touching the LOW or HIGH speed symbol which changes the value from OFF. The ventilator check will be made at the selected fan speed.

Zoning Check

The ZONING CHECKOUT allows the user to perform a DUCT ASSESSMENT. This is the same check that is made during the initial start-up. The DUCT ASSESSMENT will perform an airflow measurement on each zone and determine the relative size of each zone and the overall system damper leakage. This assessment will require approximately 1 minute for each zone in the system.

NOTE: A Duct Assessment will automatically occur every 24 hours at the time preset by the technician or at the factory default of 1:00 PM to check system static and calibrate dampers.

Zone Damper Check

The second ZONING CHECKOUT is the Sensor/Damper Check that allows the installer to check each zone damper for operation and to confirm that the correct zone sensor is wired to a particular zone.

When first initiated, the Zone 1 damper will open fully, and all other zones will close. Using the scroll button, select each zone and verify that the damper is fully open while all other dampers remain closed.

After proper damper operation has been verified, check and verify that the Remote Room Sensor corresponds to the proper zone damper in the same zone. Start from the top and highlight Zone 1 to open its damper. Temporarily disconnect any other zone Remote Room Sensor, we will use Zone 4, at the sensor location in its zone. The Zone 4 damper will now open, while the Zone 1 damper will close. The word **FAIL** will also be displayed instead of the actual temperature for Zone 4.

Reconnect the Zone 4 sensor and try all remaining sensors in the system, one at a time. Smart Sensors may also be checked, see the Smart Sensor Installation Instructions for this procedure.

Airflow Limits Check

Since there is no bypass damper, the Zone Airflow Limit check will allow the installer to assess the airflow noise generated by the system. The Zoned Communicating Control provides the maximum amount of airflow to each zone individually. The technician can then modify the maximum amount of airflow to each zone by changing the Zone Airflow Limit setting.

Select ZONE, then select AIRFLOW LIMIT: HIGH. HIGH is also the factory default. When START is pressed by the Right button the selected zone's damper will fully open, all others will close, and the indoor unit will provide the maximum airflow for that zone as selected in SETUP —ZONING, AIRFLOW LIMITS. If the airflow noise is objectionable, the installer can select a lower airflow noise limit. If the noise is not objectionable, the installer should leave the setting at the default value of HIGH, or even increase the setting to NO LIMIT.

Sensor Type

The type of sensor can be validated through the SENSOR TYPE under ZONING CHECK. If the wiring of a sensor

is broken or loosened, instead of displaying the type of sensor, NONE will be displayed.

Service Information

The SERVICE INFORMATION section displays several categories of useful information to the technician that can be used to troubleshoot the system. For example, the status of the indoor unit, FURNACE STATUS, and outdoor unit, HEAT PUMP STATUS, can be observed to determine if unit operation is within the design parameters. The components that make up the zoned system can also be observed.

If there was a fault to one of the pieces of equipment, a VIEW DIAGNOSIS box would appear after the equipment that experienced the fault. Clicking on the VIEW DIAGNOSIS box will open a screen that will list the fault number along with a list of possible root causes.

If there were any unusual unit operation or stoppage, the history can be checked under the LAST 10 SYSTEM FAULTS, where the LAST 10 SYSTEM EVENTS will be displayed. After service is performed on the system and the faults are corrected, the servicing technician can reset the faults in RUN/FAULT HISTORY. The RUN/FAULT HISTORY also stores the equipment's run times and cycles.

MODEL/SERIAL NUMBERS will also display the models numbers and serial numbers of the equipment in the system including zone board models and serial numbers.

SERVICE PHONE NUMBER will display the dealer information uploaded to the UI. This can include the company's name, logo, phone number and URL address.

Last 10 System Events

- Active = Event currently in effect
- Technician records date and events
- Events stored in memory
- Reset in resettable faults
- Equipment identified by event

If the UI indicates an active system malfunction, it is a malfunction that is currently in effect. Each entry has the time and date from the most recent incident. The service technician should record the current date before checking and logging the last 10 system events. These events are stored in the memory of the Touch Control and are resettable the RESETABLE FAULTS selection.

Each entry has a label preceding the event name to identify which piece of equipment generated the event. This notification may also clear by itself, but it can be cleared by touching the word MENU, then touch and hold the SERVICE symbol on the next screen and touching SERVICE INFORMATION on the third screen. Next touches RUN/FAULT HISTORY then touch RESETABLE FAULTS. If a malfunction keeps on occurring, a check of the system is required. This displays only after a critical fault occurs, not all faults will cause this display.

Variable Speed Heat Pump (VSHP)

The Communicating Control system serves in assisting the variable speed heat pump manage refrigeration in three ways. First, it aids in CHARGING a newly installed system with the proper amount of refrigerant and also aids in charging a system that has lost a portion of its charge.

Second, it aids in isolating refrigeration in the outdoor or indoor coil through the PUMPDOWN process when service is performed.

Lastly, it will drive the EXV wide open to allow complete EVACUATION of the refrigerant system. It will also open and close the EXV to "help" verify proper operation of the EXV. This operation in itself does not totally verify that the EXV operates properly and additional testing will have to be performed. We will address that in EVACUATION AND EXV CHECK.

During refrigerant charging, the system must be in the cooling mode and that the outside air temperature should be above 55°F. Favorable charging conditions exist when the outdoor air temperature is between 55°F and 100°F, and the indoor air temperature is between 70°F and 80°F. If the temperatures are outside of these ranges, any refrigerant in the system must be reclaimed and the charge must be weighed in. If charge confirmation is required, return and check the sub cooling when the temperatures are within these ranges. Refrigerant charge can only be added during the cooling cycle.

Refrigerant Charge Calculation

The refrigerant charging calculation takes into account the sizes of the indoor and outdoor units as well as the size, diameter and length, of the vapor line between the indoor and outdoor units. The liquid line size must be ⅜-inch OD. If the liquid line and vapor line are different in their lengths, use the liquid line length for the length of the vapor line.

The refrigerant charge calculation display can be used for a quick and easy means to charge the refrigeration system after the system has been opened and the charge was removed and reclaimed or at the time of initial installation.

This charge calculation should also be used when conditions are not right for charging and charge cannot be added during the cooling mode. To start, the service technician would input the vapor line diameter and the line set length by touching the UP and DOWN arrow symbols labeled "line set" and "vapor line". The line length can be adjusted in increments of five feet and the vapor line diameter is adjusted in eighths of an inch.

The system performs the calculation and tells the service technician the total charge that is required by the system. If the system had a pre-charged amount of refrigerant, the service technician would add additional charge or remove some of the excess refrigerant to meet the total system requirements.

If the system currently contains refrigerant but the amount of refrigerant is questionable, charge can be added to the system by the sub-cooling method, system sub-cool at the service valve.

Service Valve Subcool Charging

In order to add refrigerant charge the service technician will also have to select the line set length and the vapor line diameter as shown in the prior example.

The system will measure the indoor and outdoor ambient temperature and display a sub cooling temperature target measured on liquid line where it enters the service valve. Tolerance on the sub cooling temperature is ±2°F. If any adjustment is necessary, adjust charge slowly, no greater than ½-lb. per minute, and allow the system to operate for the displayed stabilization time to give any added refrigerant time to mix with the other oil and refrigerant in the system.

Note that the communicating control displays the stabilization time, the mode and compressor speed, EXV position and indoor airflow. The expanded screen displays temperatures and pressures. When the target sub cool temperature is reached, simply touch DONE to complete the process.

Refrigerant Pumpdown

At times it may be necessary to isolate as much of the refrigerant into one of the coils to break into the refrigeration system. Conventional procedures cannot be used to pump down and isolate the refrigerant into the outdoor or indoor units. Select the mode to pump down the system, COOL or HEAT. The COOL mode allows refrigerant to be isolated into the outdoor unit coil while the HEAT mode allows the refrigerant to be isolated into the indoor unit coil and lineset. Set the pump down time and start the pump down procedure, the unit will begin running in the selected mode after a brief delay. The system will display several parameters that you can observe and as the suction pressure drops the suction pressure transducer will be ignored. At the conclusion of the pump down check, close the liquid and vapor valves on the unit to store the refrigerant in the coil.

Evacuation and EXV Check

Since there is an EXV in the system for the heating expansion device, additional steps must be taken to open the EXV if the heat pump refrigerant is recovered or the system must be evacuated after service. If the EXV is not open when pulling a vacuum or recovering refrigerant, extended evacuation time may be required and/or an adequate vacuum will not be obtained.

To open the EXV for evacuation or refrigerant recovery, set the desired time period, the factory default is 120 minutes. Touch OPEN then START on the UI to open the valve. Begin evacuation or refrigerant recovery as required after the control indicates that the EXV is open. Power may be removed from the heat pump after the control indicates READY TO EVACUATE.

When the EVACUATION and EXV check is displayed the EXV can be checked for operation by forcing the EXV open, touch OPEN, or forcing the EXV closed, touch CLOSED. This check is performed in the UI OFF mode and the EXV will exhibit a small amount of chatter because of the motor steps. The technician can verify audibly that the EXV "appears" to be opening and closing. Although the EXV can be heard to be moving, a stuck EXV that cannot move will also exhibit a small amount of chatter. Further testing is necessary by closing the EXV and removing the EXV coil connections from the variable speed heat pump board and turning the unit on in the heating mode. Since the EXV is supposed to be closed, the refrigerant will be pumped into the indoor coil. If this does not occur, the EXV is not closed.

Complete the Checkout portion of the Quiz and then check your answers to see how familiar you are with checking out and servicing the Communicating Control system.

Troubleshooting

This section provides a basic understanding of the Sequence of Operation of the Communicating Control system utilizing the UI controller. Modes of operation are described to give the technician an overview of the way the system operates. These modes apply to either zoned or non-zoned systems.

Some symptoms that may occur after the system has been started and commissioned are explained in this portion of the program. For additional detailed information on Troubleshooting, refer to the documents presented in the supplement section of this program.

System Troubleshooting

- System tracks malfunctions
  - Equipment circuit boards display fault code sequences
  - System stores malfunctions as fault codes in user interface
- User interface messages and fault codes provide probable cause
- Following user interface screens are helpful

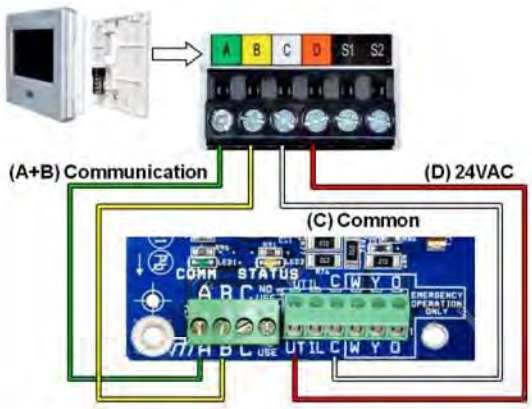
The Communicating Control system is designed to record and store system faults and events that may be used to help lead a technician to the root cause of a real or perceived system problem. These fault codes are recorded in the UI and displayed by LED flash sequences on the circuit board of each piece of equipment in the system.

There are a variety of fault codes that relate to a fan coil, furnace, small packaged product, outdoor unit, zone board, or to the UI itself. For further information on fault codes, refer to the installation and start-up literature for each piece of equipment installed in the system. It should be understood, however, that not all recorded events represent system problems. Thus, fault codes should be used as a clue to guide the technician to the appropriate malfunctioning part of the system.

Knowing the probable reason for the malfunction, attention can then be directed to the appropriate piece of equipment to resolve the issue. The following information will be helpful in troubleshooting a Communicating Control system.

Communicating Control systems are designed to alert the equipment owner of a potential system problem, and help guide the technician in determining a system problem.

Second User Interface



When working on a rooftop unit or outdoor unit of a split system with communicating controls and the UI is mounted and located indoors, it is time consuming operating the UI indoors then running outdoors to check unit operation. To overcome this, the communicating control has the ability to add a second UI outside wired into the outdoor unit board board.

To utilize a second UI connect the A and B communication bus wires from the second UI to the terminals marked A and B on the terminal strip located in the bottom left corner of the VSHP board. But instead of connecting the wires on the second UI to the terminals marked C and D connect the C wire from the second UI to the terminal strip to the right of the ABCD terminal strip at the terminal marked C. Connect the D wire from the second UI to the terminal marked UT, the far left terminal, on the same terminal strip that the wire from the C terminal was connected.

