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TEMPERATURE /  
RELATIVE HUMIDITY  
SENSOR  
CATALOG # 21L07



TEMPERATURE /  
RELATIVE HUMIDITY  
SENSOR WITH DISPLAY  
CATALOG # 21L08



WIRELESS REPEATER  
CATALOG # 21L09

## INSTALLATION INSTRUCTIONS FOR WIRED/ WIRELESS SENSORS AND REPEATER KITS

11/23



508163-02

## Table of Contents

<b>Acronym List</b> .....	<b>3</b>
<b>Shipping and Packing List</b> .....	<b>3</b>
<b>Overview</b> .....	<b>4</b>
<i>M4/W4 Wireless Gateway System</i> .....	4
<i>Wireless/Wired Temperature / Relative Humidity Sensor (21L07)</i> .....	4
<i>Wireless Temperature / Relative Humidity Sensor With Display (21L08)</i> .....	5
<i>Wireless Repeater (21L09)</i> .....	5
<i>Lennox® CORE Service Application (for adding Sensors and Repeaters)</i> .....	5
<b>Sensors</b> .....	<b>6</b>
<i>Wireless Sensor Configuration</i> .....	7
<i>Sensor – Power Options (21L07 &amp; 21L08)</i> .....	7
<i>Sensor – S-BUS Wired Installation Setup</i> .....	8
<i>Sensor – Wiring Troubleshooting</i> .....	15
<i>Sensor – Wireless Installation Setup</i> .....	16
<i>Sensor – Placement and Confirming Location (Test Mode Procedure)</i> .....	19
<i>Sensor – Wireless Checkout / Troubleshooting</i> .....	20
<i>Sensor – Signal Strength Alert Indication</i> .....	20
<i>Sensor – Low Battery Indication</i> .....	20
<i>Sensor – After Hour Override (AHO)</i> .....	20
<i>Sensor – Data Verification</i> .....	21
<i>Sensor – Network Removal and Reset</i> .....	21

<b>Sensor with Display Features (21L08 Only)</b> .....	<b>22</b>
<i>Sensor with Display – Temperature Setpoint Adjustment</i> .....	22
<i>Sensor with Display – Occupancy Override</i> .....	23
<i>Sensor with Display – Sleep Mode</i> .....	24
<i>Sensor with Display – Communication Loss</i> .....	25
<i>Sensor with Display – Maintenance Mode</i> .....	25
<b>Repeater (21L09)</b> .....	<b>29</b>
<i>Repeater – 24VAC (Line Power)</i> .....	29
<i>Repeater – Wireless Installation Setup</i> .....	29
<i>Repeater – Signal Strength Alert Indication</i> .....	30
<i>Repeater – Placement and Confirming Location (Test Mode Procedure)</i> .....	30
<i>Repeater – Network Removal and Reset</i> .....	31
<b>Repeater and Sensor Placement Requirements</b> ...	<b>32</b>
<b>FCC Compliance Statement</b> .....	<b>35</b>
<b>FCC RF Exposure Information</b> .....	<b>35</b>

## Acronym List

<b>AHO</b>	After Hour Override	<b>M4</b>	CORE Unit Controller
<b>AWG</b>	American Wire Gauge	<b>MAC</b>	Media Access Control
<b>BAS</b>	Building Automation System	<b>NCP</b>	Network Control Panel
<b>BLE</b>	Bluetooth Low Energy	<b>RH</b>	Relative Heat
<b>CO2</b>	Carbon Dioxide	<b>RSSI</b>	Received Signal Strength Indicator
<b>CSP</b>	Cooling Setpoint	<b>RTU</b>	Rooftop Unit
<b>FCC RF</b>	Federal Communications Commission Radio Frequency	<b>SBus</b>	Software Blocking Unblocking Sending
<b>HSP</b>	Heating Setpoint	<b>SMS</b>	Sheet Metal Screw
<b>IMC</b>	Integrated Modular Control	<b>TAR</b>	Temperature Adjust Range
<b>LED</b>	Light-emitting Diode	<b>TMP</b>	Temperature
<b>M2</b>	Prodigy Unit Controller	<b>VAC</b>	Volts Alternating Current
<b>M3</b>	Prodigy Unit Controller	<b>W4</b>	Wireless Control

## Shipping and Packing List

The temperature sensors (21L07 & 21L08) and wireless repeater (21L09) are sold separately.

### **Wireless/Wired Temperature / Relative Humidity Sensor (21L07) 106924-01 & Wireless/Wired Temperature / Relative Humidity Sensor with Display (21L08) 107511-01**

Package 1 of 1 contains:

- 1 - Wireless Sensor
- 4 - AA Lithium Batteries
- 2 - Wall Anchors
- 2 - Screw #6 X 1.25 SMS
- 1 - Warranty and Installation Instruction

### **Wireless Repeater (21L09) 106926-01**

Package 1 of 1 contains:

- 1 - Wireless Repeater
- 2 - Wall Anchors
- 2 - Screw #6 X 1.25 SMS
- 1 - Warranty and Installation Instruction

## Overview

The wireless system employs the following components:

- M4/W4 Wireless Gateway System (see page 4)
- Temperature / Relative Humidity Sensor (21L07) (see page 4)
- Temperature / Relative Humidity Sensor With Display (21L08) (see page 5)
- Wireless Repeater (21L09) (see page 5)

### M4/W4 WIRELESS GATEWAY SYSTEM

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- Plenum-rated Bluetooth Low Energy (BLE) antenna, which assists in boosting the signal from to Lennox CORE Unit Controller to:
  - » CORE Service App
  - » Wireless room sensors (wireless mode)
  - » Wireless repeaters
- Efficient design allows for use in vertical and horizontal applications

- Return air mounted antenna reduces signal loss from roof and connected to gateway system via coax cable

### WIRELESS/WIRED TEMPERATURE / RELATIVE HUMIDITY SENSOR (21L07)

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- TMP / RH / After Hours Override
- Unit powered by either 24VAC (line power) or four (4) AA batteries. Batteries are provided, but not installed. AA Lithium batteries provide a battery life greater than two years.

**NOTE:** *Lennox® suggests allowing a 45-minute acclimation period on 24VAC-powered sensors on temperature readings.*

**NOTE:** *Battery life greater than two years is subject to the sensor operating under good signal coverage. If the signal is weak or the RTU is off for long periods, the signal strength LED illuminates and the battery will be depleted.*

- Wireless or S-BUS
- Locking Captive Screw
- Up to five sensors can be used per rooftop unit

## WIRELESS TEMPERATURE / RELATIVE HUMIDITY SENSOR WITH DISPLAY (21L08)

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- TMP / RH / After Hours Override
- Adjustment of setpoints and occupancy in both manual and scheduled rooftop unit configurations
- Unit powered by either 24VAC (line power) or four (4) AA batteries

**NOTE:** *Batteries are provided, but not installed. AA Lithium batteries provide a battery life greater than two years.*

- Wireless or S-BUS
- Locking Captive Screw
- One display sensor (21L08) can be used per rooftop unit with up to four non-display sensors (21L07)
- Displays rooftop unit connectivity and alert status information
- Displays TMP / RH / After Hours Override status information

## WIRELESS REPEATER (21L09)

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- Used to repeat and extend communication
- Increases effective range
- Up to five repeaters can be used per rooftop unit
- Powered by external 24VAC (line power) only
- Used in wireless application only
- Locking Captive Screw

