



**Equipment Interface Module (EIM) (22X18)**  
*Installation and Setup Guide*

507240-04  
11/2022  
Supersedes 9/2022

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## 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 a service agency.

### Shipping and Packing List

Quantity	Description
1	Equipment Interface Module.
1	Installation and setup guide
1	Warranty certificate

### Indoor Transformer Requirements

The following lists the required indoor unit transformer rating (VA) for specific configurations.

Table 1. System VA Loading Chart

Configuration	Minimum Transformer Rating (VA)
2-Stage HP, 3-Stage Electric heat and Fresh Air	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
Single stage fresh air damper	6 to 12VA

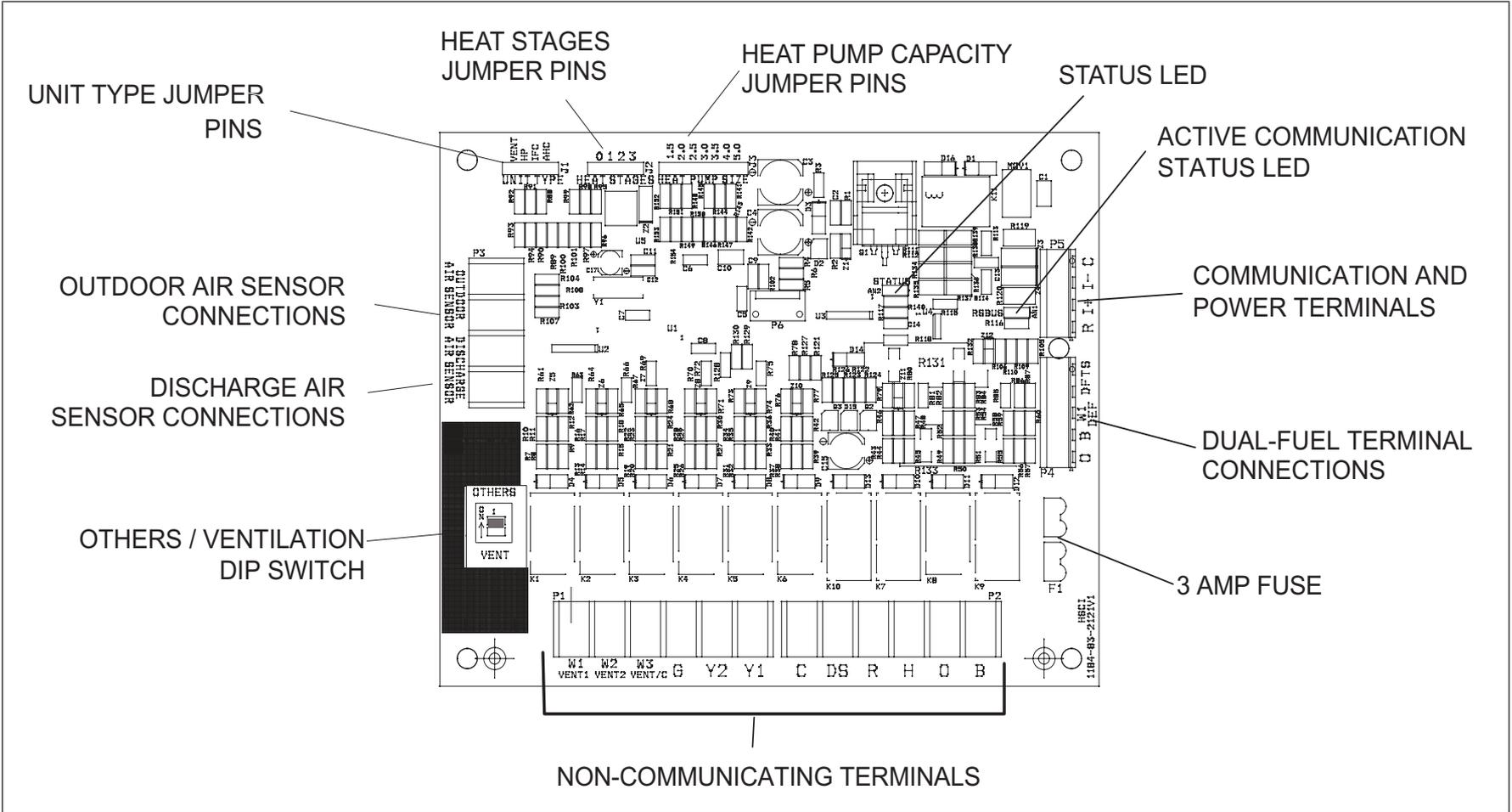
### Overview

The Equipment Interface Module (EIM) is used with an Lennox communicating thermostat using the R, i+, i-, and C terminals. The EIM is the interface between non-communicating HVAC equipment and Lennox communicating HVAC equipment.

**NOTE:** EIM will support single-stage outdoor units with single-stage or variable-stage indoor furnaces.

For ventilation or zoning applications, see “Applications (Ventilation and Zoning)” on page 31.

**Equipment Interface Module Control Layout**



**Figure 1. Connections, Jumpers, Fuse and LEDs**

## ! CAUTION

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

## ! WARNING

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.

### Jumpers Pins, DIP Switch, Connections and LEDs

## IMPORTANT

The Lennox communicating 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 Lennox communicating thermostat without the Equipment Interface Module (EIM) will work with Lennox communicating HVAC equipment.

1. Remove the module cover.
2. Mount the Equipment Interface Module (EIM) near the indoor unit.
3. Use the wiring diagrams reference in the section titled "Field Wiring Diagrams" on page 12 to complete the wiring connections for the specific application and configuration.

### Unit Type Jumper Pin Settings

Set the unit type jumper for the type of indoor unit, Use the following table and figure as a guide. The factory default setting is **IFC**. If jumper is missing from the jumper pins, then alarm 130 is activated.

Table 2. Unit Type Jumper Pin Settings

Jumper Position	Indoor Unit	Outdoor Unit
<b>VENT</b>	ERV, HRV or Fresh Air Damper	Not supported. Second EIM would be required for non-communicating heat pump or air conditioner.
<b>HP</b>	Lennox Communicating Furnace	Non-communicating heat pump.
<b>IFC (Default)</b>	Conventional furnace	Non-communicating heat pump or air conditioner.
<b>AHC</b>	Conventional air handler	

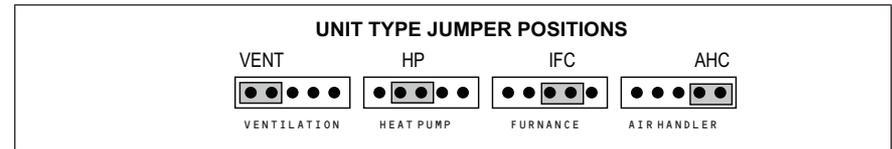


Figure 2. Unit Type Jumper Terminal Settings

### Heat Stages Jumper Pin Settings

The factory default setting is position 2 (two heat stages). If jumper is missing from the jumper pins, then alarm 130 is activated. Depending on the type of equipment and system set up being used:

- Set the number of stages of electric heat (air handler) when jumper pin selection is AHC selection.
- Set the number of stage of gas heat (Furnace) when jumper pin selection is IFC.
- Set the number of stages of the compressor when jumper pin selection is HP.

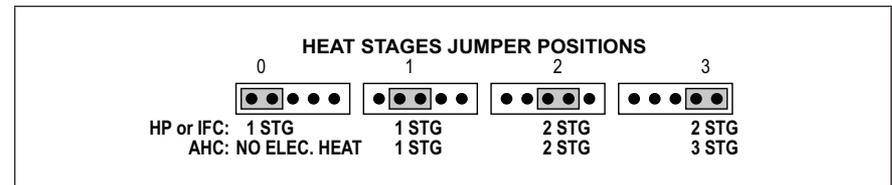


Figure 3. Heat Stage Jumper Positions

Table 3. Heat Stage Jumper Pin Settings

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.

### Heat Pump Capacity Jumper Pin Settings

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 jumper pins then alarm 130 is activated.

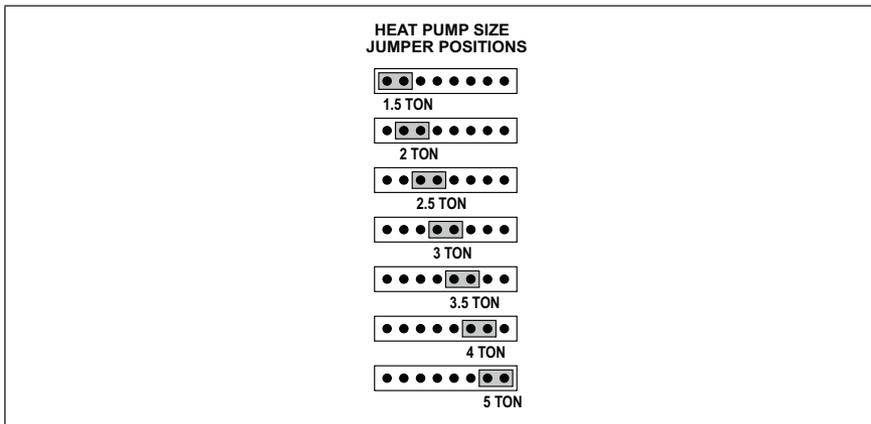


Figure 4. Conventional Heat Pump Capacity Jumper Setting

### Others / Vent DIP Switch Settings

- **Ventilation Only Operation (ERV/HRV)** - Set the unit type jumper to **VENT** and the DIP switch set to **OFF (VENT)**.
- **Ventilation Only Operation (FRESH AIR DAMPER)** - Set the unit type jumper to **VENT** and the DIP switch set to **OFF (VENT)**.
- **IFC/AHC/HP Operation** - Set the unit type jumper to the desired component and the DIP switch must be set on **ON (OTHERS)** position.

**NOTE:** Factory default for this switch is **ON**.

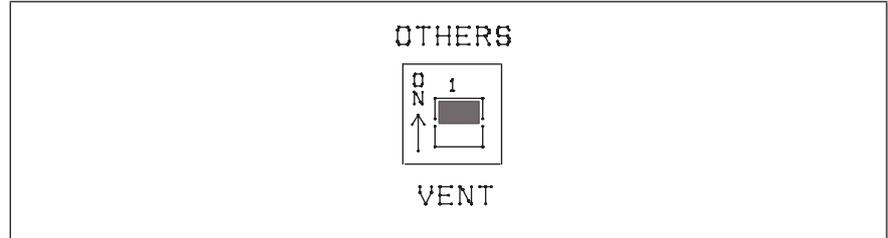


Figure 5. OTHERS/VENT DIP Switch Settings

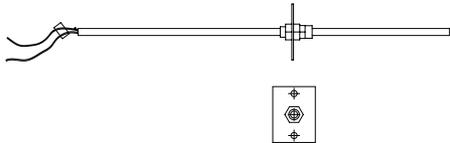
### Sensor Connections

Refer to “Figure 1. Connections, Jumpers, Fuse and LEDs” on page 3 for various terminal locations.

Table 4. Outdoor Air and Discharge Air Sensors

Label	Function / Description
Outdoor Air Sensor	<p>Show ambient temperatures (optional if weather feed is acceptable or outdoor unit is a communicating unit; use X2658 Outdoor Sensor - two terminals).</p> <p><b>NOTE:</b> Wiring distance between the EIM and the outdoor temperature sensor can not exceed 150 feet (45 meters) when wired with minimum 18 - 22 AWG dedicated two-conductor thermostat cable.</p>

**Table 4. Outdoor Air and Discharge Air Sensors**

Label	Function / Description
Discharge Air Sensor	<p>This sensor is optional for diagnostics of indoor air. Recommend using use discharge air sensor (88K38).</p> 

**Dual-Fuel Terminal Connections**

**Table 5. Dual-Fuel Terminals**

Label	Description	Function
DFTS	Not Used	Not Used
W1-DEF	Defrost signal input	<ul style="list-style-type: none"> <li>This input is used in systems with non-communicating heat pumps for defrost indication.</li> <li>The input provides a nominal load of 50 mA, 24 VAC.</li> </ul>
O	Heat Pump Reversing Valve. (Power for cooling)	<ul style="list-style-type: none"> <li>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.</li> <li>A 24VAC signal is generated on <b>O</b> for cooling operation, while the terminal is open for heating operation.</li> </ul>
B	Heat Pump Reversing Valve (Power for heating)	<ul style="list-style-type: none"> <li>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.</li> <li>A 24VAC signal is generated on <b>B</b> for heat pump operation, while the terminal is open for cooling operation.</li> </ul>

**Conventional Terminal Connections and Wiring Requirement**

**Table 6. Conventional Terminals**

Label	Description	Function
<b>NOTE:</b> 18AWG unshielded thermostat cable (field-provided) for all non-communicating connections.		
W1/Vent 1		<ul style="list-style-type: none"> <li>Set the unit type jumper to <b>IFC</b> and the DIP switch to <b>ON (OTHERS)</b>, then there is a first-stage gas heat output</li> <li>Set the unit type jumper to <b>AHC</b>, and the DIP switch to <b>ON (OTHERS)</b>, then there is first stage electric heat output.</li> <li>When unit type jumper is set to <b>VENT</b> and the DIP switch is set to <b>OFF (VENT)</b>, then there is single-speed ventilation.</li> <li>When unit type jumper is set to <b>VENT</b> and the DIP switch is set to <b>OFF (VENT)</b>, then there is single-speed fresh air damper output.</li> </ul>
W2/Vent 2		<ul style="list-style-type: none"> <li>Set the unit type jumper to <b>IFC</b> and the DIP switch to <b>ON (OTHERS)</b>, then there is second stage gas heat output.</li> <li>Set the unit type jumper to <b>IFC</b> and the DIP switch to <b>ON (OTHERS)</b>, then there is second stage electric heat output.</li> <li>Set the unit type jumper to <b>VENT</b> and the DIP switch to <b>OFF (VENT)</b>, then this terminal can be used for two-speed ventilation only.</li> </ul>
W3/Vent C		<ul style="list-style-type: none"> <li>Set the unit type jumper to <b>IFC</b> and the DIP switch to <b>ON (OTHERS)</b>, then there is third stage gas heat output.</li> <li>Set the unit type jumper to <b>IFC</b> and the DIP switch to <b>ON (OTHERS)</b>, then there is third stage electric heat output.</li> <li>Set the unit type jumper to <b>VENT</b> and the DIP switch to <b>OFF (VENT)</b>, then this terminal can be used as common for single or two speed ventilation.</li> <li>Set the unit type jumper to <b>VENT</b> and the DIP switch to <b>OFF (VENT)</b>, then this terminal can be used when installed wire jumpered between <b>W3/Vent C</b> and terminal <b>R</b>, can provide 24VAC in a fresh air damper application.</li> </ul>
G	Indoor blower control (continuous fan) (monitoring only).	
Y2	2nd - stage compressor output	
Y1	1st - stage compressor output	
DS	<ul style="list-style-type: none"> <li>24VAC dehumidification signal output.</li> <li>The <b>DS</b> terminal is powered when there is not a dehumidification call.</li> </ul>	
C	Class II, 24VAC transformer common	<ul style="list-style-type: none"> <li><b>R</b> and <b>C</b> terminals are used to receive power from the indoor unit and capable of providing the power to the EIM and all the associated loads.</li> <li>The <b>R</b> power input uses a 3A fuse (Lennox catalog number 25J49).</li> </ul>
R	Class II, 24VAC transformer power	
H	24VAC humidifier signal output.	

