Compatible with
STRATUS Series

STRATUS Technical Guide

Software Version 1.01

STRATUS CONTROLLER TECHNICAL GUIDE	
REVISION AND DATE	**CHANGE**
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This manual is available for download from www.aaon.com

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PART NUMBERS

I-O Boards and Kits

PART NUMBER CROSS REFERENCE	
PART DESCRIPTION	**AAON**
STRATUS Air Handler I-O Board	ASM08156
STRATUS Cooling I-O Board	ASM08159
STRATUS Heating I-O Board	ASM08162
STRATUS Outdoor Air I-O Board	ASM08419
STRATUS POWER COMM I-O Board	ASM08153
STRATUS Preheat I-O Board	ASM08171
STRATUS Outdoor Air I-O Kit	ASM08165
STRATUS Sealed Enclosure	G174610
STRATUS Unit Manager	ASM08150
Building Static Pressure Transducer	ASM01832
Duct Static Pressure Transducer and Pickup Tube	ASM01640 and ASM02242
Differential Pressure Transducer	
E-BUS Cable Assembly E-BUS Power and Comm: 1.5 ft., 3 ft., 10 ft., 25 ft., 50 ft., 75 ft., 100 ft., 150 ft., 250 ft., and 1000 ft. Spool	G029440 (1.5 ft.), G012870 (3 ft.), G029460 (10 ft.), G045270 (25 ft.), G029510 (50 ft.), G029530 (75 ft.), G029450 (100 ft.), G029470 (150 ft.), V36590 (250 ft.), G018870 (SPOOL)
E-BUS Adapter Hub	G033970
E-BUS Adapter Hub with 1.5 ft. EBC Cable	ASM01635
E-BUS Adapter Board	ASM01878
E-BUS CO2 Space Sensor (wall or duct mounted)	ASM01829 / ASM01831
E-BUS Digital Room Sensor - LCD - Temp. or Temp and RH	ASM01819 / ASM01820
E-BUS Digital Room Sensor - No LCD - Temp and RH	ASM02221
E-BUS Horizontal Outdoor Air Temperature and RH Sensor	ASM01836
E-BUS Vertical Outdoor Air Temperature and RH Sensor	ASM01838
E-BUS Return Air Temperature and RH Sensor	ASM01840
E-BUS CO2 Return Air Sensor Emulator Board	ASM01623
E-BUS CO2 Space Sensor Emulator Board	ASM01622
E-BUS Outdoor Air Temp/RH Sensor Emulator Board	ASM01697
E-BUS Return Air Temp/RH Sensor Emulator Board	ASM01621
E-BUS Space Temp/RH Sensor Emulator Board	ASM01696
Duct Temperature Sensor - 6” or 12” Space, Supply Air, Entering Air, Leaving Air, Mixed Air, or Return Air Temperature	G051240 / G051250
Outdoor Air Temperature Sensor	G042230
Standard Room Sensor - Plain or W/ Override	ASM02227 / ASM01638
Standard Room Sensor - with Setpoint Adjust or Setpoint Adjust and Override	ASM01642 / ASM01643
Strap-On Temperature Sensor Kit	ASM01624
Suction Pressure Transducer	ASM02222

Cables

PART NUMBER CROSS REFERENCE		
Part Description	**Length**	**AAON**
A2L Cable	2 ft.	G179010
	5 ft.	G179020
	9 ft.	G132540
	14 ft.	G132550
	17 ft.	G132560
	25 ft.	G132570
	38 ft.	G132580
	50 ft.	G181870
	100 ft.	G181880
Cooling Cable	2 ft.	G178770
	3 ft.	G178780
	4 ft.	G178800
	8 ft.	G167950
	12 ft.	G178810
Damper Cable	2 ft.	G178820
	3 ft.	G178830
	5 ft.	G167930
	8 ft.	G178840
	15 ft.	G178850
EXV Cable	18 in.	G178450
	22 in.	G178460
	3 ft.	G178470
	4 ft.	G167940
	9 ft.	G178480
	15	G178490
Gas Valve no Spade	3 ft.	G178970
	4 ft.	G174310
	6 ft.	G178980
Gas Valve w/ Spade	3 ft.	G178990
	4 ft.	G174320
	6 ft.	G179000
Limit Cable	2 ft.	G167880
	3 ft.	G178870
	5 ft.	G178880
	8 ft.	G178890
	15 ft.	G178900
MOUT Cable	1 ft.	G178680
	2 ft.	G167870
	3 ft.	G178690
	5 ft.	G178700
	6 ft.	G178710
	8 ft.	G178720
	10	G178730
	20 ft.	G178740

PART NUMBER CROSS REFERENCE		
Part Description	**Length**	**AAON**
Overload Relay Cable	3 ft.	G167960
	6 ft.	G182440
	9 ft.	G182450
	15 ft.	G182460
Power Cable STD	3 ft.	G180000
	6 ft.	G180010
	10 ft.	G180020
POWERCOMM Cable	3 ft.	G185070
	6 ft.	G185080
	10 ft.	G190420
	15 ft.	G190430
Stepper Cable	2 ft.	G178750
	5 ft.	G167910
	10 ft.	G178760
T1L Cable	18 in.	G178520
	30 in.	G178530
	3 ft.	G167900
	5 ft.	G178540
	8 ft.	G178550
	10 ft.	G178600
	15 ft.	G178560
	20 ft.	G178570
	25 ft.	G178580
	30 ft.	G178630
	35 ft.	G178590
	50 ft.	G178610
	100 ft.	G178620
	150 ft.	G178650
VFD Cable	2 ft.	G178910
	4 ft.	G178960
	5 ft.	G178920
	6 ft.	G178930
	10 ft.	G178940
	12 ft.	G178950

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Important Wiring Considerations

WIRING DETAILS				
Control Device	**Operating Power**	**Power Consumption**	**Temp**	**Humidity (Non-Condensing)**
Air Handler Board, Cooling Board, Heating Board, Preheat Board, Outside Air Board	23-26 VDC 24 VDC Nominal	10W Nominal 90W Maximum	-31°F to 158°F -35°C to 70°C	0-95% RH
Unit Manager	23-26 VDC 24 VDC Nominal	10W Maximum	-40°F to 158°F -40°C to 70°C	0-95% RH
POWERCOMM Board	23-26 VDC 24 VDC Nominal	10W Maximum	-40°F to 158°F -40°C to 70°C	0-95% RH

Table 1: Voltage and Environment Requirements

Wiring

The STRATUS Unit Manager and connected I-O boards must be connected to a power source of the proper size for the calculated Watt load requirements.

Please carefully read and apply the following information when wiring the STRATUS Controller and connected I-O boards.

- All wiring is to be in accordance with local and national electrical codes and specifications.
- Be sure all wiring connections are properly inserted into the terminal blocks. Do not allow wire strands to stick out and touch adjoining terminals which could potentially cause a short circuit.
- Before applying power to the STRATUS controller, recheck all wiring connections and terminations thoroughly.

A2L Mitigation

General

A2L leak detection sensors are connected to the STRATUS Air Handler I-O board and/or the STRATUS Cooling I-O board.

NOTE: Ensure connected A2L leak detection sensors are configured correctly in the configuration section of the STRATUS Unit Manager.

Wiring

See"Figure 14: Air Handler I-O Board Wiring" on page 21 and "Figure 15: Cooling I-O Board Wiring" on page 23.

Configuration

Ensure the connected A2L sensors are enabled and configured correctly in the configuration setting of the STRATUS Unit Manager.

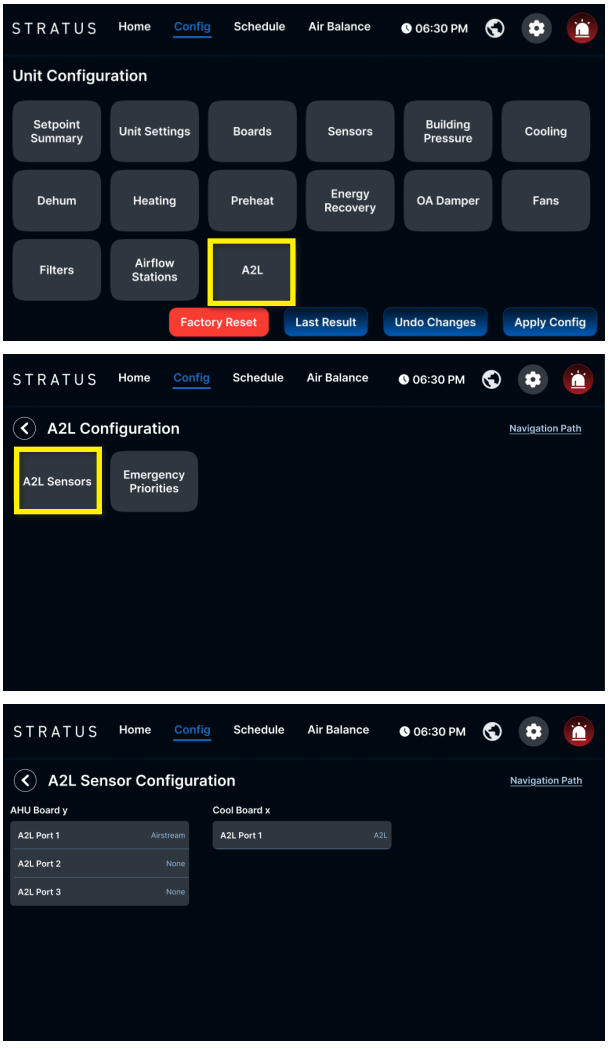


Figure 1: A2L Configuration - Unit Configuration

The configuration can also be accomplished in the individual board configuration.

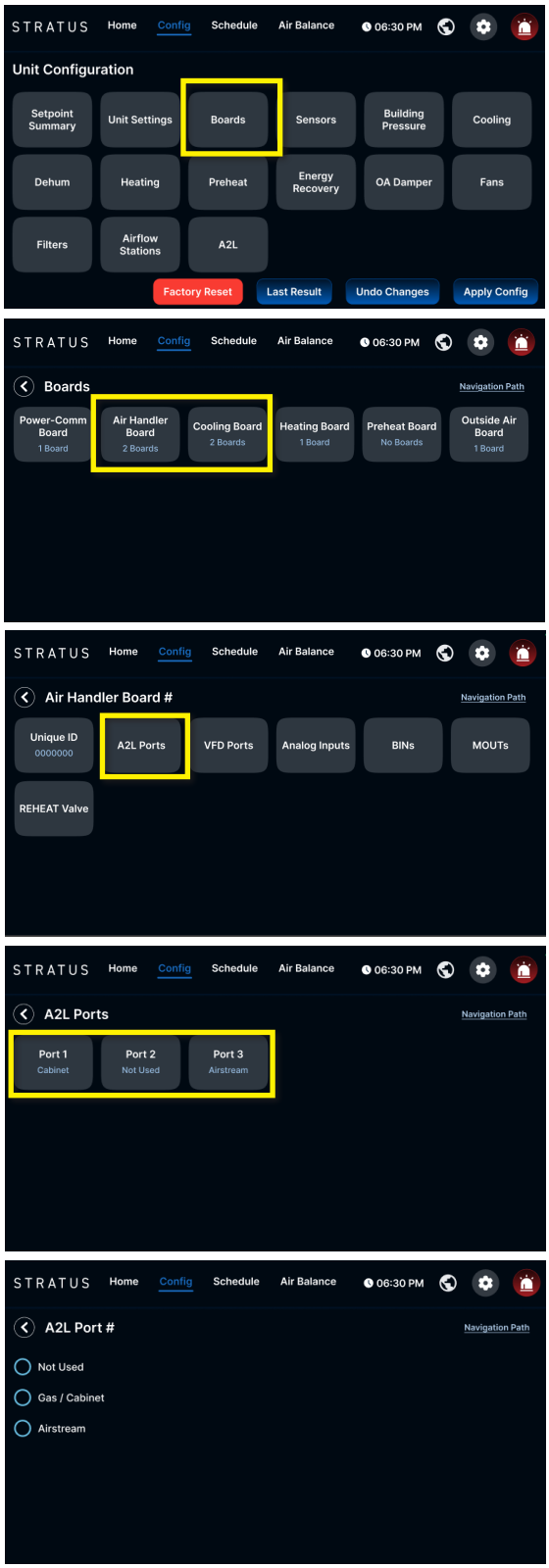


Figure 2: A2L Configuration - Board Configuration

A2L Mitigation

Airstream Leak Detection Only

When an A2L Airstream Leak is detected, all compressor operation will cease immediately, and the A2L Airstream Leak Detect alarm will be activated.

If the unit is commanded to be occupied

It will operate as it would normally with the compressors locked out. If the supply fan is configured for variable speed it will ramp up to 100%.

If the unit is commanded unoccupied at any time while the alarm is active

The supply fan will be forced to operate based on the current control method configured. If the supply fan is configured for variable speed, it will ramp up to 100% in 90 seconds.

-Heating can operate as required; however, it will only operate to the unoccupied control temperatures.

Cabinet Leak Detection Only

When an A2L Cabinet Leak is detected, all compressor and gas heat operations will cease immediately. Electric heat sources will still be able to operate.

If the unit is off, it will remain off.

Cabinet and Airstream Leak Detection

When an A2L Airstream and Cabinet Leak us detected, both A2L Leak Detect Alarms are activated.

If the unit is commanded to be occupied

It will operate as it would normally with the compressors and gas heat locked out. If the supply fan is configured for variable speed, it will ramp up to 100%.

If the unit is commanded unoccupied at any time while the alarm is active

-The supply fan will be forced to operate based on the current control method configured. If the supply fan is configured for variable speed, it will ramp up to 100% in 90 seconds.

-The OA damper is not required to open. If economizer cooling is configured for unoccupied operation, it will only operate to the unoccupied control temperatures.

If unoccupied operation is disabled, the unit will control to the Occupied setpoints.

A2L vs. Building Smoke Control

Default (A2L Priority)

STRATUS units will ship with A2L sequences at the highest priority. This may activate the indoor blower in the event of an A2L leak even if Building Smoke Controls or Non-smoke safeties are in place.

Building Smoke Control Priority

CAUTION: Using this alternative wiring method will shift the unit safety priority toward building smoke control. Only modify this setting if required by local codes. Building smoke control may override A2L.

Users can access the Priority ordering from **Config > A2L > Emergency Priorities.**

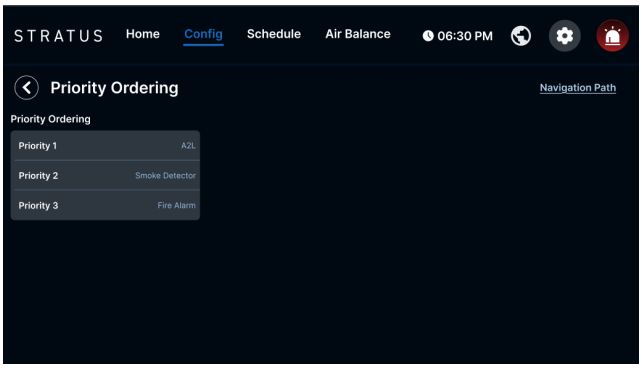


Figure 3: A2L Configuration - Priority Ordering

Dimensions

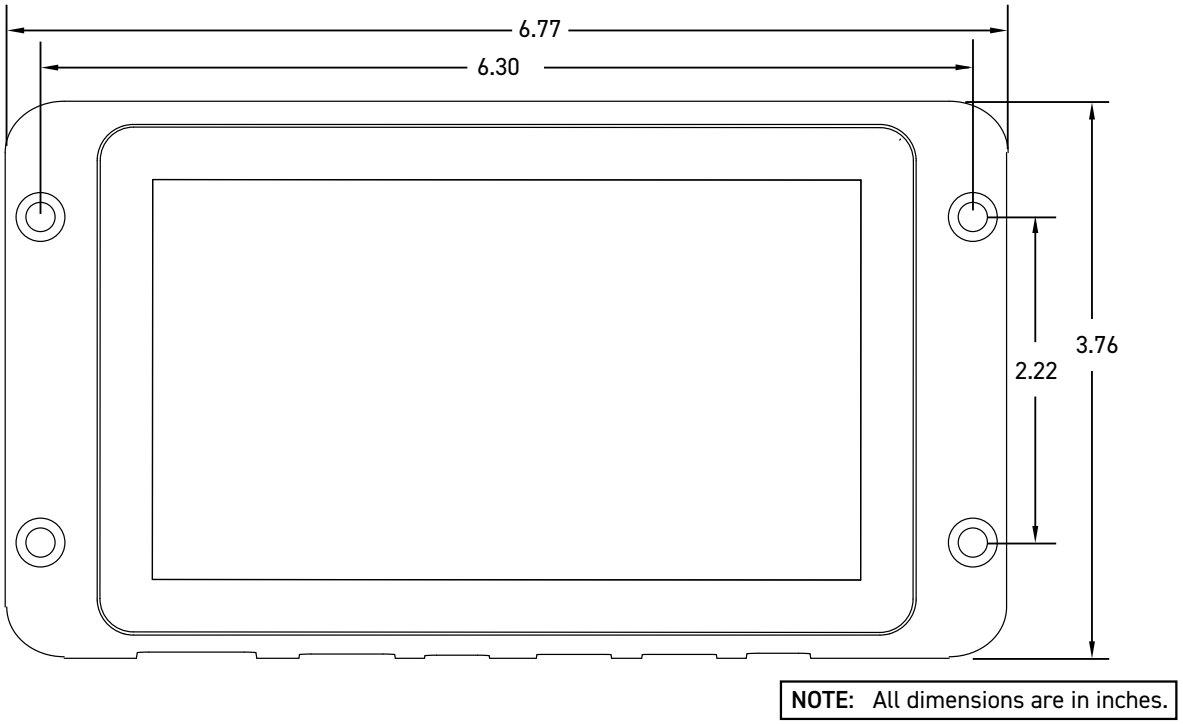


Figure 4: STRATUS Unit Manager Dimensions

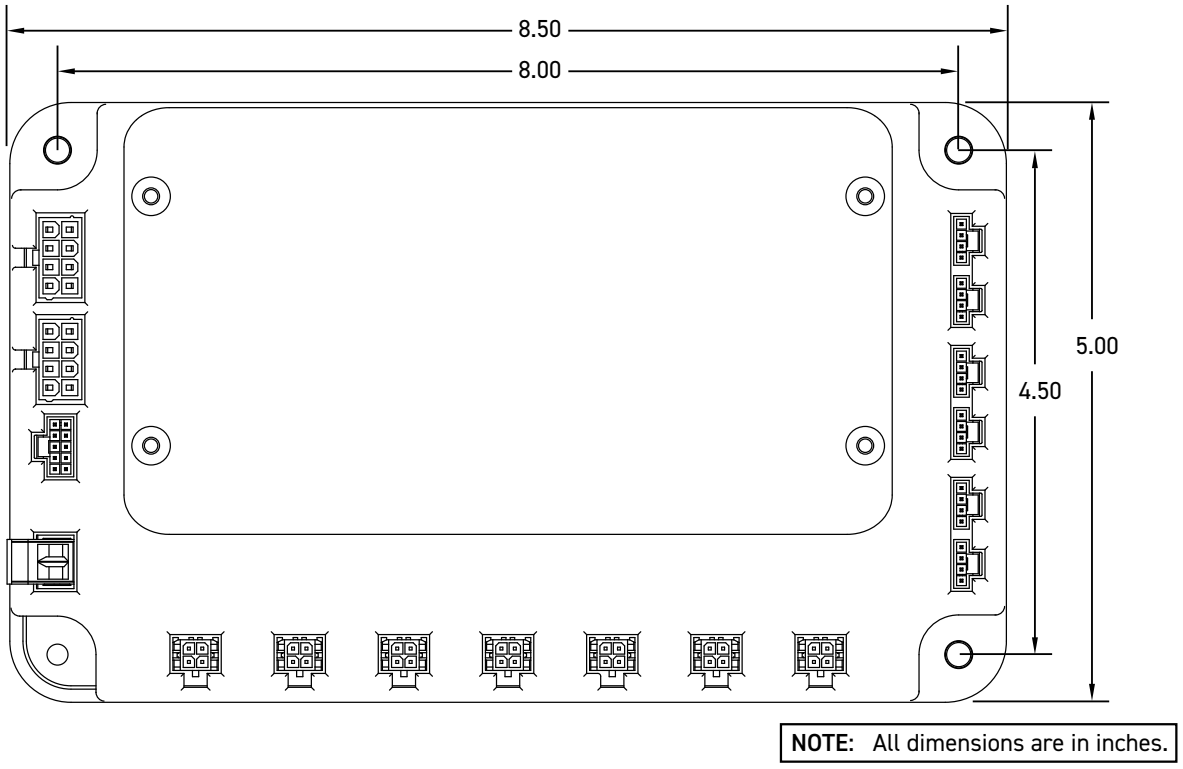
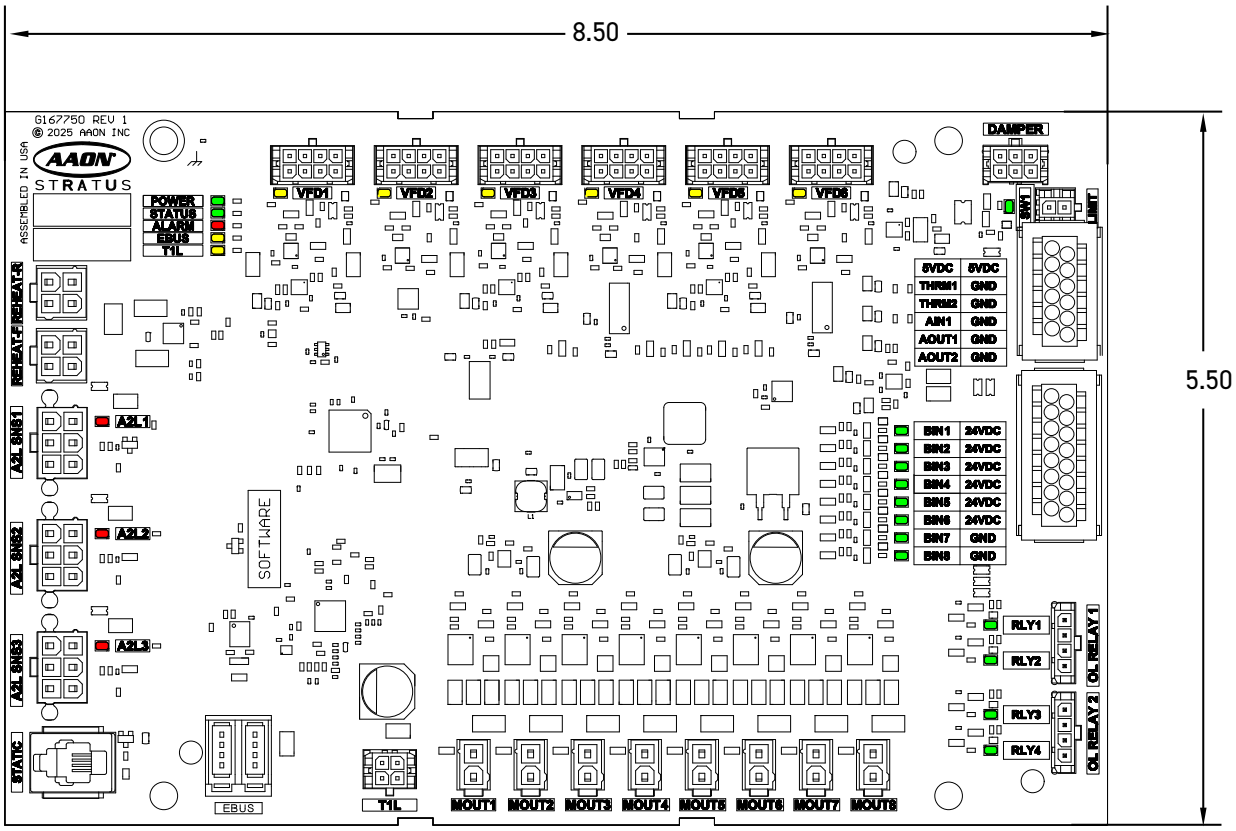


Figure 5: STRATUS POWERCOMM Board Dimensions

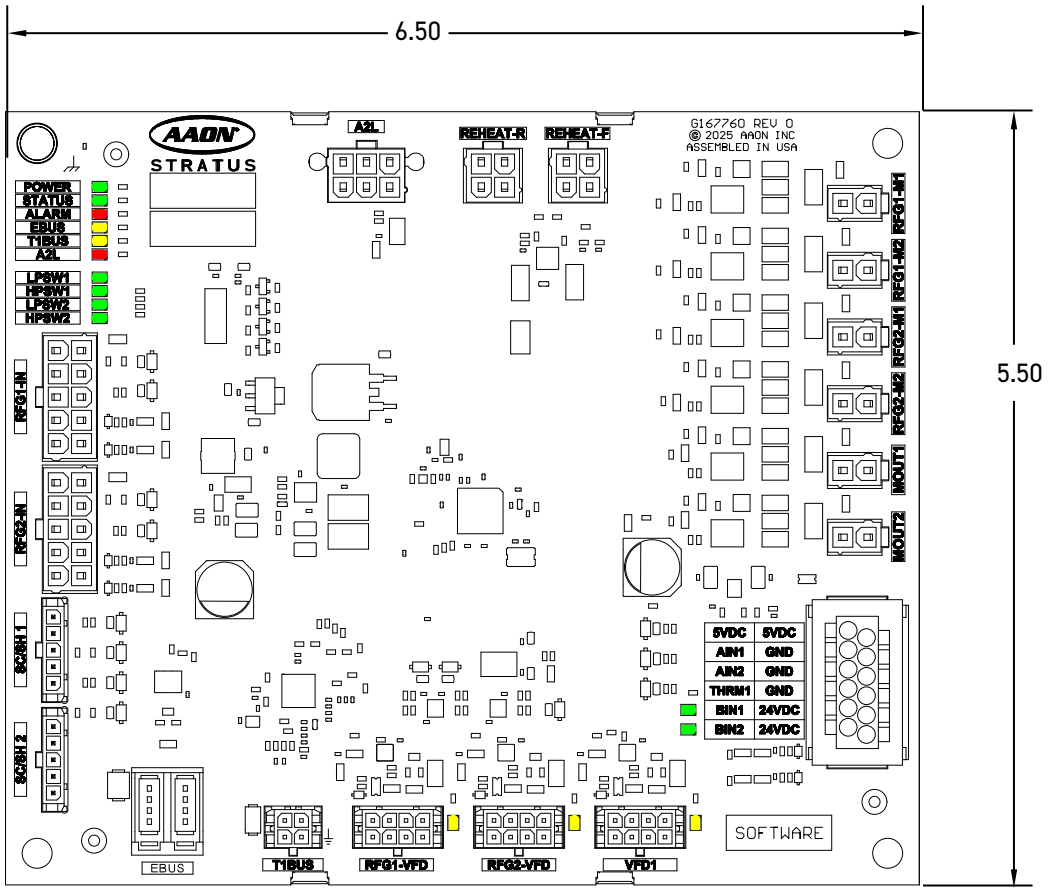
Dimensions



NOTE: All dimensions are in inches.

