

Installation and Setup Guide

**ComfortSense® 8500 Commercial
Programmable Thermostat Series —
(14X55 and 14X56)**

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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 service agency.

Shipping and Packing List

- 1 - ComfortSense® 8500 touchscreen thermostat with wall and back plates
- 2 - Mounting screws (M3.5x25mm self-tapping screws)
- 2 - Wall anchors
- 1 - Warranty sheet
- 1 - Installation & Setup Guide
- 1 - User Guide

Thermostat Features

The ComfortSense® 8500 is a commercial, electronic, 7-day, multi-stage, programmable, touchscreen thermostat. Provides temperature control for packaged gas/electric and electric/electric for up to 4-heat / 4-cool multi-stage systems (not for heat pump systems).

Models are available with or without CO₂ sensing capabilities.

Table 1. Model Information

Configuration Types	Model Numbers	Catalog Numbers
Without CO ₂ Sensor	C0SNAJ03FF1L	14X55
With CO ₂ Sensor	C0SNAJ22FF1L	14X56

For use with Energence® commercial rooftop units equipped with Prodigy.

CO₂ models can be used to control Lennox' premium rooftop unit Demand Control Ventilation features based on CO₂ set points and conditions stored in the Prodigy® 2.0 Unit Controller.

Thermostats also feature enhanced capabilities including remote temperature sensing, dehumidification and control, economizer control and custom reminders.

- Built-in humidification monitoring - range 5% to 95% with accuracy at $\pm 5\%$
- Built-in carbon dioxide monitoring (14X56 only) - range 400-2000 ppm, range 5% to 95% and with accuracy at ± 40 ppm + 3% or reading @ 77°F (25°C). Sensor has built-in self-calibration algorithm.
- Temperature monitoring - two internal thermistors, range 32°F (0°C) to 99°F (37°C). Measurement accuracy $\pm 0.5^\circ\text{F}$ (-17.5°C)
- External indoor temperature sensor connections 10kΩ (47W37) or 11kΩ (94L61) — up to nine (9) sensor in parallel may be used.
- External occupancy sensor connection (24VAC).
- Supports 50 and 60Hz operations.

Unit Dimensions (H x W x D)

Case dimensions: 3-5/16 x 4-5/16 x 7/8 in. (84 x 110 x 22mm)

Wall Plate Dimensions (H x W)

Plate dimensions: 4-1/2" x 5-3/4" (114 x 146mm)

Cable Requirements

Communication Wire

Use one of the following Lennox communication cables (twisted pair with shield plenum):

Table 2. Twisted Pair Communication Wire

Order	Description
SysBus - Lennox Yellow	Communication Cable
27M19	500 foot roll
94L63	1000 foot roll
68M25	2500 foot roll

Remote Sensor Wire

All remote sensors use standard non-shielded thermostat wiring; sensors may be wired using two wires of a multiple wire cable.

NOTE - *Outdoor and indoor sensor wire runs should not exceed 300 feet (100m).*

Transformer Wire

Standard thermostat wire (one pair 20 AWG minimum) may be used to wire the thermostat to the optional wall plug 24VAC transformer 18M13 or other field-provided 2VA minimum, 24VAC output transformer.



CAUTION

This is a 24VAC low-voltage sensor. Do not install on voltages higher than 30VAC.

Do not short (jumper) across terminals to test installation. This will damage the sensor and void the warranty.

Installation

1. Unpacked the thermostat and open the case with a thin-blade screwdriver. Place between wall base and unit and twist to separate unit from base.