**Table 6. Conventional Terminals**

Label	Description	Function
<b>NOTE:</b> 18AWG unshielded thermostat cable (field-provided) for all non-communicating connections.		
<b>O</b>	Heat pump reversing valve (24VAC = cool)	<ul style="list-style-type: none"> <li>Used as reversing valve output for heat pumps.</li> <li>The EIM uses a single-pole dual throw relay to generate <b>O</b> and <b>B</b> signals.</li> </ul>
<b>B</b>	Heat pump reversing valve (24 VAC = heat)	<ul style="list-style-type: none"> <li>Normally the <b>O</b> output is open and <b>B</b> output at 24VAC during heating calls.</li> <li>During cooling calls <b>O</b> is 24VAC and <b>B</b> open.</li> <li>With relay de-energized then 24VAC is present on <b>O</b> terminal.</li> <li>When power off/ or control reset, 24VAC power shall not be present on the <b>O</b> terminal.</li> </ul>

**LED Indicators**

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 7. Status LED (Green)**

Green LED	Function / Description
Steady On	Remains steady ON until the device sends its start-up message.
Blinks 1 second ON and 3 seconds OFF	Soft disable state
Blinks 2 seconds ON and 2 second OFF	Service is being provided ( <b>W</b> , <b>Y</b> or <b>G</b> relay is ON, or <b>G</b> input ON)
Blinks 1 second ON and 1 second OFF	When alarms are present, you may review alarm(s) listed either on the homeowner notification screen or notifications under Dealer Service Center. Information will be listed in either location on how to clear the alert code(s).

**Table 7. Status LED (Green)**

Green LED	Function / Description
Blink 3 seconds ON and 1 second OFF.	<ul style="list-style-type: none"> <li><b>OTHERS/VENT</b> switch mis-match. Unit type jumper is set to <b>VENT</b> but the <b>OTHERS/VENT</b> DIP switch is set to <b>ON</b>.</li> <li>Other switch mis-match. Unit type switch is set to <b>IFC</b>, <b>AHC</b> or <b>HP</b>, but the <b>OTHERS/VENT</b> DIP switch is set to <b>OFF</b>.</li> </ul> <p><b>NOTE:</b> This notification will only appear when there is a demand being called.</p>

**Soft Disable**

- Soft disabling is when the thermostat detects an unknown control such as a indoor or outdoor unit control, Lennox Smart Zoning (iHarmony) or EIM on the system communication bus.
- The thermostat sends the unknown control a message to go into soft disable mode until component is properly configured.
- The thermostat will display (--) symbols 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 such as thermostat, EIM, indoor and outdoor unit).
2. Cycle power to the control that is displaying the soft disable code.
3. Touch the **Lennox** icon on the thermostat home screen and hold until the installer warning screen appears.
4. Touch **yes** to continue.
5. Touch **Setup** and then **confirm** to continue.
6. Use this Thermostat? Touch **press here** to continue.
7. Touch the **next** button to continue past the next three screens.
8. From the **System Devices** list, touch **reset ALL** to reset all devices.
9. Touch the **confirm** button.

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

# IMPORTANT

If any jumpers were set incorrectly AFTER commissioning was completed, then reposition jumpers to correct positions. Re-running the commissioning procedure will be required at the Lennox communicating thermostat.

This completes the configuring of the conventional outdoor unit.

## Lennox Communicating Thermostat Commissioning (Conventional Outdoor Unit)

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

1. From the equipment found screen, touch the non-communication equipment location to add non-communicating equipment.
2. A add/remove equipment screen will appear. Under **Outdoor Unit Type**, select the applicable 1 or 2-stage unit.
3. Touch either the **plus** or **minus** buttons to selected the applicable **Outdoor Unit Capacity**. Valid options are **18, 24, 30, 36, 42, 48** and **60**.
4. Touch **save** to continue.

## Operating Environment Specifications

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.

## Unit Dimensions

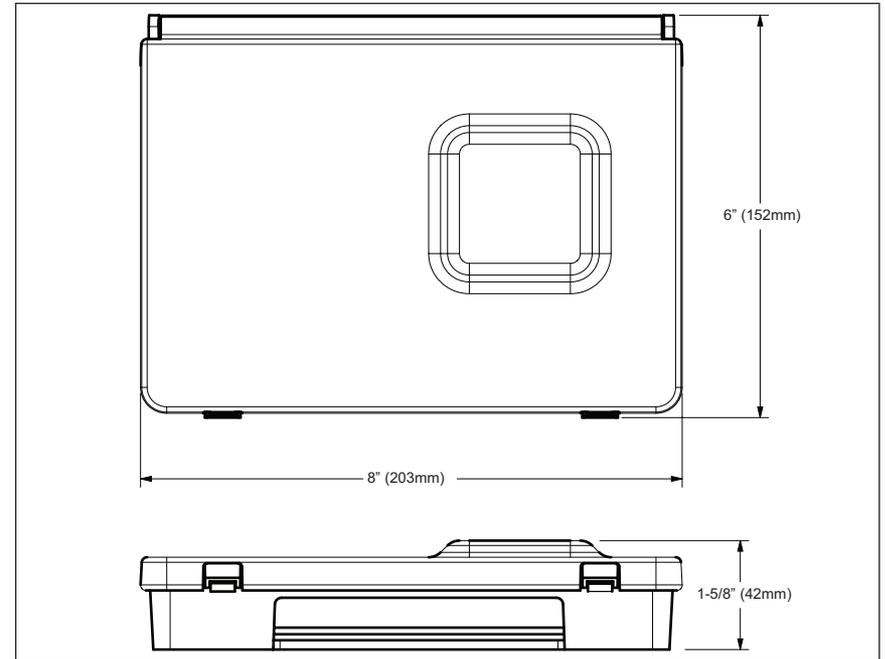


Figure 6. Unit Dimensions

## Most Common Configurations

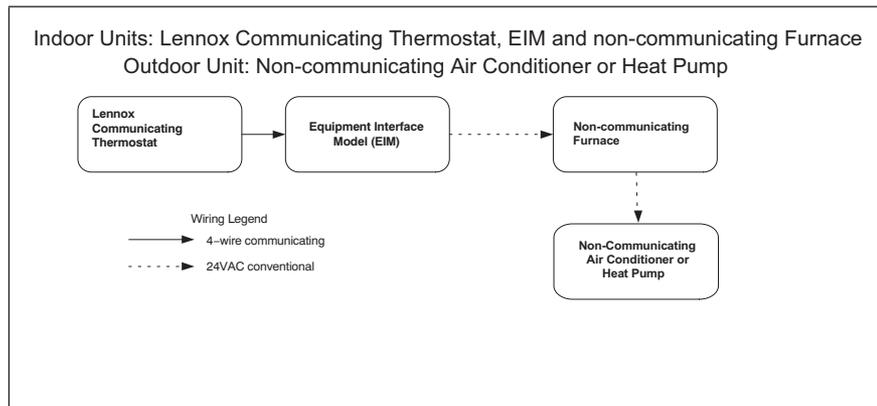
How the EIM is configured is determined by the system components.

**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 Lennox communicating thermostat will also need to be reaccomplished. See the Lennox communicating thermostat Setup Guide for recommissioning procedure.

The following examples are three typical configurations used with the EIM. There are other applications as well and are address in the wiring diagrams section titled “Field Wiring Diagrams” on page 12. Those diagrams will indicate all required jumper settings on the EIM and wiring connections.

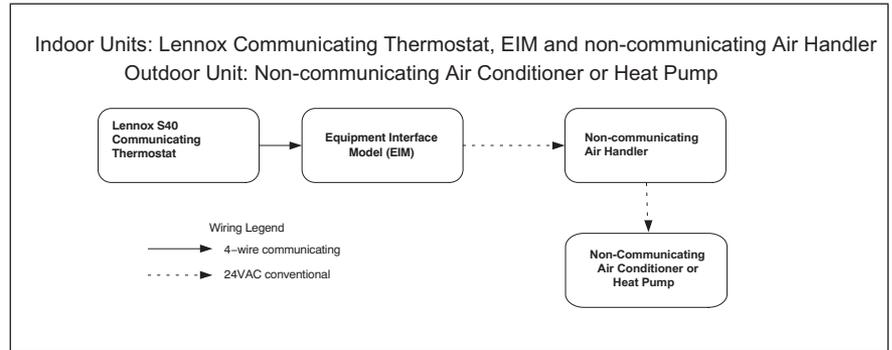
### Lennox Communicating Thermostat, EIM, Non-communicating Furnace, Non-communicating Air Conditioner or Heat Pump



**Figure 7. Lennox Communicating Thermostat, EIM, Non-Comm Furnace and Non-Communicating AC or HP**

1. Set the EIM Unit Type Jumper to **IFC**.
2. Set the EIM Heat Stage Jumper (see “Table 3. Heat Stage Jumper Pin Settings” on page 5) to the applicable number of furnace heat stages or number of electric heat stages.
3. Set the OTHERS/VENT DIP switch to the **OTHERS (ON)** position.

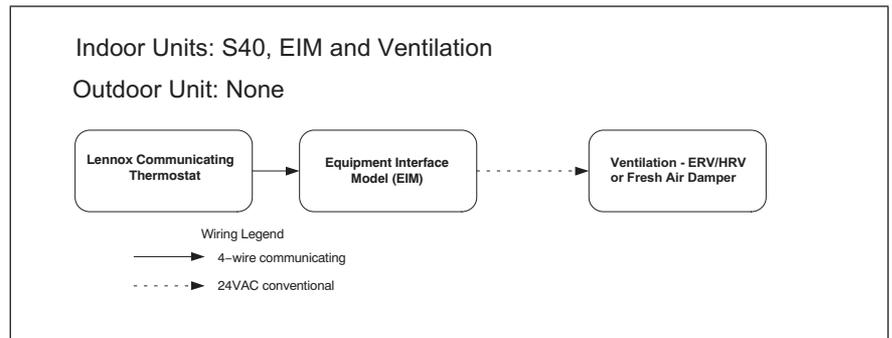
### Lennox Communicating Thermostat, EIM, Non-communicating Air Handler, Non-communicating Air Conditioner or Heat Pump



**Figure 8. Lennox Communicating Thermostat, EIM, Non-Comm Air Handler and Non-Communicating AC or HP**

1. Set the EIM Unit Type Jumper to **AHC**.
2. Set the EIM Heat Stage Jumper (see “Table 3. Heat Stage Jumper Pin Settings” on page 5) to the applicable number of HP heat stages or number of electric heat stages.
3. Set the OTHERS/VENT DIP switch to the **OTHERS (ON)** position.
4. Use the Lennox communicating thermostat to complete the commissioning procedure.

### Lennox S40 Smart Thermostat Only, EIM and Ventilation Only



**Figure 9. System View - Ventilation Only**

1. Set the Unit Type Jumper to **VENT**.
2. Set the OTHERS/VENT DIP switch to the **VENT (OFF)**.
3. Use the Lennox communicating thermostat to complete the commissioning procedure.

### Dual-Fuel Configurations

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

Defrost Air Tempering Kit (67M41) will be required. The included DT1 discharge temperature probe is inserted in the furnace air outlet between the furnace and the indoor coil to keep the furnace from overheating the coil which would cause heat pump high pressure tripping during the defrost cycling. The DT1 is only needed with non-communicating furnaces and is not required for air handlers.

Wiring example for the DT1 Discharge Temperature Probe is in “Figure 20. Dual-Fuel - Conventional Furnace with Conventional Heat Pump (1 or 2-Stage)” on page 16.

