

**Installation Instructions for the Equipment Interface Module (EIM) (10T50) used with iComfort Wi-Fi® Thermostat**

**IMPORTANT!**



- The iComfort Wi-Fi® thermostat paired with the Equipment Interface Module (EIM) will work with most 24VAC furnaces, air handlers, air conditioners and heat pumps (up to 2-stages of cooling and 3-stages of heat).
- The iComfort Wi-Fi® thermostat without the Equipment Interface Module (EIM) will work with Lennox branded communicating HVAC equipment.

**⚠ WARNING**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.

Installation and service must be performed by a licensed professional HVAC installer (or equivalent) or service agency.

**Application and Requirements**

**INDOOR TRANSFORMER REQUIREMENTS**

Table 1 lists the required indoor unit transformer rating (VA) for specific configurations.

**EQUIPMENT**

The EIM is used with an iComfort Wi-Fi® thermostat using the R, i+, i-, and C terminals and is the interface between non-RSBus HVAC equipment and RSBus-enabled (communicating) HVAC equipment. The control supports the following equipment applications:

*NOTE - EIM will support single-stage outdoor units and single-stage, variable stage indoor furnace.*

**Table 1. System VA Loading Chart**

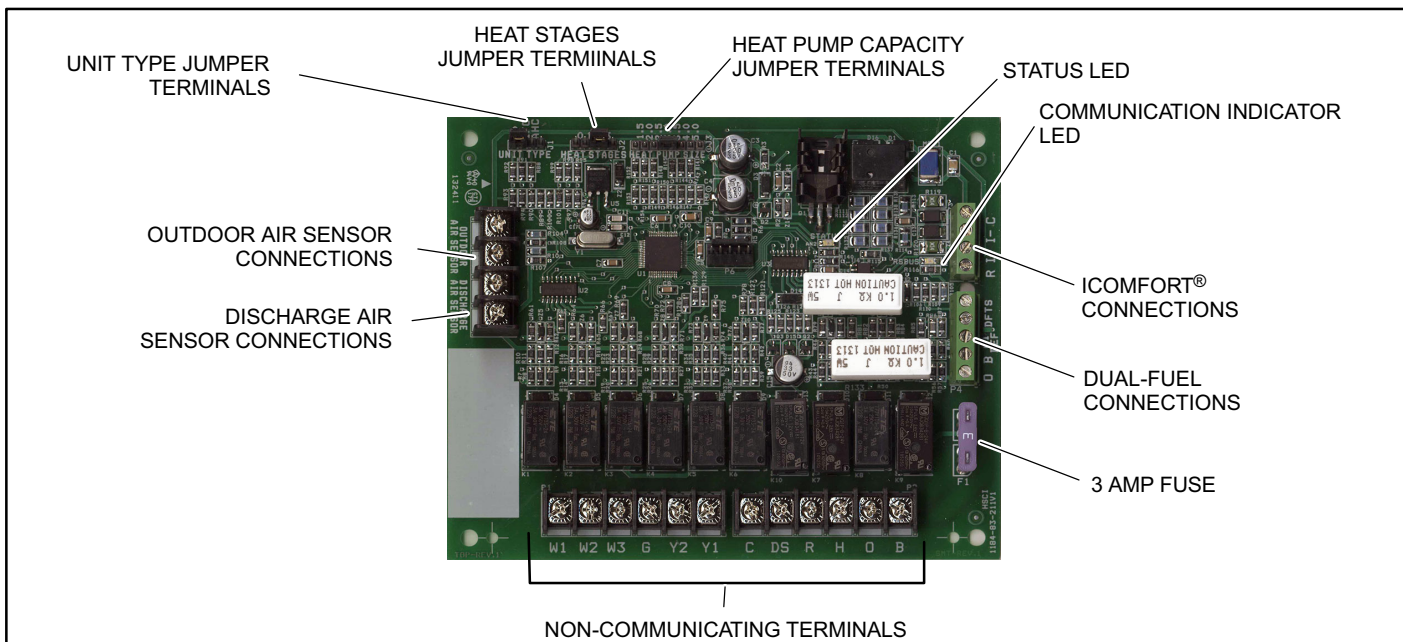
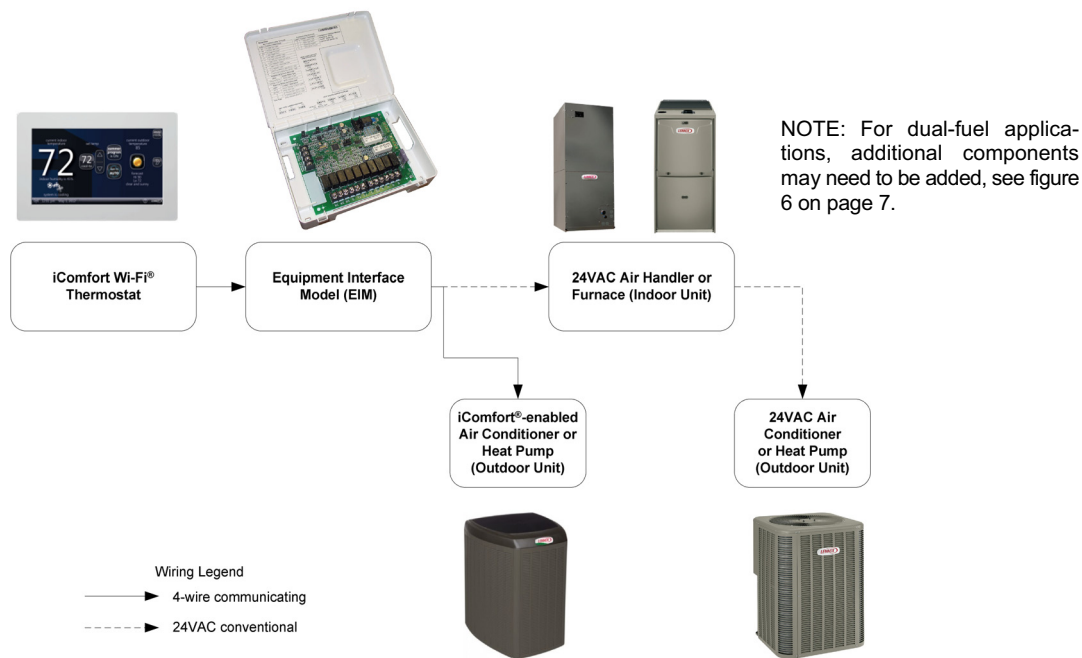
Configuration	Minimum Transformer Rating (VA)
2-Stage HP, 3-Stage Electric heat	70
2-Stage HP, 2-Stage Furnace (with tempering)	70
2-Stage HP, 2-Stage Furnace (without tempering)	50
2-Stage AC, 2-Stage Furnace	40

**Table 2. Wiring Diagrams**

SYSTEM	INDOOR UNIT	OUTDOOR UNIT	DIAGRAM
AIR CONDITIONER	24VAC CONVENTIONAL	24VAC CONVENTIONAL	Figure 8
HEAT PUMP	24VAC CONVENTIONAL	24VAC CONVENTIONAL	Figure 8
DUAL FUEL	24VAC CONVENTIONAL	ICOMFORT®-ENABLED	Figure 9
DUAL FUEL	ICOMFORT®-ENABLED	24VAC CONVENTIONAL	Figure 10
DUAL FUEL	24VAC CONVENTIONAL	24VAC CONVENTIONAL	Figure 11
DUE FUEL WITH IHARMONY®	ICOMFORT®-ENABLED	24VAC CONVENTIONAL	Figure 11
BASEBOARD HEAT	24VAC CONVENTIONAL*	ICOMFORT®-ENABLED	Figure 12
HOT WATER COIL WITH AQUASTAT BLOWER CONTROL	24VAC CONVENTIONAL(	ICOMFORT®-ENABLED	Figure 12
ACESSORIES - DEHUMIDIFIERS, HUMIDIFIERS, HEPA BYPASS FILTER - HRV / ERV	24VAC CONVENTIONAL		Figure 13
ACCESSORIES - EDA HUMIDITROL® - LVCS VENTILATION CONTROL	24VAC CONVENTIONAL	24VAC CONVENTIONAL	Figure 14

\* 24VAC conventional air handler or CBX32MV(-6) / CBX40UHV used as 24VAC conventional.

## EIM with Air Handler or Furnace (Indoor Unit) and either a Air Conditioner or Heat Pump (Outdoor Unit)



**Figure 1. Equipment Interface Module (EIM) Terminals and LEDs**

## Shipping and Packaging

1 - Equipment interface module with housing (10T50)

## Installation

### ⚠ CAUTION

Controls in this module are sensitive to moisture. Do NOT secure this module to the sheet metal cabinet where moisture may condense during periods of high humidity. Secure the module to a nearby wooden stud, if possible.