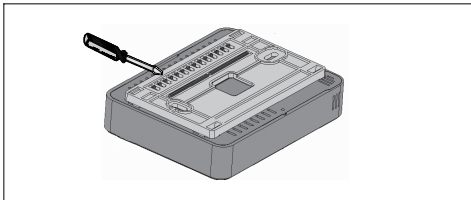


Figure 1. Removing Back Plate

2. Select a location for the sensor about five (5) feet (1.5m) above the floor in an area with good air circulation at average temperature.
3. Do not install the thermostat where it can be affected by:
 - Drafts or dead spots behind doors and in corners.
 - Entrance or automatic doors.
 - Heat generating equipment such as kitchen equipment.
 - Enclose environment unless a remote indoor sensor is used.
 - Hot or cold air from ducts.
 - Radiant heat from sun or appliances.
 - Concealed pipes and chimneys.
 - Unheated (uncooled) areas such as an outside wall behind the sensor.

4. Use steps A through D (see figure 6 for using provided optional wall plate).

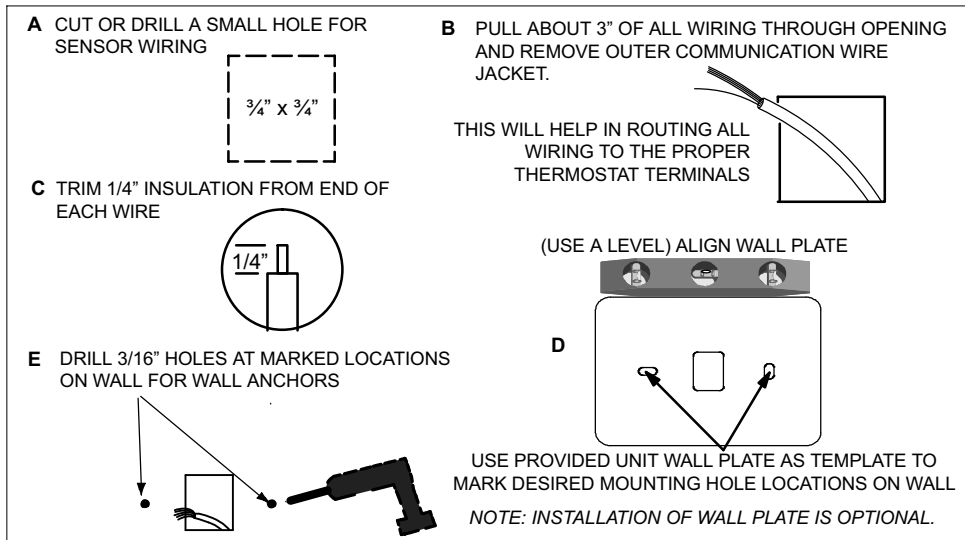


Figure 2. Installing Sensor

Terminal Connections

Terminal(s)	Purpose
R	24VAC
T T	External indoor temperature sensor (10K Ω or 11K Ω)
OC OC	Occupancy sensor
CM- CM+	S-Bus communication (L Connection)
C	24VAC common

NOTE - All external sensors use standard thermostat wiring; it may be wired using two wires of a multiple wire cable. Wire run should not exceed 300 feet (100m). Terminals CM- and CM+ will use twisted pair communication as referenced in table 2 on page 4.

IMPORTANT!

Damage to the ComfortSense 8500 may occur if 24VAC polarity is not maintained.

Wiring Thermostat - (with or without CO₂)

Below are the terminal designations and a general description of their purpose.

1. Connect wiring between thermostat and applicable controller.
2. Connect external sensors if applicable.
3. Seal the hole in the wall with a suitable material to prevent drafts from entering the thermostat case.
4. Configure thermostat and equipment for system type and test system.