When the second UI is connected and powered up, the UI inside of the occupied space will "go to sleep" and let the second UI take control of the system. In this manner the service technician can run the diagnostic checkouts right at the outdoor unit using the second UI.

After the checkouts are completed and it is no longer necessary to use the second UI, remove it from the Communicating Control system and the indoor UI will regain control in about a 2-minute timeframe.

System Malfunction Screen

- Screen shows after a malfunction
- May clear on its own
- Check system if it reoccurs
- Caused by specific fault codes
- RESETABLE FAULTS clears system

Certain system events can result in the pop-up message SYSTEM MALFUNCTION. A system malfunction is an event that could be related to a failed component, or an event that may not necessarily indicate an equipment problem. If this message clears on its own and the equipment operates normally, it can be ignored. If it does not clear, or comes back repeatedly after being dismissed, the system should be checked as soon as possible. SYSTEM MALFUNCTION is only caused by specific fault codes, not all fault codes will result in a SYSTEM MALFUNCTION.

The user can touch and hold the SERVICE symbol to get the SERVICE INFORMATION screen and then touch RUN/FAULT HISTORY. The next screen layer will display RESETABLE FAULTS. Touching RESETABLE FAULTS will clear the system of the fault. If the error has not disappeared within the next 24 hours, the above display will return.

If the error code disappears, SYSTEM MALFUNCTION will disappear.

This message may be generated from any of the communicating system components, and will be displayed as shown.

Service Menus

- EQUIPMENT SUMMARY
- INSTALLATION
- SETUP
- CHECK OUT
- STATUS

The SERVICE Menu provides system information to aid in troubleshooting. To access the SERVICE Menu touch the Home Display screen then touch the word MENU. The next screen layer displayed will be the menu items, SERVICE being one of them. Touch and hold the SERVICE symbol to access the Service menu items. The SERVICE screen allows the technician to view the installed equipment, remove or install equipment, setup equipment in the system, check the performance of the equipment, check the status of the equipment and access the last 10 system faults. SERVICE is also the section for uploading revised software and dealer information to the UI.

Checkout Menus

- Touch main display screen
- Touch the word MENU
- Touch and hold the SERVICE symbol
- Touch the word CHECKOUT

The CHECK OUT menus give the technician the ability to run all the system components briefly to verify proper operation. Access this by touching the Main screen then the word MENU on the next screen layer. In the menu, touch and hold the SERVICE symbol then the word CHECK OUT on the next screen. Select the equipment that you wish to check and follow screen prompts.

Airflow during Checkout mode defaults to Efficiency airflow regardless of airflow setting. If it is necessary to operate the system in another airflow, such as maximum, you must exit checkout mode, return to the main screen, and initiate a call for heating or cooling.

Equipment Status

- Touch main display screen
- Touch the word MENU
- Touch and hold the SERVICE symbol
- Touch the words SERVICE INFORMATION

To check equipment status from the normal display screen, touch the screen then touch the word MENU on the next screen. Next touch and hold the SERVICE symbol on the menu screen and the words SERVICE INFORMATION on the next screen layer.

The next screen layer will give you the option to check the status of any of the equipment in the system. This will show what the UI is telling the system to do. Compare this information to what is actually happening. This can help lead you to a component problem.

Checking Airflow, Static Pressure, and RPM

When viewing service screen:

- Airflow is *requested* – not actual
- Static pressure is *calculated* on
  - Requested airflow
  - RPM
  - Known system characteristics
- RPM is *actual*
- Static pressure accuracy is *limited* when RPM reaches 1300 on some furnaces
  - See product data to determine airflow performance
  - Maximum about 1300 RPM (varies with model)

The UI screen shown here was accessed by selecting FURNACE STATUS from the UI SERVICE menu then the SERVICE INFORMATION menu. It displays valuable air system information; airflow (CFM), blower RPM, and air system static pressure (inches water column).

When observing these values, the following points must be considered in order to interpret the information correctly:

- The airflow displayed is the ***requested*** airflow from the zones and not the actual airflow delivered by the indoor blower to the zones.
- The static pressure displayed is a ***calculated*** value, based on requested airflow, RPM, and known system characteristics, not the measured static pressure.
- The blower RPM displayed is ***actual*** RPM of the blower wheel and motor.
- The accuracy of static pressure displayed is ***limited*** when the RPM reaches about 1300.

RPM can be used as an indicator of restrictive ductwork. When RPM reaches its maximum, the cutback algorithm takes control of the system and protects the furnace or fan coil unit.

Most furnaces and fan coils will deliver the zone's requested airflow up to the maximum blower RPM. When a system is unable to deliver the requested airflow at high static pressures, the accuracy of the static pressure calculation is limited. See airflow information in the appropriate Product Data to determine airflow performance for the furnace or fan coil involved. Although the Maximum RPM varies with model, it is about 1300 RPM.

Circuit Board LEDs

- LEDs on all circuit boards
  - Indoor unit
  - Outdoor unit
  - Zone Damper Module
  - Network Interface Module

- Provide fault code when malfunction occurs
- Fault codes provided in the supplements section of this book to facilitate troubleshooting

All circuit boards that exist in the indoor unit, outdoor unit, ZDM and NIM contain colored LEDs that when correctly interpreted, provide useful information about a possible problem. When a malfunction occurs, the LEDs provide a

flash sequence code to aid the service technician. The installation instructions for each product should be checked to ascertain the fault code indicated and possible steps to remedy the situation.

User Interface Does Not Power Up

- Check wiring to ABCD terminals
- Match all colors at all terminals
- Indoor unit power on
- Indoor amber LED lit
- Check fuse at indoor unit circuit board
- 24 vac at C-D terminals, Zone Control Terminal
- 24 vac at C-D terminals, Damper Control Module

Common problems associated with successful UI operation can be resolved using the appropriate troubleshooting approach. If the UI does not power up, be sure to follow this procedure before concluding that there is a product problem.

First, recheck to be sure the wiring is connected properly to the A, B, C, and D terminals on all devices, making sure the colors match for every A, B, C, and D terminal. Make sure that power is applied to the indoor unit. The amber LED on the indoor unit control circuit board should be lit. If it is not, check to see if the fuse at the indoor unit circuit board is missing or blown. Check to be sure that 24 volts, AC power across the C-D terminals on the Communicating Control Zone Control Terminal and Damper Control Module.

Indoor Unit Not Found

- Display: INDOOR UNIT NOT FOUND
- Check for green led at indoor unit circuit board
- Check wiring to ABCD terminals
- Match all colors at all terminals
- Avoid communication bus run next to power wiring
- Touch RETRY in lower right corner of UI screen
- If still "INDOOR UNIT NOT FOUND":
  - Disconnect electronic devices from indoor unit
  - Leave only indoor unit connected
  - Try again
- If still "INDOOR UNIT NOT FOUND":
  - Connect User Interface direct to indoor unit with short piece of thermostat wire
- If for furnace, CANNOT COMMUNICATE WITH EQUIPMENT:
  - Turn off all DIP-switches at SW-4

When using a Communicating Control, variable speed indoor unit, fan coil or furnace, you may face a situation where the UI display says INDOOR UNIT NOT FOUND. This means the Communicating Control communications features have searched for the indoor unit and not found it. This may be caused by wiring problems at any of the system components or accessories. In brief summary, here is the troubleshooting routine to follow for this situation.

First, check to see if the green communications LED light is lit at the indoor unit circuit board. It should be lit to show that it is recognized as a part of the communicating bus. Recheck to be sure that the wiring is connected properly to the A, B, C, and D terminals on all devices, making sure that all colors match for every terminal. Look the system over to be sure that the communication bus does not run in close proximity to the power wiring for the house, wherever it is connected (lighting, appliances, air conditioning equipment, alarm systems, etc.). When it is run close to power wiring, it can cause communications problems by polluting the signal running down the communication bus.

Now re-start the system again. If the UI display still reads INDOOR UNIT NOT FOUND, then electrically disconnect all devices and accessories from the indoor unit, leaving only the indoor unit connected.

Re-start the system and if the UI display still reads Indoor UNIT NOT FOUND, then try directly connecting the UI to the indoor unit with a small piece of thermostat wire, as follows.

Use thermostat wire with at least 4 wires, because you will be making a 4-wire jumper connection directly between the indoor unit and the UI. Make the direct connection by first disconnecting the green, 4-wire plug from the indoor unit circuit board. Now you will directly connect the UI to the indoor unit circuit board by taking a short piece of thermostat wire (your jumper wire), that you know is good, and connecting it to the A, B, C, and D terminals of the spare UI back plate. Now, remove the four wires from the green plug that you removed from the indoor unit circuit board and plug the four wires from your jumper wire into the green plug (an alternative is to carry a spare green indoor unit plug and use it instead). Be sure to match color for color on the A, B, C and D terminals. Now install the UI on the spare back plate and plug the green plug attached to your jumper into the indoor unit circuit board. Now try again.

If, during the startup of a furnace installation, a CANNOT COMMUNICATE WITH EQUIPMENT message is displayed on the screen of the UI, make sure all dip switches are in the off position on SW-4.

Outdoor Unit Not Found

Display says outdoor unit not found:
(I have a communicating outdoor unit)

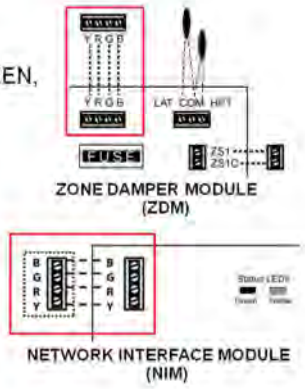
- Recheck wiring to ABCD connector on the outdoor unit
- Make sure all colors match for every terminal
- Check for 24vac between the C and D terminal connector of the outdoor unit
- Make sure wiring is not in close proximity to high voltage wires or other such device wiring such as an alarm system

Display says Outdoor Unit not found and I have a communicating outdoor unit. This may be due to a wiring problem with any of the system components or accessories.

- Recheck wiring to ABCD connector on outdoor unit.
- Make sure all colors match for every terminal.
- Check for 24 vac between the C and D terminal connector of outdoor unit.
- Make sure wiring is not in close proximity to high voltage wire, or other such device wiring such as an alarm system. This can cause communications problems on the bus.

ERV/HRV Not Recognized By System

- Check wiring:
  - Ventilator wired to YELLOW, RED, GREEN, and BLUE terminals of ZDM or NIM
- Check for 12 volts between Y(+12 vdc) and B (ground) on ventilator
  - Make sure ventilator powered



A ventilator may be connected to the system by wiring the ventilator directly to a ZDM in a zoned system, or a NIM in a non-zoned system. The system recognizes a ventilator is connected when the ventilator is wired to the YEL, RED, GRN, and BLU terminals of the ZDM or NIM, and the ventilator is powered.

If the ventilator is not found by the UI, check for 12 volts between the Y, +12 vdc, and B, ground, terminals of the ventilator. If voltage is not detected, the ventilator will not be found by the control system. Make sure the ventilator is powered.

Mistake On Start-Up Screen

- **Change ventilator from YES to NO**
- Touch DONE to return to main display screen
- Touch the word MENU
- Touch the SERVICE symbol and hold for 10 seconds
- Touch the word INSTALLATION then NEXT
- Make corrections

If a mistake is made on the start-up screen or a change is made to some of the accessories in the system and you see that the EQUIPMENT SUMMARY does not match the system, here is how you get back to make the change to the system. Let's use the ventilator as an example and assume that the system does not contain a unit ventilator. Notice that in this example that YES appears after ventilator and you want to change that to NO.

Touch DONE on the EQUIPMENT SUMMARY display screen to return to the Main display screen. At the Main display screen touch the word menu and the next layer screen will appear. Touch and hold the SERVICE symbol for 10 seconds to get the SERVICE screen. Now touch the word INSTALLATION on this screen. Touching NEXT will allow you to go back and make any changes to the accessories and any other inputted information made during Power-Up. Proceed to make the necessary corrections. In this example, when the system displays VENTILATOR INSTALLED, touch NO. After installation is complete, the EQUIPMENT SUMMARY should display ventilator, NO.