Figure 6: Air Handler I-O Board Dimensions

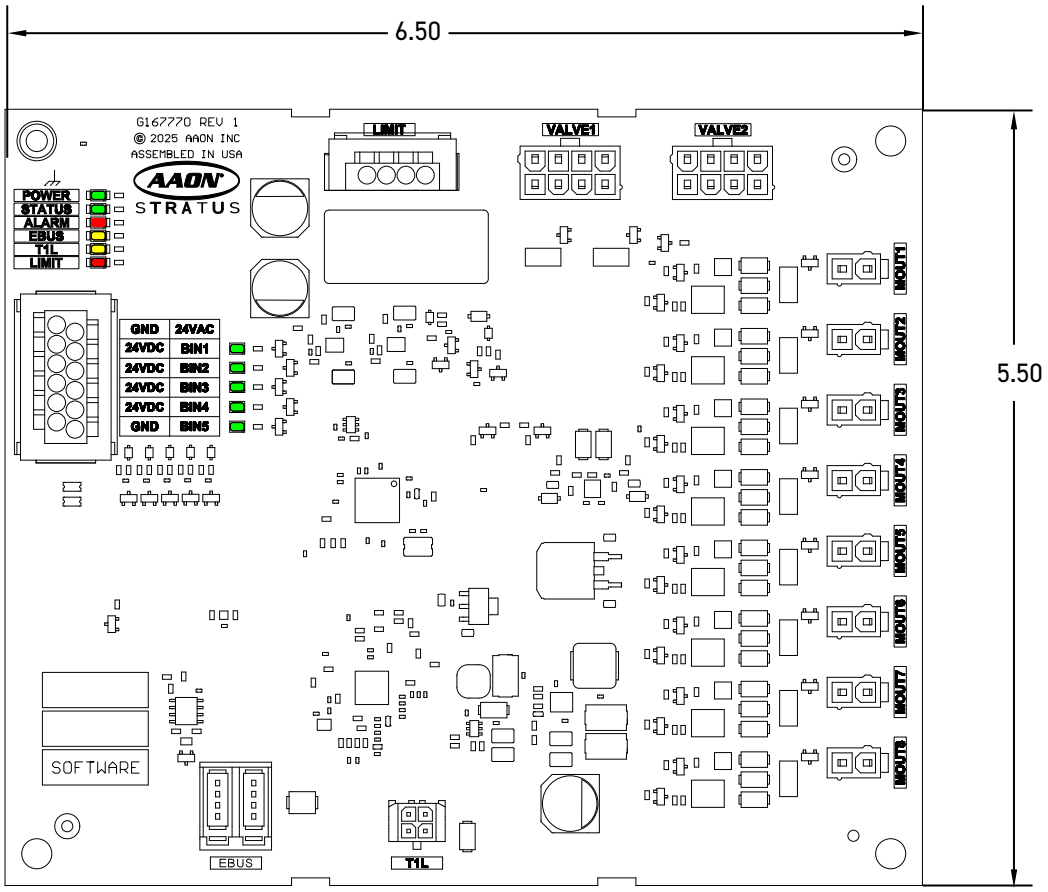
Dimensions



NOTE: All dimensions are in inches.

Figure 7: Cooling I-O Board Dimensions

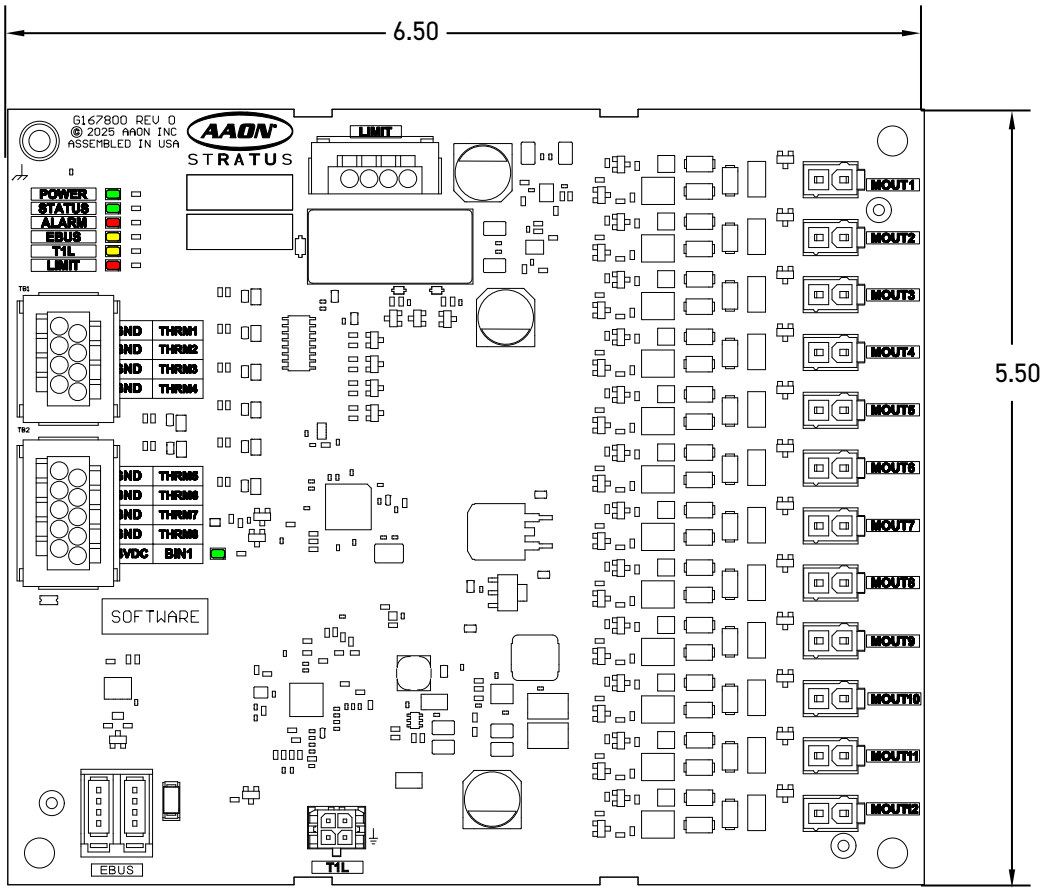
Dimensions



NOTE: All dimensions are in inches.

Figure 8: Heating I-O Board Dimensions

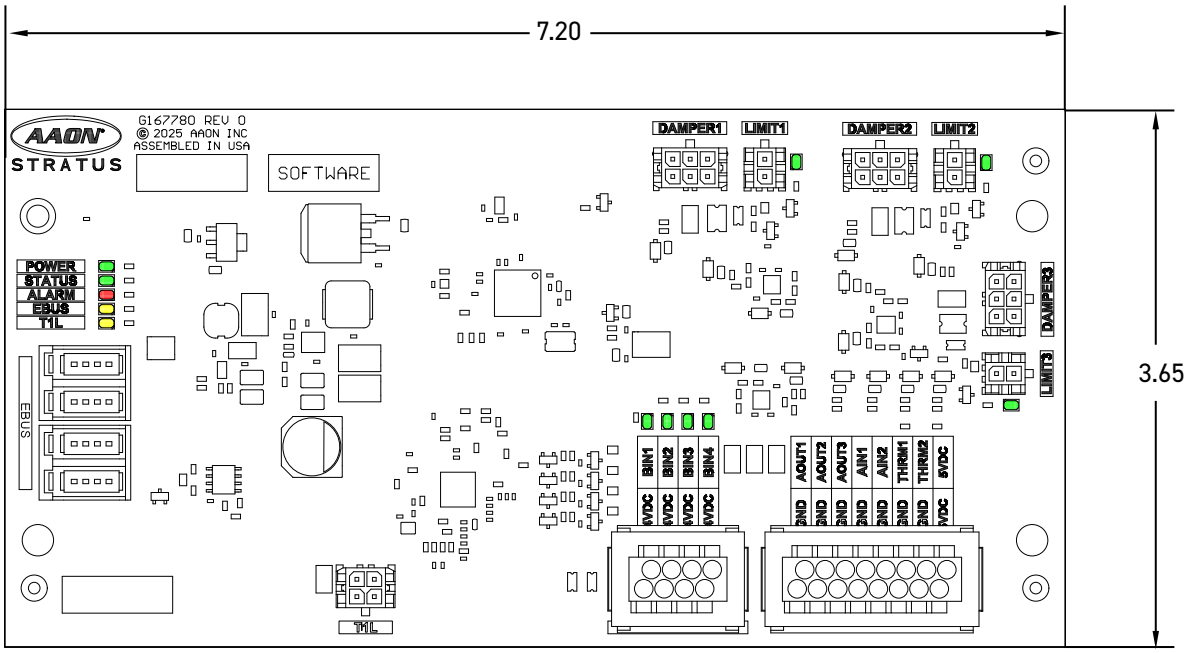
Dimensions



NOTE: All dimensions are in inches.

Figure 9: Preheat I-O Board Dimensions

Dimensions



NOTE: All dimensions are in inches.

Figure 10: Outdoor Air I-O Board Dimensions

Wiring

The wiring in the following diagrams represent typical or default wiring options. Refer to the Unit Manager configuration screens and factory wiring diagrams to ensure all devices are connected correctly.

All wiring of Analog or Binary inputs must be properly grounded and connected to the appropriate voltage where necessary.

When multiple identical inputs are available, connect devices to the closest I-O board and ensure it is configured correctly on the Unit Manager for all instances not covered by the factory wiring diagram.

Each cable is available in multiple lengths. Ensure the correct length and part number before installing or replacing cables.

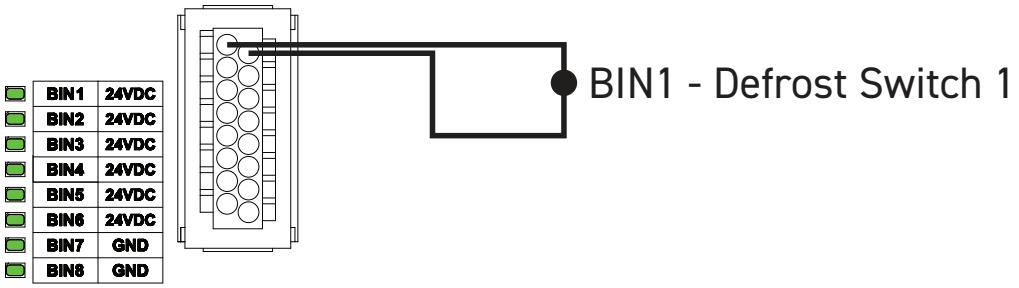


Figure 11: Binary Input Wiring Example

Unit Manager

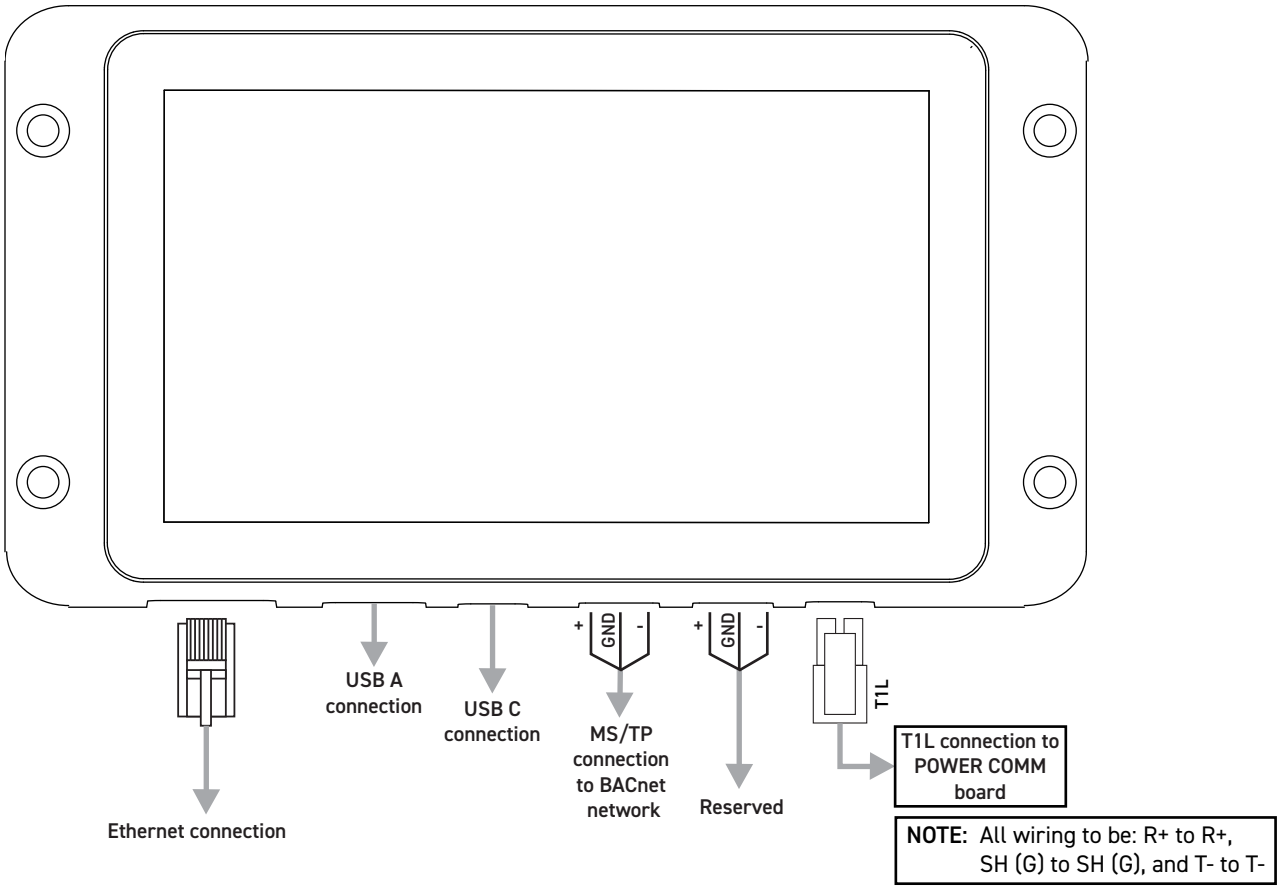


Figure 12: Unit Manager Wiring

Ethernet (10/100; BACnet/IP, Web Access)

Ethernet communications input is used for building automation communication, enabling web access (Stratus Workstation), data exchange, and remote operations.

USB A (2.0)

Universal Serial Bus (USB) A input is used for software updates and configuration imports/exports.

USB C (2.0 OTG)

Universal Serial Bus (USB) C input is used for software updates and configuration imports/exports.

MS/TP Communications (BACnet)

BACnet protocol MS/TP communications input is a local network connecting the Unit Manager with a Building Automation controller through RS-485 serial communications.

T1L

The Unit Manager receives +24 VDC and communications from the POWER COMM board for both board level power and communications.

NOTE: The Unit Manager T1L Port should be wired strictly to the Power Comm Board T1L (Port 1).

POWERCOMM Board

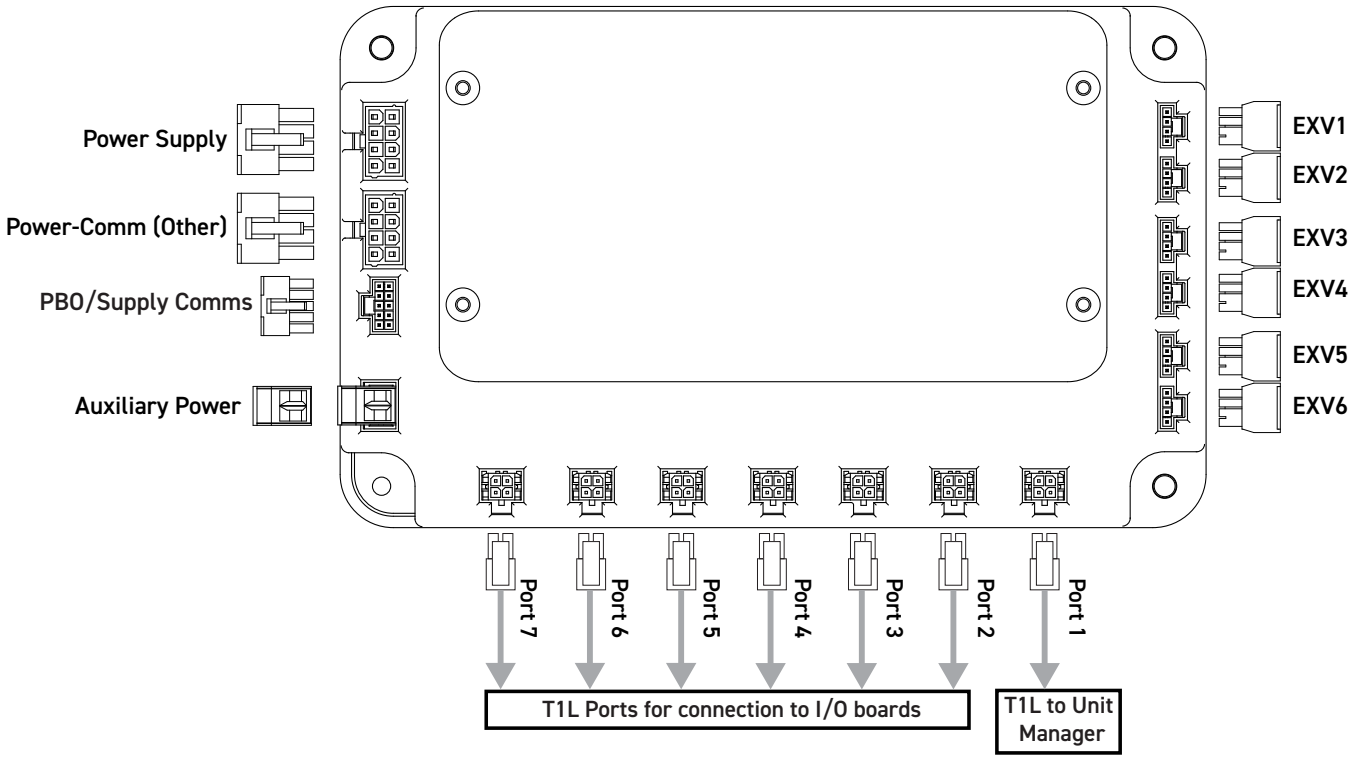


Figure 13: STRATUS POWERCOMM Board Wiring

Power Supply
23-26 VDC; 24 VDC Nominal

PBO/Supply Comms

EXV - Ports 1 thru 6
Sporlan EXV and Vapor Injection modules receive +24 VDC and communications from the POWER COMM board for both board level power and communications.

Power-Comm (Other)
AAON's power supply.

Auxiliary Power
23-26 VDC; 24 VDC Nominal.

WARNING: Ensure that the load calculation for Auxiliary Powered devices does NOT exceed the MAX VA limit. Exceeding this limit will result in EFUSE resets on the POWERCOMM Board, causing a unit ESHUTDOWN state.

T1L - Port 1 (Unit Manager; ONLY)
The Unit Manager receives +24 VDC and communications from the POWER COMM board for both board level power and communications.

NOTE: T1L Port 1 is strictly intended to be used with the Stratus Unit Manager.

T1L - Port 2 through 7 (I-O Boards)
The I-O Boards receives +24 VDC and communications from the POWER COMM board for both board level power and communications.

NOTE: T1L Ports 2-7 are strictly intended to be used with Stratus I-O boards.

Air Handler I-O Board

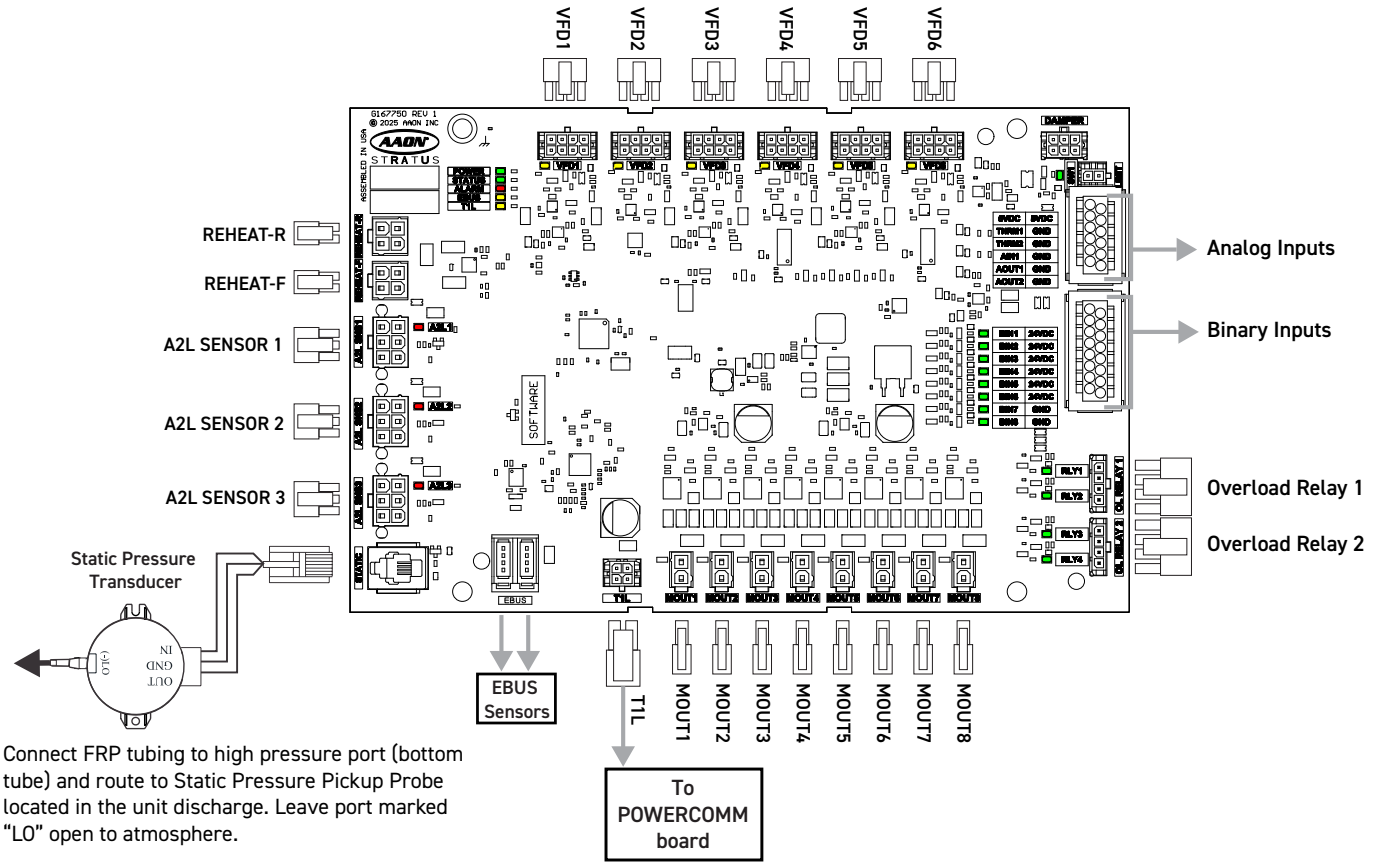


Figure 14: Air Handler I-O Board Wiring

A2L - Sensors

A2L Airstream and Cabinet sensors receive +12 VDC for board level power and sends its active state to the I-O board as a +5 VDC signal.

Duct Static Pressure (RJ-11)

The Duct Static Pressure Sensor receives +5 VDC for board level power and sends its active pressure reading to the I-O board as a 0-5 VDC signal.

NOTE: The Duct Static Pressure Sensor cable input accepts an RJ-11 jack-style connector.

EBUS Sensors

EBUS sensors receive +12 VDC and communications from the I-O board for both board level power and communications.

T1L

The T1L port receives +24 VDC and communications from the POWER COMM board for both board level power and communications.

NOTE: The Boards T1L Port should be wired strictly to the POWER COMM Board T1L (Ports 2-7).

Analog Inputs

For Pinout, see **"Table 2: Air Handler I-O Board Analog Inputs" on page 22**.

THERM: Thermistor Inputs measure a 0-5 VDC signal by detecting a change in electrical resistance. As a thermistor is a passive device and does not produce an electrical output on its own. The inputs use temperature sensing probes for application and unit control.

AIN: Analog Inputs receive a 0-5 VDC signal from a differential pressure sensing device. The input uses the signal for fan control or dirty filter sensing.