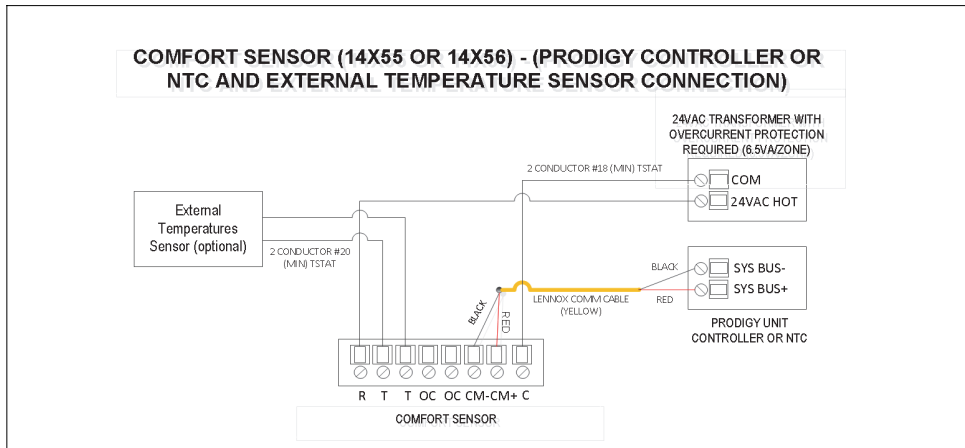


Figure 3. Thermostat Connections (14X55 or 14X56)

Installing Indoor Temperature Sensors

Wire external sensors as shown in figure 4. Up to nine sensors may be used in averaging sensor applications. Use Lennox catalog numbers 10k Ω (47W37) or 11k Ω (94L61). Sensors are not polarity sensitive.

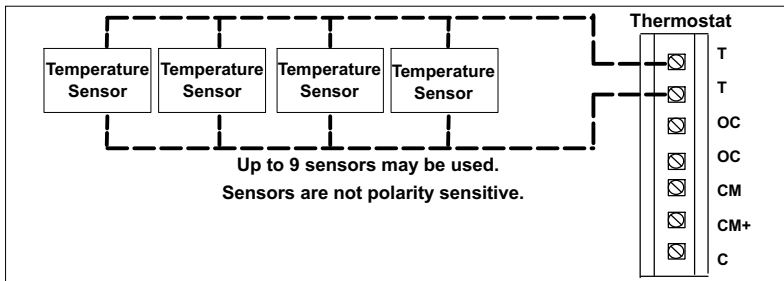


Figure 4. Temperature Sensor Wiring (parallel)

The thermostat will calculate the average temperature readings from all connected external temperature sensors. If any of the sensors malfunction, they may still report a temperature value. Only when the average value of the connected temperature sensors including any malfunction sensor(s) is lower than -40°F, or when it is higher than 158°F, the thermostat would determine that an external temperature sensor(s) has failed and switch automatically to the thermostat internal temperature sensor. A error message will be displayed on the home screen and under notification screen indicating an "external temperature sensor" error.

Installing Occupancy Sensor

When occupied the sensor will output 24VAC and 0VAC when unoccupied. Below is an example on how to make connections for a occupancy sensor.

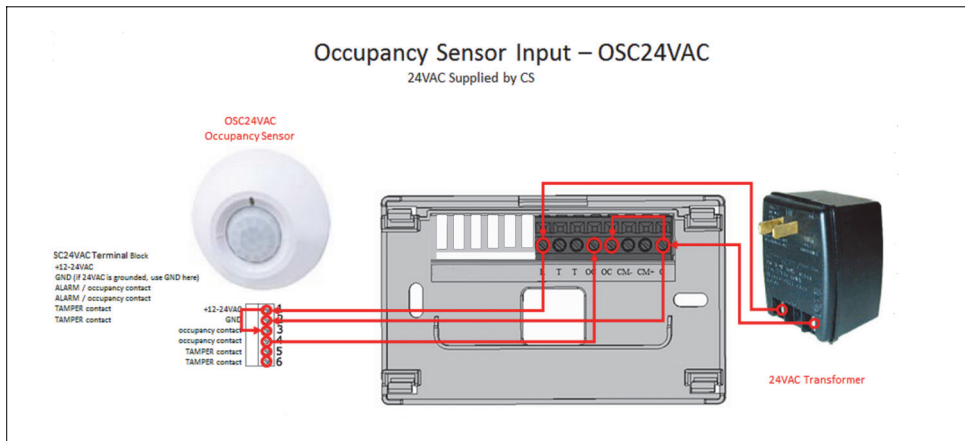


Figure 5. Occupancy Sensor Connections and 24VAC Transformer

Thermostat Installation with Wall Plate

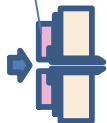
Place wall plate over holes in wall.



