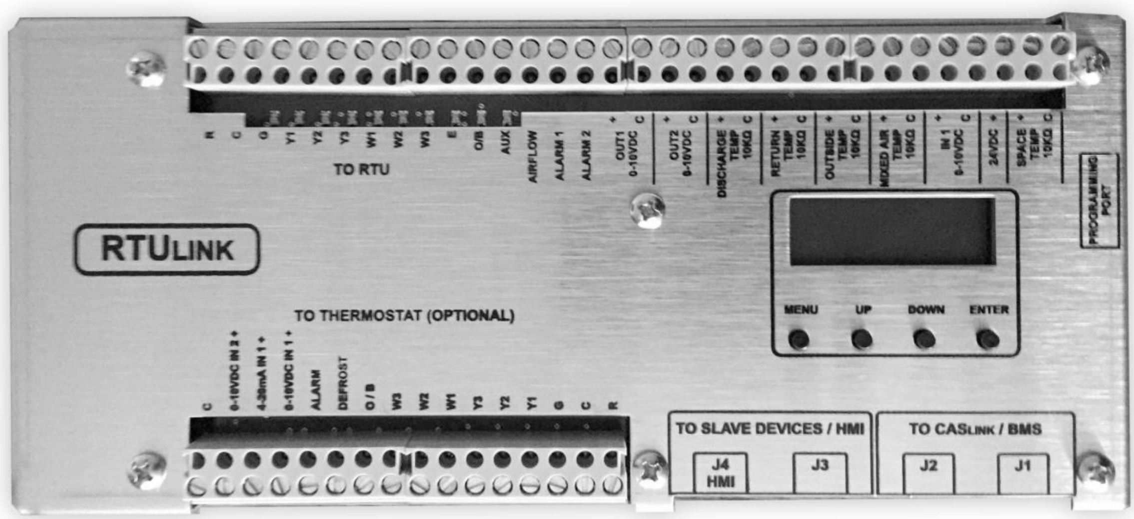
Installation, Operation, and Maintenance Manual



RECEIVING AND INSPECTION

Upon receiving unit, check for any interior and exterior damage, and if found, report it immediately to the carrier. Also check that all accessory items are accounted for and are damage free.

WARNING!!

Installation of this control panel should only be performed by a qualified professional who has read and understands these instructions and is familiar with proper safety precautions. Improper installation poses serious risk of injury due to electric shock and other potential hazards. Read this manual thoroughly before installing or servicing this equipment. ALWAYS disconnect power prior to working on module.

Save these instructions. This document is the property of the owner of this equipment and is required for future maintenance. Leave this document with the owner when installation or service is complete.

A0026630
April 2022 Rev. 5

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WARRANTY

This equipment is warranted to be free from defects in materials and workmanship, under normal use and service, for a period of 2-years from date of shipment. This warranty shall not apply if:

1. The equipment is not installed by a qualified installer per the MANUFACTURER'S installation instructions shipped with the product,
2. The equipment is not installed in accordance with federal, state and local codes and regulations,
3. The equipment is misused or neglected,
4. The equipment is not operated within its published capacity,
5. The invoice is not paid within the terms of the sales agreement.

The MANUFACTURER shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the 2-year warranty period, upon examination by the MANUFACTURER, such part will be repaired or replaced by MANUFACTURER at no charge. The BUYER shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without MANUFACTURER'S prior authorization and all returned equipment shall be shipped by the BUYER, freight prepaid to a destination determined by the MANUFACTURER.

SAFETY INFORMATION

General

Monitoring components utilize a mixture of traditional controls along with a “smart” digital circuit board controller, referred to as the RTULink control board. The RTULink is designed to be installed in the controls cabinet of a roof top unit (RTU). The RTULink board is powered by 24 VAC, which is provided by the same step-down transformer that is intended to power the unit’s thermostat.

Some parts of the printed circuit boards can be electrically live and some surfaces can be hot. Inappropriate use and incorrect installation or operation creates the risk of injury to personnel and/or damage to equipment. All operations concerning installation, commissioning, and maintenance must be carried out by a qualified, skilled technician who is familiar with the installation, assembly, commissioning, and operation of the control panel and the application for which it is being used.

Installation

Ensure proper handling of components and avoid excessive mechanical stress. Do not bend any components during transport, handling, installation, or maintenance. Do not touch any electronic components or contacts. These boards contain electrostatically sensitive components, which can easily be damaged by inappropriate handling. Static control precautions must be adhered to during installation, testing, servicing, and repairing of these boards. Component damage may result if proper procedures are not followed.

To ensure proper operation, do not install any of the monitoring boards where they will be subjected to adverse environmental conditions such as combustible, oily, or hazardous vapors; corrosive chemicals; excessive dust, moisture or vibration; direct sunlight or extreme temperatures.

When working on live panel controllers, applicable national safety regulations must be observed. The electrical installation must be carried out according to the appropriate regulations (e.g. cable cross-sections, circuit breaker, protective earth [PE] connection). While this document does make recommendations in regards to these items, national and local codes must be adhered to.

It is recommended that all thermistor wiring be completed with low voltage thermistor wire and that all low voltage sensor wiring be completed with 18-5 thermistor wire with braided conductors. All wiring to and from the control boards should be routed using a code-approved method. Grommets should be used whenever wiring enters or exits an electrical box or enclosure or whenever it is determined that friction or sharp edges may deteriorate wire. When routing wire internal to RTUs, utilize existing wire channels within the unit and zip tie the wire to existing wires every two feet within the unit to prevent it from moving and coming in contact with motors, gears, heating elements, etc.

OVERVIEW

The RTULink control board is designed to provide a better understanding of building HVAC operation. It provides control variability ranging from monitor only to full control. Regardless of the level of control that is being utilized, the board relays all information gathered to the CASLink cloud-based monitoring and control website. Since CASLink is cloud-based, it allows all of the features and data offered by the RTULink to be accessed from any internet-capable device. Email alerts are generated when scenarios arise that are detrimental to RTU components or indicate that the RTU is not operating as designed.

HVAC equipment is currently a set-it-and-forget-it type product with little to no human interaction after the initial startup (aside from fixing units when they stop working). The RTULink breaks this standard by offering remote and dynamic monitoring, control, and scheduling. Components whose processes were previously invisible, such as damper, economizer, powered exhaust, demand control ventilation, and more, are exposed and controllable through the RTULink.

If the equipment were to fail under RTULink control, the personnel in charge of HVAC equipment can remotely troubleshoot by viewing historical data. Often times a solution for the failure can be found before repairs are scheduled, saving time and money.

Figure 1 shows the RTULink board layout. Become familiar with the pin labeling as this terminology will be referenced throughout the remainder of this document. In **Figure 1**, the left side of the RTULink is the “THERMOSTAT” side of the board and will be referred as such throughout the document. In **Figure 1**, the right side of the RTULink is the “RTU” side of the board and will be referred to as such throughout the document.

For more information on CASLink, refer to the latest version of CASLink “Building Management O&IM”.

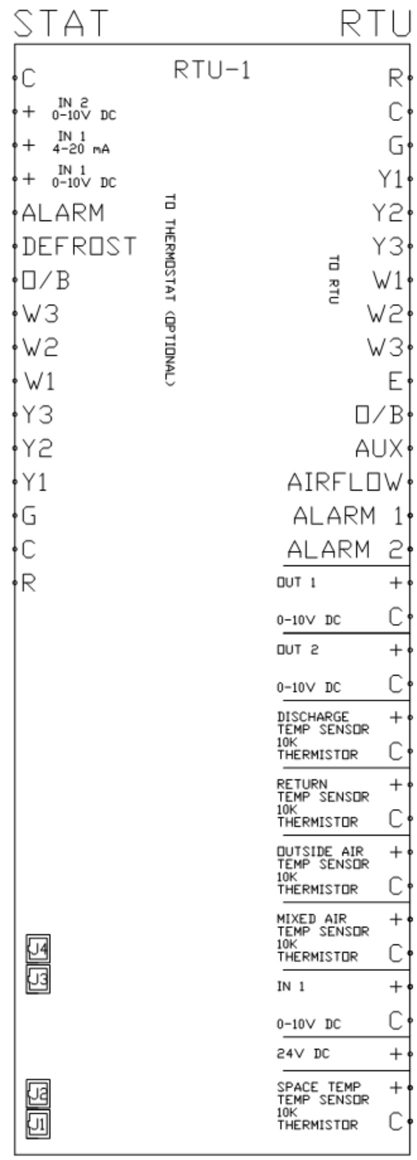


Figure 1. *RTULink Layout*

INSTALLATION OF HARDWARE COMPONENTS

It is imperative that these components are installed and operated with the designed specifications and in accordance with the procedures outlined in this manual. If there are any questions about any items, please call the service department at **1-866-784-6900** for technical support.

RTULink

Open the controls cabinet of the RTU that is being equipped with an RTULink. Locate a spot in the controls cabinet that will accommodate the footprint of the RTULink, leaving a few inches on each side for wiring. Do not alter RTU factory wiring configuration. Contact support before moving or rerouting existing RTU wiring. Secure the board with four of the provided self-tapping screws. Become familiar with the terminal labeling on the RTULink.

RTULink Control Kit Thermistors

Figure 2 shows a detail of one of the probe thermistors that is included in the RTULink Control Kit. Each probe thermistor will be wired to the RTULink. Sensor wiring and mounting locations internal to the RTU are shown with dashed lines in **Figure 3**. A thermistor wiring diagram can be seen in **Figure 4**. Sensor descriptions and mounting instructions can be found in the subsections that follow.

Note: For split system units, mount the return and discharge sensors directly in the ductwork at a location that will not be impacted by external factors.

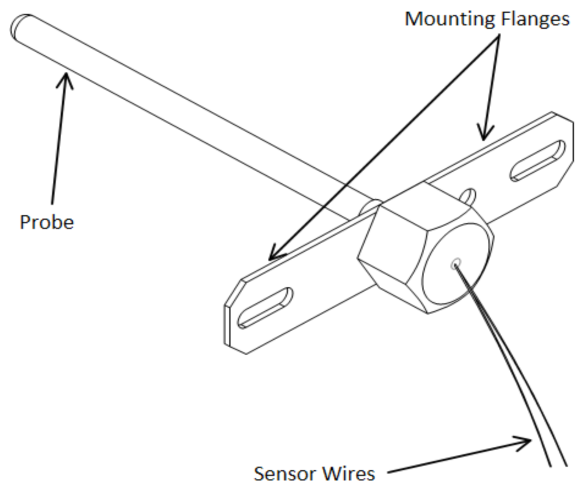


Figure 2. *Temperature Sensor Probe*

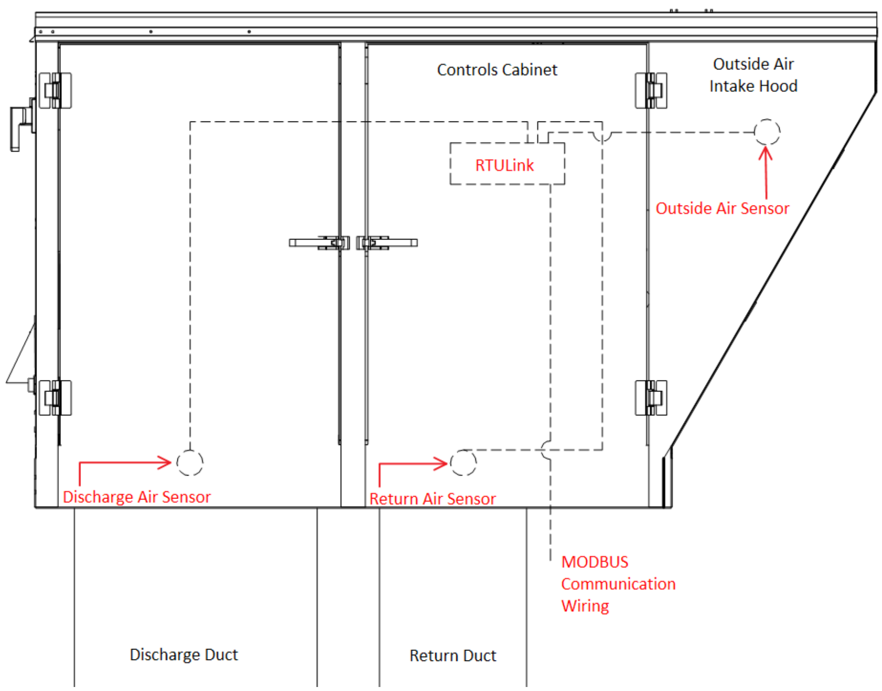


Figure 3. *RTULink Kit Installation Detail*

Outside Air Sensor

The outside air thermistor will measure the temperature of ambient atmospheric air. It should be mounted in the RTU outside air intake hood. This location is ideal as it is important to keep this sensor out of direct sunlight and weather to improve the accuracy of readings. If the thermistor cannot be mounted in the intake hood, choose a location on the outside of the RTU that has the highest percentage of shade throughout the day. Two of the provided self-tapping screws should be used to secure the sensor to its final location using the mounting flanges.

Label the wires for the outside air thermistor and wire it to the positive (+) and common (C) terminals (thermistor input is not polarity sensitive) labeled “OUTSIDE AIR TEMP SENSOR 10kΩ” on the TO RTU side of the RTULink control board. If a penetration is made through an exterior panel of the RTU, ensure it is sealed watertight with caulk, a grommet, or similar.

Return Air Sensor

The return air thermistor will be measuring the temperature of the air in the return duct. Remove the side panels of the RTU in order to access the return duct. The thermistor should be mounted in a location internal to the RTU that is not affected by incoming outdoor air through the intake (if applicable). It should also be mounted in a location that does not interfere with operation of the outside air damper and/or economizer gears and damper blades. Two of the provided self-tapping screws should be used to secure the sensor to its final location using the mounting flanges.

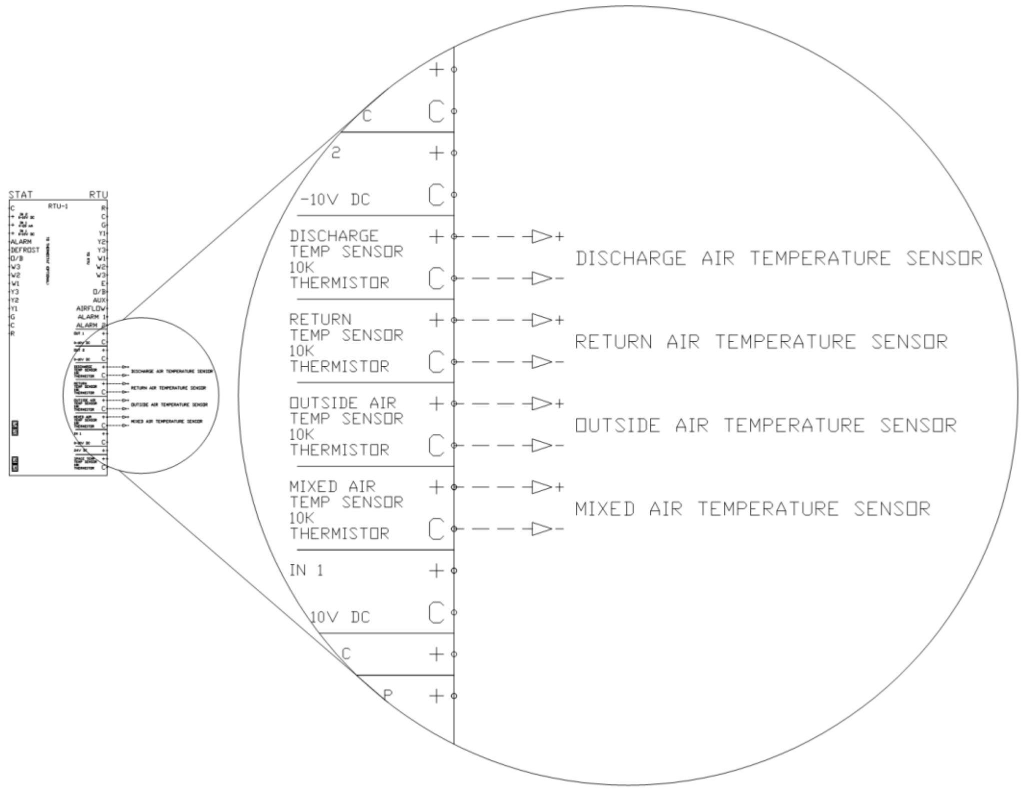


Figure 4. *Control Kit Thermistors – RTULink Wiring*

An alternative to mounting the sensor in the unit is to mount it in the return duct or return diffusers in the space, which will provide the most accurate reading. A ½” hole should be drilled in the return duct so that the sensor probe can be inserted through the duct and into the return airstream. Two of the provided self-tapping screws should be used to secure the sensor to the duct using the mounting flanges.

Label the wires for the return air thermistor and wire it to the positive (+) and common (C) terminals (thermistor input is not polarity sensitive) labeled “RETURN AIR TEMP SENSOR 10kΩ” on the RTU side of the RTULink control board.

Discharge Air Sensor

The discharge air sensor will measure the temperature of the air being supplied to the space by the RTU. Remove the side panels of the RTU in order to access the discharge area (usually directly beneath the blower or burner). It is important to mount this sensor as far downstream from the heating and/or cooling elements as possible in order to obtain the most accurate readings. Two of the provided self-tapping screws should be used to secure the sensor to its final location using the mounting flanges.

An alternative to mounting the sensor in the unit is to mount it in the discharge duct or diffusers in the space, which will provide the most accurate reading. A 1/2” hole should be drilled in the discharge duct so that the sensor probe can be inserted through the duct and into the supply airstream. Two of the provided self-tapping screws should be used to secure the sensor to the duct using the mounting flange. If mounted near the heating components, ensure that at least 9” of space exists between the probe and the burner elements.

Label the wires for the discharge air thermistor and wire it to the positive (+) and common (C) terminals (thermistor input is not polarity sensitive) labeled “DISCHARGE AIR TEMP SENSOR 10kΩ” on the RTU side of the RTULink control board.

RTULink to RTU Wiring

The RTULink will need to be wired to the RTU in order to send control signals. **Table 1** details the "RTU" side terminals on the RTULink and the corresponding terminal definitions. **Figure 5** shows the wiring diagram for the RTULink to RTU control wiring. Not all terminals will be utilized on every unit. Refer to the specific RTU and thermostat documentation to determine which of the terminals are relevant to the application.

When certain unique options are present, it is possible for one or more of these terminals to be repurposed for a different use. View the remaining subsections to determine which features will repurpose board terminals.

Table 1. *RTULink to RTU Wiring Terminals*

TERMINAL LABEL	SIGNAL VOLTAGE	RTULINK INPUT/OUTPUT	SIGNAL DESCRIPTION
R	24 VAC	INPUT	24VAC THERMOSTAT TRANSFORMER HOT
C	COMMON	INPUT	24VAC THERMOSTAT TRANSFORMER NEUTRAL
G	24 VAC	OUTPUT	BLOWER
Y1	24 VAC	OUTPUT	1ST STAGE COOLING
Y2	24 VAC	OUTPUT	2ND STAGE COOLING
Y3	24 VAC	OUTPUT	3RD STAGE COOLING
W1	24 VAC	OUTPUT	1ST STAGE HEATING
W2	24 VAC	OUTPUT	2ND STAGE HEATING
W3	24 VAC	OUTPUT	3RD STAGE HEATING
E	24 VAC	OUTPUT	EMERGENCY HEAT
O/B	24 VAC	OUTPUT	HEAT PUMP REVERSING VALVE
AUX	24 VAC	OUTPUT	AUXILIARY
AIRFLOW	24 VAC	INPUT	AIRFLOW PROVING
ALARM 1	24 VAC	INPUT	CONFIGURABLE ALARM
ALARM 2	24 VAC	INPUT	CONFIGURABLE ALARM

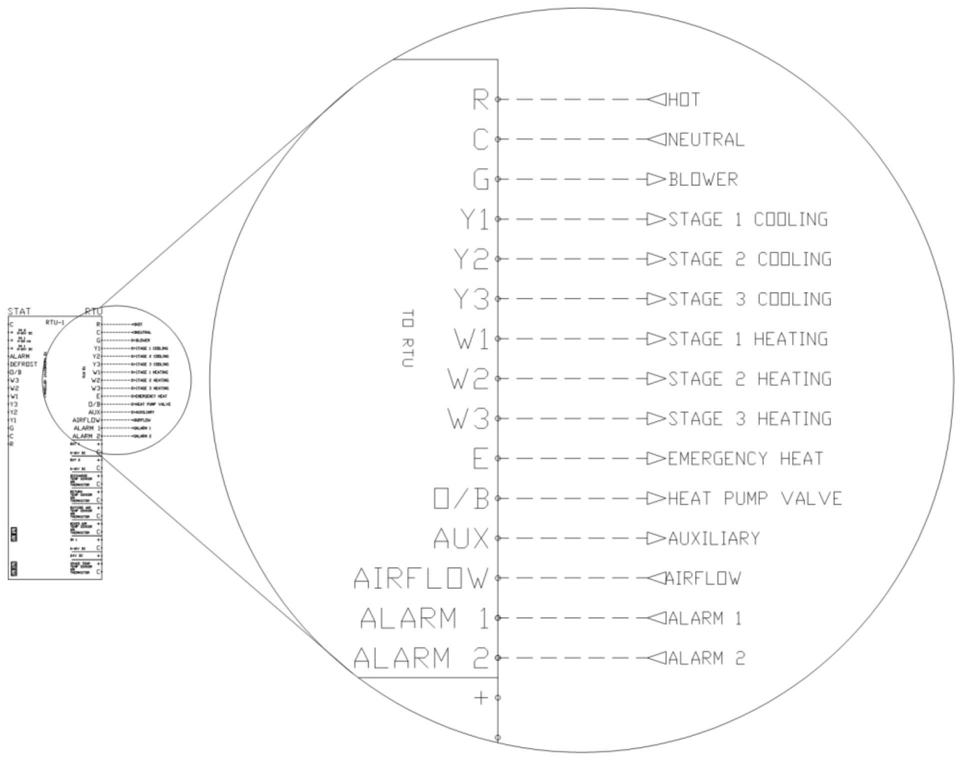


Figure 5. *RTULink – RTU Wiring*

Thermostat (optional)

If a traditional external thermostat will be used to control the RTU, follow these instructions.

The thermostat that is being used to control the RTU will need to be wired to the RTULink. **Table 2** details the "THERMOSTAT" side terminals on the RTULink and the corresponding terminal definitions. **Figure 6** shows the wiring diagram of the thermostat to RTULink control wiring. **Figure 7** shows a detail of a space mounted thermostat wired to an RTULink. Not all terminals will be wired, view RTU and thermostat documentation to determine which of the terminals are relevant to the application.

In a retrofit application, the thermostat may already be wired to the RTU. In this case, there will likely be a terminal strip in the controls cabinet of the RTU with the wiring from the thermostat landed on one side and the wiring to the RTU landed on the other. You will need to individually disconnect the incoming thermostat wire and connect it on the "THERMOSTAT" side of the RTULink. **Do not disconnect all of the wires at once**, disconnect wires one at a time so it is easier to keep track of the wiring.

When certain additional features are present (Occupied/Unoccupied), it is possible for one or more of these terminals to be repurposed for a different use. The remaining subsections detail all additional features and the corresponding wiring diagrams.

