Strato Automation

Product Description



I/O: 2 UI's, 1 AO & 1 BO's

Room Temp & Supply Control

BACnet MSTP: *B-BC BTL Certification (Pending)*

Applications:

- Room and/or discharge air control application
- 0-10 Vdc, 10 Vdc pulsed or 24 Vac pulsed control of single stage modulating output
- Local interface for user setpoint control & configuration. Configuration can also be made through BACnet

OPEN STAT

Model Information

Model	Temp	BACnet MSTP
OS214-EH	X	X

Contents

Symbol Definitions **3**
Installation **4**
Overview **5**
Connectors 5
Applications **6**
Wiring 6
Select Your Equipment 6
Room Pulsed 3-32VDC SSR 7
Room Pulsed 24VAC SSR 8
Room 0-10VDC SCR 9
Supply Pulsed 3-32DC SSR 10
Supply Pulsed 24VAC SSR 11
Supply 0-10VDC SCR 12
Optional Remote Inputs / Network Options 13
Control Curves 14
Setup **15**
Setup Menu 15
BACnet Objects **18**
Physical Inputs and Outputs 18
Analog Values (AV) 19
Binary Values (BV) 20
Multi-State Values (MSV) 21
Loop(s) 22
Network **23**
MS/TP Wiring 23
RS-485 Network Guidelines 23
Specifications **24**
End User Operation Guide **25**

Symbol Definitions

The symbols defined below are used throughout this document to highlight information that requires particular attention.



ATTENTION: This information requires special consideration.



TIP: Identifies advice or hints to help the user perform certain tasks.



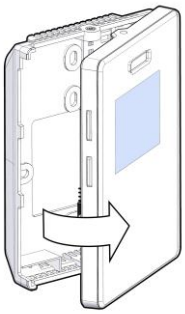
WARNING: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, equipment damage, or data loss. It may also be used to alert against unsafe practices.



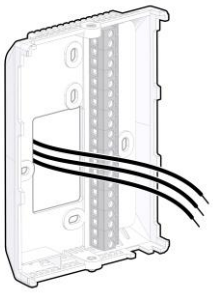
CAUTION: Indicates a situation where users must observe precautions for handling electrostatic-sensitive devices

Installation

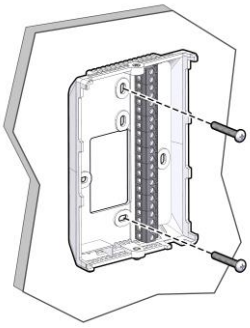
1. After unpacking your OS537, gently pull away from the base using the left side of the front cover.



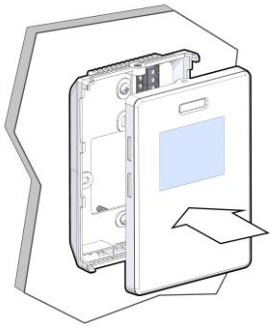
2. Pull the wires through the hole in the base.



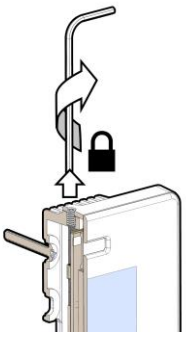
3. Use 2 screws to attach the base to the wall.



4. Connect the wires to the terminals. Refer to the documentation for the proper connections. Then, gently push the front cover straight on to the base.



5. Optionally use the lock screws on top and bottom to secure the cover. Use a 1/16" Allen key and turn counterclockwise until flat with cover.



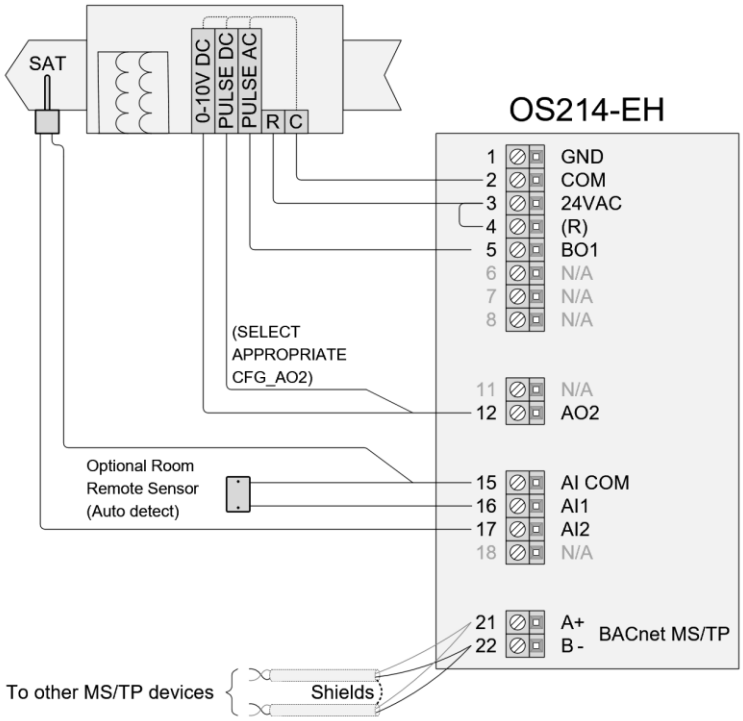
Electronic controls are static sensitive devices; discharge yourself properly before manipulating and installing the device.

Short circuits or incorrect wiring may permanently damage the controller. Double-check your wiring before applying power.

If a control failure could lead to personal injury and/or property loss, the installer must add safety devices and/or alarm systems to protect against failures.

Overview

CONNECTORS



Add a 24VAC transformer when the equipment does not supply the power.