Insert wall anchors through wall plate into wall.



Attach back plate to wall plate.



Insert provided screws through back and wall plates into wall anchors.

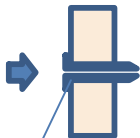


Attach sensor to back plate.

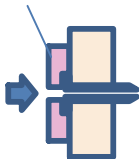


Thermostat Installation without Wall Plate

Place back plate over wall anchors in wall.



Insert wall anchors into wall.



Insert provided screws through back plate into wall anchors.



Attach sensor to back plate.

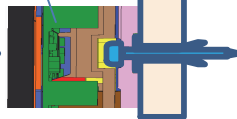


Figure 6. Thermostat Installation to Wall

System Setup

A single thermostat (14X55 or 14X56) can be connected directly to the S-bus connection on the Prodigy Unit Controller.

The optional settings (M2 ECTOs or M3 Parameters) can be adjusted using Unit Controller software, a PC with UC software, and L Connection PC converter. See table 2 for additional M2 ECTOs or M3 Parameters information.

Units Equipped with an NTC

ECTO A4.07 - Set to 1. Enables remote sensor mode in the NTC.

Thermostat Configuration — M1 and M2 Unit Controllers

The following options (M1/M2 ECTOs and M3 Parameters) must be set when the thermostat is used.

ECTO 6.01 - Set to 1, 2, or 3. Tells the M1/M2 unit controller what control mode and back-up set points to use.

- 1 = Zone sensor mode with no backup.
- 2 = Zone sensor mode with local sensor backup.
- 3 = Zone sensor mode with return air sensor backup.

ECTO 5.27 - Set to 2, 3, 10, or 11, depending on the options available on the thermostat. Room temperature reading is standard on all models. Setting tells the M1/M2 unit controller where to get zone temperature, CO₂, and indoor RH input.

- 2 = Room temperature (A2)
- 3 = Room temperature and IAQ (A63)
- 10 = Room temperature and indoor RH (A91)
- 11 = Room temperature, IAQ, and indoor RH

ECTO A4.07 - Set to 1. Enables remote sensor mode in the network thermostat controller (NTC).

Thermostat Configuration — M3 Unit Controller:

To **enable** the M3 Unit Controller to use the thermostat and L Connection, use the following procedure:

1. Set CONFIGURATION ID1, position 5 to N.
2. Go to SETUP and select NETWORK INTEGRATION.
3. Use the Adjust and set values arrows to display L-CONNECTION and press the SAVE button to continue.
4. Adjust the L-CONNECTION ADDRESS if required and press SAVE button to continue.

NOTE: Both the L-Connection address setting and thermostat address setting will need to be exactly the same.

5. CONTROL MODE will need to be set to ROOM SENSOR. Press the SAVE button to continue.
6. NETWORK SENSOR > CO₂ needs to be set to YES if needed. Press the SAVE button to continue.
7. NETWORK SENSOR > RELATIVE HUMIDITY needs to be set to YES if needed. Press the SAVE button to continue.
8. NETWORK SENSOR > TEMPERATURE will need to be set to YES (mandatory).
9. Press the SAVE and quit the menu.

NOTE: If the thermostat is not communicating with the Prodigy Unit Controller, cycle power to the Prodigy Unit Controller.

Thermostat Troubleshooting

1. Make sure 24VAC is supplied to the thermostat.
2. Make sure the thermostat S-Bus address setting matches the M1/M2 unit controller address. (*Note: an NCP is required when using an NTC.*)

3. Check communication cable wiring.
4. Verify that the sensor data from the thermostat display matches the Prodigy Unit Controller display.
5. For the M1 unit controller (IMC), use the IMC MODE TEMP switch to display the data.
6. For the M2 unit controller use the **DATA > SENSORS** menu to display the data.
7. For the M3 Unit Controller use the **DATA > IN/OUTPUT > SENSORS > NETWORK**

Setting Return Air Temperature Limits


The M3 unit controller may be set up to monitor return air temperature and interrupt the demand if return temperature is above the heating adjustable limits. To enable this feature set parameters 113 and 115 locally at the Prodigy 2.0 unit controller which is located inside the Lennox rooftop unit.