Table 2. *Thermostat to RTULink Wiring Terminals*

TERMINAL LABEL	SIGNAL VOLTAGE	RTULINK INPUT/OUTPUT	SIGNAL DESCRIPTION
ALARM	24 VAC	OUTPUT	ALARM NOTIFICATION
DEFROST	24 VAC	OUTPUT	DEFROST NOTIFICATION
O/B	24 VAC	INPUT	HEAT PUMP REVERSING VALVE
W3	24 VAC	INPUT	3RD STAGE HEATING
W2	24 VAC	INPUT	2ND STAGE HEATING
W1	24 VAC	INPUT	1ST STAGE HEATING
Y3	24 VAC	INPUT	3RD STAGE COOLING
Y2	24 VAC	INPUT	2ND STAGE COOLING
Y1	24 VAC	INPUT	1ST STAGE COOLING
G	24 VAC	INPUT	BLOWER
C	COMMON	OUTPUT	24VAC THERMOSTAT TRANSFORMER NEUTRAL
R	24 VAC	OUTPUT	24VAC THERMOSTAT TRANSFORMER HOT

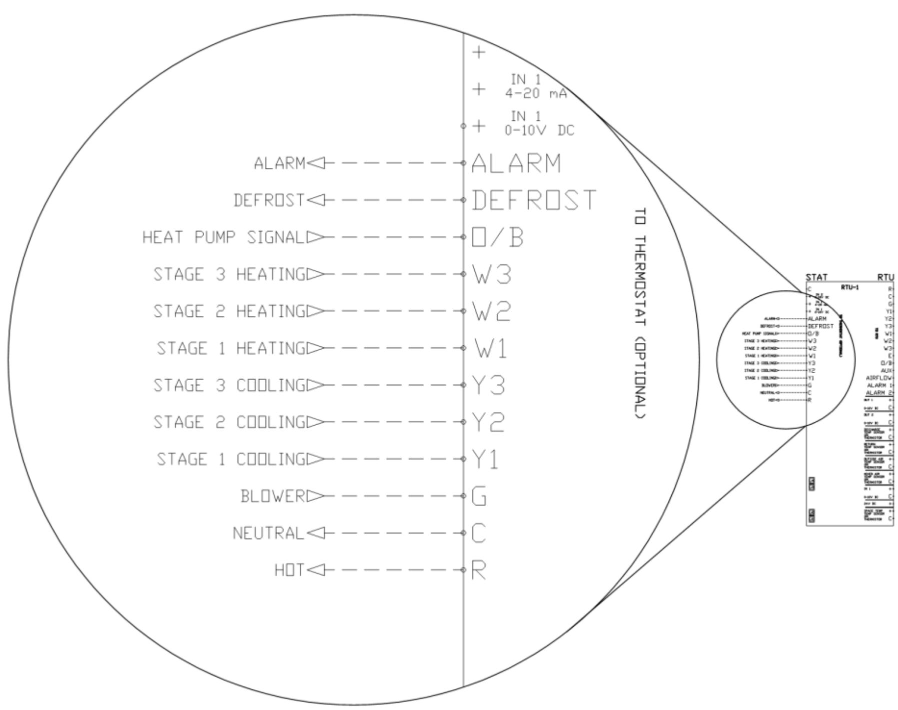


Figure 6. *Thermostat – RTULink Wiring*

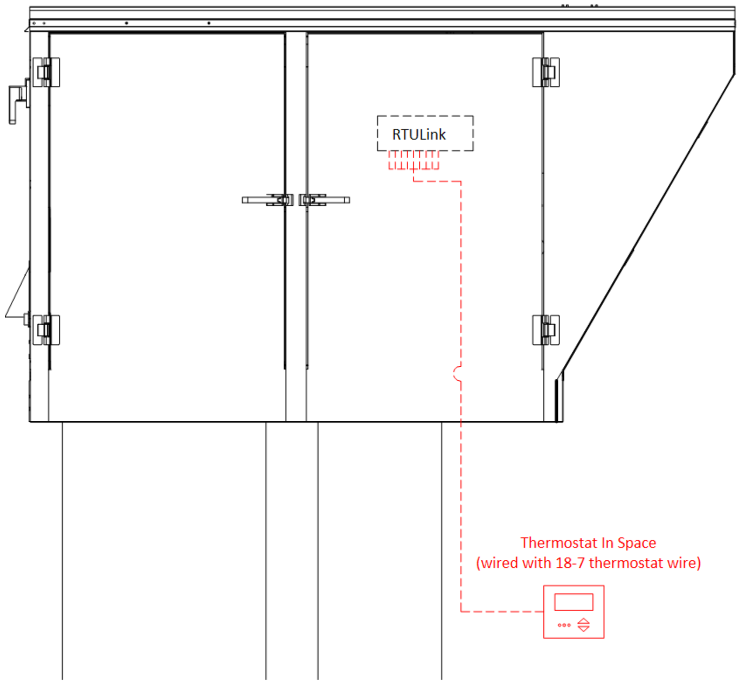


Figure 7. *Thermostat - RTULink Installation Detail*

Space Thermistor – Wall Mount (optional)

If a space temperature sensor/thermistor is called for in the specifications, follow the instructions in this section. Note: This is not to be confused with the traditional space stat that is used for commercial kitchen ventilation electrical packages.

A space thermistor will need to be installed in the zone being supplied by the RTU. Install a junction box in an area that will provide accurate temperature readings. Avoid areas near windows that are exposed to sunlight, areas near diffusers, areas near appliances, areas more than 6 ft. above the floor, etc. Route the thermistor wire to the RTULink and connect it to the + and C terminals (thermistor input is not polarity sensitive) on the "RTU" side of the RTULink labeled "SPACE TEMP 10kΩ". Use the mounting screws provided with the sensor to secure the sensor to the junction box. **Figure 8** shows an installation detail for a stainless steel space thermistor (PN: A/CP-SP). **Figure 9** shows an installation detail for a space thermistor with a plastic housing (PN: A/CP-R2). **Figure 10** shows the space sensor terminals and wiring detail.

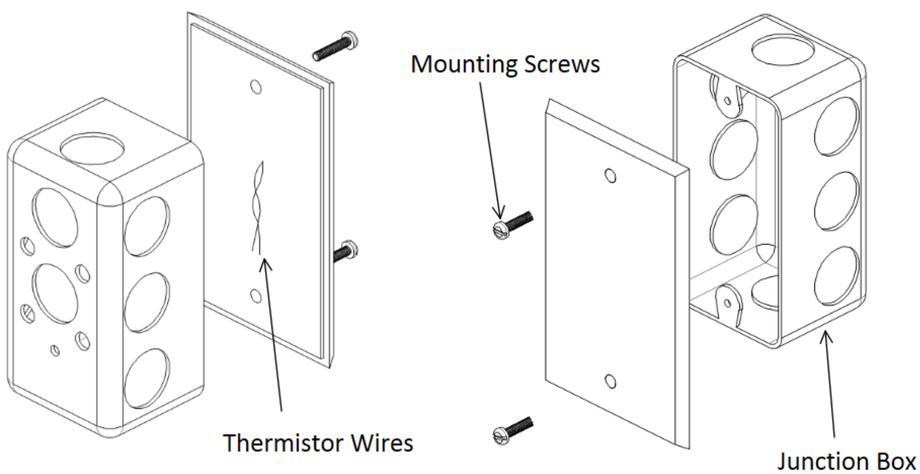


Figure 8. *Space Thermistor Detail (Stainless Steel Housing Wall Mount)*

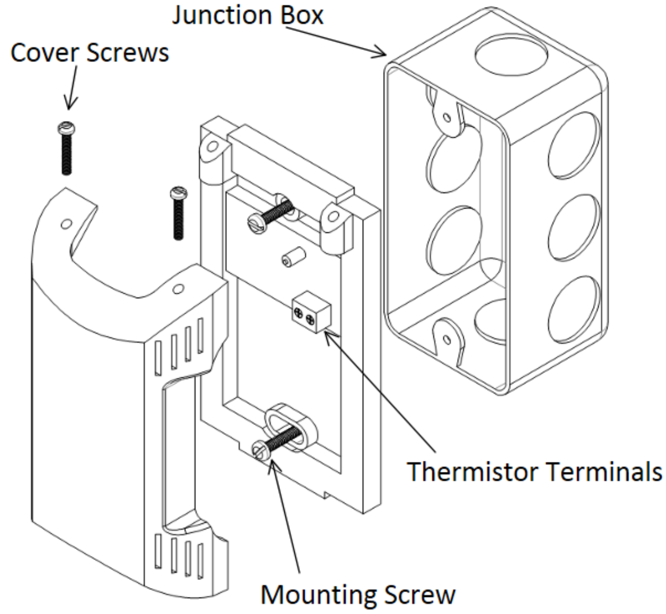


Figure 9. *Space Thermistor Detail (Plastic Housing Wall Mount)*

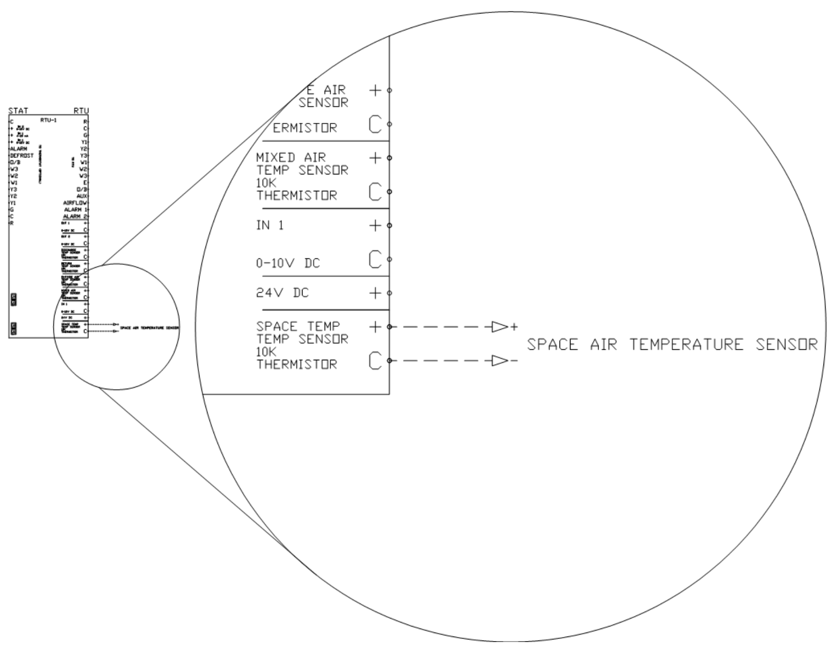


Figure 10. *Space Temperature – RTULink Wiring*

Modbus Communication Wiring

Each RTULink will need to have a path of communication to the communication module (PN: COMM01 located in the hood panel) via a CAT5 cable. The communication module is typically located in a kitchen ventilation hood control panel, however it is not limited to that specific location. In most cases, wiring a daisy chain configuration will require the least amount of wire. See APPENDIX A for typical network layouts in order to determine the best configuration for the application. Use the J1 and J2 RJ45 ports to connect the RTULinks together using the CAT5 cable. If an RTULink is the last in a line, it will only have one CAT5 cable connected to it and will require an end of line resistor (PN: EOL120A) in its unused port (J1 or J2). **Figure 11** shows a wiring detail for the Modbus communication network.

All CAT5 cables should be run without RJ45 connectors, and a crimp tool should be used to add connectors once wire routing is complete. Each RJ45 connector wire should be wired in a T-568-B straight-through configuration. See **APPENDIX B** if you are unfamiliar with how to make a straight-through CAT5 cable using RJ45 connectors and a crimp tool. Once complete, a CAT5 tester should be used to test each length of wire.

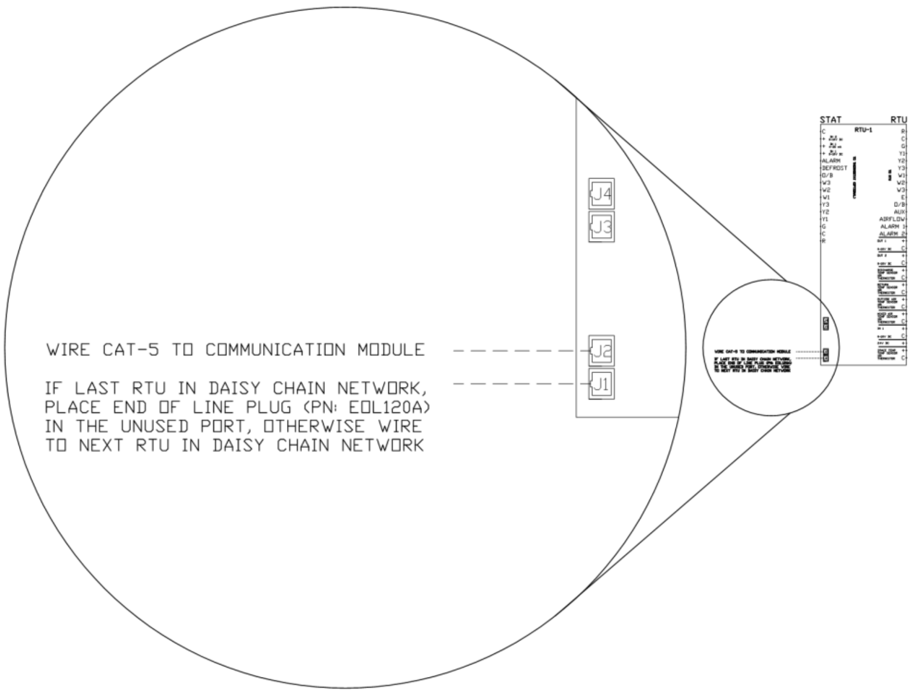


Figure 11. *Modbus Network – RTULink Wiring*

Optional Sensors

Temperature and Humidity Sensor – Wall Mount

If a humidity or temperature/humidity sensor is called for in the specifications, follow the instructions in this section.

A temperature and humidity sensor will need to be installed in the desired location. It is important to install the space humidity sensor in a single gang junction box in an area that will provide accurate temperature and humidity readings. Avoid areas near windows that are exposed to sunlight, areas near diffusers, areas near appliances, areas more than 6 ft. above the floor, etc. Any holes in the junction box should be completely sealed with caulk to prevent humid air from coming in contact with the sensors circuit board.

Figure 12 shows an install detail for a wall-mounted temperature and humidity sensor with a plastic housing (PN: A/RH3-CP-R2). **Figure 13** shows an install detail for a wall-mounted temperature and humidity sensor with stainless steel housing (PN: A/RH3-CP-SP). **Figure 14** shows a wiring schematic of a space temperature and humidity sensor that is installed in the space and connected to the “RTU” Input 1 on the RTULink. Standard 18-5 thermostat wire should be used for sensor wiring.

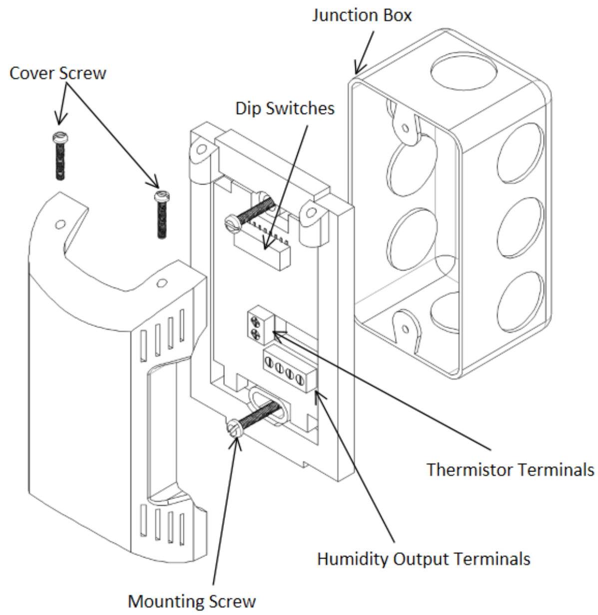


Figure 12. *Temperature and Humidity Sensor Detail (Plastic Wall Mount)*

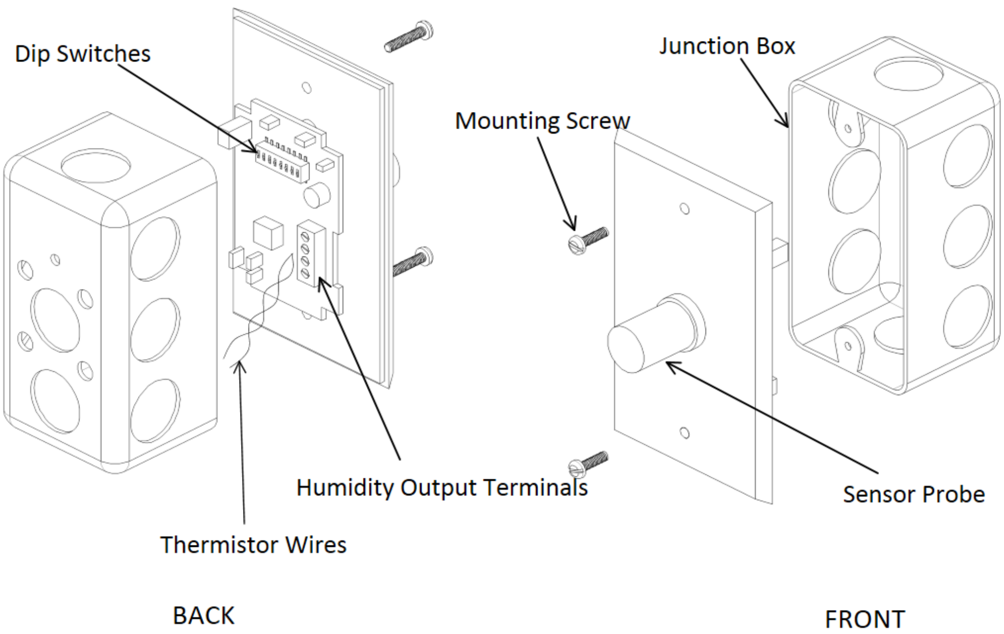


Figure 13. *Temperature and Humidity Sensor Detail (Stainless Steel Wall Mount Housing)*

The sensor has a bank of eight dip switches that control the range of the output voltage of the humidity sensor. Switches seven (7) and eight (8) need to be turned ON, and the rest should remain OFF. These dip switches can be seen in the sensor detail in **Figure 14**.

Once the sensor is wired to an input, enter the configuration menu of the RTULink via the onboard HMI and configure the corresponding input for the humidity sensor that was installed. In the **Figure 14** example, "RTU IN 1" would be configured for "SPACE RH".

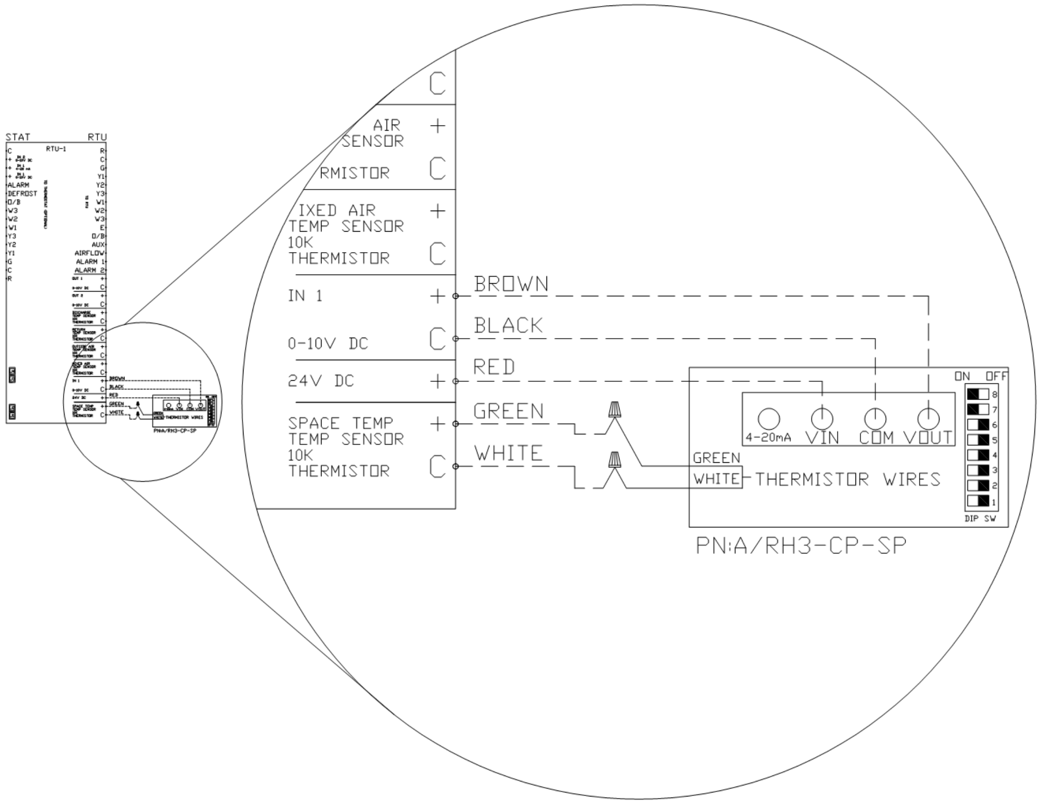


Figure 14. *Space Mounted Temp/Humidity Sensor Wiring*

Temperature and Humidity Sensor – Outdoor Mount

If exterior mounted temperature and humidity sensors are called for in the specifications, follow the instructions in this section.

An outdoor temperature and humidity sensor (PN: A/RH3-CP-O10) shall be mounted in an outdoor location that is free from direct weather and sunlight. This can be under an eave, intake, or any other area that is out of the elements.

Figure 15 shows a detail and terminology of the sensor. The sensor probe must be facing downward. Mount the sensor in the desired location using screws inserted into the mounting flanges. Use EMT conduit where sensor wiring would be exposed to the elements when routing wire back to the RTULink control board. When holes are made for connecting conduit to the knockout, make sure that they are properly sealed with liquid tight fittings to prevent moisture from entering the sensor housing. Standard 18-5 thermostat wire should be used for sensor wiring.

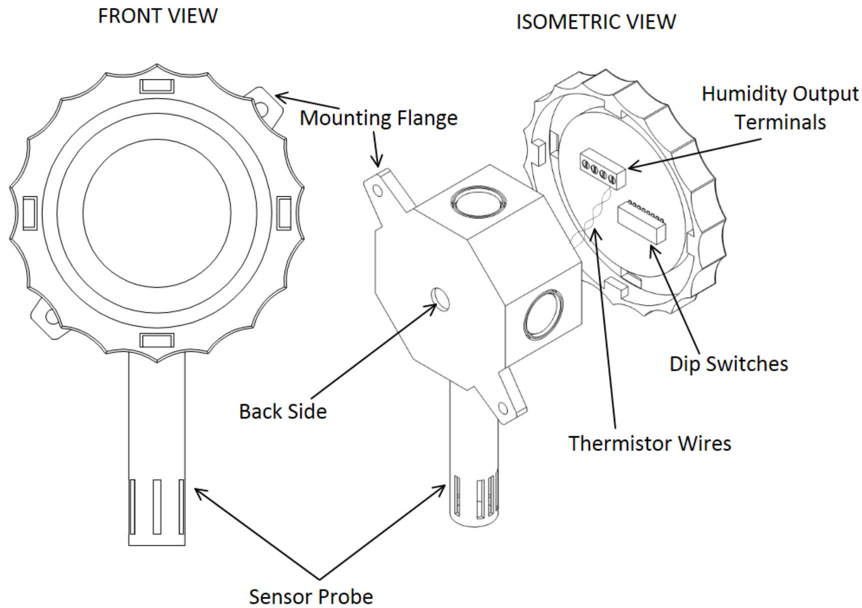


Figure 15. *Outdoor Temperature/Humidity Sensor*

The sensor has a bank of eight dip switches that control the range of the output voltage of the humidity sensor. Switches seven (7) and eight (8) need to be turned ON and the rest should remain OFF. These dip switches can be seen in the sensor detail in **Figure 16**.

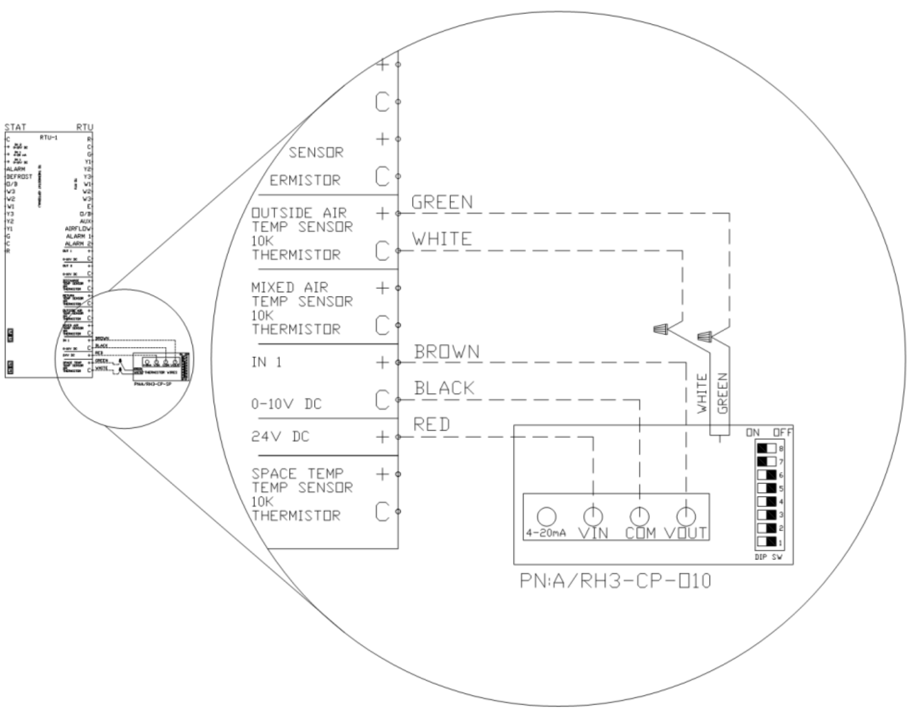


Figure 16. *RTULink - Outside Air Temp and RH*

Figure 16 is a wiring diagram of an outside air temperature and humidity sensor connecting to the “RTU” Input 1 on the RTULink.