Clean or Replace Filter

- CLEAN OR REPLACE FILTER is displayed after a short period of time:
  - Probable cause: System static pressure approaching equipment capability
    - Check/replace filter
    - Evaluate ductwork to lower system static pressure
    - Disable pressure measurement in filter setup screen

These systems have a feature called True Sense filter detection. This feature reads the change in static pressure caused by the filter accumulating dirt. At a preset time every day, or at the factory default setting of 1:00 PM, the system will take a reading and record the change in static pressure. The "clean or replace filter" message will pop up when the filter is full.

Zones Not Found

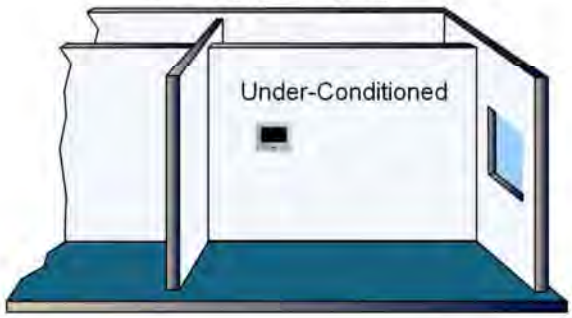
- Make sure zone module 1 - 4 has the DIP-switches at ⑤ set to the left
- Make sure zone damper module 5 - 8 has the DIP-switches at ⑤ set to the right
- Recheck wiring to the ABCD connectors at ③
- Perform a re-Install in the INSTALL/SERVICE menu

When the error message appears that says ZONES 5-8 NOT FOUND, the control does not see Zones 5 through 8. Be sure that the ZDM in Zones 5 through 8 have the DIP-switches set to the right. The dip switch is shown here as item 5 for a sample ZDM. Also, recheck the wiring to the A, B, C, and D terminals, Item 3 shows the terminal block, and be sure the colors match up.

If the UI says ZONES 1-4 NOT FOUND the control does not see Zones 1 through 4. Be sure that the ZDM in Zones 1 through 4 have the dip switches set to the left. The DIP-switch is shown here as item 5 for a sample ZDM. Also, recheck the wiring to the A, B, C, and D terminals, item 3 shows the terminal block, and be sure the colors match up. Perform an "INSTALLATION" in the SERVICE menu to complete the procedure.

Some Zones Under-Conditioned

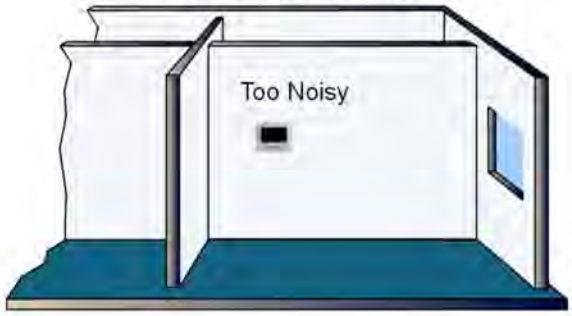
- Airflow limit too low?
- Do zone airflow limit check
- Raise airflow limit setting



There may be a problem with some zones being under-conditioned. That is, during cooling, the temperature of some zones is too warm and during heating, the temperature of some zones is too cool. In each case, there is a noticeable difference between the zone set point and its temperature. In such cases, it is possible that the Zone Airflow Limit, configured at installation time, may be set too low. Perform an Airflow Limit Checkout procedure, raising the airflow limit setting, if possible.

Some Zones Noisy – Excess Airflow

- Airflow limit too high?
- Do zone airflow limit check
- Reduce airflow limit setting



There may be a problem with some zones being too noisy due to excess airflow. In such cases, it is possible that the Zone Airflow Limit, configured at installation time, may be set too high. Perform an Airflow Limit Checkout procedure, reducing the airflow limit setting, if possible.

Some Zones Over-Conditioned

Over-conditioning is happening in 1 or more zones

- Check sensor location for drafts behind the wall
- Perform damper/sensor check to ensure sensors wired properly to dampers
- Check for partially broken damper wire or stuck damper
- Understand what system is being told to do and what it is doing:
  - Check system status to view demand
    - Demand may exist even though UI shows actual temp and set point are same
    - System controls to 1/16th of degree
  - Check zoning status to view damper positions
    - Damper open and system is running, probable call for conditioning
    - Damper closed and zone over-conditioned, have damper problem
  - Check zone setback to see if it is a dump zone

The maximum airflow into a zone is based on the relative size of the zone determined by the duct assessment and the ZONE AIRFLOW LIMIT selected for each zone. Airflow limits are set to HIGH as the factory default. This means that 200% of the assessed airflow is allowed into the zone as the default value.

Thus, based on default settings, the system will allow some over-conditioning to ensure minimum airflow through the equipment and to maintain selected airflow limits. However, the system may not be capable of wide set point differences. For example, consider a house in the heating mode with one zoned Communicating Control system installed. If a customer wants the unoccupied upstairs bedroom at 62° F and the downstairs zone at 70° F, the upstairs zone may be allowed to over-condition up to 70° F in order to satisfy the minimum airflow requirements through the equipment or to match the selected airflow limits.

When over-conditioning is not desired but is happening in one or more zones, the following steps can be followed to minimize it.

First, the sensor locations may be causing the sensor to be influenced by drafts behind the wall on which it is mounted, giving a false response. Make sure that the hole behind each sensor and the UI is plugged.

Second, the dampers or sensors may be wired improperly. Perform a DAMPER/SENSOR CHECK in the ZONING CHECKOUT screen to ensure that dampers and sensors are wired properly.

Third, a partially broken damper wire that is intermittently losing connection or a partially stuck damper may be the cause. When using a cable with 6 or more wires to connect the damper actuators, use the other three wires, which were not originally connected, to eliminate the possibility of broken down wiring. Check for a stuck damper by adjusting the UI so that the damper should modulate either closed or open. See if it moves smoothly as it should.

Fourth, understand what the system is being told to do and what it is actually doing. Several features are available to assist you in this task:

- ***Check the system status***. Do not assume that a zone is not calling for heating or cooling because the set point matches the actual temperature reading on the UI or Smart Sensor. The system controls in 16ths of a degree but only displays in whole degrees. There could be as much as a 0.9° F demand in a zone when the readings of set point and room temperature match on the UI or Smart Sensor screen. This is enough demand to bring on high stage heating or cooling.
- ***Check zoning status.*** Proceed to the ZONING STATUS screen to view damper positions. This is the best way to determine if any of the zones in the system is calling for heating or cooling. If a damper is open and the system is running, there is probably a call for conditioning that zone, unless it is opened slightly due to airflow limit management or excess static pressure build-up in the system.

  If the damper position is 0, the zone is over-conditioned. There may be an application problem. You may have a damper leakage issue, oversized damper, or conditioning from an adjacent space in the building.
- ***Check zone set back.*** A zone may be over-conditioning due to AIRFLOW LIMIT and EXCESS STATIC PRESSURE settings. If a zone is set back more than 3° F from the most conditioned zone set point, and the system needs to dump air to continue operating the system, that zone may be a dump zone and must, by necessity, be over-conditioned. It is being told to over-condition for the sake of the stability and safe operation of the system.

Zoning System – Excess Static Pressure

- Blower RPM at MAX and unable to deliver zones requested airflow
  - Many calling zones closed and/or
  - Restrictive (undersized) zone duct runs
- Control algorithm attempts to keep system running by staging down and dumping air
- Control then shuts down system if it can't maintain minimum equipment airflow at Maximum RPM
- Solutions:
  - Decrease Zone Airflow Limits in suspected high pressure loss zones
  - Evaluate duct design – improve as necessary
  - Evaluate building suitability for zoning

If the zoning system will not run or shuts down intermittently, and EXCESS STATIC PRESSURE appears in the LAST 10 SYSTEM EVENTS, this indicates that the controls have increased the RPM of the indoor fan to MAXIMUM in an unsuccessful attempt to maintain the equipment minimum airflow rate against a high ductwork static pressure loss.

This situation is probably caused by many zones closing and producing excessive static pressure loss when the control is trying to push the minimum equipment airflow through the remaining open damper or dampers. The excessive pressure drop may be caused by undersized zone duct runs or by trying to pass all the minimum equipment airflow through too few open dampers.

Communicating Control controls contain an air management algorithm that does not allow the system to run under these extremely restrictive conditions. However, the algorithm attempts to maintain system operation before shutting down by first staging down the equipment capacity. This reduces the target airflow of the controls to minimum levels. The control then dumps extra air as described earlier.

If a reasonable static pressure cannot be achieved at minimum airflow and maximum RPM, the algorithm then shuts down the system and the controls record a HIGH STATIC STAGEDOWN system fault in the LAST 10 SYSTEM EVENTS. When this happens, there are some things to try. They are similar to the strategy followed when some zones are over-conditioned.

First, change zone airflow settings. Some zones may be set to high maximum airflow, which means high static pressure loss when that airflow is sent to that zone. Another possibility is that the zone ductwork may have a high resistance to airflow. Either of these situations may result in excessive static pressure loss. Decrease the maximum zone airflow settings in suspected zones. This will decrease the static pressure loss because the loss through the duct and diffuser reduces as the square of the airflow. Reducing the airflow to ½ reduces the static pressure loss to ¼. This should help to keep the system running longer by staging down to low and by dumping air sooner.

Second, evaluate duct design, which may be undersized or not aerodynamic. Make improvements where necessary. Be especially careful to correct flex duct abuses.

Third, evaluate the building structure for proper zoning strategy.

Airflow Limit – Stage Down Occurred

- This is normal operation
- If no under-conditioning complaint:
  - Ignore
- If under-conditioning complaint:
  - Raise airflow limit for the zone
  - Educate owner on trade-off of noise vs. comfort (airflow)

This fault message shows up in the UI fault history area under LAST 10 SYSTEM EVENTS, not on the normal display. The event indicates that a zone has reached its airflow limit setting and the system has compensated by

staging down to a lower equipment capacity step or by shutting down. The system is designed to do this to control air noise, so it does not necessarily reflect a problem with the system.

The factory default airflow limit is set to HIGH in each zone. For a 5 ton system:

$$450 \times 5 \times 2.5 \times (\text{Zone\%} + \text{Leakage\%})$$

If the airflow limit is set to MED HIGH, the max allowable airflow to that zone is $450 \times 5 \times 2.14 \times$ (Zone% + Leakage%). If the airflow limit is set to MED, $450 \times 5 \times 1.76 \times$ (Zone% + Leakage%). If the airflow limit is set to MED-LOW, $450 \times 5 \times 1.38 \times$ (Zone% + Leakage%). If the airflow limit is set to LOW, $450 \times 5 \times 1.00 \times$ (Zone% + Leakage%).

If the equipment owner is not complaining about zones being under conditioned, then this message should be ignored. If the homeowner is complaining, then:

Raise the Zone Airflow Limit for that zone - up to MAX if possible. However, the homeowner may now experience excessive noise for that zone. It should be communicated to the equipment owner that there is a trade-off between comfort and noise when these airflow limits are adjusted.

Heating Set Point Change Issue

- Zone heating set point must be increased 3° F over other zone set points before heating comes on
- After set point change, must be sufficient zones calling to meet minimum equipment cfm limit
- Solution:
  - Using SETUP menu, set zone AIRFLOWLIMIT NO LIMIT if Airflow Limited fault is active
  - Lower Zone Airflow Limit if EXCESS STATIC PRESSURE fault is active

Example: When increasing the set point temperature for a zone, the heating does not come on until the set point temperature is 3 degrees over all of the other zones.

The system may not allow the equipment to turn on after a set point adjustment if there are not enough zones calling. Once a difference of 3 degrees exists between zones, the system can then use the setback zones as dump zones, and the system may then turn on. Lowering the set point back to within 3 degrees may cause the equipment to turn off. To eliminate this problem, set the zone airflow limits to HIGH if AIRFLOW LIMITED fault is active and lower the Zone Airflow Limit if the EXCESS STATIC PRESSURE fault is active.

Complete the Troubleshooting portion of the Quiz and then check your answers to see how familiar you are with troubleshooting the Communicating Control system.

