Strato Automation



OPEN STAT

Product Description

I/O: 2 AI's, 1 AO & 4 BO's

Temperature

BACnet MSTP

Applications:

Single stage RTU, HP, FCU

Ref: Firmware version 1.0.4 and higher

Model Information

MODEL	TEMP	Wi-Fi
OS214	X	
OS214W	X	X

Quick links:

- Select between RTU or FCU
- Rooftop Unit (RTU)
- Setup Menu
- Fan Coil Unit (FCU)
- Setup Menu
- Network
- Specifications
- End User Operation Guide

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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

Cybersecurity

The Strato Automation OS214 series controllers present a low cybersecurity risk profile due to their streamlined design. These devices do not store, process, or transmit sensitive customer or enterprise data. All communications use standard open building automation protocols (BACnet/IP and BACnet MS/TP), which are not intended to carry confidential information.

Cybersecurity considerations for the OS214 therefore focus on network-level protection rather than device-level defenses. Recommended best practices include deploying the controllers on segmented building automation networks, restricting unnecessary access, and conforming to site-specific IT security policies. By design, the OS214 minimizes exposure, delivering reliable operation without adding unnecessary cybersecurity complexity.

Compliance

ISED non-interference disclaimer

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

This device complies with the Canadian ICES-003 Class A specifications. CAN ICES-003(A) / NMB-003 (A).

ISED RF Exposure statement

This equipment complies with ISED RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm (7.9 inches) between the radiator and any part of your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

J.2 Restrictions

a. Except as allowed in J.2(b), devices are only to be used when the aircraft is on the ground.

b. Devices used in-flight are subject to the following restrictions:

i. they shall be used within closed, exclusive on-board, communication networks within the aircraft

ii.they shall not be used in wireless avionics intra-communication (WAIC) applications where external structural sensors or external cameras are mounted on the outside of the aircraft structure

iii.they shall not be used on aircraft equipped with a body/fuselage that provides little or no RF attenuation except when installed on unmanned air vehicles (UAVs) and complying with J.2(d)

iv.devices operating in the 59.3-71.0 GHz band shall not be used except if they meet all of the following conditions:

1. they are FDS
2. they are installed within personal portable electronic devices
3. they comply with the relevant requirements in J.3.2(a), J.3.2(b) and J.3.2(c)

FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation. Please note that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

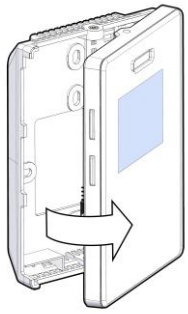
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC RF Exposure Statement

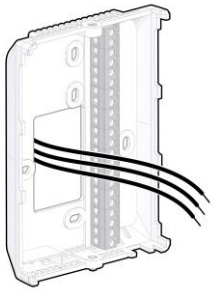
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, this equipment should be installed and operated with minimum distance 20 cm (7.9 inches) between the antenna and your body during normal operation. Users must follow the specific operating instructions for satisfying RF exposure compliance.

Installation

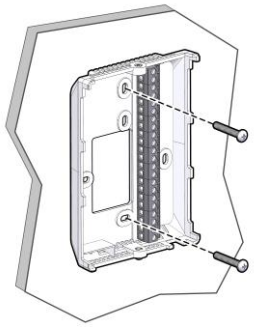
1. After unpacking your Openstat, gently pull away from the base using the left side of the front cover.



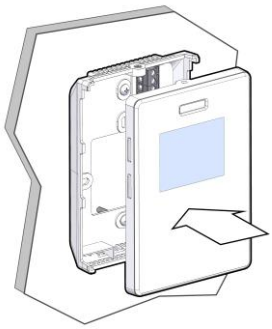
2. Pull the wires through the hole in the base.



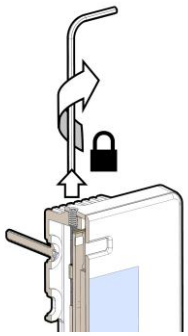
3. Use 2 screws to attach the base to the wall.