## LENNOX® CORE SERVICE APPLICATION (FOR ADDING SENSORS AND REPEATERS)

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- Connects to the Lennox® CORE Unit Controller
- Pairs with a simple button press (requires physical access)
- Used for installation of wireless sensors and repeaters, service, and maintenance of CORE controlled rooftop units
- Wireless operation of sensors are only compatible with CORE Unit Controller software version 09.01.0219 or higher

## Sensors

### 21L07

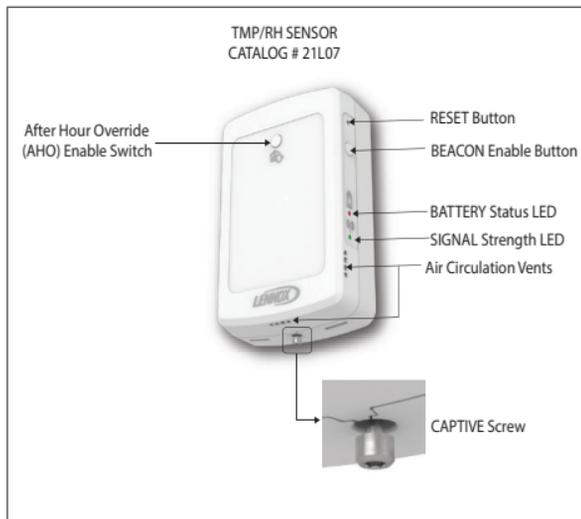


Figure 1. Wireless/Wired Sensor Buttons and Indicators

### 21L08

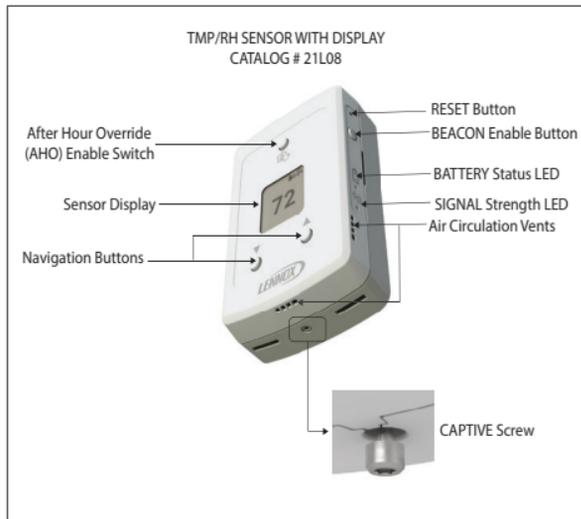


Figure 2. Wireless/Wired Sensor With Display Buttons and Indicators

## WIRELESS SENSOR CONFIGURATION

Changes to the switch settings will only take effect after a power reset. Remove 24VAC or battery power from the sensor after switch adjustments have taken place.

**NOTE:** Switch settings: 1 = ON; 0 = OFF.  
S1, Switch 6 determines the mode:

- 1 = Stand Alone or
- 0 = Network/BAS

See Figure 3 for an example.

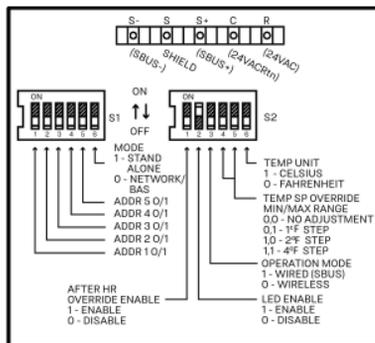


Figure 3. Wireless Sensor Configuration Label  
(Factory Default Settings)

See Figure 3 to set the following functions on the S2 bank.

- Temperature Unit (Celsius and Fahrenheit)
- Temperature Setpoint Override
- Operation Mode
- LED Enable

## SENSOR – POWER OPTIONS (21L07 & 21L08)

- **Battery Power:** The wireless sensor is powered by the four (4) AA Lithium batteries (included). The battery has an operational life of an estimated two (2) years.
- **Line Power:** The wireless sensor is powered by external line power (24VAC).

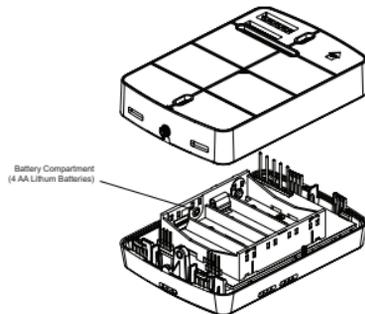


Figure 4. Wireless Sensor Battery Compartment

## SENSOR – S-BUS WIRED INSTALLATION SETUP

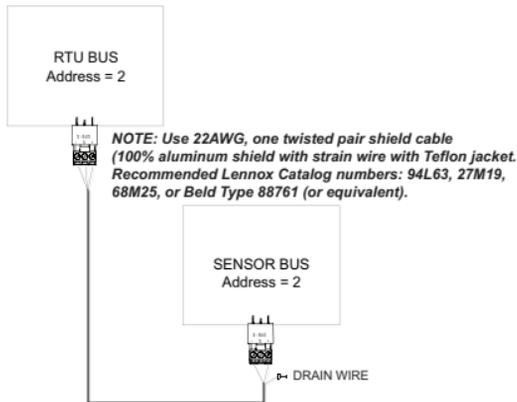
S-BUS connections can be used with M1-8 (IMC), M2, M3, and M4 Unit Controllers. The sensor can function in the following configurations:

- Wired Stand Alone - Functions independently with a controller. See page 8.
- NCP - Functions in a network with a Lennox Network Control Panel. See page 9.
- M3/M4 Unit Controllers ONLY - Functions in a network with a third-party BACnet controller. See page 12.

## SENSOR – WIRED STAND ALONE

Stand Alone operation consists of one (1) unit controller and one (1) sensor without a Building Automation System (BAS). See Figure 5 for a wiring example.

### SBUS OPERATION IN STANDALONE MODE



**NOTE:** Wireless sensor S-Bus address **MUST** match RTU S-Bus address.

**Figure 5. Wired Stand Alone**

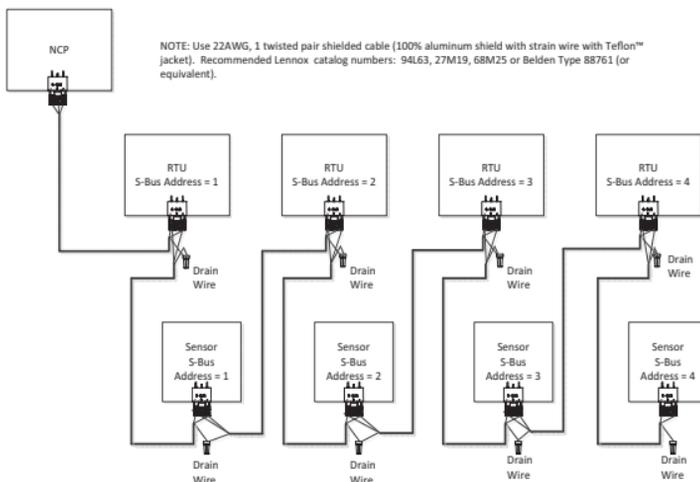
## SENSOR - NCP

Both sensors (21L07 & 21L08) are compatible with unit controllers participating in an NCP/L-Connection system. The 21L07 and 21L08 are compatible with the following unit controllers:

- M1-8
- M2
- M3
- M4

See Figure 6. NCP Wiring Configuration for a wiring example.