QUIZ

Familiarization

1. The Infinity Touch control UI replaces what?
   a) Room thermostat
   b) Zone damper module
   c) Infinity push button control
   d) Communicating furnace board
2. What network control component can be used to integrate a heat recovery or energy recovery ventilator unit (HRV/ERV) into a non-zoned Communicating Control System?
   a) Network interface module
   b) Zone damper module
   c) Room thermostat
   d) Communicating furnace board
3. What network module is used to control up to 5 motorized zone dampers in a Communicating Controlled system?
   a) Network interface module
   b) Zone damper module
   c) Room thermostat
   d) Communicating furnace board
4. Because the Communicating Control relies on measurements of duct pressure and airflow;
   a) A VFD must be installed
   b) The ducts must be sealed
   c) A Magnehelic is used to measure pressure
   d) a bypass damper must not be installed
5. When used in a zoned system, the Communicating Control UI may take the place of a Remote Room Sensor in which zone(s)?
   a) All zones
   b) Zone 1 only
   c) Zones 1 and 2
   d) Any zone
6. In a non-zoned system, a Remote Room Sensor (RRS) can be used instead of the sensor that is provided internally with the UI.
   a) True
   b) False
7. A Zone Damper Module can be used to control a heat recovery or energy recovery (HRV/ERV).
   a) True
   b) False
8. A(n) _____ is used on a Zone Damper Module to protect the board from over current on the damper drive outputs.
   a) Switch
   b) Ground wire
   c) Automotive fuse
   d) Insulator
9. A _____ sensor is automatically provided with all communicating 2-stage condensing units.
   a) Leaving air temperature
   b) Heat pump temperature
   c) Supply air temperature
   d) Outdoor air temperature
10. The Communicating control system requires a separate humidity sensor be installed to control dehumidification.
    a) True
    b) False

Installation

1. When installing a Communicating Control residential fan coil system, a by-pass damper must be installed to handle the throttled supply air at very low CFM.
   a) True
   b) False
2. The Zone Damper Module should be located as close to the _____ as possible to facilitate wires being run to it.
   a) User interface
   b) Indoor unit
   c) NIM
   d) Zone damper
3. Remote Room or Smart Sensors should be mounted 5 feet from the floor, and preferably on a(n) _____ wall.
   a) Hallway
   b) Inner
   c) Outer
   d) Living room
4. _____ gage wire must be used when installing a Remote Room Sensor 700 feet away from the Zone Damper Module.
   a) 16
   b) 18
   c) 20
   d) 22
5. Both a Remote Room Sensor and a Smart Sensor may be installed in the same zone.
   a) True
   b) False
6. Which wire of the ABCD bus provides a 24 vac (HOT) power supply?
   a) A
   b) B
   c) C
   d) D
7. How many zone dampers (wired in parallel) can be driven by a single Zone Damper Module output signal?
   a) 2
   b) 3
   c) 4
   d) 5
8. When installing zones 5-8, the DIP-switches must be moved to the _____ on the 2nd Zone Damper Module.
   a) Left
   b) Middle
   c) Right
9. The _____ sensor, if used, must be installed after the cooling/heating coil, but before the first branch in the ductwork.
   a) LAT
   b) HPT
   c) SAT
   d) OAT
10. If a Remote Room Sensor is wired to the Zone Damper Module's Zone 1 terminals, the UI's internal sensor be ignored?
    a) True
    b) False
11. When a 2-stage non-communicating heat pump is used with a Communicating Control system, a _____ must be used to integrate the outdoor unit into the system.
    a) Network interface module
    b) Zone damper module
    c) Room thermostat
    d) Communicating furnace board
12. A separate 24 vac power supply is required to power a Network Interface Module when installed in an Infinity-A controlled system.
    a) True
    b) False

Power-Up and Configuration

1. A USB (Universal Serial Bus) port is built into the bottom of the UI.
   a) True
   b) False
2. Upon initial power up of a split system, the UI automatically searches the ABCD bus to find communicating equipment _____.
   a) Accessories
   b) Electric heaters
   c) Control boards
   d) Sensors
3. If identifiable, any electric heaters are found by the UI during its communication search at power-up.
   a) True
   b) False
4. During power-up, the UI automatically identifies accessories (i.e. filter media).
   a) True
   b) False
5. In a non-zoned system the _____ screen will appear after set-up is exited.
   a) Equipment summary
   b) Static pressure check
   c) Equipment status
   d) Home
6. In a zoned system the _____ screen will appear after the static pressure check is exited.
   a) Equipment summary
   b) Equipment status
   c) Duct assessment
   d) Home
7. The "i" information symbol is displayed on each screen.
   a) True
   b) False
8. The user may temporarily alter the system's mode of operation and the appropriate programmed set point by _____ the set point.
   a) Bypassing
   b) Changing
   c) Overriding
   d) Touching
9. Fan OFF indicates an AUTO Fan, while a _____ displays the fan speed.
   a) Mode
   b) System ON
   c) Touch N Go
   d) Continuous fan
10. The desired humidity and fresh air can be set using the HUMIDITY AND FRESH AIR PROFILES for each activity, _____.
    a) If a humidifier has been installed for the system.
    b) When the humidity is low
    c) If an HRV/ERV has been installed
    d) Only when the HRV/ERV is running
11. After touching the SCHEDULES button symbol the next screen that will appear will be a display telling the user that the system will set the schedule.
    a) True
    b) False
12. VACATION ACTIVE will only be displayed after the vacation period starts.
    a) True
    b) False
13. The OPERATING STATUS will only display the indoor and outdoor equipment operation, not the accessories.
    a) True
    b) False
14. During initial Power Up on a zoned system, the zones will be identified by name from a table of common names.
    a) True
    b) False

Service Set-Up

1. The Install/Service menus are not designed for use by the homeowner.
   a) True
   b) False
2. The Technician SERVICE menus may be accessed by touching and holding the SERVICE symbol for _____ seconds.
   a) 2
   b) 5
   c) 10
   d) 12
3. The SERVICE _____ menu item allows the technician to alter the default values that define equipment and system operating parameters.
   a) Status
   b) Equipment summary
   c) Install
   d) Set-up
4. SMART RECOVERY starts the system _____ minutes prior to the programmed schedule start time for both cooling and heating modes.
   a) 30
   b) 60
   c) 90
   d) 120
5. Selecting FURNACE from the SETUP menu will allow you to set the desired airflow for heating, called FURNACE AIRFLOW; selections are _____.
   a) Comfort and efficiency
   b) EFF325 and EFF350
   c) HI and LO
   d) Humidify and dehumidify
6. In the THERMOSTAT SETUP, ___is used to apply a correction factor for the static pressure reading that the system performs for the indoor airflow.
   a) Offsets
   b) Resets
   c) Barometric pressure
   d) Altitude
7. The G TERMINAL option is a feature used only on the _____ with the Control System.
   a) Variable speed heat pump
   b) Air conditioners and heat pumps
   c) Zoned systems
   d) Fan coils and furnaces
8. The Communicating Control System has added the _____ selection which is a smart defrost interval selection made by the controls.
   a) Touch N Go
   b) Auto
   c) Smart
   d) System
9. When LOW AMBIENT COOLING is selected, ensure that the COOLING LOCKOUT is set to one of the other three temperature settings.
   a) True
   b) False
10. Outdoor heat pump units installed with an indoor gas furnace will allow the system to operate as a hybrid heat units allowing the system to heat using either the heat pump or the gas furnace. The user can set the outdoor air temperature above which the heat pump cannot operate, as well as, the outdoor air temperature below which the furnace cannot operate.
    a) True
    b) False
11. All systems will display ACCESSORIES and all systems will be limited to indoor air FILTER type, installed HUMIDIFIER, and installed ULTRA VIOLET LIGHTS.
    a) True
    b) False
12. A kit can be applied to the Control System so that the system can be applied to a current Communicating Control fan coil unit that will allow the use of a _____ to provide heat in an air conditioning or heat pump system.
    a) Router
    b) NIM
    c) Hot water heat exchanger
    d) Gas furnace

Checkout

1. Equipment _____ in the SERVICE menu is a technician's tool for troubleshooting the system.
   a) STATUS
   b) CHECKOUT
   c) LAST 10 FAULTS
   d) TROUBLESHOOTING
2. During checkout, the heat pump airflows are performed in the EFFICIENCY mode. If other airflows need to be checked, the heat pump must be placed into operation with a _____ demand.
   a) SYSTEM MODE
   b) CONTINUOUS FAN
   c) HEAT or COOL
   d) AUTO
3. When the cooling checkout of the heat pump is performed, both high cool and low cool checkout will operate for a minimum time of _____.
   a) 5 minutes
   b) Defrost
   c) 120 seconds
   d) One cycle each
4. The DUCT ASSESSMENT will perform an airflow measurement on each zone and determine the _____ of each zone and the overall system damper leakage.
   a) Duct assessment
   b) Zone airflow limit
   c) Relative size
   d) Noise
5. The second ZONING CHECKOUT is the _____ that allows the installer to check each zone damper for operation and to confirm that the correct zone sensor is wired to a particular zone.
   a) Duct assessment
   b) Static pressure test
   c) Duct leakage check
   d) Sensor/damper check
6. To aid in trouble-shooting a reported situation, the technician may want to review the _____ that have occurred.
   a) Run/fault history
   b) last 10 system events
   c) System status
   d) Equipment status
7. The refrigerant charging calculation takes into account the sizes of the indoor and outdoor units as well as the size, _____, of the vapor line between the indoor and outdoor units.
   a) Volume
   b) Cubic inches
   c) diameter and length
   d) theoretical volume
8. If the heat pump refrigerant is recovered or the system must be evacuated after service, no additional steps are be taken.
   a) True
   b) False
9. The technician can verify audibly that the EXV "appears" to be opening and closing.
   a) True
   b) False
10. Although the EXV can be heard to be moving, a stuck EXV that cannot move will also exhibit a small amount of chatter.
    a) True
    b) False

Troubleshooting

1. The communicating control has the ability to add a second UI outside wired into the outdoor unit board.
   a) True
   b) False
2. The CHECK OUT menus give the technician the ability to run all the system components briefly to verify____.
   a) Static pressure
   b) Equipment summary
   c) Power to the system
   d) Proper operation
3. To check equipment status from the normal display screen, touch the screen then touch the word MENU on the next screen. Next touch and hold the SERVICE symbol on the menu screen and the words INFORMATION STATUS on the next screen layer.
   a) True
   b) False
4. All circuit boards that exist in the indoor unit, outdoor unit, ZDM and NIM contain _____ that when correctly interpreted, provide useful information about a possible problem.
   a) LCD screen
   b) Colored LEDs
   c) DIP-switches
   d) Communicating signals
5. The system recognizes a ventilator is connected when the ventilator is wired to the YEL, RED, GRN, and BLU terminals of the ZDM or NIM, and the ventilator is powered.
   a) True
   b) False
6. These systems have a feature called True Sense filter detection that reads the change in static pressure caused by the filter accumulating dirt.
   a) True
   b) False
7. When the error message appears that says ZONES 5-8 NOT FOUND, the control does not see Zones 5 through 8. Be sure that the ZDM in Zones 5 through 8 have the _____.
   a) LEDs are blinking
   b) DIP-switches set to the left
   c) DIP-switches set to the right
   d) Communication signals
8. There may be a problem with some zones being too noisy due to excess airflow, it is possible that the Zone Airflow Limit, configured at installation time, may be set too high.
   a) True
   b) False

QUIZ ANSWERS

		Slide	Page
Familiarization			
1.	c) Infinity push button control	1	1
2.	a) Network Interface Module	2 & 3	1 & 2
3.	d) A bypass damper must not be used	4	2
4.	b) Zone Damper Module	7	3
5.	b) Zone 1 only	7	3
6.	a) True. The RRS can be used	7	3
7.	a) True. A ZDM can control an HRV/ERV	13	5
8.	c) Automotive fuse	13	5
9.	d) Outside Air Temperature	17	8
10.	b) False. The UI has a humidity sensor	18	8
Installation			
1.	b) False. The indoor unit variable speed drive is sufficient.	22	10
2.	d) Indoor unit	23	10
3.	c) Inner	25	11
4.	b) 18 gage can handle up to 1000 feet	27	12
5.	a) True, RRS is for temp, SS for temp display	28	12
6.	d) the D wire is the HOT 24 vac	28	12
7.	d) Five maximum	29	13
8.	c) DIP-switches, to the right	30	13
9.	a) LAT sensor	31	14
10.	a) True, it will be ignored	32	14
11.	a) Network Interface Module	35	16
12.	b) False. The C&D wires power the NIM	36	16
Power-Up and Configuration			
1.	a) True, it is built into the UI	41	19
2.	c) control boards	44	20
3.	a) True	44	20
4.	b) False	48	21
5.	b) Static Pressure Check	54	23
6.	c) Duct Assessment Test	55	23
7.	b) False, only when there is relevant information	59	25
8.	c) Overriding	61	26
9.	d) Continuous fan displays the fan speeds	64	27
10.	a) if a humidifier has been installed for the system	65	28
11.	b) False, the system can guide the user	66	29