For details on grounding within control panels, NFPA 79 and UL508A provide the required details.

Applications

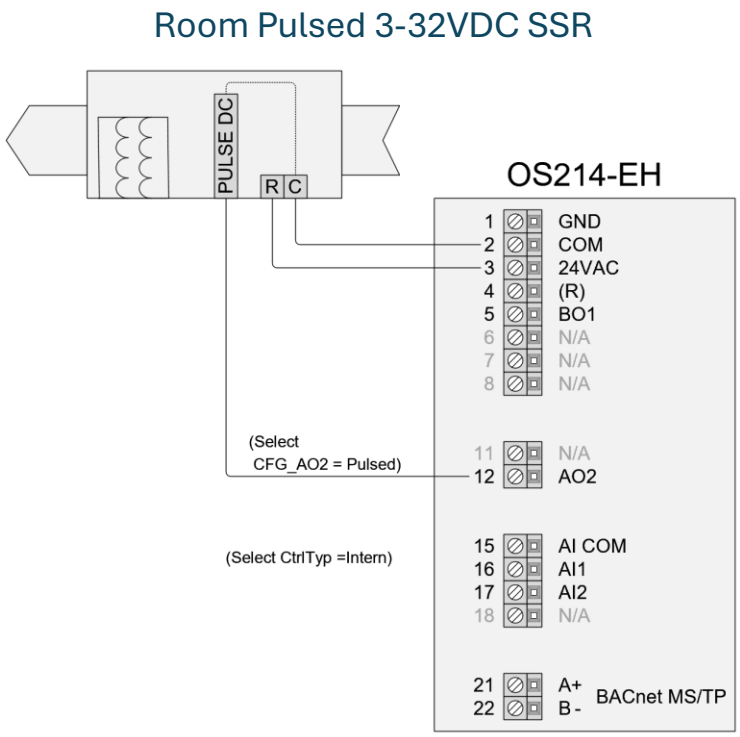
Wiring

Select Your Equipment

Room Pulsed 3-32VDC SSR
Room Pulsed 24VAC SSR
Room 0-10VDC SCR
Supply Pulsed 3-32DC SSR
Supply Pulsed 24VAC SSR
Supply 0-10VDC SCR
Optional Remote Inputs / Network Options

Connector	I/O id	BACnet Name		PULSE DC	PULSE AC	0-10V DC	Options
1	GND						
2	COM			C	C	C	C
3	24V			R	R	R	R
4	(R)				R		
5	BO1	BO_1			Pulsed 24VAC		
12	AO2	AO2		Pulsed 10VDC		Modulated 0-10VDC	
15	AI COM						
16	AI1	AI_1					Remote Room Sensor
17	AI2	AI_2					Supply Air Sensor
21	A+ MS/TP						BACnet
22	B- MS/TP						BACnet

Applications – Wiring



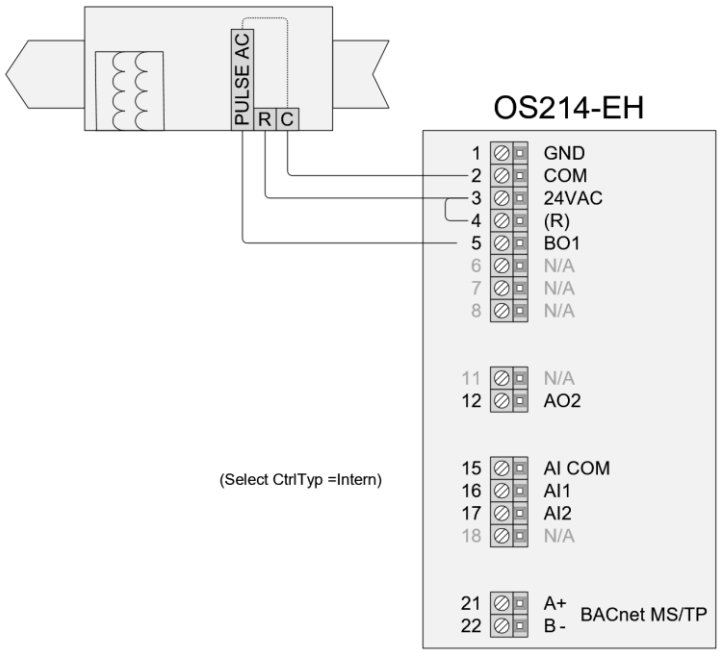
Sequence of operation

On a call for heating: The AO2 output will pulse 0V and 10VDC in a proportional duty cycle that increase progressively from 0% to 100% as the temperature drop. A control loop object will readjust the output over time period to maintain the temperature setpoint.

OBJECT INSTANCE	OBJECT NAME	DESCRIPTION	DEFAULT VALUE
AV-1	RoomSetp	Room temperature setpoint	70°F
AV-14	RoomPB	Adjust room heating prop band	5°F
MSV-6	CFG_AO2	Pulsed or 0 to 10Volt Analog output	Pulsed
LOOP-2	PidRoomT	Room temp heating control loop	0 to 100%