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.



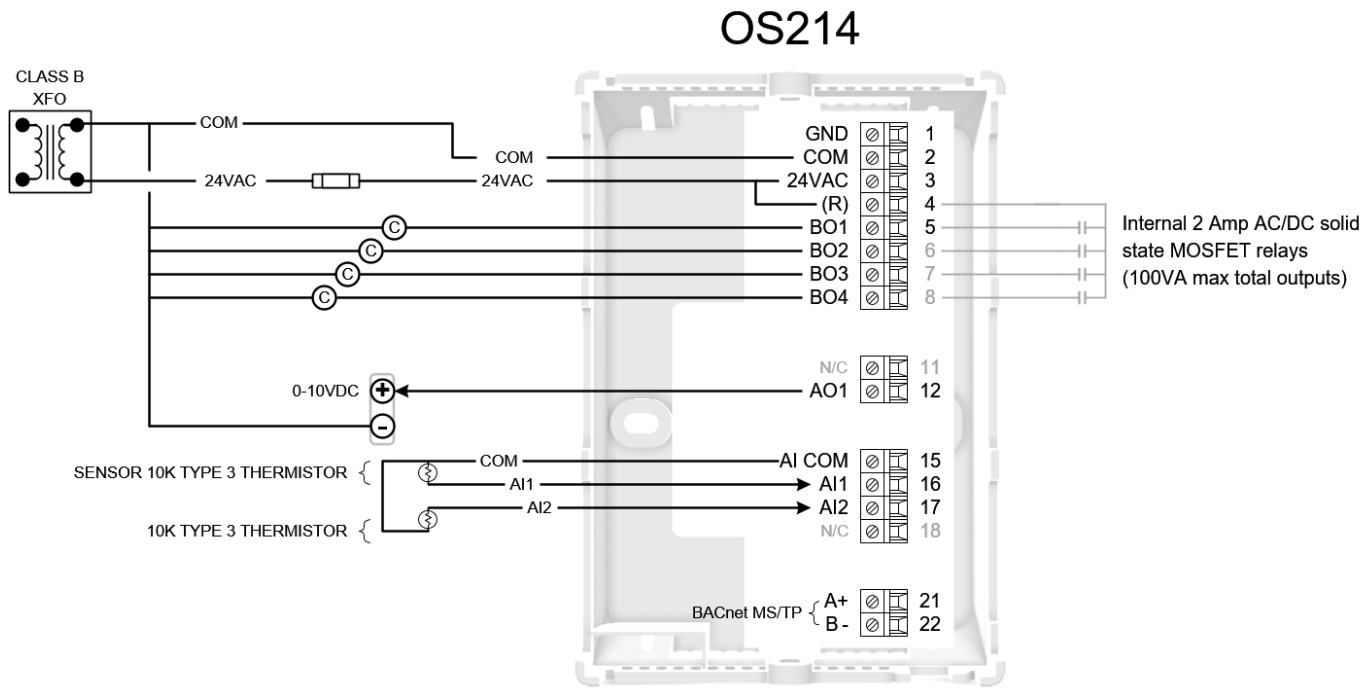
Electronic controls are static sensitive devices; discharge yourself properly before manipulating and installing the device.

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

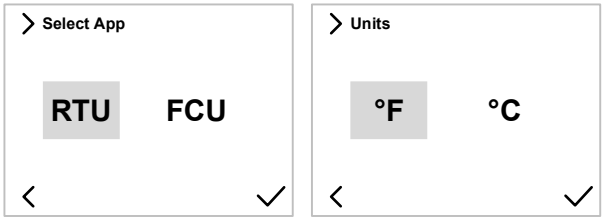


Add a 24VAC transformer when the equipment does not supply the power.