### S-BUS OPERATIONS WITH NETWORK CONTROL PANEL (NCP)



NOTE: Wireless Sensor S-Bus address MUST match RTU S-BUS address.

**Figure 6. NCP Wiring Configuration**

## SWITCH SETTINGS SETUP (STAND ALONE & NETWORK/BAS AND S-BUS)

Set the sensor configuration according to Figure 7 or Figure 8 (depending on the desired mode). Set the configuration prior to supplying power to the sensor.

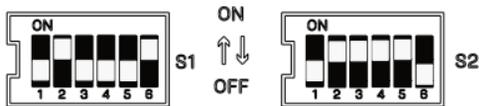


Figure 7. Stand Alone and S-BUS Settings

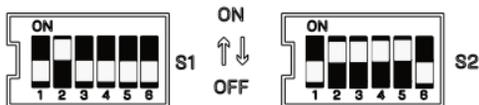


Figure 8. Network/BAS and S-BUS Settings

1. Set S1 (switches 1 through 5) for **S-BUS Address** to match the S-BUS address of the RTU. In operation with an NCP, each RTU must have a unique address.

**NOTE:** *Lennox M3/M4 Unit Controllers use a default S-BUS address of 2. If the sensor and unit controller are both configured to use address 2, there is*

*no need to go through S-BUS setup to change the unit S-BUS address.*

2. Set S1 (switch 6) for **Mode** to **ON** to enable **STAND ALONE** or **OFF** (factory default) for **NETWORK/BAS**.
3. Set S2 (switch 3) **Operation Mode** to **ON** for wired S-BUS mode.
4. Connect sensor and RTU controller using recommended wire (two conductor, twisted-pair, shielded, 22AWG). See Figure 6. NCP Wiring Configuration on page 9 for further details.

For setup with the **M4 Unit Controller**:

1. Download the CORE Service App.
2. Supply power to the sensor.
3. Using the CORE Service App, go to the **Rooftop Unit** menu and select **Network Integration** under **Setup**.
4. Select the **Network Setup Wizard**.
5. Select **S-BUS / Wireless Sensor** (beneath **Network Setup Wizard** and select **Next**.
6. Enter the **S-BUS Address** and select **Next**.
7. (Stand Alone) Select **Room Sensor** as the **Control Source** and press **Next**.
8. Select **CO2 sensor source** as **Local** or **None**.

9. Select **Relative Humidity Sensor Source** as **Network** and select **Next**.
10. Select **Temperature Sensor Source** as **Network** and select **Next**.
11. Set **Occupied Blower Mode** as **Auto cycling/Continuous** depending on the ventilation need and select **Next**.
12. Select **Backup Mode** as **None/Wired Thermostat/Return Air Backup** and select **Next**. The summary displays.
13. Select **Next** after verifying the displayed setting information.
14. Select **Finish**.

For setup with the **M3 Unit Controller**:

1. Navigate on the M3 Unit Controller screen to **Setup > Network Integration**.
2. Select **L-CONNECTION** and select **SAVE**.
3. Enter the S-BUS address and select **SAVE**.
4. Select the **Control Mode** as **Room Sensor** and select **SAVE**.
5. Select **CO2 network sensor source** as **NO** and select **SAVE**.
6. Select **Relative Humidity Network Source** as **YES** and select **SAVE**.
7. Select **Temperature Network Source** as

**YES** and select **SAVE**.

8. Set **Occupied Blower Mode** as **Auto Cycling/Auto-Continuous 1/2/3** and select **SAVE**.
9. Select **Backup Mode** as **None/Wired Thermostat/ Return Air Backup** and select **SAVE**.

**NOTE:** *Lennox® recommends selecting Backup Mode (Return Air Backup).*

10. Complete the wizard steps and return to the main menu.

For setup with the **M2/M1-8 Unit Controllers**:  
Refer to the application manual for these controllers. Setup will be similar to the M3 Unit Controller.

## SENSOR – OPERATION WITH BACNET NETWORK (M3/M4 ONLY)

Both sensors (21L07 and 21L08) are compatible with unit controllers participating in an BACnet Building Automation System (BAS). The 21L07 is **ONLY** compatible in this mode of operation with M3 and M4 Unit Controllers.

See Figure 9. BACnet Wiring Configuration for a wiring example.

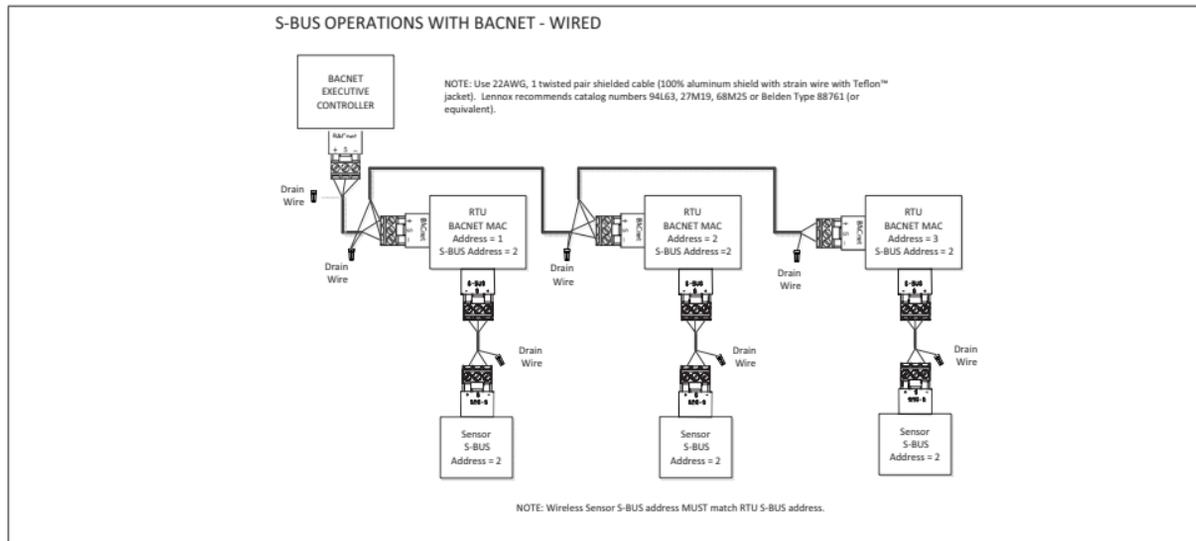


Figure 9. BACnet Wiring Configuration

## SWITCH SETTINGS SETUP (BACNET NETWORK M3/M4 ONLY)

The S1 and S2 switch settings must be set according to Figure 10 before power is supplied to the sensor.

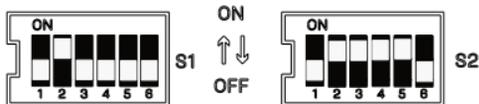


Figure 10. Network/BAS and S-BUS Settings

1. Set S1 (switches 1 through 5) for **S-BUS Address** to match the S-BUS address of the RTU. Each RTU must have a unique address.
2. Set S1 (switch 6) for **Mode** to **OFF** for **NETWORK/BAS**.
3. Set S2 (switch 3) **Operation Mode** to **ON** for **Wired S-BUS Mode**.
4. Set S2 (switch 4 and switch 5) to **ON**.
5. Set S2 (switch 6) to **OFF**.
6. Connect sensor and RTU controller using recommended wire (two conductor, twisted-pair, shielded, 22AWG). See Figure 9. BACnet Wiring Configuration on page 12 for a wiring example.