Applications – Wiring

Room Pulsed 24VAC SSR



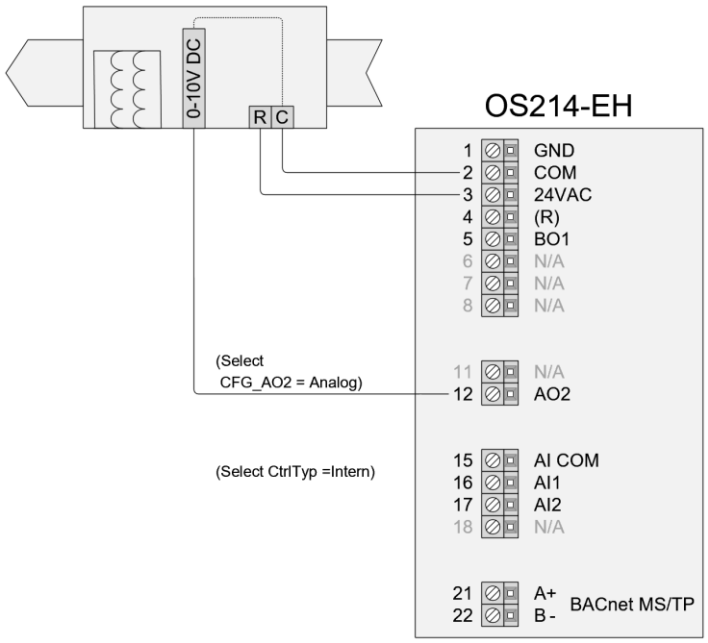
Sequence of operation

On a call for heating: The BO1 output will pulse 0V and 24VAC in a proportional duty cycle that increase progressively from 0% to 100% as the temperature drop. A control loop object will readjust the output over time period to maintain the temperature setpoint.

OBJECT INSTANCE	OBJECT NAME	DESCRIPTION	DEFAULT VALUE
AV-1	RoomSetp	Room temperature setpoint	70°F
AV-14	RoomPB	Adjust room heating prop band	5°F
LOOP-2	PidRoomT	Room temp heating control loop	0 to 100%

Applications – Wiring

Room 0-10VDC SCR



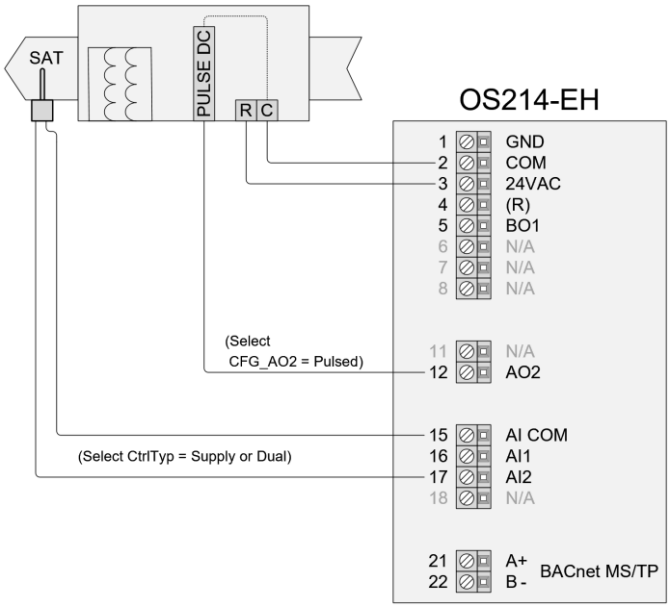
Sequence of operation

On a call for heating: The AO2 output will increase from 0V up to 10VDC progressively from 0% to 100% as the temperature drop. A control loop object will readjust the output over a time period to maintain the temperature setpoint.

OBJECT INSTANCE	OBJECT NAME	DESCRIPTION	DEFAULT VALUE
AV-1	RoomSetp	Room temperature setpoint	70°F
AV-14	RoomPB	Adjust room heating prop band	5°F
MSV-6	CFG_AO2	Pulsed or 0 to 10Volt Analog output	Analog
LOOP-2	PidRoomT	Room temp heating control loop	0 to 100%

Applications – Wiring

Supply Pulsed 3-32DC SSR



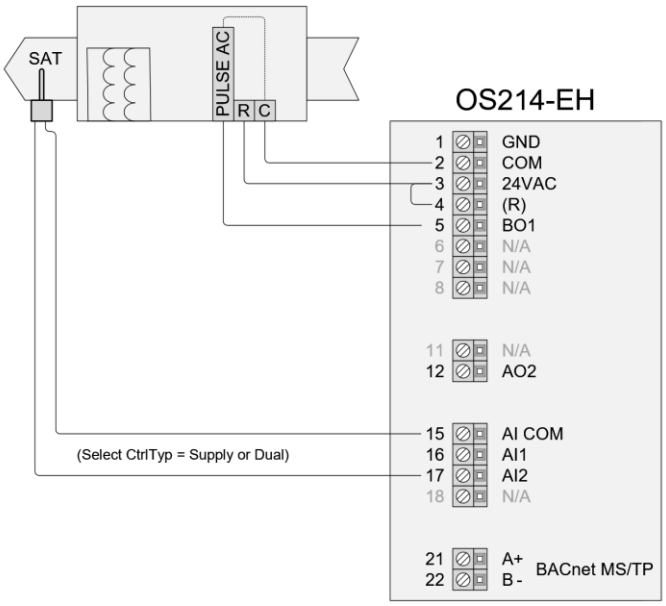
Sequence of operation

On a call for heating: The AO2 output will pulse 0V and 10VDC in a proportional duty cycle that increase progressively from 0% to 100% as the temperature drop. When control type "Dual" is selected, the control will maintain room temperature and a minimum supply temperature set by the supply temperature setpoint.