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

Select between RTU or FCU

At first power-up, the following menus will appear. This will create all default BACnet objects for a RTU or a FCU in °F or °C:



To reinitialize the controller to factory settings (completely reset system settings and network settings) and will display again RTU/FCU selection:

1) Disconnect power
2) Hold these 3 buttons
3) Reconnect power
4) Keep holding buttons until the full red circle is complete



Rooftop Unit (RTU)

Wiring

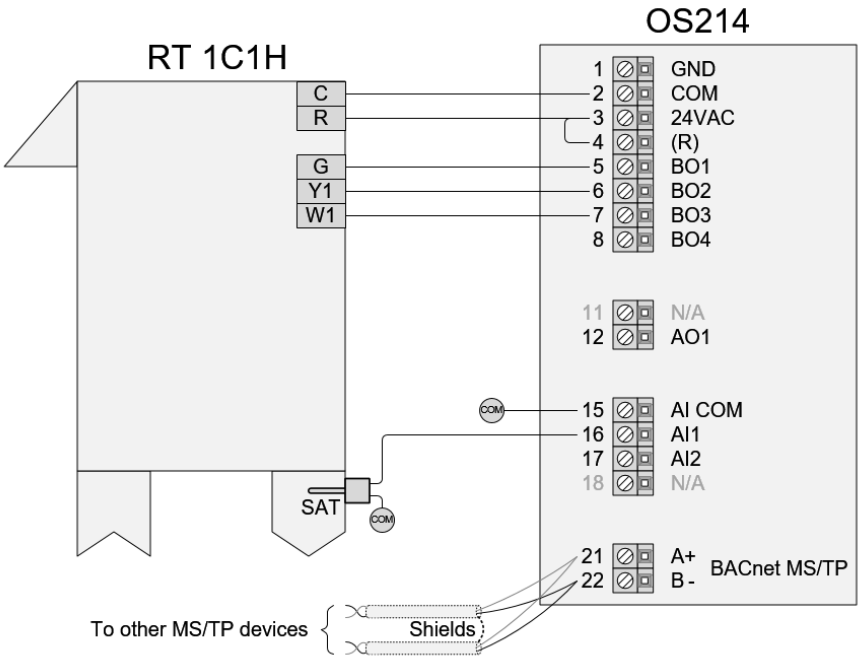
RTU Select Your Equipment

RT 1C1H	Rooftop 1 Cool 1 Heat (RT 1C1H)
RT 2C1H	Rooftop 2 Cool 1 Heat (RT 2C1H)
RT ECON	Rooftop with full control of the economizer
HP 1C2H	Heat Pump 1 Cool 2 Heat (HP 1C2H)
RT MOD	Rooftop with 0-10VDC SCR electric heating
RT MOD	Rooftop with 0-10VDC SCR electric heating
RT ECM	Rooftop with 0-10VDC Variable Fan Speed Control
HP ECM	Heat Pump with 0-10VDC Variable Fan Speed Control

Connector	I/O id	BACnet Name	RT 1C1H	RT 2C1H	RT ECON	HP 1C2H	RT MOD	RT ECM	HP ECM
1	GND								
2	COM								
3	24V								
4	(R)								
5	BO1	BO_1	G	G	G	G	G	G	G
6	BO2	BO_2	Y1	Y1	Y1	Y1	Y1	Y1	Y1
7	BO3	BO_3	W1	Y2	Y2	W1 (Aux)	Y2	Y2	W1 (Aux)
8	BO4	BO_4		W1	W1	O/B (O)	W1	W1	O/B (O)
11	n/a								
12	AO1	AO_1			Econo		W2 (0-10V)	FAN 0-10Vdc	FAN 0-10Vdc
15	AI COM								
16	AI1	AI_1	SAT	SAT	SAT	SAT	SAT	SAT	SAT
17	AI2	AI_2			OAT	OAT			OAT
18	n/a								
21	A+ MS/TP								
22	B- MS/TP								

Rooftop Unit (RTU) – Wiring

Rooftop 1 Cool 1 Heat (RT 1C1H)



RT 1C1H: Sets for an on/off fan, 1 on/off cooling stages & 1 on/off heat RTU unit

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

Sequence of operation

Occupied Mode: Setpoints will revert to those defined by occupied cooling and heating setpoints.