### ⚠ CAUTION

#### ELECTROSTATIC DISCHARGE (ESD) Precautions and Procedures

Electrostatic discharge can affect electronic components. Take precautions during unit installation and service to protect the unit's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the unit, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface before performing any service procedure

1. Remove the module cover.
2. Mount the Equipment Interface Module (EIM) near the indoor unit.
3. Use the provided wiring diagrams (figures 8 through 14) to complete the wiring connections for the specific application and configuration.

## Configuration

Configure the EIM based on the components used in the system.

*NOTE - Changing jumper positions after the control has been powered-up requires recommissioning for the change to be recognized.*

*NOTE - When the Equipment Interface Module is replaced, recommissioning the iComfort Wi-Fi® thermostat will also need to be re-accomplished. See the iComfort Wi-Fi® Installer Setup Guide for recommissioning procedure.*

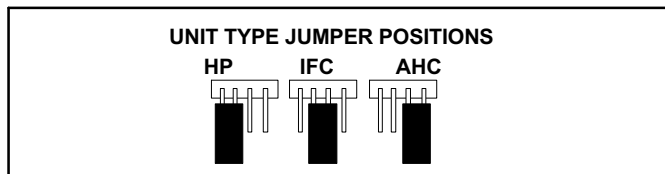
*NOTE - For using the equipment interface module in **dual-fuel mode**, see page 7.*

### UNIT TYPE

Set the *unit type* jumper for the type of indoor unit being used (see figure 2 and table 4). The factory default setting is **IFC**. If jumper is missing from header, alarm **130** is activated.

**Table 3. Unit Type Jumpers Positions**

Jumper Position	Indoor Unit	Outdoor Unit
HP	iComfort®-enabled furnace	24VAC non-communicating heat pump
IFC	24VAC non-communicating furnace	24VAC non-communicating air conditioner or heat pump
AHC	24VAC non-communicating air handler	



**Figure 2. Unit Type Jumper Positions**

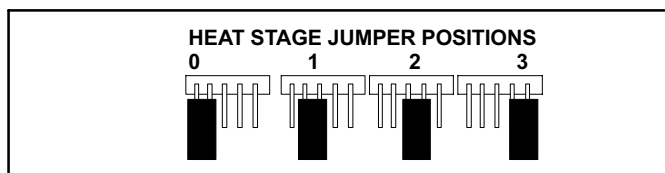
**Table 4. Unit Type Jumpers**

Label	Function / Description
HP	Equipment Interface Module—Heat Pump
IFC	Equipment Interface Module—Furnace (factory default)
AHC	Equipment Interface Module—Air Handler

### HEAT STAGES

The Heating Staging Jumper must be set for the number of stages of electric heat (air handler) or the number of stage of gas heat (furnace) and stages of heat pump. Using the HEAT STAGES jumper (see figure 3 and table 8).

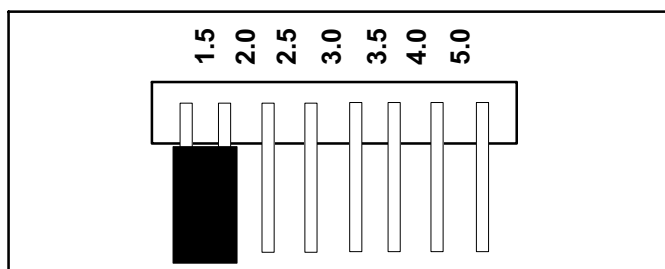
The factory default setting is **position 2**. If jumper is missing from header, alarm **130** is activated.



**Figure 3. Heat Stages**

### NON-COMMUNICATING HEAT PUMP SIZE

Heat pump size must be configured when using a non-communicating heat pump using the Heat Pump Size jumper (see figure 4 and table 5). Factory default setting is for **3.0** (3-ton). If jumper is missing from header, alarm **130** is activated.



**Figure 4. Heat Pump Size Jumper Positions**

**Table 5. Non-Communicating Heat Pump Capacity Jumper Settings**

Label	Function / Description
1.5	1-1/2-ton
2.0	2-ton
2.5	2-1/2-ton
3.0	3-ton
3.5	3-1/2-ton
4.0	4-ton
5.0	5-ton

**Table 6. Air Temperature Sensor Terminals**

Label	Function / Description
Outdoor Air Sensor	Show ambient temperatures (optional if weather feed is acceptable or outdoor unit is a communicating unit; use X2658 Outdoor Sensor - 2 terminals).  <i>Note: Wiring distance between the EIM and the outdoor temperature sensor can not exceed 200 feet when wired with 18AWG thermostat wire.</i>
Discharge Air Sensor	Optional for diagnostics of indoor air; use 88K38 Discharge Air Sensor - 2 terminals.

**TERMINAL CONNECTIONS**

See figure 1 for location of the various terminals.

**Table 7. iComfort® Terminals**

Label	Function / Description
R	24VAC communication power Input
i+	Communication high – data line
i-	Communication low – data line
C	24VAC communication common power Input

**Table 8. Heat Stage Jumpers**

Label (Position)	Air Handler Heat Stages		Furnace Heat Stages		Heat Pump Stages	
	Number of Electric Heat Stages	Stage Percentage	Number of Gas Stages	Stage Percentage	Number of Compressors Stages	Stage Percentage
0	No Electric Heat	0	1	100%	1	100%
1	1	100%	1	100%	1	100%
2 (Default)	2	50%, 100%	2	70%, 100%	2	70%, 100%
3	3	33.5%, 66.5%, 100%	2	70%, 100%	2	70%, 100%

NOTE: If jumper is missing, setting defaults to single stage. Changing jumper position after power-up requires recommission for the change to be recognized.

**Table 9. Dual-Fuel Terminals**

Label	Function / Description	
DFTS	Pre-coil discharge air temperature (2 terminals)	The pre-coil discharge air sensor should be installed downstream of the gas heat exchanger and before the indoor coil when a heat pump is used and defrost tempering is required.  It must be placed in free airflow, where other accessories (such as humidifiers, UV lights, etc.) will not interfere with its accuracy. Wiring distance between the EIM and the discharge air sensor should not exceed 10 feet when using 18AWG thermostat wire.
W1-DEF	Defrost signal input	This input is used in systems with non-communicating heat pumps for defrost indication. The input provides a nominal load of 50 mA, 24 VAC.
O	Heat Pump Reversing Valve (Powered for cooling)	In systems with communicating IFC, the EIM (HP) <b>O</b> output is connected to a non-communicating heat pump compatible with <b>O</b> signal for reversing valve operation. A 24VAC signal is generated on <b>O</b> for cooling operation, while the terminal is open for heating operation.
B	Heat Pump Reversing Valve (Powered for heating)	In systems with communicating IFC, the EIM (HP) <b>B</b> output is connected to a non-communicating heat pump compatible with <b>B</b> signal for reversing valve operation. A 24VAC signal is generated on <b>B</b> for heat pump operation, while the terminal is open for cooling operation.

**Table 10. Non-Communicating Terminals (Conventional)**

Label	Function / Description	
<b>W1</b>	1 <sup>st</sup> - stage heat output (1 <sup>st</sup> stage gas heat output when configured as IFC and 1 <sup>st</sup> stage electric heat output when configured as AHC).	
<b>W2</b>	2 <sup>nd</sup> - stage heat output (2 <sup>nd</sup> stage gas heat output when configured as IFC and 2 <sup>nd</sup> stage electric heat output when configured as AHC).	
<b>W3</b>	3 <sup>rd</sup> - stage heat output (3 <sup>rd</sup> stage electric heat output when configured as AHC)	
<b>G</b>	Indoor blower control (continuous fan) (monitoring only). <b>G</b> input may be connected to IAQ devices such as LVCS, HRV or ERV to turn the indoor blower on and off.	
<b>Y2</b>	2 <sup>nd</sup> - stage compressor output	
<b>Y1</b>	1 <sup>st</sup> - stage compressor output	
<b>DS</b>	24VAC dehumidification signal output. The DS terminal is powered when there is not a dehumidification call.	
<b>C</b>	Class II, 24VAC transformer common	R and C terminals are used to receive power from the indoor unit and capable of providing the power to the EIM and all the associated loads. The R power input uses a 3A fuse (Lennox part number 25J4901).
<b>R</b>	Class II, 24VAC transformer power	
<b>H</b>	24VAC humidifier signal output	
<b>O</b>	Heat pump reversing valve (24VAC = cool)	Used as reversing valve output for heat pumps. The EIM uses a single-pole dual throw relay to generate O and B signals. Normally the O output is open and B output at 24VAC during heating calls. During cooling calls O is 24VAC and B open. With relay de-energized 24VAC is present on O terminal.  When power off/ or control reset, 24VAC power shall not be present on the O terminal.
<b>B</b>	Heat pump reversing valve (24 VAC = heat)	

**LEDS**

This control has two green LED to indicate status and communication activity One LED is labeled **Status** and the other is labeled **RSBUS**.