### Lennox Communicating Thermostat, EIM, Lennox Communicating Furnace and Non-communicating Heat Pump

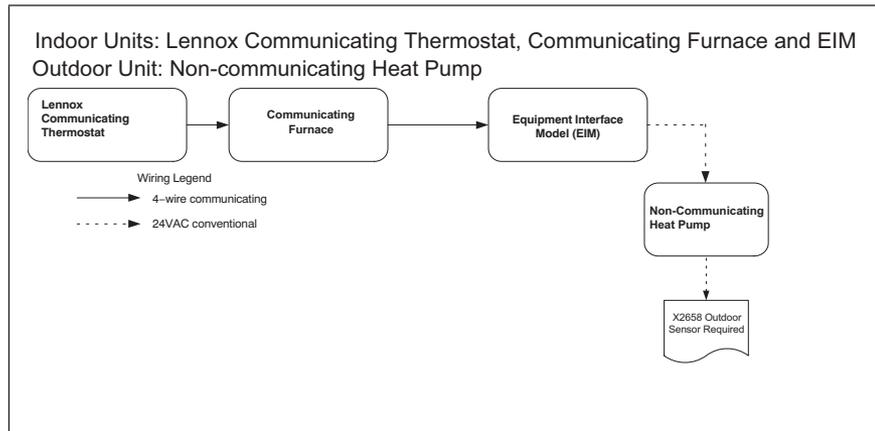


Figure 10. Dual Fuel - Lennox Communicating Thermostat, IFC, EIM and Non-Comm HP

1. Set the EIM Unit Type Jumper to **HP**.

2. Set the EIM Heat Stage Jumper (see “Table 3. Heat Stage Jumper Pin Settings” on page 5) to the applicable number of heat pump heating stages.
3. Set the OTHERS/VENT DIP switch to the **OTHERS (ON)** position.
4. Use the Lennox communicating thermostat to complete the commissioning procedure.

**NOTE:** For two-stage heat pump go to the heat pump defrost control, locate P3 - low ambient thermostat pins and disable this function by removing the installed jumper and relocating it to one pin only.

### Lennox Communicating Thermostat, EIM, Non-Communicating Furnace and Communicating Heat Pump

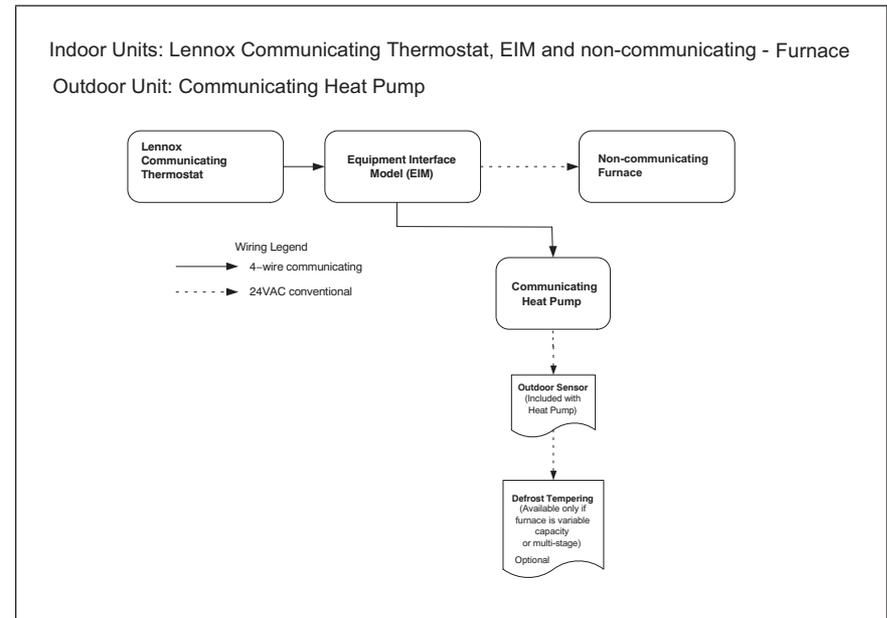
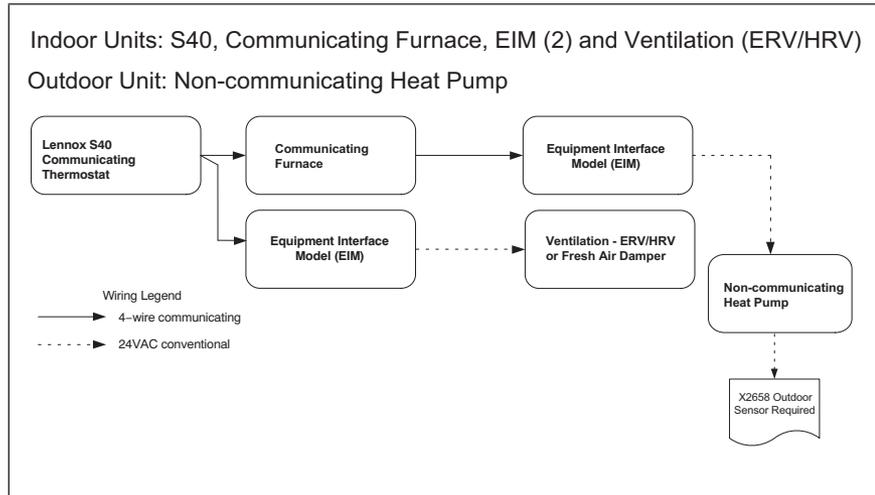


Figure 11. Lennox Communicating Thermostat, EIM, Non-Comm Furnace/Air Handler and Communicating AC or HP

1. Set the EIM Unit Type Jumper to **IFC**.
2. Set the EIM Heat Stage Jumper (see “Table 3. Heat Stage Jumper Pin Settings” on page 5) to the applicable number of furnace heat stages or number of electric heat stages.

- Set the **OTHERS/VENT DIP** switch to the **OTHERS (ON)** position.
- Use the Lennox communicating thermostat to complete the commissioning procedure.

**Lennox S40 Smart Thermostat Only, EIM (2), Lennox Communicating Furnace, 24VAC Heat Pump and Ventilation (ERV/HRV)**



**Figure 12. Duel Fuel - Lennox Communicating Thermostat, IFC, EIM (2) No-Comm HP and Ventilation**

- Set the EIM 1 Unit Type Jumper to **HP**.
  - Set the EIM 1 Heat Stage Jumper (see “Table 3. Heat Stage Jumper Pin Settings” on page 5) to the applicable number of heat pump heating stages.
  - Set the OTHERS/VENT DIP switch to the **OTHERS (ON)** position.
- NOTE:** For two-stage heat pump go to the heat pump defrost control, locate P3 - low ambient thermostat pins and disable this function by removing the installed jumper and relocating it to one pin only.
- Set the EIM 2 Unit Type Jumper to **VENT**.
  - Set the EIM 2 OTHERS/VENT DIP switch to the **VENT (OFF)** position.

- Use the Lennox communicating thermostat to complete the commissioning procedure.

**Thermostat Terminal Information**

**Table 8. Terminal Designations and Wiring Recommendations**

Terminal Designation	Description	Thermostat Wiring
<b>R</b>	24VAC input	18AWG unshielded
<b>I+</b>	RS-BUS I+	18 - 22AWG unshielded or shielded
<b>I-</b>	RS-BUS I-	<b>NOTE:</b> Shielded wiring may be required in some rare situations. Use two-conductor shielded cabling.
<b>C</b>	24VAC return	18AWG unshielded

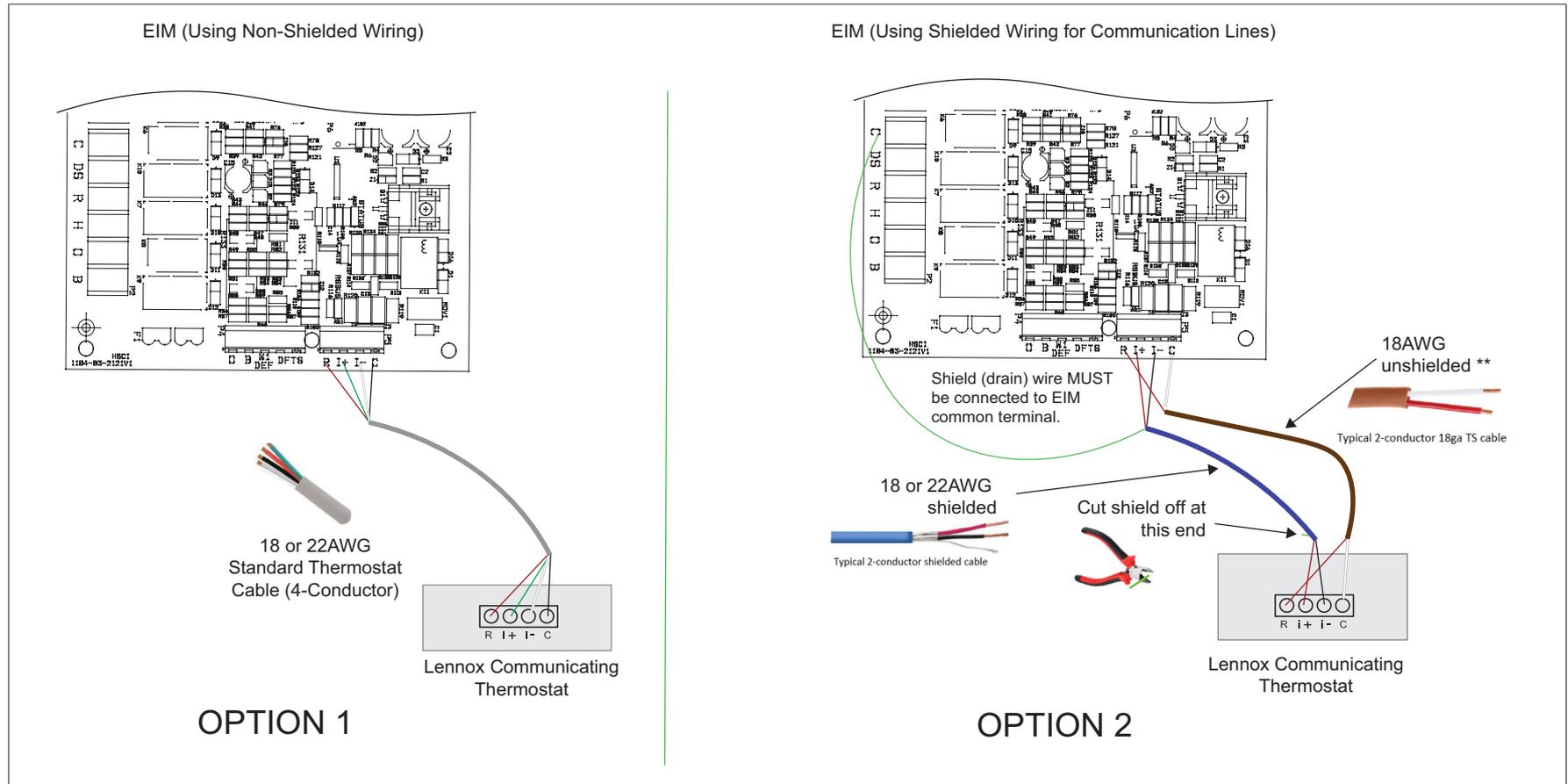
## Field Wiring Diagrams

**Table 9. Wiring Diagrams**

System Type	Lennox Indoor Unit	Lennox Outdoor Unit	EIM 1 Jumper Settings			EIM 2 Jumper Settings			Diagram
			Unit Type	Heat Stages	OTHER/VENT DIP Setting	Unit Type	Heat Stages	OTHER/VENT DIP Setting	
Air Conditioner	Conventional Furnace	Conventional Air Conditioner	IFC	Set to number of furnace stages.	ON	N/A	N/A	N/A	Figure 16 on page 15.
Air Conditioner	Conventional Air Handler	Conventional Air Conditioner	AHC	Set to number of air handler electric heat stages.	ON	N/A	N/A	N/A	
Heat Pump	Conventional Air Handler	Conventional Heat Pump	HP	Set to number of heat pump compressor stages.	ON	N/A	N/A	N/A	Figure 17 on page 15.
Dual Fuel	Conventional Furnace	Communicating Heat Pump	IFC						Figure 19 on page 16.
Dual Fuel	Communicating Furnace	Conventional Heat Pump	HP						Figure 18 on page 15.
Dual Fuel	Conventional Furnace	Conventional Heat Pump	IFC						Figure 20 on page 16.
Dual Fuel with iHarmony	Communicating Furnace	Conventional Heat Pump	HP						Figure 23 on page 18.
Dual Fuel with Ventilation	Communicating Furnace	Conventional Heat Pump	HP	Set to number of heat pump compressor stages.	ON	VENT	N/A	OFF	Figure 26 on page 21.
Baseboard Heat	Conventional Air Handler*	Communicating Air Conditioner or Heat Pump	IFC	Set to the number of heat pump compressor stages or air handler electric heat stages.	ON	N/A	N/A	N/A	Figure 21 on page 16.
Hot Water Coil with Aquastat Blower Control	Conventional Air Handler*	Communicating Air Conditioner or Heat Pump	IFC						
Accessories - Dehumidifiers, humidifiers, HEPA Bypass Filter	Conventional Air Handler or Furnace	Conventional Air Conditioner or Heat Pump	IFC						
Accessory - Ventilation (ERV/HRV or Fresh Air Damper)	Conventional or Communicating Thermostat	None	VENT	N/A	OFF	N/A	N/A	N/A	Figure 25 on page 20.
Accessory - EDA	Conventional	Conventional	IFC or AHC	Set to the number of heat pump compressor stages or air handler electric heat stages.	ON	N/A	N/A	N/A	Figure 24 on page 19.

\* 24VAC conventional air handler or CBA38MV setup as 24VAC conventional.