5 VDC: A +5 VDC low-voltage output is provided as the source power requirements needed for a pressure sensor device, when configured and wired into the I-O boards Analog Input (AIN).

Binary Inputs

For Pinout, see **"Table 3: Air Handler I-O Board Binary Inputs" on page 22**.

Binary inputs are ON/OFF signals that are active when a +24 VDC signal is present at the binary input. When an ON (+24 VDC) state is present it represents the active status of the configured input. States such as running/stopped, open/closed, fault/normal.

Air Handler I-O Board

Table 2: Air Handler I-O Board Analog Inputs

AIR HANDLER I-O BOARD ANALOG INPUTS			
Type	**Pin**	**Input / Outputs**	**Description**
5 VDC	A1	+ 5 VDC	+5 VDC Output
	B1	+ 5 VDC	+5 VDC Output
THERM 1	A2	GND	Thermistor; Wire Lead #1
	B2	+ 5 VDC	Thermistor; Wire Lead #2
THERM 2	A3	GND	Thermistor; Wire Lead #1
	B3	+ 5 VDC	Thermistor; Wire Lead #2
AIN 1	A4	GND	AIN1; Ground
	B4	Signal	AIN1; Signal Input (0-5 VDC)

Table 3: Air Handler I-O Board Binary Inputs

AIR HANDLER I-O BOARD BINARY INPUTS			
Type	**Pin**	**Input / Outputs**	**Description**
BIN 1	A1	+ 24 VDC	+24 VDC Output
	B1	Signal	Signal Input (+24 VDC)
BIN 2	A2	+ 24 VDC	+24 VDC Output
	B2	Signal	Signal Input (+24 VDC)
BIN 3	A3	+ 24 VDC	+24 VDC Output
	B3	Signal	Signal Input (+24 VDC)
BIN 4	A4	+ 24 VDC	+24 VDC Output
	B4	Signal	Signal Input (+24 VDC)
BIN 5	A5	+ 24 VDC	+24 VDC Output
	B5	Signal	Signal Input (+24 VDC)
BIN 6	A6	+ 24 VDC	+24 VDC Output
	B6	Signal	Signal Input (+24 VDC)
BIN 7	A7	GND	Ground
	B7	Signal	Signal Input (+24 VDC)
BIN 8	A8	GND	Ground
	B8	Signal	Signal Input (+24 VDC)

MOUT (Mechanical Output)

MOUT's when configured as a signal type configuration and an ON state is present will output +24 VDC.

MOUT's when configured as a contactor/relay type configuration and an ON state is present will output a +2-5 VDC; Pulse Width Modulation (PWM) signal.

NOTE: If a 24 VAC relay coil is wired to a MOUT with a signal configuration. When the signal is Enabled, the I-O Board's EFUSE will reset resulting in an ESHUTDOWN sequence.

REHEAT-R

Reheat-R (condenser coil) valves are opened/closed by receiving +6 VDC inputs from the I-O board in the form of a stepper voltage sequence.

REHEAT-F

Reheat-F (reheat coil) valves are opened/closed by receiving +6 VDC inputs from the I-O board in the form of a stepper voltage sequence.

VFD

Non-Communicating Motor:

Permanent Split Capacitor (PSC) Motor will modulate the fan speed by receiving a speed reference signal (user-configurable) and a +24 VDC enable signal. 0% signal (Minimum Voltage setpoint) is equal to OFF and 100% signal (Maximum Voltage setpoint) is equal to MAX speed.

Electronically Commutated Motor (ECM) will modulate the fan speed by receiving a speed reference signal (user-configurable). 0% signal (Minimum Voltage setpoint) is equal to OFF and 100% signal (Maximum Voltage setpoint) is equal to MAX speed..

Communicating Motor

A VFD motor will modulate the fan speed by receiving a speed reference signal from the I-O board. 0% signal is equal to OFF and 100% signal is equal to MAX speed.

Cooling I-O Board

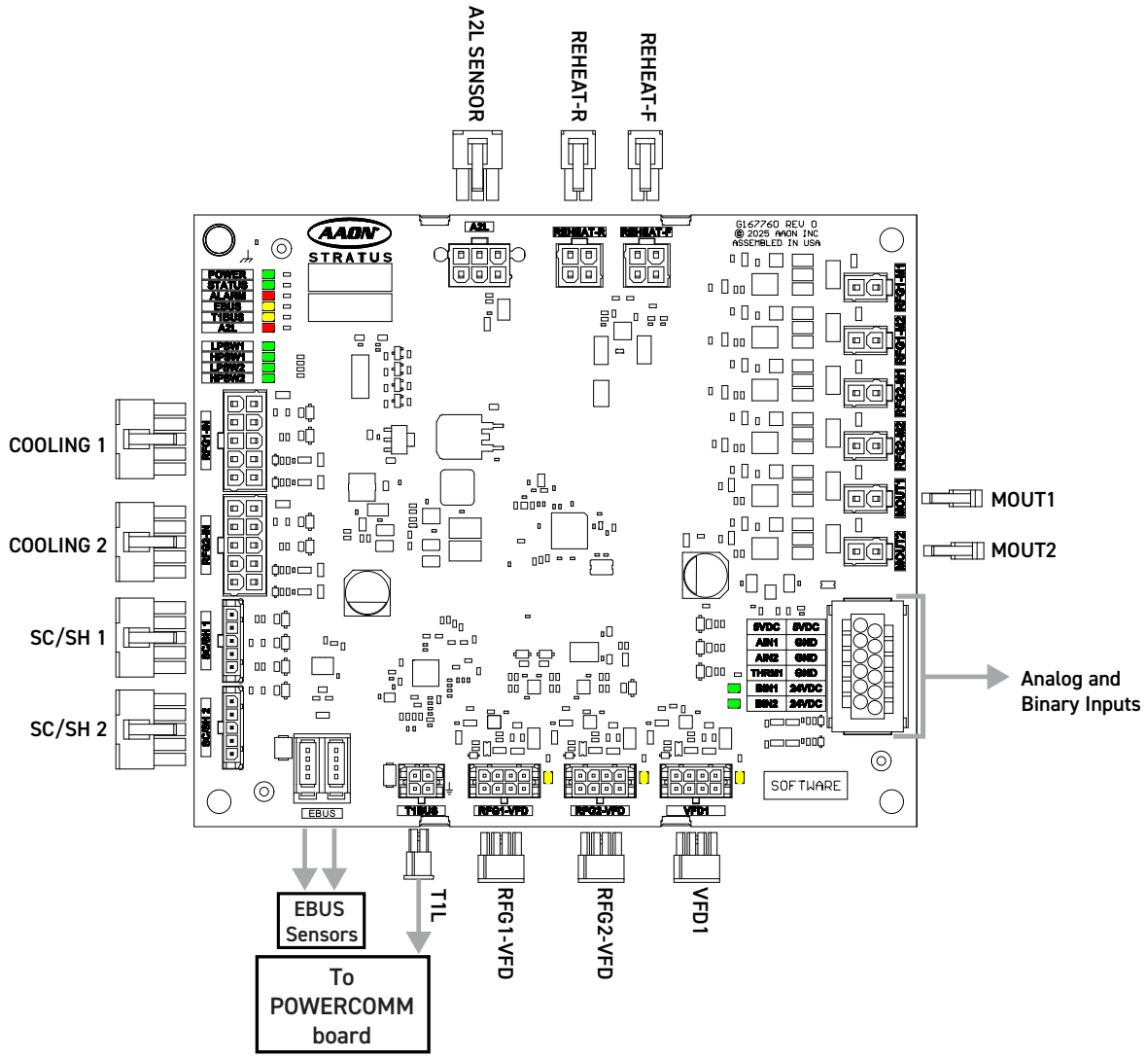


Figure 15: Cooling I-O Board Wiring

A2L - Sensor 1

A2L Cabinet sensor receives +12 VDC for board level power and sends its active state to the I-O board as a +5 VDC signal.

EBUS Sensors

EBUS sensors receive +12 VDC and communications from the I-O board for both board level power and communications.

T1L

The T1L port receives +24 VDC and communications from the POWER COMM board for both board level power and communications.

NOTE: The Boards T1L Port should be wired strictly to the POWER COMM Board T1L (Ports 2-7).

RFG-IN (Cooling Cable)

High-Pressure Switch:

The High-Pressure Switch input is ON/OFF signal that is active when a +24 VDC signal is present at the high-pressure switch signal input. When an ON (+24 VDC) state is present it represents the active status of the high-pressure switch input. The high-pressure switch signal is used for refrigeration unit control as an emergency shutdown safety.

Discharge Line Temperature:

The Discharge Temperature Input measures a 0-5 VDC signal by detecting a change in electrical resistance. As the thermistor is a passive device and does not produce an electrical output on its own. The discharge temperature sensing input is used for refrigeration unit control.

Cooling I-O Board

Discharge Pressure Transducer:
The Discharge Pressure Input receives a 0-5 VDC signal from a discharge pressure transducer. The discharge pressure signal is used for refrigeration unit control.

Analog Inputs

AIN: Analog Inputs receive a 0-5 VDC signal from a differential pressure sensing device. The input uses the signal for fan control or dirty filter sensing.

5 VDC: A +5 VDC low-voltage output is provided as the source power requirements needed for a pressure sensor device, when configured and wired into the I-O boards Analog Input (AIN).

Binary Inputs

Binary inputs are ON/OFF signals that are active when a +24 VDC signal is present at the binary input. When an ON (+24 VDC) state is present it represents the active status of the configured input. States such as running/stopped, open/closed, fault/normal.

Table 4: Cooling I-O Board Analog and Binary Inputs

COOLING I-O BOARD ANALOG AND BINARY INPUTS			
Type	Pin	Input / Outputs	Description
5 VDC	A1	+ 5 VDC	+5 VDC Output
	B1	+ 5 VDC	+5 VDC Output
AIN 1	A2	GND	AIN1; Ground
	B2	Signal	AIN1; Signal Input (0-5 VDC)
AIN 2	A3	GND	AIN2; Ground
	B3	Signal	AIN2; Signal Input (0-5 VDC)
BIN 1	A5	+ 24 VDC	+24 VDC Output
	B5	Signal	SIGNAL Input (+24 VDC)
BIN 2	A6	+ 24 VDC	+24 VDC Output
	B6	Signal	Signal Input (+24 VDC)

MOUT

MOUT's when configured as a contactor/relay type configuration and an ON state is present will output a +2-5 VDC; Pulse Width Modulation (PWM) signal.

REHEAT-R

Reheat-R (condenser coil) valves are opened/closed by receiving +6 VDC inputs from the I-O board in the form of a stepper voltage sequence.

REHEAT-F

Reheat-F (reheat coil) valves are opened/closed by receiving +6 VDC inputs from the I-O board in the form of a stepper voltage sequence.

RFG-VFD (VFD Cable)

Communicating Motor:
Variable Frequence Drive (VFD) Motor will modulate the fan speed by receiving speed reference signal from the I-O board. 0% signal is equal to OFF and 100% signal is equal to MAX speed.

VFD - 1

Non-Communicating Motor:
Permanent Split Capacitor (PSC) Motor will modulate the fan speed by receiving a speed reference signal (user-configurable) and a +24 VDC enable signal. 0% signal (Minimum Voltage setpoint) is equal to OFF and 100% signal (Maximum Voltage setpoint) is equal to MAX speed.

Electronically Commutated Motor (ECM) will modulate the fan speed by receiving a speed reference signal (user-configurable). 0% signal (Minimum Voltage setpoint) is equal to OFF and 100% signal (Maximum Voltage setpoint) is equal to MAX speed.

Communicating Motor:
Variable Frequence Drive (VFD) Motor will modulate the fan speed by receiving a speed reference signal from the I-O board. 0% signal is equal to OFF and 100% signal is equal to MAX speed.

Heating I-O Board

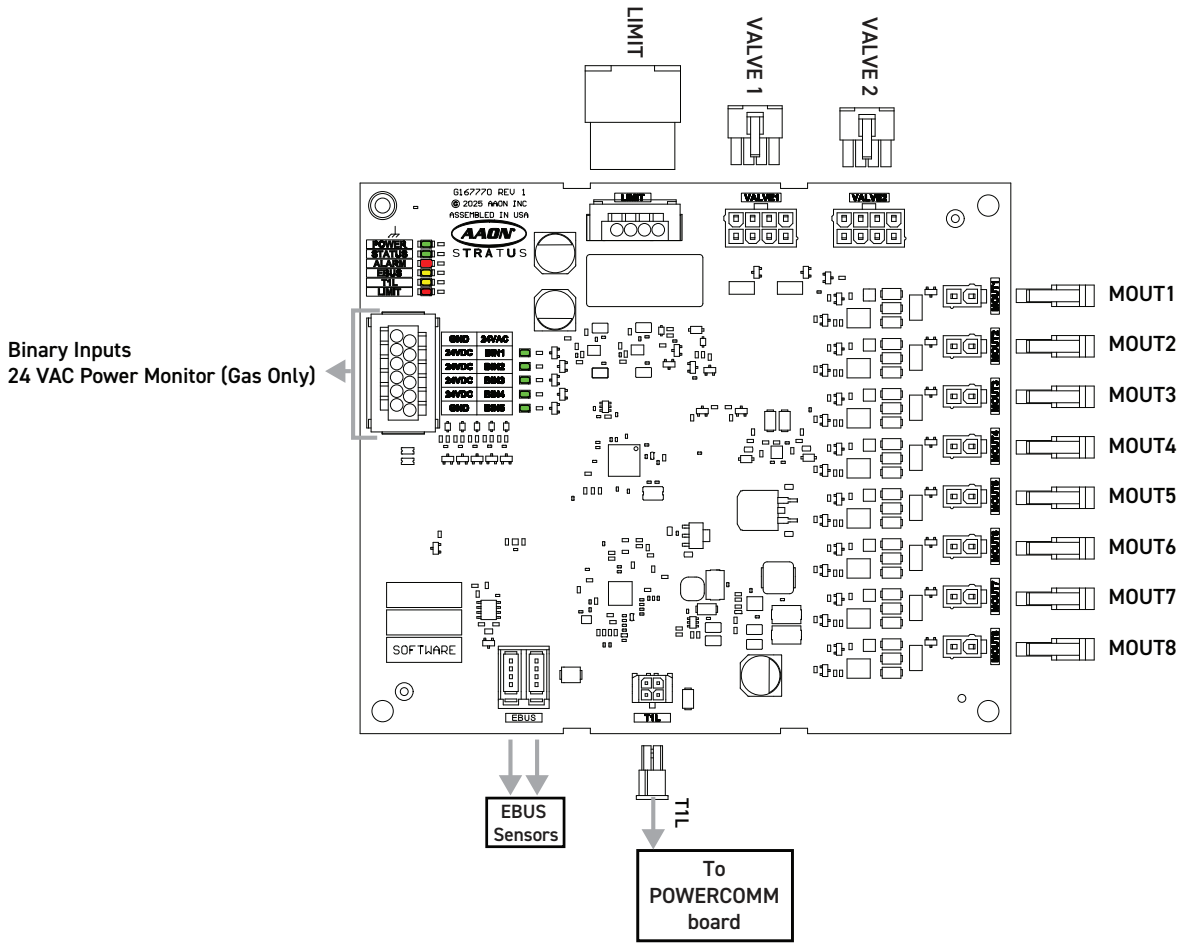


Figure 16: Heating I-O Board Wiring

LIMIT

The limit input is an ON/OFF signal that is closed when a +24 VDC signal is present at the signal input. An ON (+24 VDC) state represents a closed state of the limit switch.

EBUS Sensors

EBUS sensors receive +12 VDC and communications from the I-O board for both board level power and communications.

T1L

The T1L port receives +24 VDC and communications from the POWER COMM board for both board level power and communications.

NOTE: The Boards T1L Port should be wired strictly to the POWER COMM Board T1L (Ports 2-7).

24 VAC Power Monitor

See **"Table 5: Heating I-O Board Analog and Binary Inputs" on page 26** for pin information.

Gas Heat unit configurations only. The +24 VAC positive and ground inputs on the I-O board monitors the AC power supply voltage and ties the ground wires between the AC and DC power supplies together, as to ensure there is no difference in grounding potential.

WARNING: Observe polarity! The 24 VAC power supply wiring must be wired with GND-to-A6 and 24 VAC-to-B6 of the input header. Failure to observe polarity will result in damage to one or more of the boards.

BINARY

See **"Table 5: Heating I-O Board Analog and Binary Inputs" on page 26** for pin information.

Binary inputs are ON/OFF signals that are active when a +24 VDC signal is present at the binary input. When an ON (+24 VDC) state is present it represents the active status of the configured input. States such as running/stopped, open/closed, fault/normal.

Gas Heat unit configurations only. By default, a single binary input will be assigned as Ignition Proof per stage, starting with BIN 1. Once a flame has been established by the Direct Spark Ignition Control (White-Rodgers or UTEC) a proof of flame signal will be received by the binary input associated with the active stage.

Example: If two stages of gas are configured. Binary 1 be assigned to Stage 1 and Binary 2 will be assigned to Stage 2.

Table 5: Heating I-O Board Analog and Binary Inputs

HEATING I-O BOARD 24 VAC AND BINARY INPUTS			
Type	**Pin**	**Input / Outputs**	**Description**
+24 VAC	A6	GND	Ground
	B6	+ 24 VAC	+24 VAC Input
BIN 1	A5	+ 24 VDC	+24 VDC Output
	B5	SIGNAL	SIGNAL Input (+24 VDC)
BIN 2	A4	+ 24 VDC	+24 VDC Output
	B4	SIGNAL	SIGNAL Input (+24 VDC)
BIN 3	A3	+ 24 VDC	+24 VDC Output
	B3	SIGNAL	SIGNAL Input (+24 VDC)
BIN 4	A1	+ 24 VDC	+24 VDC Output
	B2	SIGNAL	SIGNAL Input (+24 VDC)
BIN 5	A1	GND	Ground
	B1	SIGNAL	SIGNAL Input (+24 VDC)

MOUT

Electric Heat (unit configuration):
When a heat stage is enabled the MOUT will output a +2-5 VDC; Pulse Width Modulation (PWM) signal to the stage contractor or relay.

If a Silicon Controlled Rectifier (SCR) relay is configured, two MOUT's will need to be assigned for the modulating heat stage. When enabled, the corresponding MOUT will close the high-voltage contactor and modulate the SCR Signal to its corresponding MOUT configuration.

NOTE: Stratus will only allow one SCR stage configuration for the I-O board.

Gas Heat (unit configuration):
When a heat stage is enabled the MOUT will output +24 VDC signal to a Direct Spark Ignition Control (White-Rodgers or UTEC) as its W1 input.

A single MOUT must be assigned as the 'Inducer Fan Speed Low'. When heat is enabled, it will send +24 VDC to the combustion (inducer) fan as its low speed. Modulating the gas valve to an ignition start position of 70% to maintain proper fuel to air ratios during the ignition sequence

VALVE 1 (Gas Valve Cable)

Gas Heat unit configurations only. When configured, the communicating output will control a modulating gas valve, Stage 1. If configured, the I-O board will detect if the valve is connected and will verify its valve position.

VALVE 2 (Gas Valve Cable)

Gas Heat unit configurations only. When configured, the communicating output will control a modulating gas valve, Stage 2. If configured, the I-O board will detect if the valve is connected and will verify its valve position.

Outdoor Air I-O Board

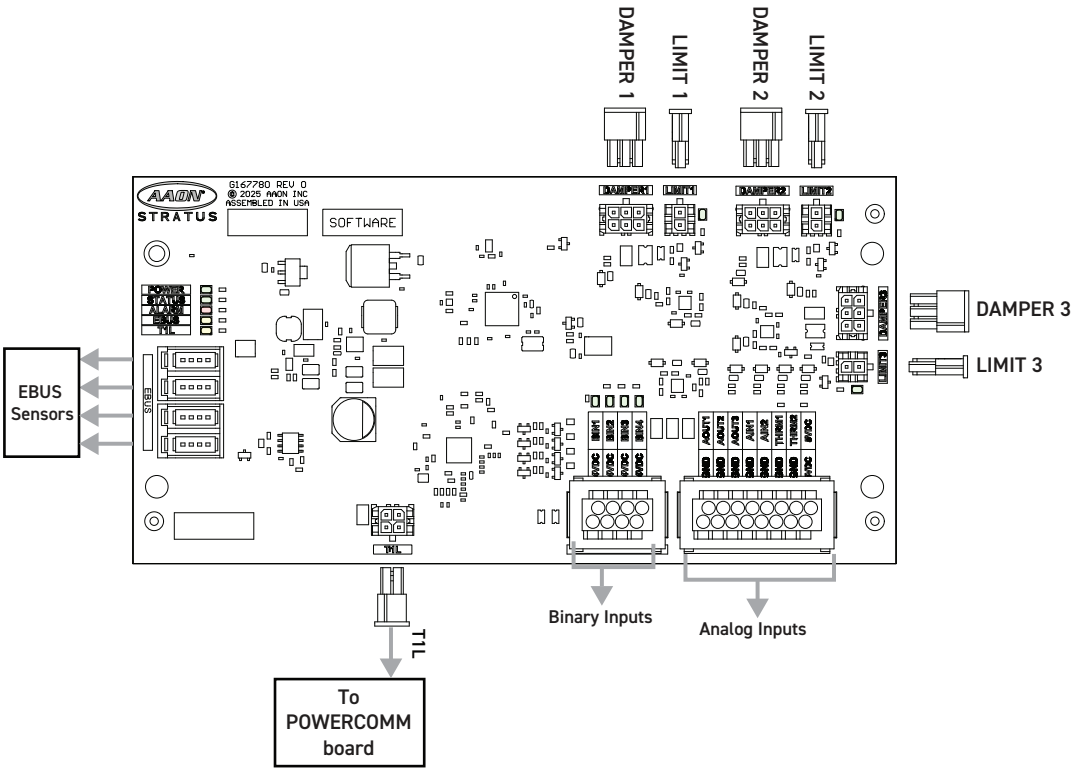


Figure 17: Outdoor Air I-O Board Wiring

EBUS Sensors

EBUS sensors receive +12 VDC and communications from the I-O board for both board level power and communications.

T1L

The T1L port receives +24 VDC and communications from the POWER COMM board for both board level power and communications.

NOTE: The Boards T1L Port should be wired strictly to the POWER COMM Board T1L (Ports 2-7).

ANALOG

AIN: Analog Inputs receive a 0-5 VDC signal from a differential pressure sensing device. The input uses the signal for fan control or dirty filter sensing.

THERM: Thermistor Inputs measure a 0-2.5 VDC signal by detecting a change in electrical resistance. As a thermistor is a passive device and does not produce an electrical output on its own. The inputs use temperature sensing probes for application and unit control.

Table 6: Outdoor Air I-O Board Analog Inputs

OUTDOOR AIR I-O BOARD ANALOG INPUTS			
Type	**Pin**	**Input / Outputs**	**Description**
AIN 1	A5	GND	AIN1; Ground
	B5	SIGNAL	AIN1; Signal Input (0-5 VDC)
AIN 2	A4	GND	AIN2; Ground
	B4	SIGNAL	AIN2; Signal Input (0-5 VDC)
THERM 1	A3	GND	Thermistor; Wire Lead #1
	B3	+ 2.5 VDC	Thermistor; Wire Lead #2
THERM 2	A2	GND	Thermistor; Wire Lead #1
	B2	+ 2.5 VDC	Thermistor; Wire Lead #2
5 VDC	A1	+ 5 VDC	+5 VDC Output
	B1	+ 5 VDC	+5 VDC Output

5 VDC: A +5 VDC low-voltage output is provided as the source power requirements needed for a pressure sensor device, when configured and wired into the I-O boards Analog Input (AIN).

Outdoor Air I-O Board

BINARY

Binary inputs are ON/OFF signals that are active when a +24 VDC signal is present at the binary input. When an ON (+24 VDC) state is present it represents the active status of the configured input. States such as running/stopped, open/closed, fault/normal.

Dampers

Table 7: Outdoor Air I-O Board Binary Inputs

OUTDOOR AIR I-O BOARD BINARY INPUTS			
Type	**Pin**	**Inputs**	**Description**
BIN 1	A4	+ 24 VDC	+24 VDC Output
	B4	SIGNAL	SIGNAL Input (+24 VDC)
BIN 2	A3	+ 24 VDC	+24 VDC Output
	B3	SIGNAL	SIGNAL Input (+24 VDC)
BIN 3	A2	+ 24 VDC	+24 VDC Output
	B2	SIGNAL	SIGNAL Input (+24 VDC)
BIN 4	A1	+ 24 VDC	+24 VDC Output
	B1	SIGNAL	SIGNAL Input (+24 VDC)

Damper Actuators will modulate by receiving a +2-10 VDC commanded position signal from the I-O board. The I-O board will receive a +2-10 VDC feedback position from the actuator. +2 VDC is equal to a damper position of 0% or FULLY CLOSED and a +10 VDC signal is equal to a damper position of 100% or FULLY OPEN.