**RSBUS LED**

The RSBUS LED flashes when information is being communicated over the RSBUS.

**Status LED**

The following table lists all status LED information.

**Table 11. Status LED (Green)**

Status LED (Green)	Function / Description
<b>Steady On</b>	Remains steady <b>ON</b> until the device sends its start-up message.
Blinks 3 second <b>OFF</b> and 1 second <b>ON</b>	Soft disable state
Blinks 2 second <b>ON</b> and 2 second <b>OFF</b>	Service is being provided (W, Y or G relay is ON, or G input ON)
Blinks 1 second <b>ON</b> and 1 second <b>OFF</b>	Alarm is present.

**SOFT DISABLE**

Soft disabling is when iComfort® room thermostat finds an unknown control (indoor or outdoor unit control, iHarmony® zoning system or Equipment Interface Module (EIM) on the system communication bus. The room thermostat sends the unknown control a message to go into soft disable mode until properly configured.

**The iComfort® room thermostat will not show any code for a soft disabled control. When soft disabling occurs only the control that has been disabled will display the blinking LED status. In this case, the control blinks three seconds OFF and one second ON.**

Use the following procedure if the equipment interface module is displaying the soft disable code

1. Confirm proper wiring between all devices (Thermostat, EIM, indoor and outdoor)
2. Cycle power to the control that is displaying the soft disable code.
3. Press the **Lennox** icon on the thermostat home screen and hold until the installer warning screen appears.
4. Press **yes** to continue.
5. Press **Setup** and then **confirm** to continue.
6. Use this Thermostat? Press **press here** button to continue.
7. Press the **next** button to continue pass the next three screens.
8. From the **System Devices** list, press **reset ALL** to reset all devices.
9. Press the **confirm** button

The thermostat will reboot and start through the setup process again.

**ERROR CODES**

Error codes are transmitted to the thermostat (see table 12). No codes are stored in the equipment interface module.

**WIRING DIAGRAM**

See figures 8 through 14.

## CONVENTIONAL 24V OUTDOOR UNIT SETUP (COMMISSIONING)

Both unit capacity and number of compressor stages are required to be configured through the iComfort Wi-Fi® thermostat. Once the outdoor unit has been installed and connected to the equipment interface module, go to the thermostat and start the configuration process.

**system devices**  
System  
Furnace  
Add or Remove Non-communicating equipment?  
yes

**non-communicating device list**  
Outdoor Unit Type  
Humidifier  
Dehumidifier  
to add/remove/adjust a device, select it, then press edit  
current value:  
Not Installed  
edit

**Outdoor Unit Type**  
Select one  
 Not Installed  
 2 Stage A/C Unit  
 2 Stage HP Unit  
 1 Stage A/C Unit  
 1 Stage HP Unit  
save cancel

**non-communicating device list**  
Outdoor Unit Type  
Outdoor Unit Type  
Outdoor Unit 1st Stage Capacity  
Humidifier  
Dehumidifier  
to add/remove/adjust a device, select it, then press edit  
current value:  
2 Stage AC Unit  
please view and save all red settings  
edit

**Outdoor Unit Capacity**  
Range is 18 to 60  
Default is 36, inc:1  
set-to  
36  
save cancel

9:39 am Aug 15, 2012

1. From the **system devices** screen, press the **yes** button to add or remove non-communicating equipment.
2. A non-communicating device list will appear, select **Outdoor Unit Type** and then press **edit**.
3. Under **Outdoor Unit Type**, select the applicable 1 or 2-stage unit. Press **save** to continue.
4. Under **non-communicating device list**, select **Outdoor Unit Capacity** and then press **edit**.
5. Press either the **up** or **down arrows** to selected the applicable **Outdoor Unit Capacity**. Valid options are **18, 24, 30, 36, 42, 48** and **60**. Press **save** to continue.

This completes the configuring of the conventional 24V outdoor unit.

**IMPORTANT!**  
If any jumpers were set incorrectly and the above commissioning was completed. Reposition jumpers to correct positions and re-run commissioning at the iComfort Wi-Fi® thermostat.

Figure 5

## Dual-Fuel Operations

To use the equipment interface module in dual-fuel mode, the following equipment combinations and configuration is required.

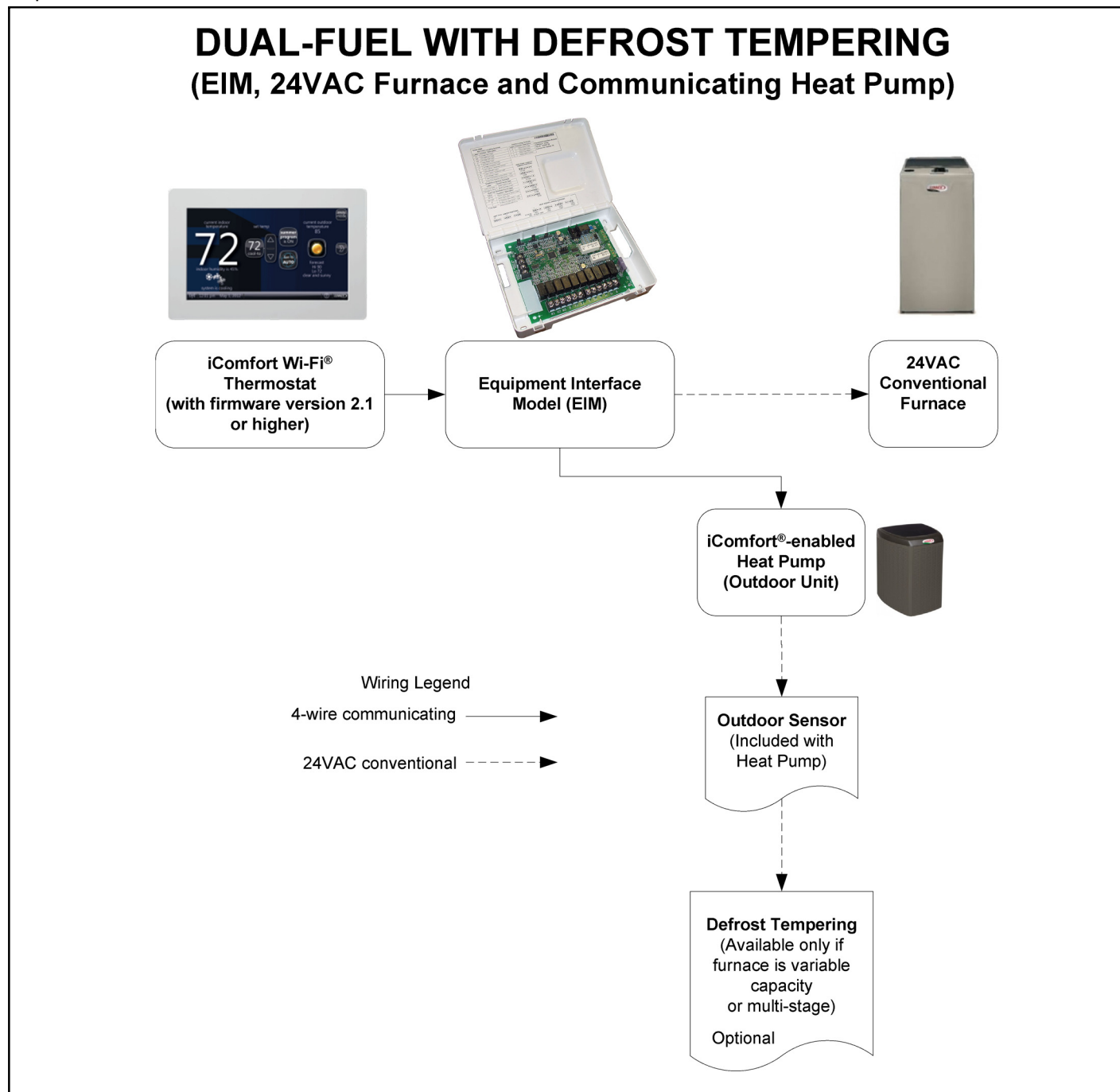


Figure 6

## DUAL-FUEL WITH DEFROST TEMPERATING

The DT1 (67M41) Discharge Temperature Probe is inserted in the furnace air outlet between the furnace and the indoor coil to keep furnace from overheating coil causing heat pump high pressure tripping during the defrost cycle. The DT1 is only needed with non-communicating furnaces (not required for air handlers). Wiring example for the DT1 Discharge Temperature Probe is exemplified in figure 10 on page 12.