		Slide	Page
12.	b) False, it will be displayed after the vacation schedule is set	68	30
13.	b) False, the OPERATING STATUS displays accessories	70	30
14.	b) False, they are identified as numbers	76	32

Service Set-Up

1.	a) True, for service technician only.	Service Setup Introduction	34
2.	c) 10 seconds	Service Setup Introduction	34
3.	d) Set-up	79	34
4.	c) 90 minutes	83	36
5.	a) COMFORT and EFFICIENCY	85	37
6.	d) Altitude	86	37
7.	d) fan coils and furnaces	87	38
8.	b) AUTO	88	38
9.	b) False, it must be set to NONE	88	38
10.	b) False, below for heat pump, above for furnace	91	40
11.	b) False, ventilator will also be displayed	94	41
12.	c) hot water heat exchanger	100	43

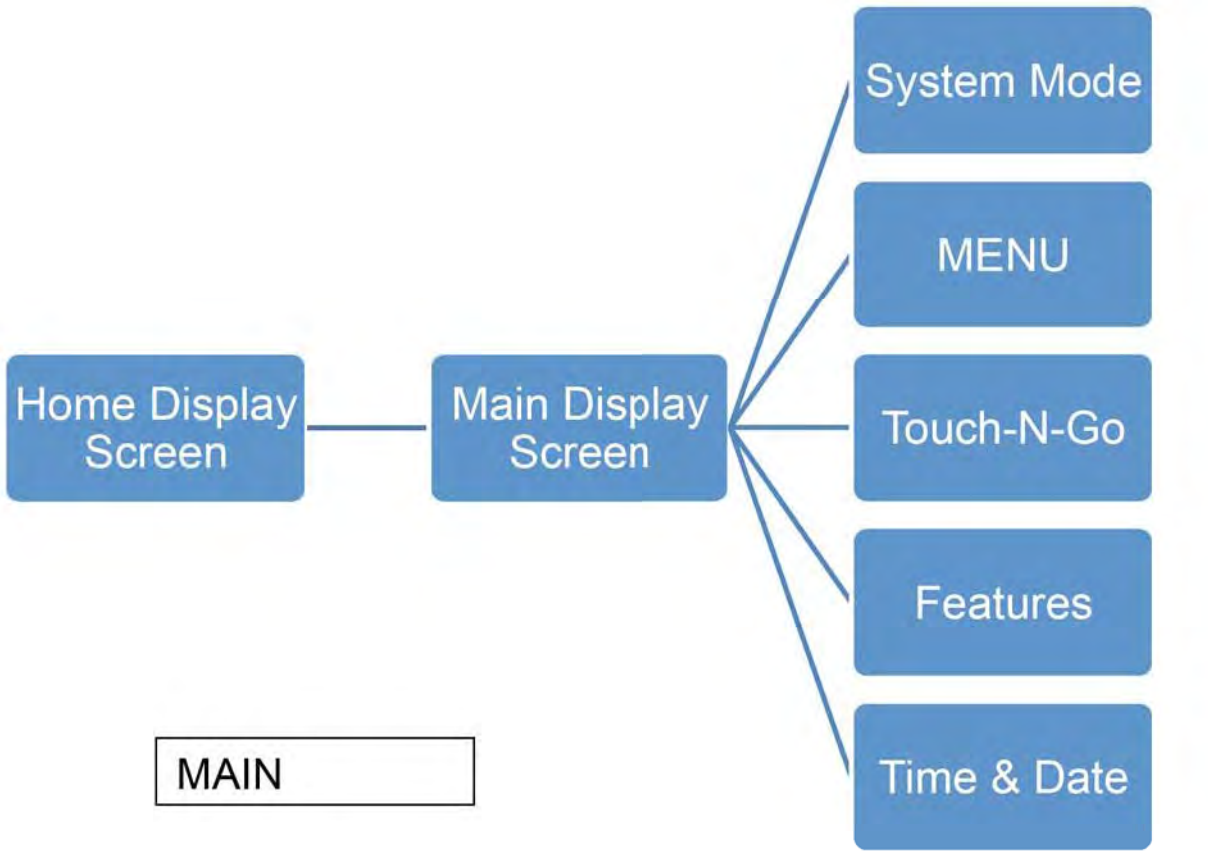
Checkout

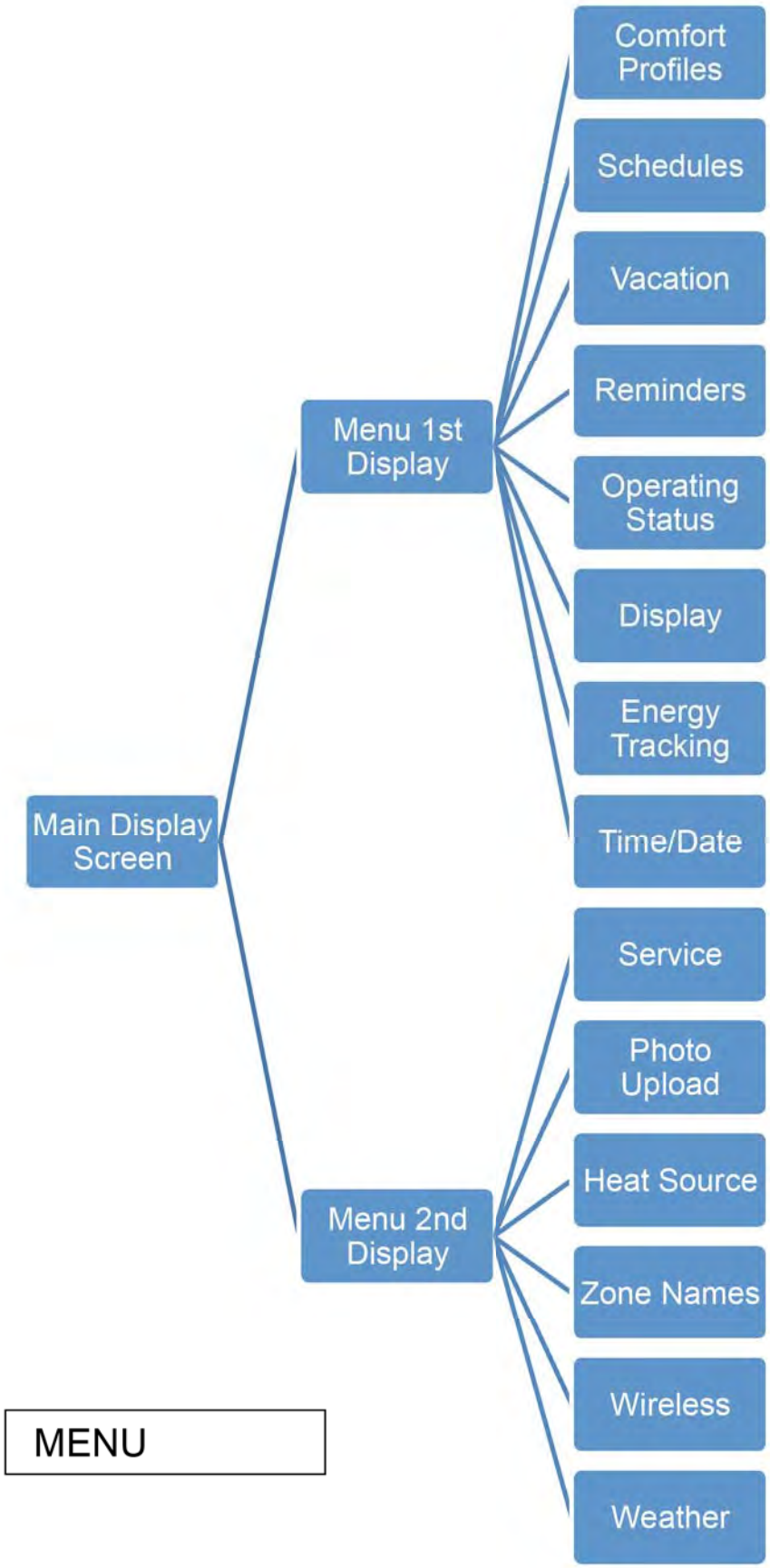
1.	b) CHECKOUT	106	45
2.	c) Heat or Cool	108	46
3.	a) 5-minutes	108	46
4.	c) Relative size	110	46
5.	d) Sensor/Damper Check	111	47
6.	b) last events that occurred	114	48
7.	c) diameter and length	117	49
8.	b) False, additional steps must be taken to open the EXV	120	50
9.	a) True	120	50
10.	a) True, it will still chatter	120	50

Troubleshooting

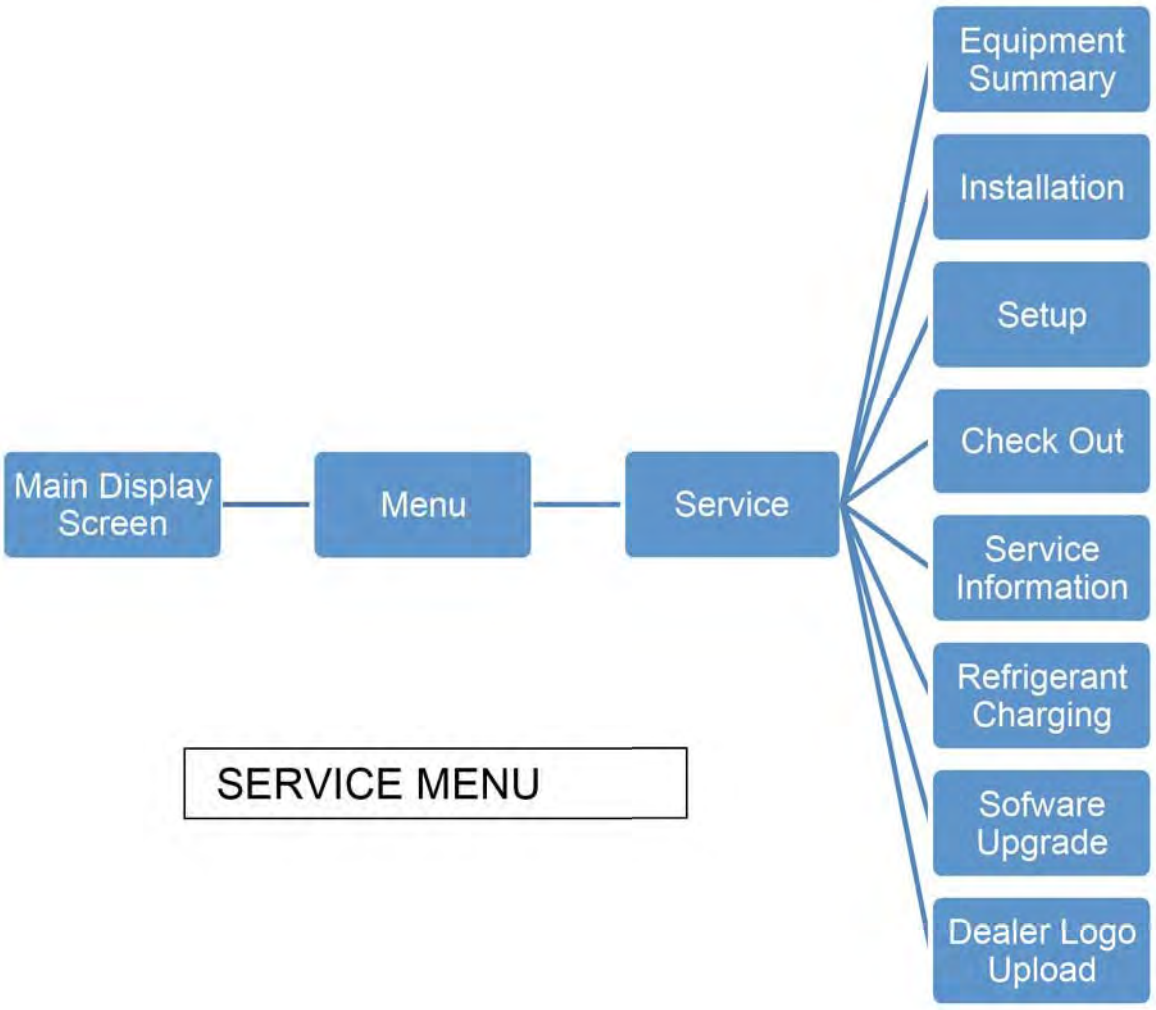
1.	a) True, a second UI can be used	122	51
2.	d) Proper operation	125	52
3.	b) False, it is SERVICE INFORMATION	126	53
4.	b) colored LEDs	128	53
5.	a) True, it will recognize a ventilator	132	55
6.	a) True, it reads the change of static pressure	134	56
7.	c) DIP-switches set to the rightt	135	56
8.	a) True, airflow limit may be too high	137	56