Preheat I-O Board

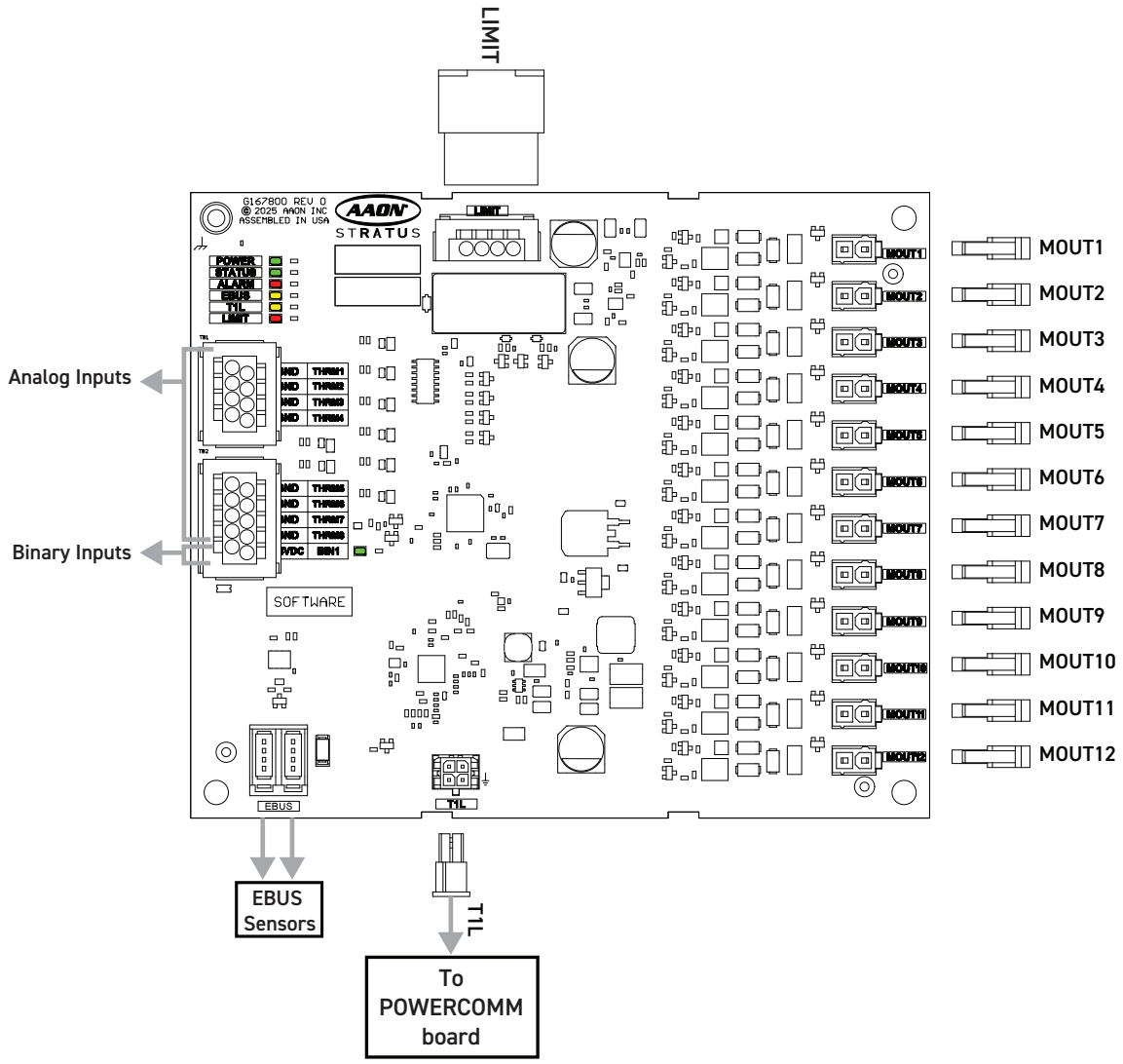


Figure 18: Preheat I-O Board Wiring

LIMIT

The limit input is an ON/OFF signal that is closed when a +24 VDC signal is present at the signal input. An ON (+24 VDC) state represents a closed state of the limit switch.

EBUS Sensors

EBUS sensors receive a +12 VDC and communications from the I-O board for both board level power and communications.

T1L

The T1L port receives a +24 VDC and communications from the POWER COMM board for both board level power and communications.

NOTE: The Boards T1L Port should be wired strictly to the POWER COMM Board T1L (Ports 2-7).

MOUT

Electric Heat

When a heat stage is enabled the MOUT will output a +2-5 VDC; Pulse Width Modulation (PWM) signal to the stage contractor or relay.

If a Silicon Controlled Rectifier (SCR) relay is configured, two MOUT's will need to be assigned for the modulating heat stage. When enabled, the corresponding MOUT will close the high-voltage contactor and modulate the SCR Signal to its corresponding MOUT configuration.

NOTE: Stratus will only allow one SCR stage configuration for the I-O board.

Preheat I-O Board

Analog Inputs

THERM: Thermistor Inputs measure a 0-5 VDC signal by detecting a change in electrical resistance. As a thermistor is a passive device and does not produce an electrical output on its own. The inputs use temperature sensing probes for application and unit control.

Table 8: Preheat I-O Board Analog Inputs

PREHEAT I-O BOARD ANALOG INPUTS			
Type	**Pin**	**Inputs**	**Description**
THERM 1	A1	+ 5 VDC	Thermistor; Wire Lead #1
	B1	GND	Thermistor; Wire Lead #2
THERM 2	A2	+ 5 VDC	Thermistor; Wire Lead #1
	B2	GND	Thermistor; Wire Lead #2
THERM 3	A3	+ 5 VDC	Thermistor; Wire Lead #1
	B3	GND	Thermistor; Wire Lead #2
THERM 4	A4	+ 5 VDC	Thermistor; Wire Lead #1
	B4	GND	Thermistor; Wire Lead #2

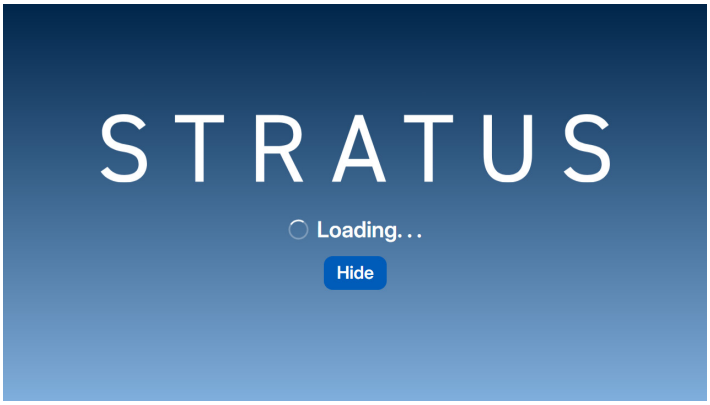
Table 9: Preheat I-O Board Analog and Binary Inputs

PREHEAT I-O BOARD ANALOG AND BINARY INPUTS			
Type	**Pin**	**Inputs**	**Description**
THERM 5	A1	+ 5 VDC	Thermistor; Wire Lead #1
	B1	GND	Thermistor; Wire Lead #2
THERM 6	A2	+ 5 VDC	Thermistor; Wire Lead #1
	B2	GND	Thermistor; Wire Lead #2
THERM 7	A3	+ 5 VDC	Thermistor; Wire Lead #1
	B3	GND	Thermistor; Wire Lead #2
THERM 8	A4	+ 5 VDC	Thermistor; Wire Lead #1
	B4	GND	Thermistor; Wire Lead #2

General

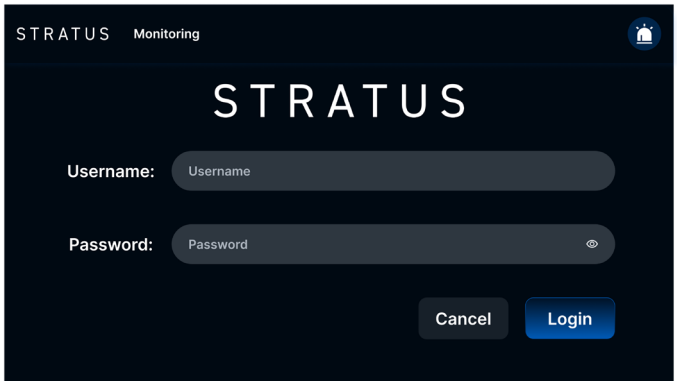
Power Up

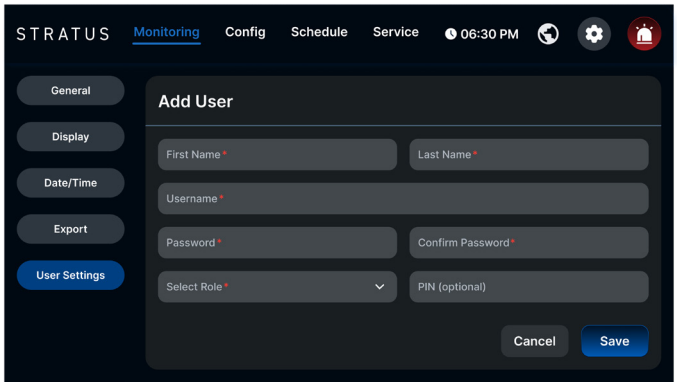
On powerup, the STRATUS Unit Manager will display a loading screen. While the device is loading, it is possible to access the rest of the settings and configurations by selecting the hide button. The device will continue to load in the background during user interactions.



First Time Users

Pressing the Login Button for the first time will require an account creation. Enter the User Admin credentials for the Startup Admin account, then press Save.



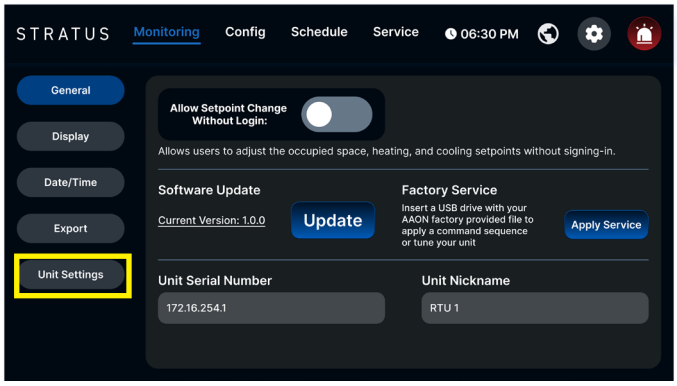


Returning Users

Returning users are required to enter previously saved account credentials by entering the accounts user name and password, then press Login.

Additional Users

From the Home Screen, selecting the Settings icon will load the Unit Manager Settings screen. Within this menu, users can modify time and date settings, display options, update software, and create additional users.



Home Screen

After loading or selecting hide, the home screen will be displayed with basic unit information.

Home Screen - Selecting the STRATUS logo from any screen will return the user to the home screen. If it is flashing, this indicates the Unit Manager is still loading.

Monitoring - Will load the monitoring screen which include graphs, setpoints, and other unit information.

Time - Currently configured time.

Network Status - Selecting this icon opens network configuration.

Settings - Loads settings screen. This is not available until a user has logged in.

Notifications - Will display red if there are notifications or blue if there are none.

Outside Air Temperature and Humidity - Current outside air temperature and humidity readings.

Mode Enable Temperature and Label - Current mode enable temperature setpoint.

Current Unit Mode/Operation - Current unit operation.

Mode Enable Setpoints - Allows users to configure the mode enable setpoints.

Login - User login screen.

Dehumidification Enable Sensor Reading - Shows the Current Dehumidification Enable sensor reading.

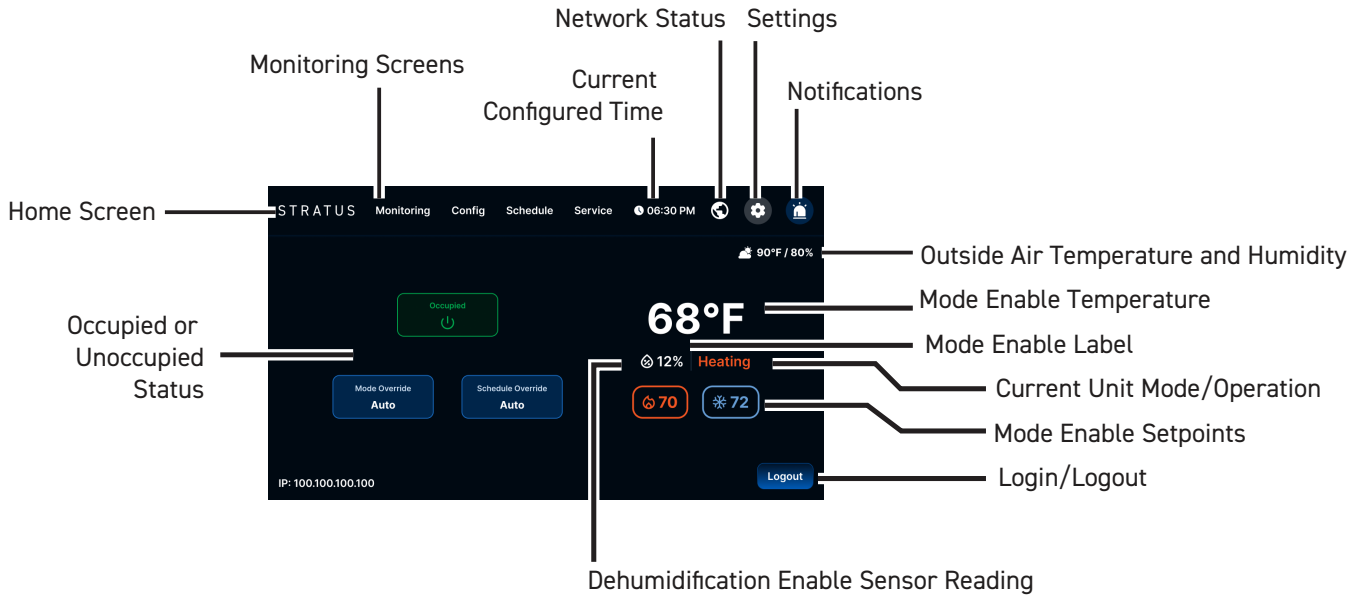


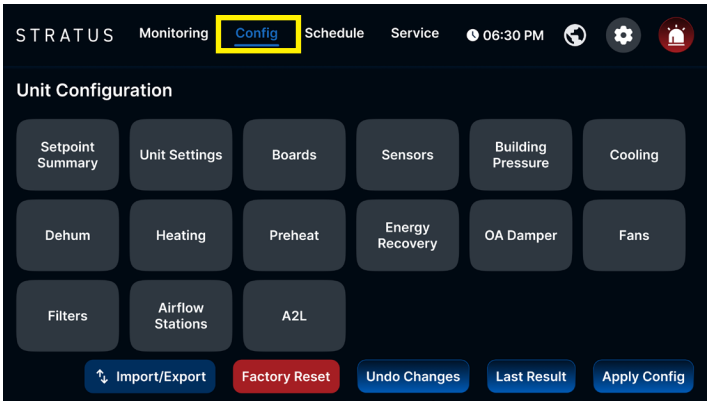
Figure 19: Home Screen Callouts

Navigation and Legend

Navigation

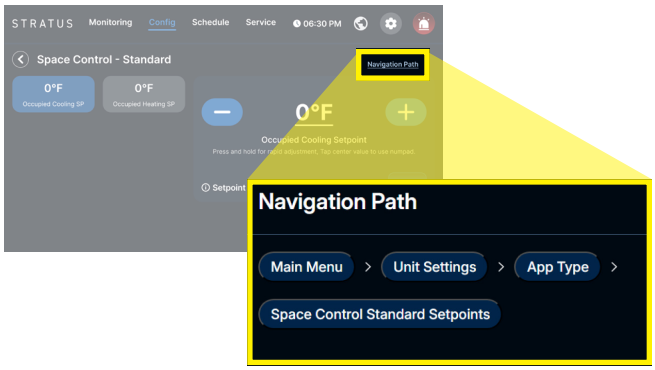
Ribbon Menu

The ribbon menu at the top will display blue when all settings are saved in the configuration menu, or yellow when there are modified settings that have not been applied. Selecting **Undo Changes** will revert the Unit Manager back to the last saved configuration.



Navigation Path

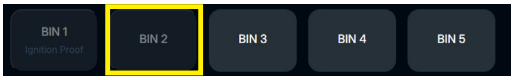
Selecting the Navigation path will show the breadcrumb trail from the home screen to the currently viewed screen. Users can quickly navigate to any displayed menu from this selection.



Icon Menus

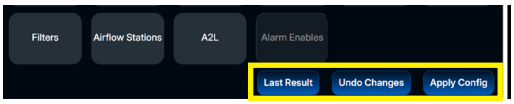
Icons can indicate additional information without needing to access the submenus.

- Greyed out - This application is not available.

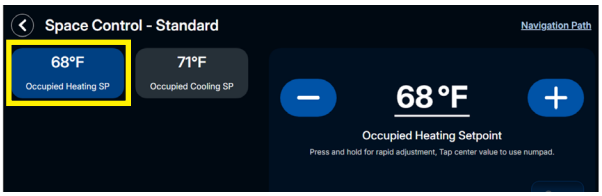


- White Text on Grey - This icon can be selected to reveal a submenu or modify a value.

- White text on Blue
  - Bottom Ribbon - Selecting this button will finalize a process.



  - Setpoint Screen - This is the selection currently being modified.



- Blue Subtext - This value is the selected on the submenu.

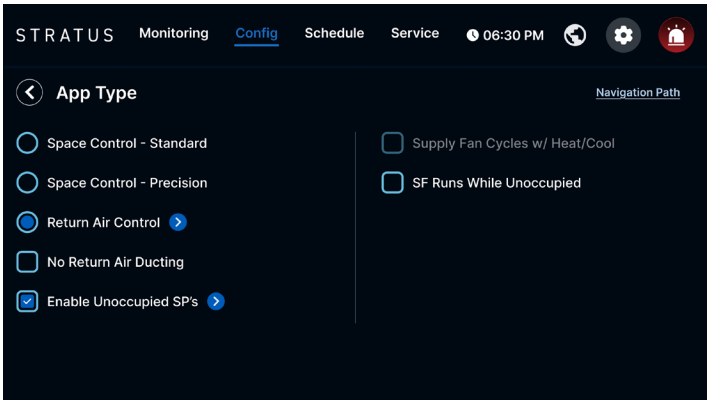
Navigation and Legend

Radial, Checkboxes, and Arrows

Radial selections only allow one selection to be enabled.

Checkboxes enable multiple options and are not limited to a single selection.

A white arrow in a blue circle indicates there are additional selections that can be made in relation to the selected radial or checkbox.

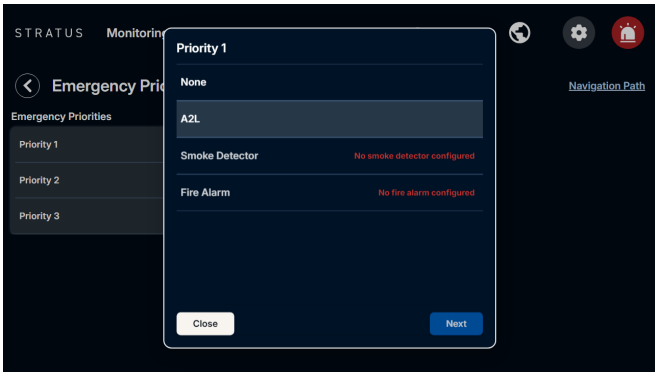


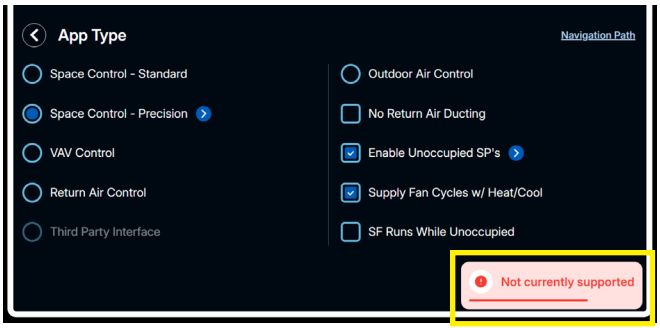
Additional Information

Most options have a tooltip that will provide additional information about the selection to be made. Pressing the tooltip will pull up the additional information. Pressing anywhere outside of the tooltip pane will close it.

Configuration Error Notifications

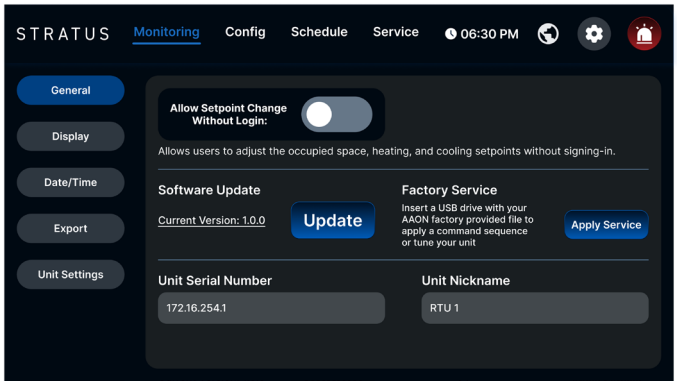
During the configuration process, red text indicates configuration steps that need to be completed or are not compatible with the current selections. These items need to be addressed before the Unit Manager can be properly configured.





Unit Manager Settings

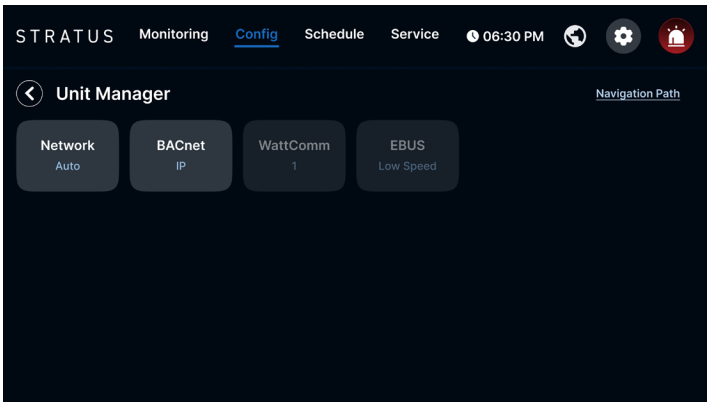
From the Home Screen, selecting the Settings icon will load the Unit Manager Settings screen. Within this menu, users can modify time and date settings, display options, update software, and create additional users.



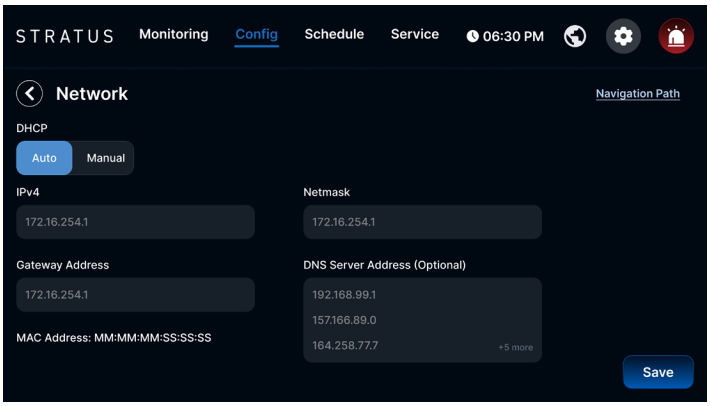
Network Configuration

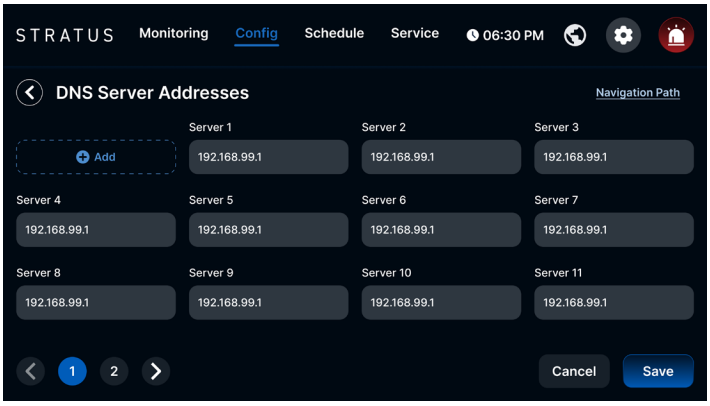
General

Note: Before modifying network settings, ensure the Unit Manager is properly connected to the network.



When Dynamic Host Configuration Protocol (DHCP) is selected as Auto, the network settings are automatically determined by the host protocol. If DHCP is selected as manual, all network fields are user configurable.





Any modifications to these screens will only be saved after selecting the Save button. Allow several minutes for the device to update the settings.

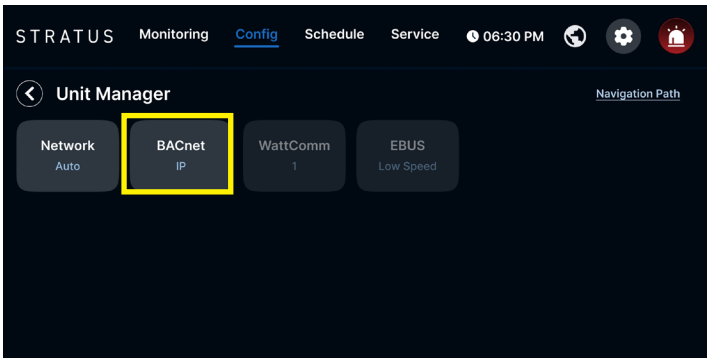
When a manual configuration is made the Save button must be selected.

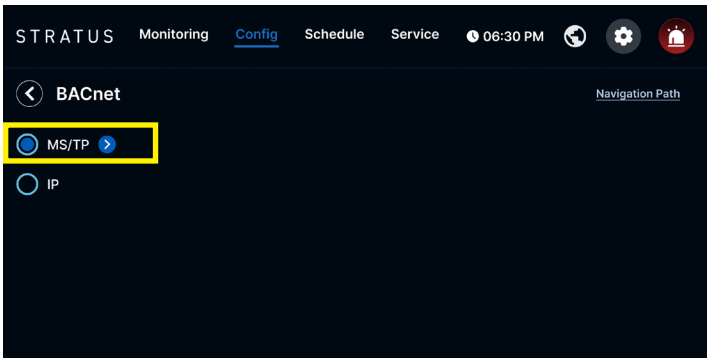
NOTE: Network settings may take up to 3 minutes to apply. Required time for communications between the Unit Manager and the Network Host Protocol.