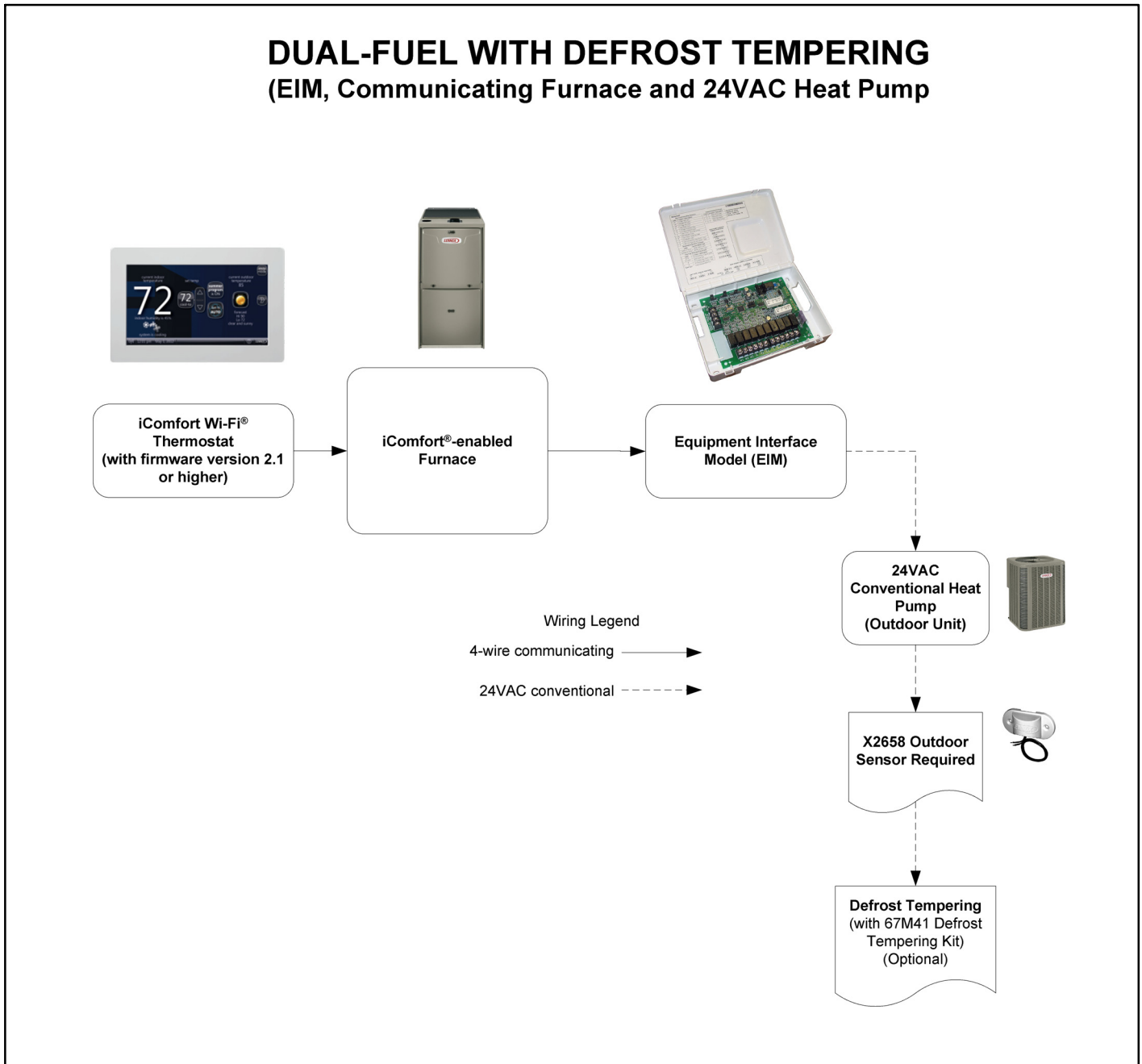


Figure 7



## **JUMPER SETTINGS AND THERMOSTAT COMMISSIONING REQUIREMENTS**

### **Non-Communicating Furnace and Communicating Heat Pump**

1. Set the EIM **Unit Type Jumper** to **IFC**.
2. Set the EIM **Heat Stage Jumper** to the applicable number of furnace heat stages.
3. Use the iComfort Wi-Fi® thermostat to complete the commissioning procedure

### **Communicating Furnace and Non-Communicating Heat Pump**

1. Set the EIM **Unit Type Jumper** to **Heat Pump**.
2. Set the EIM **Heat Stage Jumper** to the applicable number of heat pump heating stages.

3. Use the iComfort Wi-Fi® thermostat to complete the commissioning procedure

### **Equipment Interface Module, Communicating Furnace, iHarmony® zoning system and Non-Communicating Heat Pump**

1. Set the EIM **Unit Type Jumper** to **Heat Pump**.
2. Set the EIM **Heat Stage Jumper** to the applicable number of heat pump heating stages.
3. Wire according to figure 11.
4. Use the iComfort Wi-Fi® thermostat to complete the commissioning procedure

*NOTE - For two-stage heat pump go to the heat pump outdoor control, locate J2 - 2<sup>ND</sup> STAGE LOCKIN and disable this function by removing the installed jumper and relocating it to one pin only.*