For setup with the **M4 Unit Controller**:

1. Download the CORE Service App.
2. Apply power to the sensor.
3. Using the CORE Service App, go to the Rooftop Unit menu and select **Network Integration** under **Setup**.
4. Select the **Network Setup Wizard**.
5. Select **BACnet** under **Network Setup Wizard** and select **Next**.
6. Enter the **BACnet MAC address**, **Device Instance**, and **BAUD RATE** and select **Next**.
7. Select the **Control Source** as **Room Sensor** and select **Next**.
8. Select **CO2 sensor source** as **Local** or **None**.
9. Select **Relative Humidity Sensor Source** as **SBUS / Wireless Sensor** and select **Next**.
10. Select **Temperature Sensor Source** as **S-BUS / Wireless Sensor** and select **Next**.
11. Set **Occupied Blower Mode** as **Auto Cycling/Auto-Continuous1/2/3** and select **Next**.
12. Select **Backup Mode** as **None/Wired Thermostat/ Return Air Backup** and select **Next**. The summary displays.

**NOTE:** Lennox® recommends setting a backup mode (Return Air Backup).

13. Select **Next** after checking the displayed setting information.
14. Select **Finish**.

For setup with the **M3 Unit Controller**:

1. Use the M3 Unit Controller and navigate on the screen to **Settings > RTU Options > Edit Parameter**.
2. Use the up arrow until the screen shows **DATA ID = 385** and select **SAVE**.
3. **Set ID 385** (BACnet and CS COEXIST) to **1** and select **SAVE**.
4. Navigate on the screen to **Setup > Network Integration**.
5. Select **L-CONNECTION** and select **SAVE**.
6. Enter the **S-BUS Address** and select **SAVE**. This should match the S-BUS address on switch S1 on the sensor.

**NOTE:** Lennox M3/M4 Unit Controllers use a default S-BUS address of 2. If the sensor and unit controller are both configured to use address 2, there is no need to go through S-BUS setup to change the unit S-BUS address.

7. Select the **Control Mode** as **Room Sensor** and select **SAVE**.
8. Select **CO2 network sensor source** as **NO** and select **SAVE**.
9. Select **Relative Humidity Network Source** as **YES** and select **SAVE**.
10. Select **Temperature Network Source** as **YES** and select **SAVE**.
11. Set **Occupied Blower Mode** as **Auto Cycling/Auto-Continuous1/2/3** and select **SAVE**.
12. Select **Backup Mode** as **None/Wired Thermostat/ Return Air Backup** and select **SAVE**.

**NOTE:** Lennox® recommends setting a backup mode (Return Air Backup).

13. Complete the wizard steps and return to the main menu.
14. Navigate to **Setup > Network Integration**.
15. Select **BACNET** and select **SAVE**.
16. Enter the **BACNET MAC ADDRESS** and **BAUD RATE**; select **SAVE**. The BACnet MAC address should be unique for each RTU. It does not have to match the S-BUS address.
17. Select the **Control Mode** as **Room Sensor** and select **SAVE**.

18. Select **CO2 network sensor source** as **NO** and select **SAVE**.
19. Select **Relative Humidity Network Source** as **YES** and select **SAVE**.
20. Select **Temperature Network Source** as **YES** and select **SAVE**.
21. Set **Occupied Blower Mode** as **Auto Cycling/Auto-Continuous1/2/3** and select **SAVE**.
22. Select **Backup Mode** as **None/Wired Thermostat/ Return Air Backup** and select **SAVE**.

**NOTE:** *Lennox® recommends setting a backup mode (Return Air Backup).*

23. Finish the wizard and return to the main menu.

## **SENSOR – WIRING TROUBLESHOOTING**

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1. Verify 24VAC is supplied to the sensor.
2. Check communication cable wiring.
3. Check the sensor data from the zone sensor.
  - For the M1 Unit Controller (IMC), use the **IMC MODE TEMP** switch to display the data.
  - For the M2 Unit Controller, use the **DATA > SENSORS** menu to display the data.
  - For the M3 Unit Controller, use the **DATA > IN/OUTPUT > SENSORS > NETWORK**.
  - For the M4 Unit Controller, use **DATA > SYSTEM DATA > SENSORS > OUTPUTS > NETWORK**.

## SENSOR – WIRELESS INSTALLATION SETUP

Wireless operation is **ONLY** compatible with an M4 Unit Controller. To commission a wireless sensor, the CORE Service App must be paired to the applicable RTU.

After the app is connected to the RTU and the sensor search process has begun (step 3), leave the range of the RTU and provision sensors in the space.

### IMPORTANT

It is recommended to add the sensors **PRIOR** to adding the repeaters. If this is not possible, discontinue power to the repeaters before adding the sensors.

1. Open the CORE Service App and navigate to **RTU Menu > Network Integration > Wireless Sensor Network Setup > Wireless Sensor Network**.

**NOTE:** *Provisioning the RTU is only required once. If you have already completed this step, proceed to step 3. Select Adding and wait for the adding process to complete.*

2. Click **Add node** on the Network Nodes screen. This triggers the CORE Service App to scan for new sensors or repeaters.
3. **Press and hold** the **Beacon** button for two (2) seconds. The **Beacon** button is found on the side of the wireless sensor.  
(For 21L08 models): **Press Beaconing Button** appears on the display.



(For 21L07 & 21L08 models): The MAC address of the wireless sensor becomes visible on the CORE Service App.

(For 21L08 model only): The MAC address of the wireless sensor becomes visible on the display.



**NOTE:** *The wireless sensor's MAC address can be verified by cross-checking the label affixed to the cover of the sensor.*

4. Name the sensor (optional). Otherwise, follow the prompts on the screen to finish the setup process.
5. Verify that the CORE Service App displays “Node Provisioned” on the Provision Sensor Network screen.

## IMPORTANT

**DO NOT** interrupt the adding process of the wireless sensors. If interrupted, the sensor will need to be factory-reset.

A maximum of five wireless sensors can be provisioned per RTU.

### SENSOR – WIRELESS STAND ALONE

#### 21L07

Stand Alone operation is a setup of one CORE Unit Controller with up to five wireless sensors without a Building Automation System (BAS).

#### 21L08

Stand Alone operation is a setup of one CORE Unit Controller, one sensor with display (21L08), and up to four optional wireless sensors (21L07).

When in Stand Alone mode, the Occupancy icon and the setpoint will display even if the sensor is not configured.

### PAIRING RESULTS

- *Success* – The display shows the name of the RTU (as configured in the CORE Service App prior to pairing) and will proceed to the home screen after five seconds.
- *Timeout Fail* – If the provisioning process never establishes a connection with an RTU, *Timeout Fail* displays after the beeping process times out.
- *Provisioning Fail* – If the RTU and display device starts the provisioning process, but fails (regardless of reason), *Provisioning Fail* displays.
- *Connecting Fail* – *Pairing with the RTU is successful, but subsequent communication is unsuccessful.*

### Troubleshooting Options

- Option 1: Reboot the RTU while keeping the sensor active. Rebooting the RTU forces the system to reattempt a connection to the wireless sensor.
- Option 2: Reboot the sensor (without a factory reset) and wait until the RTU attempts to connect to it. If the sensor and RTU are paired, the RTU will attempt to communicate with the device once every two minutes.