- Adjusting parameter 113 enables return room temperature limits. Default is 0 (OFF). To enable set to 1 (ON). Go to **SETTINGS > RTU OPTION > EDIT PARAMETER = 113 (EN RET AIR TMP LMT)**

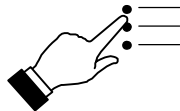
- Adjusting parameter 115 is used to interrupt a heating demand. Default is 85.0°F. Adjustable range is 60.0°F to 100.0°F. Go to **SETTINGS > RTU OPTION > EDIT PARAMETER = 115 (HEAT RET AIR LIMIT)**

If return air temperature is above the adjustable limits, alarm code 40 will be displayed but not stored in memory for recall.

Technician Settings Overview

During initial power up of the thermostat, the technician settings menu will appear first. The S-bus address option must be selected and a address set before you can proceed. Use either the minus/plus buttons or numeric keypad to enter enter the address. After setting the s-bus address is set, touch the  , to return to the technician settings menu.

NOTE: If you need to access the **technician settings** option in the future, go to the home page, touch menu > technical settings and enter technician PIN code 864. This code cannot be changed.




Technician Settings Menu Options

The following settings are also available from this screen:

- S-bus address
- operation with Smart Hub
- local scheduling function (when enabled)
- display on home screen
- contractor info
- temperature sensor config.
- Offsets
- reminders
- reset to factory defaults
- installation test
- change owner pin
- RTU fan on/auto user control

Technician Settings Descriptions

1. S-bus Address

Options are 0 through 31. Select address and touch the set button  to save the setting and return to the technician setting screen.

2. Operation with Smart Hub

When disabled (default) the thermostat can communicate directly with a Prodigy Unit Controller via the S-bus. Default is disabled. For future use.

3. Local Scheduling Function

This feature provides the ability to setup a local schedule. When set to ON, **edit schedules** will appear under the menu screen. Once schedules have been defined, the scheduling function can be turned on from the home screen by selecting **heat/cool** on the home screen and select mode **schedule**.

4. Display on Home Screen

Turn ON or OFF for the followings options:

- CO₂ value (only on models with CO₂ sensor)
- RTU function state
- Service required alert

Factory default is OFF for all of the above options. Touch < in the upper left-hand corner of the screen to return to the technician settings menu.

5. Contractor Info

Information to be completed for this option is name, address, phone, email, website and contractor number. Touch < in the upper left-hand corner of the screen to return to the technician settings menu.

6. Temperature Sensor Config.

Temp. Sensor source by default is set to **internal temp. sensor**. The other option is **external temp. sensor(s)**. When **external temp. sensor(s)** is selected, the following settings need to be configured;

- **number of external temp. sensor:** Default is 1, and up to nine can be selected.
- **type of external sensor:** Options are 10k sensor type 2 (47W37) or 11k sensor type 2 (94L61). Default sensor type is 10k sensor type 2.

Touch < in the upper left-hand corner of the screen to return to the technician settings menu.

7. Offsets

- **internal temp. Sensor offset:** Offset for the built-in temperature sensor (internal) is -5°F to +5°F. Default is 0°F.
- **external temp. sensor offset** (only selectable when **external temp. sensor** is selected under temperature sensor config.): Offset for the external temp, sensor is -5°F to +5°F. Default is 0°F.

- **humidify offset:** The setting option for this is -10% to +10%. Default is 0%.
- **CO₂ sensor offset:** Offset for the CO₂ sensor is -10 ppm to +10 ppm. Default is 0 ppm. (Only on models with internal CO₂ sensor.)