Occupied Override Mode: The system will revert to occupied mode for the duration determined by the "OvrTime_Set AV27" parameter.

On a call for cooling / System mode is Cooling or Auto: Cooling stages will be energized according to cooling demand AV7 as per % threshold values to maintain room temperature. Heating outputs are not energized.

On a call for heating / System mode is Heating or Auto: Heating stages will be energized according to heating demand AV6 as per % threshold values to maintain room temperature. Cooling outputs are not energized.

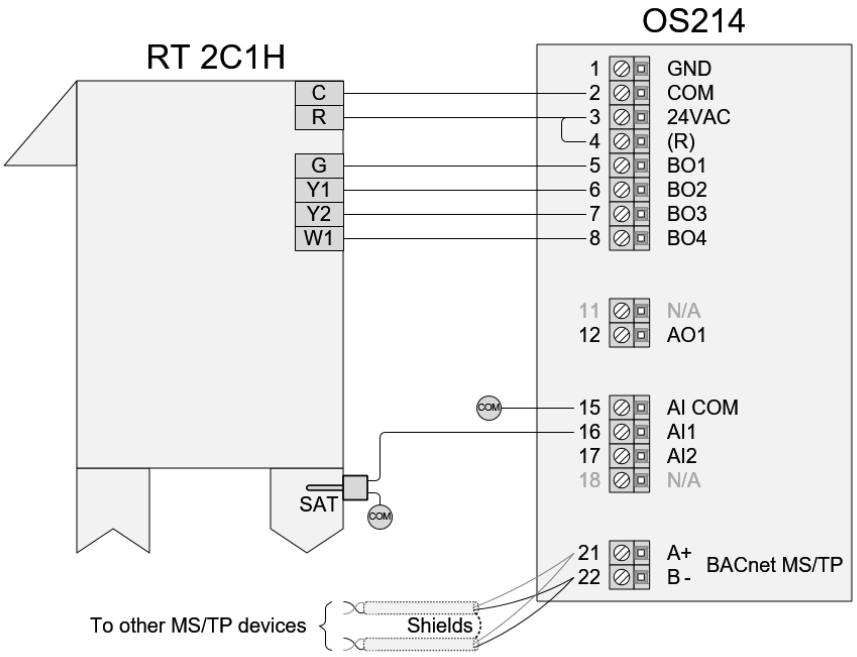
Fan operation: The fan will follow the fan mode setting (MSV4 Fan Mode) in occupied mode. Fan On will make the fan run continuously during occupied hours. Fan Auto will only energize the fan on a call for a heating or cooling stage to be energized.

Note: Fan needs to be running 1 minute before cooling or heating stages can be energized. There is 3 minutes anti-cycling OFF delay on cooling and heating stages. There is 3 minutes delay if switching from cooling stages to heating stages (and vice versa). Also a 1 minute delay between each stage.

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

Rooftop Unit (RTU) – Wiring

Rooftop 2 Cool 1 Heat (RT 2C1H)



RT 2C1H: Sets for an on/off fan, 2 on/off cooling stages & 1 on/off heat RTU unit

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

Sequence of operation

Occupied Mode: Setpoints will revert to those defined by occupied cooling and heating setpoints.

Occupied Override Mode: The system will revert to occupied mode for the duration determined by the "OvrTime_Set AV27" parameter.

On a call for cooling / System mode is Cooling or Auto: Cooling stages will be energized according to cooling demand AV7 as per % threshold values to maintain room temperature. Heating outputs are not energized.

On a call for heating / System mode is Heating or Auto: Heating stages will be energized according to heating demand AV6 as per % threshold values to maintain room temperature. Cooling outputs are not energized.