Appendix

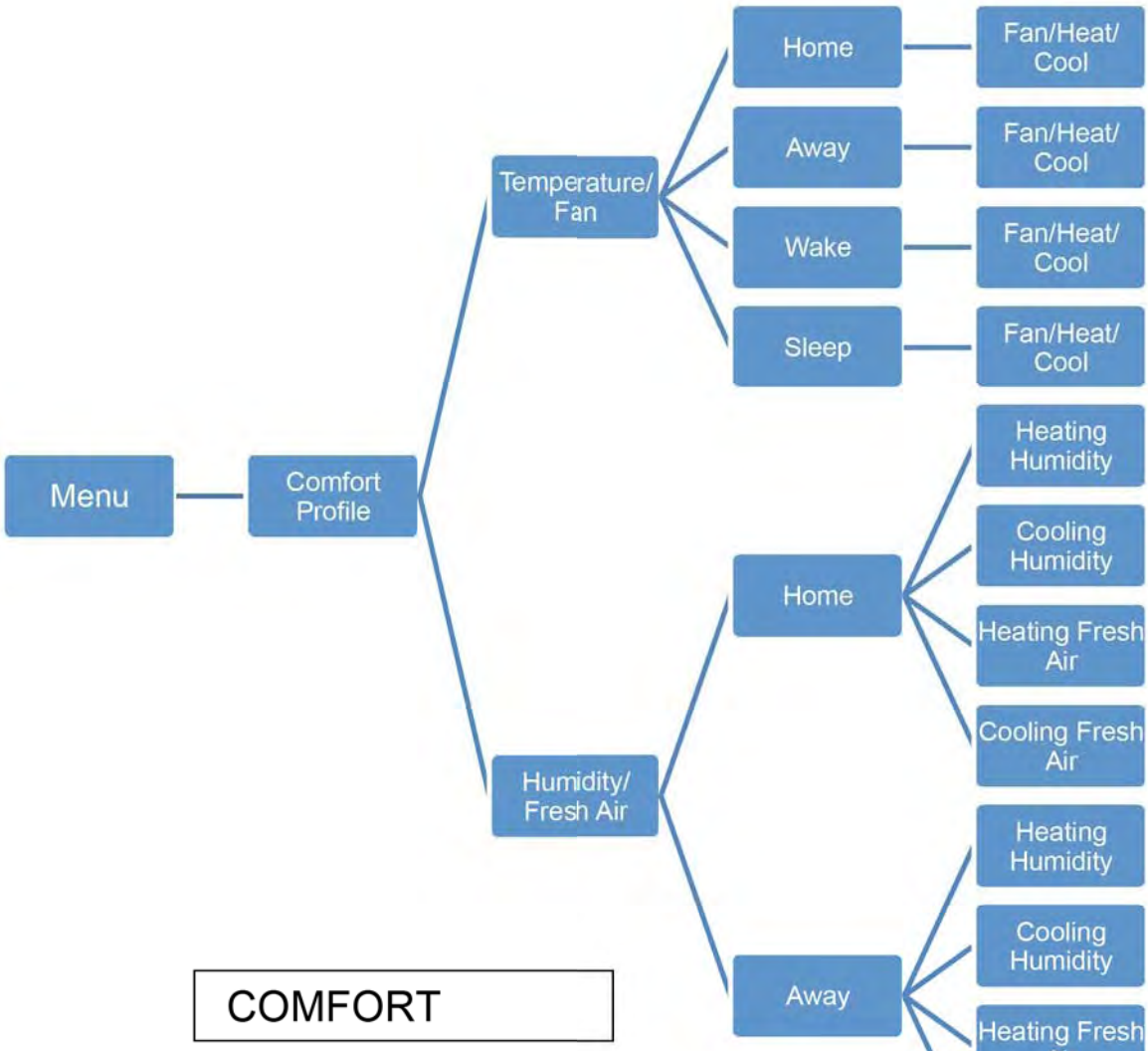

Home Display Screen
Main Display Screen
System Mode
MENU
Touch-N-Go
Features
Time & Date
MAIN

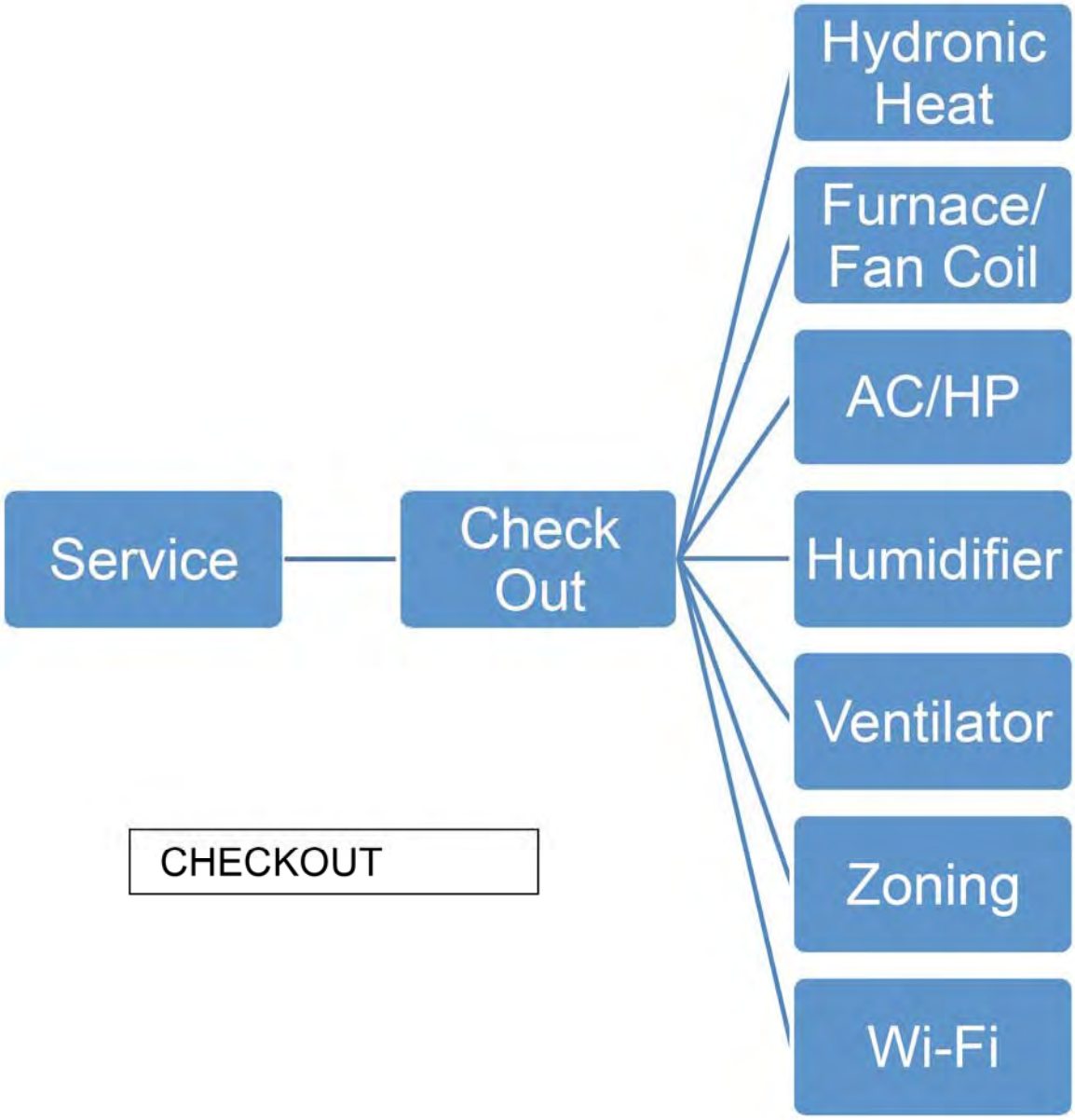

Main Display Screen
Menu 1st Display
Menu 2nd Display
Comfort Profiles
Schedules
Vacation
Reminders
Operating Status
Display
Energy Tracking
Time/Date
Service
Photo Upload
Heat Source
Zone Names
Wireless
Weather