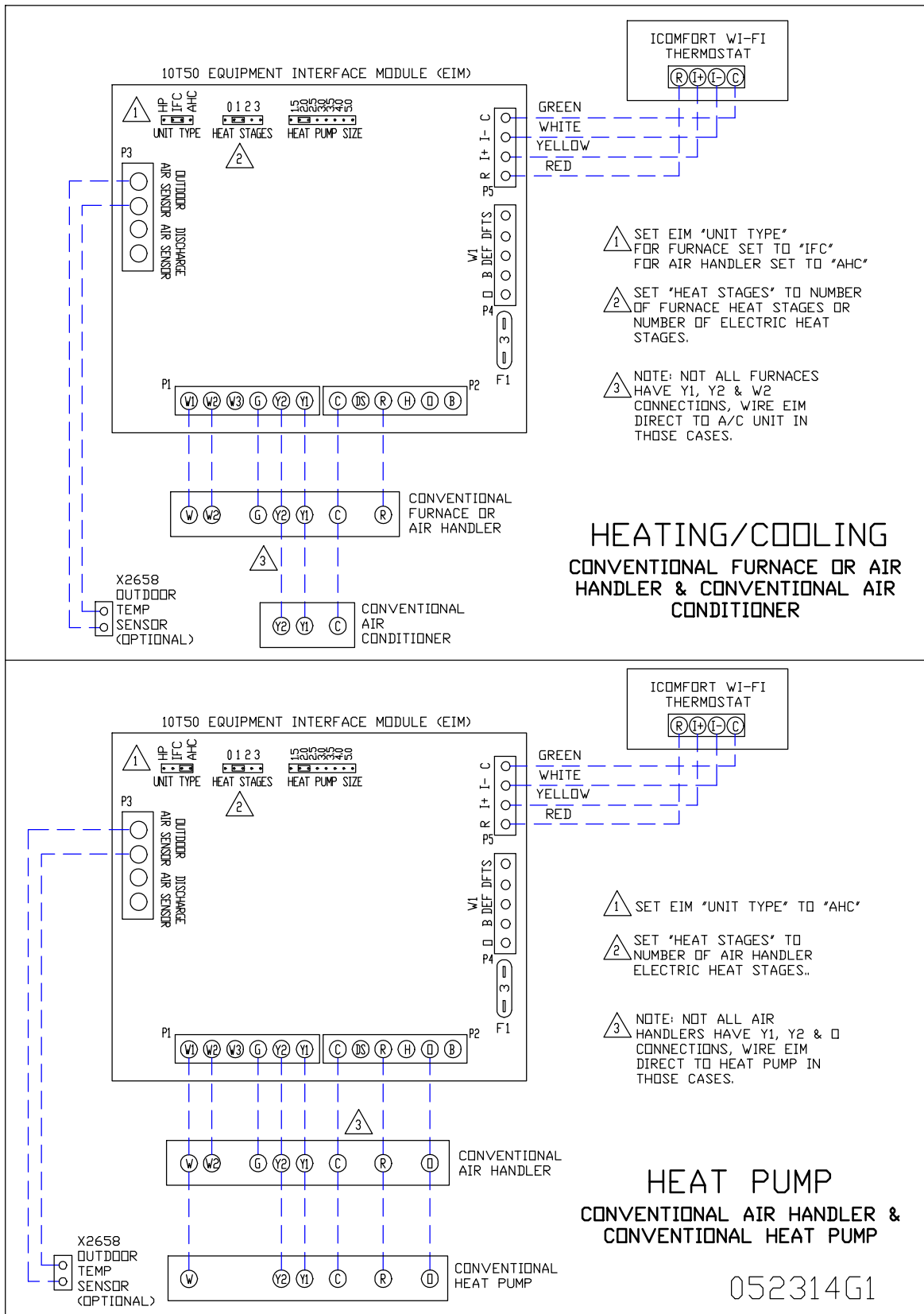


Figure 8

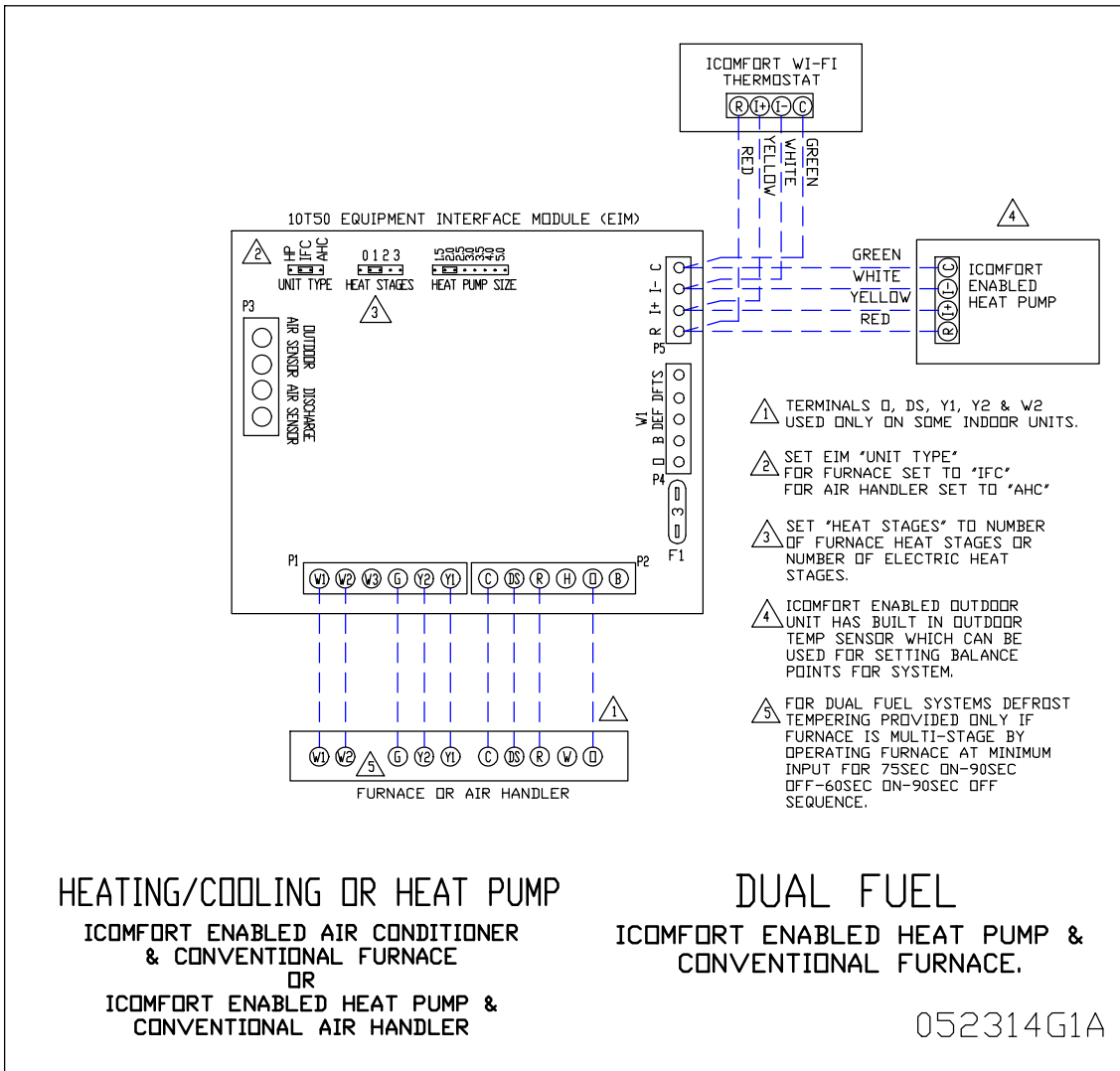


Figure 9

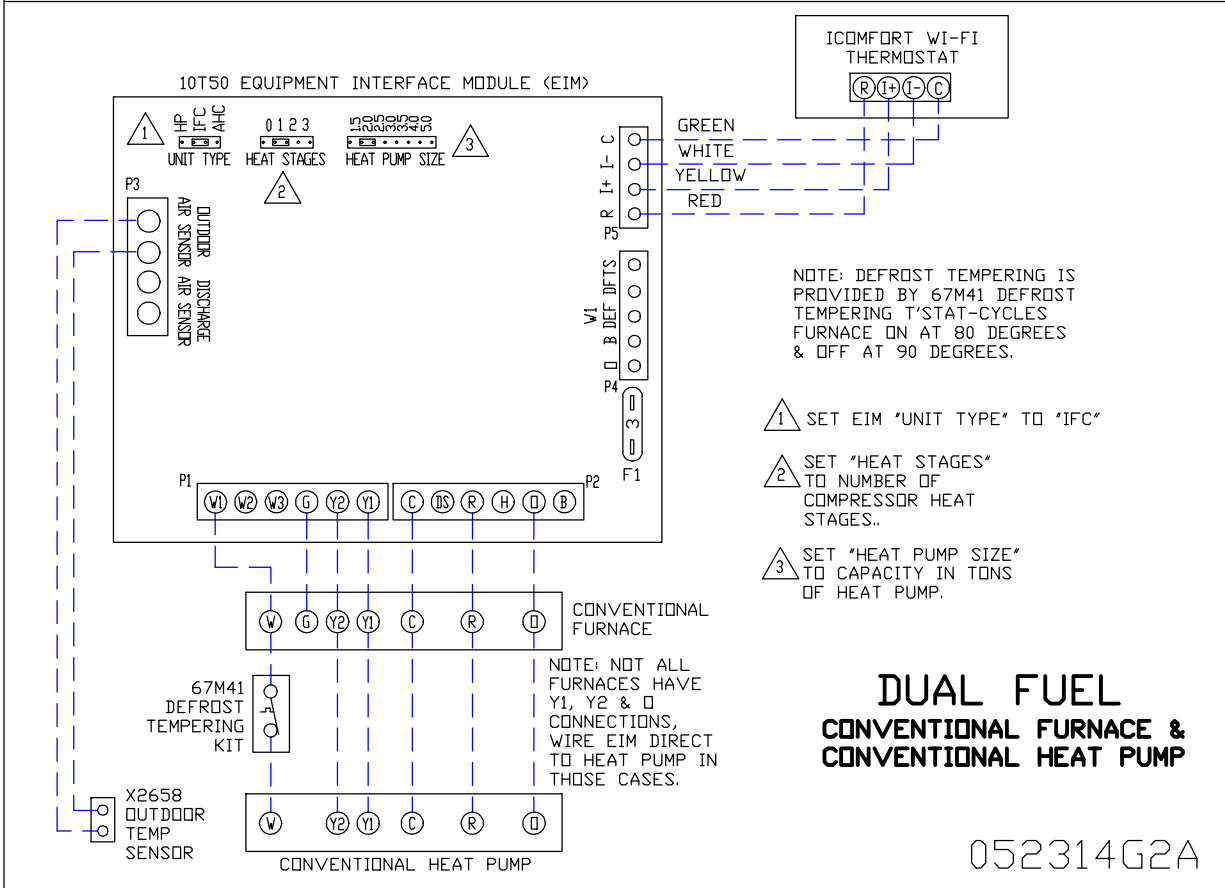
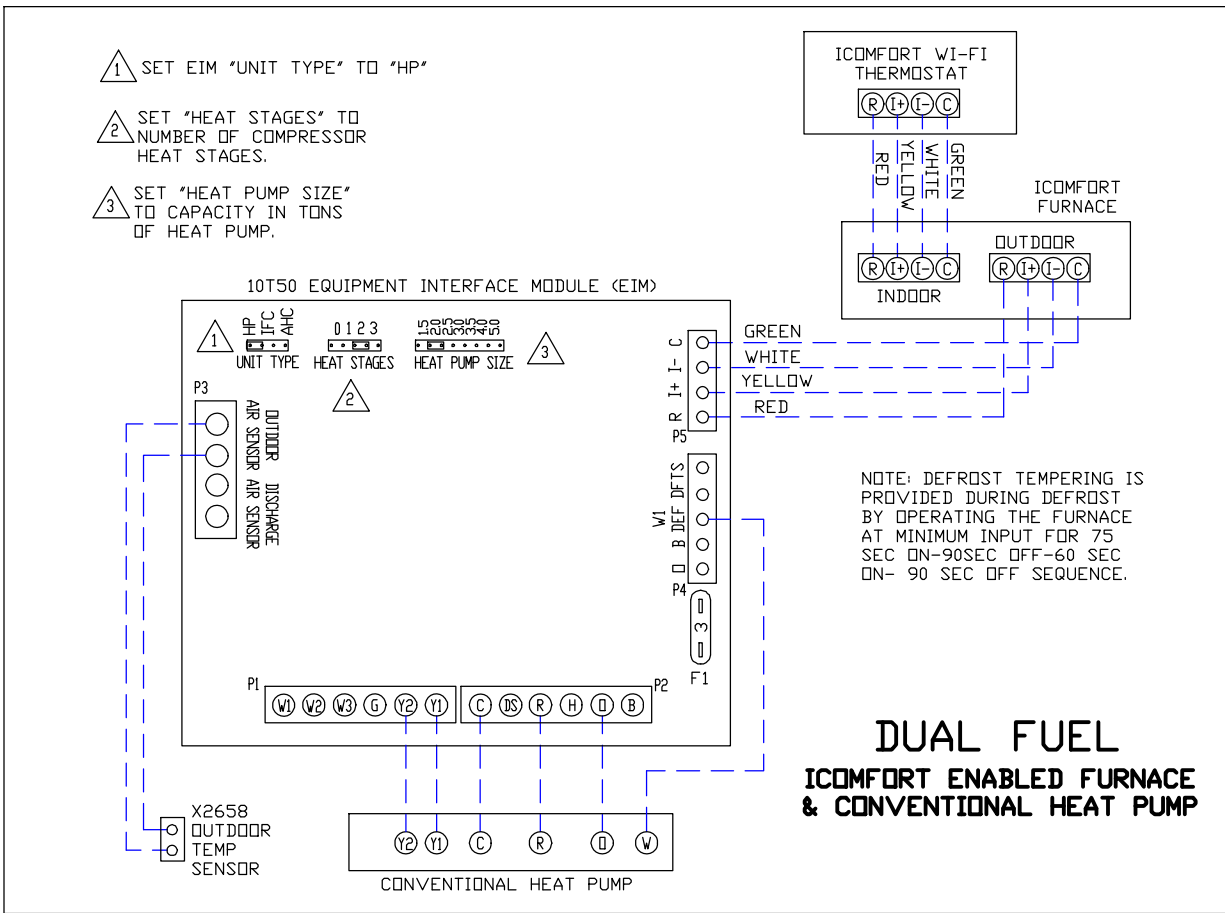