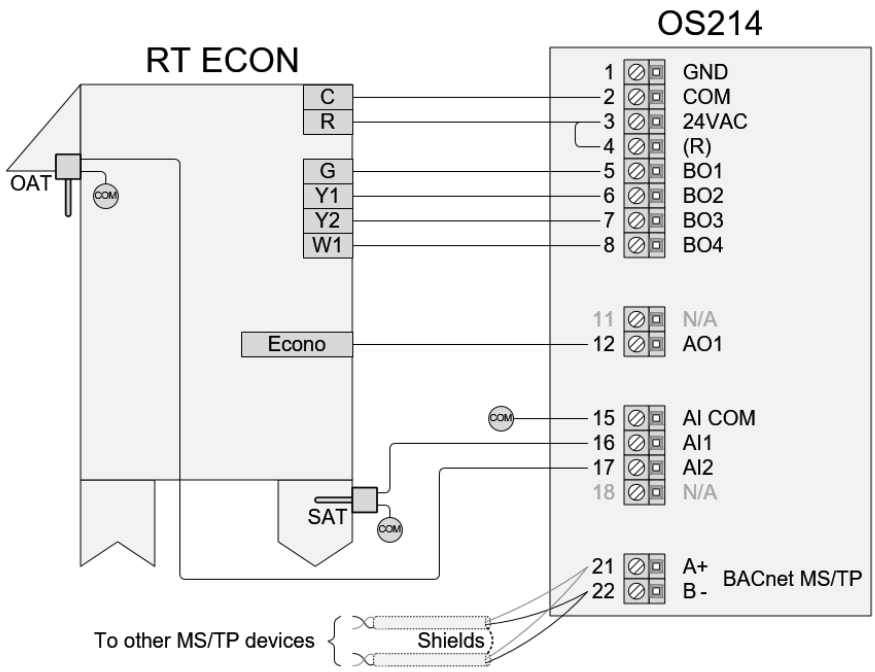
Fan operation: The fan will follow the fan mode setting (MSV4 Fan Mode) in occupied mode. Fan On will make the fan run continuously during occupied hours. Fan Auto will only energize the fan on a call for a heating or cooling stage to be energized.

Note: Fan needs to be running 1 minute before cooling or heating stages can be energized. There is 3 minutes anti-cycling OFF delay on cooling and heating stages. There is 3 minutes delay if switching from cooling stages to heating stages (and vice versa). Also a 1 minute delay between each stage.

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

Rooftop Unit (RTU) – Wiring

Rooftop with Economizer (RT ECON)



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

RT 2STG: Sets for an on/off fan, one on/off heat & two on/off cooling stages RTU unit plus modulating fresh air damper.

Sequence of operation

Occupied Mode: Setpoints will revert to those defined by occupied cooling and heating setpoints.

Occupied Override Mode: The system will revert to occupied mode for the duration determined by the "OvrTime_Set AV27" parameter.

On a call for cooling / System mode is Cooling or Auto and OAT > the economizer changeover value: Cooling stages will be energized according to cooling demand AV7 as per % threshold values to maintain room temperature. Heating outputs are not energized.

On a call for cooling / System mode is Cooling or Auto and OAT < the economizer changeover value: Cooling stages will not be energized. Cooling will be provided by modulating the economizer's minimum position according to cooling demand AV7. The supply temperature will be modulated between the SAT_CTR_Set setpoint AV57 and the low limit setpoint SAT_LL_Set AV58.

On a call for heating / System mode is Heating or Auto: Heating stages will be energized according to heating demand AV6 as per % threshold values to maintain room temperature. Cooling outputs are not energized.

Fan operation: The fan will follow the fan mode setting (MSV4 Fan Mode) in occupied mode. Fan On will make the fan run continuously during occupied hours. Fan Auto will only energize the fan on a call for a heating or cooling stage to be energized.