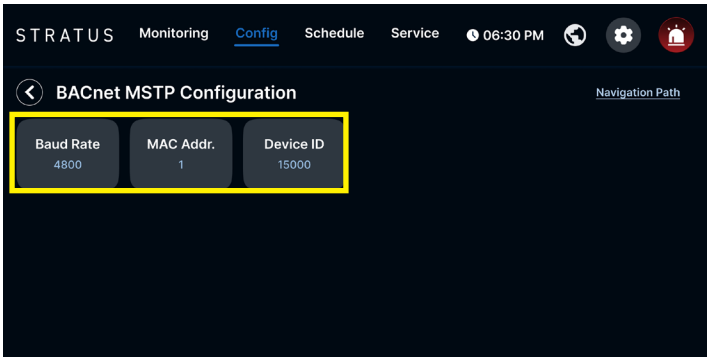
BACnet Configuration

MS/TP

To configure a BACnet MS/TP network. Navigate to Unit Settings > Unit Manager > BACnet. There will be an indication shown on the BACnet icon to note what is currently configured.







Ensure the Baud Rate, MAC Address, and Device ID are configured correctly and saved for MSTP configuration.

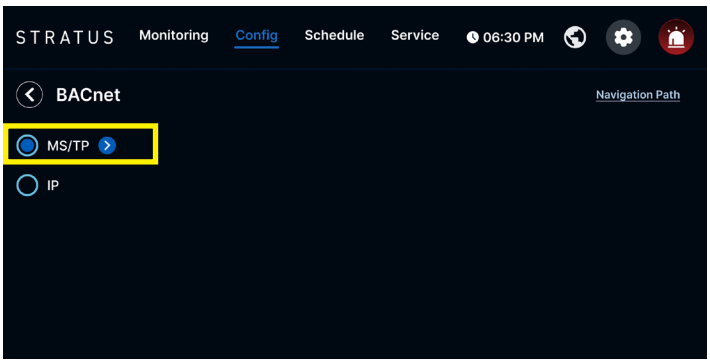
Baud Rate – Baud Rate: All connected devices connected on the MS/TP network have to be configured for the same speed.

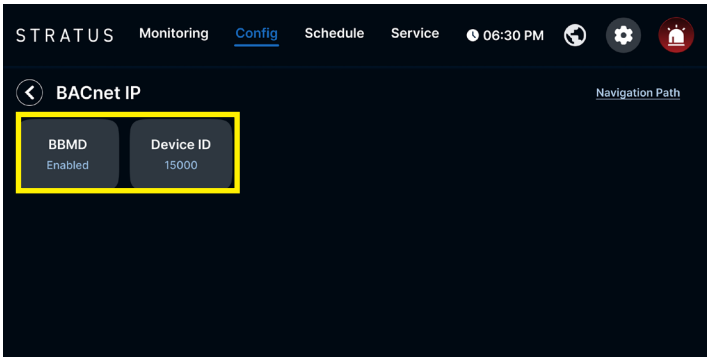
MAC Address – Master Devices (0–127): These devices can initiate communication and hold the token. Slave Devices (128–254): These are restricted to responding to master device requests and can not initiate communications.

Device ID – Ensure the STRATUS Unit Manager has a unique Device ID.

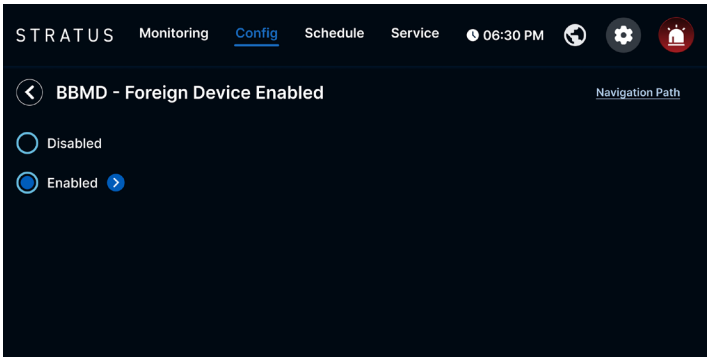
IP

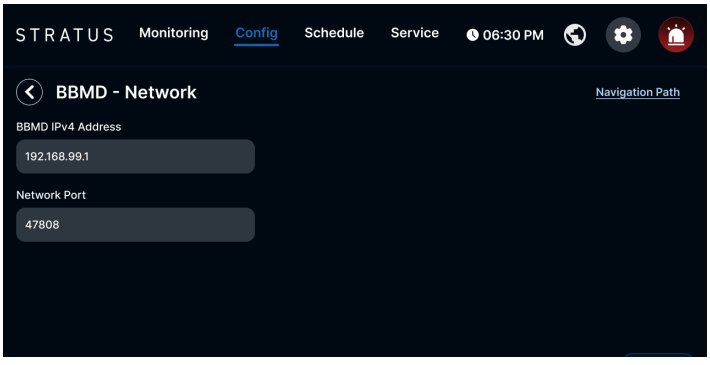
Ensure the BBMD - Network and Device ID are configured correctly and saved for IP configuration.





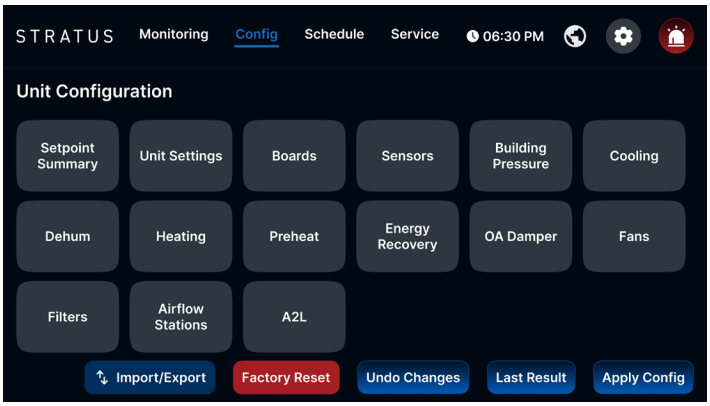
BBMD – BACnet Broadcast Management Device (BBMD) is used when BACnet Devices using the IP network need to communicate on different IP networks. When enabled, the BMD IPv4 Address and Network Port must be configured.

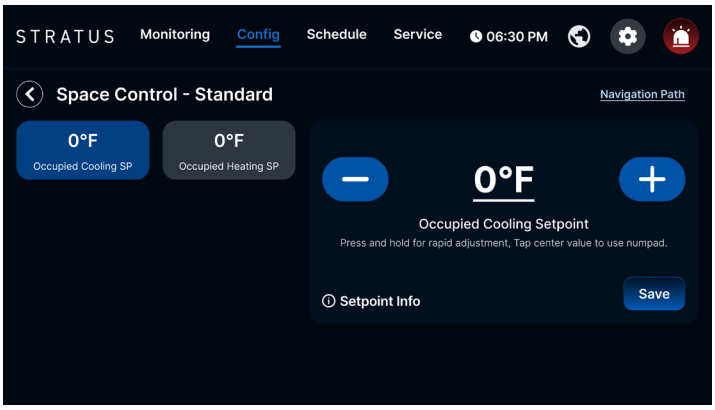




Setpoint and I-O Board Configuration

It is possible to configure all setpoints, connected I-O board configurable connections, and Unit Manager settings from this menu.





All changes in configuration must be applied by selecting the **Apply Config** button.

It is a requirement to have created a user and to be logged in to modify any of the configuration settings.

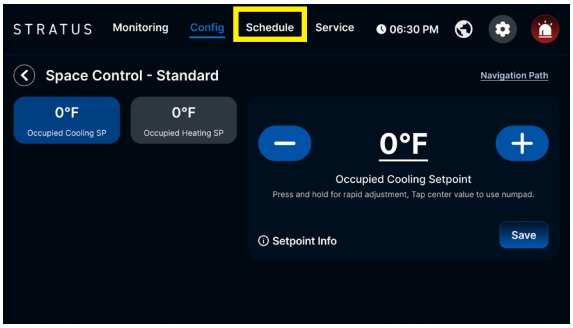
CAUTION: Before modifying any configuration settings, verify the cables are connected in accordance with the supplied wiring diagram. Incorrect configurations or cable connections could lead to unpredictable operations that could lead to damage to the I-O boards or the unit.

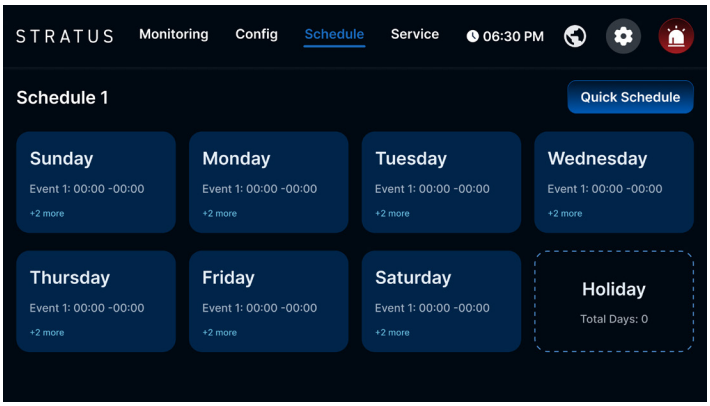
Scheduling

Scheduling can be viewed and modified from the Unit Manager Home screen. The modifications can be broken into three categories:

- Individual Day Parts
- Quick Schedule
- Holidays

NOTE: There is a default 24hr event for the schedule. This can be configured as unoccupied or occupied.

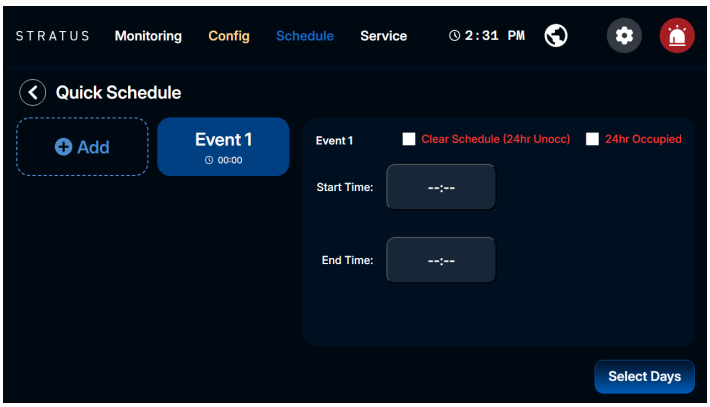




Individual Day Parts

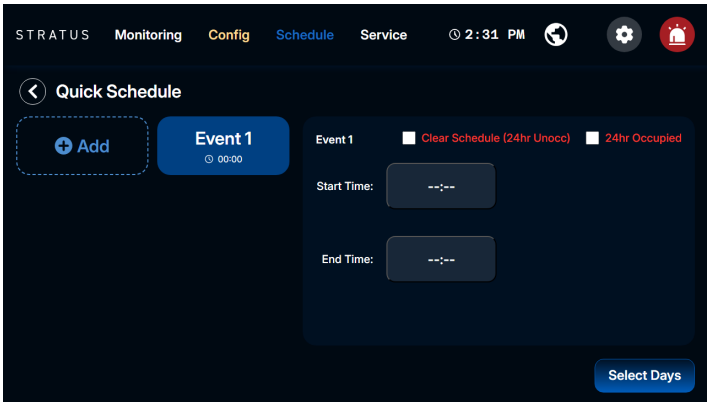
Each day can be configured for multiple unique events.

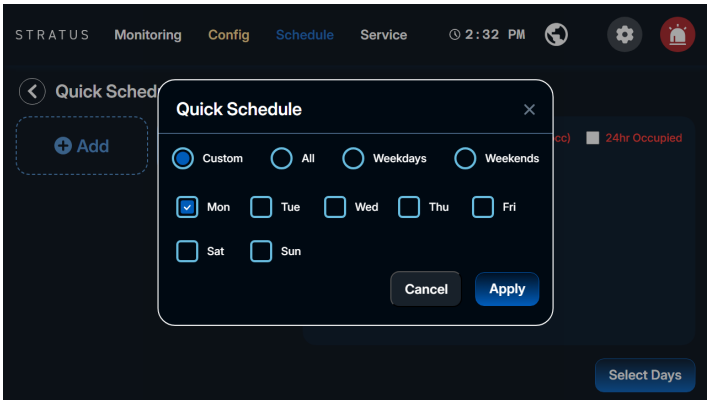
After configuring the start and end times, press the Apply button to save that event for that individual day.



Quick Schedule

The Quick Scheduling menu allows users to define events and then select which days the events will apply.

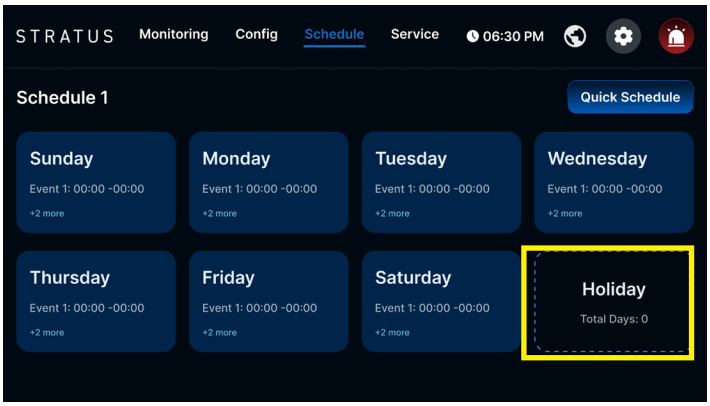




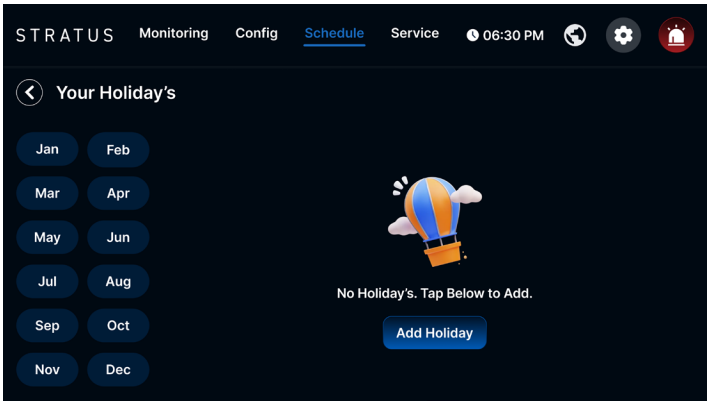
Scheduling

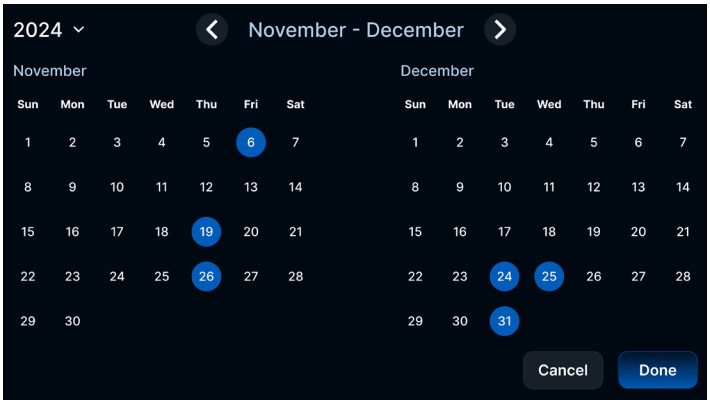
Holiday Schedule

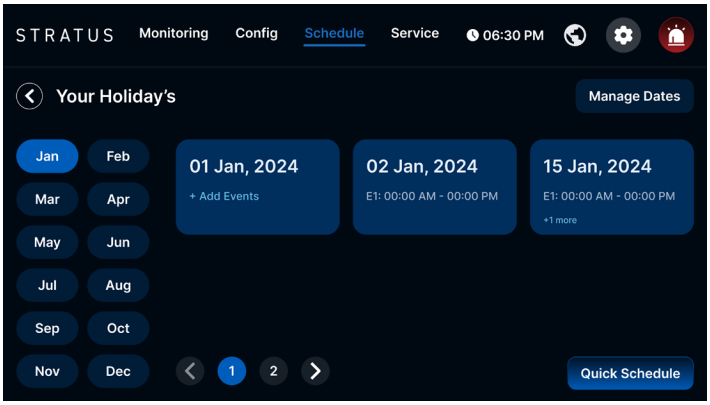
From the Schedule screen, select the Holiday icon.



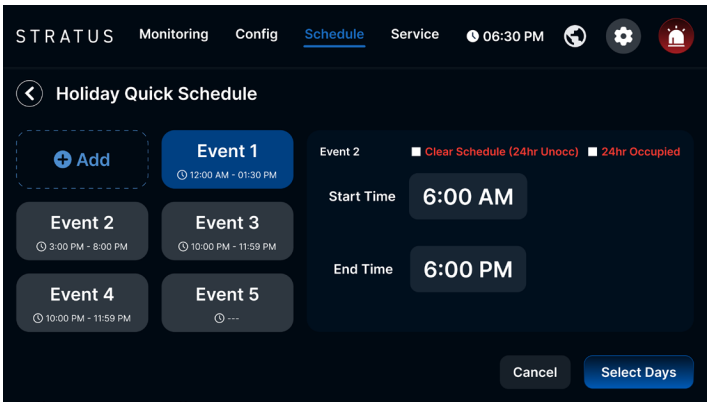
From the Holiday scheduling screen, all saved holidays will be shown. If no holidays have been created, select the Add Holiday button to select holidays from a calendar.



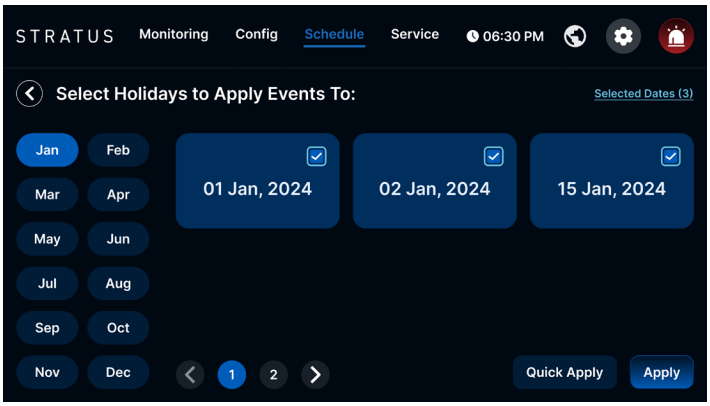




Then select Quick Schedule button to configure the events in the same manner as a normal schedule.



After creating the events, then select the holidays that have already been configured and apply the event schedule.



NOTE: If Apply has not been selected at the end of the configuration of the Holiday Scheduling, the schedule will not be applied.

Fans

STRATUS supports operation of three distinct fans:

- Supply
- Return
- Exhaust

CAUTION: Only a return fan or an exhaust fan can be configured.

Supply Fan Configurations

- **CAV** - The fan will run at a constant speed.
- **SZVAV** – The fan will modulate based on the demand in the space.
- **SZVAV w/SAT Reset** – This allows for a SAT reset when the supply fan is at minimum and the space is over-conditioned, operating much like a CAV with SAT reset.
- **SZVAV w/Heat-Pump Optimization** – Extends the SZVAV w/SAT Reset to optimize operations between HP only and HP with auxiliary heat operations.
- **Duct Static Control** – The supply fan will modulate to control duct static pressure.
- **Building Pressure Contro**l – The fan will modulate to control building pressure.
- Additional Supply Fan Configurations
  - The fan can also have supply air flow measurement added for monitoring only.

Exhaust Fan/Return Fan Configurations

- **Building Pressure** – The fan will modulate to control building pressure.
- **Supply Fan Tracking** – The fan will modulate based on a percent of the supply fan, setpoint configurable.

Cooling

STRATUS supports cooling operations including utilizing economizer and mechanical cooling as necessary to provide the required supply air from the unit.

Cooling is enabled when the mode Enable Sensor rises 1°F above the Cooling Setpoint and the Supply Air Temperature rises 5°F above the Supply Air Temperature Setpoint.

Economizer Operation (Standard)

The Economizer can operate as a sensible economizer if used with an outside air temperature sensor or as an enthalpy economizer with an E-BUS outdoor air temperature/humidity sensor.

Economizer operation is enabled when the outdoor air drybulb, wetbulb, or dewpoint temperature falls below the Economizer Enable Setpoint by 1°F and if the outdoor air temperature is at least 5°F below the return air temperature (if that value is available). Economizer operation is disabled when the outdoor air temperature rises 1°F above the Economizer Enable Setpoint.

The economizer acts as the first stage of cooling and controls to the active Supply Air Cooling Setpoint. An economizer minimum position can be configured on the Unit Manager. During economizer operation, the economizer will modulate between this minimum position and 100%. If the economizer reaches 100% for the 'Cooling Stage Up Timer' and the 'Cooling Stage Control Window' and the supply air temperature is still above setpoint, mechanical cooling is then allowed to stage up while the economizer is held at the full open position. Any time cooling stages are currently running, and the economizer becomes enabled, it will immediately open to 100%.

During Heat and Vent Modes, the economizer will remain at its minimum position. The only exception to this can occur during VAV operation with outdoor air temperature control. During Unoccupied Mode, the economizer can be used for night setback free cooling; otherwise it will remain closed.

Indoor air quality (CO2) and/or OA Min CFM, and/or Return Fan with Building Pressure will override the economizer's minimum position by resetting the economizer minimum position greater than the minimum setpoint configuration.

If utilizing the Title 24 economizer option, the economizer feedback signal (2-10 VDC) will be monitored. Several Title 24 alarm conditions can also be displayed.

Economizer Override Via BACnet

As stated earlier, the economizer must reach and remain at 100% before compressors will be allowed to stage on to meet the Cooling Supply Air Setpoint. When BACnet commands the damper fully closed using a value of 0% or commands the damper fully open using a value of 100% the compressors are allowed to operate if required. Other values between full open and full closed will be Economizer operating as first stage and compressors as second stage.

Comparative Enthalpy Economizer Operation

A comparative enthalpy economizer option is also available. The E-BUS Outdoor Temperature/Humidity Sensor and the E-BUS Return Air Temperature/Humidity Sensor must be used for this operation to be available.

If the outdoor enthalpy is below the Comparative Economizer Enable Setpoint by the comparative economizer enable deadband amount, and the outdoor enthalpy is less than the return air enthalpy by the comparative economizer enable deadband amount, then economizer operation will be enabled to act as the first stage of Cooling.

Introduction

If the outdoor air enthalpy rises above the Comparative Economizer Enable Setpoint by the comparative economizer enable deadband amount, or if the outdoor air enthalpy rises above the return air enthalpy by the comparative economizer enable deadband amount, then economizer operation will be disabled.

Comparative enthalpy economizer with dry bulb limit is also an option. It combines the above comparative enthalpy operation with enabling the economizer using the outdoor air dry bulb. Both methods must be true for the economizer to be enabled. If either method is not true, the economizer operation will be disabled.

Mechanical Cooling

This function is provided by the Refrigeration operating in a cooling mode.

Heating

STRATUS supports heating operations including utilizing energy recovery, heat-pump heating and either electric or gas supplemental or emergency heat depending on the unit specific configuration.

Heating is enabled when the mode Enable Sensor drops 1°F below the Heating Setpoint and the Supply Air Temperature drops 5°F below the Supply Air Temperature Setpoint.

Energy Recovery

Energy recovery involves the use of a heat-wheel to recapture wasted exhaust heat and return it to the incoming air. This operation is enabled through enthalpy calculations to ensure the effectiveness of the operation.

Heat-pump

This function is provided by the Refrigeration operating in heat-pump heating mode.

Electric

Electric heat may be supplemental (auxiliary) and/or emergency only depending on unit configuration. It may include utilization of an SCR for modulation.

Gas

Gas heat may be supplemental (auxiliary) or emergency only depending on unit configuration. It may include utilization of one or two stages of modulating gas heat.

Refrigeration

Refrigeration manages one or two circuits, each with a single VFD compressor and appropriate Electronic Expansion Valves (EXV) to perform various refrigeration functions including:

- Cooling
- Heating
- Dehumidification

Cooling

Refrigeration will enable or disable circuits and modulate operating circuits to control circuit coil temperature to setpoint which itself is modulated to control the supply air temperature to its setpoint.

For units equipped with a reheat coil, the cooling system also manages periodic flushing operations to ensure proper oil return and maintain reliable compressor operation.

Cooling Flush

If the unit is in Cooling Mode, a flush will occur when the unit's flush cooling interval timer has elapsed. The time is accumulated whenever it is in cooling mode and resets after each flush cycle. The flush cooling interval timer is a setpoint that is configurable using the Unit Manager.

Heating

Refrigeration will enable or disable circuits and modulate operating circuits in heat-pump heating mode to control supply air temperature to its setpoint.

Heat-pump heating operation involves defrost functions to manage the buildup of frost and ice on exterior coils.

Dehumidification

The system uses a humidity sensor to measure moisture levels in one of three possible locations:

- Space – the area being conditioned
- Return air – the air returning from the conditioned space
- Outdoor air – for systems managing fresh-air intake

Dehumidification may operate based on either a relative humidity or dewpoint setpoint. STRATUS enables or disables individual circuits and modulates active circuits to maintain the coil temperature at its designated setpoint. This coil temperature setpoint is further modulated to achieve the target humidity/dewpoint level in the controlled zone (space or return).

During dehumidification, the system also performs flushing operations to remove any accumulated refrigerant or oil that may collect in coils experiencing low flow conditions, ensuring proper system function and compressor reliability.

Dehumidification also involves various flushing operations to avoid refrigerant logging in either the condenser or the reheat coil.