## Communicating Wiring Diagrams



**Figure 13. EIM Wiring Connections (Options 1 and 2)**

There may be situations where alternate wiring methods may need to be employed. Two options are available to address an inductive voltage issue. If Alert Code 105 (see “Alert Codes and Troubleshooting” on page 22) is still present after following troubleshooting Steps 1 and 2 then proceed to Step 3 wiring options 2 or 3.

- **Option 2** - Using shielded 2-conductor cable between the indoor, outdoor and thermostat **-i** and **+i** terminals may be required.
- **Option 3** - Using unshielded 2-conductor cable between the indoor, outdoor and thermostat **-i** and **+i** terminals may be required.

**NOTE:** When using multi-conductor unshielded thermostat cable, refer to “Figure 15. Minimizing Electrical Noise” on page 14.

Equipment Interface Module (EIM) (Using 2-conductor Unshielded Cable for Communication Lines and Separate 2-conductor Unshielded Cable for R and C)

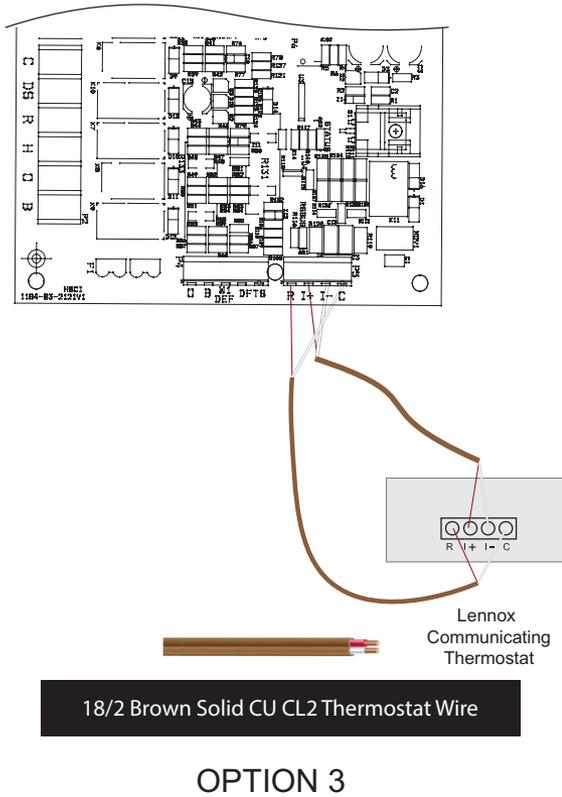


Figure 14. EIM Connections using Separate Unshielded Cable (Option 3)

## Minimizing Electrical Noise

When using multi-conductor unshielded thermostat cable, to minimize electrical noise, cap unused wires as illustrated below and run to indoor unit C terminal.

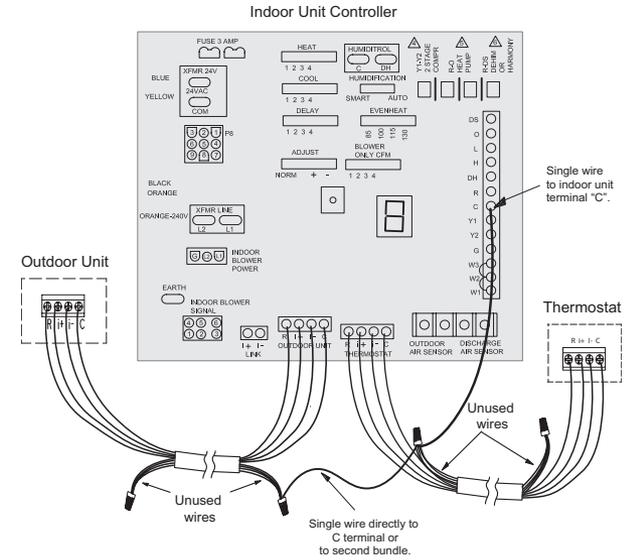


Figure 15. Minimizing Electrical Noise

## Component Wiring

The following diagrams are for specific component applications.

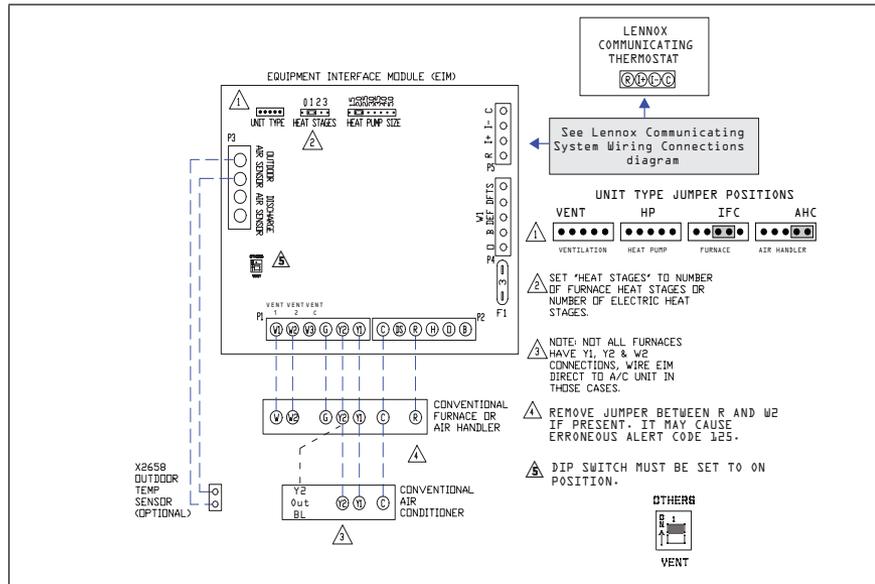


Figure 16. Conventional Furnace or Air Handler with Conventional Air Conditioner (1 or 2-Stage)

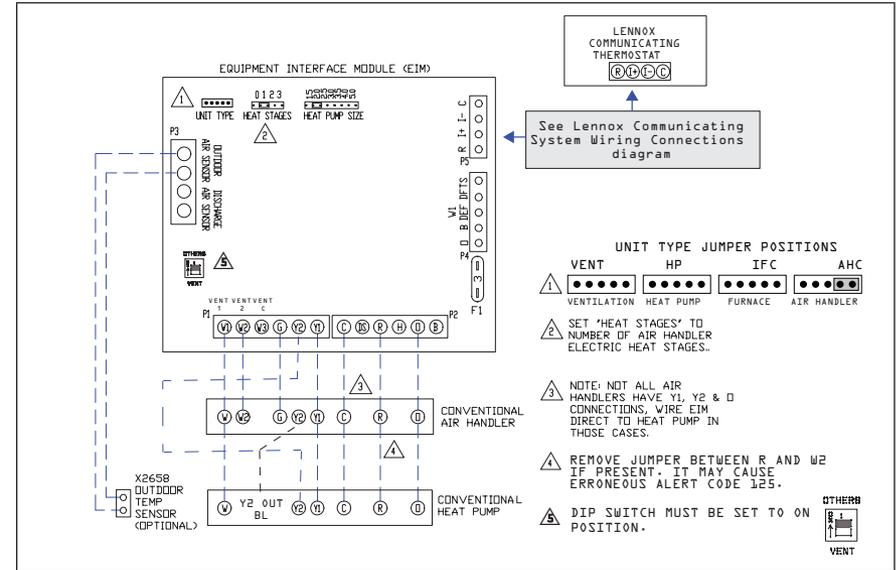


Figure 17. Conventional Air Handler with Conventional Heat Pump (1 or 2-Stage)

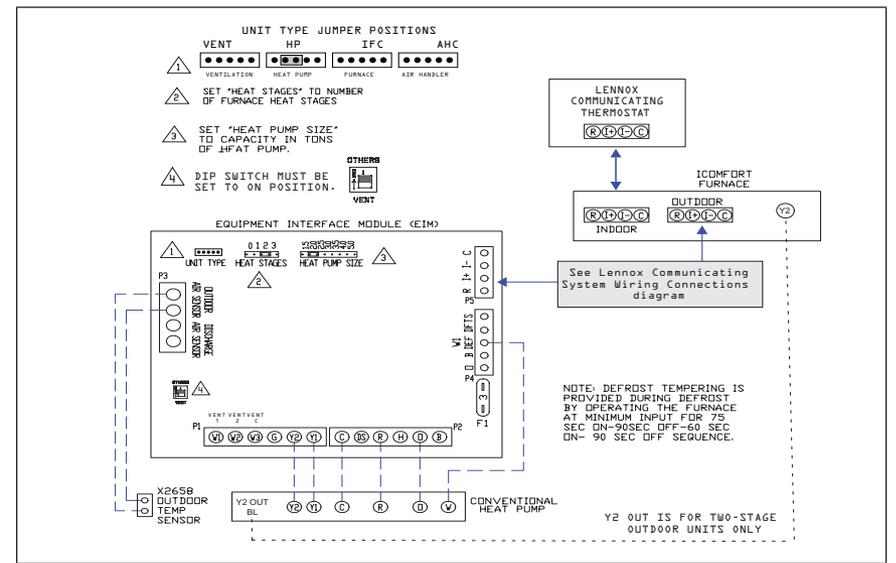


Figure 18. Dual-Fuel - Lennox Communicating Furnace with Conventional Heat Pump (1 or 2-Stage)

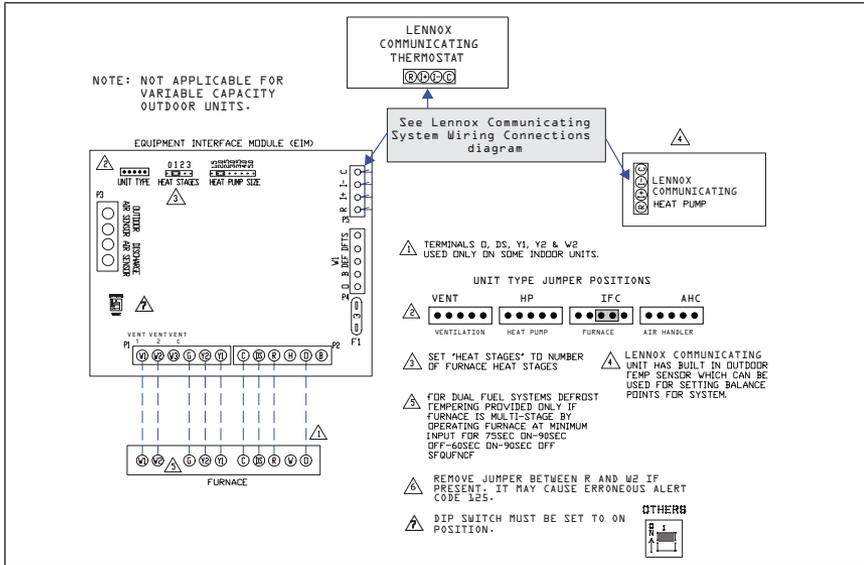


Figure 19. Dual-Fuel - Conventional Furnace with Lennox Communicating Heat Pump (1 or 2-Stage)

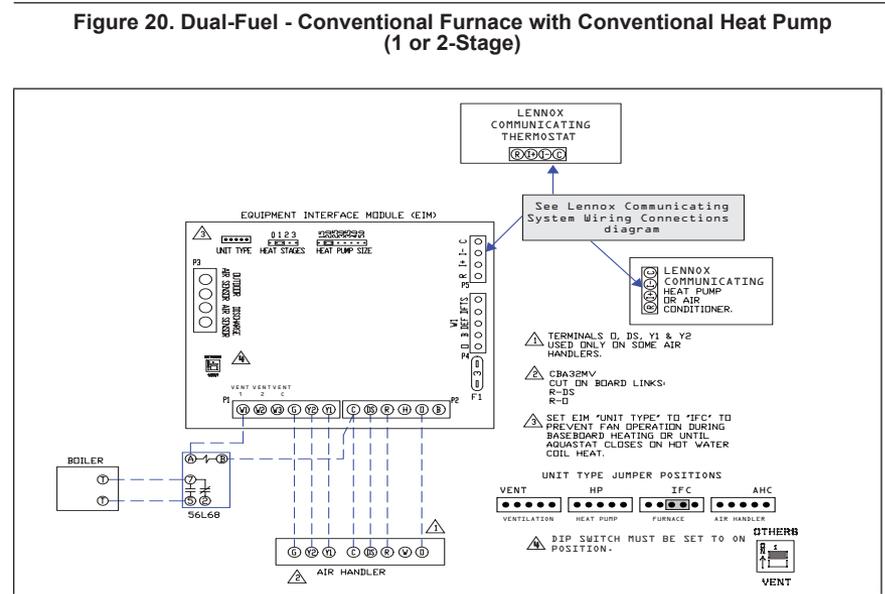
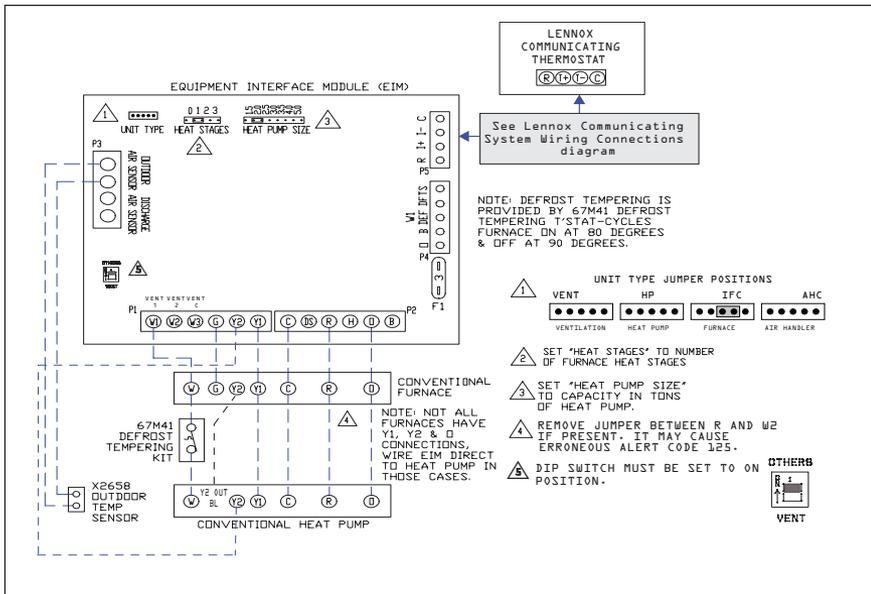