OBJECT INSTANCE	OBJECT NAME	DESCRIPTION	VALUE
AV-1	RoomSetp	Room temperature setpoint	Desired room setpoint
AV-2	Supp_SP	Supply temperature setpoint	Desired minimum supply setpoint
AV-14	RoomPB	Adjust room heating prop band	5°F
LOOP-2	PidRoomT	Room temp heating control loop	0 to 100%
LOOP-6	PIDSuppT	Supply temp control loop	0 to 100%
MSV-3	CtrlTyp	Control Type	Supply or Dual
MSV-6	CFG_AO2	Pulsed or 0 to 10Volt Analog output	Pulsed

Applications – Wiring

Supply Pulsed 24VAC SSR



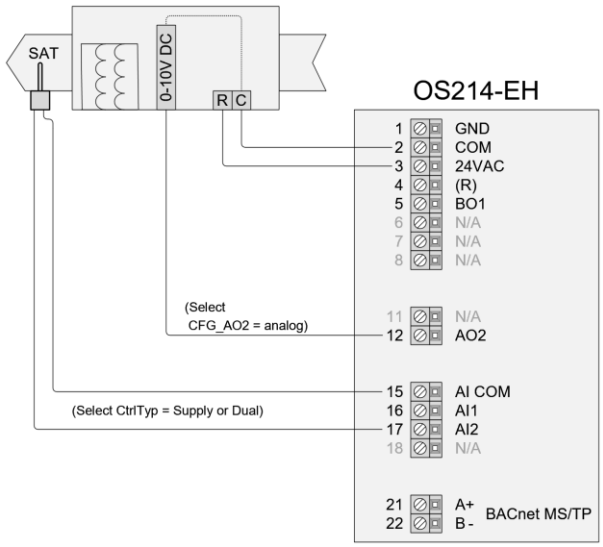
Sequence of operation

On a call for heating: The BO1 output will pulse 0V and 24VAC in a proportional duty cycle that increase progressively from 0% to 100% as the temperature drop. When control type "Dual" is selected, the control will maintain room temperature and a minimum supply temperature set by the supply temperature setpoint.

OBJECT INSTANCE	OBJECT NAME	DESCRIPTION	VALUE
AV-1	RoomSetp	Room temperature setpoint	Desired room setpoint
AV-2	Supp_SP	Supply temperature setpoint	Desired minimum supply setpoint
AV-14	RoomPB	Adjust room heating prop band	5°F
LOOP-2	PidRoomT	Room temp heating control loop	0 to 100%
LOOP-6	PIDSuppT	Supply temp control loop	0 to 100%
MSV-3	CtrlTyp	Control Type	Supply or Dual

Applications – Wiring

Supply 0-10VDC SCR



Add a 24VAC transformer when the equipment does not supply the power

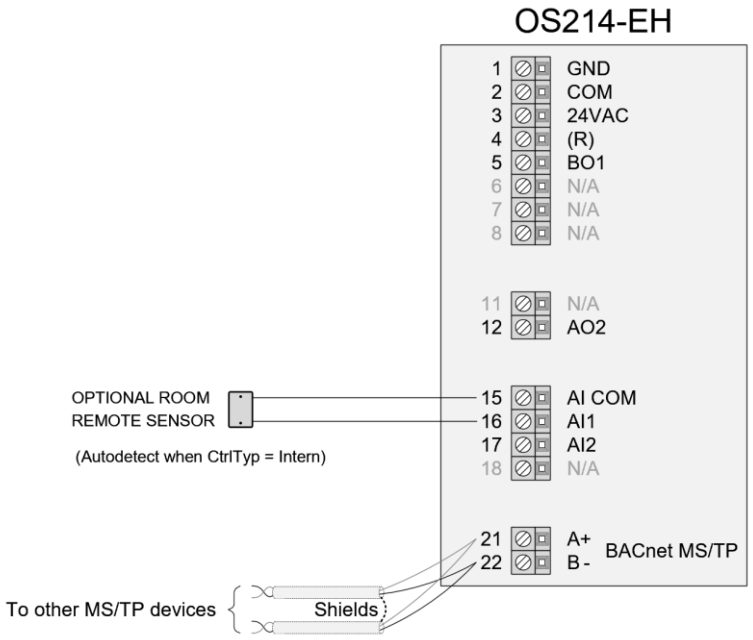
Sequence of operation

On a call for heating: The AO2 output will increase from 0V up to 10VDC progressively from 0% to 100% as the temperature drop. When control type "Dual" is selected, the control will maintain room temperature and a minimum supply temperature set by the supply temperature setpoint.

OBJECT INSTANCE	OBJECT NAME	DESCRIPTION	VALUE
AV-1	RoomSetp	Room temperature setpoint	Desired room setpoint
AV-2	Supp_SP	Supply temperature setpoint	Desired minimum supply setpoint
AV-14	RoomPB	Adjust room heating prop band	5°F
LOOP-2	PidRoomT	Room temp heating control loop	0 to 100%
LOOP-6	PIDSuppT	Supply temp control loop	0 to 100%
MSV-3	CtrlTyp	Control Type	Supply or Dual
MSV-6	CFG_AO2	Pulsed or 0 to 10Volt Analog output	Analog

Applications – Wiring

Optional Remote Inputs / Network Options



Sequence of operation:

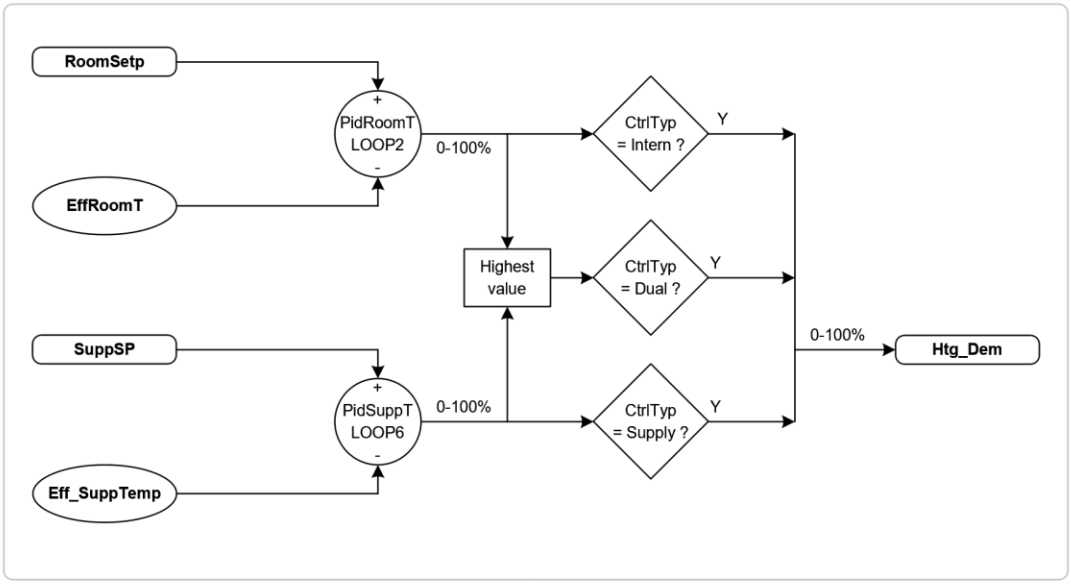
Room Remote Sensor: When a 10K thermistor is detected on AI1 input, it replaces automatically the internal temperature reading. Default is type 3. A type 2 can be selected with MSV-5 CFGSens.

CtrlTyp	AI-1 Sensor Detected	Displayed Temperature	Displayed BACnet Object	Input source	Calibration BACnet Object	Setpoint Adjustment from Right Buttons
Intern	No	Internal sensor	AV-111	AI-6	AV-16	AV-1
	Yes	Remote room sensor	AV-111	AI-1	AV-16	AV-1
Supply	No	Supply sensor	AV-110	AI-2	AV-17	AV-2
	Yes	Supply sensor	AV-110	AI-2	AV-17	AV-2
Dual	No	Internal sensor	AV-111	AI-6	AV-16	AV-1
	Yes	Remote room sensor	AV-111	AI-1	AV-16	AV-1