Reheat Mode Flush

If the unit is in Dehumidification Mode and the valve is below 70% for the flush reheat interval timer value, a flush will occur. If the valve goes above 70%, the timer is reset. The flush reheat interval timer is a setpoint that is configurable using the Unit Manager.

Condenser Coil Flush

If Condenser Coil Flush is configured and the unit is in Dehumidification Mode and the reheat valve is above 70% for the flush reheat interval timer value, a condenser flush will occur. If the valve goes below 70%, the timer is reset. The flush condenser interval timer is a setpoint that is configurable using the Unit Manager.

Condenser Fans

As an additional function of refrigeration operation outdoor (condenser) fans are managed as appropriate for maintaining head pressure in cooling or dehumidification operation and managing compressor envelopes in heating operation.

Preheat

If the entering air temperature falls below the Outdoor Air Temperature Enable Setpoint, then preheat will be controlled to either a Cooling, Heating or Vent Mode Leaving Air Setpoint, depending on active mode. These setpoints are all configured in the STRATUS Unit Manager.

If the unit is equipped with a Silicon Controlled Rectifier (SCR) relay, the first stage of preheat will modulate to control the leaving air temperature to setpoint.

Dampers

The unit manages and modulates several dampers including:

- Outdoor Air
- Supply ERV Bypass
- Exhaust ERV Bypass
- Single Supply/Exhaust ERV Bypass

Outdoor Air Damper

The outdoor air damper can be configured to maintain a minimum position during occupied operation as well as perform economizing operations. Economizing operations may be enabled by:

- Economizer w/ Dry Bulb Enable
- Economizer w/ Wet Bulb Enable
- Economizer w/ Dewpoint Enable
- Economizer w/ Comparative Enthalpy w/ Dry Bulb Limit
- Economizer w/ Comparative Enthalpy

The outdoor air minimum position may be dynamically increased by Indoor Air Quality (IAQ) driven by CO_2 measurements. This requires either a Space or Return CO_2 Sensor.

Additionally, Outdoor Air Minimum CFM, and/or Return Fan with Building Pressure (with not exhaust fan) will override the economizer's minimum position by resetting the economizer minimum position greater than the minimum setpoint configuration.

Energy Recovery

When configured, the heat wheel will enable when the unit goes into Occupied Mode. If the unit is a recirculating unit configured to use economizer free cooling, the heat wheel will disable during economizer operation. If outdoor enthalpy disable is configured and the outdoor enthalpy is less the 'Low OA Enthalpy SP' (user-configurable) or greater than the 'High OA Enthalpy SP' (user-configurable), the heat wheel will be disabled.

Heat Wheel Defrost

A defrost will occur if the heat wheel is active, the outdoor air temperature is below the Heat Wheel Defrost Setpoint, and 30 minutes have elapsed since the last Defrost Mode. Defrost Mode will disable the heat wheel for two minutes.

Filters

STRATUS supports monitoring of up to five filters on a unit:

- Prefilter
- Main
- ERV (Heat Wheel) OA
- ERV (Heat Wheel) Exhaust
- Preheat

A filter may be monitored using a Binary Switch, Differential Pressure Filter Sensor, or Change Interval. Upon activation of the switch or the pressure passing the defined limit, a warning notification will be generated.

Additionally, the filters may be configured to have runtime generated notification.

Input and Output Descriptions

Inputs

A2L - Airstream and Cabinet

A +5 VDC signal input is provided by an A2L refrigerant leak detection sensor. When a refrigerant leak is detected the +5 VDC signal is removed, indicating that a refrigerant leak is present. This will activate the refrigerant mitigation sequence by operating the supply fan(s) at nominal speed to ventilate the refrigerant and by shutting down compressor operation to prevent hazardous conditions.

- Configuration Options: Gas/Cabinet or Airstream
- Configurable on the following boards: Air Handler Board and Cooling Board

Duct Static Pressure

The duct static pressure sensor reading is used to determine the current duct static pressure. When configured, the duct static pressure reading is used to control the output signal supplied to the Supply Fan VFD.

Occupied Mode

Supply Fan Duct Static Pressure Control:

- Duct Static is greater than setpoint, Supply Fan drives to MIN speed.
- Duct Static is less than setpoint, Supply Fan drives to MAX speed.

Unoccupied Mode:

- If Supply Fan is configured to Run While Unoccupied the Supply Fan will operate the same as Occupied Mode.

Unoccupied Mode

If Supply Fan is NOT configured to Run While Unoccupied.

Supply Fan Duct Static Control:

- Duct Static is greater or less than setpoint, Supply Fan remains OFF.

Duct Static (RJ-11)

- Configuration Option: Static
- Configurable on the following boards: Air Handler Board

Duct Static (Analog Input)

- Configuration Options: Duct Static Pressure

Configurable on the following boards: Air Handler Board, Cooling Board, and Outdoor Board.

EBUS Sensors

The EBUS sensor readings are used to measure temperature, relative humidity, CO_2 levels, and air quality. Data from these devices is used to control application processes and unit operations.

Available Options: Space Temp, Return Air, Outside Air, Supply Air, CO_2, or Air Measurement Stations (EBTRON and Paragon)

Airflow Measurement Stations:

Outdoor, supply, return and exhaust airflow can be monitored using the EBTRON GTC116 (single system), Paragon MTSE ASTME-1-00 (single system), and Paragon AMTSE-1-04 (three systems) series of airflow stations. Contact AAON Controls for information on other airflow station options. Stratus will control the outdoor air damper to maintain an Outdoor Air Cubic Foot per Minute Setpoint. This operation can be overridden higher by normal economizer control.

Stratus can be configured to modulate the supply fan VFD or outside air damper to maintain a Minimum Outdoor Air Cubic Foot per Minute Setpoint.

Building Pressure

The building pressure sensor reading is used to determine the current building pressure. When configured, the building pressure reading is used to control the output signal supplied to the Supply Fan VFD, Return Fan VFD, Exhaust Fan VFD, or Outdoor Air Damper.

Occupied Mode:

Supply Fan Building Pressure Control:

- Building Pressure is greater than setpoint, Supply Fan drives to MIN speed.
- Building Pressure is less than setpoint, Supply Fan drives to MAX speed.

Return or Exhaust Fan Building Pressure Control:

- Building Pressure is greater than setpoint, Return or Exhaust Fan drives to MAX speed.
- Building Pressure is less than setpoint, Return or Exhaust Fan drives to MIN speed.

Outdoor Air Damper Building Pressure Control:

- Building Pressure is greater than setpoint, Outdoor Air Damper closes to MIN position.
- Building Pressure is less than setpoint, Outdoor Air Damper opens to MAX position.

Unoccupied Mode if the Supply Fan is configured:

The Supply Fan, Return or Exhaust, and Outside Air Damper will operate the same as Occupied Mode.

Unoccupied Mode if the Supply Fan is NOT configured:

Supply Fan Building Pressure Control:

- Building Pressure is greater or less than setpoint, Supply Fan remains OFF.

Return or Exhaust Fan Building Pressure Control:

- Building Pressure is greater or less than setpoint, Return or Exhaust remains OFF.

Outdoor Air Damper Building Pressure Control:

- Building Pressure is greater or less than setpoint, Outdoor Air Damper remains Closed.

Configuration Options: Building Pressure Sensor

Configurable on the following boards: Air Handler Board, Cooling Board, and Outdoor Air Board.

Differential Pressure Filter Sensor

When configured, Differential Pressure Filter Sensor monitors the pressure difference across an air filter, signaling when the filter is dirty or clogged by detecting increased resistance, and triggering an alert.

- The Dirty Filter Warning is set when the Differential Pressure is greater than the setpoint,
- The Dirty Filter Warning is NOT set when the Differential Pressure is less than setpoint.

Configuration Options: Differential Pressure Filter Sensor

Filter Configuration Options: Pre Filter, Main/Cabinet, Heat Wheel OA, Heat Wheel Exhaust, or Preheat Filter

Configurable on the following boards: Air Handler Board, Cooling Board, and Outdoor Air Board.

Thermistors

NOTE: The temperature sensors must be Thermistor Type III Temperature Sensors, which provide 77.0ºF at 10K ohms resistance.

Preheat Entering Air Temperature

When preheat is configured, if the Entering Air Temperature falls below the Entering Air Temperature Setpoint, the Preheat (electric) elements will be enabled.

Configuration Options: Outside Air Enable Setpoint

Configurable on the following boards: Air Handler Board, Preheat Board, Outdoor Air Board

Preheat Leaving Air Temperature

When preheat is configured, if the Leaving Air Temperature rises above the Leaving Air Temperature Setpoint, the Preheat (electric) elements will be disabled.

Configuration Options: Cool, Heat, and Vent Leaving Air Setpoints

Configurable on the following boards: Air Handler Board, Preheat Board, Outdoor Air Board

Space Temperature

When configured, the Space Temperature Sensor initiates Heating and Cooling Modes when the unit's App Type is configured for space temperature control.

Configurable on the following boards: Air Handler Board, Preheat Board, Outdoor Air Board.

Outdoor Air Temperature

When configured, the Outdoor Air Temperature Sensor initiates Heating and Cooling Modes when the unit's App Type is configured for outdoor air temperature control.

To conserve energy, the outdoor air temperature is used to lock out heating or cooling at set temperatures for each Mode of Operation. The Outdoor Air Temperature Sensor can also be used for low ambient protection operation.

Configurable on the following boards: Air Handler Board, Preheat Board, Outdoor Air Board.

Return Air Temperature

When configured, the Return Air Temperature Sensor initiates Heating and Cooling Modes when the unit's App Type is configured for return air temperature control.

Configurable on the following boards: Air Handler Board, Preheat Board, Outdoor Air Board.

Supply Air Temperature

Once the HVAC unit enters Heating or Cooling mode—based on the temperature measured by the application-type enable sensor—it controls the staging or modulation of the heating or cooling sources to maintain the Supply Air Temperature setpoint. The HVAC unit must always have a Supply Air Temperature sensor installed

Configurable on the following boards: Air Handler Board, Preheat Board, Outdoor Air Board.

Mixed Air Temperature

The Mixed Air Temperature Sensor is used to measure the combined temperature of the return air and outdoor air.

Configurable on the following boards: Air Handler Board, Preheat Board, Outdoor Air Board

Space Sensor - Slide Adjust

When an optional Space Temperature Sensor is configured, the slide adjust control is used to vary the HVAC Mode Heating and Cooling Setpoints by a user-configured maximum amount.

Analog Slide Adjust sensor configurations require two 'THERM' inputs. THERM1 supports the space sensors temperature measurement and should be configured to Space Temperature and THERM2 supports the override enable/disable and should be configured to Analog Space Slide Adjust.

Override Enable: Press the override button for 1 second to enable an override.

Override Disable: Press the override button for 5 seconds will disable an override.

If the space temperature is configured as the supply air temperature reset source, the slide adjustment adjusts both the HVAC Mode Enable Heating and Cooling Setpoints and the Supply

Configurable on the following boards: Air Handler Board and Outdoor Air Board

Binary - Inputs

Remote Shutdown

The Enabled State is normally open. When enabled, the HVAC unit will enter an Emergency Shutdown state, remain in an OFF state for the duration of the enabled state, and display a “Remote Shutdown” notification.

The Remote Shutdown is an input monitoring protection alarm provided by OTHERS that occurs when a remote shutdown signal is received.

Configurable on the following boards: Air Handler Board and Cooling Board

Smoke Detector

The Enabled State is normally open. When enabled, the HVAC unit will enter an Emergency Shutdown state, remain in an OFF state for the duration of the enabled state, and display a “Smoke Detector” notification.

The Smoke Detector is an input monitoring protection alarm provided by OTHERS that occurs when a smoke detector alarm signal is received.

Configurable on the following boards: Air Handler Board and Cooling Board.

Fire Alarm

The Enabled State is normally open. When enabled, the HVAC unit will enter an Emergency Shutdown state, remain in an OFF state for the duration of the enabled state, and display a “Fire Alarm” notification.

The Fire Alarm is an input monitoring protection alarm provided by OTHERS that occurs when a building fire alarm signal is received.

Configurable on the following boards: Air Handler Board and Cooling Board.

Phase Brown Out Alert

The Enabled State is normally open. When enabled, the HVAC unit will enter an Emergency Shutdown state, remain in an OFF state for the duration of the enabled state, and display a “Phase Brown Out” notification.

The Phase Brown Out Alert is an input monitoring protection alarm provided by OTHERS that occurs when a phase brown out alarm signal is received.

Configurable on the following boards: Air Handler Board and Cooling Board

Condensate Overflow Switch
The Enabled State is normally open. When enabled, the HVAC unit will enter an Emergency Shutdown state, remain in an OFF state for the duration of the enabled state, and display a “Condensate Overflow” notification.

The Condensate Overflow Alert is an input monitoring protection alarm provided by OTHERS that occurs when a condensate overflow switch signal is received.

Configurable on the following boards: Air Handler Board, Cooling Board, and Outdoor Air Board.

Remote Occupied
The Enabled State is normally closed. When enabled, the HVAC unit will force the unit into the Occupied Mode. When the remote occupied signal is removed, the unit will revert to the Unoccupied Mode of operation if no internal or external schedule has been configured.

Configurable on the following boards: Air Handler Board and Cooling Board

Ignition Proof
The enabled state is normally closed. When enabled, the HVAC unit receives a Proof of Ignition (also known as flame proving) signal from a Direct Spark Ignition control (White-Rodgers or UTEC), confirming that a flame has been established and that the ignition sequence was successful.

Configurable on the following boards: Heat Board

Supply Airflow Switch
The Enabled State is normally closed. When enabled, the HVAC unit receives a ‘Proof of Airflow’ signal indicating that the Supply Fan is operating. If unit mode of operation requires the supply fan and the supply airflow switch is not enabled, heating and cooling modes are suspended or disabled. The system will be limited to “Vent” mode and display a “No Proof of Airflow” notification.

Configurable on the following boards: Air Handler Board, Cooling Board, Outside Air Board.

Dirty Filter Switch
The Enabled State is normally closed. When enabled, the HVAC unit receives a signal and will display a “Dirty Filter” notification.

Dirty Filter Configuration Options: Pre Filter, Main/Cabinet, Heat Wheel OA, Heat Wheel Exhaust, or Preheat Filter

Configurable on the following boards: Air Handler Board, Heat Board, Cooling Board, Outside Air Board, and Preheat Board

Defrost Switch
Enabled state is normally closed. When enabled, the HVAC unit receives a signal indicating that the defrost switch has closed, indicating ice buildup on the evaporator coil.

Configurable on the following boards: Air Handler Board and Cooling Board

MOUT - Mechanical Outputs

Alarm Active
The Enabled state is a +24 VDC output signal. When configured and an active Warning, Alarm, or Fault notification state is present the alarm output will be active.

Configurable on the following boards: Air Handler Board.

A2L Alarm (Any)
The Enabled state is a +24 VDC output signal. When configured, and when an active A2L Gas/Cabinet or Airstream alarm notification is present, the alarm output becomes active.

Configurable on the following boards: Air Handler Board.

A2L Airstream Alarm
The Enabled state is a +24 VDC output signal. When configured, and when an active A2L Airstream alarm notification is present, the alarm output becomes active.

Configurable on the following boards: Air Handler Board.

Occupied Active
The Enabled state is a +24 VDC output signal. When the HVAC unit is in Forced Occupied Mode (Binary, UI, or BACnet enabled) or Occupied schedule the output will be active.

Configurable on the following boards: Air Handler Board.

Override Active
The Enabled state is a +24 VDC output signal. When the HVAC unit is in Forced Override (Binary, UI, or BACnet enabled) the output will be active.

Configurable on the following boards: Air Handler Board.

Economizer Active
The Enabled State is a +24 VDC output signal. When configured and the Outdoor Air Damper is set to Economize and the HVAC unit is in Economizer Mode the output will be active.

Configurable on the following boards: Air Handler Board.

Morning Warmup/Cooldown
The Enabled state is a +24 VDC output signal. When configured and the App Type is set to VAV and Morning Warmup/Cooldown is active the output will be active.

Configurable on the following boards: Air Handler Board.

Reversing Valve

When configured to 'Fail to Heating' the Enabled State is normally closed when the HVAC unit is on a refrigeration Cooling Mode a +2-5 VDC; Pulse Width Modulation (PWM) signal is delivered to the reversing valve contactor. The signal is removed when in refrigeration Heating Mode.

When configured to 'Fail to Cooling' the Enabled State is normally closed when the HVAC unit is on a refrigeration Heating Mode a +2-5 VDC; Pulse Width Modulation (PWM) signal is delivered to the reversing valve contactor. The signal is removed when in refrigeration Cooling Mode.

Configurable on the following boards: Air Handler Board and Cooling Board.

Crank Case Heater

The Enabled State is normally closed. When configured and the HVAC unit is in a refrigeration OFF state (circuit dependent) the output will send a +2-5 VDC; Pulse Width Modulation (PWM) signal to a contactor or relay.

Example: If the HVAC unit has 2 refrigeration circuits where Circuit 1 is ON and Circuit 2 is OFF. The Crank Case Heater for Circuit 1 will be OFF, and the Crank case Heater for Circuit 2 will be ON.

Configurable on the following boards: Air Handler Board and Cooling Board.

Startup Solenoid

The Enabled State is normally closed. When configured and the HVAC unit enables a refrigeration circuit ON state (circuit dependent) and the Discharge Superheat is greater than 50°F a +2-5 VDC; Pulse Width Modulation (PWM) signal is delivered to the startup solenoid contactor for 15 minutes.

Example: If the HVAC unit has 2 refrigeration circuits where Circuit 1 is ON and Circuit 2 is OFF. The Startup Solenoid for Circuit 1 will be ON if the above conditions are present, and the Startup Solenoid for Circuit 2 will be OFF.

Configurable on the following boards: Air Handler Board and Cooling Board.

Heat Wheel Enable

The Enabled State is normally closed. When configured and the HVAC unit is in Occupied Mode and the Economizer is not active, a +2-5 VDC; Pulse Width Modulation (PWM) signal is delivered to the heat wheel contactor.

Configurable on the following boards: Air Handler Board.

Low Ambient Enable

The Enabled state is a +24 VDC output signal. When configured and the Outdoor Ambient is below the configured setpoint the output will be active.

Configurable on the following boards: Air Handler Board.

SCR Signal (Electric Heat)

The Enabled State is normally closed. When configured and the HVAC unit is in Auxiliary Heat, Emergency Heat, or Preheat and the output is enabled a +24 VDC; Pulse Width Modulation (PWM) signal is delivered to the SCR relay.

Configurable on the following boards: Heat Board and Preheat Board.

Heat Enable

Electric Heat (unit configuration):

The Enabled State is normally closed. When configured and the HVAC unit is in Auxiliary Heat, Emergency Heat, or Preheat and the output is enabled a +2-5 VDC; Pulse Width Modulation (PWM) signal is delivered to a contactor or relay.

Gas Heat (unit configuration):

The Enabled State is a +24 VDC output signal. When configured and the HVAC unit is in Auxiliary Heat or Emergency Heat and the output will be active.

Configurable on the following boards: Heat Board and Preheat Board.

Inducer Fan Low Speed (Modulating Gas)

The Enabled State is a +24 VDC output signal. When configured and the HVAC unit is in Auxiliary Heat or Emergency Heat and the Modulating Gas Valve position is less than 54.5% the output will be active.

Configurable on the following boards: Heat Board.

Application Types

Space Control - Standard

The Space Temperature Sensor determines the heating or cooling mode of operation.

In Heating Mode, when the space temperature drops below the Space Heating Setpoint and a Cooling Demand is not present, a demand for heating is calculated based on the temperature delta between the Space Temperature and the Space Heating Setpoint.

In Cooling Mode, when the space temperature rises above the Space Cooling Setpoint and a Heating Demand is not present, a demand for cooling is calculated based on the temperature delta between the Space Temperature and the Space Cooling Setpoint.

Standard space control targets efficiency by creating a deadband zone in which active conditioning may be reduced or eliminated, effectively vent/off mode based on the space heating and cooling setpoints.

- Unit Control Configurations: Occupied Space Temperature Heat/Cool Setpoints & SAT Resets
- App Type Configurations: Enable Unoccupied Space Temperature Heat/Cool Setpoints, Supply Fan Cycles w/ Heat/Cool, & Supply Fan Runs While Unoccupied

Space Control - Precision

The Space Temperature Sensor determines the heating or cooling mode of operation.

Precision space control targets a single space temperature setpoint and enables heating or cooling as necessary to maintain the space temperature by calculating a demand based on the space temperature delta from singular setpoint.

- Unit Control Configurations: Occupied Space Temperature Heat/Cool Setpoint
- App Type Configurations: Enable Unoccupied Space Temperature Heat/Cool Setpoints, Supply Fan Cycles w/ Heat/Cool, Supply Fan Runs While Unoccupied, & Allow Heat During Cool Demand

VAV Control

VAV control targets a single Supply Air Temperature Setpoint of 55°F and enables cooling mode only to Maintain the supply air temperature. If 'Allow Heating During Cool Demand' is enabled (user-configured) VAV control will temper the outside air.

The Supply Fan only supports Duct Static Control in VAV Control mode.

- Unit Control Configurations: Morning Warmup/Cooldown, Duct Static Pressure Setpoint, & SAT Resets
- App Type Configurations: Enable Unoccupied Space Temperature Heat/Cool Setpoints, Supply Fan Runs While Unoccupied, & Allow Heat During Cool Demand

Return Air Control

The Return Air Temperature Sensor determines the heating or cooling mode of operation.

In Heating Mode, when the return air temperature drops below the Return Air Heating Setpoint and a Cooling Demand is not present, a demand for heating is calculated based on the temperature delta between the Return Air Temperature and the Return Air Heating Setpoint.

In cooling Mode, when the return air temperature rises above the Return Air Cooling Setpoint and a Heating Demand is not present, a demand for cooling is calculated based on the temperature delta between the Return Air Temperature and the Return Air Cooling Setpoint.

Return air control targets efficiency by creating a deadband zone in which active conditioning may be reduced or eliminated, effectively vent/off mode based on the return air heating and cooling setpoints.

- Unit Control Configurations: Occupied Return Air Temperature Heat/Cool Setpoints & SAT Resets
- App Type Configurations: Enable Unoccupied Return Temperature Heat/Cool Setpoints & Supply Fan Runs While Unoccupied

Outdoor Air Control

The Outdoor Air Temperature Sensor determines the heating or cooling mode of operation.

In Heating Mode, when the outdoor air temperature drops below the Outdoor Air Heating Setpoint and a Cooling Demand is not present, a demand for heating is set to the Heating Supply Air Temperature Setpoint.

In Cooling Mode, when the outdoor air temperature rises above the Outdoor Air Cooling Setpoint and a Heating Demand is not present, a demand for cooling is set to the Cooling Supply Air Temperature Setpoint.

Outdoor air control targets efficiency by creating a deadband zone in which active conditioning may be reduced or eliminated, effectively vent/off mode based on the outdoor air heating and cooling setpoints.

- Unit Control Configurations: Occupied Outdoor Air Temperature Heat/Cool Setpoints & SAT Resets
- App Type Configurations: Supply Fan Runs While Unoccupied & Allow Heat During Cool Demand

Supply Air Temperature (SAT) Setpoint Resets

Various sources can be configured to reset the Supply Air Temperature Setpoint. The following reset source options are available:

- Space Temperature
- Outdoor Air Temperature
- Return Air Temperature
- Supply Fan Speed (VFD) Signal

NOTE: Supply air temperature reset cannot be used in a Space Control - Precision application type mode of operation.

Temperature Reset Source

When a temperature reset option is selected, a High and a Low Reset Source Setpoint must be configured that will correspond to configured Low and High Supply Air Temperature Setpoints. This must be done separately for the Cooling Mode Setpoints and for the Heating Mode Setpoints.

When the reset source is at its highest configured setpoint, the Supply Air Temperature Setpoint will be reset to its lowest configured setpoint. When the reset source is at its lowest configured setpoint, the Supply Air Temperature Setpoint will be reset to its highest configured setpoint.

In all cases, as the reset source value moves within its range established by the configured High and Low Reset Setpoints, the Supply Air Setpoint will be proportionally reset within its range established by the configured Low and High Supply Air Temperature Setpoints.

Supply Fan Speed Reset Source

When a supply fan speed signal reset option is selected, the High supply fan signal (100%) and a the Low supply fan signal (0%) Reset Source Setpoint are not configurable and will correspond to configured Low and High Supply Air Temperature Setpoints. This must be done separately for the Cooling Mode Setpoints and for the Heating Mode Setpoints.

In heating, when the reset source is at its highest configured setpoint, the Supply Air Temperature Setpoint will be reset to its highest configured setpoint. When the reset source is at its lowest configured setpoint, the Supply Air Temperature Setpoint will be reset to its lowest configured setpoint.

In cooling, when the reset source is at its highest configured setpoint, the Supply Air Temperature Setpoint will be reset to its lowest configured setpoint. When the reset source is at its lowest configured setpoint, the Supply Air Temperature Setpoint will be reset to its highest configured setpoint.

In all cases, as the reset source value moves within its range established by the configured High and Low Reset Setpoints, the Supply Air Setpoint will be proportionally reset within its range established by the configured Low and High Supply Air Temperature Setpoints.

Morning Warm-Up Mode Operation (VAV Control - ONLY)

When configured and the unit switches to the Occupied Mode of Operation (not Override or Force Mode from an operator interface device), the unit compares the return air temperature to a Morning Warm-Up target setpoint temperature. If the return air temperature is below this setpoint, the Warm-Up Mode is initiated. Heating will then be controlled to the Warm-Up Supply Air Temperature Setpoint.

This mode remains in effect until the return air temperature rises above the target temperature or a user-adjustable time expires, or the supply air temperature rises above the user-adjustable setpoint. Warm-Up Mode is not initiated by push-button overrides or unoccupied heating demands. The outdoor air damper remains closed during Warm-Up Mode.