Figure 21. Hot Water or Baseboard Heat - Conventional or Communicating Air Handler in Non-Communicating Setup with either a Lennox Communicating AC Conditioner or HP





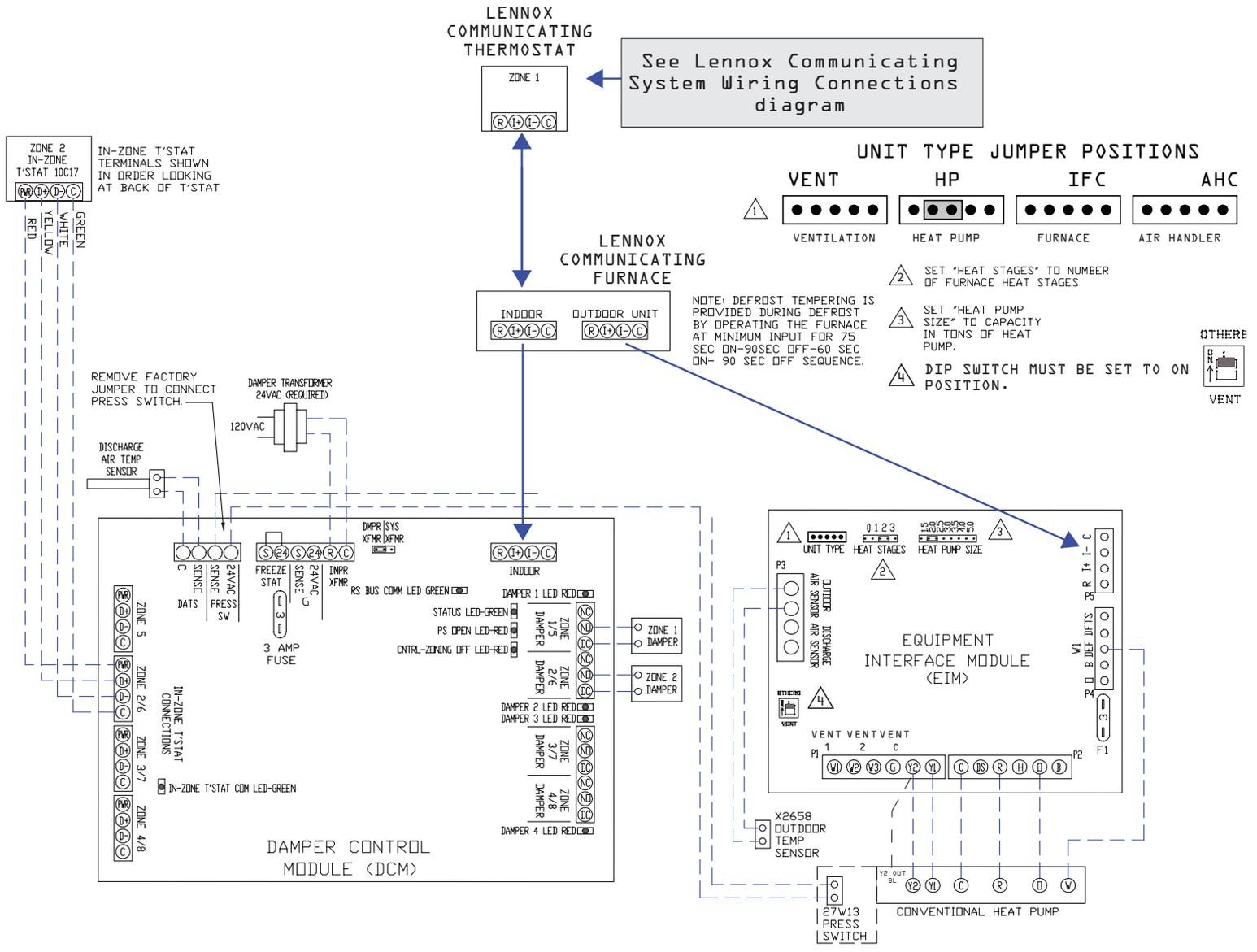
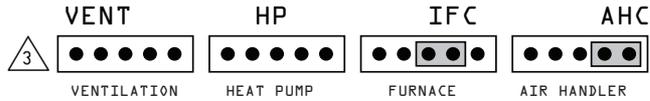


Figure 23. Dual-Fuel - Lennox Communicating Furnace, Smart Zoning and Conventional Heat Pump

### UNIT TYPE JUMPER POSITIONS



SET UNIT TYPE TO EITHER IFC OR AHC

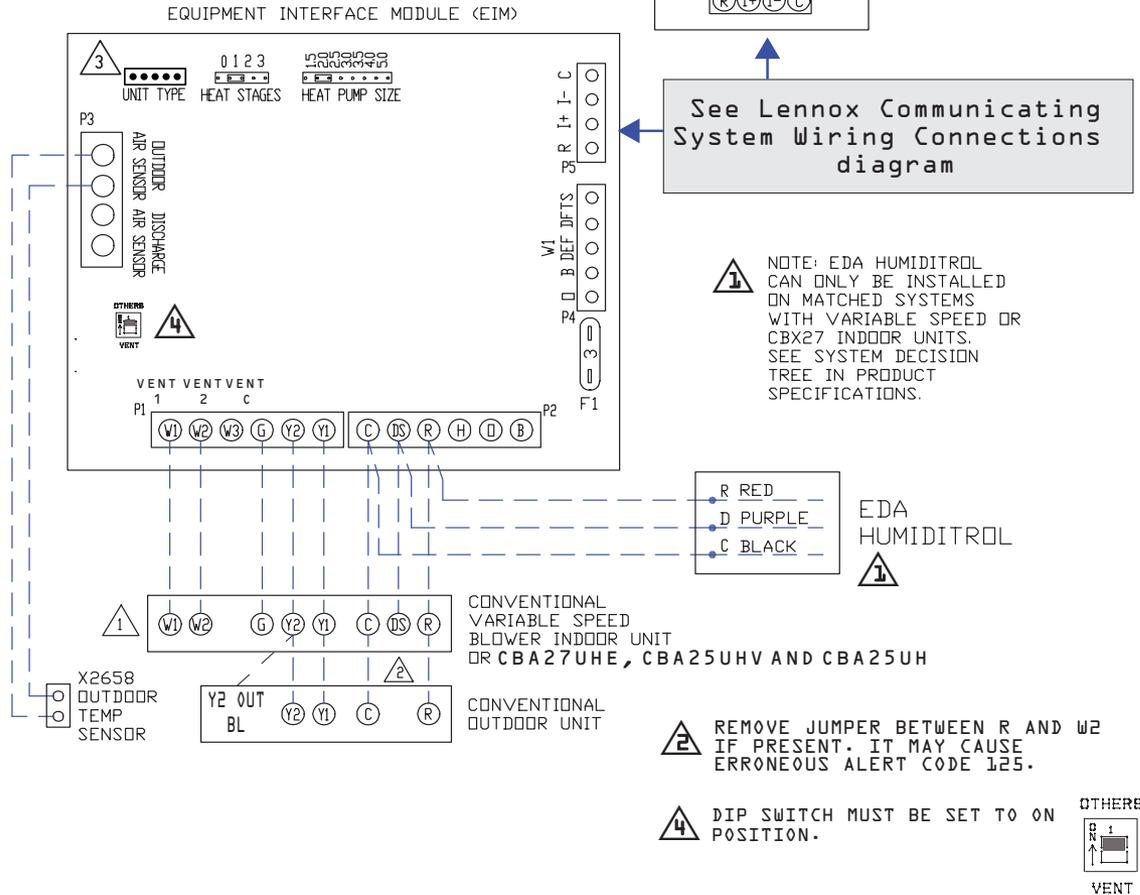


Figure 24. Conventional Indoor and Outdoor Units (EDA Humiditrol)

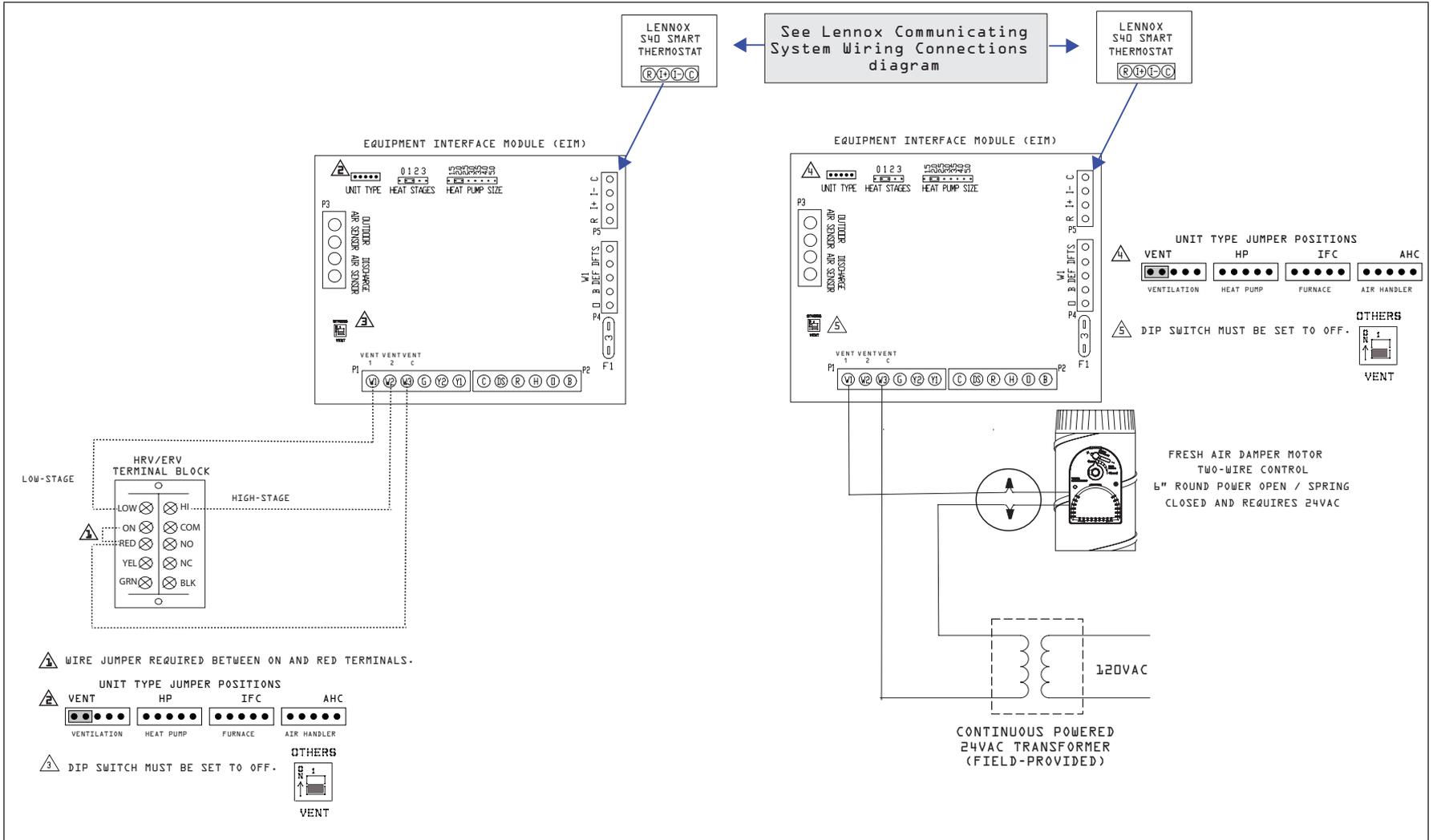


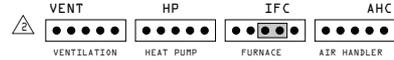
Figure 25. Lennox S40 Smart Thermostat, EIM and Ventilation (ERV/HRV or Fresh Air Damper) -

NOTE: NOT APPLICABLE FOR VARIABLE CAPACITY OUTDOOR UNITS.

### EIM 1 Settings

⚠ TERMINALS O, DS, Y1, Y2 & W2 USED ONLY ON SOME INDOOR UNITS.

#### UNIT TYPE JUMPER POSITIONS



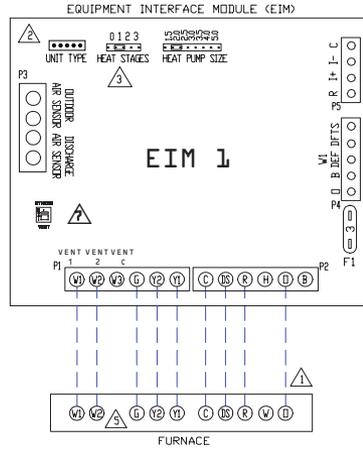
⚠ SET 'HEAT STAGES' TO NUMBER OF FURNACE HEAT STAGES

⚠ ICOMFORT ENABLED OUTDOOR UNIT HAS BUILT IN OUTDOOR TEMP SENSOR WHICH CAN BE USED FOR SETTING BALANCE POINTS FOR SYSTEM.