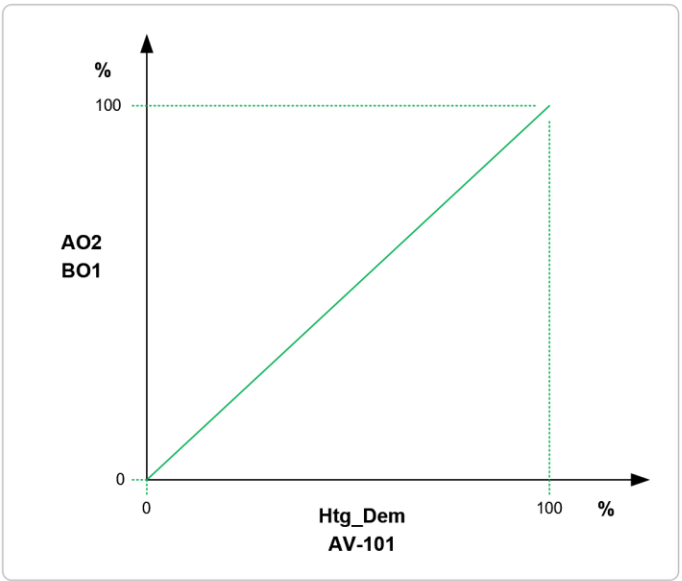
Applications – Wiring

Control Curves

Control Flowchart



Outputs



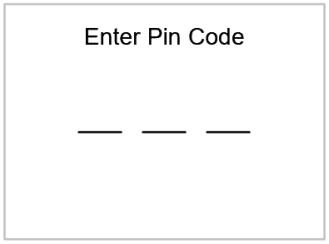
Setup

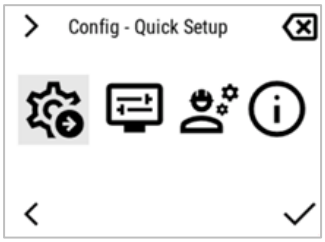
SETUP MENU

1. Access the Setup Menu by holding the two left buttons.



2. Press these PIN keys in sequence: The top left button twice and the top right button once

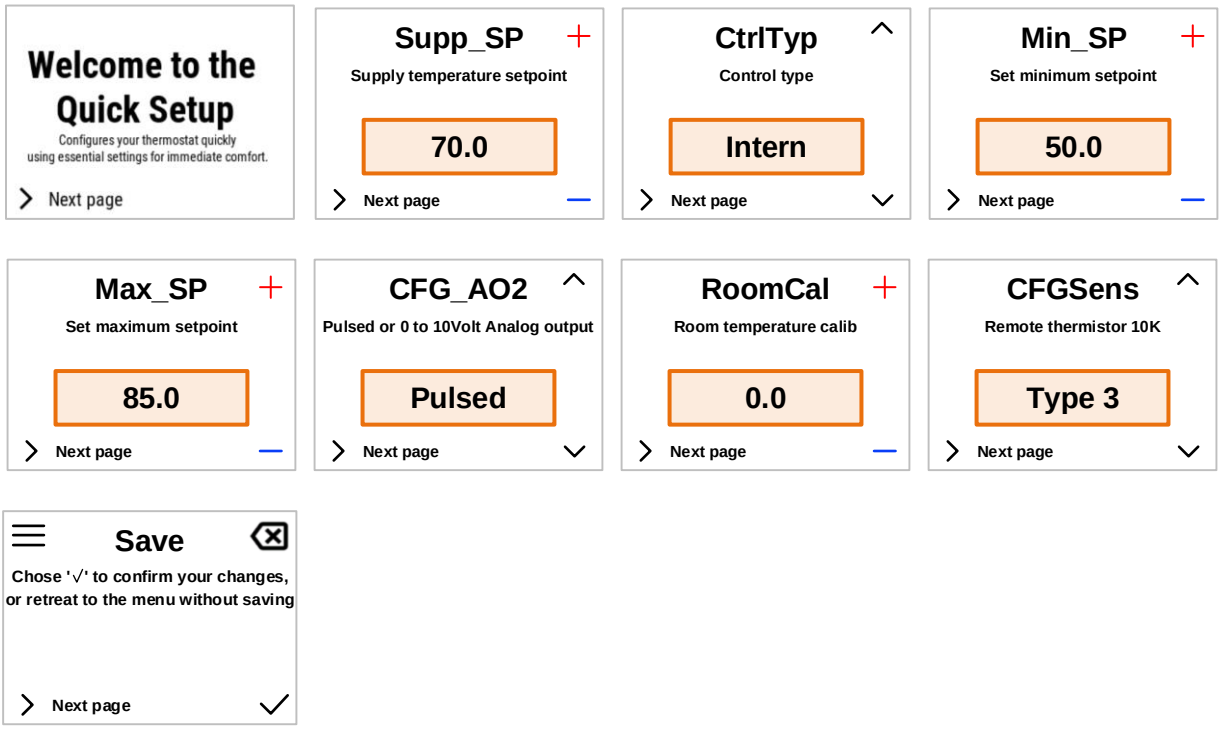




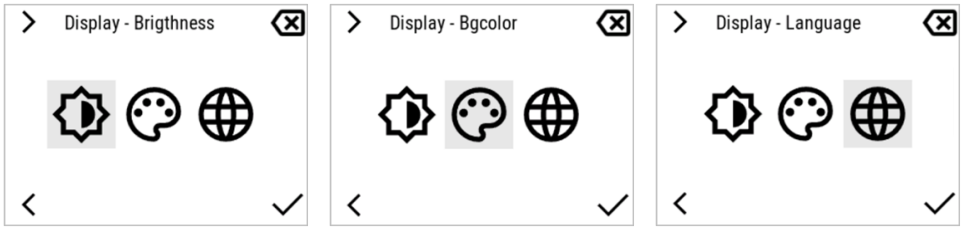
	Config - Quick Setup
	Display Configuration
	MSTP Communication Configuration
	Display Additional Information About The Thermostat
	Scroll Menu Choices
	Select
	Exit Menu

Setup Menu

3. Config – Quick Setup

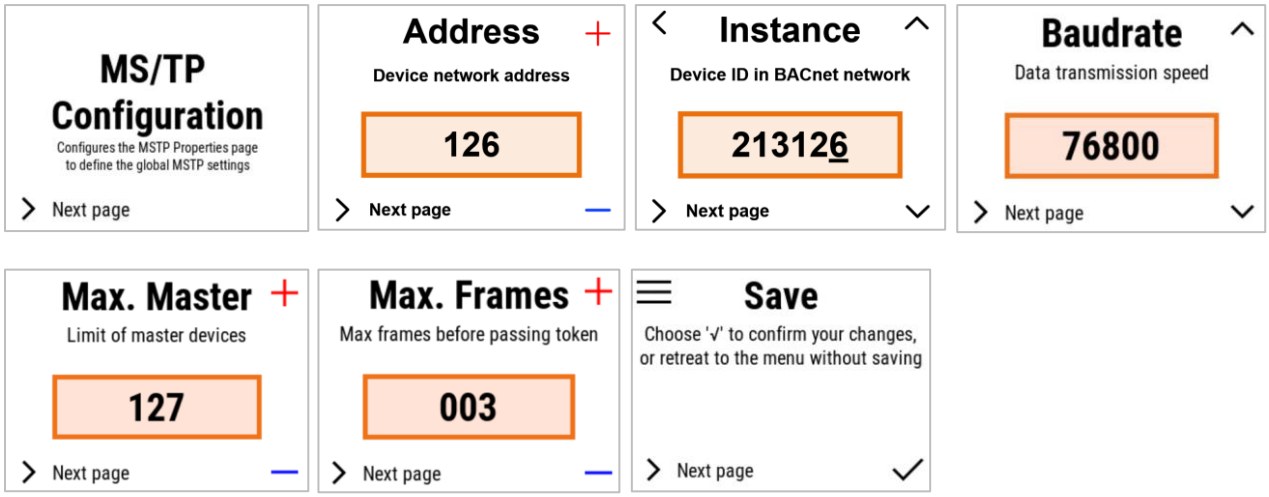


4. Config Display

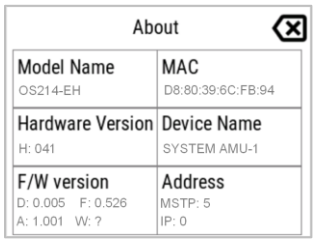


Setup Menu

5.  Config - MSTP Config



6.  Config – About



BACnet Objects

PHYSICAL INPUTS AND OUTPUTS

OBJECT INSTANCE	OBJECT NAME	DESCRIPTION	DEFAULT VALUE	TAGS	RANGE
AI-1	AI1_RemRoom	Remote room temperature sensor		Status	32-122°F
AI-2	AI2_Supply	Supply temperature sensor		Status	32-122°F
AI-6	RoomT	Internal room temperature sensor		Status	32-122°F
AO-1	BO_1	BO1 Pulsed 24AC output	0%	Status	
AO-2	AO_2	Pulsed or 0 to 10Volt Analog output	0%	Status	
BO-2	BO_2	Unused	Off	Status	
BO-3	BO_3	Unused	Off	Status	
BO-4	BO_4	Unused	Off	Status	



Objects tagged as Status represent objects or properties typically meant to be displayed on graphics for various required visualizations.