Figure 10

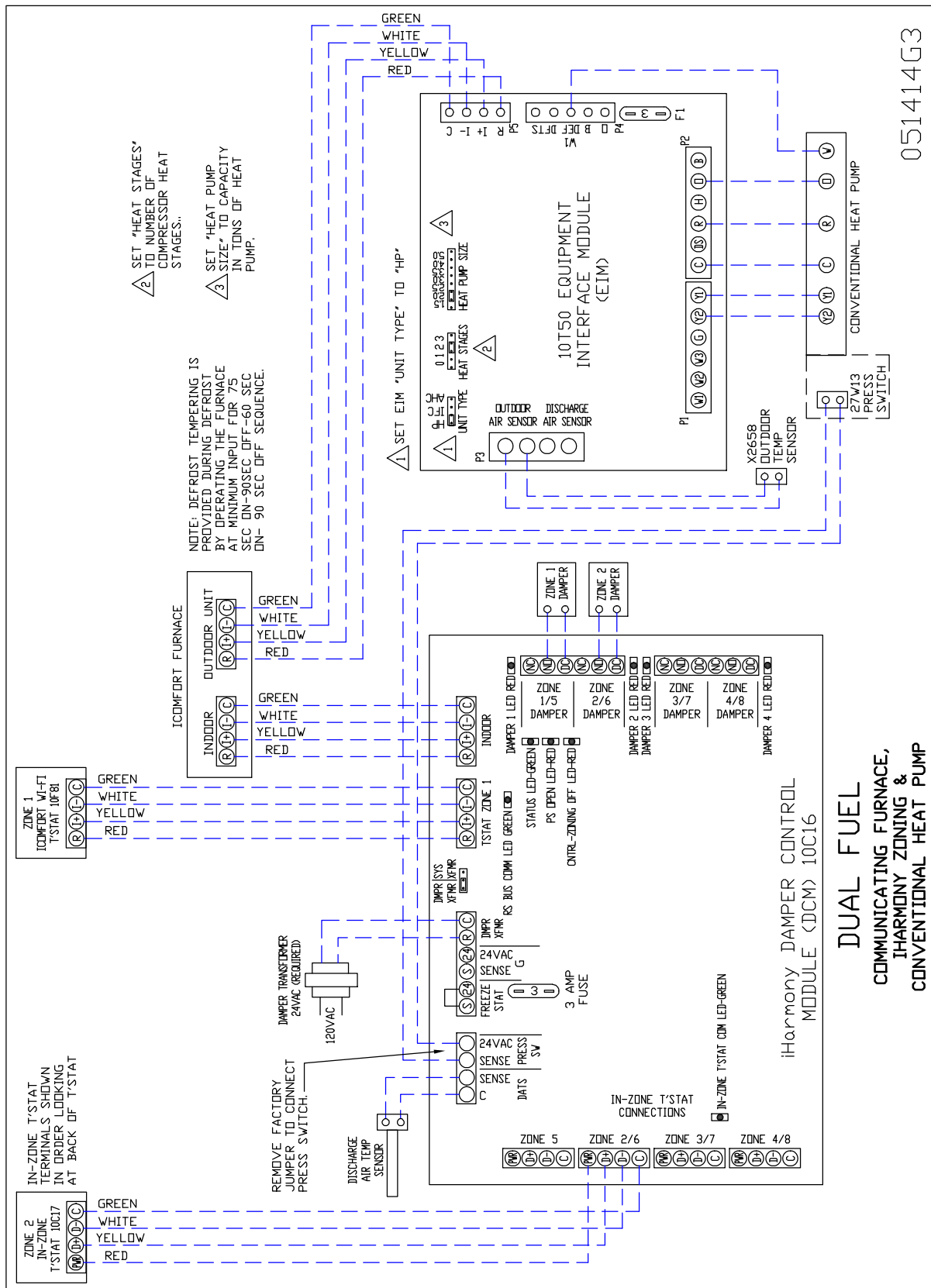
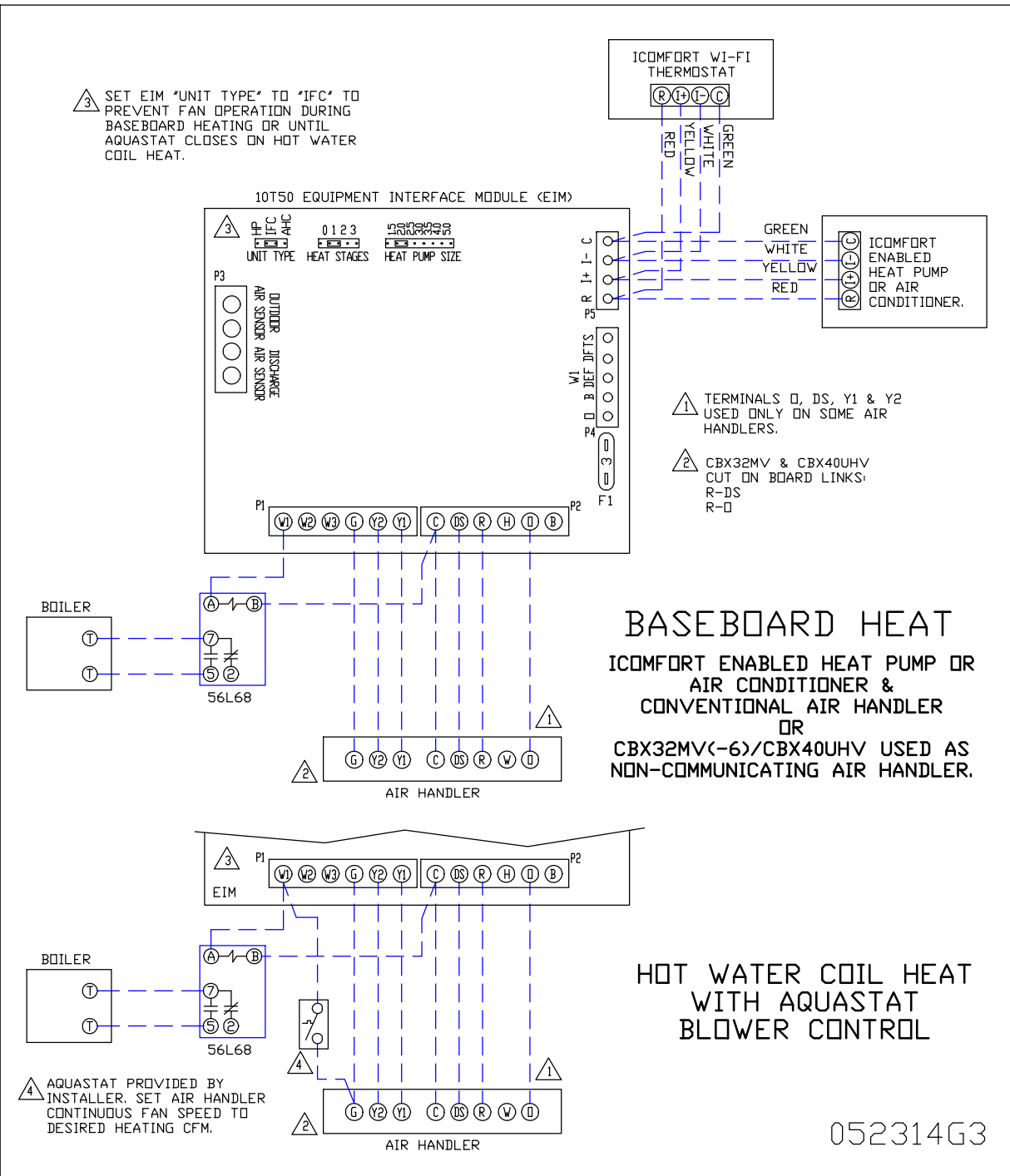