- Option 3: Perform a factory reset of the wireless sensor. Delete the sensor provisioning data from the RTU and restart the process.

### SWITCH SETTINGS SETUP (STAND ALONE AND BLE)

The S1 and S2 switch settings must be set according to Figure 11. Stand Alone and BLE Settings prior to supplying power to the sensor.

#### 21L07 and 21L08

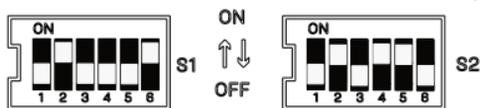


Figure 11. Stand Alone and BLE Settings

1. Set S1 (switch 6) **MODE** switch to **ON** to enable **STAND ALONE** operation.
2. Set S2 (switch 3) **OPERATION MODE** switch to **OFF** to enable wireless BLE operation.
3. Set S2 (switches 4 and 5) to **ON**.
4. Set S2 (switch 6) to **OFF**.
5. Download and launch the CORE Service App.
  - a. Go to the **Rooftop Unit** menu and select **Network Integration** beneath **Setup**.
  - b. Select **Network Setup Wizard**.
  - c. Select **S-BUS / Wireless Sensor** beneath **Network Setup Wizard** and select **Next**.
  - d. Leave the S-BUS address in its current setting and select **Next**.
  - e. Select the **Control Source** as **Room Sensor** and select **Next**.
  - f. Select **CO2 sensor source** as **Local** or **None**.
  - g. Select **Relative Humidity Sensor Source** as **Network** and select **Next**.
  - h. Select **Temperature Sensor Source** as **Network** and select **Next**.
  - i. Set **Occupied Blower Mode** as **Auto cycling/Continuous** (depending on the ventilation need) and select **Next**.
  - j. Select **Backup Mode** as **None/Wired Thermostat/Return Air Backup** and select **Next**. The summary displays.
  - k. Select **Next** after verifying the setting information.
  - l. Select **Finish**.

## SENSOR – PLACEMENT AND CONFIRMING LOCATION (TEST MODE PROCEDURE)

The wireless sensor has a test functionality to confirm whether sensor placement is within an acceptable range from the RTU.

To test the sensor placement:

1. Take the sensor to the desired installation location.
2. Press the **Beacon** button for seven (7) seconds and release.
3. Wait five (5) to 20 seconds for the test to complete.
4. Observe the battery LED status (battery powered units only). See Table 1. Sensor LED Descriptions for status explanations.

Table 1. Sensor LED Descriptions

Battery LED	Signal Indicator LED	Description
Slow Blink	Slowly blinks five (5) times	Battery LED slowly blinks until the boot sequence is complete.
Off	3 Blinks	Battery is good, and sensor is within range. Sensor is good to install.
Blinking for 10 seconds	3 Blinks	Sensor is within range, but battery power is low. Replace battery.

Table 1. Sensor LED Descriptions

Battery LED	Signal Indicator LED	Description
Blinking for 10 seconds	Solid for 10 seconds	Battery power is low, and sensor is out of range. Move sensor closer and replace batteries.
Off	Solid for 10 seconds	Battery is good, but sensor is not within range. Re-test or find a closer location.
Off	Off	Sensor does not have power. Power sensor and re-test.

### BLE SIGNAL STRENGTH RANGE:

- 0 to -50 dB is 4 bars (best RSSI)
- -51 to -65 dB is 3 bars
- -66 to -76 dB is 2 bars
- -77 to -87 dB is 1 bar
- -88 below is 0 bar

**NOTE:** *If the sensor is taken beyond the range of communication with the RTU and is not in Test Mode, the Signal Indicator LED will illuminate (though not immediately). Lennox® suggests relying solely upon the Test Mode procedure (listed above) when evaluating sensor placement.*

## SENSOR – WIRELESS CHECKOUT / TROUBLESHOOTING

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It may be necessary to verify whether the added wireless sensor is grouped and communicating with the rooftop unit.

The sensor data will display on the CORE Service App dashboard screen.

More details are available in the Sensor Menu: **(RTU Menu > Network Integration > Wireless Sensor Network Setup > Wireless Sensor Network)**.

Verify 24VAC / AA Battery Power is supplied to the sensor. Battery power can be used temporarily to confirm signal strength by moving sensor closer to unit / on roof.

**NOTE:** *Wireless range varies based on building construction.*

**NOTE:** *By default the LED indicators are set to ON (enabled).*

## SENSOR – SIGNAL STRENGTH ALERT INDICATION

---

After the wireless sensor is added successfully, it will communicate with the RTU. If the signal strength is weak, the Signal Strength LED indicator will be ON for 10 seconds.

## SENSOR – LOW BATTERY INDICATION

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The Battery LED will blink for 10 seconds when the battery voltage drops below 20%. An alarm will activate if the system is using an M4 Unit Controller.

## SENSOR – AFTER HOUR OVERRIDE (AHO)

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After Hour Override can be triggered by pressing the AHO button on a wireless sensor. The AHO event will notify the associated rooftop unit. The rooftop unit performs AHO based on its Network type selection. Refer to the unit controller manual to configure the duration of the After Hour Override.

**NOTE:** *After Hour Override is disabled by default. It can be enabled by setting S2, switch 1 to ON.*

The S2 switch settings must be set according to Figure 12 prior to supplying power to the sensor. Power cycle the sensor if it is already installed.

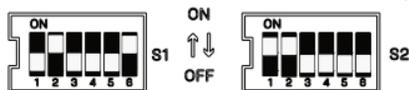


Figure 12. After Hour Override Enabled Setting

## SENSOR – DATA VERIFICATION

---

It may be required to verify whether the added wireless sensor is grouped and communicating with the rooftop unit.

The sensor data displays on the CORE Service App dashboard screen.

## SENSOR – NETWORK REMOVAL AND RESET

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### CORE SERVICE APP SENSOR REMOVAL

To remove the node (sensor) from the RTU:

1. Launch the CORE Service App and navigate to **RTU Menu > Network Integration > Wireless Sensor Network**.
2. Select the node (sensor) to remove.
3. Select **Remove Sensor** at the bottom of the screen. The screen **Remove Sensor** displays.
4. Select **Yes** to proceed.
5. Press and hold the **Beacon** button for two seconds to remove the node (sensor) from the BLE mesh network.
6. Enter the **Sensor Name** on this screen and select **Proceed**.

## IMPORTANT

Lennox® recommends performing a hard reset after removing the sensors from the network.

### SENSOR HARD RESET

To perform a sensor hard reset.

1. Press and hold both the **Beacon** and **Reset** buttons for 10 seconds.
2. Release the **Reset** button only.
3. Release the **Beacon** button two seconds later.

After performing the hard reset, the wireless sensor can be added to any other rooftop unit group or added back to the same rooftop unit network.

**NOTE:** *A factory reset deletes all wireless provisioning information. A factory reset will not affect the function of the system.*

## Sensor with Display Features (21L08 Only)

### SENSOR WITH DISPLAY – TEMPERATURE SETPOINT ADJUSTMENT

When changing the setpoints, the value being adjusted must fall within the setpoint adjustment range defined by the Temperature Adjust Range (TAR) DIP value and the DEADBAND value acquired from the rooftop unit.

The new setpoint value must stay within the range defined by the TAR value and the setpoints must be farther apart than the DEADBAND value.