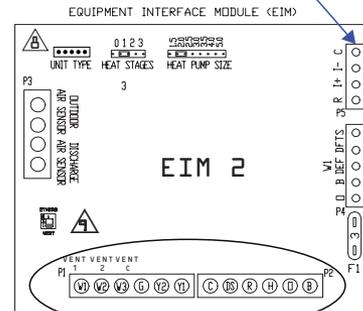
⚠ FOR DUAL FUEL SYSTEMS DEFROST TEMPERING PROVIDED ONLY IF FURNACE IS MULTI-STAGE BY OPERATING FURNACE AT MINIMUM INPUT FOR 75SEC ON-90SEC OFF-60SEC ON-90SEC OFF SF0UFNCF

⚠ REMOVE JUMPER BETWEEN R AND W2 IF PRESENT. IT MAY CAUSE ERRONEOUS ALERT CODE 125.

⚠ DIP SWITCH MUST BE SET TO ON POSITION.

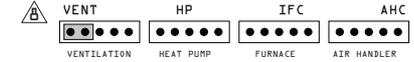


See Lennox Communicating System Wiring Connections diagram

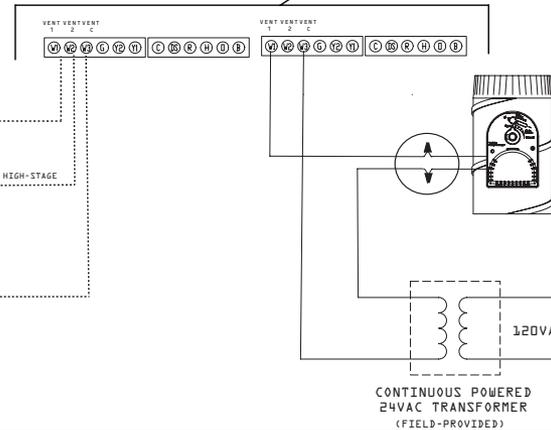


### EIM 2 Settings

#### UNIT TYPE JUMPER POSITIONS



⚠ DIP SWITCH MUST BE SET TO VENT (OFF) POSITION FOR HRV/ERV OR FRESH AIR DAMPER OPERATIONS.



FRESH AIR DAMPER MOTOR  
TWO-WIRE CONTROL  
L" ROUND POWER OPEN / SPRING  
CLOSED AND REQUIRES 24VAC

CONTINUOUS POWERED  
24VAC TRANSFORMER  
(FIELD-PROVIDED)

Figure 26. Lennox S40 Smart Thermostat, EIM, Non-communicating Furnace, Communicating Heat Pump and Ventilation (ERV/HRV or Fresh Air Damper)

## Alert Codes and Troubleshooting

### Alert Code Types

To expand a specification notification to access a more detail description of the alert code, press the down arrow to expand the description.

- **Service Urgent** alerts are displayed on Home (user) screen under the homeowner and installer alert buttons. **Service Urgent** means that a service call is needed to get the system running.
- **Service Soon / Service Urgent** means that the system will likely recover on its own and no interaction is necessary. Typically, either after a specific timer period or a specific number of instances, some **Service Soon** alerts will escalate to **Service Urgent**.
- **Service Soon** alerts are found only in under the installer alert button.
- **Information Only-Dealer** is information only and helps Lennox interpret test results and understand complicated behaviors. **Information Only** are not reported to homeowner or dealer.

Communication System: When communication controls are operating in a communication system, all jumper and link setting on controls are ignored. Jumpers and link setting are treated as defaults and would only be active if the system was converted to a non-communicating system.

Error codes are transmitted to the thermostat. No codes are stored in the EIM.

## IMPORTANT

The following applies to ventilation operations only with the EIM and will not generate a thermostat alert code. This condition will cause a service urgent type condition and stop all cooling and heating operations.

- The HRV continuously running when connected to EIM
- Check VENT/OTHERS DIP switch and move it to OFF (VENT) position.
- Automatically clears after power recycled.

## Alert Codes

**Table 1. EIM Alert Codes and Troubleshooting**

GF= Gas Furnace, AH=Air Handler, ID=Indoor unit (GF or AH), HP=Heat Pump, AC=Air Conditioner, OD=Outdoor Unit (AC or HP), PA=Pure Air S, ZA=Zone system and TS=Thermostat

Alert Code	Priority Condition	Actual Displayed Alert Text Under dealer control center > Notifications	Component or System Operational State and Troubleshooting Tip	How to clear alert code
10	Service Urgent	Unknown Device Detected	<p>The thermostat when NOT in configuration mode has detected an unknown device. Typically the thermostat will send a command to the unknown device and place the device into a soft disable state. The soft disable control will indicate so as follows:</p> <ul style="list-style-type: none"> <li>• On air handler, furnace and outdoor controls, the soft-disabled state is displayed by double horizontal lines on seven-segment display.</li> <li>• On the damper control module, the green LED will flash 3 seconds on and 1 second off.</li> <li>• On the equipment interface module, the green LED will flash 3 seconds on and 1 second off.</li> <li>• A new communicating device has been added to the system since the original configuration setup was completed.</li> <li>• Go to <b>menu &gt; settings &gt; advanced settings &gt; view dealer control center &gt; equipment</b> and press <b>reset all equipment</b>. This will allow the system to auto-detect any Lennox communicating devices attached.</li> </ul>	Clear alert code by reconfiguring the system.
12	Service Urgent	Indoor Unit Not Detected	<p>Thermostat did not find an indoor unit. Make sure there is an Lennox communicating indoor unit on the system.</p> <ul style="list-style-type: none"> <li>• Check for voltage and missing component.</li> <li>• Check <b>R</b>, <b>i+</b>, <b>i-</b> and <b>C</b> connections at mag-mount or subbase, smart hub and all attached communicating components.</li> <li>• Ohm wires for electrical continuity.</li> <li>• Cycle power to both indoor unit first and then thermostat.</li> <li>• Verify that equipment interface module (if applicable) is configured as either an air handler or furnace when used with a non-communicating indoor unit.</li> <li>• Go to <b>menu &gt; settings &gt; advanced settings &gt; view dealer control center &gt; equipment</b> and press <b>reset all equipment</b>. This will allow the system to auto-detect any Lennox communicating components attached.</li> <li>• Replace indoor unit control if there is no response.</li> </ul>	Automatically clears when the system detects that the issue no longer exists.

**Table 1. EIM Alert Codes and Troubleshooting**

GF= Gas Furnace, AH=Air Handler, ID=Indoor unit (GF or AH), HP=Heat Pump, AC=Air Conditioner, OD=Outdoor Unit (AC or HP), PA=Pure Air S, ZA=Zone system and TS=Thermostat

Alert Code	Priority Condition	Actual Displayed Alert Text Under dealer control center > Notifications	Component or System Operational State and Troubleshooting Tip	How to clear alert code
105	Service Urgent	Communication Problem	<p>Low voltage wiring between one of the systems components has been compromised. The System component (device) is unable to communicate.</p> <ul style="list-style-type: none"> <li>• <b>S40 - Open Dealer Service Center</b> - Select the notification icon, select <b>All</b>, review alert code details to determine which device's low voltage wiring is experiencing a communication issue. Review both active and cleared alerts.</li> <li>• <b>Lennox Smart Technician or iComfort Dealer Setup APP</b> - Select the Notifications icon, select <b>All</b>, review alert code details to determine which device's low voltage wiring has the communication problem. Review both active cleared</li> <li>• <b>S30</b> - Access dealer control center, select notifications icon, review alert code details to determine which device or unit has the communication problem. Review both active and cleared alerts.</li> <li>• <b>iComfort Wi-Fi</b> – Press and hold the Lennox logo on the bottom right of stat for 5 seconds to access the dealer control center. Follow the prompts to access the dealer / installer screen and select the "Alerts" tab. Review alert code details to determine which device or unit has the communication problem. Review both active and cleared alerts.</li> <li>• <b>Smart Zoning</b> - Remove wire from smart hub to Lennox Smart Zoning control and just have wiring from furnace.</li> </ul> <p><b>Step 1 Troubleshooting:</b></p> <p><b>In most issues can be resolved by taking the following actions:</b></p> <ul style="list-style-type: none"> <li>• Make sure all unused wires are tied together and taken back to the <b>C</b> terminal on the indoor board as shown in the installation and setup guide. See "Figure 15. Minimizing Electrical Noise" on page 14 for illustration on how to bundle unused wires.</li> <li>• Check for loose terminal connections on components (devices). Lennox recommends using a slotted screwdriver with a 3/32" (2.4 mm) tip.</li> <li>• Check for incorrectly wired or poorly spliced connections between components.</li> <li>• Verify that low voltage going to system components has been separated from high voltage wiring in wall, ceiling, &amp; floor cavities.</li> <li>• Check for proper grounding on the line voltage and low voltage wiring, transformer, and equipment.</li> </ul> <p>If Alert Code 105 is still present after performing the actions listed above proceed to <b>Step 2: Troubleshooting.</b></p> <p><b>Step 2 Troubleshooting:</b></p> <ul style="list-style-type: none"> <li>• Disconnect all wiring to other components (except S40 thermostat and indoor unit) and reconnect one device at a time. Recommission system each time a device is added until wiring issue has been located.</li> <li>• Zoning: If a zoning system has been installed and is wired directly from the thermostat to the zoning control then disconnect wiring and run control wiring from the zoning control directly to the indoor unit control. Wiring diagrams are provided in the Lennox Smart Zoning Installation and Setup Guide.</li> </ul>	Automatically clears when the system detects the issue no longer exists.

**Table 1. EIM Alert Codes and Troubleshooting**

GF= Gas Furnace, AH=Air Handler, ID=Indoor unit (GF or AH), HP=Heat Pump, AC=Air Conditioner, OD=Outdoor Unit (AC or HP), PA=Pure Air S, ZA=Zone system and TS=Thermostat

Alert Code	Priority Condition	Actual Displayed Alert Text Under dealer control center > Notifications	Component or System Operational State and Troubleshooting Tip	How to clear alert code
105	Service Urgent	Communication Problem	<ul style="list-style-type: none"> <li>• Float Switch: When using a float switch, use an isolation relay between the dedicated float switch terminals as shown in “Figure 13. Lennox Communicating System Wiring Connections” on page 13 . For testing purposes, remove float switch from circuit.</li> <li>• Inductive voltage from surrounding sources. Check each wire in AC mode to <b>C</b> on circuit board.               <ul style="list-style-type: none"> <li>&gt; Good voltage is .03-.3VAC inductive voltage is not an issue.</li> <li>&gt; Acceptable can be up to .7VAC with moderate success.</li> <li>&gt; Some units have worked with up to 1.2VAC with occasional success.</li> <li>&gt; Voltage over 1.2VAC needs to be addressed.</li> </ul> </li> </ul> <p>If Alert Code 105 is still present after performing the actions listed above proceed to <b>Step 3: Troubleshooting</b>.</p> <p><b>Step 3 Troubleshooting:</b></p> <p>New low voltage wiring will need to be ran to the system components. There are 2 options for replacing low voltage wiring:</p> <ul style="list-style-type: none"> <li>• <b>OPTION 2</b> - Utilizing 18/2 AWG for wires going to 24VAC (<b>R</b> and <b>C</b>) terminals and 18 or 22/2 AWG shielded wires going communicating terminals (i+ and i-).</li> <li>• <b>OPTION 3</b> - Utilizing two separate 18/2 AWG unshielded wires. One set wire to 24 VAC terminals (<b>R</b> and <b>C</b>) and one set to communicating terminals (i+ and i-).</li> <li>• See “Communicating Wiring Diagrams” on page 13 for Option 2 and 3 wiring diagrams.</li> </ul>	Automatically clears when the system detects the issue no longer exists.

**Table 1. EIM Alert Codes and Troubleshooting**

GF= Gas Furnace, AH=Air Handler, ID=Indoor unit (GF or AH), HP=Heat Pump, AC=Air Conditioner, OD=Outdoor Unit (AC or HP), PA=Pure Air S, ZA=Zone system and TS=Thermostat

Alert Code	Priority Condition	Actual Displayed Alert Text Under dealer control center > Notifications	Component or System Operational State and Troubleshooting Tip	How to clear alert code
114	Service Soon/Service Urgent	AC Line Frequency / Distortion Prob	<p>In most cases the errors will have something to do with the transformer(s) phasing, input power or output loading (amperage load). For the air handler control only, alert code 114 is generated only if the measured line frequency is below 57Hz or above 63Hz and remains out of range for 10 consecutive seconds. We count power line cycles and determine line frequency every 1 second of time based on the processor's quartz crystal oscillator. We have a fair amount of filtering on when we consider a power line cycle to have occurred, so there would have to be really bad distortion for it to count an extra cycle or miss a real cycle.</p> <p>Voltage low enough to miss a cycle would generate an alert code 115. There are lots of events, such as power utility substation switching, that could occasionally make our power line frequency off by one count. These are rare one-time events and I don't know anything other than a generator with bad frequency that could cause problems long enough to cause this alert code.</p> <p>There is a frequency / distortion problem with the power to a specific system component. This alert code may indicate transformer overloading.</p> <ul style="list-style-type: none"> <li>• Check the voltage and line power frequency.</li> <li>• Check the generator operating frequency, if the system is running on back-up power.</li> <li>• Correct voltage and frequency problems.</li> <li>• System will resume normal operation five seconds after fault recovered.</li> <li>• All applicable system component outputs are disabled – service soon condition.</li> <li>• After 10 minutes, the priority condition is escalated – service urgent condition.</li> <li>• Damper control module will operate in central mode only until proper voltage is restored or frequency distortion is resolved – moderate condition.</li> <li>• If connected to iHarmony, set damper control module transformer jumper to system transformer. Check for proper wiring. Replace 40VAC furnace transformer with 70VAC transformer. Re-commission system.</li> </ul> <p><b>NOTE:</b> <i>The unitary control (outdoor unit control board) whether it is a single, two-stage or multi-stage control is not displaying alert code 114.</i></p>	
115	Service Soon	Low Secondary (24VAC) Voltage	<p>24VAC power to a system component control is lower than the required range of 18 to 30VAC.</p> <ul style="list-style-type: none"> <li>• Check and correct voltage.</li> <li>• Check for additional power-robbing system components (devices) connected to system.</li> <li>• This alert code may require the installation of an additional or larger VA transformer.</li> <li>• Damper control module will operate in non-zone mode until proper voltage is restored.</li> </ul>	Automatically clears when the system detects the issue no longer exists.