BACnet Objects

ANALOG VALUES (AV)

OBJECT INSTANCE	OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	RANGE
AV-1	RoomSetp	Room temperature setpoint	User	70°F	50-120°F
AV-2	Supp_SP	Supply temperature setpoint	Cfg	70°F	50-120°F
AV-4	Min_SP	Set minimum setpoint	Cfg	50°F	32-150°F
AV-5	Max_SP	Set maximum setpoint	Cfg	85°F	32-150°F
AV-14	RoomPB	Adjust room heating prop band	Cfg	5°F	1-10°F
AV-15	SupplyPB	Adjust supply heating prop band	Cfg	40°F	10-60°F
AV-16	RoomCal	Room temperature calib	Cfg	0°F	-5 to +5°F
AV-17	SuppCal	Supply temperature calib	Cfg	0°F	-5 to +5°F
AV-18	SensorFault	Sensor Fault Heating Setpoint	Cfg	0%	0-100%
AV-101	Htg_Dem	Heating demand (internal use)	Status	0%	0-100%
AV-110	Eff_SuppTemp	Supply temperature (Calibrated)	Status	---	---
AV-111	EffRoomT	Effective temp for ctrl (Calibrated)	Status	---	---
AV-202	memoryProgress	(internal use)	Status	---	---
AV-203	memoryBlock	(internal use)	Status	---	---

Please note that objects tagged as:

- **Cfg:** represents configuration properties of the device that are typically only set once during commissioning and start-up.
- **User:** represents properties or objects that users of the controller typically manipulate.
- **Status:** represent objects or properties typically meant to be displayed on graphics for various required visualizations.
- **Cmd:** represent objects that can be controlled directly by other BACnet external processes.

BACnet Objects

BINARY VALUES (BV)

OBJECT INSTANCE	OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	INACTIVE / ACTIVE TEXT
BV-100	SupplyTempAlarm	Supply Temperature Sensor Alarm	Status	Normal	Normal / Active

Please note that objects tagged as:

- **Cfg:** represents configuration properties of the device that are typically only set once during commissioning and start-up.
- **User:** represents properties or objects that users of the controller typically manipulate.
- **Status:** represent objects or properties typically meant to be displayed on graphics for various required visualizations.
- **Cmd:** represent objects that can be controlled directly by other BACnet external processes.

BACnet Objects

MULTI-STATE VALUES (MSV)

OBJECT INSTANCE	OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	STATE TEXTS
MSV-3	CtrlTyp	Control type	Cfg	Intern	Intern Supply Dual ExtBMS
MSV-5	CFGSens	Remote thermistor 10K	Cfg	Type 3	Type 3 Type 2
MSV-6	CFG_AO2	Pulsed or 0 to 10Volt Analog Output	Cfg	Pulsed	Pulsed Analog
MSV-200	Brightness	Brightness Control	Cfg	Med	Low Med-Low Med
MSV-201	BgColor	Background Color	Cfg	White	White Orange Blue Green Red
MSV-203	Language	Language selection	Cfg	English	English

Please note that objects tagged as:

- **Cfg:** represents configuration properties of the device that are typically only set once during commissioning and start-up.
- **User:** represents properties or objects that users of the controller typically manipulate.
- **Status:** represent objects or properties typically meant to be displayed on graphics for various required visualizations.
- **Cmd:** represent objects that can be controlled directly by other BACnet external processes.

BACnet Objects

LOOP(S)

OBJECT INSTANCE	OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	RANGE
LOOP-2	PidRoomT	Room temp heating control loop	Status	---	0-100%
LOOP-6	PidSuppT	Supply temp control loop	Status	---	0-100%