MENU

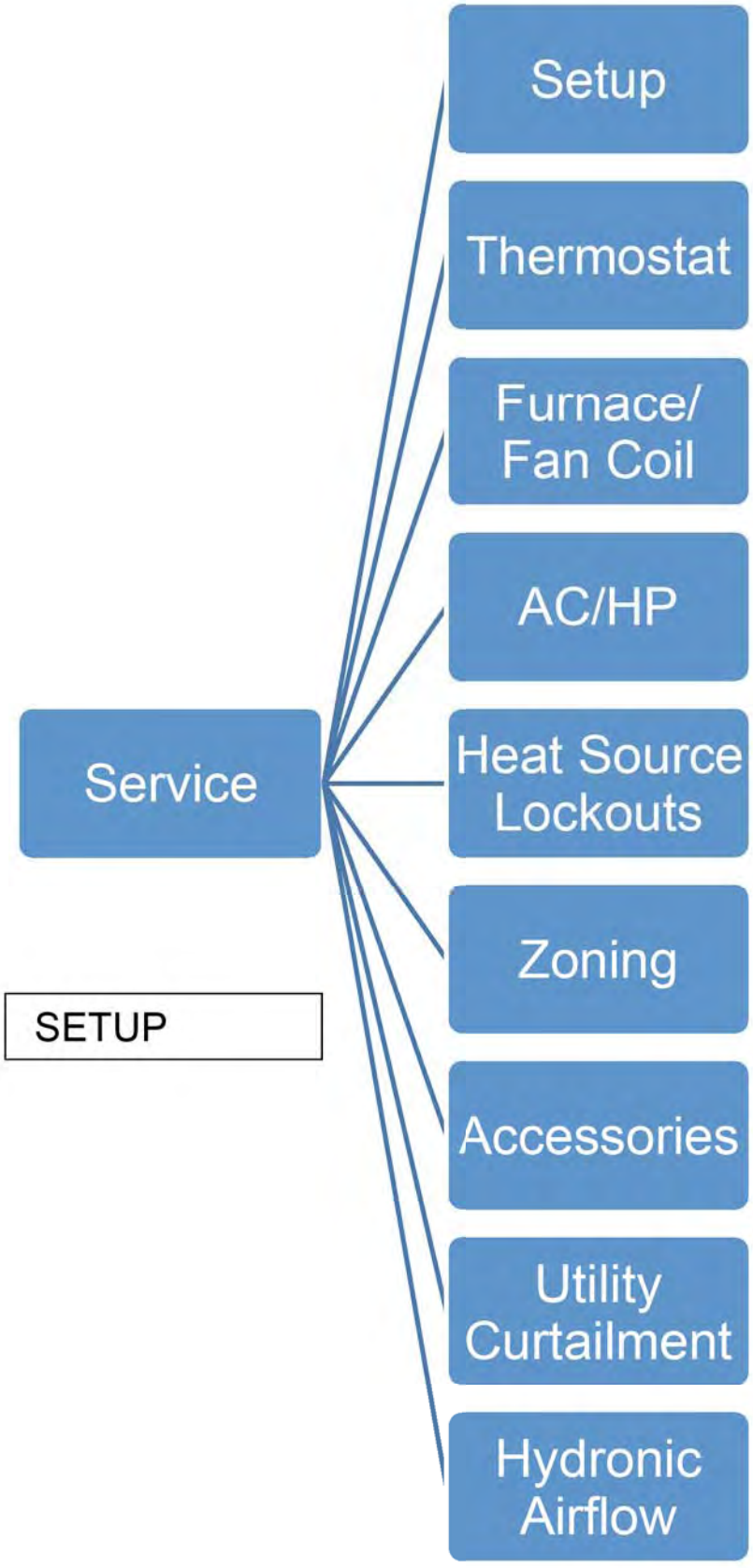


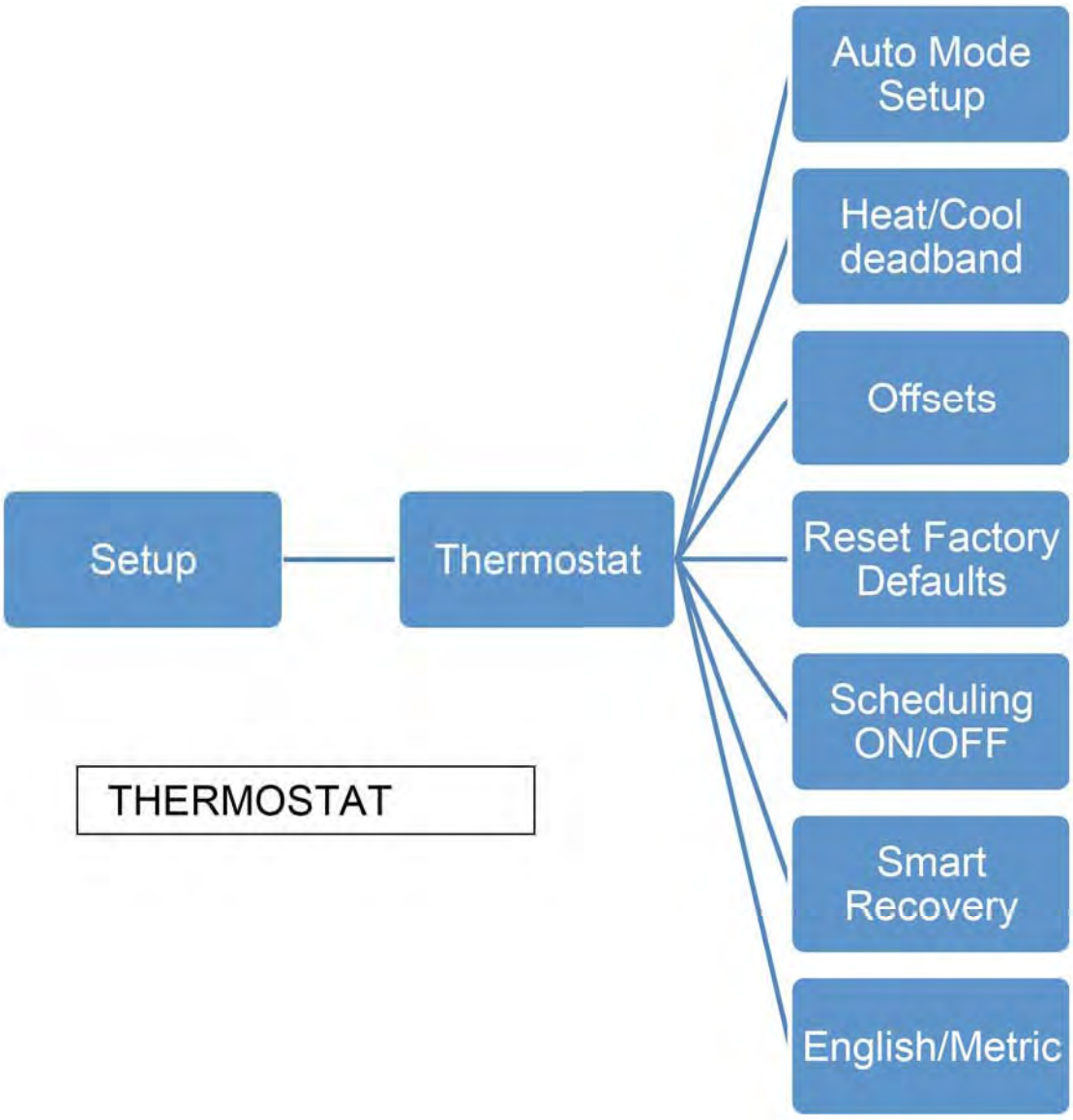
SERVICE MENU


Menu
Comfort Profile
Temperature/ Fan
Home
Fan/Heat/ Cool
Away
Fan/Heat/ Cool
Wake
Fan/Heat/ Cool
Sleep
Fan/Heat/ Cool
Humidity/ Fresh Air
Home
Heating Humidity
Cooling Humidity
Heating Fresh Air
Cooling Fresh Air
Away
Heating Humidity
Cooling Humidity
Heating Fresh Air
Cooling Fresh Air
COMFORT

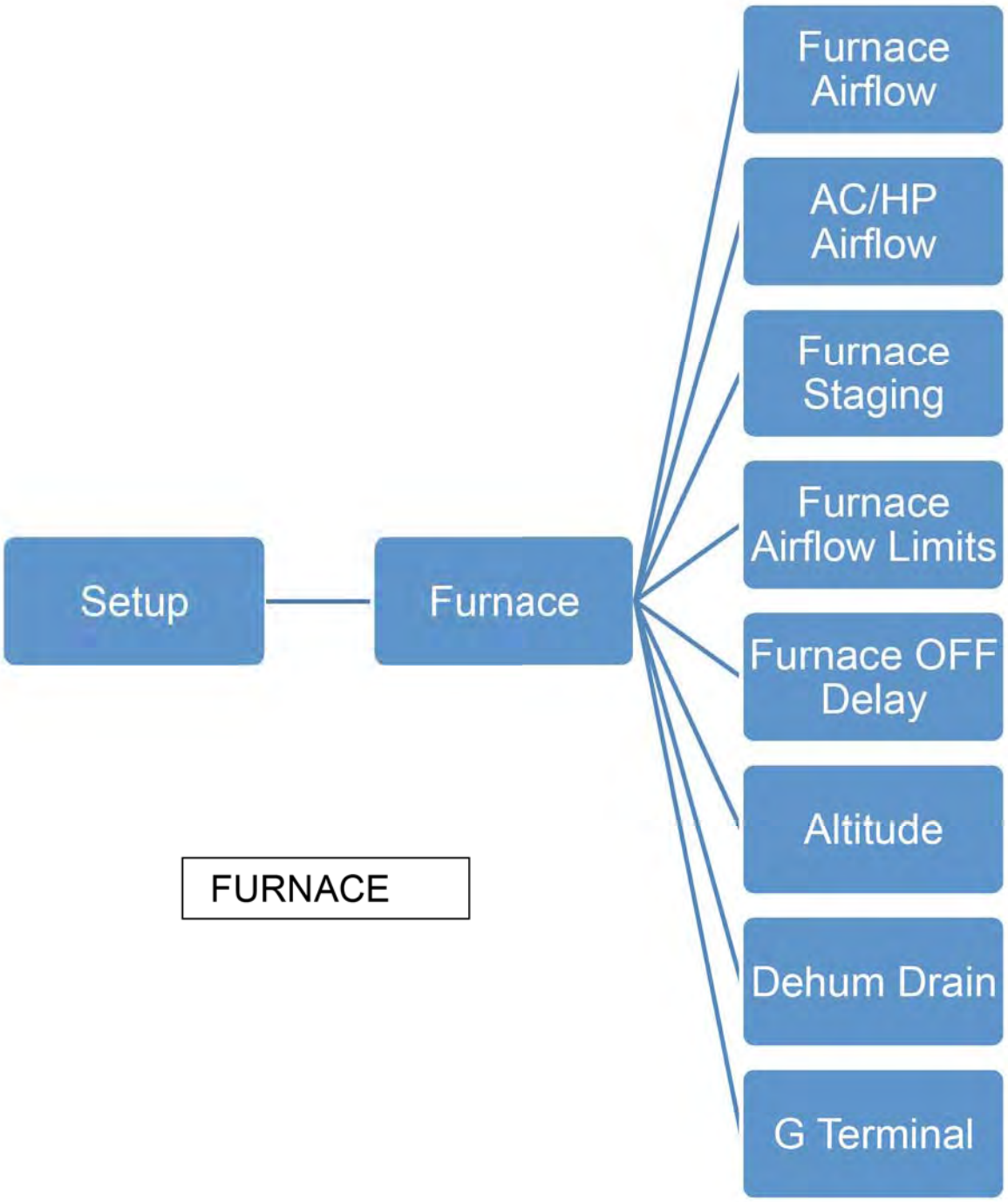

Hydronic Heat
Furnace/ Fan Coil
AC/HP
Service
Check Out
Humidifier
Ventilator
Zoning
Wi-Fi

CHECKOUT

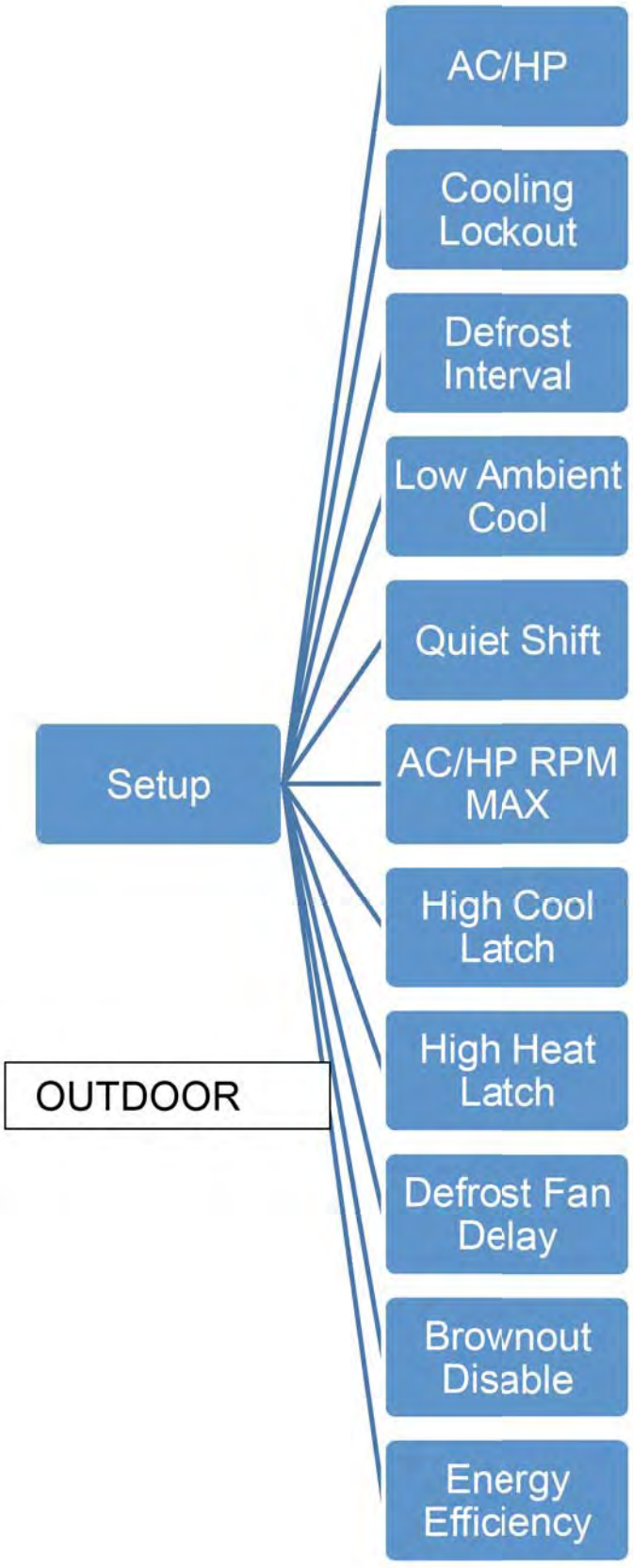

Setup
Thermostat
Furnace/
Fan Coil
AC/HP
Service
Heat Source
Lockouts
Zoning
SETUP
Accessories
Utility
Curtailment
Hydronic
Airflow