**Table 1. EIM Alert Codes and Troubleshooting**

GF= Gas Furnace, AH=Air Handler, ID=Indoor unit (GF or AH), HP=Heat Pump, AC=Air Conditioner, OD=Outdoor Unit (AC or HP), PA=Pure Air S, ZA=Zone system and TS=Thermostat

Alert Code	Priority Condition	Actual Displayed Alert Text Under dealer control center > Notifications	Component or System Operational State and Troubleshooting Tip	How to clear alert code
120	Service Soon	Unresponsive Device	<p>There is a delay in the system component responding to the system. Typically this alert code does not cause any operational issues and will clear on its own.</p> <ul style="list-style-type: none"> <li>• This alert code is usually caused by a delay in the outdoor unit responding to the thermostat.</li> <li>• Leaking voltage from strands within the bundle.               <ul style="list-style-type: none"> <li>&gt; Land only the <b>R</b> wire on the <b>R</b> terminal to load the bundle with 24VAC.                   <ul style="list-style-type: none"> <li>▶ Typically only the <b>R</b> wire needs to be landed to identify if voltage is leaking.</li> <li>▶ If voltage is present checking the other wires is informational only but not needed.</li> <li>▶ If voltage is not present checking the other wires one at a time would be needed.</li> </ul> </li> <li>&gt; Check each loose wire in AC mode to <b>C</b> on circuit board.                   <ul style="list-style-type: none"> <li>▶ Good voltage is .03 -.3VAC leaking voltage is not the issue.</li> <li>▶ Acceptable can be up to .7VAC with moderate success.</li> <li>▶ Some units have worked with up to 1.2VAC with occasional success.</li> <li>▶ Voltage over 1.2VAC needs to be addressed.</li> </ul> </li> </ul> </li> </ul>	Automatically clears after an unresponsive system component (device) responds to any inquiry.
124	Information Only – Dealer	Equipment Lost Communications	<p>The thermostat has lost communication with a system component for more than three minutes. System component has lost communication with the thermostat.</p> <ul style="list-style-type: none"> <li>• Check the wiring connections between components.</li> <li>• Ohm wires.</li> <li>• Cycle power.</li> <li>• Any component that is miss-wired may cause a false component code to be shown on system component.</li> <li>• Disconnect all wiring to other system components and check communication one at a time.</li> </ul> <p><b>NOTE:</b> <i>When using a float switch, use isolation relay to break common wire to outdoor unit. For testing purposes, remove float switch from the circuit</i></p> <p>This alert code stops all associated system operations and waits for a heartbeat message from the system component that is not communicating.</p>	Automatically clears after communication is re-established with applicable system component (device).

**Table 1. EIM Alert Codes and Troubleshooting**

GF= Gas Furnace, AH=Air Handler, ID=Indoor unit (GF or AH), HP=Heat Pump, AC=Air Conditioner, OD=Outdoor Unit (AC or HP), PA=Pure Air S, ZA=Zone system and TS=Thermostat

Alert Code	Priority Condition	Actual Displayed Alert Text Under dealer control center > Notifications	Component or System Operational State and Troubleshooting Tip	How to clear alert code
125	Service Urgent	Control Hardware Problem	<p>There is a hardware problem on a system component control. There is a control hardware problem.</p> <ul style="list-style-type: none"> <li>In system using iHarmony zoning, the system will remain in non-zone mode (all dampers open) for five minutes after priority condition no longer exist.</li> <li>In systems using a Equipment Interface Module, remove jumper if present on indoor unit between <b>R</b> and <b>W2</b>.</li> <li>In systems using a PureAir S, the pure air control board jumper selector is missing.</li> </ul> <p>If none of the above tips are applicable, then replace the control if the problem prevents operation and is persistent.</p>	Automatically clears five minutes after the issue no longer exists.
132	Service Urgent	Device Control Software Fault	<p>System component control software is corrupted.</p> <ul style="list-style-type: none"> <li>Recycle power.</li> <li>If failure re-occurs, replace the system component control.</li> </ul>	Manual system power reset is required to recover from this alert code.
180	Service Soon	Outdoor Temperature Sensor Problem	<p>The thermostat has found a problem with the outdoor temperature sensor. In normal operation after system component control recognizes sensors, the alert code will be sent if valid temperature reading is lost.</p> <ul style="list-style-type: none"> <li>Compare outdoor sensor resistance to temperature / resistance charts in unit installation instructions. Replace sensors pack if necessary.</li> <li>At the beginning of (any) configuration, furnace, air-handler control or equipment interface module will detect the presence of the sensor(s).</li> <li>If detected (reading in range), appropriate feature will be set as 'installed' and shown in the 'About' screen.</li> </ul>	Automatically clears upon configuration, or sensing normal values.
310	Service Soon	Discharge Air Temp Sensor Problem	<p>There is a discharge air temperature sensor issue.</p> <ul style="list-style-type: none"> <li>Confirm there is no short or open circuits in the Lennox communicating thermostat connections to any of the other components in the communication system.</li> <li>Compare discharge air temperature sensor (DATS) resistance to temperature / resistance charts in system component installation instruction.</li> <li>Replace discharge air sensor if necessary.</li> </ul> <p><b>NOTE:</b> Issues with a DATS connected to a damper control module or equipment interface model will not generate an alert code.</p>	Automatically clears 30 seconds after condition is detected as recovered or after system restart.

**Table 1. EIM Alert Codes and Troubleshooting**

GF= Gas Furnace, AH=Air Handler, ID=Indoor unit (GF or AH), HP=Heat Pump, AC=Air Conditioner, OD=Outdoor Unit (AC or HP), PA=Pure Air S, ZA=Zone system and TS=Thermostat

Alert Code	Priority Condition	Actual Displayed Alert Text Under dealer control center > Notifications	Component or System Operational State and Troubleshooting Tip	How to clear alert code
345	Service Urgent	Relay O Failure	<p>The <b>O</b> relay on the system component has failed. Either the pilot relay contacts did not close or the relay coil did not energize.</p> <ul style="list-style-type: none"> <li>• Possible <b>O</b> relay / stage 1 failure.</li> <li>• Pilot relay contacts did not close or the relay coil did not energize.</li> <li>• Replace system component (device) control.</li> </ul> <p>If error is applicable to the XC20, XC25, XP20 or XP25, the outdoor control will need to be replaced.</p>	Automatically clears after the fault recovered following reset.
347	Service Urgent	ID or EIM Relay Y1 Fault	<ul style="list-style-type: none"> <li>• Lennox communicating thermostat sends a <b>Y1</b> compressor demand to the indoor control requesting it to relay the demand to the outdoor unit.</li> <li>• The indoor unit communicating control will verify the presences of 24VAC between the <b>Y1</b> and <b>C</b> on its terminals. If it does not detects the presences 24VAC, it will trigger alert code 347.</li> </ul> <p>Possible cause for alert code 347 is <b>Y1</b> relay on the applicable system component has failed. Either the furnace pilot relay contacts did not close or the relay coil did not energize.</p> <ul style="list-style-type: none"> <li>• System operation will stop.</li> <li>• Possible <b>Y1</b> relay / stage 1 failure.</li> <li>• Furnace pilot relay contacts did not close or the relay coil did not energize.</li> </ul> <p><b>NOTE:</b> <i>There is no input back to the applicable system component control.</i></p>	Automatically clears after reset and <b>Y1</b> input sensed.
380	Service Soon / Service Urgent	EIM Interlock Relay Fault	<p><b>Interlock relay failure (furnace or air handler modes only).</b></p> <ul style="list-style-type: none"> <li>• Interlock relay is energized, but input is not sensed after three seconds.</li> <li>• There will be no heating or cooling due to this alert code – service soon condition.</li> <li>• De-energize interlock relay and energize after five minutes if demand is still present – service urgent condition.</li> </ul>	Automatically clears after fault recovered.
			<p><b>Mis-match VENT/OTHERS DIP Switch.</b></p> <p>Example: The unit type jumper is set to AHC, IFC or HP and VENT/OTHERS DIP switch is set to OFF (VENT). The VENT/OTHERS DIP switch needs to be changed to ON (OTHERS).</p> <p>When there is a settings mis-match, the following condition will occur:</p> <ul style="list-style-type: none"> <li>• There will not be heating and cooling due to service urgent condition.</li> <li>• System will energize after 5 minutes if demand is still present.</li> </ul>	Clears after cycling power to the EIM.
381	Service Soon / Service Urgent	EIM Interlock Relay Stuck	<p>Interlock relay stuck (furnace or air handler modes only).</p> <ul style="list-style-type: none"> <li>• Interlock relay continuously sensed (with relay off).</li> <li>• There is no heating and cooling operation – service soon condition.</li> <li>• After 10 minutes if event still exist it will be escalated to priority condition service urgent.</li> </ul>	Automatically clears 30 seconds after fault clears.

**Table 1. EIM Alert Codes and Troubleshooting**

GF= Gas Furnace, AH=Air Handler, ID=Indoor unit (GF or AH), HP=Heat Pump, AC=Air Conditioner, OD=Outdoor Unit (AC or HP), PA=Pure Air S, ZA=Zone system and TS=Thermostat

Alert Code	Priority Condition	Actual Displayed Alert Text Under dealer control center > Notifications	Component or System Operational State and Troubleshooting Tip	How to clear alert code
382	Service Urgent	EIM Relay W1 Fault	Relay <b>W1</b> failure (furnace or air handler modes only). <b>W1</b> relay is energized but input is not sensed after three seconds.	Automatically clears when W1 relay input is sensed.
418	Service Soon	OD EIM W Output Hardware Fault	<p>There is a faulty <b>W</b> output circuit.</p> <ul style="list-style-type: none"> <li>• <b>W</b> terminal is energized while in cooling mode.</li> <li>• Possible cause may be a stuck closed relay on the control, or something external to the control that is energizing <b>W</b> terminal when it should not be energized.</li> <li>• Disconnect any wiring from the <b>W</b> terminal.</li> <li>• If 24VAC is still present on the terminal, then it is a stuck relay.</li> <li>• If 24VAC disappears, then there is a need to check any of the wires hooked up to the <b>W</b> terminal.</li> </ul>	Automatically clears after fault signal is removed.
419	Service Urgent	OD EIM W Output Hardware Fault Lockout	<p>The <b>W</b> output has reported more than five errors.</p> <ul style="list-style-type: none"> <li>• The system will shut down the outdoor unit.</li> <li>• The <b>W</b> output (alert code 418) on the outdoor unit has reported more than five strikes.</li> <li>• Disconnect thermostat wire from <b>W</b> and verify there is no 24VAC on the <b>W</b>.</li> <li>• If 24VAC is present, replace the outdoor control.</li> </ul>	Automatically clears after power recycled.
420	Service Soon	AH EIM Defrost Out Of Cycle	<p>The heat pump defrost cycle has taken more than 20 minutes to complete.</p> <ul style="list-style-type: none"> <li>• Defrost cycle lasts longer than 20 minutes.</li> <li>• Check heat pump operation.</li> <li>• This is applicable only in communicating indoor unit with non-communicating heat pump.</li> </ul>	Automatically clears when <b>W1</b> signal is removed.
421	Service Urgent	OD EIM W External Miswire Fault	The <b>W</b> output terminal on the outdoor unit is not wired correctly. Voltage sensed on <b>W</b> output terminal when <b>Y1</b> out is deactivated.	Automatically clears once voltage is not sensed on output or power is cycled.
--	Service Soon	--	Possible loose or mis-wired connections or two zone sensors are assigned the same zone number. Two dashes will be displayed on the S30 thermostat for indoor temperature and/or zone sensor. The system will go into central mode. Individual zone functions is disabled. Anytime the zone sensor loses communication with the damper control module, the entire system will go into central mode. If two sensors are assigned the same zone number, this could result in the double dashes to appear as well.	If two zone sensors are assigned the same zone number, this could cause the double dashes to appear. If loose or mis-wired connection was confirmed, correct the issue and run the re-configuration procedure.

## Applications (Ventilation and Zoning)

### ERV/HRV Applications

Please refer to 507363-0x ERV/HRV Installation Instructions and Homeowner Guide for application requirements.

This equipment is designed to provide fresh air while exhausting an equal amount of stale air.

The Lennox S40 thermostat ventilation function is only a turn on - turn off feature. All CFMs must be adjusted from the HRV/ERV unit. The ventilation function can be controlled by outdoor temperatures and by timers in the thermostat. The ventilation feature can also control 1 and 2 stages of ventilation operation.

Thermostat ventilation CFM parameters are to be adjusted only after the HRV/ERV set up is completed and the CFMs are known. Once the thermostat's CFMs are adjusted they are used with the thermostat's timer algorithm to determine how long to run the HRV/ERV and to change from low to high speed if a 2-stage HRV/ERVs.