If operating in a scheduled configuration (BACnet, NCP), attempting to adjust the setpoint will automatically request an override. The Wireless Sensor with Display (21L08) will return to the menu if the setpoint change request is denied by the rooftop unit.

### ADJUSTING TEMPERATURE SETPOINT

**NOTE:** Users can navigate the screens by pressing the Up or Down arrow button. The screens are set on a loop.

1. Press the **Up** or **Down** arrow button. The display presents HSP and CSP values with corresponding arrows.
2. Select either arrow and the corresponding mode displays. The figure below shows HSP as the preferred mode for this example.

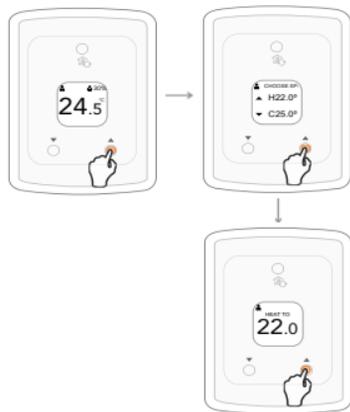


Figure 13. HSP CSP Selection

3. Press the **Up** or **Down** arrow button to find the desired temperature. The system returns to the main screen after the user reaches the desired setpoint or after five seconds of inactivity.

**NOTE:** *The new setpoint value must stay within the range defined by the TAR value, and the setpoints must be farther apart than the DEADBAND value.*

*If the user tries to set a temperature beyond the TAR range, the rooftop unit will deny the request and the screen will return to the Setpoint Adjust screen.*

### **SENSOR WITH DISPLAY – OCCUPANCY OVERRIDE**

The Occupancy status can be adjusted using the After Hour Override (AHO) button. The system's response depends on whether the system is configured for manual or scheduled operation.

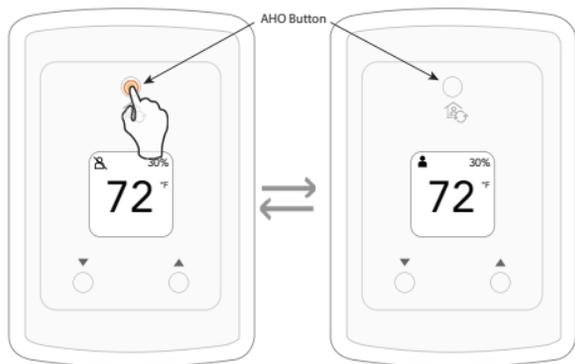
The AHO button is active only if the AHO DIP switch (S2, switch 1, AHO Enable) is set to **ON** to allow Occupancy Overrides.

### **MANUAL OPERATION**

While in Manual Operation, the user can press the AHO button to toggle the rooftop unit between Occupied and Unoccupied status.

The setpoints change according to the stored setpoint values on the device.

The  icon displays when the status is Occupied. The  icon displays when the system status is Unoccupied. See Figure 14 below.



**Figure 14. Unoccupied Vs. Occupied Status**

## SCHEDULED OPERATION

While in Scheduled Operation, the user can press the AHO button to activate a temporary Occupancy Override if the rooftop unit's schedule controller (BACnet or NCP) allows the override.

The AHO button is active only if the AHO DIP switch (S2, switch 1, AHO Enable) is set to **ON** to allow Occupancy Overrides.

If Occupancy Override is enabled, the override may remain or be prematurely terminated by the 21L08 by pressing the AHO button again to cancel the override. The Occupancy icon changes to a "timer" to indicate the override is temporary.

If Occupancy Override is disabled, the AHO button will be inactive.

## OVERRIDE EXPIRES

When the override expires, the rooftop unit schedule controller issues a command to the 21L08 to end the override.

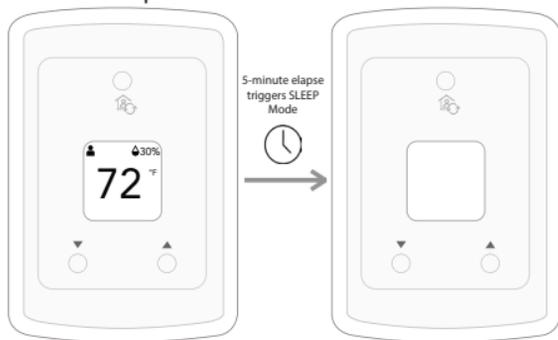
The 21L08 will reflect the change by reverting the occupancy to Occupied or Unoccupied depending on how the rooftop unit is scheduled to perform.

## SENSOR WITH DISPLAY – SLEEP MODE

The default setting for Sleep Mode in systems that are wired/S-BUS configurations is **OFF**.

For wireless system configurations, the default setting for Sleep Mode is **ON**.

The Sleep Mode feature engages after five (5) minutes of inactivity. The sensor's display appears blank and the device goes into a low-power state. The device continues to report temperature and RH data to the rooftop unit while in Sleep Mode.



**Figure 15. Sleep Mode Display**

One press of the **Up**, **Down**, or **AHO** button will wake the device from Sleep Mode.

**NOTE:** Sleep Mode can be enabled in line-powered operation. Sleep Mode is forced ON in wireless mode.

## **SENSOR WITH DISPLAY – COMMUNICATION LOSS**

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### **BACNET/NCP NETWORKS**

If there is a communication loss between the wireless sensor and the rooftop unit, the Alert icon  will display and the RSSI LED will be solid red.

### **STAND ALONE**

While in Stand Alone Mode, the occupancy icon remains in case of communication loss. In Scheduled Mode, the Occupancy icon will not display if there is a communication loss (both wired and wireless).

## **SBUS**

If there is a communication loss between the wireless sensor and the rooftop unit, the Alert icon  displays on the sensor's display.

## **SENSOR WITH DISPLAY – MAINTENANCE MODE**

---

To access the Maintenance Mode, users must press the Up and Down arrow buttons simultaneously for five (5) seconds.



**NOTE:** After five (5) seconds of inactivity, the screen returns to the main screen.

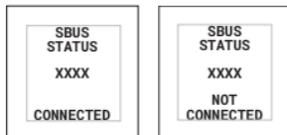
## ***SBUS (WIRED)***

Press the **Down** arrow button to navigate through the following screens:

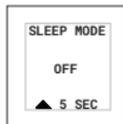
- **Alert Status.** Shows whether an active alert exists on the rooftop unit; will not show the alert number.



- **SBUS Connectivity Status.** Lists the SBUS address and connection status.

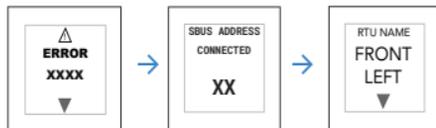


- **Sleep Mode.** Allows users to enable or disable the Sleep Mode feature.



## **ALERT STATUS**

1. Press the **Down** arrow button.
2. Press the down arrow button.  
The SBUS Address screen displays.
3. Press the down arrow.  
The RTU Name screen displays the RTU with the active alert.



## SBUS CONNECTIVITY STATUS

While in Maintenance Mode, press the **Down** arrow button until the SBUS Address screen displays. If the screen displays *Connected* the SBUS connectivity is uninterrupted. If the screen displays *Not Connected*, the SBUS connectivity has experienced an interruption.

## SLEEP MODE

1. (While in Maintenance Mode) Press the **Down** arrow button to navigate to the Sleep Mode screen.