Network

MS/TP Wiring

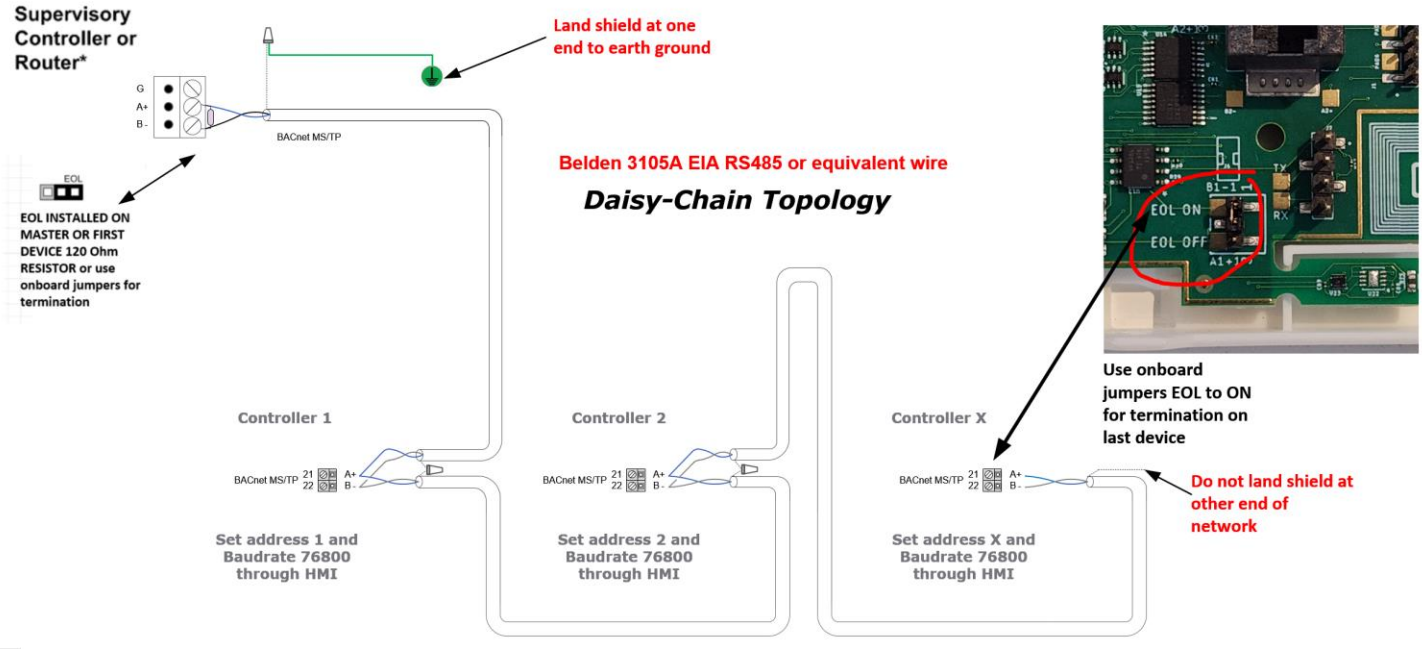
RS-485 Network Guidelines

The best way to ensure a robust and reliable RS-485 network is to build it around a daisy-chain configuration.

Connecting a multidrop 485 network.

The EIA RS-485 Specification labels the data wires "A" and "B", but many manufacturers label their wires "+" and "-". In our experience, the "+" wire should be connected to the "A" line, and the "-" wire should be connected to the "B" line. Reversing the polarity will not damage a 485 device but will not communicate. That being said, the rest is easy: always connect "+" to "+", and "-" to "-".

Do not forget the Signal Ground. *While a differential signal does not require a signal ground to communicate, the ground wire serves an important purpose. Over hundreds of thousands of feet, there can be significant differences in the voltage level of "ground". The function of the signal ground wire is to tie the signal ground of each node to one common ground. If the ground voltage rises above 3 VAC, data will be lost, and the port itself will often be damaged. However, if the differences in signal grounds are too great, further attention is necessary.*



Specifications

OS214-EH

OPENSTAT Electric Heat
BACnet MS/TP Controller

Strato Automation

OPENSTAT

Description

- Configurable wall or panel mount controller for electric duct heater applications
- Native BACnet MSTP enabled and ready with BTL certified as a B-ASC
- Room and or discharge air control application
- 0-10 Vdc, 10 Vdc pulsed or 24 Vac pulsed control of single stage modulating output
- Local interface for user setpoint control & configuration. Configuration can also be made through BACnet
- 4 I/O: 2 UI, 1 AO, 1 BO
- BACnet MS/TP: *B-BC BTL Certification (Pending)*



Application

The OS214-EH controller is designed to facilitate the control and management of custom electric resistive duct heater equipment typically used in the HVAC industry. It allows powerful solutions that can be configured according to any project needs. It features a very flexible I/O set capable of meeting electric heaters applications such as modulating small zone heaters, large staged heater systems, room and or discharge air control for central system control or make up air systems.

Technical Specifications

Power supply:
- 24 VAC/VDC ± 15%; Class 2

Current Consumption:
- 1.5 VA controller only
- 50 VA Max including BO 2A max

Communication Protocols:
- BACnet MS/TP half-wave device
- Baud 9600, 19200, 38400, 76800 Bps (76800 default) RS485 transceiver is a ¼ load device
- Mini USB2 MS/TP network access
- BTL listed: B-BC, BACnet Building Controller

Hardware
- Microprocessor: STM32 (ARM Cortex™ M33) 32 bits
- CPU Speed: 250 MHz
- Memory: 2 Mbytes non-volatile Flash
- RAM: 640 KB SRAM
- Real-time clock (RTC): Built-in capacitor (one-week backup)

Configuration
- Configurable using the local buttons, writing to the BACnet configuration objects or Strato Software tools.

Inputs:
2 temperature Inputs (AI)
- Thermistor 10KΩ (type 2 or 3)
- Resolution: 12 Bits (4096 segments)

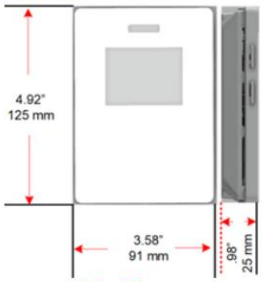
Outputs:
1 Binary Output
- MOSFET Solid State Relays, Isolated
- Zero cross-fired
- 10 to 30VAC, 2.0A max

1 Analog Outputs
- Voltage 0 - 10 VDC linear or pulsed

Mechanical:
- Dimensions: W 3.58"(91 mm) x H 4.92"(125 mm) x D 0.98"(25 mm)
- Stocking temperature: -30 °C to 50 °C / -22 °F to 122 °F
- Operating conditions: 0 °C to 50 °C / ...°F to 113 °F 10% to 90% H.R. without condensation
- Mounting type: Standard 2" x 4" electrical junction box
- Enclosure: White color, PCABS material UL94VO

Warranty: 1 Year

Certifications:
- UL 916 Energy Management Equipment
- BTL listed: B-BC, BACnet Building Controller



OS214-EH - Spec *sheet - Oct 2024 rev 0.docx*

Designed and assembled in CANADA

End User Operation Guide



Increase Temperature Setpoint

Decrease Temperature Setpoint

Normal display:

	System Status: *No Heating* / *Heating*
	BACnet MSTP communication is connected.