Once the Warm-Up Mode has been terminated, it cannot resume until the unit has been through a subsequent Unoccupied Mode. Only one Warm-Up Mode is allowed per 24-hour period.

If stand-alone VAV boxes that need to be forced wide open during the Warm-Up Mode, configure one of the MOUTS to be used during this mode. If the Warm-Up Mode is active, a +24 VDC output signal is activated. This signal then becomes the Force Open Command for all VAV boxes to which it is wired.

NOTE: If Morning Warm-Up Mode Operation is desired, 'Allow Heat During Cool Demand' MUST be enabled under application types.

Morning Cool-Down Mode Operation (VAV Control - ONLY)

When configured and the unit switches to the Occupied Mode of Operation (not Override or Force Mode from an operator interface device), the unit compares the return air temperature to a Morning Cool-Down target temperature. If the return air temperature is above this Setpoint, the Cool-Down Mode is initiated. Cooling will then be controlled to the Cool-Down Supply Air Temperature Setpoint.

This mode remains in effect until the return air temperature drops below the target temperature or a user-adjustable time expires, or the supply air temperature drops below the user-adjustable setpoint. Cool-Down Mode is not initiated by push-button overrides or unoccupied heating demands. The outdoor air damper remains closed during Cool-Down Mode.

Once the Cool-Down Mode has been terminated, it cannot resume until the unit has been through a subsequent Unoccupied Mode. Only one Cool-Down Mode is allowed per 24-hour period.

If stand-alone VAV boxes that need to be forced wide open during the Cool-Down Mode, configure one of the MOUTS to be used during this mode. If the Cool-Down Mode is active, a +24 VDC output signal is activated. This signal then becomes the Force Open Command for all VAV boxes to which it is wired.

Supply Fan Cycles w/ Heat/Cool

When disabled, the supply fan will operate in Vent Mode and will run at the user-adjustable global supply fan vent speed. Vent Mode occurs in Occupied Mode of operation, on units configured for continuous supply fan operation and is generated anytime there is no demand for heating or cooling. Vent Mode also occurs in the Unoccupied Mode when there is no heating or cooling demand and the user-configured 'SF Runs While Unoccupied' is enabled.

When enabled, the supply fan will operate in Off Mode. Off Mode occurs in the Unoccupied Mode when there is no heating or cooling demand. The supply fan is off, and the outside air damper is closed. Off Mode can only occur in the Occupied Mode if the fan is configured to 'Supply Fan Cycles w/ Heat/Cool' (user-configured) and there is no call for heating or cooling.

Enable Unoccupied Setpoints

Application Type dependent and if 'Enable Unoccupied SP's' (user-configured) is enabled the unit will use Unoccupied Setback Offset Setpoints for Heating and Cooling calls. The outdoor air damper will be closed except if the unit is in Allow Econo During Unoccupied Mode, user-configured.

Allow Heat During Cool Demand

If enabled (user-configured) the unit will allow heating during a cooling demand when the space is overheating and the supply air temperature is below the cooling supply air temperature minimum setpoint. Increasing the supply air temperature to the 'Cooling SAT Min SP' (user-configured).

Analog Values

STRATUS ANALOG VALUES						
Parameter	Object	Description	Units	R/W	Min	Max
Mode Based Controlled Temp	1	This is the current temperature for the controlled point. For example, if the application is controlling space temperature, this will be the space temperature.	°F	RO	NA	NA
Supply Air Temperature	2	Functional supply air temperature	°F	RO	NA	NA
Supply Air Relative Humidity	3	Functional supply air relative humidity	%	RO	NA	NA
Outdoor Air Temperature	4	Functional outdoor temperature	°F	RO	NA	NA
Outdoor Air Relative Humidity	5	Functional outdoor relative humidity	%	RO	NA	NA
Outdoor Air Wetbulb	6	Functional outdoor wetbulb temperature	°F	RO	NA	NA
Outdoor Air Dewpoint	7	Functional outdoor dewpoint	%	RO	NA	NA
Return Air Temperature	8	Functional return air temperature	°F	RO	NA	NA
Return Air Relative Humidity	9	Functional return air relative humidity	%	RO	NA	NA
Mixed Air Temperature	10	Functional mixed air temperature	°F	RO	NA	NA
Mixed Air Relative Humidity	11	Functional mixed air relative humidity	%	RO	NA	NA
Space Temperature	12	Functional space temperature. This may be an average of multiple sensors.	°F	RO	NA	NA
Space Relative Humidity	13	Functional space relative humidity. This may be an average of multiple sensors.	%	RO	NA	NA
Commanded OA Damper Position	14	The outdoor air damper current commanded position.	%	RO	NA	NA
OA Damper Position	15	Current outdoor air damper position	%	RO	NA	NA
Supply Fan Speed	16	Current supply fan speed as a percentage from minimum speed to maximum speed. *See associated Binary Value for fan running status.*	%	RO	NA	NA
Return Fan Speed	17	Current return fan speed as a percentage from minimum speed to maximum speed. *See associated Binary Value for fan running status.*	%	RO	NA	NA
Exhaust Fan Speed	18	Current exhaust fan speed as a percentage from minimum speed to maximum speed. *See associated Binary Value for fan running status.*	%	RO	NA	NA
Duct Static Pressure Active Setpoint	19	Duct static pressure control target	“WC	RO	NA	NA
Duct Static Pressure	20	Current duct static pressure	“WC	RO	NA	NA
Building Pressure Active Setpoint	21	Building pressure control target	“WC	RO	NA	NA
Building Pressure	22	Current building pressure	“WC	RO	NA	NA
Heating Stages Active	23	Total heat stages active including modulating and fixed stages		RO	NA	NA
Heating Modulation Percent	24	Heat modulation percent.	%	RO	NA	NA
Preheat Stages Active	25	Total preheat stages active including modulating and fixed stages		RO	NA	NA
Preheat Modulation Percent	26	Preheat modulation percent	%	RO	NA	NA
Refrigeration Circuits Active	27	Number of refrigeration circuits currently active		RO	NA	NA
Refrigeration Circuit A Modulation	28	Overall percent of operation for the circuit.	%	RO	NA	NA
Refrigeration Circuit B Modulation	29	Overall percent of operation for the circuit.	%	RO	NA	NA
Condenser Fan Bank 1 Modulation	34	Condenser Fan bank 1 modulation as a percentage from minimum to maximum speed. See associated Binary Value for fan running status	%	RO	NA	NA
Condenser Fan Bank 2 Modulation	35	Condenser Fan bank 2 modulation as a percentage from minimum to maximum speed. See associated Binary Value for fan running status	%	RO	NA	NA
Reheat Position	40	Reheat position, which is the same for all operating circuits having reheat. This may vary just during a flush if circuits do not flush simultaneously	%	RO	NA	NA
Occupied Cooling Active Setpoint	41	This is the active setpoint.	°F	RO	NA	NA

NOTES:
R/W Indicates the value is READ ONLY or READ/WRITE
1. A value less than 40°F will disable the override. This point must be written at least every 5 minutes or it will be assumed invalid and the current control mode will take over writing the SATsp.
2. This setpoint is shared with the same functional setpoint in the Unit Manager Interface. Changes in one location will be reflected to the other.

Analog Values

STRATUS ANALOG VALUES						
Parameter	Object	Description	Units	R/W	Min	Max
Occupied Heating Active Setpoint	42	This is the active setpoint.	°F	RO	NA	NA
Unoccupied Cooling Active Setpoint	43	This is a read-only repeat of the setpoint.	°F	RO	NA	NA
Unoccupied Heating Active Setpoint	44	This is a read-only repeat of the setpoint.	°F	RO	NA	NA
Active Supply Air Temperature Setpoint	45	This is the active setpoint.	°F	RO	NA	NA
Measured Outdoor Airflow	46	This is the measured outdoor air flow.	CFM	RO	NA	NA
Measured Supply Airflow	47	This is the measured supply airflow.	CFM	RO	NA	NA
Measured Return Airflow	48	This is the measured return airflow.	CFM	RO	NA	NA
Measured Exhaust Airflow	49	This is the measured exhaust airflow.	CFM	RO	NA	NA
Indoor CO_2	50	This is the measured indoor CO_2 level.	PPM	RO	NA	NA
Supply Air Setpoint Override[1]	10003	When enabled by value, this becomes the supply air setpoint	°F	R/W	30°F	140°F
Occupied Heating Setpoint[2]	10004	This is the occupied space heating setpoint.	°F	R/W	35°F	120°F
Occupied Cooling Setpoint[2]	10005	This is the occupied space cooling setpoint.	°F	R/W	35°F	120°F
Unoccupied Heating Setpoint[2]	10006	This is the unoccupied space heating setpoint.	°F	R/W	35°F	120°F
Unoccupied Cooling Setpoint[2]	10007	This is the unoccupied space cooling setpoint.	°F	R/W	35°F	120°F
OA Damper Minimum Position[2]	10008	This is the outdoor air damper minimum position during occupied operation.	%	R/W	0%	100%
IAQ CO2 Setpoint	10009	This setpoint is shared with the same functional setpoint in the Unit Manager Interface. Changes in one location will be reflected to the other.		R/W		

NOTES:
R/W indicates READ/WRITE. RO indicates read only.
1. A value less than 40°F will disable the override. This point must be written at least every 5 minutes or it will be assumed invalid and the current control mode will take over writing the SATsp.
2. This setpoint is shared with the same functional setpoint in the Unit Manager Interface. Changes in one location will be reflected to the other.

Binary Values

STRATUS BINARY VALUES					
Name	Object	Description	FALSE	TRUE	R/W
Supply Fan Enable	3	This is the fan run status	DISABLED	RUNNING	RO
Return Fan Enable	4	This is the fan run status	DISABLED	RUNNING	RO
Exhaust Fan Enable	5	This is the fan run status	DISABLED	RUNNING	RO
Economizer Enable	6	This indicates whether the OA damper is being operated in economizer control	DISABLED	ENABLED	RO
Auxiliary Heat Enable	7	This indicates auxiliary heat is active	DISABLED	ENABLED	RO
Emergency Heat Enable	8	This indicates emergency heat is active	DISABLED	ENABLED	RO
Supply Fan Proof of Airflow	9	This indicates supply fan is moving air	FALSE	TRUE	RO
Occupancy	16	Occupancy status	UNOCCUPIED	OCCUPIED	RO
Dirty Filter	17	True indicates filter needs replacement	FALSE	TRUE	RO
Supply Air Temperature Sensor Status	18	This indicates the supply air temperature sensor is detected as valid	FAILED	GOOD	RO
Supply Air Humidity Sensor Status	19	This indicates supply air humidity sensor is detected as valid	FAILED	GOOD	RO
Outdoor Air Temperature Sensor Status	20	This indicates the outdoor air temperature sensor is detected as valid.	FAILED	GOOD	RO
Outdoor Air Humidity Sensor Status	21	This indicates the outdoor air humidity sensor is detected as valid.	FAILED	GOOD	RO
Return Air Temperature Sensor Status	22	This indicates the return air temperature sensor is detected as valid.	FAILED	GOOD	RO
Return Air Humidity Sensor Status	23	This indicates the return air humidity sensor is detected as valid.	FAILED	GOOD	RO
Mixed Air Temperature Sensor Status	24	This indicates the mixed air temperature sensor is detected as valid.	FAILED	GOOD	RO
Mixed Air Humidity Sensor Status	25	This indicates the mixed air humidity sensor is detected as valid.	FAILED	GOOD	RO
Space Temperature Sensor Status	26	This indicates the space temperature sensor is detected as valid.	FAILED	GOOD	RO
Space Humidity Sensor Status	27	This indicates the space humidity sensor is detected as valid.	FAILED	GOOD	RO
OA Cooling Lockout	28	Indicates if mechanical unit cooling operation is disabled based on OA temperature	FALSE	TRUE	RO
OA Heating Lockout	29	Indicates if mechanical unit heating operation is disabled based on OA temperature	FALSE	TRUE	RO
Low Supply Air Temperature Fault	30	The supply air is below the low supply air temperature limit	FALSE	TRUE	RO
High Supply Air Temperature Fault	31	The supply air is above the high supply air temperature limit	FALSE	TRUE	RO
Circuit 1 Fault	32	An unspecified fault has occurred on circuit 1	FALSE	TRUE	RO
Circuit 2 Fault	33	An unspecified fault has occurred on circuit 2	FALSE	TRUE	RO
A2L Airstream Alarm	36	Refrigerant has been detected in the airstream and mitigation strategies are active	FALSE	TRUE	RO
A2L Cabinet Alarm	37	Refrigerant has been detected in the compressor cabinet and mitigation strategies are active	FALSE	TRUE	RO
Fire Alarm	38	The fire alarm status	FALSE	TRUE	RO
Unit Smoke Detector Alarm	39	The smoke detector alarm status	FALSE	TRUE	RO
Remote Shutdown	40	The remote shutdown status	FALSE	TRUE	RO
Power Input Phase Status	41	Input power phase sequence is backwards	FALSE	TRUE	RO
Power Input Voltage Status	42	Input power voltage is incorrect	FALSE	TRUE	RO

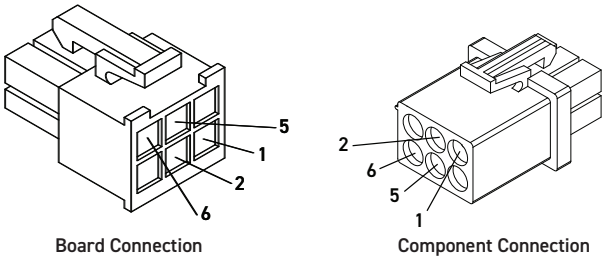
Binary Values

STRATUS BINARY VALUES					
Name	Object	Description	FALSE	TRUE	R/W
Unit Cannot Run Alarm	43	Indicates that there is something blocking unit operation.	FALSE	TRUE	RO
Mechanical Cooling Alarm	44	Something is blocking mechanical cooling from functioning	FALSE	TRUE	RO
Mechanical Heating Alarm	45	Something is blocking mechanical heating from functioning	FALSE	TRUE	RO
Title 24 Alarm A	46	Fault Detection and Diagnostics Fault A	FALSE	TRUE	RO
Title 24 Alarm B	47	Fault Detection and Diagnostics Fault B	FALSE	TRUE	RO
Title 24 Alarm C	48	Fault Detection and Diagnostics Fault C	FALSE	TRUE	RO
Title 24 Alarm D	49	Fault Detection and Diagnostics Fault D	FALSE	TRUE	RO
Title 24 Alarm E	50	Fault Detection and Diagnostics Fault E	FALSE	TRUE	RO
Refrigerant Injection Active	51	Status indicator for the refrigerant injection operation	FALSE	TRUE	RO
Defrost Active	52	A defrost cycle is in operation on at least one circuit	FALSE	TRUE	RO
Disable Economizer Operations[1]	10002	This can be used to disable the economizer operation if configured.	ENABLED	DISABLED	RW

NOTES:
1. This command is inverted logic, by default, if the economizer is configured then it is enabled. Setting this value to true will disable economizer operations.

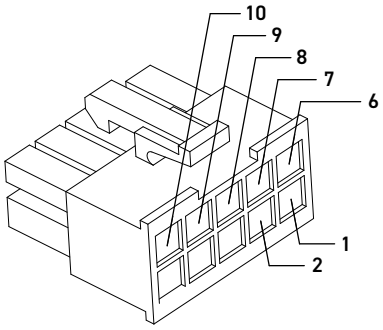
MULTISTATE VALUES				
Name	Object	Description	State List	R/W
Application Sequence	1	This is the current application sequence in operation	• Space Temperature Control Standard • Space Temperature Control Precision • Return Temperature Control Standard • Return Temperature Control Precision • OA Control • VAV Control • External Supply Air Control	RO
HVAC Unit Operating Mode	2	This is the current HVAC Unit mode of operation	• Off • Vent • Cool • Heat • Dehum	RO
Occupancy	3	Current occupancy status	• Unoccupied • Occupied • Override Occupied • Forced Occupied • Forced Unoccupied • Remote Input Occupied	RO
Force Occupancy	10001	This parameter can force the occupancy state of the unit.	• Auto • Force Occupied • Force Unoccupied	R/W

Pinout



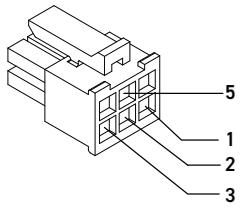
Board Pin	Comp Pin	Wire Color	Input / Outputs	Description
1	1	Red	+ 12 VDC	Output Power; Positive Voltage
2	6	White	Signal	Signal Input (+5 VDC)
5	5	Green	+ 5 VDC	+5 VDC Output
6	2	Black	GND	Output Power; Ground

Figure 20: A2L Cable



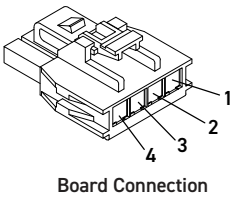
Pin	Wire Color	Input / Outputs	Description
1	Blue	Signal	High Pressure Switch; Signal Input (+24 VDC)
2	Blue	+ 24 VDC	High Pressure Switch; +24 VDC Output
6	White	+ 5 VDC	Discharge Temperature; Wire Lead #1
7	Black	GND	Discharge Temperature; Wire Lead #2
8	White	Signal	Discharge Pressure; Signal Input (0-5 VDC)
9	Black	GND	Discharge Pressure; Ground
10	Red	+ 5 VDC	Discharge Pressure; +5 VDC Output

Figure 21: Cooling Cable (RFG-IN Connection)



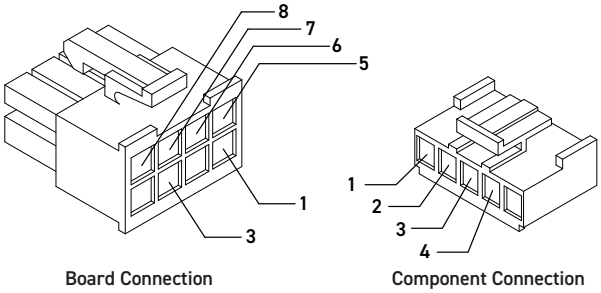
Pin	Wire Color	Input / Outputs	Description
1	Red	+ 24 VDC	+24 VDC Output
2	White	Signal	Commanded Position (2-10 VDC)
3	Green	Signal	Feedback Position (2-10 VDC)
5	Black	GND	Actuator; Ground

Figure 22: Damper Cable



Pin	Wire Color	Input / Outputs	Description
1	Green	Signal (+)	Board Communications (+)
2	Black	GND	Board Power; Ground
3	White	Signal (-)	Board Communications (-)
4	Red	+ 24 VDC	Board Power; Positive Voltage

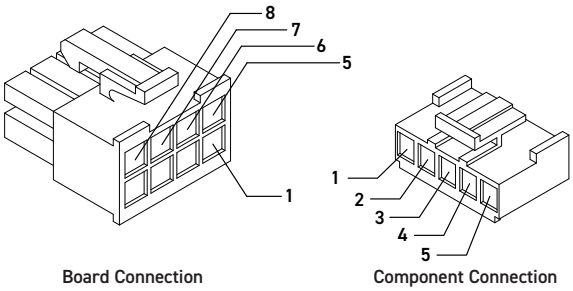
Figure 23: EXV Cable



Board Pin	Comp Pin	Wire Color	Input / Outputs	Description
1	4	Green	GND	Ground
3		Blue	GND	Ground
5		Brown	BIN/Solenoid	SIGNAL Input (+24 VAC)
6	3	Red	PWM_RX	Position Feedback; PWM (0-10 VDC)
7	2	Black	PWM_TX	Position Command; PWM (0-10 VDC)
8	1	White	+ 24 VAC	+24 VAC Output

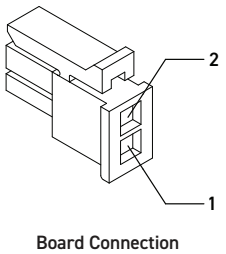
Figure 24: Gas Valve Cable With Spade

Pinout



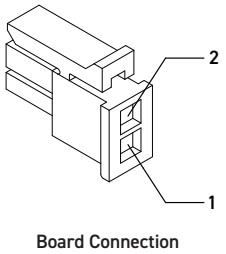
Board Pin	Comp Pin	Wire Color	Input / Outputs	Description
1	4	Green	GND	Ground
5	5	Brown	BIN/Solenoid	SIGNAL Input (+24 VAC)
6	3	Red	PWM_RX	Position Feedback; PWM (0-5 VDC)
7	2	Black	PWM_TX	Position Command; PWM (0-5 VDC)
8	1	White	+ 24 VAC	+24 VAC Output

Figure 25: Gas Valve Cable Without Spade



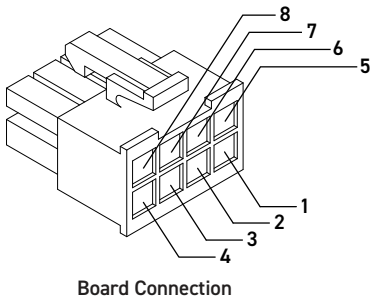
Board Pin	Wire Color	Input / Outputs	Description
1	Black	GND	Ground
2	White	+ 24 VDC	+24 VDC Output

Figure 26: Limit Cable



Board Pin	Wire Color	Input / Outputs	Description
1	Black	Signal (-)	Contactor Configuration; +2-5 VDC @ 300mA (PWM)
2	White	Signal (+)	Signal Configuration; +24 VDC Output or

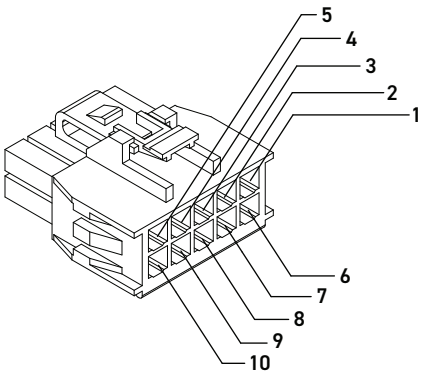
Figure 27: MOUT Cable



Board Pin	Wire Color	Input / Outputs	Description
1	Red	+ 24 VDC	Supply Power; Positive Voltage
2	Red	+ 24 VDC	Supply Power; Positive Voltage
3	Black	GND	Supply Power; Ground
4	Black	GND	Supply Power; Ground
5	Red	+ 24 VDC	Supply Power; Positive Voltage
6	Red	+ 24 VDC	Supply Power; Positive Voltage
7	Black	GND	Supply Power; Ground
8	Black	GND	Supply Power; Ground

Figure 28: Power Cable - Standard

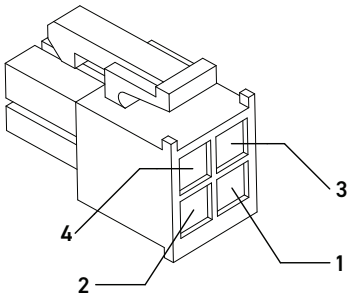
Pinout



Board Connection

Board Pin	Wire Color	Input / Outputs	Description
1	Red	+ 24 VDC	Supply Power; Positive Voltage
2	Black	GND	Supply Power; Ground
3	Brown	+ 5 VDC Standby	Aux +5V Power; Positive Voltage
4	Grey	GND	Supply Power; Ground
5	Orange	PWR BIN 1	ACOK, PBO
6	Yellow	PWR BIN 2	DCOK
7	Purple	INHIBIT	Remote On/Off
8	Green	GND	Supply Power; Ground
9	White	PWR T-	Board Communications (-)
10	Blue	PWR T+	Board Communications (+)

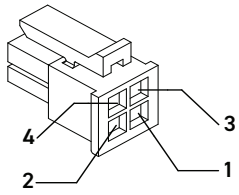
Figure 29: POWERCOMM Cable



Board Connection

Board Pin	Wire Color	Input / Outputs	Description
1	White		A2, Coil 1
2	Green		B1, Coil 2
3	Black		A1, Coil 1
4	Red		B2, Coil 2

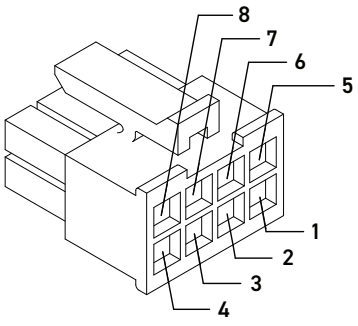
Figure 30: Stepper Cable



Board Connection

Board Pin	Wire Color	Input / Outputs	Description
1	Green	Signal (+)	Board Communications (+)
2	White	Signal (-)	Board Communications (-)
3	Red	+24 VDC	Board Power, Positive Voltage
4	Black	GND	Ground

Figure 31: T1L Cable



Board Connection

Board Pin	Wire Color	Input / Outputs	Description
1	Black	GND	VFD; Ground
2	Red	ENABLE	VFD Enable; Signal Output (24 VDC)
3	Orange	STO	
4	Brown	ANALOG	VFD Speed; Signal Output (0-10 VDC)
5	Yellow	FAULT	Signal Input (24 VDC)
6	White	T-	VFD Communications (-); Signal (2.5 VDC)
7	Sheild	GND	VFD Communications; Ground
8	Blue	R+	VFD Communications (+); Signal (2.5 VDC)

Figure 32: VFD Cable

Building Pressure Sensor Testing

The following sensor voltage and pressure table is provided to aid in checking sensors that appear to be operating incorrectly. Inaccurate system operation may be traced to incorrect sensor wiring. Ensure all sensors are wired per their wire diagrams, as defined within this manual. If the sensors do not appear to be operating or reading correctly, check voltage and/or pressure to confirm the sensor is operating correctly per **"Table 10: 0-5 VDC Pressure Sensor – Voltage and Pressure for a Building Pressure Sensor" on page 58**.