#### **Energy Recovery Ventilator (ERV)**

The ERV unit is equipped with an enthalpic core. This device is designed for use in warm, humid climates with heavy air conditioning loads. The ERV unit transfers both sensible (temperature) and latent (moisture) heat from incoming fresh air to the stale air as it is being exhausted; thus, reducing the air conditioning load.

#### **Heat Recovery Ventilator (HRV)**

The HRV unit is equipped with an aluminum core. The device uses the stale air that is being exhausted to condition the fresh air as it is being brought in.

Lennox models are all non-communicating equipment and can be added during the commissioning procedure.

Parameter settings and descriptions are listed in "Thermostat Ventilation Parameters" on page 33. The table below list which parameters are available for the Fresh Air Damper, ERV and HRV equipment.

### Fresh Air Damper Application

The fresh air damper is powered by a field-provided 24VAC transformer. Fresh air dampers typically require 6 to 12VA each depending on fresh air damper manufacturer being used. The fresh air damper transformer must have an adequate VA rating.

**NOTE:** A 6" Round Ventilation Damper (Normally Closed/Power Open) 24V 6W can be ordered using catalog number X4152.

**NOTE:** A 40VA transformer can be ordered from Lennox using catalog number 10P17.

This option is used to control a damper connecting outside air to the return plenum of the system. When a fresh air damper style of ventilation is added to the system, and ventilation is required, the ventilation demand is serviced by energizing one relay to close or open the relay contacts connected to the fresh air damper and commanding the blower to run at a rate of at least the continuous fan speed.

The parameter Fresh Air Damper Ventilation CFM represents the CFM of the air drawn through the fresh air damper while the system runs the indoor blower at the continuous fan speed for non-zoned systems, and the lowest zone CFM (continuous fan, heating, or cooling) for zoned applications. All calculations used to determine the ventilation volume requirement and the amount of ventilation air delivered use this number regardless of the actual fan speed.

#### **Operation of Fresh Air Dampers with Environmental Overrides**

- When the Non-ASHRAE Compliant mode is selected (Timed), the system first checks for the outdoor temperature and dew point to be within the set parameter range before allowing ventilation to occur.
- When the ventilation changes states (on/off) due to an environmental override, it will remain in that state for a minimum of 10 minutes before again changing states due to an environmental override.
- Operation is otherwise the same as the ASHRAE compliant method.

### Ventilation Zoning Application

- When ventilation is demanded in zoned applications without conditioning calls, the fresh air damper will open and the blower will run at the lowest set zone CFM referred to above.
- Ventilation while a zone is being conditioned is serviced simply by opening the fresh air damper while the zone system conditions the zone.

- The system keeps track of the amount of ventilation delivered in the same manner as any single speed HRV or ERV.
- When the time required to satisfy the ventilation time requirement using the fresh air damper ventilation rate is greater than or equal to the time remaining in the ventilation time block, then ventilation is initiated and continues until the ventilation time requirement is satisfied.

### **Ventilation Control Modes**

Thermostat ventilation CFM parameters are to be adjusted only after the HRV/ERV set up is completed and the CFMs are known. Once the thermostat's CFMs are adjusted they are used with the thermostat's timer algorithm to determine how long to run the HRV/ERV and to change from low to high speed if a 2-stage HRV/ERVs.

**Table 10. Ventilation Control Modes**

Ventilation Control Mode	Fresh Air Damper	1 Speed HRV	2 Speed HRV	1 Speed ERV	2 Speed ERV
<b>Timed</b>					
Ventilation Minutes Per Hour (0 to 60 min., default is 20 min.)	X	X	X	X	X
Ventilation Rate (20 to 500 cfm, default is 130 cfm) (Shown only for single speed ERV or HRV)	X	X		X	
Ventilation Rate for Low Speed (10 to 200 cfm, default is 50 cfm) (Shown only for two speed ERV or HRV)			X		X
Ventilation Rate for High Speed (20 to 500 cfm, default is 130 cfm) (Shown only for two speed ERV or HRV)			X		X
Ventilation High Outdoor Temperature Limit (60 to 115°F, default is 100°F)	X	X	X	X	X
Ventilation Low Outdoor Temperature Limit (-20 to 55°F, default is 0°F)	X	X	X	X	X
Ventilation High Outdoor Dew Point Limit (45 to 80°F, default is 55°F)	X	X	X	X	X

**ASHRAE (62.2)**

**NOTE:** In this mode the thermostat can assist the installer by validating the ventilation CFMs are capable of meeting the ASHRAE required ventilation volumes, but the thermostat has no ability to control CFM from the HRV/ERV.

**Table 10. Ventilation Control Modes**

Ventilation Control Mode	Fresh Air Damper	1 Speed HRV	2 Speed HRV	1 Speed ERV	2 Speed ERV
Ventilation Rate (20 to 500 cfm, default is 130 cfm)	X	X		X	
Ventilation Rate for Low Speed (10 to 200 cfm, default is 50 cfm)			X		X
Ventilation Rate for High Speed (20 to 500 cfm, default is 130 cfm)			X		X
ASHRAE Compliance Check	NO	YES	YES	YES	YES
ASHRAE Infiltration Credit (0 to 200 cfm, default is 0 cfm)	X	X	X	X	X
ASHRAE House Floor Area Serviced by this Ventilator	X	X	X	X	X
ASHRAE Number of Bedrooms	X	X	X	X	X
<b>Ventilation Outdoor Condition Override - Enabled</b>					
Ventilation High Outdoor Temperature Limit (60 to 115°F, default is 100°F)	X	X	X	X	X
Ventilation Low Outdoor Temperature Limit (-20 to 55°F, default is 0°F)	X	X	X	X	X
Ventilation High Outdoor Dew Point Limit (45 to 80°F, default is 55°F)	X	X	X	X	X

## Thermostat Ventilation Parameters

**Table 11. S40 Thermostat Ventilation Parameters**

Parameter (In alphabetical order)	Description
<b>Ventilation Rates</b>	
Thermostat ventilation CFM parameters are to be adjusted only after the HRV/ERV set up is completed and the CFMs are known. Once the thermostat's CFMs are adjusted they are used with the thermostat's timer algorithm to determine how long to run the HRV/ERV and to change from low to high speed if a 2-stage HRV/ERVs.	
<b>Ventilation Rate</b> (Only listed for 1-speed ERV or HRV)	Parameter range is 20 - 500 CFM. Default is 130 CFM. Can be adjusted in increments of 1.0 CFM.
<b>Ventilation Rate for Low Speed</b> (Only listed for 2-speed ERV or HRV)	Parameter range is 10 - 200 CFM. Default is 50 CFM. Can be adjusted in increments of 1.0 CFM.
<b>Ventilation Rate for High Speed</b> (Only listed for 2-speed ERV or HRV)	Parameter range is 20 - 500 CFM. Default is 130 CFM. Can be adjusted in increments of 1.0 CFM.
<b>Ventilation High Outdoor Temperature Limit</b>	Parameter range is 60 to 115°F. Default is 100°F. Can be adjusted in increments of 5°F. While the outdoor temperature is equal to or higher than the setting for <b>Ventilation High Outdoor Temperature Limit</b> , ventilation does not run. When locked out due to high outdoor temperature, it will become unlocked when either the outdoor temperature is missing, or when the temperature reported is 1°F less than the <b>Ventilation High Outdoor Temperature Limit</b> setting when display units are in Fahrenheit, or is reported as 0.5°C less than lock out setting when the display units are Celsius.
<b>Ventilation Low Outdoor Temperature Limit</b>	Parameter range is -20 to 55°F. Default is 0°F. Can be adjusted in increments of 5°F. While the outdoor temperature is lower than the setting for the <b>Ventilation Low Outdoor Temperature Limit</b> , ventilation does not run. When locked out due to low outdoor temperature, it will become unlocked when the outdoor temperature is missing, or when the temperature reported is 1°F higher than the <b>Ventilation Low Outdoor Temperature Limit</b> setting when display units are Fahrenheit, or is reported as 0.5°C higher than lock out setting when the display units are Celsius
<b>Ventilation High Outdoor Dew Point Limit</b>	Parameter range is 45 to 80°F. Default is 55°F. Can be adjusted in increments of 5°F. While the outdoor dew point is higher than the setting for the high outdoor dew point limit, ventilation does not run. When locked out due to high outdoor dew point limit, it will become unlocked when the outdoor dew point is missing, or when the dew point temperature reported is 1°F less than the lock out setting when display units are Fahrenheit, or is reported as 0.5°C less than lock out setting when the display units are Celsius.

**Table 11. S40 Thermostat Ventilation Parameters**

Parameter (In alphabetical order)	Description
<b>Ventilation Control Mode - ASHRAE</b>	
<ul style="list-style-type: none"> <li>In this mode the thermostat can assist the installer by validating the ventilation CFMs are capable of meeting the ASHRAE required ventilation volumes, but the thermostat has no ability to control CFM from the HRV/ERV.</li> <li>The system first tries to satisfy the ventilation volume by only ventilating while conditioning is occurring. Continuous fan is not considered conditioning.</li> <li>The total volume of ventilation air is accumulated and stored to compare against the target hourly ventilation volume (Vhr). The accumulated value resets each hour.</li> <li>When the remaining required volume of ventilation air for the hour divided by the fan only ventilation rate is equal to or greater than the time remaining to ventilate for the hour and no conditioning is occurring, the system begins ventilation using continuous fan and does not stop until the target hourly ventilation volume requirement is satisfied.</li> <li>When ventilating without a conditioning demand, the ventilation output is active as well a continuous indoor fan demand.</li> <li>When ventilating with a conditioning demand, the ventilation output is active with the conditioning demand outputs.</li> <li>When the system is ventilating, the user interface can indicate as such by showing “ventilating” to the user on the home screen.</li> </ul>	
<b>Ventilation Rates</b>	
<b>Thermostat ventilation CFM parameters are to be adjusted only after the HRV/ERV set up is completed and the CFMs are known. Once the thermostat’s CFMs are adjusted they are used with the thermostat’s timer algorithm to determine how long to run the HRV/ERV and to change from low to high speed if a 2-stage HRV/ERVs.</b>	
<b>Ventilation Rate (Only listed for 1-speed ERV or HRV)</b>	Parameter range is 20 - 500 CFM. Default is 130 CFM. Can be adjusted in increments of 1.0 CFM.
<b>Ventilation Rate for Low Speed (Only listed for 2-speed ERV or HR)</b>	Parameter range is 10 - 200 CFM. Default is 50 CFM. Can be adjusted in increments of 1.0 CFM.
<b>Ventilation Rate for High Speed (Only listed for 2-speed ERV or HRV)</b>	Parameter range is 20 - 500 CFM. Default is 130 CFM. Can be adjusted in increments of 1.0 CFM.
<b>Ventilation Outdoor Condition Override</b>	Options are Disabled (default) or Enabled.
<b>ASHRAE Compliance Check</b>	= NO (Ventilation CFM too low to comply with ASHRAE 62.2) or = YES (Current settings comply with ASHRAE 62.2)
<b>ASHRAE Infiltration Credit</b>	Parameter range is 0.0 - 200.0 CFM. Default is 0 CFM. Can be adjusted in increments of 1.0 CFM.
<b>ASHRAE House Floor Area Serviced by This Ventilator</b>	Parameter range is 500.0 - 5000.0 square feet. Default is 2500.0 CFM. Can be adjusted in increments of 100.0 square feet. The formula for calculating how much ventilation is required is: $\text{(Total square footage of the home/100)} + \text{(number of bedrooms+1)} \times 7.5 \text{ cfm}$
<b>ASHRAE Number of Bedrooms</b>	Parameter range is 1.0 - 10.0. Default is 3.0. Can be adjusted in increments of 1.0.
<b>Fresh Air Damper Ventilation CFM</b>	Parameter range is 20 - 250 CFM. Default is 75 CFM. Can be adjusted in increments of 1.0.CFM

**Table 11. S40 Thermostat Ventilation Parameters**

Parameter <i>(In alphabetical order)</i>	Description
<b>Ventilation Outdoor Condition Override - Enabled</b>	
<b>Ventilation High Outdoor Temperature Limit</b>	<p>Parameter range is 60 to 115°F. Default is 100°F. Can be adjusted in increments of 5°F.</p> <p>While the outdoor temperature is equal to or higher than the setting for <b>Ventilation High Outdoor Temperature Limit</b>, ventilation does not run. When locked out due to high outdoor temperature, it will become unlocked when either the outdoor temperature is missing, or when the temperature reported is 1°F less than the <b>Ventilation High Outdoor Temperature Limit</b> setting when display units are in Fahrenheit, or is reported as 0.5°C less than lock out setting when the display units are Celsius.</p>
<b>Ventilation Low Outdoor Temperature Limit</b>	<p>Parameter range is -20 to 55°F. Default is 0°F. Can be adjusted in increments of 5°F.</p> <p>While the outdoor temperature is lower than the setting for the <b>Ventilation Low Outdoor Temperature Limit</b>, ventilation does not run. When locked out due to low outdoor temperature, it will become unlocked when the outdoor temperature is missing, or when the temperature reported is 1°F higher than the <b>Ventilation Low Outdoor Temperature Limit</b> setting when display units are Fahrenheit, or is reported as 0.5°C higher than lock out setting when the display units are Celsius.</p>
<b>Ventilation High Outdoor Dew Point Limit</b>	<p>Parameter range is 45 to 80°F. Default is 55°F. Can be adjusted in increments of 5°F.</p> <p>While the outdoor dew point is higher than the setting for the high outdoor dew point limit, ventilation does not run. When locked out due to high outdoor dew point limit, it will become unlocked when the outdoor dew point is missing, or when the dew point temperature reported is 1°F less than the lock out setting when display units are Fahrenheit, or is reported as 0.5°C less than lock out setting when the display units are Celsius.</p>