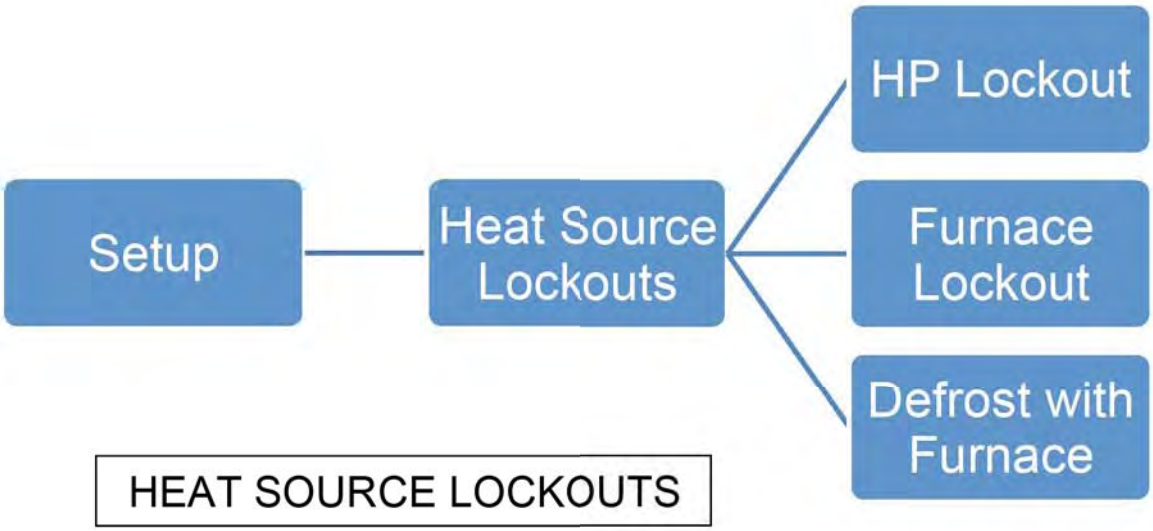

Setup
Thermostat
Auto Mode Setup
Heat/Cool deadband
Offsets
Reset Factory Defaults
Scheduling ON/OFF
Smart Recovery
English/Metric

THERMOSTAT

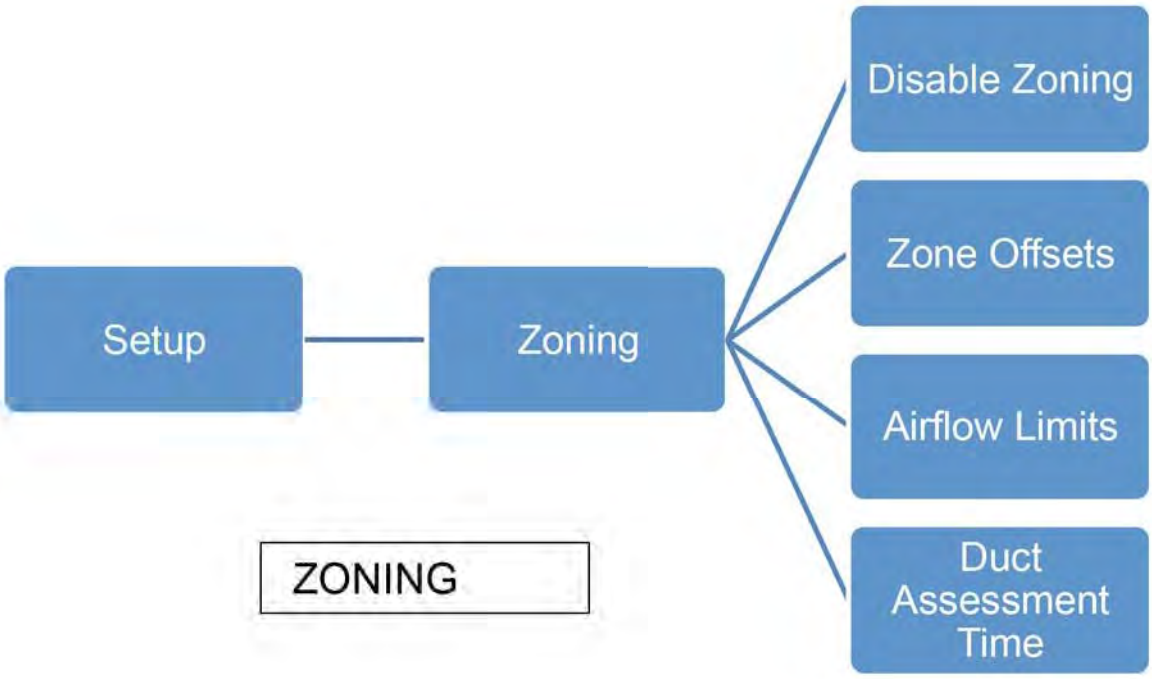

Setup
Furnace
Furnace Airflow
AC/HP Airflow
Furnace Staging
Furnace Airflow Limits
Furnace OFF Delay
Altitude
Dehum Drain
G Terminal

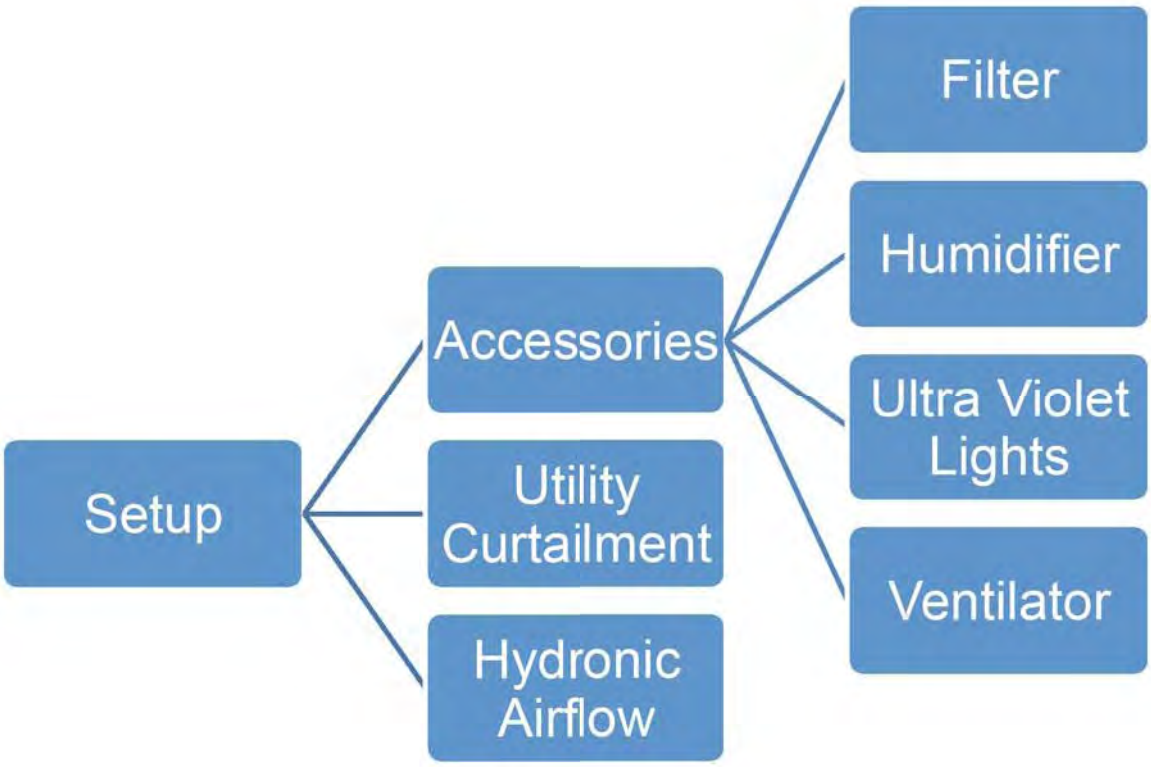
FURNACE


AC/HP
Cooling Lockout
Defrost Interval
Low Ambient Cool
Quiet Shift
Setup
AC/HP RPM MAX
High Cool Latch
High Heat Latch
OUTDOOR
Defrost Fan Delay
Brownout Disable
Energy Efficiency

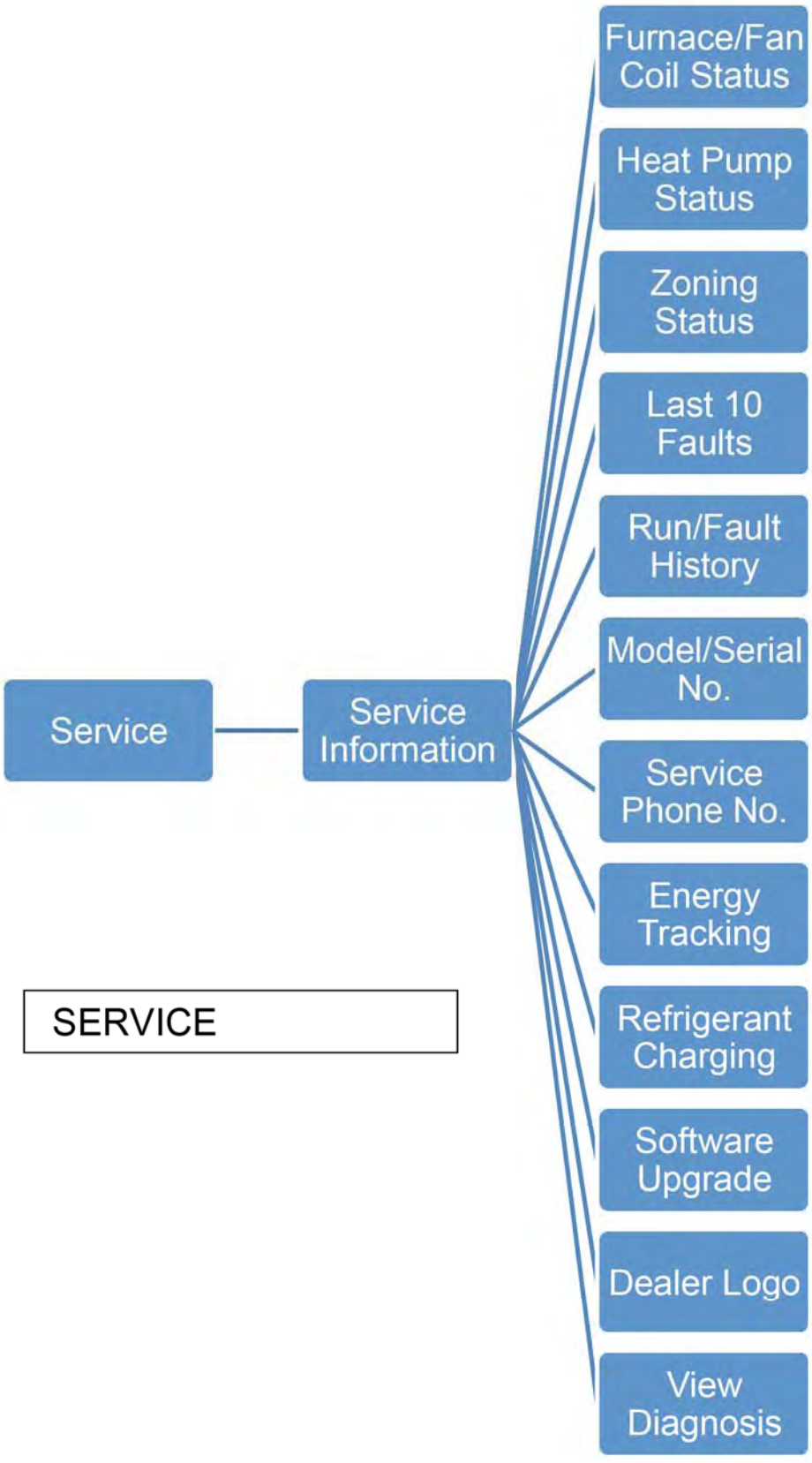


HEAT SOURCE LOCKOUTS


Setup
Zoning
Disable Zoning
Zone Offsets
Airflow Limits
Duct Assessment Time
ZONING



ACCESSORY SETUP


Service
Service Information
Furnace/Fan Coil Status
Heat Pump Status
Zoning Status
Last 10 Faults
Run/Fault History
Model/Serial No.
Service Phone No.
Energy Tracking
Refrigerant Charging
Software Upgrade
Dealer Logo
View Diagnosis

SERVICE

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