8. Reminders:

Two customer reminders can be set and a routine system check up.

- For both reminders, the name change be customized and date and time set.
- For routine system check up the date and time can be set.

9. Reset to Factory Defaults:

There are three options under this setting, partial reset and all reset.

- **reset all settings** - Resets everything to factory factory default.
- **reset all owner settings** - Resets all owners settings listed under general display menus.
- **reset technician settings:** Resets all technician settings listed on the technician menu.

Touch < in the upper left-hand corner of the screen to return to the technician settings menu.

10. **Change Owner Pin**

This option is used to create or change the owner pin number when **screen lock** is enabled under the owner settings > general settings. The default owner pin is 864. Screen lock can be set under **home screen > menu > owner settings > general**. Screen lock ON or OFF.

Default is OFF.


11. **RTU Fan On/Auto User Control**


Options are OFF and ON. Default is ON. When this is set to on:













- RTU FAN is displayed on the home screen.
- FAN setting option is displayed under owner settings menu.

When this is set to OFF, fan is not displayed and fan option under owner settings is not available.

Technician Status Icons

The technician system status icon screen can be accessed by touching the  which is located on the left side of the home screen. Then press the view status option.

Press the  to access the technician system status screen. Technician pin 864 is required to access that screen.

 comm. status errors detected	connected, error detected	 HP defrosting	LEGEND: CS - Thermostat HP - heat pump FAT - Fresh Air Tempering RTU - Roof Top Unit
 comm. status connected	connected, no error detected	 F.A.T heating	
 comm. status offline	Online or offline	 F.A.T cooling	
 occupied warmup	Occupied warmup or heating	 F.A.T dehumidifying	
 occupied cool-down	Occupied cool-down or cooling	 RTU fault state fault detected	
		 fan is auto	
		 fan is on	



RTU fault state
zero faults

no faults detected



CS fault state
fault detected



CS fault state
zero faults

no faults detected



CO₂ 1265 ppm

LEGEND:

CS - Thermostat

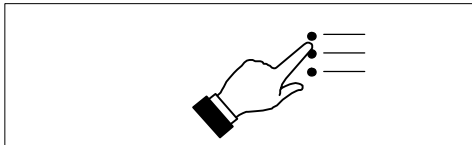
HP - heat pump

FAT - Fresh Air Tempering

RTU - Roof Top Unit

Notifications

Touch the three lines in the upper right-hand corner of the screen to access the **menu**. Selectable options under **menu** are **notifications** and **settings**.









menu	
	notifications 
	performance report
	edit schedule
	owner settings
	technician settings

Figure 7. User Menu Screen

NOTE: *Edit schedule is only available when **local scheduling function** is set to ON under technician settings.*

When a system error or reminder occurs, a pop-up screen will appear indicating the condition.

- Error code notification pop-up can be dismissed by touching the back button. Contact the contractor to resolve the issue.
- For notification, touch either clear or set a future reminder.

Any active history for notifications are listed under **settings > notification** as illustrated in figure 8. Touch the down arrow icon next to the notification to expand the notification for further details. Touch the contractor info option for assistance.