Once the sensor is wired to an input, enter the configuration menu via the onboard HMI and configure the corresponding input for the Outdoor Air humidity sensor that was installed. In the above example, “RTU IN 1” would be configured for “OA RH”.

Relative Humidity – Duct Mount (Return or Discharge)

If a duct mounted humidity sensors is called for in the specifications, follow the instructions in this section.

A duct mounted (return or discharge duct) humidity sensor (PN: A/RH3-DO10) shall be installed in the duct of the RTU.

Figure 17 shows a detail and terminology of the sensor. A 1" hole should be drilled in the duct so the sensor probe can be inserted into the airstream. The sensor should be secured to the duct using the mounting flanges. Ensure that any holes in the duct are properly sealed. Use EMT conduit where sensor wiring would be exposed to the elements when routing wire back to the RTULink control board. Standard 18-5 thermostat wire should be used for sensor wiring.

The sensor has a bank of eight dip switches that control the range of the output voltage of the humidity sensor. Switches seven (7) and eight (8) need to be turned ON and the rest should remain OFF. These dip switches can be seen in the sensor detail in **Figure 18**.

Figure 18 is a wiring diagram of a duct mounted humidity sensor that is wired to the "RTU" Input 1 on the RTULink.

Once the sensor is wired to an input, enter the configuration menu via the onboard HMI and configure the corresponding input for the humidity sensor that was installed. In the example in Figure 18, the sensor was installed in the return duct, so "RTU IN 1" would be configured for "RA RH".

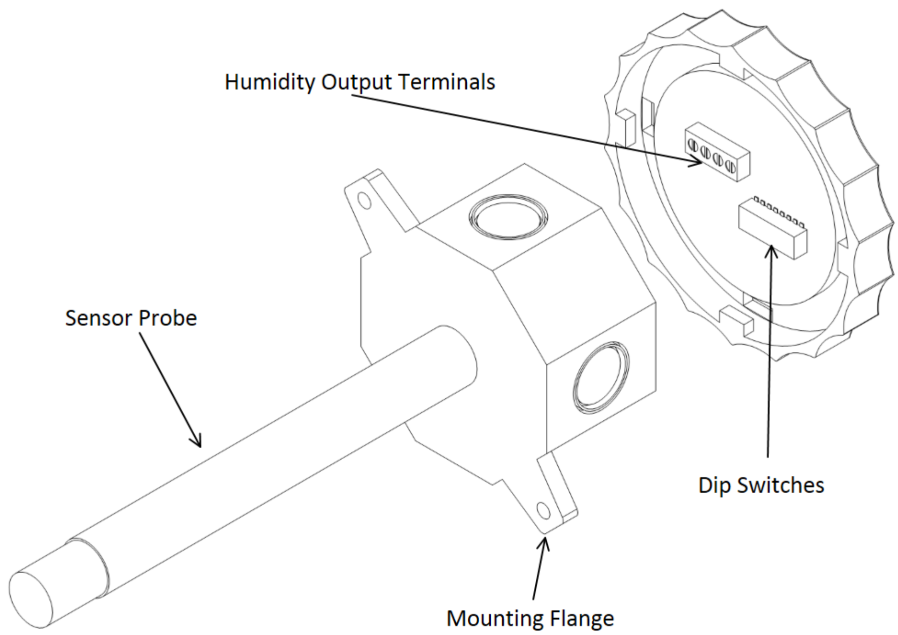


Figure 17. *Duct Mount Humidity Sensor*

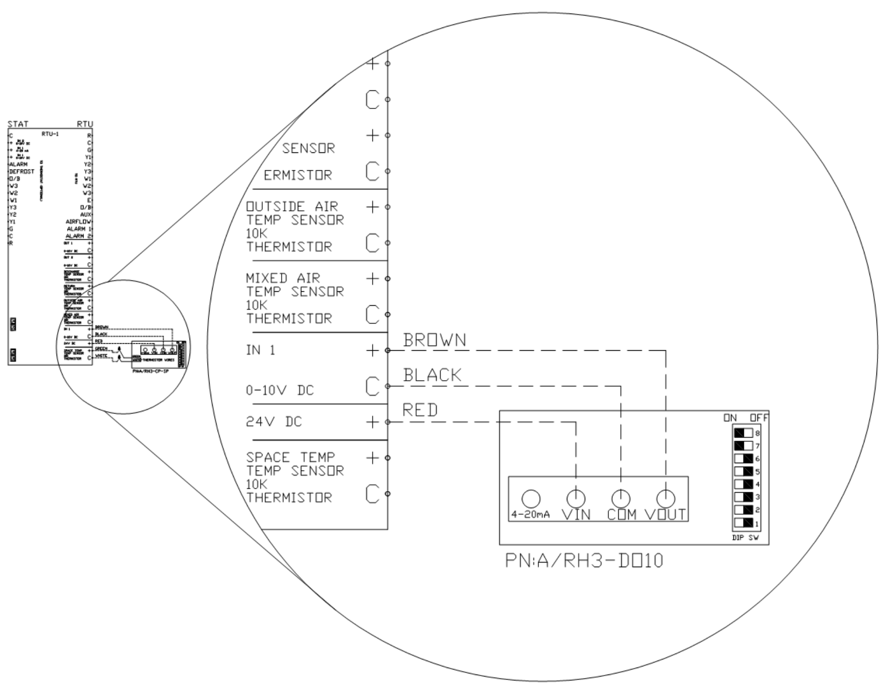


Figure 18. *RTULink - Duct Mount RH*

Carbon Dioxide Sensor – Duct Mount

If a CO_2 sensor is called for in the specifications or if CO_2 based demand control ventilation will be used for RTULink control, follow the instructions in this section.

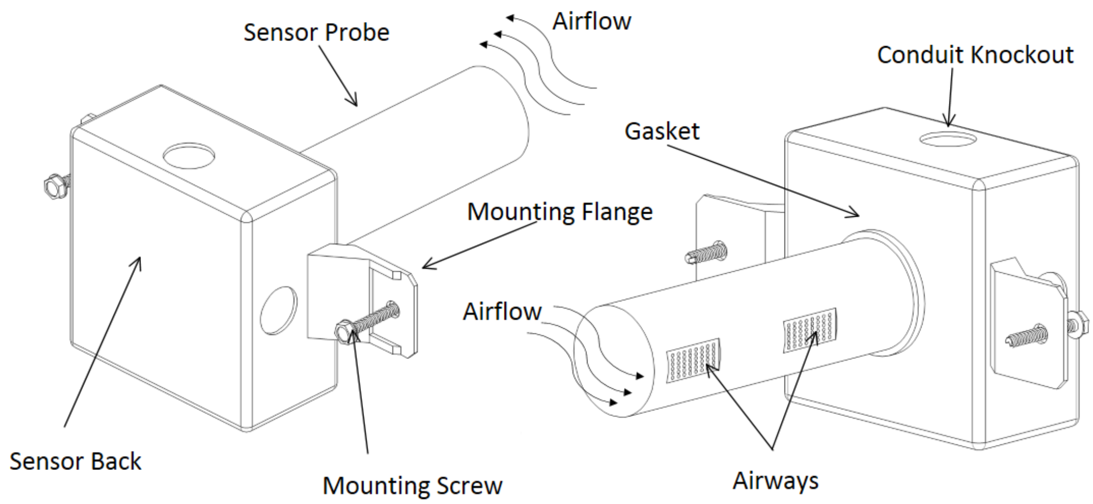


Figure 19. *CO2 Sensor Detail (Duct Mount)*

A CO_2 sensor (PN: A/CO2-D010) will need to be installed in a duct to measure carbon dioxide content of the air. A sensor detail and terminology can be seen in **Figure 19**. The most common application is to install this sensor in the return air duct, which effectively measures the CO_2 of the space. A 1½" or 1¼" hole should be drilled in the duct so that the sensor can be inserted into the airstream. Make sure that the provided gasket is installed on the sensor to prevent duct leakage. Refer to the airflow arrow on the sensor to determine the proper mounting orientation (air should hit the side of the probe opposite of the airways). Once the sensor is in its final position, secure it to the duct with self-tapping screws. Wire nuts will be provided with the sensor so that wire connections can be made. The sensor will be powered by 24VDC which will be supplied by the RTULink. The output voltage of the CO_2 sensor will need to be wired to a 0-10VDC input on the RTULink. A wiring diagram of a CO_2 sensor wired to Input 1 on the "RTU" side of the RTULink can be seen in **Figure 20**. Standard 18-5 wire should be used for sensor wiring.

Once the sensor is wired to an RTULink input, be sure to enter the configuration menu via the onboard HMI and configure this input for "CO2". In the **Figure 20** example, "RTU IN 1" will need to be configured as "CO2".

Note: This sensor has a rolling calibration that utilizes a normal occupancy CO_2 curve as a reference. If the building or space that this sensor will be installed in does not follow a normal occupancy bell curve, contact support.

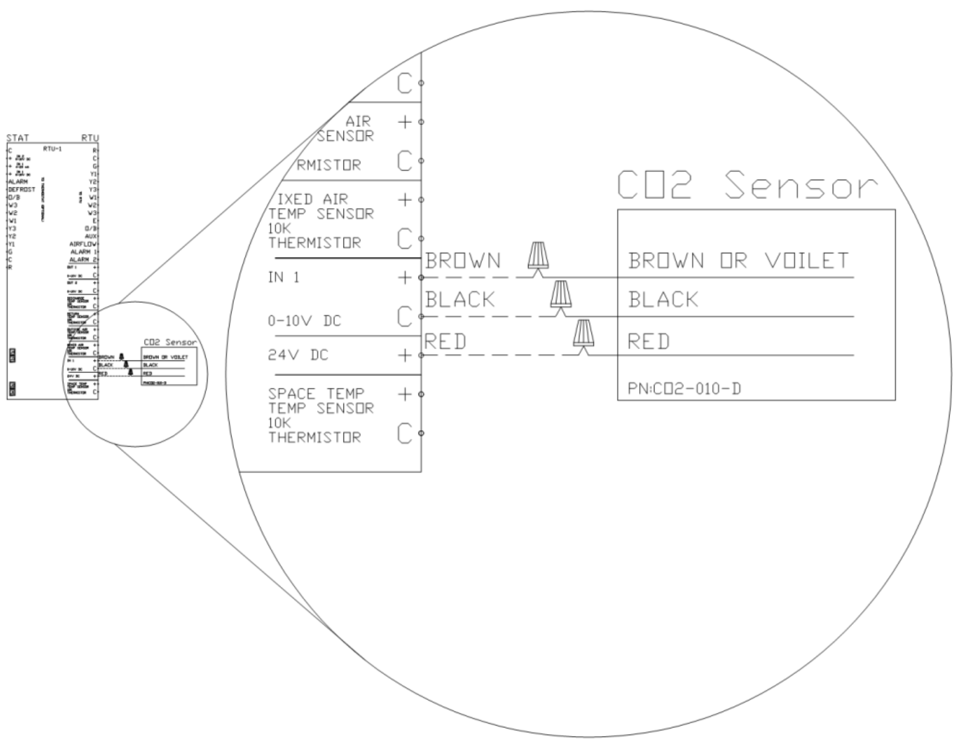


Figure 20. *CO2 – RTULink Wiring*

Current Transducer

If current transducer(s) are called for in the specifications, follow the instructions in this section.

A current transducer (CT) will be installed in the RTU control panel with mounting screws or on a piece of din rail. Energy consumption will be measured by routing the line wiring through the hole in the CT. For an RTU application, the CTs can measure condenser power consumption, heating element power consumption (if electric), or total RTU power consumption. These lines can usually be accessed inside of the RTU. Refer to RTU manufacturer documentation for detailed wiring schematics. Only one wire can be inserted through each CT for measurement.

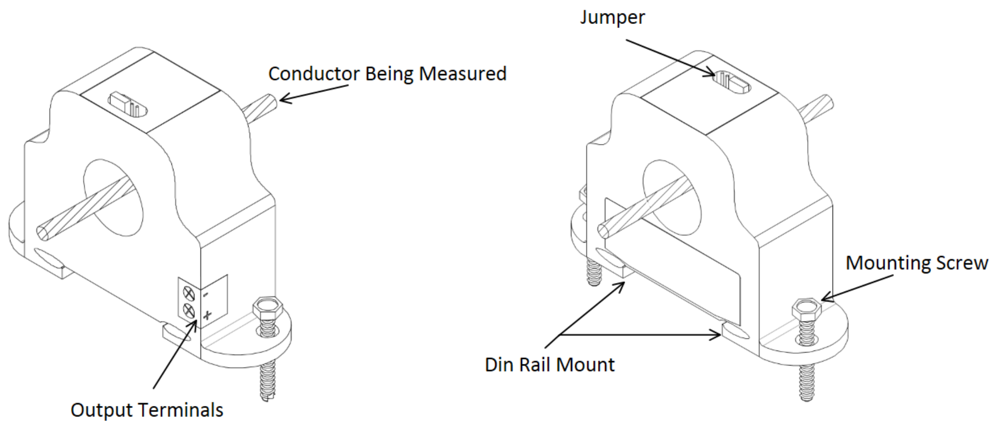


Figure 21. *Current Transducer Detail*

Set the current transducer jumper to monitor the closest amperage that is equal to or higher than the maximum expected current of the circuit that will be monitored (do not account for inrush current). For example, a condenser with a maximum amperage rating of 80 amps will have a current transducer jumper installed to monitor 100 amps (100 amp is the lowest setting that exceeds 80 amp). Connect the positive (+) and negative (-) terminals of the current transducer to the positive (+) and negative (-) terminals of a 0-10VDC input on the RTULink. PN: A/CTV-50 is used to measure components in the range of 10, 20, and 50 amps. PN: A/CTV-250 is used to monitor components in the range of 100, 200, and 250 amps. **Figure 21** shows a detail and terminology of a current transducer. For specialized applications out of these ranges contact support.

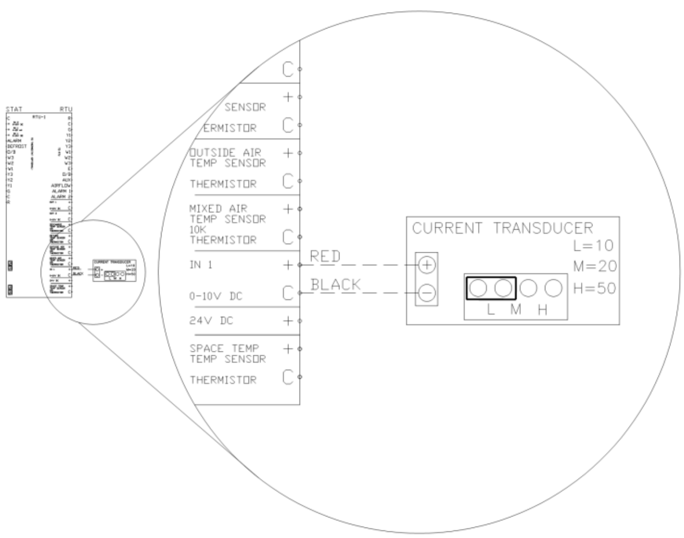


Figure 22. *CT – RTULink Wiring*

Figure 22 shows a wiring diagram of a current transducer that is wired to Input 1 on the "RTU" side of the board and whose jumper set to measure 10 Amps. Standard 18-2 wire should be used for sensor wiring. Once the sensor is wired to an input, enter the configuration menu via the onboard HMI and configure the corresponding input for "Current X". The X will represent the number of the current transducer that is installed on the RTULink (if this is the second, the X will be a 2). Next, "Current X" will need to be configured with the corresponding Amps/V. In the above example, the "RTU IN 1" would be configured for "Current 1" (since this is the first and only current transducer wired to the RTULink) and "Current 1" would then be configured for 1 Amps/V.

Optional Outputs

Damper/Economizer (0-10VDC)

If the RTULink will be controlling an 0-10VDC damper or economizer, it must be configured to accommodate this feature. Choose a 0-10VDC output on the "RTU" side of the RTULink that will be controlling the economizer. **Figure 23** is a wiring schematic of an economizer connected to Output #1. View the FUNCTIONALITY section of this manual to determine how to setup an economizer and how to change the set points that are associated with it. There are four economizer types that the RTULink has the capability of controlling: fixed dry bulb, differential dry bulb, fixed enthalpy, or differential enthalpy. Each economizer requires specific auxiliary sensors which are explained in **Table 3**.

For enthalpy economizers, enthalpy is calculated using temperature and relative humidity.

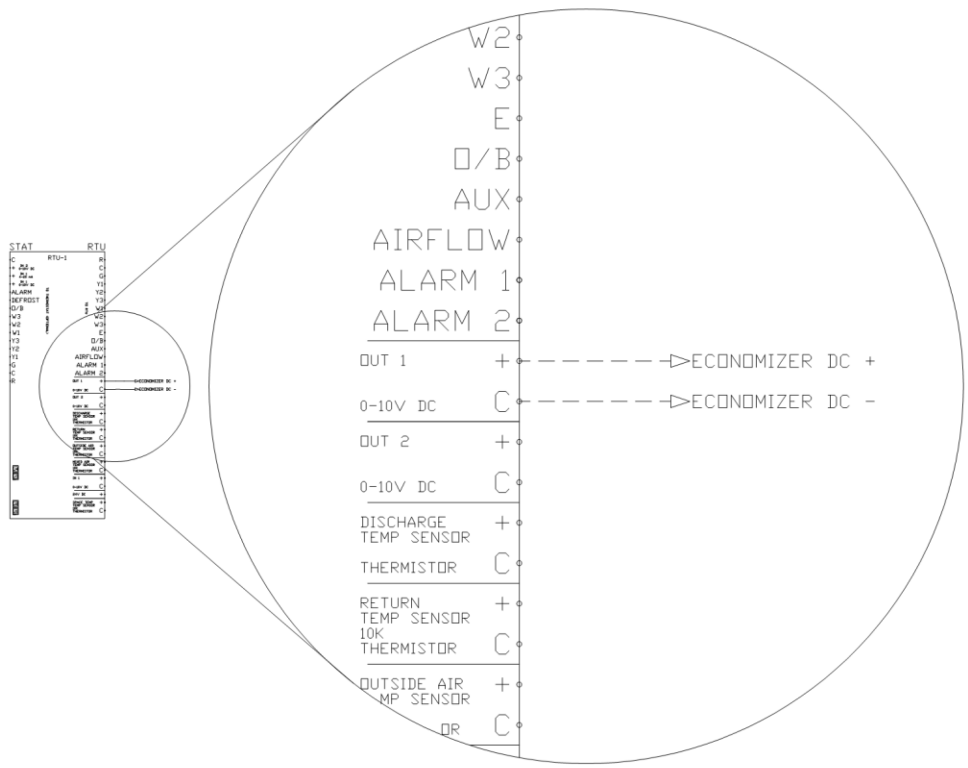


Figure 23. *Economizer Connected to Output #1 (0-10VDC)*

In **Table 3**, the outside air enthalpy is represented as OAE and the return air enthalpy is represented as RAE. View **APPENDIX C** for psychometric chart visuals on how the four economizer types operate.

Table 3. *Economizer Sensors*

Economizer Type	Required Sensor(s)	Modulate Open If
Fixed Dry Bulb	• Outside Air Temperature (OAT)*	If OAT < (Dry Bulb Set Point)
Differential Dry Bulb	• Outside Air Temperature (OAT)* • Return Air Temperature (RAT)*	If OAT < RAT
Fixed Enthalpy	• Outside Air Temperature (OAT)* • Outside Air Relative Humidity (OARH)	If OAE < (Enthalpy Set Point)
Differential Enthalpy	• Outside Air Temperature (OAT)* • Outside Air Relative Humidity (OARH) • Return Air Temperature (RAT)* • Return Air Relative Humidity (RARH)	If OAE < (RAE)

*Already included by default

Powered Exhaust Coil Signal ON/OFF (24VAC)

If the RTULink will be using 24VAC as the control signal for a powered exhaust, it must be configured to accommodate this feature. View the FUNCTIONALITY section of this manual to determine how to enable a powered exhaust output and how to change the settings that are associated with it. If configured, the 24VAC powered exhaust signal will use the AUX and C terminals on the "RTU" side of the RTULink as HOT and NEUTRAL respectively. **Figure 24** is a wiring schematic for a powered exhaust connected to AUX and C terminals. Standard 18-2 wire should be used for output wiring.

Note: This is a low voltage, low amperage powered exhaust coil signal that does not provide power to the powered exhaust, it only signals an ON/OFF state.

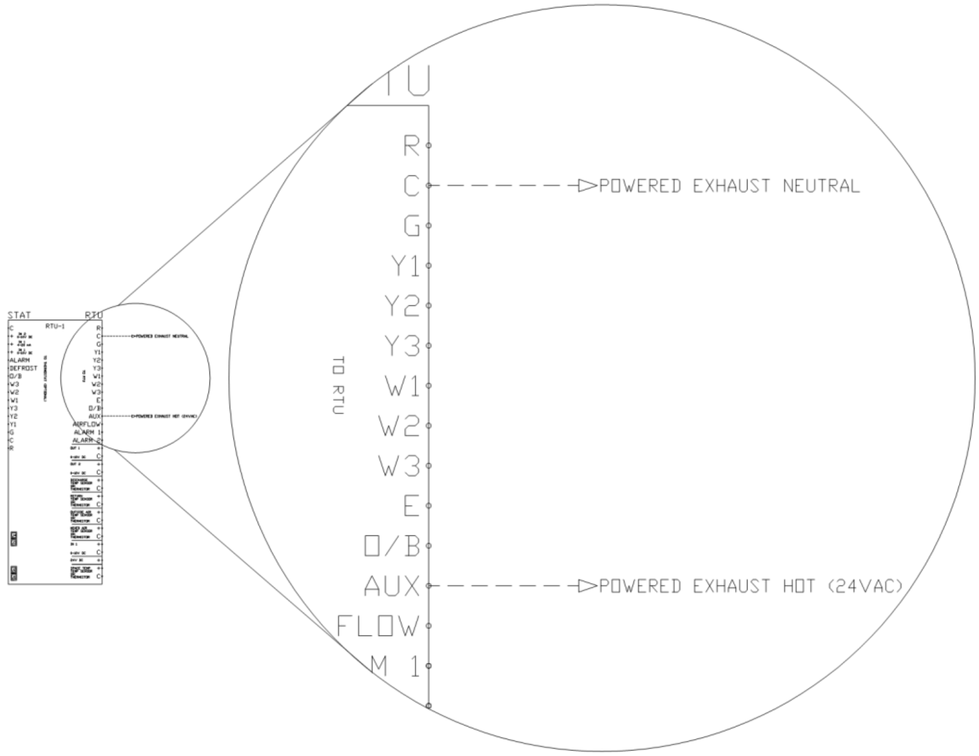


Figure 24. *RTULink - Powered Exhaust Coil Signal (24VAC Signal)*

Powered Exhaust (0-10VDC)

If the RTULink will be using a 0-10VDC as the control signal for a powered exhaust, it must be configured to accommodate this feature. Determine which 0-10VDC output on the "RTU" side of the RTULink will be used to control the powered exhaust. **Figure 25** is a wiring schematic for a powered exhaust connected to Output #2. View the FUNCTIONALITY section of this manual to determine how to enable a powered exhaust 0-10VDC output and how to change the settings that are associated with it. Standard 18-2 wire should be used for output wiring.