Figure 11



**Figure 12**

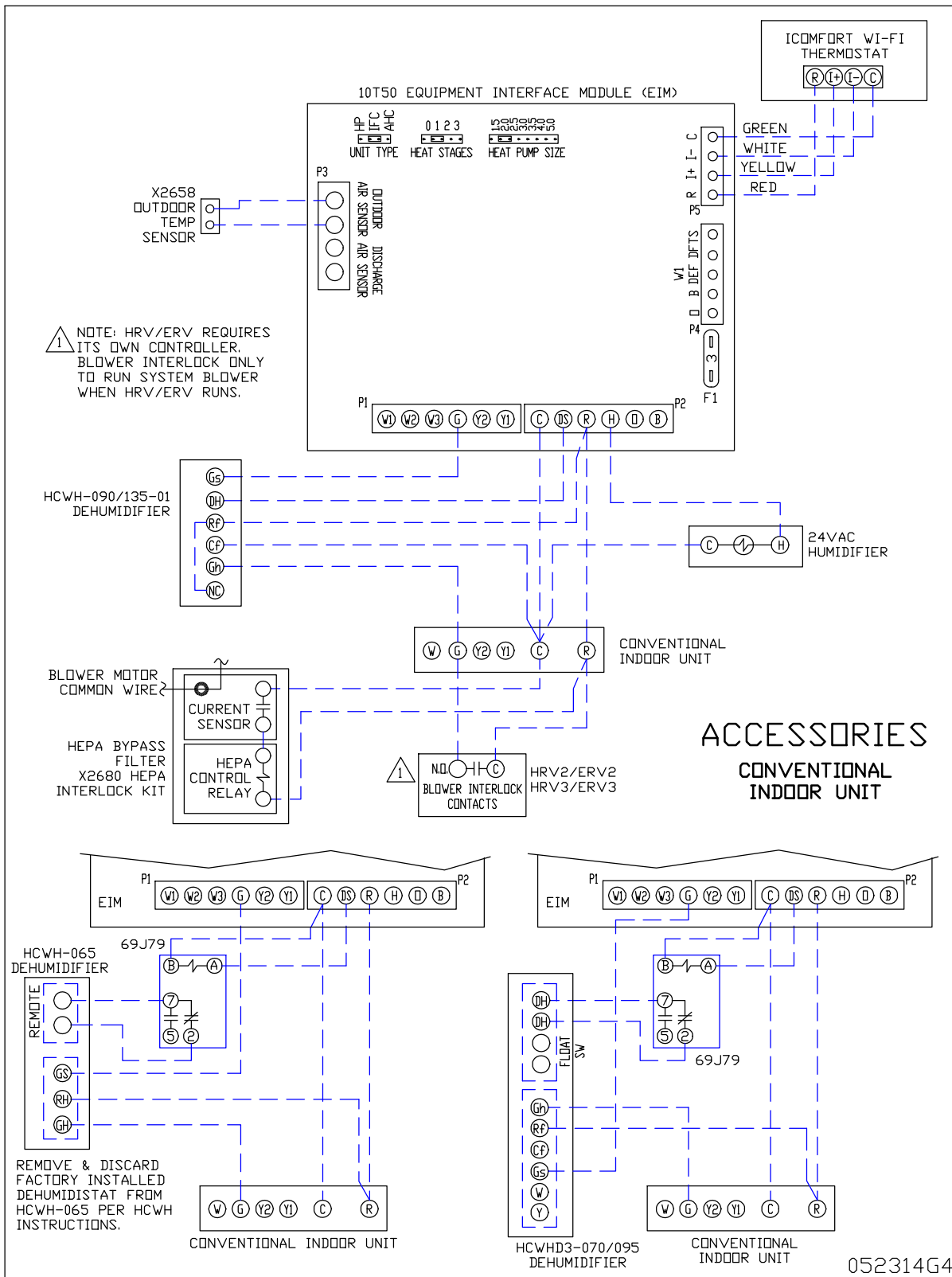


Figure 13

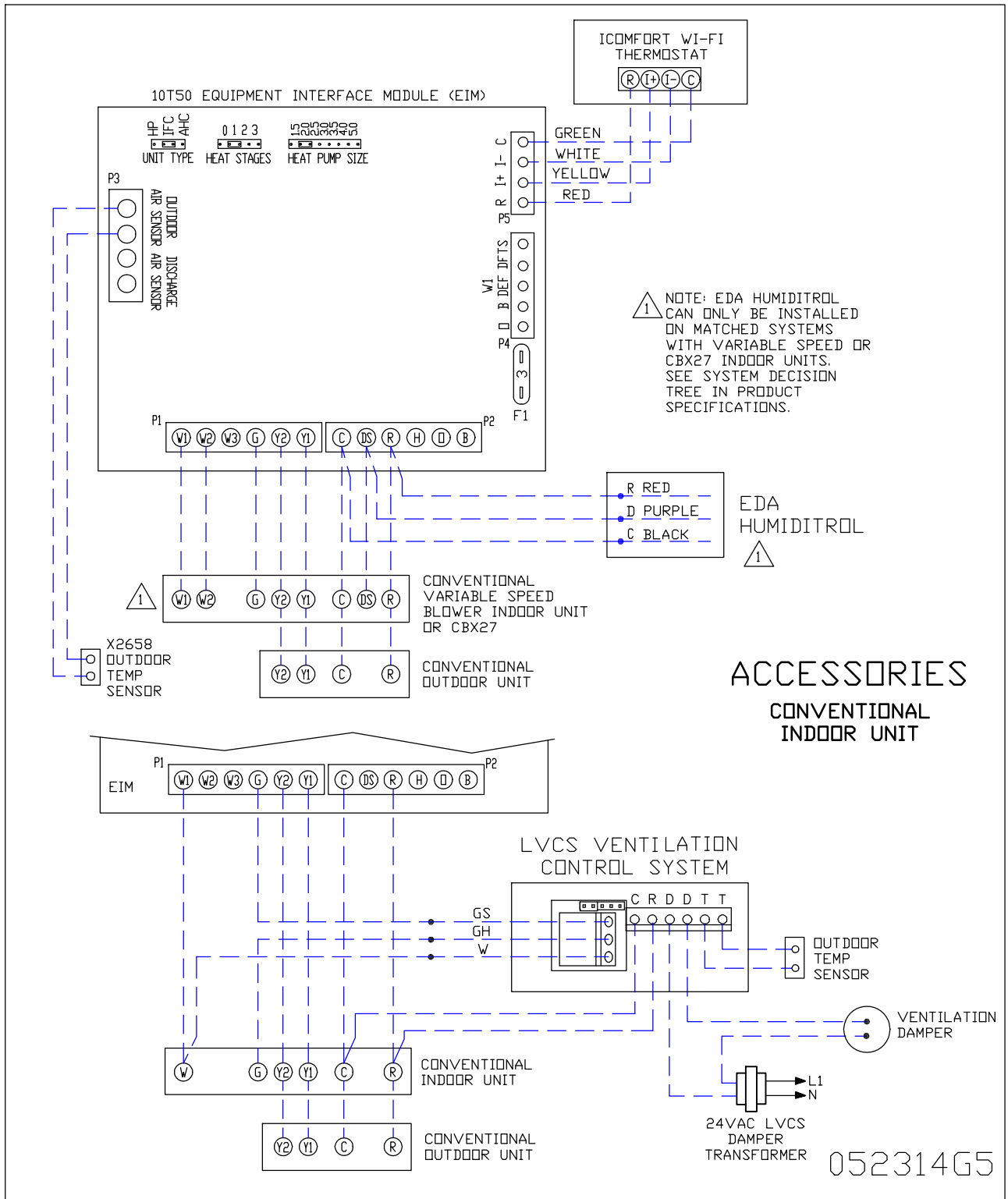


Figure 14



**Table 12. Alarm/Fault Name**

<b>Table 13. Alert Codes and Troubleshooting</b>			Critical alerts are displayed on Home (user) screen, in the Homeowner alert button, and in the Installer alert button. Minor and Moderate alerts are found only in the Installer alert button.
<b>Alert Code</b>	<b>Priority</b>	<b>Alert Text</b>	<b>Steps to clear</b>
14	Critical	(Thermostat) The thermostat found more than one thermostat, more than one indoor unit, or more than one outdoor unit on the system.	Check wiring and remove duplicate equipment. Reconfigure system.
105	Critical	(Thermostat / Furnace / Air Handler / Outdoor Unit) The ( <i>stat, furnace, air-handler or outdoor unit</i> ) has lost communication with the rest of the system.	Equipment is unable to communicate. This may indicate the existence of other alarms/codes. In most cases errors are related to electrical noise. Make sure high voltage power is separated from RSBUS. Check for mis-wired and/or loose connections between the stat, indoor unit and outdoor unit. Check for a high voltage source of noise close to the system. Generally, this is a self-recoverable error.
114	Critical	(Furnace / Air Handler / Outdoor Unit) There is a frequency/distortion problem with the power to the ( <i>furnace or air-handler</i> ).	This alarm/code may indicate transformer overloading. Check the voltage and line power frequency. Check the generator operating frequency, if the system is running on back-up power. Correct voltage and frequency problems. System resumes normal operation 5 seconds after fault recovered.
115	Critical	(Furnace / Air Handler / Outdoor Unit) The 24VAC to the ( <i>furnace or air-handler control</i> ) is lower than the required range of 18 to 30VAC.	24-Volt Power Low (Range is 18 to 30 volts). Check and correct voltage. Check for additional power-robbing equipment connected to system. This alarm/code may require the installation of an additional or larger VA transformer.
120	Moderate	(Thermostat / Furnace / Air Handler / Outdoor Unit) There is a delay in the ( <i>thermostat, furnace, air-handler or outdoor unit</i> ) responding to the system.	Typically, this alarm/code does not cause any issues and will clear on its own. The alarm/code is usually caused by a delay in the outdoor unit responding to the thermostat. Check all wiring connections. Cleared after unresponsive device responds to any inquiry.
124	Critical	(Thermostat / Furnace / Air Handler / Outdoor Unit) The thermostat has lost communication with the ( <i>furnace, air-handler or outdoor unit</i> ) for more than 3 minutes.	Equipment lost communication with the thermostat. Check the wiring connections, ohm wires and cycle power. The alarm stops all associated HVAC operations and waits for a heartbeat message from the unit that's not communicating. The alarm/fault clears after communication is re-established.
125	Critical	(Thermostat / Furnace / Air Handler / Outdoor Unit) There is a hardware problem on either the ( <i>thermostat, furnace control, air-handler control, equipment interface module or outdoor unit control</i> ).	There is a control hardware problem. Replace the control if the problem prevents operation and is persistent. The alarm/fault is cleared 300 seconds after the fault recovers.
130	Moderate	An EIM configuration jumper is missing.	Configuration jumper(s) missing on control (applicable in non-communicating applications only). Reinstall the jumper on control. Cleared after jumper is connected.
131	Critical	(Thermostat / Furnace / Air Handler / Outdoor Unit) The ( <i>thermostat, furnace, air-handler or outdoor unit</i> ) control parameters are corrupted.	Reconfigure the system. Replace the control if heating or cooling is not available.
132	Critical	(Thermostat / Furnace / Air Handler / Outdoor Unit) The device control software is corrupted.	Recycle power. If failure re-occurs, replace the control. System reset is required to recover.