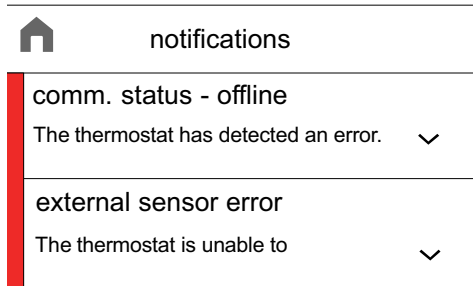


Figure 8. Notifications

Table 3. Error Codes and Reminders

Condition	Display	System Action	Action to Clear / Recovery Condition
<p>Built-In Temp Sensor error - temperature sensor reads 40°F or less or 158°F (\pm 5°F) or greater.</p>	<p>temperature sensor error</p>	<ul style="list-style-type: none"> Indoor temp is displayed as "--" on the home screen. This error is displayed on the notification screen as well. 	<ul style="list-style-type: none"> If the sensor starts detecting a normal operating range, the error message will automatically clear and the system will return to normal operation. Contact service contractor to replace the thermostat.
<p>Remote temperature sensor error. External sensor reads 40°F or less or 158°F (\pm 5°F) or greater.</p>	<p>external sensor error</p>	<ul style="list-style-type: none"> Indoor temp is displayed as "--" on the home screen. This error is displayed on the notification screen as well. When configured for external temperature sensors and there is an error, the unit will automatically switch to the internal temperature sensor. 	<ul style="list-style-type: none"> If the sensor starts detecting a normal operating range, the error message will automatically clear and the system will return to normal operation. Contact service contractor to replace the external temperature sensor. Other than replacing the thermostat, go to the <i>technician setting > temperature sensor config.</i> and change the <i>temp. sensor source</i> back to <i>internal temp. sensor</i>. That will remove the error message from the home and notification screens.

Condition	Display	System Action	Action to Clear / Recovery Condition
EEPROM error (power-on)	Memory Error	<ul style="list-style-type: none"> • System will restore all settings to factory default and resume operations. • This error is displayed in notification screen. 	<ul style="list-style-type: none"> • Contact service contractor to replace the thermostat.
EEPROM error (operating)	Memory Error	<ul style="list-style-type: none"> • System will operate in normal mode until power off. • This error is displayed in notification screen. 	<ul style="list-style-type: none"> • Contact service contractor to replace the thermostat.
Humidity sensor error (without Humidifier or Dehumidifier): Sensor reads out of range 0% to 100%	Humidity Sensor Error	<ul style="list-style-type: none"> • The reading for humidity is not valid. This message indicates humidity sensor is not working correctly. When there is an error the home screen humidity display will indicate "--". • This error is displayed on the notification screen as well. 	<ul style="list-style-type: none"> • If the sensor starts detecting a normal operating range, the error message will automatically clear and the system will return to normal operation. • Contact service contractor to replace the thermostat.

Condition	Display	System Action	Action to Clear / Recovery Condition
CO ₂ Sensor error - sensor reads out of range (above 3500 ppm)	CO ₂ sensor error	<ul style="list-style-type: none"> • The reading for CO₂ is not valid. This message indicates CO₂ sensor is not working correctly. • The display of Indoor CO₂ from HOME will be "--". • This error is displayed on the notification screen as well 	<ul style="list-style-type: none"> • Contact service contractor to replace the thermostat. • If the sensor starts detecting a normal operating range, the error message will automatically clear and the system will return to normal operation.
<p>Comm error state at start-up.</p> <p>NOTE: Also if 2 or more length or Checksum errors are detected (in any message) since the last message received by this address.</p>	Comm Status – Errors Detected	<ul style="list-style-type: none"> • When the failed (offline) state is detected, continue listening for a valid message. • If this occurs then normal operation should resume. • This error is displayed in notification screen. 	<ul style="list-style-type: none"> • Contact service contractor to check communication wire connection. • If a valid message is received, then the error message will be automatically cleared and system will resume normal operations.

Condition	Display	System Action	Action to Clear / Recovery Condition
RTU Fault State	RTU Fault State Detected	This error is displayed in notification screen and technician system status screen.	<ul style="list-style-type: none"> • User will have to contact the Service Contractor to have the system serviced. • Will need to check RTU state • If the RTU recovered from the error automatically the error will also automatically clear.
Routine system check up	Routine System Check-up	Displayed in notification screen.	<ul style="list-style-type: none"> • Pressing done button will clear the reminder. • Or pressing remind later on pop-up screen will extend the duration.
custom reminder 1 or 2 or service reminder	User Editable	Displayed in notification screen.	<ul style="list-style-type: none"> • Pressing done button will clear the reminder. • Or pressing remind later on pop-up screen will extend the duration.