Note: This is a low voltage, low amperage control signal that does not provide power to the powered exhaust but signals a variable speed

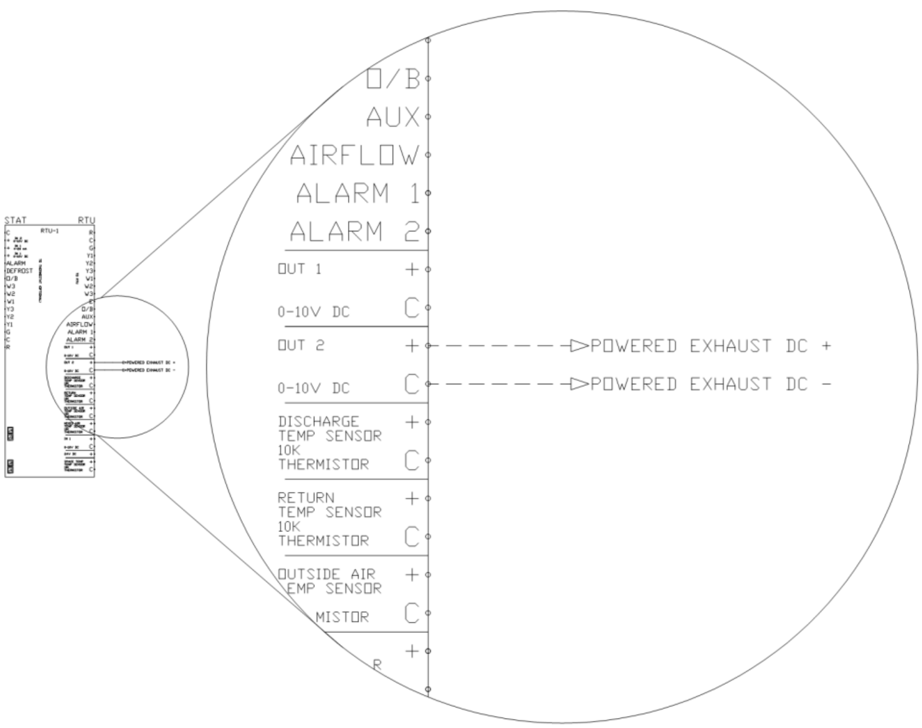


Figure 25. *RTULink - Powered Exhaust Connected to Output #2 (0-10VDC)*

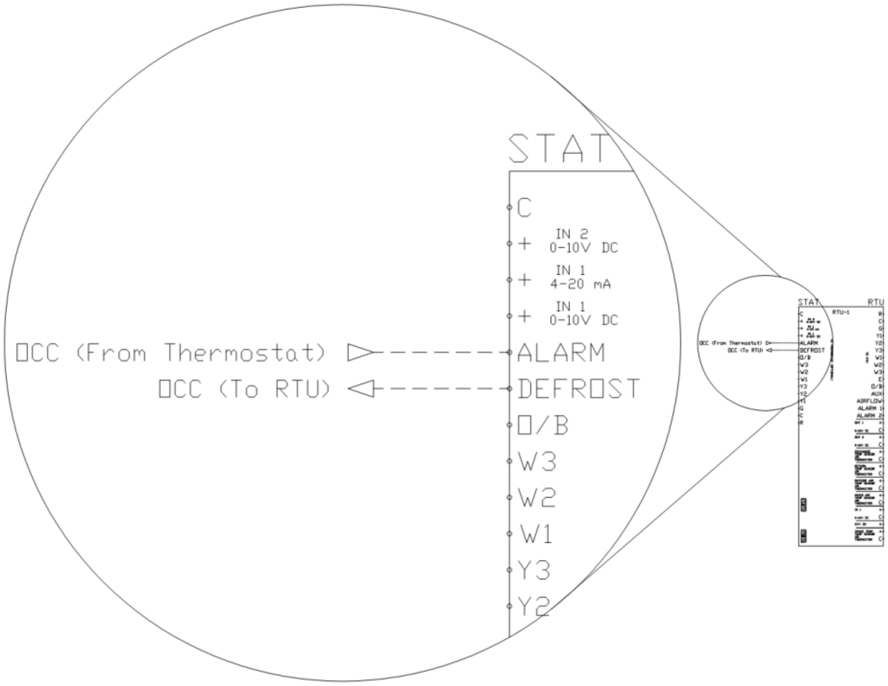


Figure 26. *RTULink – Occupied/Unoccupied*

Occupied/Unoccupied Signal (24VAC)

If the RTU occupancy will be controlled by an external, non-cloud based occupied/unoccupied signal, the RTULink must be configured to accommodate this feature. "Occ/Unocc Enable" must be enabled in the configuration menu. View the FUNCTIONALITY section of this manual for details on how to accomplish this. Once this feature is enabled, the RTULink must we wired accordingly. Wire the DEFROST terminal on the TO THERMOSTAT side of the RTULink to the RTU occupied terminal (this will send the occupied signal to the RTU). If an external thermostat is going to be wired to control the occupied signal, wire the occupied terminal on the thermostat to the ALARM terminal on the "THERMOSTAT" side of the RTULink (this will receive the signal from the thermostat). View **Figure 26** for detailed wiring schematic.

START-UP PROCEDURE

This startup procedure should be followed once the installation procedure has been completed for all RTULinks at the site. The HMI on the RTULink has four buttons below the screen that are labeled “MENU”, “UP”, “DOWN”, and “ENTER”.

Pressing “MENU” backs out one menu selection and is the opposite of pressing “ENTER”. Pressing “UP” or “DOWN” cycles through the current menu options. Pressing “ENTER” selects the current menu setting displayed on the HMI.

1. The RTULink should be powered by incoming 24VAC from an RTU transformer. Once powered, the HMI will power on (indicated by the backlight turning on) and immediately display “START UP CONFIG” in text on the screen. Press ENTER to move into the Hardware Configuration menu.
2. The Hardware Configuration menu contains parameters that are unique to the hardware of the RTU that the RTULink is installed in. This menu is treated similar to a setup wizard and is performed only once at the beginning of the startup procedure. If a hardware configuration parameter is incorrectly set or if the RTULink board is switched from one RTU to another or if Hardware Configuration parameters need to be changed for some reason, a “Factory Reset” will need to be performed. Enter and configure the parameters in this menu and continue once every parameter has been considered.
3. Once the Hardware Configuration has been set, enter the “Configuration” menu with the password 9002. The “Configuration” menu contains operational mode settings and parameters. The Control Mode is the second parameter that will be available in the “Configuration” menu (when cycling down through the menu). The remainder of the “Configuration” menu will contain parameters exclusive to the control mode that is being utilized. Examples include timers to reduce cycling, timers to increase energy efficiency, economizer settings, input configuration, etc. View the mode definitions in the FUNCTIONALITY section of this manual to determine which operational mode should be utilized.

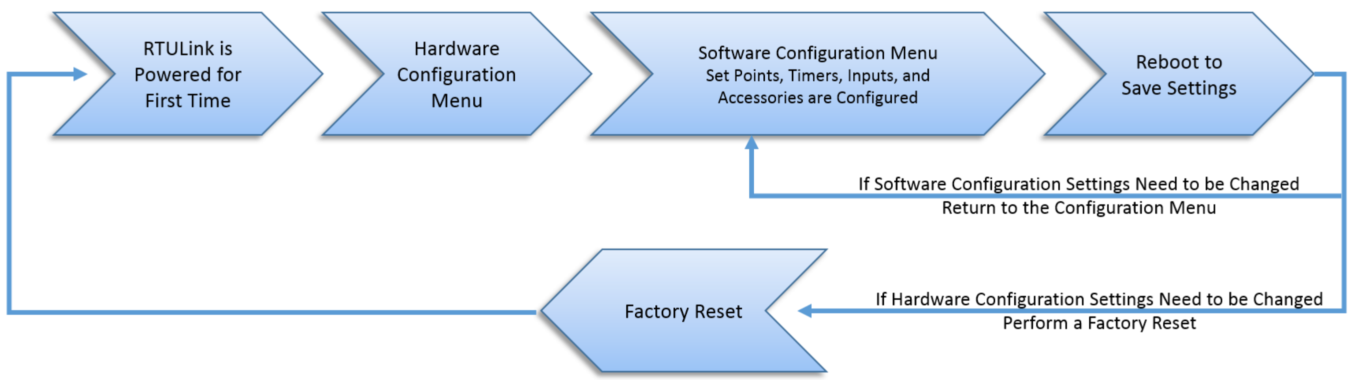


Figure 27. *RTULink System Diagram*

RTULink MODES OF OPERATION

Read through the operation mode descriptions below to determine which one best fits the application. It is recommended that all RTULinks at a site be configured for the same operational mode. Global scheduling abilities via CASLink will be lost if RTULinks are set to different operational modes. Once a mode is configured on the RTULink, the configuration menu will hide parameters that do not pertain to the current control mode. To get a full list of the settings that apply to a control mode, view the FUNCTIONALITY section of this manual.

Full Control

Full control mode requires a tempering sensor to be configured and is the operational mode that allows the highest level of remote control. RTULinks can be fully configured via the CASLink interface. This control mode allows access to all features outlined in this document. Once configured and connected to CASLink, the RTULink will provide all the information necessary to fine-tune RTU operation. This includes multi-block scheduling where soft starts can be utilized and peak load energy usage can be reduced. This is the recommended method of control due to the ability to customize HVAC operation to building and climate parameters. **Note: When this control mode is configured, an external thermostat is no longer used for RTU control.**

Monitor Only

Monitor only mode allows no control from the CASLink website. The RTULink board passes through all commands it receives from a thermostat. This mode is utilized when RTUs will be controlled with an external thermostat at all times. RTU temperatures and signal status' can still be monitored through CASLink. CASLink will issue alerts or faults to indicate improper unit operation but no action will be taken to correct the fault. An external thermostat is required in order to operate in this control mode.

External Mode

External mode is a hybrid control mode. It offers the ability to control an RTU with a thermostat while impeding or interrupting signals only when the thermostat is calling for an operation that is not energy efficient or is not desirable for the equipment or the building. There are two sub-modes of external control mode:

- **Without a Tempering Sensor**
  External mode without a tempering sensor connected allows the RTULink to apply logic that does not rely on a known space temperature. This logic includes things such as minimum on and off timers, minimum damper position, occupancy schedule, etc. CASLink will issue alerts or faults to indicate improper unit operation and will only take corrective action if the operation is deemed not desirable or energy inefficient. An example of this would be preventing compressor cycling. Another example would be forcing the blower to an ON state when the building is occupied via a CASLink occupancy schedule.

- **With a Tempering Sensor**
  External mode with a tempering sensor connected allows the RTULink to apply more logic than when a tempering sensor is not present. This logic includes, high and low space temperature limit thresholds, emergency heat differentials, economizer operation, etc. CASLink User Interface (UI) will allow thermostat overrides (temporary override of heat and cool set points) and will issue alerts or faults to indicate improper unit operation. This is to prevent a malfunctioning thermostat from impeding operations. An example of this additional logic would be if the space temperature is above a user-defined threshold and the RTU is still heating, disable unit heating until the space temperature drops below the threshold.

Emergency Heat

The emergency heat mode will operate if the RTU utilizes an emergency heat function.

FUNCTIONALITY

Info

From the Home Screen, press the DOWN button once, and “Info” will be displayed on the screen. Press ENTER to enter the “Info” menu. The options below will appear in order as the DOWN button is pressed.

Temperature - The temperature sensor values are displayed in this menu. If no sensors are connected, the HMI will indicate that the sensor is disconnected.

HMI Humidity - Humidity Sensor values are displayed in this menu. If no sensors are connected, the HMI will indicate that the sensor is disconnected.

Date/Time - The date in MM/DD/YYY format will be displayed on the top line of the HMI display. The military time in HH:MM:SS format will be displayed on the bottom line of the HMI.

Inputs - The status of inputs are displayed in this menu. 24VAC binary inputs are displayed in the format of “ON” or “OFF”. Analog inputs are displayed as the raw value of the signal being received by the RTULink.

Outputs - The status of outputs are displayed in this menu. 24VAC binary outputs are displayed in the format of “ON” or “OFF”. Analog outputs are display as the raw value of the signal being transmitted by the RTULink.

Timers - The status of active timers will be displayed in this menu. Timers will appear with names on the top line of the display and time remaining in the timer on the bottom line of the display. Timer nomenclature and definitions are explained in the CONFIGURATION section of this document. Press Enter and cycle through the timers with the UP and DOWN buttons.

Current Settings - The configuration settings are displayed in this menu. No settings or parameters can be changed in this menu, current settings can be viewed. Refer to **Configuration on page 25** for nomenclature explanations used in this menu.

Hardware Config - The hardware configuration settings are displayed in this menu. No settings or parameters can be changed in this menu, current settings can be viewed. When “Hardware Config” is displayed on the Board HMI, press ENTER to enter the menu. To cycle through the menu options rapidly, the UP or DOWN button can be pushed and held in.

Use Ext Stat? - Displays wiring configuration of the external thermostat being used.

Tempering Sensor - Displays the thermistor (if any) that will be used for RTU tempering. The RTULink will try to heat or cool as necessary until the temperature of the thermistor selected here is within the set point range.

Heat Pump - Displays the wiring configuration that the RTULink will output to the RTU.

HP O/B Mode - Heat pump O/B mode sets whether the O/B terminal is energized with a call for heating or a call for cooling. If “energize w/ heat” is selected, the RTULink will signal a call for heating with terminals Y and O/B. If “energize w/ cool” is selected, the RTULink will signal a call for cooling with terminals Y and O/B.

Damper? - Displays if the RTULink damper or economizer is controlled by a 0-10VDC signal.

Heat Stages - Displays the number of heating stages that are equipped on the RTU.

Cool Stages - This sets the number of cooling stages that the RTU is equipped with.

Version - Displays the current software version. This version must match the space HMI version software too.

Configuration

Press MENU button until the home screen appears. The password to enter this menu is 9002. The options below will appear in order as the DOWN button is pressed. **All of these selections may not be visible, refer to Main Board HMI Menu Tree on page 30 for full list of menu options.** Press ENTER and adjust this set point. Use the UP and DOWN buttons to adjust set point. Press ENTER to set value.

Modbus Address - Modbus addressing begins at 60, so unit number 1 will be assigned 60. Modbus 61 will be assigned to unit number 2. Modbus 62 will be assigned to unit number 3, etc. It is important to number the units in accordance with the mechanical plans.

Control Mode - When scrolling through the menu, the board will adjust between the following settings, Full Control, External Control, Monitor Only, and Emergency Heat. Control mode definitions are explained in detail in **RTULink MODES OF OPERATION on page 24**.

Tempering Sensor - If "Space" is selected, the space thermistor will be used as the tempering sensor. If "Return" is selected, the return air thermistor will be used as the tempering sensor.

 # Heat Stages - Sets the number of heating stages that are equipped on the RTU.

 # Cool Stages - Sets the number of cooling stages that are equipped on the RTU.

Heat Pump Enable - Setting to enable or disable heat pump.

HP O/B Mode - For heat pump units, this will set the reversing valve to activate for heating or cooling.

Heat Pump Lock - If the heat pump temperature is below the temperature setting, the heat pump will be locked out.

Mode Change Time - Mode change time is only applicable to heat pumps. This is the time required to elapse to change state (from heating to cooling or cooling to heating). For example, a heat pump must be off after heating for the duration of this timer to reverse the condenser valve and change to cooling. If the condenser valve is switched rapidly it will damage the condenser, so this timer is intended to increase the condenser's life.

# of HMIs - Sets the number of HMIs connected to the system.

Screen Saver - Setting to enable screen saver option.

Lock Screen - Displays information on the Space HMI when the screen is inactive.

HMI 'x' Avg Enable - Sets if averaging is ON or OFF.

Heating SP - The heating set point is the default set point that the RTULink defaults to if it ever comes out of a schedule from CASLink or has never received a schedule from CASLink (during startup). If the tempering sensor is below this set point plus the Heat Hysteresis value, the RTULink will send a signal for heating.

Cooling SP - The cooling set point is the default set point that the RTULink defaults to if it ever comes out of a schedule from CASLink or has never received a schedule from CASLink (during startup). If the tempering sensor is above this set point plus the Cool Hysteresis value, the RTULink will send a signal for cooling.

Blower Mode - Blower mode is the blower's default status that the RTULink defaults to if it ever comes out of a schedule from CASLink or has never received a schedule from CASLink (during startup).

Airflow Required – Setting to turn on/off proving for airflow.

Blower Delays - Setting to enable or disable blower delays.

Blower On Delay - Time setting for Blower On Delay.

Blower Off Delay - Time setting for Blower Off Delay.

Enable Max HP - Setting to enable or disable maximum heat pump runtime.

Max HP Runtime - Time setting for heat pump runtime before auxiliary heat activates

Emer. Heat Lock - Setting to enable or disable emergency heat.

Lockout Temp - If the outside air temperature is below the temperature setting, emergency heat will be locked out.

Min Blower Time - Minimum blower time is the minimum amount of time the blower is required to be ON before turning OFF, and the minimum time it is required to be OFF before turning ON. This setting is intended to reduce the blower from cycling, and improve the lifespan of the motor and belts if applicable.

Emer Heat Config - Emergency heat configuration determines if an emergency heat feature is present on the RTU and what is used to control it.

Emer Heat Diff - Emergency heat differential is the temperature differential from the heating set point in degrees Fahrenheit at which emergency heat will be activated. For example, if the tempering thermistor goes below this set point, the RTULink will send an emergency heat signal on the “E” terminal.

Heat Diff Stg 2 - Second stage heating temperature differential is the number degrees Fahrenheit below the heating set point that the tempering sensor must be to allow a call for the second stage of heating.

Heat Diff Stg 3 - Third stage heating temperature differential is the number degrees Fahrenheit below the heating set point minus the Heat Diff Stg 2 that the tempering sensor must be to allow a call for the second stage of heating.

Cool Diff Stg 2 - Second stage cooling temperature differential is the number degree(s) Fahrenheit above the cooling set point that the tempering sensor must be to allow a call for the second stage of heating.

Cool Diff Stg 3 - Third stage cooling temperature differential is the number degree(s) Fahrenheit above the cooling set point plus the Cool Diff Stg 2 that the tempering sensor must be to allow a call for the second stage of heating.

Heat Hysteresis - Heat hysteresis is the number of degree(s) Fahrenheit the tempering stat is allowed to be above the heating set point before the RTULink will stop a call for heating.

Cool Hysteresis - Cool hysteresis is the number of degree(s) Fahrenheit that the tempering stat is allowed to be below the cooling set point before the RTULink will stop a call for cooling.

Min Heat On Tim(e) - Minimum heat on time is the time that the heating signal is required to be ON before it is allowed to turn OFF. This timer is intended to reduce heater cycling and increase life cycle of the heating components. The timer is in a MM:SS format and is adjustable from 00:00 to 20:00.

Min Cool On Tim(e) - Minimum cool on time is the time that the cooling signal is required to be ON before it is allowed to turn OFF. This timer is intended to reduce condenser cycling and increase life cycle of the cooling components. The timer is in a MM:SS format and is adjustable from 00:00 to 20:00.

Min Heat Off Tim - Minimum heat off time is the time that the heating signal is required to be OFF before it is allowed to turn ON. This timer is intended to reduce heater cycling and increase life cycle of the heating components. The timer is in a MM:SS format and is adjustable from 00:00 to 20:00.

Min Cool Off Tim - Minimum cool off time is the time that the cooling signal is required to be OFF before it is allowed to turn ON. This timer is intended to reduce condenser cycling and increase life cycle of the cooling components. The timer is in a MM:SS format and is adjustable from 00:00 to 20:00.

Set Point Limit - Setting to enable set point limit adjustments.

Sp Limit Adjust - Setting to adjust set point limit temperature.

Max X Stg RunTim - Maximum X stage runtime is the maximum time that a stage is allowed to run before the RTULink calls for the next stage (if applicable). For example, if stage x has been running for the duration of this timer, then force stage x+1, if the unit is equipped with a stage x+1. This timer applies to heating and cooling. This timer is intended to increase efficiency by not allowing a unit to continuously run while not satisfying set points. The timer is in a MM:SS format and is adjustable from 00:00 to 120:00. If this feature is not desired, set the time to 00:00.

Occ Intlk Type – When set to Passthrough, allows a hardware input (on the ALARM terminal of the stat side of the RTULink) which will output a defrost signal to the RTU side. When set to Interlock, this will force the RTULink into an occupied state in scheduling and forces the blower on.

Space Air Stat - If a space air stat is used, this option should be set to Yes.

Discharge Stat - If a discharge stat is used, this option should be set to Yes.

Return Air Stat - If a return air stat is used, this option should be set to Yes.

Outside Air Stat - If an outside air stat is used, this option should be set to Yes.

Mixed Air Stat - If a mixed air stat is used, this option should be set to Yes.

Aux Out Type - Auxiliary output type sets the use for the 24VAC auxiliary output signal. If a powered exhaust is selected for this output, it will eliminate the option to control a powered exhaust with a 0-10VDC signal.

Damper - Setting to turn on/off damper.

Out #1 0-10VDC - Output #1 configures the use for OUT #1 on the "To RTU" side of the RTULink.

Out #2 0-10VDC - Output #2 configures the use for OUT #2 on the "To RTU" side of the RTULink.

Out #1 Range - Output 1 range is the voltage range that the component connected to output 1 is designed to operate with. Once set, the RTULink will use the low-end voltage of this range for an OFF signal and the high-end voltage of this range for a fully modulated ON signal.

Out #2 Range - Output 2 range is the voltage range that the component connected to output 2 is designed to operate with. Once set, the RTULink will use the low-end voltage of this range for an OFF signal and the high-end voltage of this range for a fully modulated ON signal.

Power Exh Thrsh - Powered exhaust threshold is the percentage open the economizer/damper must be in order for the powered exhaust to turn on. For an ON/OFF powered exhaust, this is the threshold at which it turns on. For a modulating powered exhaust, the speed of the exhaust will modulate linearly as the economizer/damper opens from this threshold to fully open (100% open).

Economizer Type - Economizer type sets the type of economizer logic that will be used. This only applies if the RTULink will be used to control an economizer that accepts a 0-10VDC signal. This feature will control the economizer using an output on the RTULink. If you are unaware whether or not the RTU is capable of this feature, contact technical support.

Use Diff Econ? - This parameter determines whether or not to use fixed or differential enthalpy. If this parameter is set to yes, then differential economizer logic will be used, if this parameter is set to no, then fixed economizer logic will be used. View **APPENDIX C** for enthalpy economizer operation and logic.

Dry Bulb Band - Dry bulb band is the modulation band for the dry bulb economizer in degrees Fahrenheit. View **APPENDIX C** for dry bulb economizer operation and logic.

Enthalpy Band - Enthalpy band is the modulation band for the enthalpy economizer in BTU per pound (btu/lb). View **APPENDIX C** for enthalpy economizer operation and logic.

Econ Temp SP - Enthalpy temperature set point is the temperature set point in degrees Fahrenheit for the enthalpy economizer. View **APPENDIX C** for enthalpy economizer operation and logic.

Econ RH SP - Economizer relative humidity set point is the relative humidity set point (%) for the enthalpy economizer. View **APPENDIX C** for enthalpy economizer operation and logic.

Econ Cool Disbl - Economizer cool disable is the percentage open the economizer/OA damper must be in order for mechanical cooling to be disabled. View **APPENDIX C** for economizer operation and logic.

Min OA Damper % - Minimum outside air damper percentage is the percent open the damper will be during occupied times. During unoccupied times, the damper will close completely for energy conservation. The RTULink occupancy schedule defaults to occupied, so once this is set, the damper will open to a minimum position until it receives an unoccupied schedule block from CASLink. When the RTULink loses a schedule, it defaults to this minimum outside air damper position.

CO2 OA DCV? - Carbon dioxide based demand control ventilation (DCV) strategy will allow a reduction of OA when space CO_2 levels are below a threshold. This feature requires a CO_2 sensor to be installed in a space or return that will accurately measure the CO_2 levels of the space supplied by the unit and it requires the outside air damper to be controlled by the RTULink. The intent of this feature is to reduce energy consumption by reducing the outside air load on the space when possible.

CO2 OA Thresh - Carbon dioxide based threshold is the value in parts per million (ppm) that the CO_2 levels can reach before forcing the units outside air damper is forced to fully open. This parameter is only relevant if the CO2 OA DCV option is enabled.