180	Critical	(Furnace / Air Handler / Outdoor Unit) The thermostat has found a problem with the ( <i>furnace, air-handler or outdoor unit</i> ) outdoor sensor.	In normal operation after control recognizes sensors, the alarm will be sent if valid temperature reading is lost. Compare outdoor sensor resistance to temperature/resistance charts in unit installation instructions. Replace sensor pack if necessary. At the beginning of (any) configuration, furnace or air-handler control will detect the presence of the sensor(s). If detected (reading in range), appropriate feature will be set as 'installed' and shown in the 'About' screen. The alarm/fault will clear upon configuration, or sensing normal values.
310	Critical	(Furnace / Air Handler) There is a problem with ( <i>furnace or air-handler</i> ) discharge air sensor.	Compare outdoor sensor resistance to temperature/resistance charts in installation instructions. Replace sensor if necessary. The alarm/fault is cleared 30 seconds after fault is detected as recovered.
345	Critical	(Air Handler / Heat Pump) The "O" relay on the air-handler has failed. Either the pilot relay contacts did not close or the relay coil did not energize.	O relay / Stage 1 failed. Pilot relay contacts did not close or the relay coil did not energize. Replace control. Cleared after the fault recovered following reset.
347	Critical	(Furnace / Air Handler / Heat Pump) The "Y1" relay on the ( <i>furnace or air-handler</i> ) has failed. Either the pilot relay contacts did not close or the relay coil did not energize.	Operation stopped. Y1 relay / Stage 1 failed. (Pilot relay contacts did not close or the relay coil did not energize; no input back to IFC chip). Critical Alert. Cleared after reset and Y1 input sensed.
380	Moderate / Critical	Interlock relay failure (IFC / AHC / Heat Pump)	Interlock relay is energized, but input is not sensed after 3 seconds. There will be no heating or cooling due to this error. De-energize interlock relay and energize after 5 minutes if demand is still present.
381	Moderate / Critical	Interlock relay stuck (IFC / AHC / Heat Pump)	Interlock relay continuously sensed (with relay off). No heating and cooling operations. Alarm clears 30 seconds after fault clears.
382	Moderate	Relay W1 failure (IFC and AHC modes only)	W1 relay energized, but input is not sensed after three seconds.
420	Critical	The heat pump defrost cycle has taken more than 20 minutes to complete.	Defrost cycle lasts longer than 20 minutes. This alarm is applicable with non-communicating heat pump only. Check heat pump defrost operation. The alarm is cleared after the "W1" signal is removed.
421	Critical	(Outdoor Unit) The "W" output terminal on the outdoor unit is not wired correctly.	Voltage sensed on W output terminal when Y1 out is deactivated.

<b>Table 13. Alert Codes and Troubleshooting</b>			Critical alerts are displayed on Home (user) screen, in the Homeowner alert button, and in the Installer alert button. Minor and Moderate alerts are found only in the Installer alert button.
<b>Alert Code</b>	<b>Priority</b>	<b>Alert Text</b>	<b>Steps to clear</b>
594	Moderate / Critical	Pre-coil discharge air temperature sensor problem (HP mode only). Advances from moderate to critical after ten (10) minutes.	Interlock relay energized, but input not sensed after 3 seconds. No heating and cooling operations. De-energize interlock relay and re-energized 5 minutes later if demand is still present. Alarm clears 5 minutes after fault clears.

### **EQUIPMENT INTERFACE MODULE OPERATING ENVIRONMENT**

The Equipment Interface Module is designed to operate in the following environmental conditions.

- **Operating Temperature Range:** -40°F to 176°F (-40°C to 80°C).
- **Shipping and Storage Temperature Range:** -40°F to 185°F (-40°C to 85°C).
- **Operating Humidity Range:** 10% to 90% non-condensing at 104°F.