**NOTE:** *The Sleep Mode is OFF by default.*

2. Press and hold the **Up** arrow button for five (5) seconds to enable Sleep Mode. To disable Sleep Mode, press and hold the **Up** arrow button for five (5) seconds.

## **WIRELESS**

Press the **Down** arrow button to navigate through the following screens:

- *Alert Status.* Shows whether an active alert exists on the rooftop unit; will not show the alert number. Users can consult the CORE Service App to learn the actual error.

- *Battery Level.* Displays how much battery life remains.
- *RSSI Signal Strength.* Indicates the strength of the wireless connection.
- *MAC Address.* Displays the sensors address.

## ALERT STATUS

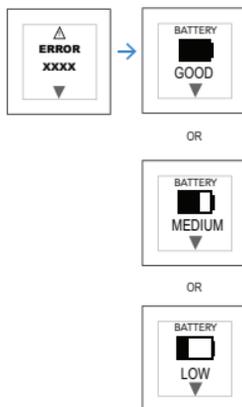
Users can cycle through the Alert menu by pressing the **Down** or **Up** arrow button (while in the Alert Status screen).

The order of the menu:

- Alerts
- RSSI Level (wireless only)
- MAC Address (wireless only)
- SBUS Address (wired only)
- RTU Name (wireless only)
- Sleep Mode Toggle (wired only)
- Battery Level (applies to wireless and wired applications when a battery is the power source)

## BATTERY LEVEL

1. Enter Maintenance Mode and press the **Down** arrow to navigate through the Maintenance Mode screens.
2. Press the Alert screen.  
The Battery screen displays. The possible battery levels are Good (76-100%), Medium (34-75%), and Low (below 34%).



## RSSI SIGNAL STRENGTH

1. Enter Maintenance Mode and press the **Down** arrow button to navigate through the Maintenance Mode screens.
2. Press the down button until the Signal Strength screen displays. This screen displays the status of the signal.
  - 0 to -50 dB is 4 bars (best RSSI)
  - -51 to -65 dB is 3 bars
  - -66 to -76 dB is 2 bars
  - -77 to -87 dB is 1 bar
  - -88 below is 0 bar

## MAC ADDRESS FOR SENSOR

1. Enter Maintenance Mode and press the **Down** arrow button to navigate through the Maintenance Mode screens.
2. Press the **Down** arrow button until the MAC Address screen displays. This screen shows the sensors MAC address. This address should also be reflected on the CORE Service App.

## Repeater (21L09)

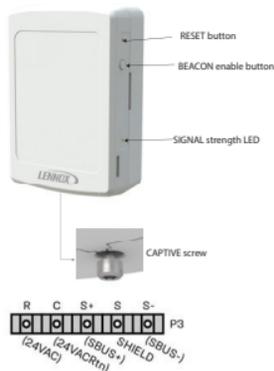


Figure 16. Wireless Repeater Buttons, Indicators, and Terminals

### REPEATER – 24VAC (LINE POWER)

The wireless repeater can only be powered by an external 24VAC power source.

### REPEATER – WIRELESS INSTALLATION SETUP

**NOTE:** *Wireless Repeaters are only compatible with the CORE (M4) Unit Controller.*

## IMPORTANT

Lennox® recommends adding the repeaters after adding the wireless sensors. Lennox® highly recommends adding the repeaters at the roof-top unit before installation in desired locations.

To connect the wireless repeater to the rooftop unit BLE mesh network:

1. Open the CORE Service App.
2. Go to the **RTU Menu > Network Integration > Wireless Sensor Network Setup > Wireless Sensor Network > Provision Sensor Network > Network Nodes**.
3. Click **Add Node** on the Network Nodes screen. This triggers the CORE Service App to scan Bluetooth Low Energy (BLE) mesh beaconing.
4. Press and hold the **Beacon** button on the wireless repeater for two (2) seconds. The user should be able to see the MAC address of wireless repeater on the CORE Service App.

**NOTE:** *The wireless repeater MAC address can be verified with the label on the repeater.*

5. Verify the CORE Service App displays “Node Added” on the **Sensor Network**.

## IMPORTANT

A maximum of five wireless repeaters can be added per RTU.

### REPEATER – SIGNAL STRENGTH ALERT INDICATION

After the wireless repeater is added successfully, it will communicate with the rooftop unit.

The signal (RSSI) LED will illuminate if it cannot reach the RTU.

**NOTE:** *The signal strength LED is always enabled and cannot be disabled.*

### REPEATER – PLACEMENT AND CONFIRMING LOCATION (TEST MODE PROCEDURE)

The wireless repeater has no test functionality to determine the repeater is within acceptable range of the RTU.

To test a desired location for signal strength:

1. Take a battery powered wireless sensor (that is already connected to the BLE network) to the desired location.
2. Press the **Beacon** button for five (5) seconds and release.
3. Wait five (5) to 20 seconds for the test to complete.
4. Observe the status of the Signal Strength LED (Table 2. Repeater LED Descriptions on page 30).

**Table 2. Repeater LED Descriptions**

Signal Indicator LED	Description
3 Blinks	Repeater is within range and ready to install.
Solid for 10 seconds	Repeater is out of range. Re-test or find a closer location.
Off	Repeater does not have power. Power repeater and re-test.

### BLE SIGNAL STRENGTH RANGE:

- 0 to -50 dB is 4 bars (best RSSI)
- -51 to -65 dB is 3 bars
- -66 to -76 dB is 2 bars
- -77 to -87 dB is 1 bar
- -88 below is 0 bar

## REPEATER – NETWORK REMOVAL AND RESET

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### IMPORTANT

Lennox® recommends performing a hard reset after removing the sensors from the network.

#### CORE SERVICE APP REPEATER REMOVAL

Use the following steps to remove a specific wireless repeater (relay) from the rooftop unit group.

To remove the repeater (relay) from the RTU:

1. Open the CORE Service App and navigate to **RTU Menu > Network Integration > Wireless Sensor Network Setup**.
2. Select the relay to remove.
3. Select **Remove Relay** at the bottom of the screen. The **Remove Relay** screen displays.
4. Select **YES**.
5. Press and hold the **Beacon** button for two (2) seconds to remove particular node (repeater) from the BLE mesh network.
6. Type in the **Relay Name** and select **Proceed**.

#### REPEATER HARD RESET

To perform a factory reset:

1. Press and hold both the **Beacon** and **Reset** buttons for 10 seconds.
2. Release only the **Reset** button.
3. After two (2) seconds, release the **Beacon** button.

After performing the hard reset, the wireless repeater can be added to any other rooftop unit group or back to same the rooftop unit network.

## Repeater and Sensor Placement Requirements

Wireless sensors can also be used as repeaters if powered by external 24VAC. A maximum of two repeater hops are supported. Wireless sensors operated on battery power cannot hop a signal to the next device, and therefore operate only as a temperature sensor.