Scheduling - Menu to set scheduling to be ON or OFF. If disabled, the RTULink will always operate with the default settings configured through the board HMI. If enabled, settings can be overridden through CASLink.

Occ Override - Menu to set occupied override to be ON or OFF. When set to ON, the state of occupancy can be overridden on the HMI.

Override Time - Length of override timer. If override is active, it can be manually stopped by pressing the end override button on the HMI. The default setting is 1 hour but can be adjusted up to 16 hours.

RTU 0-10V In #1 / STAT 0-10V In #1 / STAT 0-10V In #2 - These three inputs are the parameters that configure the RTULink analog inputs.

Currnt 1: Amps/V; Currnt 2: Amps/V; Currnt 3: Amps/V - The Current 1, 2, and 3 Amps/V setting are what allows the voltage signal that the current transducer outputs to be converted to Amps. View the current transducer documentation to determine the amperage per volt supplied by the current transducer.

Diagnostics - Diagnostics mode allows for binary and analog inputs to be turned ON/OFF and UP/DOWN respectively. This feature can be utilized during startup or debugging scenarios.

Factory Reset - Factory reset will reset the RTULink to the hardware configuration menu (as it was when it was first programmed). Once this is performed, the RTULink will return to the Hardware Configuration menu with no settings applied.

Faults

Press MENU button until the home screen appears. **All of these selections may not be visible, refer to Main Board HMI Menu Tree on page 30 for full list of menu options.**

Active Faults – Contains the current faults on the board.

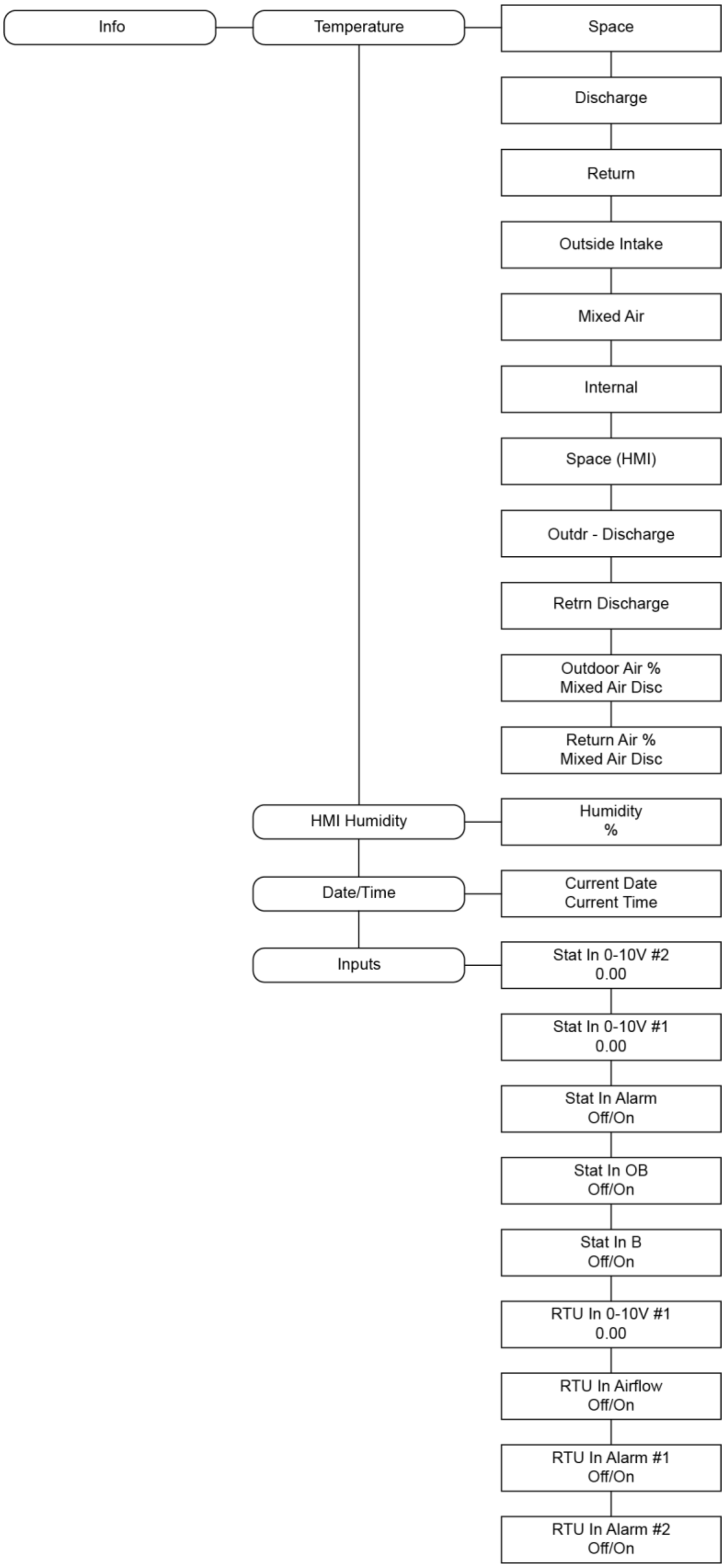
Fault History – Displays time stamped history of the last 20 faults, most recent fault showing first.

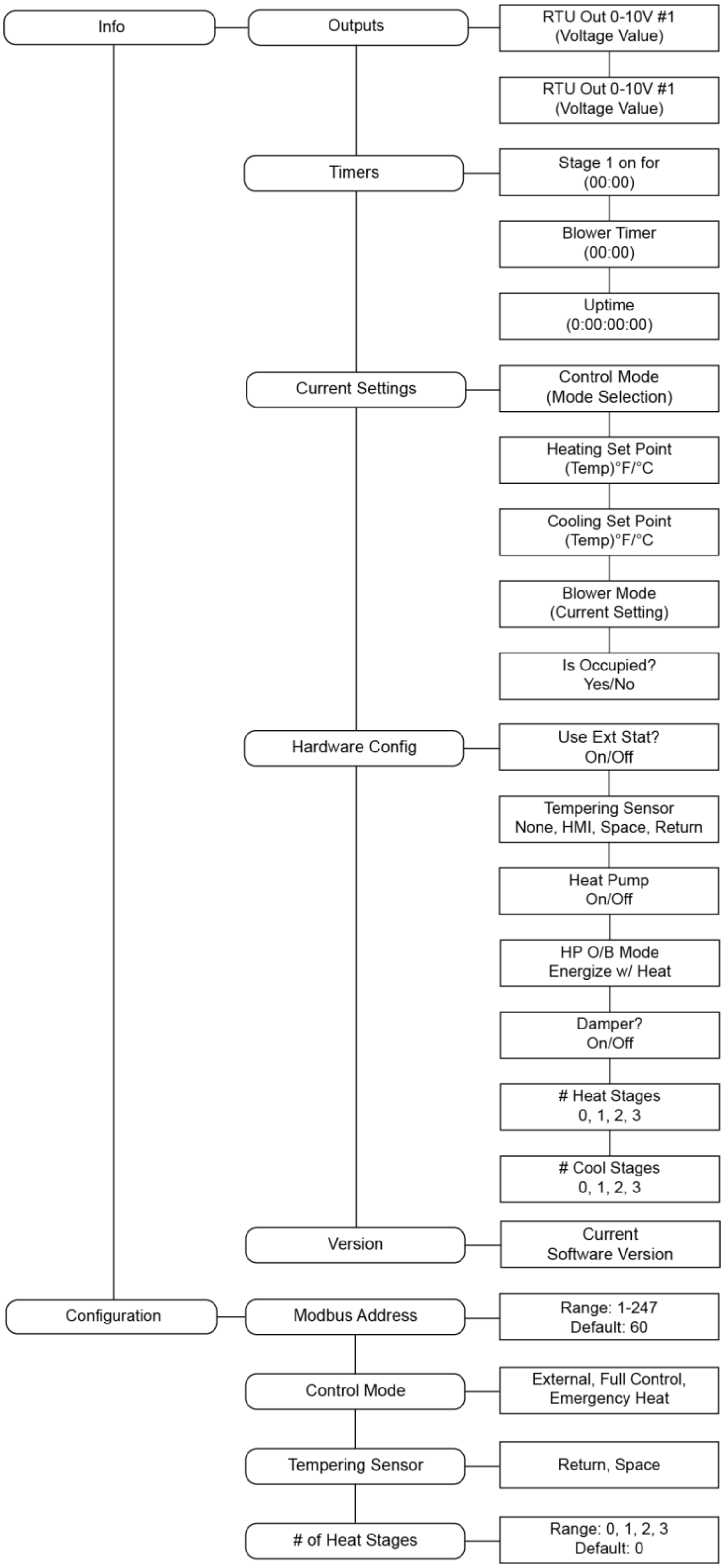
Clear Faults – This will clear the entire fault history. If there is an active fault when cleared, that fault will show up until it is fixed.

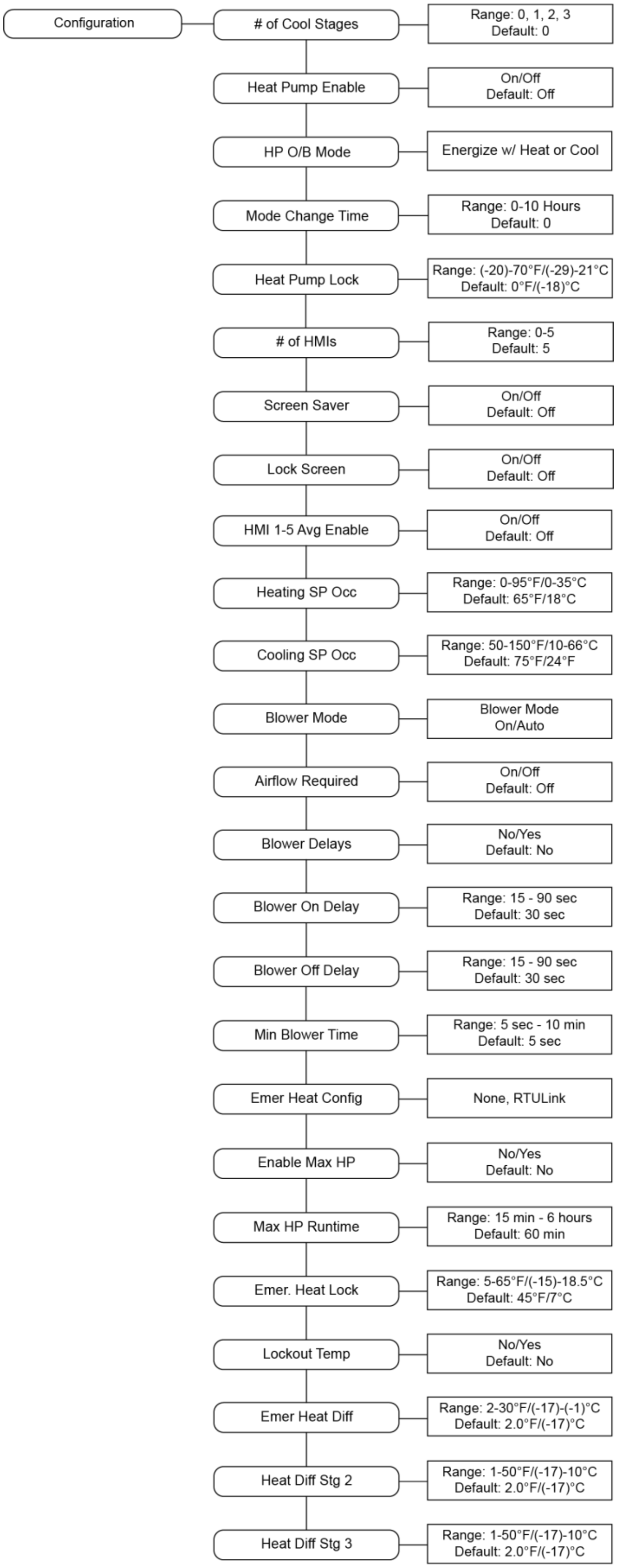
Reboot

This menu allows the user to reboot the system.

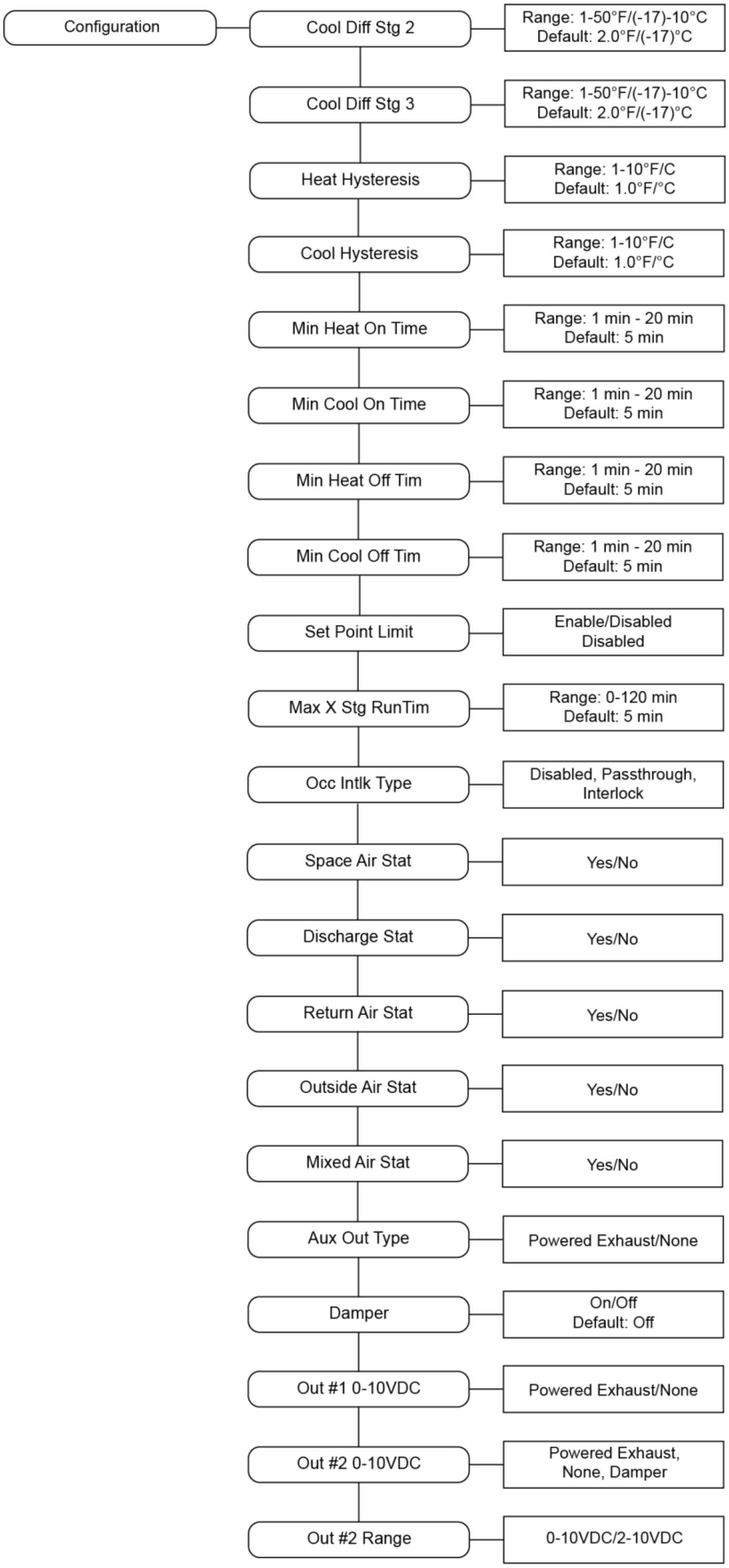
Main Board HMI Menu Tree

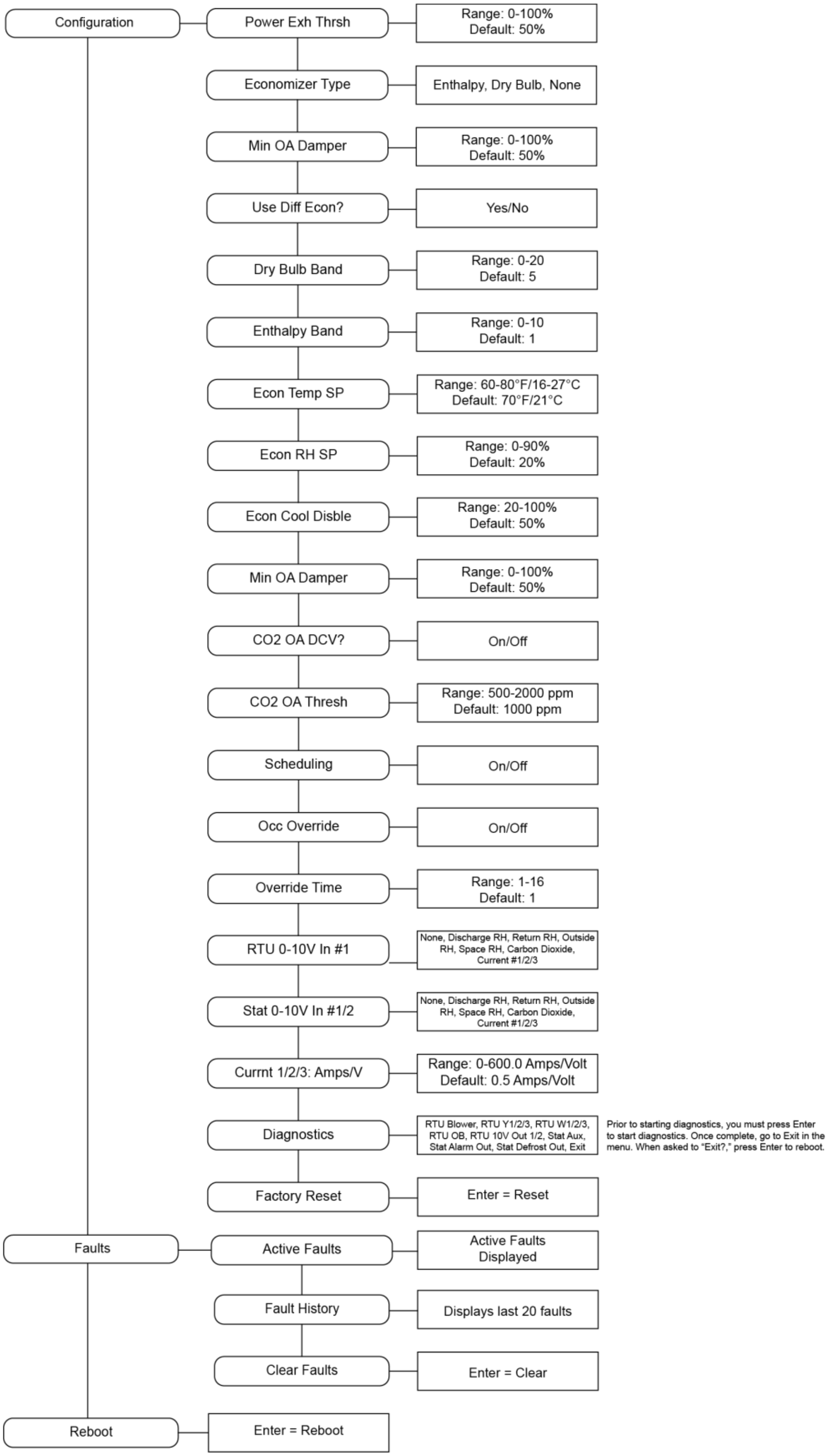



Info
Outputs
RTU Out 0-10V #1
(Voltage Value)
RTU Out 0-10V #1
(Voltage Value)
Timers
Stage 1 on for
(00:00)
Blower Timer
(00:00)
Uptime
(0:00:00:00)
Current Settings
Control Mode
(Mode Selection)
Heating Set Point
(Temp)°F/°C
Cooling Set Point
(Temp)°F/°C
Blower Mode
(Current Setting)
Is Occupied?
Yes/No
Hardware Config
Use Ext Stat?
On/Off
Tempering Sensor
None, HMI, Space, Return
Heat Pump
On/Off
HP O/B Mode
Energize w/ Heat
Damper?
On/Off
Heat Stages
0, 1, 2, 3
Cool Stages
0, 1, 2, 3
Version
Current
Software Version
Configuration
Modbus Address
Range: 1-247
Default: 60
Control Mode
External, Full Control,
Emergency Heat
Tempering Sensor
Return, Space
# of Heat Stages
Range: 0, 1, 2, 3
Default: 0



Configuration
# of Cool Stages
Range: 0, 1, 2, 3
Default: 0
Heat Pump Enable
On/Off
Default: Off
HP O/B Mode
Energize w/ Heat or Cool
Mode Change Time
Range: 0-10 Hours
Default: 0
Heat Pump Lock
Range: (-20)-70°F/(-29)-21°C
Default: 0°F/(-18)°C
# of HMIs
Range: 0-5
Default: 5
Screen Saver
On/Off
Default: Off
Lock Screen
On/Off
Default: Off
HMI 1-5 Avg Enable
On/Off
Default: Off
Heating SP Occ
Range: 0-95°F/0-35°C
Default: 65°F/18°C
Cooling SP Occ
Range: 50-150°F/10-66°C
Default: 75°F/24°F
Blower Mode
Blower Mode
On/Auto
Airflow Required
On/Off
Default: Off
Blower Delays
No/Yes
Default: No
Blower On Delay
Range: 15 - 90 sec
Default: 30 sec
Blower Off Delay
Range: 15 - 90 sec
Default: 30 sec
Min Blower Time
Range: 5 sec - 10 min
Default: 5 sec
Emer Heat Config
None, RTULink
Enable Max HP
No/Yes
Default: No
Max HP Runtime
Range: 15 min - 6 hours
Default: 60 min
Emer. Heat Lock
Range: 5-65°F/(-15)-18.5°C
Default: 45°F/7°C
Lockout Temp
No/Yes
Default: No
Emer Heat Diff
Range: 2-30°F/(-17)-(-1)°C
Default: 2.0°F/(-17)°C
Heat Diff Stg 2
Range: 1-50°F/(-17)-10°C
Default: 2.0°F/(-17)°C
Heat Diff Stg 3
Range: 1-50°F/(-17)-10°C
Default: 2.0°F/(-17)°C


Configuration
Cool Diff Stg 2
Range: 1-50°F/(-17)-10°C
Default: 2.0°F/(-17)°C
Cool Diff Stg 3
Range: 1-50°F/(-17)-10°C
Default: 2.0°F/(-17)°C
Heat Hysteresis
Range: 1-10°F/C
Default: 1.0°F/°C
Cool Hysteresis
Range: 1-10°F/C
Default: 1.0°F/°C
Min Heat On Time
Range: 1 min - 20 min
Default: 5 min
Min Cool On Time
Range: 1 min - 20 min
Default: 5 min
Min Heat Off Tim
Range: 1 min - 20 min
Default: 5 min
Min Cool Off Tim
Range: 1 min - 20 min
Default: 5 min
Set Point Limit
Enable/Disabled
Disabled
Max X Stg RunTim
Range: 0-120 min
Default: 5 min
Occ Intlk Type
Disabled, Passthrough, Interlock
Space Air Stat
Yes/No
Discharge Stat
Yes/No
Return Air Stat
Yes/No
Outside Air Stat
Yes/No
Mixed Air Stat
Yes/No
Aux Out Type
Powered Exhaust/None
Damper
On/Off
Default: Off
Out #1 0-10VDC
Powered Exhaust/None
Out #2 0-10VDC
Powered Exhaust, None, Damper
Out #2 Range
0-10VDC/2-10VDC


Configuration
Power Exh Thrsh
Range: 0-100%
Default: 50%
Economizer Type
Enthalpy, Dry Bulb, None
Min OA Damper
Range: 0-100%
Default: 50%
Use Diff Econ?
Yes/No
Dry Bulb Band
Range: 0-20
Default: 5
Enthalpy Band
Range: 0-10
Default: 1
Econ Temp SP
Range: 60-80°F/16-27°C
Default: 70°F/21°C
Econ RH SP
Range: 0-90%
Default: 20%
Econ Cool Disble
Range: 20-100%
Default: 50%
Min OA Damper
Range: 0-100%
Default: 50%
CO2 OA DCV?
On/Off
CO2 OA Thresh
Range: 500-2000 ppm
Default: 1000 ppm
Scheduling
On/Off
Occ Override
On/Off
Override Time
Range: 1-16
Default: 1
RTU 0-10V In #1
None, Discharge RH, Return RH, Outside RH, Space RH, Carbon Dioxide, Current #1/2/3
Stat 0-10V In #1/2
None, Discharge RH, Return RH, Outside RH, Space RH, Carbon Dioxide, Current #1/2/3
Currnt 1/2/3: Amps/V
Range: 0-600.0 Amps/Volt
Default: 0.5 Amps/Volt
Diagnostics
RTU Blower, RTU Y1/2/3, RTU W1/2/3, RTU OB, RTU 10V Out 1/2, Stat Aux, Stat Alarm Out, Stat Defrost Out, Exit
Prior to starting diagnostics, you must press Enter to start diagnostics. Once complete, go to Exit in the menu. When asked to "Exit?," press Enter to reboot.
Factory Reset
Enter = Reset
Faults
Active Faults
Active Faults Displayed
Fault History
Displays last 20 faults
Clear Faults
Enter = Clear
Reboot
Enter = Reboot

Space HMI and Remote Room Sensor Installation

Space HMI faceplate(s) (refer to **Figure 28**), remote room sensors (refer to **page 11** and **page 14** for optional sensors), and smart controls may be ordered and shipped separately. These components measure temperature and assist in controlling the unit. These components should be installed in a safe location, free of influence from external heat sources. Install sensors in areas indicative of the average room temperature, and away from heat-producing appliances. HMIs and remote room sensors can be installed directly to industry-standard junction boxes, either surface mounted or recessed mounted. HMIs have a built-in temperature/relative humidity (RH) sensor, which is typically used to help control the automatic function of the unit.