Building Pressure Sensor Testing Instructions

Use the voltage column, **"Table 10: 0-5 VDC Pressure Sensor – Voltage and Pressure for a Building Pressure Sensor" on page 58**', to check the Building Pressure Sensor while connected. Ensuring the Stratus controls are powered. Read voltage with a meter set on DC volts. Place the "-" (minus) lead on the GND terminal and the "+" (plus) lead on the AIN terminal.

If the voltage is above 5.10 VDC, then the sensor or wiring is "open." If the voltage is less than 0.01 VDC, then the sensor or wiring is "shorted".

NOTE: Pressure input values as seen by the Stratus Controller can be found on the Unit Manager.

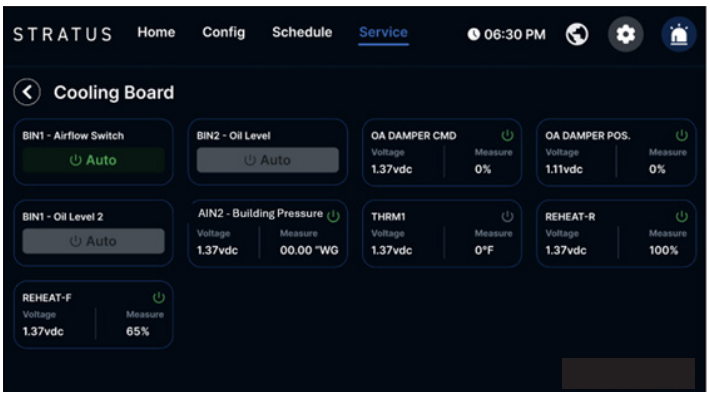


Figure 33: I-O Diagnostic Screen (Cooling Board shown)

Path

Service > I-O Diagnostics > selecting the applicable I-O Board will display its input and output states.

Table 10: 0-5 VDC Pressure Sensor – Voltage and Pressure for a Building Pressure Sensor

Pressure at Sensor (inWC)	Voltage at Input (VDC)	Pressure at Sensor (inWC)	Voltage at Input (VDC)
-0.25	0.000	0.01	2.600
-0.24	0.100	0.02	2.700
-0.23	0.200	0.03	2.800
-0.22	0.300	0.04	2.900
-0.21	0.400	0.05	3.000
-0.20	0.500	0.06	3.100
-0.19	0.600	0.07	3.200
-0.18	0.700	0.08	3.300
-0.17	0.800	0.09	3.400
-0.16	0.900	0.10	3.500
-0.15	1.000	0.11	3.600
-0.14	1.100	0.12	3.700
-0.13	1.200	0.13	3.800
-0.12	1.300	0.14	3.900
-0.11	1.400	0.15	4.000
-0.10	1.500	0.16	4.100
-0.09	1.600	0.17	4.200
-0.08	1.700	0.18	4.300
-0.07	1.800	0.19	4.400
-0.06	1.900	0.20	4.500
-0.05	2.000	0.21	4.600
-0.04	2.100	0.22	4.700
-0.03	2.200	0.23	4.800
-0.02	2.300	0.24	4.900
-0.01	2.400	0.25	5.000
0.00	2.500		

Differential (Filter) Pressure Sensor Testing

The following sensor voltage and pressure table is provided to aid in checking sensors that appear to be operating incorrectly. Inaccurate system operation may be traced to incorrect sensor wiring. Ensure all sensors are wired per their wire diagrams, as defined within this manual. If the sensors do not appear to be operating or reading correctly, check voltage and/or pressure to confirm the sensor is operating correctly per **"Table 11: 0-5 VDC Pressure Sensor - Voltage and Pressure for a Differential Pressure Sensor" on page 59** .

Differential (Filter) Pressure Sensor Testing Instructions

Use the voltage column, **"Table 11: 0-5 VDC Pressure Sensor - Voltage and Pressure for a Differential Pressure Sensor" on page 59**, to check the Differential Pressure Sensor while connected. Ensuring the Stratus controls are powered. Read voltage with a meter set on DC volts. Place the "-" (minus) lead on the GND terminal and the "+" (plus) lead on the AIN terminal.

If the voltage is above 4.25 VDC, then the sensor or wiring is "open." If the voltage is less than 0.25 VDC, then the sensor or wiring is "shorted".

NOTE: Pressure input values as seen by the Stratus Controller can be found on the Unit Manager.

Path

Service > I-O Diagnostics > selecting the applicable I-O Board will display its input and output states.

Table 11: 0-5 VDC Pressure Sensor - Voltage and Pressure for a Differential Pressure Sensor

Pressure at Sensor (inWg)	Voltage at Input (VDC)	Pressure at Sensor (inWg)	Voltage at Input (VDC)
0.10	0.250	0.80	2.401
0.11	0.367	0.83	2.477
0.12	0.485	0.86	2.554
0.13	0.602	0.89	2.631
0.16	0.678	0.92	2.708
0.18	0.747	0.94	2.784
0.21	0.816	0.97	2.861
0.24	0.891	1.00	2.938
0.27	0.966	1.03	3.012
0.30	1.040	1.06	3.085
0.32	1.115	1.08	3.159
0.35	1.190	1.11	3.233
0.38	1.267	1.14	3.306
0.41	1.344	1.17	3.380
0.44	1.421	1.20	3.458
0.46	1.497	1.23	3.536
0.49	1.574	1.25	3.614
0.52	1.651	1.28	3.691
0.55	1.728	1.31	3.769
0.58	1.801	1.34	3.847
0.60	1.875	1.37	3.922
0.63	1.948	1.40	3.996
0.66	2.021	1.42	4.071
0.69	2.097	1.45	4.145
0.72	2.173	1.48	4.220
0.75	2.249	1.49	4.235
0.77	2.325	1.50	4.250

Discharge Line Temperature Sensor Testing

The following sensor voltage and resistance table is provided to aid in checking sensors that appear to be operating incorrectly. Inaccurate system operation may be traced to incorrect sensor wiring. Ensure all sensors are wired per their wire diagrams, as defined within this manual. If the sensors do not appear to be operating or reading correctly, check voltage and/or resistance to confirm the sensor is operating correctly per **"Table 12: Temperature and Resistance Voltage for 84K OHM Thermistor Sensors" on page 61**

Thermistor Sensor Testing Instructions

Use the resistance column to check the Thermistor Sensor while disconnected from the controllers (not powered).

Use the voltage column, **"Table 12: Temperature and Resistance Voltage for 84K OHM Thermistor Sensors" on page 61**, to check the sensor while connected. Ensuring the Stratus controls are powered. Read voltage with meter set on DC volts. Place the "-" (minus) lead on GND terminal and the "+" (plus) lead on the sensor input terminal being investigated.

If the voltage is above 4.98 VDC, then the sensor or wiring is "open." If the voltage is less than 0.38 VDC, then the sensor or wiring is "shorted".

NOTE: Thermistor input values as seen by the Stratus controller can be found on the Unit Manager.

Path

Service > I-O Diagnostics > selecting the Cooling I-O Board will display its input and output states.

Discharge Line Temperature Sensor Testing

Table 12: Temperature and Resistance Voltage for 84K OHM Thermistor Sensors

TEMPERATURE – RESISTANCE – VOLTAGE FOR 84K OHM THERMISTOR SENSORS			
Temp (ºF)	Temp (ºC)	Resistance (Ω)	Voltage @ Input (VDC)
-40	-40.00	2889.60	4.980
-31	-35.00	2087.22	4.970
-22	-30.00	1522.20	4.960
-13	-25.00	1121.44	4.950
-4	-20.00	834.72	4.940
5	-15.00	627.28	4.920
14	-10.00	475.74	4.890
23	-5.00	363.99	4.860
32	0.00	280.82	4.820
41	5.00	218.41	4.770
50	10.00	171.17	4.720
59	15.00	135.14	4.650
68	20.00	107.44	4.570
77	25.00	86.00	4.470
86	30.00	69.28	4.360
95	35.00	56.16	4.240
104	40.00	45.81	4.100
113	45.00	37.58	3.940
122	50.00	30.99	3.770
131	55.00	25.68	3.590
140	60.00	21.40	3.400
149	65.00	17.91	3.200
158	70.00	15.07	3.000
167	75.00	12.73	2.800
176	80.00	10.79	2.590
185	85.00	9.20	2.390
194	90.00	7.87	2.190
203	95.00	6.77	2.010
212	100.00	5.85	1.840
221	105.00	5.09	1.680
230	110.00	4.45	1.530
239	115.00	3.87	1.390
248	120.00	3.35	1.250
257	125.00	2.92	1.120
266	130.00	2.58	1.020
275	135.00	2.28	0.920
284	140.00	2.02	0.830
293	145.00	1.80	0.760
302	150.00	1.59	0.680
311	155.00	1.39	0.610
320	160.00	1.25	0.550
329	165.00	1.12	0.500
338	170.00	1.01	0.450
347	175.00	0.92	0.420
355	179.20	0.85	0.392
356	180.00	0.83	0.380

Discharge Pressure Sensor Testing

The following sensor voltage and pressure table is provided to aid in checking sensors that appear to be operating incorrectly. Inaccurate system operation may be traced to incorrect sensor wiring. Ensure all sensors are wired per their wire diagrams, as defined within this manual. If the sensors do not appear to be operating or reading correctly, check voltage and/or pressure to confirm the sensor is operating correctly per **"Table 13: 0-5 VDC Pressure Sensor – Voltage and Pressure for the Discharge Pressure Sensor" on page 62**, below.

Discharge Pressure Sensor Testing Instructions

Use the voltage column, **"Table 13: 0-5 VDC Pressure Sensor – Voltage and Pressure for the Discharge Pressure Sensor" on page 62**, to check the Discharge Pressure Sensor while connected. Ensuring the Stratus controls are powered. Read voltage with a meter set on DC volts. Place the "-" (minus) lead on the GND terminal (pin 9) and the "+" (plus) lead on the SIGNAL terminal (pin 8) of the Cooling I-O board.

If the voltage is above 4.50 VDC, then the sensor or wiring is "open." If the voltage is less than 0.50 VDC, then the sensor or wiring is "shorted".

NOTE: Pressure input values as seen by the Stratus controller can be found on the Unit Manager.

Path

Service > I/O Diagnostics > selecting the Cooling I/O Board will display its input and output states.

Table 13: 0-5 VDC Pressure Sensor – Voltage and Pressure for the Discharge Pressure Sensor

Pressure at Sensor (PSI)	Voltage at Input (VDC)	Pressure at Sensor (PSI)	Voltage at Input (VDC)
0.00	0.500	340.00	2.540
10.00	0.564	350.00	2.600
20.00	0.623	360.00	2.660
30.00	0.683	370.00	2.720
40.00	0.742	380.00	2.780
50.00	0.802	390.00	2.840
60.00	0.861	400.00	2.900
70.00	0.920	410.00	2.960
80.00	0.980	420.00	3.020
90.00	1.040	430.00	3.080
100.00	1.100	440.00	3.140
110.00	1.160	450.00	3.200
120.00	1.220	460.00	3.260
130.00	1.280	470.00	3.320
140.00	1.340	480.00	3.380
150.00	1.400	490.00	3.440
160.00	1.460	500.00	3.500
170.00	1.520	510.00	3.560
180.00	1.580	520.00	3.620
190.00	1.640	530.00	3.680
200.00	1.700	540.00	3.740
210.00	1.760	550.00	3.800
220.00	1.820	560.00	3.860
230.00	1.880	570.00	3.920
240.00	1.940	580.00	3.980
250.00	2.000	590.00	4.040
260.00	2.060	600.00	4.100
270.00	2.120	610.00	4.160
280.00	2.180	620.00	4.220
290.00	2.240	630.00	4.280
300.00	2.300	640.00	4.340
310.00	2.360	650.00	4.400
320.00	2.420	667.00	4.500
330.00	2.480		

Duct Static Pressure Sensor Testing

The following sensor voltage and pressure table is provided to aid in checking sensors that appear to be operating incorrectly. Inaccurate system operation may be traced to incorrect sensor wiring. Ensure all sensors are wired per their wire diagrams, as defined within this manual. If the sensors do not appear to be operating or reading correctly, check voltage and/or pressure to confirm the sensor is operating correctly per **"Table 14: 0-5 VDC Pressure Sensor – Voltage and Pressure for a Duct Static Pressure Sensor" on page 63**.

Duct Static Pressure Sensor Testing Instructions

Use the voltage column, **"Table 14: 0-5 VDC Pressure Sensor – Voltage and Pressure for a Duct Static Pressure Sensor" on page 63**, to check the Duct Static Pressure Sensor while connected. Ensuring the Stratus controls are powered. Read voltage with a meter set on DC volts. Place the "-" (minus) lead on the GND terminal and the "+" (plus) lead on the AIN terminal.

If the voltage is above 4.35 VDC, then the sensor or wiring is "open." If the voltage is less than 0.10 VDC, then the sensor or wiring is "shorted".

NOTE: Pressure input values as seen by the Stratus controller can be found on the Unit Manager.

Path

Service > I-O Diagnostics > selecting the applicable I-O Board will display its input and output states.

Table 14: 0-5 VDC Pressure Sensor – Voltage and Pressure for a Duct Static Pressure Sensor

Pressure at Sensor (inWg)	Voltage at Input (VDC)	Pressure at Sensor (inWg)	Voltage at Input (VDC)
0.00	0.250	2.60	2.330
0.10	0.330	2.70	2.410
0.20	0.410	2.80	2.490
0.30	0.490	2.90	2.570
0.40	0.570	3.00	2.650
0.50	0.650	3.10	2.730
0.60	0.730	3.20	2.810
0.70	0.810	3.30	2.890
0.80	0.890	3.40	2.970
0.90	0.970	3.50	3.050
1.00	1.050	3.60	3.130
1.10	1.130	3.70	3.210
1.20	1.210	3.80	3.290
1.30	1.290	3.90	3.370
1.40	1.370	4.00	3.450
1.50	1.450	4.10	3.530
1.60	1.530	4.20	3.610
1.70	1.610	4.30	3.690
1.80	1.690	4.40	3.770
1.90	1.770	4.50	3.850
2.00	1.850	4.60	3.930
2.10	1.930	4.70	4.010
2.20	2.010	4.80	4.090
2.30	2.090	4.90	4.170
2.40	2.170	5.00	4.250
2.50	2.250		

Space, Supply Air, Outdoor Air, Entering Air, Leaving, Mixed Air or Return Air Temperature Sensor Testing

The following sensor voltage and resistance table is provided to aid in checking sensors that appear to be operating incorrectly. Inaccurate system operation may be traced to incorrect sensor wiring. Ensure all sensors are wired per their wire diagrams, as defined within this manual. If the sensors do not appear to be operating or reading correctly, check voltage and/or resistance to confirm the sensor is operating correctly per **"Table 15: Temperature Sensors - Voltage and Resistance for Type 10 K (Type III) Sensors" on page 65**.

Thermistor Sensor Testing Instructions

Use the resistance column to check the Thermistor Sensor while disconnected from the controllers (not powered).

Use the voltage column, **"Table 15: Temperature Sensors - Voltage and Resistance for Type 10 K (Type III) Sensors" on page 65** to check the sensor while connected. Ensuring the Stratus controls are powered. Read voltage with meter set on DC volts. Place the "-" (minus) lead on GND terminal and the "+" (plus) lead on the sensor input terminal being investigated.

Air Handler and Preheat I-O Board: If the voltage is above 4.88 VDC, then the sensor or wiring is "open." If the voltage is less than 0.05 VDC, then the sensor or wiring is "shorted".

Cooling and Outdoor I-O Board: If the voltage is above 2.44 VDC, then the sensor or wiring is "open." If the voltage is less than 0.025 VDC, then the sensor or wiring is "shorted."

NOTE: Thermistor input values as seen by the Stratus controller can be found on the Unit Manager.

Path

Service > I-O Diagnostics > selecting the applicable I-O Board will display its input and output states.

Space, Supply Air, Outdoor Air, Entering Air, Leaving, Mixed Air or Return Air Temperature Sensor Testing

Table 15: Temperature Sensors - Voltage and Resistance for Type 10 K (Type III) Sensors

TEMPERATURE – RESISTANCE – VOLTAGE FOR TYPE III 10 K OHM THERMISTOR SENSORS				
Temp (ºF)	Temp (ºC)	Resistance (Ω)	Air Handler and Preheat I-O Board Voltage at Input (5 VDC)	Cooling and Outdoor Air I-O Board Voltage at Input (2.5 VDC)
-10	-23.3	93333	4.510	2.255
-5	-20.6	80531	4.450	2.225
0	-17.8	69822	4.370	2.185
5	-15	60552	4.290	2.145
10	-12.2	52500	4.200	2.100
15	-9.4	45902	4.100	2.050
20	-6.6	40147	4.002	2.001
25	-3.9	35165	3.891	1.946
30	-1.1	30805	3.773	1.887
35	1.7	27140	3.651	1.826
40	4.4	23874	3.522	1.761
45	7.2	21094	3.390	1.695
50	10	18655	3.252	1.626
52	11.1	17799	3.199	1.600
54	12.2	16956	3.143	1.572
56	13.3	16164	3.087	1.544
58	14.4	15385	3.029	1.515
60	15.6	14681	2.972	1.486
62	16.7	14014	2.916	1.458
64	17.8	13382	2.861	1.431
66	18.9	12758	2.802	1.401
68	20	12191	2.746	1.373
69	20.6	11906	2.717	1.359
70	21.1	11652	2.691	1.346
71	21.7	11379	2.661	1.331
72	22.2	11136	2.635	1.318
73	22.8	10878	2.605	1.303
74	23.3	10625	2.576	1.288
75	23.9	10398	2.549	1.275
76	24.4	10158	2.520	1.260
77	25	10000	2.500	1.250
78	25.6	9711	2.464	1.232
80	26.7	9302	2.410	1.205
82	27.8	8893	2.354	1.177
84	28.9	8514	2.300	1.150
86	30	8153	2.246	1.123
88	31.1	7805	2.192	1.096
90	32.2	7472	2.139	1.070
95	35	6716	2.009	1.005

Space, Supply Air, Outdoor Air, Entering Air, Leaving, Mixed Air or Return Air Temperature Sensor Testing

Table 15: Temperature Sensors - Voltage and Resistance for Type 10 K (Type III) Sensors (continued)

TEMPERATURE – RESISTANCE – VOLTAGE FOR TYPE III 10 K OHM THERMISTOR SENSORS				
Temp (ºF)	Temp (ºC)	Resistance (Ω)	Air Handler and Preheat I-O Board Voltage at Input (5 VDC)	Cooling and Outdoor Air I-O Board Voltage at Input (2.5 VDC)
100	**37.8**	6047	1.884	0.942
105	**40.6**	5453	1.765	0.883
110	**43.3**	4923	1.650	0.825
115	**46.1**	4449	1.540	0.770
120	**48.9**	4030	1.436	0.718
125	**51.7**	3656	1.339	0.670
130	**54.4**	3317	1.246	0.623
135	**57.2**	3015	1.159	0.580
140	60	2743	1.077	0.539
145	62.7	2502	1.001	0.501
150	65.6	2288	0.931	0.466

Suction (Coil; Sporlan EXV) Line Temperature Sensor Testing

The following sensor voltage and resistance table is provided to aid in checking sensors that appear to be operating incorrectly. Inaccurate system operation may be traced to incorrect sensor wiring. Ensure all sensors are wired per their wire diagrams, as defined within this manual. If the sensors do not appear to be operating or reading correctly, check voltage and/or resistance to confirm the sensor is operating correctly per **"Table 16: 0-3.3 VDC Temperature Sensor – Voltage and Resistance for 10K (Type G) Sensors (continued)" on page 69**.

Thermistor Sensor Testing Instructions

Use the resistance column to check the Thermistor Sensor while disconnected from the controllers (not powered).

Use the voltage column, **"Table 16: 0-3.3 VDC Temperature Sensor – Voltage and Resistance for 10K (Type G) Sensors (continued)" on page 69**., to check the sensor while connected. Ensuring the Stratus controls are powered. Read voltage with meter set on DC volts. Place the "-" (minus) lead on GND terminal and the "+" (plus) lead on the Coil terminal of the Sporlan EXV controller.

If the Sporlan EXV controller measures an "open" or "shorted" condition it will communicate the failure state to the Stratus controller.

NOTE: Temperature readings as seen by the Stratus controller can be found on the Unit Manager.

Path

Monitoring > Cooling > Details Button > scroll down to Coil EXV Temp. 1 | 2

Suction (Coil; Sporlan EXV) Line Temperature Sensor Testing

Table 16: 0-3.3 VDC Temperature Sensor – Voltage and Resistance for 10K (Type G) Sensors

TEMPERATURE – RESISTANCE – VOLTAGE FOR TYPE G 10 K OHM THERMISTOR SENSORS			
Temp (ºF)	Temp (ºC)	Resistance (Ω)	Voltage @ Input (VDC)
-40	-40.06	245200	2.931
-35	-37.22	215200	2.887
-30	-34.33	174700	2.808
-25	-31.72	151700	2.747
-20	-28.89	128600	2.668
-15	-26.06	110000	2.586
-10	-23.28	95000	2.501
-5	-20.61	82000	2.410
0	-17.72	71000	2.314
5	-14.94	61000	2.207
10	-12.11	53000	2.102
15	-9.39	46500	2.001
20	-6.56	40000	1.882
25	-3.89	35500	1.785
30	-1.06	31000	1.674
32	0.06	29500	1.633
34	1.22	28000	1.590
36	2.33	26500	1.545
38	3.17	25500	1.514
40	4.61	24000	1.464
42	5.50	23000	1.429
44	6.56	22000	1.393
46	8.00	20500	1.337
48	9.11	19500	1.298
50	9.89	19000	1.277
52	10.94	18000	1.235
54	12.33	17000	1.191
56	13.11	16500	1.169
58	14.44	15500	1.122
60	15.39	15000	1.098
62	16.89	14000	1.048
64	17.89	13500	1.022
66	18.78	13000	0.996
68	20.00	12500	0.959
70	20.83	12000	0.941
72	22.00	11500	0.913
74	23.11	11000	0.884
76	24.17	10500	0.854
78	25.28	10000	0.823
80	26.78	9200	0.779
85	29.17	8500	0.727
90	31.94	7600	0.665
95	35.00	6700	0.601

Suction (Coil; Sporlan EXV) Line Temperature Sensor Testing

Table 16: 0-3.3 VDC Temperature Sensor – Voltage and Resistance for 10K (Type G) Sensors (continued)

TEMPERATURE – RESISTANCE – VOLTAGE FOR TYPE G 10 K OHM THERMISTOR SENSORS			
Temp (ºF)	Temp (ºC)	Resistance (Ω)	Voltage @ Input (VDC)
100	**37.61**	6000	0.555
105	**40.78**	5400	0.502
110	**43.11**	5000	0.471
115	**46.00**	4498	0.430
120	**48.72**	4050	0.392
125	**51.50**	3710	0.363
130	**54.33**	3381	0.334
135	**57.00**	3054	0.304
140	**60.11**	2694	0.272
145	**63.00**	2494	0.253
150	**65.78**	2265	0.231
155	**68.11**	2123	0.220
160	**71.00**	1926	0.199

Suction (Sporlan EXV) Pressure Sensor Testing

The following sensor voltage and pressure table is provided to aid in checking sensors that appear to be operating incorrectly. Inaccurate system operation may be traced to incorrect sensor wiring. Ensure all sensors are wired per their wire diagrams, as defined within this manual. If the sensors do not appear to be operating or reading correctly, check voltage and/or pressure to confirm the sensor is operating correctly per **"Table 17: 0-5 VDC Pressure Sensor – Suction Pressure Sensor (Sporlan EXV)" on page 70**.

Suction Pressure Sensor Testing Instructions

Use the voltage column, **"Table 17: 0-5 VDC Pressure Sensor – Suction Pressure Sensor (Sporlan EXV)" on page 70**, to check the Suction Pressure Sensor while connected. Ensuring the Stratus controls are powered. Read voltage with a meter set on DC volts. Place the "-" (minus) lead on the GND terminal and the "+" (plus) lead on the S terminal of the Sporlan EXV controller.

If the Sporlan EXV controller measures an "open" or "shorted" condition it will communicate the failure state to the Stratus controller.

NOTE: Pressure readings as seen by the Stratus controller can be found on the Unit Manager.

Path

Monitoring > Cooling > Details Button > scroll down to Suct. Satur. Temp | Pr.

Table 17: 0-5 VDC Pressure Sensor – Suction Pressure Sensor (Sporlan EXV)

Pressure at Sensor (PSI)	Voltage at Input (VDC)	Pressure at Sensor (PSI)	Voltage at Input (VDC)
0	0.50	130	2.58
5	0.58	135	2.66
10	0.66	140	2.74
15	0.74	145	2.82
20	0.82	150	2.90
25	0.90	155	2.98
30	0.98	160	3.06
35	1.06	165	3.14
40	1.14	170	3.22
45	1.22	175	3.30
50	1.30	180	3.38
55	1.38	185	3.46
60	1.46	190	3.54
65	1.54	195	3.62
70	1.62	200	3.70
75	1.70	205	3.78
80	1.78	210	3.86
85	1.86	215	3.94
90	1.94	220	4.02
95	2.02	225	4.10
100	2.10	230	4.18
105	2.18	235	4.26
110	2.26	240	4.34
115	2.34	245	4.42
120	2.42	250	4.50
125	2.50		

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AAON Controls Support:
866-918-1100
Monday through Friday, 7:00 AM to 5:00 PM Central Time

Controls Support website:
www.aaon.com/aaon-controls-technical-support

AAON Factory Technical Support:
918-382-6450 | techsupport@aaon.com

NOTE: Before calling Technical Support, please have the model and serial number of the unit available.

PARTS: For replacement parts, please contact your local AAON Representative.

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