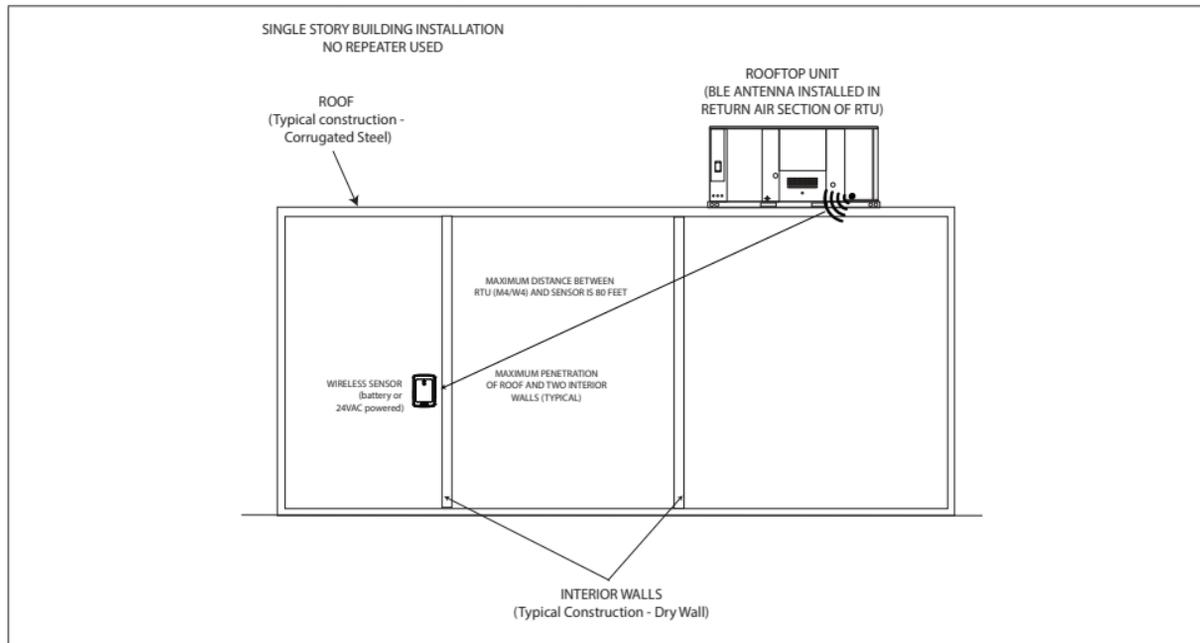
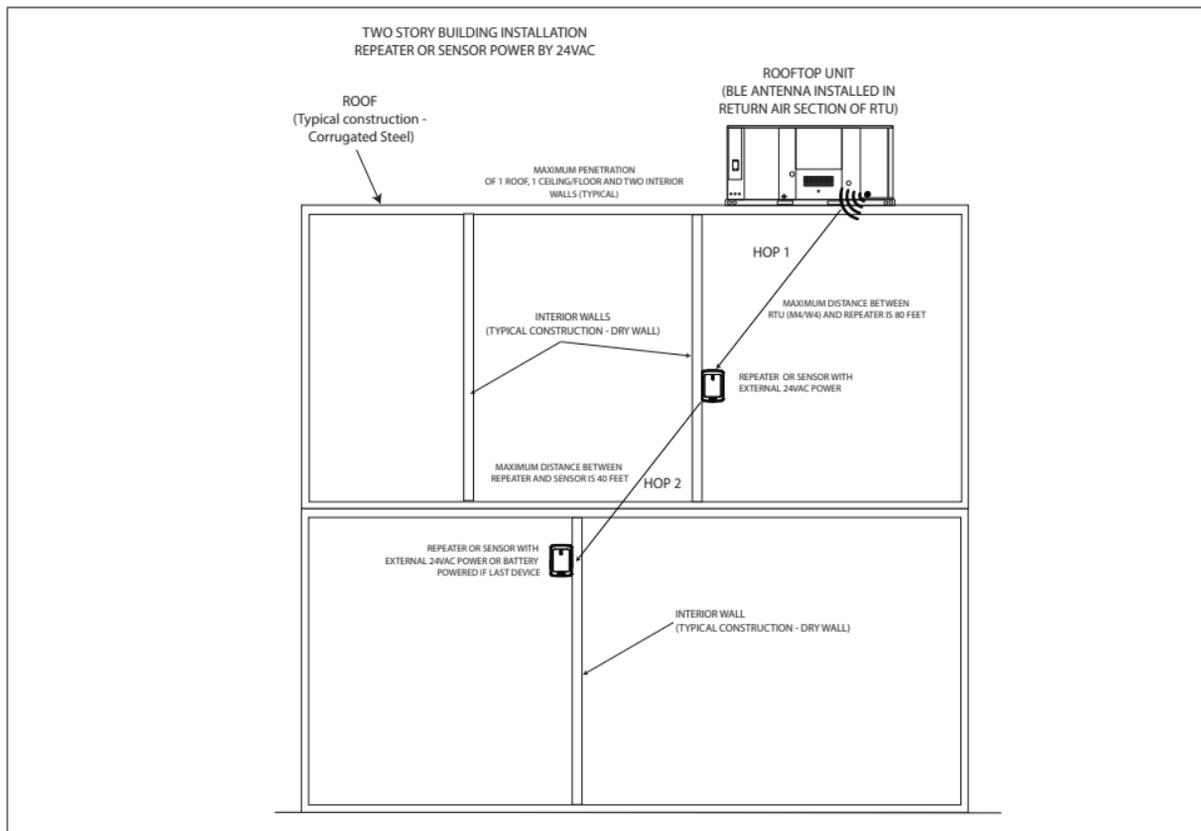


Figure 17. Single Story Application (2 Hops)



**Figure 18. Two Story Application (2 Hops)**

TWO STORY BUILDING INSTALLATION  
REPEATER OR SENSOR USING 24 VAC

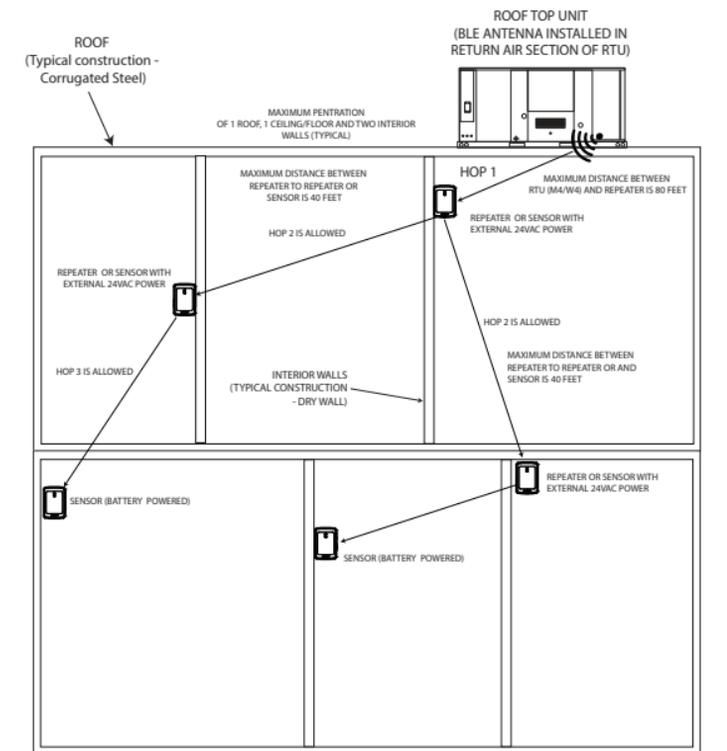


Figure 19. Two Story Application (3 Hops)

## FCC Compliance Statement

PART 15.19 This device complies with Part 15 of the FCC Rules. Operation is subject to the following four conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation. FCC Interference Statement — PART 15.105 (B).
3. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
4. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off

and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## FCC RF Exposure Information

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm during normal operation.