The HMI can also be configured to control the unit from a remote location manually. They can be configured not to use the internal temperature/relative humidity sensor. In this configuration, the sensor in the HMI is ignored in automatic operation. Multiple HMIs can be connected to one unit for temperature and R/H averaging. All combination temperature/humidity HMIs will use a vented standoff. Mount the static pressure tube close to the HMI to obtain proper room conditions.

A max of 4 additional HMIs can be daisy-chained together. Place an End-of-Line (EOL) device in the last HMI connected.

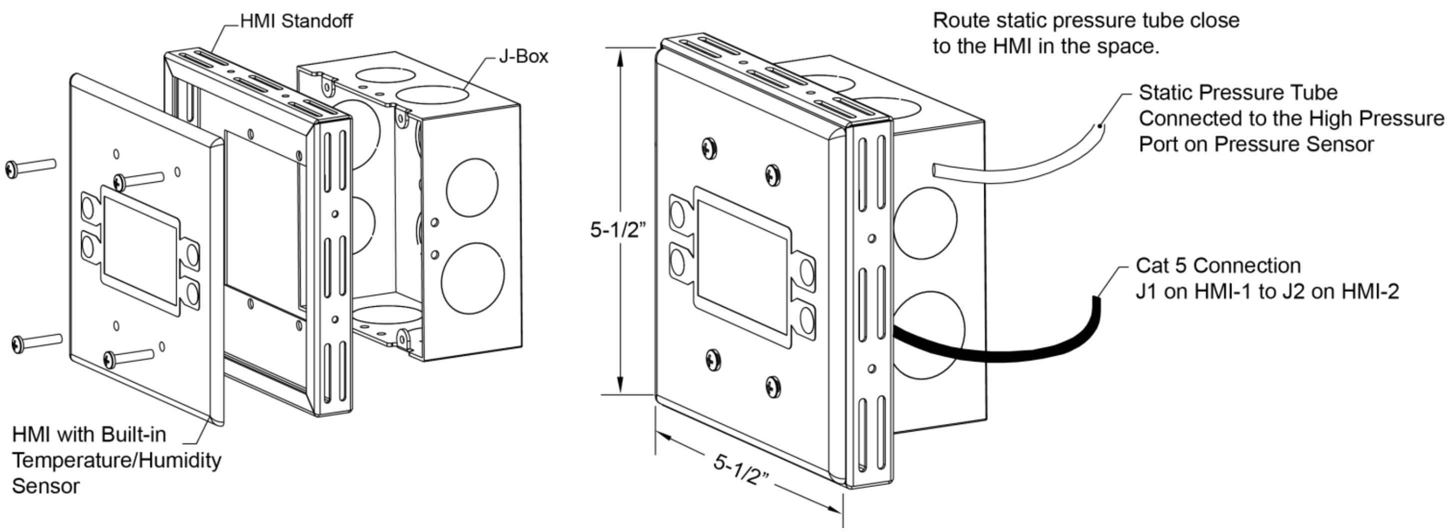


Figure 28. Space HMI Installation

Space HMI Operation

Accessing Menu Configurations

The HMI allows the user to change parameters and options. The user may use the HMI to view operating information regarding sensors, temperatures, pressures, and fault history on the HMI screen. There are four buttons to navigate through the HMI screens.

NOTE: Buttons change functions during certain options and tests. Verify the screen and buttons throughout the menu display.

The user can access the Top Menu HMI configurations by pressing the top two buttons simultaneously. To exit this screen, simply press the 'BACK' button. When setting certain options or functions, pressing the 'BACK' button multiple times will bring up the save screen. The user may select 'YES' to save the changes, select 'NO' to return to factory settings or select 'CANCEL.' When selecting 'CANCEL,' any changes made will not be saved, and the screen will return to the top menu. Pressing the bottom two buttons simultaneously allows the user to access HMI Configurations. Here you can change the HMI Number, adjust Contrast, and set Audio Enable (mutes HMI button beeping).

The HMI menu system allows full access to every configurable parameter in the HMI. The parameters are factory configured to the specific application. Parameters may need to be modified to fine-tune automatic operation after the original setup.

Remote (HMI) Control Panel

On units shipped with a space HMI, a Cat 5 cable will need to be run from RTULink board J4 to J2 on the HMI. If additional space HMIs have been added, they can be daisy-chained from the first HMI. An end of line resistor should be added to the last HMI in the chain.

Space HMI Menu Structure

User settings: Allows the user to change or set certain temperature and configurations on the unit. Any changes within this menu do not require a reboot to take effect.

Factory settings: Requires a password to enter this menu (1 1 1 1). These will be set job specific from the plant. Any changes within this menu require a reboot to take effect. Upon exiting factory settings, if anything has been altered, the board will reboot itself.

Service: Requires a password to enter this menu (1 2 3 4). Allows a certified technician to monitor the unit, and test components in the system.

Space HMI Functionality

User Settings

- **Temp Set Points** – Some or all of these may not be available based on settings. The user will be allowed to check or adjust the set points for Heating, Cooling, and Options that are enabled on the system.
- **Blower Settings** - Blower mode is the blower's default status that the RTULink defaults to if it ever comes out of a schedule from CASLink or has never received a schedule from CASLink (during startup).
- **Scheduling** – Top menu to set schedule options.
  - **Scheduling Times** – To set a schedule for a specific day and time. There are four slot schedules (A, B, C, D). Select the slot schedule, and select a start and end time for the schedule.
  - **Copy Schedule** – Once a schedule is set for a day and time, that set schedule can be copied from one day to the next.
  - **Override Sch** – To override a schedule, select the appropriate schedule slot that will need to be overridden.
  - **Unocc Def Set Points** – When the system is in an unoccupied state, use this menu to set unoccupied set points.
- **Active Faults** – Contains the current faults on the board.
- **Fault History** – Displays time-stamped history of the last 20 faults, most recent fault showing first.

Factory Settings

Password to enter factory menu is 1 1 1 1.

Temperature Control

Tempering Sensor – If "None" is selected, no external tempering thermistor will be connected (External or Monitor Only). If "HMI" is selected, the HMI will be used as the tempering sensor. If "Space" is selected, the space thermistor will be used as the tempering sensor. If "Return" is selected, the return air thermistor will be used as the tempering sensor.

Mode Change Tim – Mode change time is only applicable to heat pumps. This is the time required to elapse in order to change state (from heating to cooling or cooling to heating). For example, a heat pump must be off after heating for the duration of this timer in order to reverse the condenser valve and change to cooling. If the condenser valve is switched rapidly, it will damage the condenser. This timer is intended to increase the life of the condenser.

Stage Runtimes

Max Runtime – Maximum time that a stage is required to run before the RTULink will allow a call for the next stage (if applicable). For example, if stage x has been running for the duration of this timer, then force stage x+1, if the unit is equipped with a stage x+1. This timer applies to heating and cooling. This timer is intended to increase efficiency by not allowing a unit to continuously run while not satisfying set points. The timer is in a MM:SS format and is adjustable from 00:00 to 120:00.

Heating Config

Heat Hysteresis – The number of degree(s) the tempering stat is allowed to be above the heating set point before the RTULink stops a call for heating.

Heat Pump – This sets the wiring configuration that the RTULink will output to the RTU. Heatpump output signals Y and O/B are used. Standard output signals Y and W are used.

HP O/B Mode – For heatpump units, this will set the reversing valve to activate for heating or cooling.

 # Heat Stages – Sets the number of heating stages that are equipped on the RTU.

Heat Differential – When the number of heat stages is set to greater than 1, the following menus will be available.

Stage 2 – Second stage heating temperature differential is the number degrees below the heating set point that the tempering sensor must be to allow a call for the second stage of heating.

Stage 3 – Third stage heating temperature differential is the number degrees below the heating set point minus the Heat Diff Stg 2 that the tempering sensor must be to allow a call for the second stage of heating.

E Heat Type – If RTULink is selected, RTULink will control the emergency heat with "E" terminal. Only visible if tempering sensor is configured. If None is selected, the RTU does not have an emergency heat feature.

E Heat Diff – Emergency heat differential is the temperature differential from the heating set point in degrees Fahrenheit at which emergency heat will be activated. For example, if the tempering thermistor goes below this set point, the RTULink will send an emergency heat signal on the "E" terminal.

Min On Time – Minimum heat on time is the time that the heating signal is required to be ON before it is allowed to turn OFF. This timer is intended to reduce heater cycling and increase life cycle of the heating components. The timer is in a MM:SS format and is adjustable from 00:00 to 20:00.

Min Off Time – Minimum heat off time is the time that the heating signal is required to be OFF before it is allowed to turn ON. This timer is intended to reduce heater cycling and increase life cycle of the heating components. The timer is in a MM:SS format and is adjustable from 00:00 to 20:00.

Cooling Config

Cool Hysteresis – Cool hysteresis is the number of degree(s) Fahrenheit that the tempering stat is allowed to be below the cooling set point before the RTULink stops a call for cooling.

 # Cool Stages – Sets the number of cooling stages that are equipped on the RTU.

Cool Differential

Stage 2 – When the number of cool stages is set to greater than 1, the following menus will be available. Second stage cooling temperature differential is the number degree(s) Fahrenheit above the cooling set point that the tempering sensor must be to allow a call for the second stage of heating.

Stage 3 – Third stage cooling temperature differential is the number degree(s) Fahrenheit above the cooling set point plus the Cool Diff Stg 2 that the tempering sensor must be to allow a call for the third stage of cooling.

Min On Time – Minimum cool on time is the time that the cooling signal is required to be ON before it is allowed to turn OFF. This timer is intended to reduce condenser cycling and increase life cycle of the cooling components. The timer is in a MM:SS format and is adjustable from 00:00 to 20:00.

Min Off Time – Minimum heat off time is when the heating signal is required to be OFF before it is allowed to turn ON. This timer is intended to reduce heater cycling and increase life cycle of the heating components. The timer is in a MM:SS format and is adjustable from 00:00 to 20:00.

Scheduling – Menu to set scheduling to be ON or OFF. If disabled, the RTULink will always operate with the default settings configured through the board HMI. If enabled, settings can be overridden through CASLink.

Occ Override – Menu to set occupied override to be ON or OFF. When set to ON, the state of occupancy can be overridden on the HMI.

Room Ovrd Duration – Length of override timer. If override is active, it can be manually stopped by pressing the end override button on the HMI. The default setting is 1 hour but can be adjusted up to 16 hours.

Occ Intlk – When set to Passthru, allows a hardware input (on the ALARM terminal of the stat side of the RTULink) which will output a defrost signal to the RTU side. When set to Interlock, this will force the RTULink into an occupied state in scheduling and forces the blower on.

Unit Options

Board Config

Ctrl Mode – When scrolling through the menu, the board will adjust between the following settings, Full Control, External Control, Monitor Only, and Emergency Heat. Control mode definitions are explained in detail in **RTULink MODES OF OPERATION on page 24**.

Board Address – Modbus addressing begins at 60, so unit number 1 will be assigned 60. Modbus 61 will be assigned to unit number 2. Modbus 62 will be assigned to unit number 3, etc. It is important to number the units in accordance with the mechanical plans.

Temp Unit – Sets the temperature reading to Fahrenheit or Celcius.

# of HMIs – Sets the number of HMIs connected to the system.

Screen Saver – Setting to enable screen saver option.

Lock Screen – Displays information on the Space HMI when the screen is inactive.

HMI Averaging

HMI 'x' Avg – Sets if averaging is ON or OFF.

Blower Config – Sets the minimum blower timer.

Airflow Required – Setting to turn on/off proving for airflow.

Min Blow Time – The minimum amount of time the blower is required to be ON before shutting OFF, and the minimum time it is required to be OFF before turning ON. This setting is intended to reduce the blower from cycling, and improve the lifespan of the motor and belts if applicable

Blower Delays – Setting to enable or disable blower delays.

Blower On Delay – Time setting for Blower On Delay.

Blower Off Delay – Time setting for Blower Off Delay.

Monitoring Sensors

Configure Stats

Space Air Stat – If a space air stat is used, this option should be set to Yes.

Return Air Stat – If a return air stat is used, this option should be set to Yes.

Discharge Stat – If a discharge stat is used, this option should be set to Yes.

Mixed Air Stat – If a mixed air stat is used, this option should be set to Yes.

Outside Stat – If an outside air stat is used, this option should be set to Yes.

Configure Alarms – Set alarms to operate on Normally Open, Normally Closed, or Unused.

0-10V Inputs

RTU #1 – None, Outside Air RH, Return RH, Supply RH, Mixed RH, Space RH, CO2, Current 1, Current 2, Current 3.

Stat #1 – None, Outside Air RH, Return RH, Supply RH, Mixed RH, Space RH, CO2, Current 1, Current 2, Current 3.

Stat #2 – None, Outside Air RH, Return RH, Supply RH, Mixed RH, Space RH, CO2, Current 1, Current 2, Current 3.

Currnt 1: Amps/V; Currnt 2: Amps/V; Currnt 3: Amps/V – The Current 1, 2, and 3 Amps/V settings are what allows the voltage signal that the current transducer outputs to be converted to Amps. View the current transducer documentation to determine the amperage per volt supplied by the current transducer.

Outdoor Air Config

0-10V Damper – When set to OFF, no output to the damper from the RTULink board. When set to ON, an output signal is sent from the RTULink board to the damper.

Min OA Damper – The minimum percentage the outdoor damper will operate.

Economizer

Type – Available options are Enthalphy, Dry Bulb, None. If Enthalpy is selected, temperature and humidity will be used to control the economizer. If Dry Bulb is selected, the temperature will be used to control the economizer. Select None if an economizer is not equipped on the unit.

Econ Cool Disbl – Economizer cool disable is the percentage open the economizer/OA damper must be for mechanical cooling to be disabled.

Allow Economizer – This feature enables and disables the use of the economizer. This feature is useful when disabling the economizer during the test and balance of a building. Disabling the economizer through this parameter will save the economizer settings instead of setting them back to defaults.

Use Diff Econ – This parameter determines whether or not to use fixed or differential enthalpy. If this parameter is set to On, then differential economizer logic will be used, if this parameter is set to Off, then fixed economizer logic will be used.

CO2 OA DCV – Carbon dioxide based demand control ventilation (DCV) strategy will allow a reduction of OA when space CO_2 levels are below a threshold. This feature requires a CO_2 sensor to be installed in a space or return that will accurately measure the CO_2 levels of the space supplied by the unit and it requires the outside air damper to be controlled by the RTULink. The intent of this feature is to reduce energy consumption by reducing the outside air load on the space when possible.

CO2 OA Thresh – Carbon dioxide based threshold is the value in parts per million (ppm) that the CO_2 levels can reach before forcing the units outside air damper is forced to fully open. This parameter is only relevant if the CO_2 OA DCV option is enabled.

Output

Aux Out Type – Auxiliary output type sets the use for the 24VAC auxiliary output signal. If a powered exhaust is selected for this output, it will eliminate the option to control a powered exhaust with a 0-10VDC signal.

VDC Out1 – Output #1 configures the use for OUT #1 on the “To RTU” side of the RTULink.

VDC Out2 – Output #2 configures the use for OUT #2 on the “To RTU” side of the RTULink.

VDC Out1 Range – Output 1 range is the voltage range that the component connected to output 1 is designed to operate with. Once set, the RTULink will use the low-end voltage of this range for an OFF signal and the high-end voltage of this range for a fully modulated ON signal.

VDC Out2 Range – Output 2 range is the voltage range that the component connected to output 1 is designed to operate with. Once set, the RTULink will use the low-end voltage of this range for an OFF signal and the high-end voltage of this range for a fully modulated ON signal.

Power Exhaust – The powered exhaust threshold is the percentage open the economizer/damper must be in order for the powered exhaust to turn on. For an ON/OFF powered exhaust, this is the threshold at which it turns on. For a modulating powered exhaust, the speed of the exhaust will modulate linearly as the economizer/damper opens from this threshold to fully open (100% open).

Enable Max HP – Setting to enable or disable maximum heat pump runtime.

Max HP Runtime – Time setting for heat pump runtime before auxiliary heat activates

Emer. Heat Lock – Setting to enable or disable emergency heat.

Lockout Temp – If the outside air temperature is above “Lockout Temp” setting, emergency heat will be locked out.

Set Point Limit – Setting to enable set point limit adjustments.

Limit SP Adjust – This allows the user to change the current temperature set point through the home screen. The range adjustment is 0-100 degrees.

Service

Password to enter factory menu is 1 2 3 4.

Temperatures – User can monitor various temperature values.

Air % – Displays outdoor and return air percentage.

RH Values – User can monitor various RH values.

Open/Closed Status – Menu to view the open/closed status of all inputs.

Inputs – Allows user to monitor all of the variable input values.

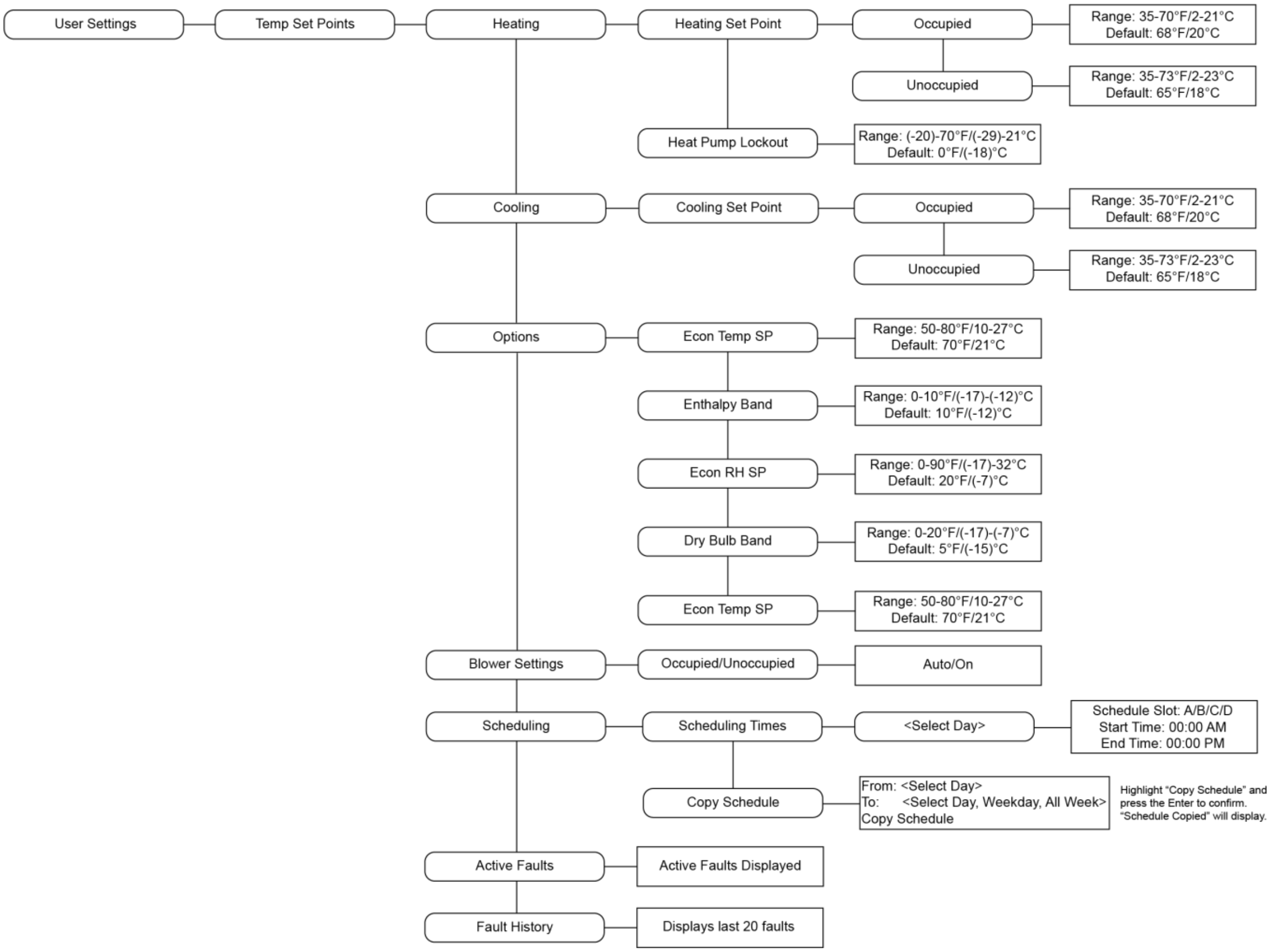
Outputs – Allows user to monitor all of the variable output values.

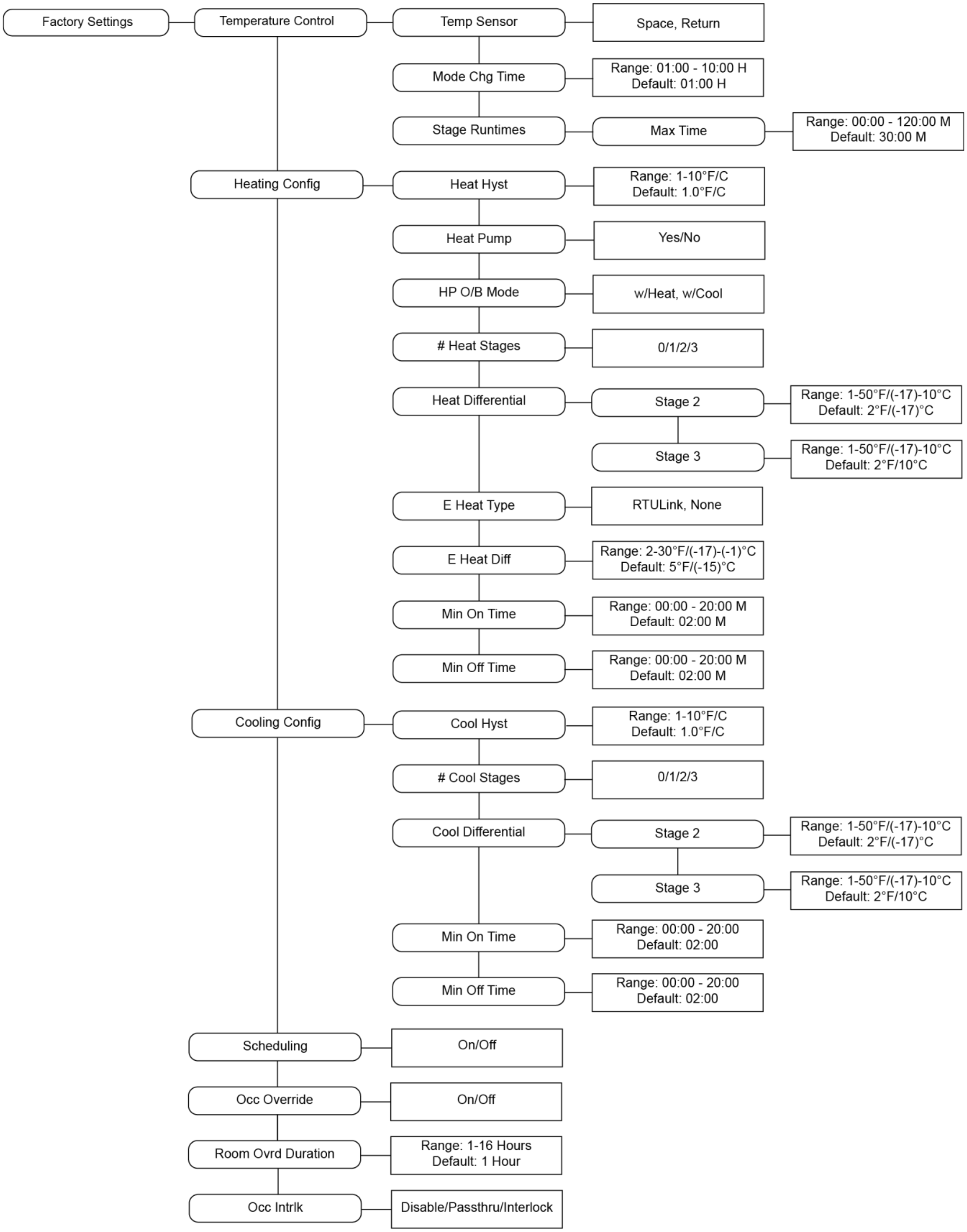
Clear Faults – This will clear the entire fault history. If there is an active fault when cleared, that fault will show up until it is fixed.

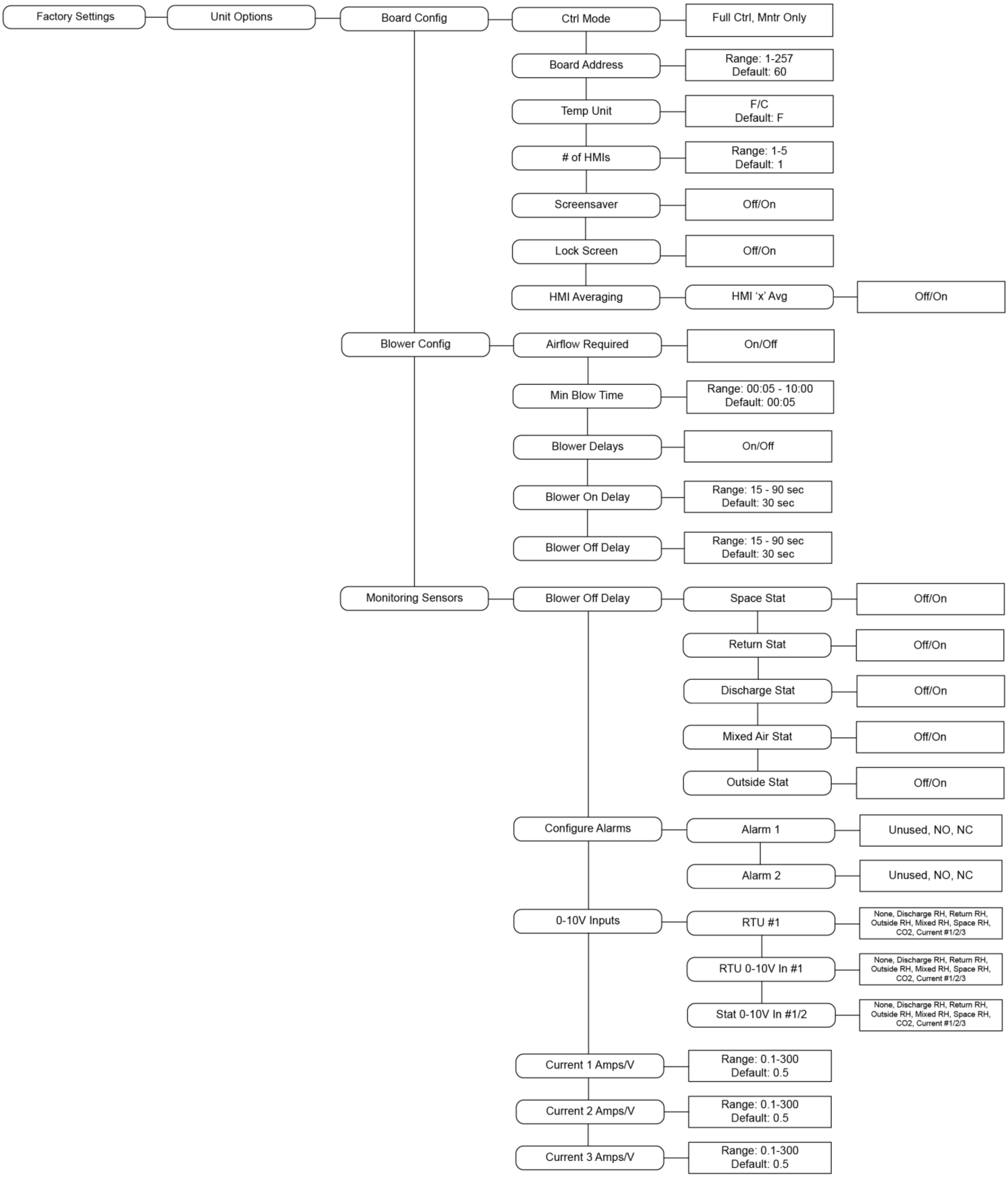
Set Clock – Set day and time.

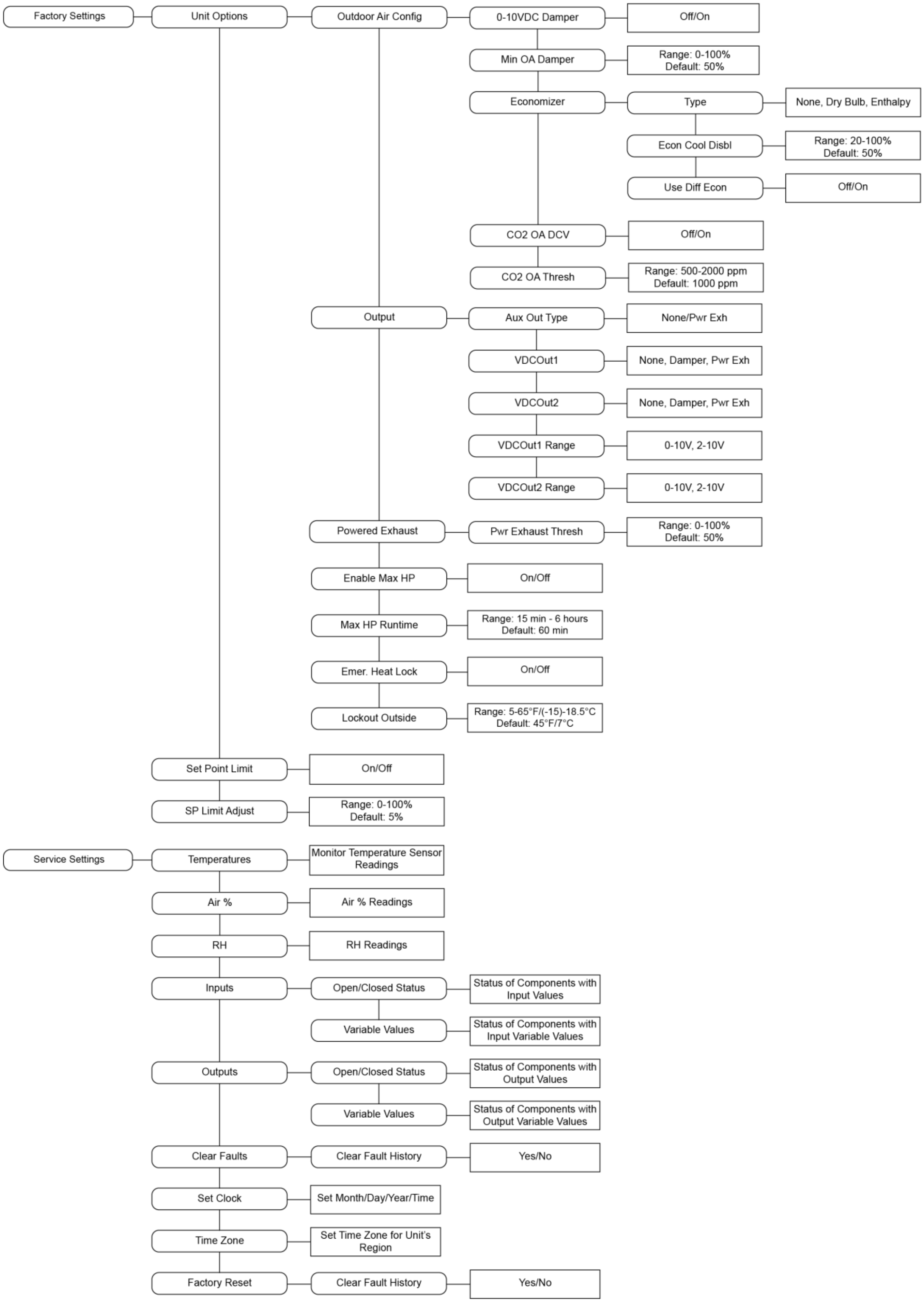
Time Zone – Set time zone for the unit.

Factory Reset – This will reset the board to factory commissioned settings.


User Settings
Temp Set Points
Heating
Heating Set Point
Occupied
Range: 35-70°F/2-21°C
Default: 68°F/20°C
Unoccupied
Range: 35-73°F/2-23°C
Default: 65°F/18°C
Heat Pump Lockout
Range: (-20)-70°F/(-29)-21°C
Default: 0°F/(-18)°C
Cooling
Cooling Set Point
Occupied
Range: 35-70°F/2-21°C
Default: 68°F/20°C
Unoccupied
Range: 35-73°F/2-23°C
Default: 65°F/18°C
Options
Econ Temp SP
Range: 50-80°F/10-27°C
Default: 70°F/21°C
Enthalpy Band
Range: 0-10°F/(-17)-(-12)°C
Default: 10°F/(-12)°C
Econ RH SP
Range: 0-90°F/(-17)-32°C
Default: 20°F/(-7)°C
Dry Bulb Band
Range: 0-20°F/(-17)-(-7)°C
Default: 5°F/(-15)°C
Econ Temp SP
Range: 50-80°F/10-27°C
Default: 70°F/21°C
Blower Settings
Occupied/Unoccupied
Auto/On
Scheduling
Scheduling Times
<Select Day>
Schedule Slot: A/B/C/D
Start Time: 00:00 AM
End Time: 00:00 PM
Copy Schedule
From: <Select Day>
To: <Select Day, Weekday, All Week>
Copy Schedule
Highlight "Copy Schedule" and press the Enter to confirm. "Schedule Copied" will display.
Active Faults
Active Faults Displayed
Fault History
Displays last 20 faults


Factory Settings
Temperature Control
Temp Sensor
Space, Return
Mode Chg Time
Range: 01:00 - 10:00 H
Default: 01:00 H
Stage Runtimes
Max Time
Range: 00:00 - 120:00 M
Default: 30:00 M
Heating Config
Heat Hyst
Range: 1-10°F/C
Default: 1.0°F/C
Heat Pump
Yes/No
HP O/B Mode
w/Heat, w/Cool
Heat Stages
0/1/2/3
Heat Differential
Stage 2
Range: 1-50°F/(-17)-10°C
Default: 2°F/(-17)°C
Stage 3
Range: 1-50°F/(-17)-10°C
Default: 2°F/10°C
E Heat Type
RTULink, None
E Heat Diff
Range: 2-30°F/(-17)-(-1)°C
Default: 5°F/(-15)°C
Min On Time
Range: 00:00 - 20:00 M
Default: 02:00 M
Min Off Time
Range: 00:00 - 20:00 M
Default: 02:00 M
Cooling Config
Cool Hyst
Range: 1-10°F/C
Default: 1.0°F/C
Cool Stages
0/1/2/3
Cool Differential
Stage 2
Range: 1-50°F/(-17)-10°C
Default: 2°F/(-17)°C
Stage 3
Range: 1-50°F/(-17)-10°C
Default: 2°F/10°C
Min On Time
Range: 00:00 - 20:00
Default: 02:00
Min Off Time
Range: 00:00 - 20:00
Default: 02:00
Scheduling
On/Off
Occ Override
On/Off
Room Ovrd Duration
Range: 1-16 Hours
Default: 1 Hour
Occ Intrlk
Disable/Passthru/Interlock


Factory Settings
Unit Options
Board Config
Ctrl Mode
Full Ctrl, Mntr Only
Board Address
Range: 1-257
Default: 60
Temp Unit
F/C
Default: F
# of HMIs
Range: 1-5
Default: 1
Screensaver
Off/On
Lock Screen
Off/On
HMI Averaging
HMI 'x' Avg
Off/On
Blower Config
Airflow Required
On/Off
Min Blow Time
Range: 00:05 - 10:00
Default: 00:05
Blower Delays
On/Off
Blower On Delay
Range: 15 - 90 sec
Default: 30 sec
Blower Off Delay
Range: 15 - 90 sec
Default: 30 sec
Monitoring Sensors
Blower Off Delay
Space Stat
Off/On
Return Stat
Off/On
Discharge Stat
Off/On
Mixed Air Stat
Off/On
Outside Stat
Off/On
Configure Alarms
Alarm 1
Unused, NO, NC
Alarm 2
Unused, NO, NC
0-10V Inputs
RTU #1
None, Discharge RH, Return RH, Outside RH, Mixed RH, Space RH, CO2, Current #1/2/3
RTU 0-10V In #1
None, Discharge RH, Return RH, Outside RH, Mixed RH, Space RH, CO2, Current #1/2/3
Stat 0-10V In #1/2
None, Discharge RH, Return RH, Outside RH, Mixed RH, Space RH, CO2, Current #1/2/3
Current 1 Amps/V
Range: 0.1-300
Default: 0.5
Current 2 Amps/V
Range: 0.1-300
Default: 0.5
Current 3 Amps/V
Range: 0.1-300
Default: 0.5


Factory Settings
Unit Options
Outdoor Air Config
0-10VDC Damper
Off/On
Min OA Damper
Range: 0-100%
Default: 50%
Economizer
Type
None, Dry Bulb, Enthalpy
Econ Cool Disbl
Range: 20-100%
Default: 50%
Use Diff Econ
Off/On
CO2 OA DCV
Off/On
CO2 OA Thresh
Range: 500-2000 ppm
Default: 1000 ppm
Output
Aux Out Type
None/Pwr Exh
VDCOut1
None, Damper, Pwr Exh
VDCOut2
None, Damper, Pwr Exh
VDCOut1 Range
0-10V, 2-10V
VDCOut2 Range
0-10V, 2-10V
Powered Exhaust
Pwr Exhaust Thresh
Range: 0-100%
Default: 50%
Enable Max HP
On/Off
Max HP Runtime
Range: 15 min - 6 hours
Default: 60 min
Emer. Heat Lock
On/Off
Lockout Outside
Range: 5-65°F/(-15)-18.5°C
Default: 45°F/7°C
Set Point Limit
On/Off
SP Limit Adjust
Range: 0-100%
Default: 5%
Service Settings
Temperatures
Monitor Temperature Sensor Readings
Air %
Air % Readings
RH
RH Readings
Inputs
Open/Closed Status
Status of Components with Input Values
Variable Values
Status of Components with Input Variable Values
Outputs
Open/Closed Status
Status of Components with Output Values
Variable Values
Status of Components with Output Variable Values
Clear Faults
Clear Fault History
Yes/No
Set Clock
Set Month/Day/Year/Time
Time Zone
Set Time Zone for Unit's Region
Factory Reset
Clear Fault History
Yes/No

TROUBLESHOOTING

Faults

Table 4. *RTULink Faults*

Fault Message on HMI	Potential Cause	Corrective Action
Heating Discharge Temp	Heating stage failure (Temp rise between return and discharge is not adequate).	Check the heating stage operation and ensure that each stage achieves a proper temperature drop from the inlet temperature
Cooling Discharge Temp	Cooling stage failure (Temp drop between return and discharge is not adequate).	Check the heating stage operation and ensure that each stage achieves a proper temperature drop from the inlet temperature
Space Temp Not Connected	Temperature sensor has been disconnected or has failed.	Verify correct resistance across Type II 10kΩ thermistor and replace if the sensor is faulty (not required for monitor only control mode)
Outside Temp Not Connected	Temperature sensor has been disconnected or has failed.	Verify correct resistance across Type II 10kΩ thermistor and replace if the sensor is faulty
Return Temp Not Connected	Temperature sensor has been disconnected or has failed.	Verify correct resistance across Type II 10kΩ thermistor and replace if the sensor is faulty
Discharge Temp Not Connected	Temperature sensor has been disconnected or has failed.	Verify correct resistance across Type II 10kΩ thermistor and replace if the sensor is faulty
Out of Schedule	RTULink has lost its connection to CASLink and has run out of schedule tasks.	Verify that the RTULink is reporting via the CASLink profile. Once communication with CASLink has been verified, setup and push a valid schedule
RTU Alarm 1	Alarm 1 on the TO RTU side of the RTULink is active.	Determine if the wiring connected to this terminal is valid. If it is valid, view the RTU manufacturers manual to determine the meaning of Alarm 1
RTU Alarm 2	Alarm 2 on the TO RTU side of the RTULink is active.	Determine if the wiring connected to this terminal is valid. If it is valid, view the RTU manufacturers manual to determine the meaning of Alarm 2
STAT Alarm	Alarm on the TO THERMOSTAT side of the RTULink is active.	Determine if the wiring connected to this terminal is valid. If it is valid, view the RTU manufacturers manual to determine the meaning of the signal that is connected to Alarm 1 on the “RTU” side of the RTULink
Mixed Air Temp Not Connected	Temperature sensor has been disconnected or has failed.	Verify correct resistance across Type II 10kΩ thermistor and replace if the sensor is faulty

Outside RH Not Configured	Enthalpy economizer is configured on the RTULink but an outside air relative humidity sensor is not configured.	Verify that an outside air relative humidity sensor is connected to one of the RTULink inputs. Install and connect one if one has not already been connected. Once the sensor is connected, configure the sensor via the onboard HMI. For details on how to configure an RTULink input, view the FUNCTIONALITY portion of this manual
Return RH Not Configured	Differential enthalpy economizer is configured on the RTULink but a return air relative humidity sensor is not configured/connected.	Verify that a return air relative humidity sensor is connected to one of the RTULink inputs. Install and connect one if one has not already been connected. Once the sensor is connected, configure the sensor via the onboard HMI. For details on how to configure an RTULink input, view the FUNCTIONALITY portion of this manual
Invalid Schedule	RTULink has received a schedule from CASLink that is invalid for its current control mode (i.e. a set point schedule has been passed and the board doesn't support set points).	Login to CASLink and ensure that all RTULink board data has timestamps that are current. If the board is currently reporting all data, overwrite the current schedule with an "OFF" control mode and pass a new one.
Gap In Schedule	The RTULink has been disconnected from CASLink and there is a gap in scheduling.	Check all RTULink communication network wiring. If the wiring is accurate, ensure the communication module is connected to CASLink by viewing the latest heartbeat in CASLink.
Stat Missing (Return, Outside, Intake, Discharge, Space)	If the temperature sensor signal being sensed is too low, a missing fault will be active.	Install and wire sensor. Check for faulty wiring to the sensor.
Stat Broken (Return, Outside, Intake, Discharge, Space)	If the temperature sensor signal being sensed is too high, a broken fault will be active.	Install and wire sensor. Check for faulty wiring to the sensor.
Space HMI Missing	One of the HMIs in the system is not connected properly, or one of the settings is not properly set.	Verify that the "# of HMIs" is set correctly. Verify there is no damage to the HMI(s). Check for loose or damaged wiring to the HMI(s). If space temperature is being utilized, make sure "HMI Averaging" is set to 'On' for all space HMIs.
HMI Config Error	HMI is not connected, or HMI is assigned incorrectly.	Install HMI or change HMI address using bottom 2 buttons on HMI.

COMPONENT DESCRIPTION

Temperature Sensor – Wall Mount

A wall mount thermistor may be used to monitor a space temperature. The thermistor is a Type II 10kΩ thermistor that provides a constant space temperature reading to the control board. It should be installed on a junction box, which should be mounted in a space that gives an accurate reading. Avoid spaces close to appliances, direct sunlight, or drafts from doors or foot traffic. Space temperature sensors are available with a plastic housing or a stainless steel housing.

Current Sensor

Current transducers can be utilized to estimate energy usage or detect a faulty component. A current sensor has a solid core and provides a 0-10VDC analog output that is proportional to the current measured. There are two versions, one with an adjustable range of 0-10 amp, 0-20 amp or 0-50 amp, and one with an adjustable range of 0-100 amp, 0-200 amp, or 0-250 amp. The measurable range is based on the position of the jumper on the top of sensor: L, M or H respectively. The range selected should be the smallest range possible that includes the FLA of the component being monitored.

Temperature and Humidity Sensor – Wall Mount

One or several wall-mounted temperature and humidity sensors can be utilized. The sensor has a Type II 10kΩ thermistor and a circuit board that houses the humidity sensor and outputs its 0-10VDC signal. The sensor has a bank of dip switches on the circuit board that control the range of the output signal. Dip switches 7 and 8 need to be switched to ON and the rest need to be left off in order for the sensor to output 0-10VDC. To access the circuit board on the stainless steel sensor, remove the sensor from its junction box. In order to access the circuit board on the plastic sensor, remove the sensor housing by backing out the housing screws with a 1/16" Allen key.

Temperature and Humidity Sensor – Outdoor Mount

One or several outdoor air temperature and humidity sensors may be utilized at a site. The sensor contains a Type II 10kΩ thermistor for the temperature reading and a 0-10VDC relative humidity sensor for the humidity reading. This sensor can be mounted using ½" EMT conduit or by securing the sensor housing with approved fasteners. The probe that sticks out of the sensor should always be pointed downward to protect it from the elements. To improve sensor readings, mount this in a location that will be free from the elements and direct sunlight.

Carbon Dioxide Sensor – Duct Mount

A duct mounted carbon dioxide sensor can be used to implement CO2 based demand control ventilation for RTU operation. The sensor will output a 0-10VDC signal and should be installed in the return duct in order to get an accurate CO2 reading of the space. Ensure correct orientation of the sensor in the airstream by the airflow arrows present on the sensor.

APPENDIX A

NOTE: DO NOT ROUTE COMMUNICATION WIRING WITH HIGH VOLTAGE WIRES

Daisy Chain Topology:

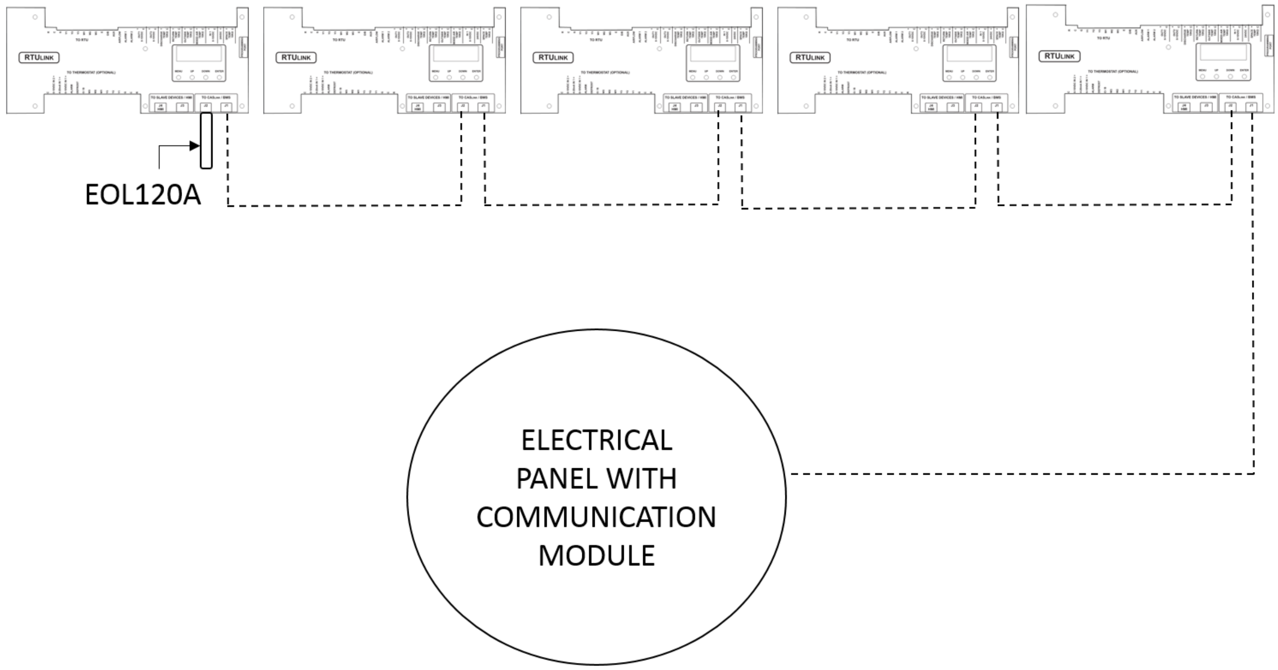


Figure 29. Daisy Chain – Ideal Configuration

Star Topology:

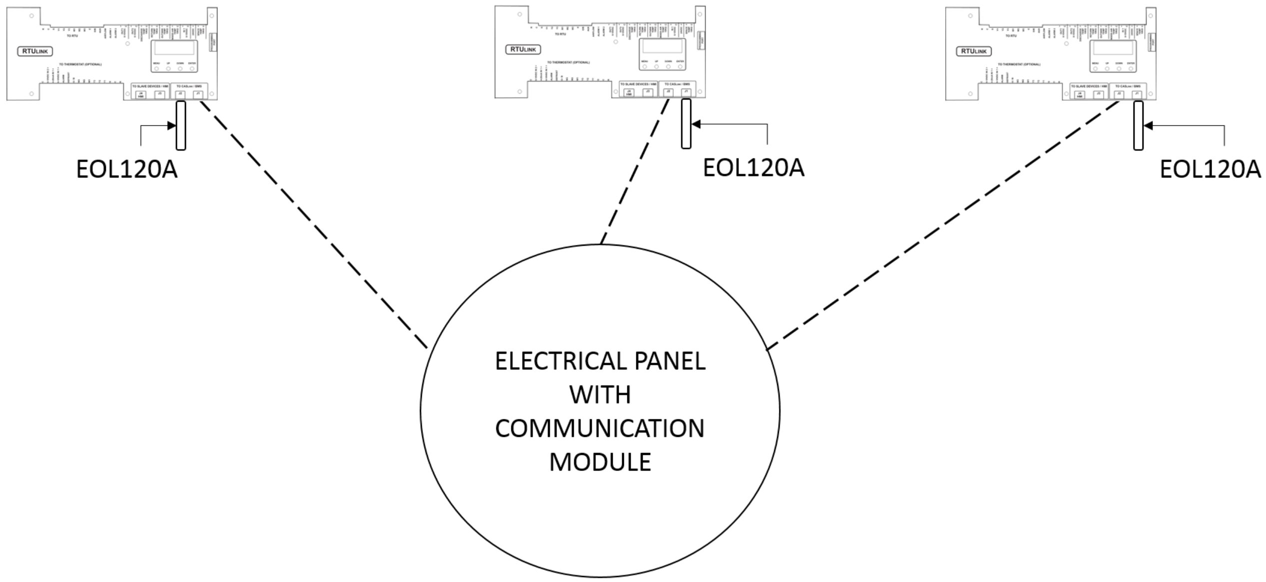


Figure 30. *Star*

APPENDIX B

1. Strip the CAT5 cable and arrange the wires in the color configuration seen below.

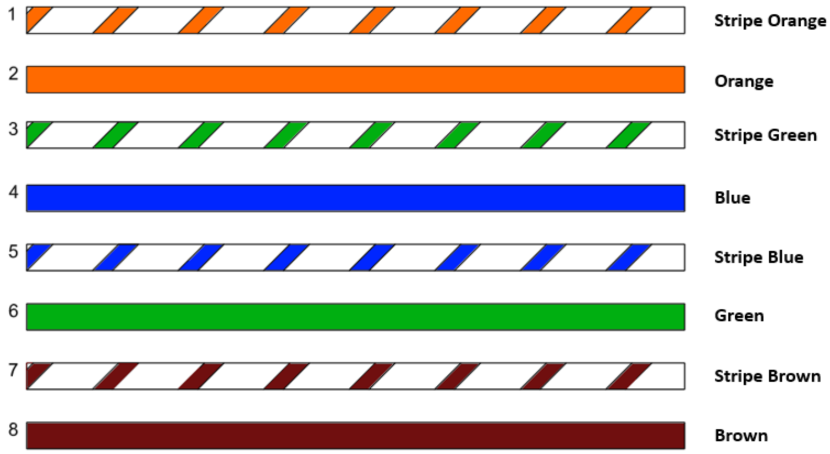


Figure 31. *Straight-Through Wiring Configuration*

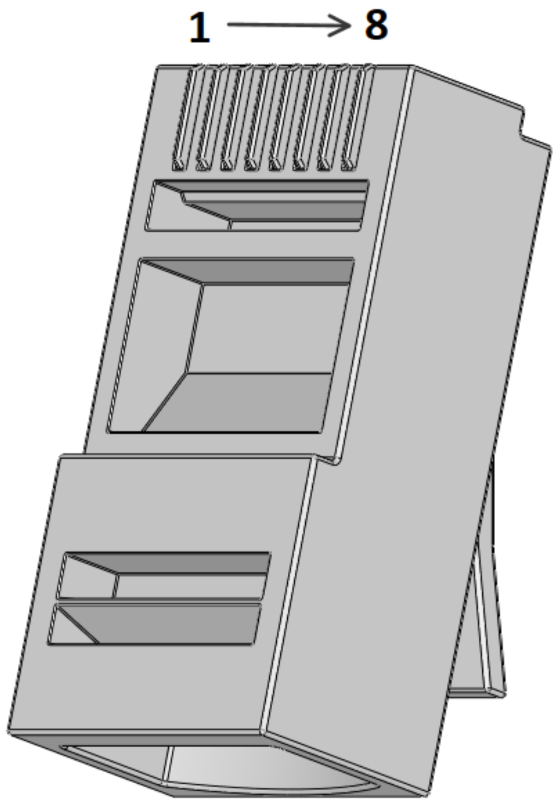


Figure 32. *RJ45 Pinout*

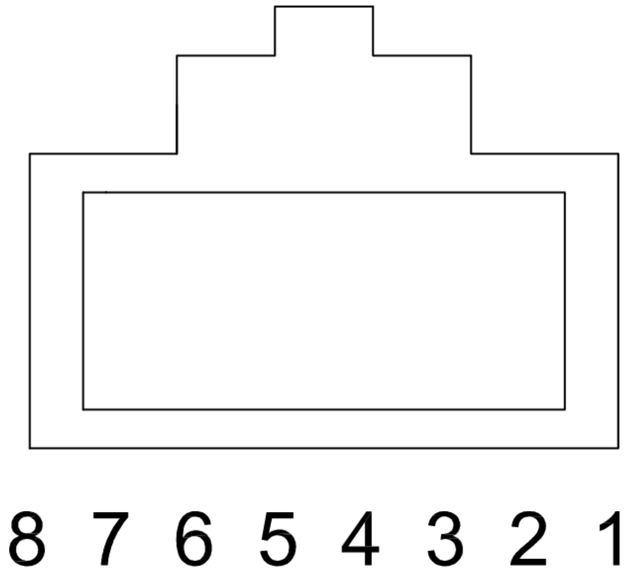


Figure 33. *Looking Into Rear Opening of RJ45 Connector*

Match the numbers of the wire color coding in **Figure 31** with the numbers in **Figure 33**. **NOTE: Figure 33 is the view looking into the rear opening of the RJ45 connector**. Ensure that the wires are completely inserted into the connector. You can accomplish this by looking at the tip of the RJ45 connector (the end without the opening) and being able to see the copper ends of each wire pushed up against the plastic. Insert the RJ45 connector into the crimp tool and crimp the connector. Repeat this for the other end of the CAT5 cable. Use a CAT5 tester to ensure connectors were installed properly.

APPENDIX C

Fixed Dry Bulb Economizer

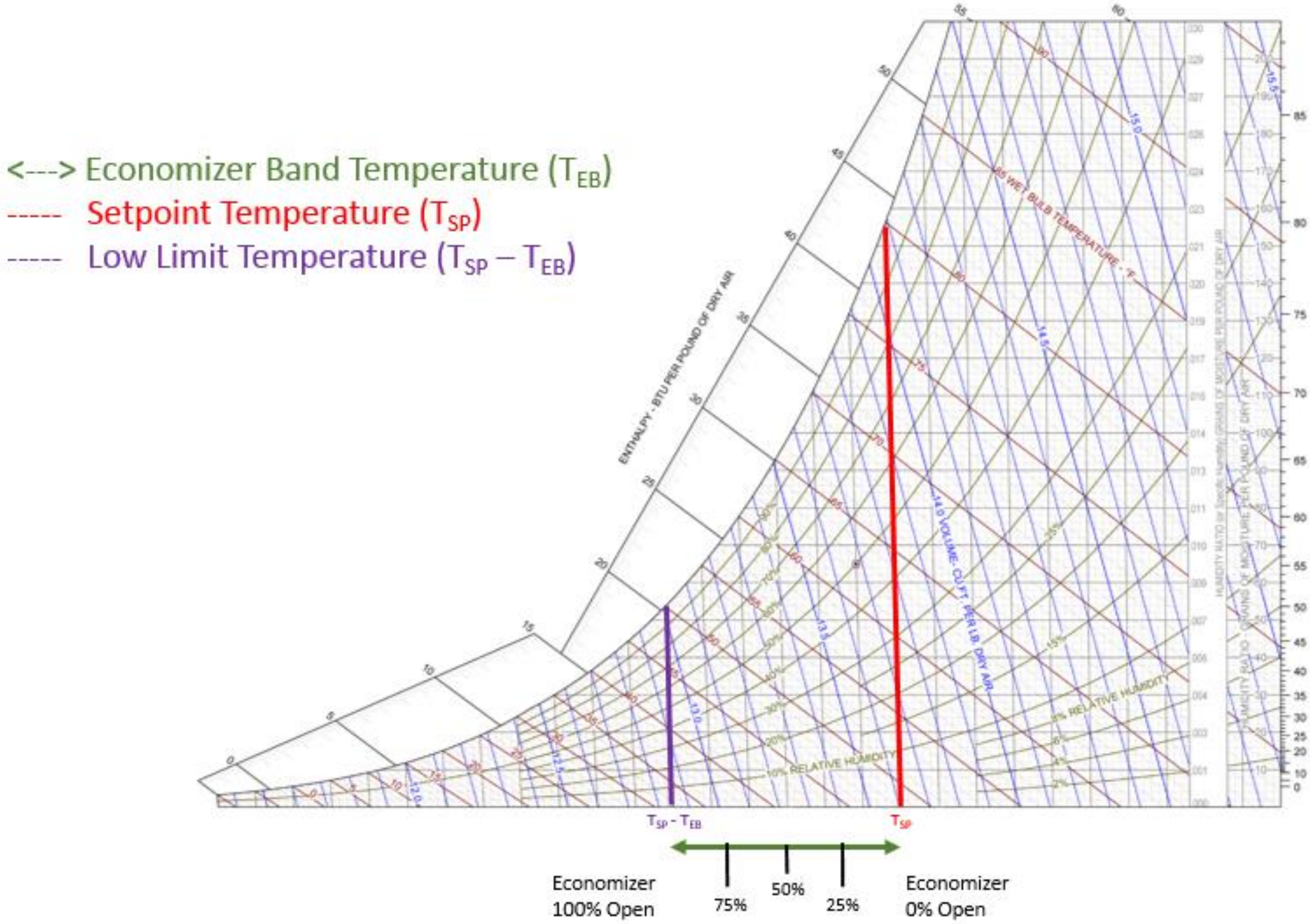


__Figure 34.__ Fixed Dry Bulb Economizer Operation

Differential Dry Bulb Economizer

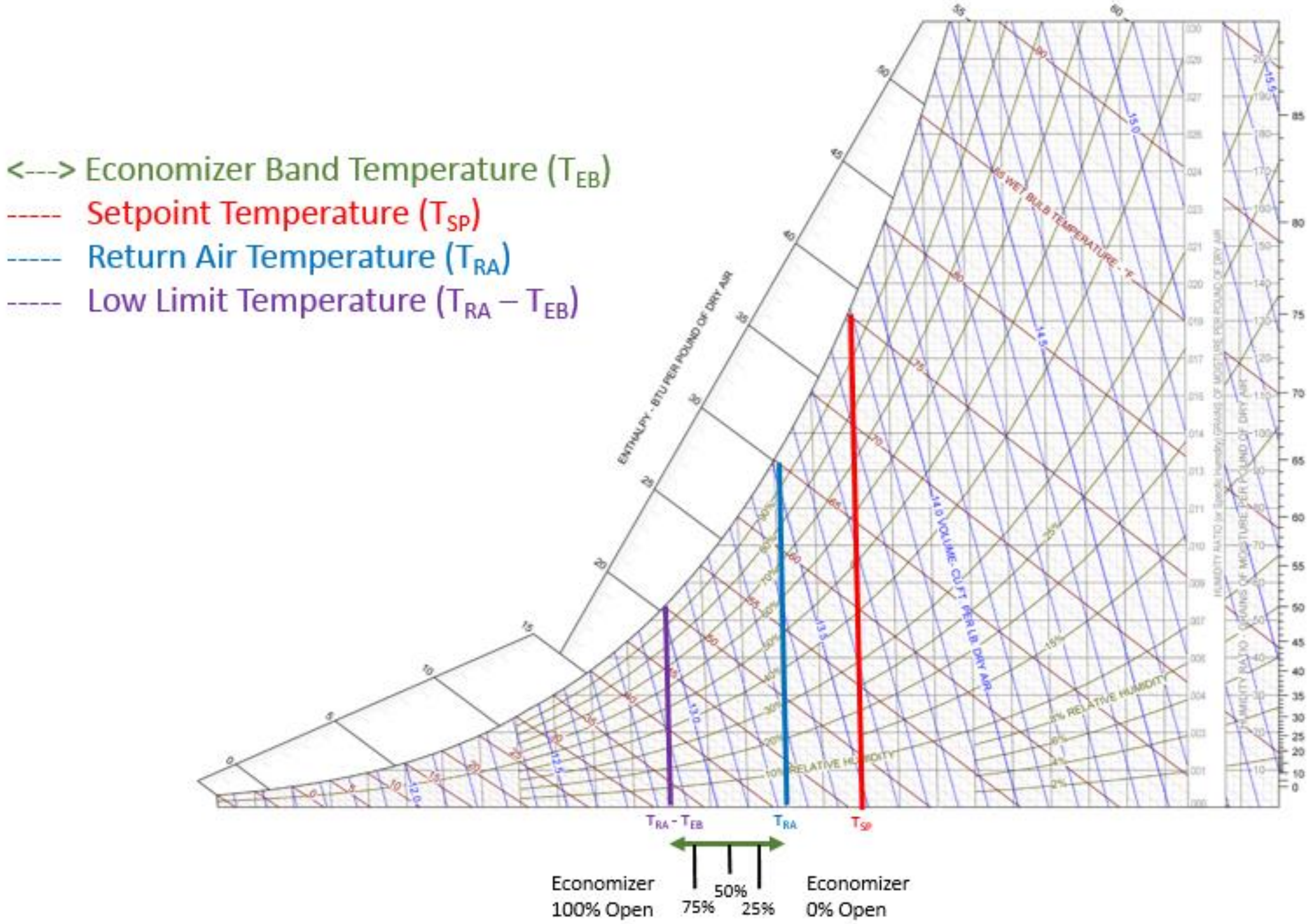


Figure 35. *Differential Dry Bulb Economizer Operation*

Fixed Enthalpy Economizer

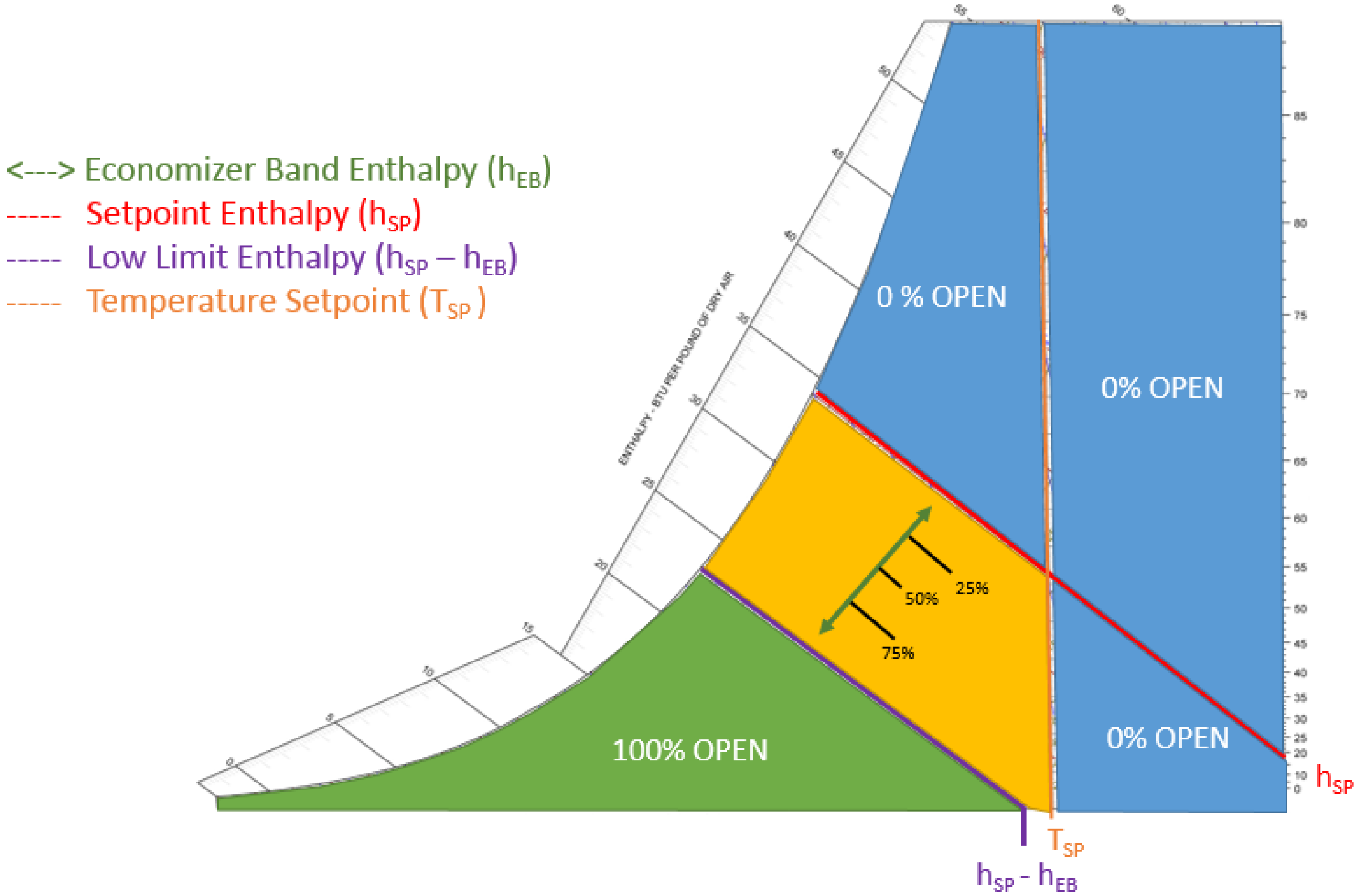


Figure 36. *Fixed Enthalpy Economizer Operation*

Differential Enthalpy Economizer

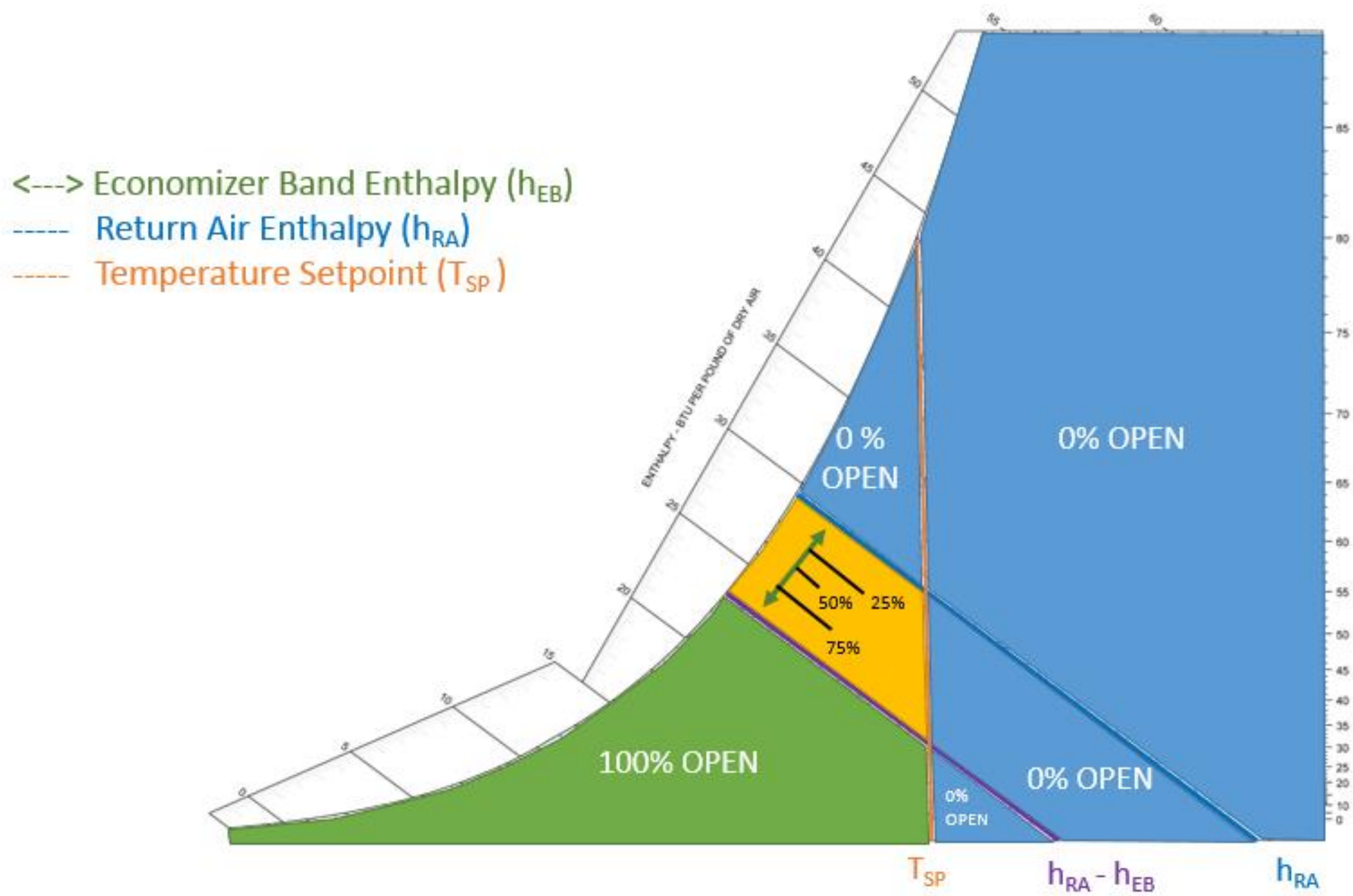


Figure 37. *Differential Enthalpy Economizer Operation*

Start-Up and Maintenance Documentation

Job Information

Job Name			Service Company	
Address			Address	
City			City	
State			State	
Zip			Zip	
Phone Number			Phone Number	
Fax Number			Fax Number	
Contact			Contact	
Purchase Date			Startup Date	

MAC Address:	
Static IP if Assigned:	

Maintenance

Date	Service Performed

Factory Service and Support Department
Phone: 1-866-784-6900
Fax: 1-919-554-9374