Note: Fan needs to be running 1 minute before cooling or heating stages can be energized. There is 3 minutes anti-cycling OFF delay on cooling and heating stages. There is 3 minutes delay if switching from cooling stages to heating stages (and vice versa). Also a 1 minute delay between each stage.

Rooftop Unit (RTU) – Wiring

Economizer Dry Bulb Sequence of Operation

The economizer is enabled to utilize free cooling, and there is a call for cooling if the outside air temperature is greater than the

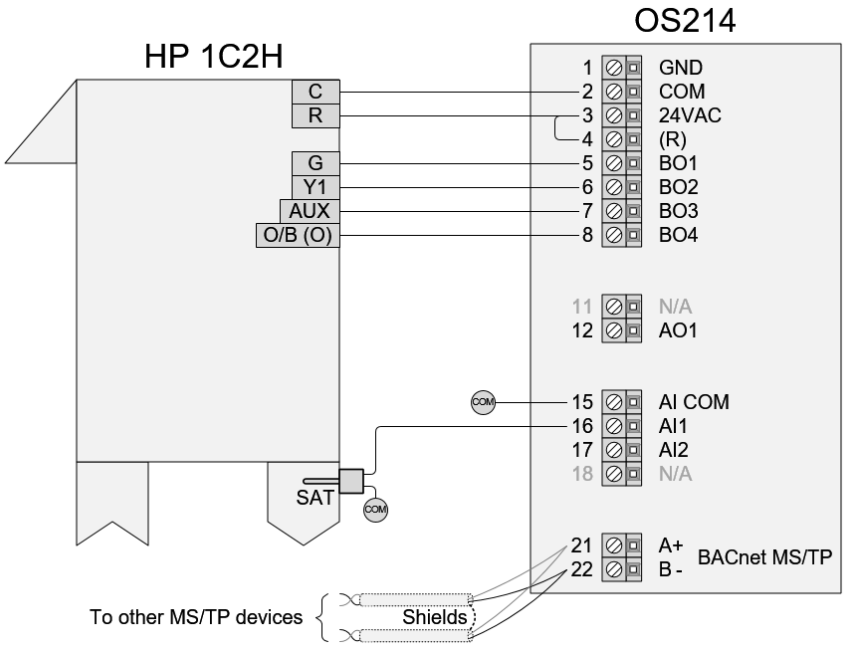
OAT EconoAuthorization setpoint. *OATeconOutAuth AV-68*.

When the control type is set to Off-Auto and the economizer is enabled, the output will energize the manufacturer's equipment economizer control.

When the control type is set for Modulating, the controller will modulate the outside air damper from minimum to 100% to maintain the *Minimum Supply Setpoint* SAT_LL_Set AV-58 at 100% demand call. When the demand call is 0%, the economizer will be set Off or Modulated to maintain the *Neutral Supply Setpoint* SAT_CTR_Set AV-57.

Rooftop Unit (RTU) – Wiring

Heat Pump 1 Cool 2 Heat (HP 1C2H)



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

HP 1STG: Sets for an on/off fan, 1 on/off heat pump, 1 on/off auxiliary, 1 reversing valve HEATPUMP unit.

Sequence of operation

Occupied Mode: Setpoints will revert to those defined by occupied cooling and heating setpoints.

Occupied Override Mode: The system will revert to occupied mode for the duration determined by the "OvrTime_Set AV27" parameter.

On a call for cooling / System mode is Cooling or Auto and OAT > the economizer changeover value: Reversing valve will be set in cooling (default O setting). HPump stages will be energized according to cooling demand AV7 as per % threshold values to maintain room temperature. Heating outputs are not energized.

On a call for cooling / System mode is Cooling or Auto and OAT < the economizer changeover value: Heat pump stages will not be energized. Cooling will be provided by modulating the economizer's minimum position according to cooling demand AV7. The supply temperature will be modulated between the economizer center setpoint AV57 and the low limit setpoint AV58.

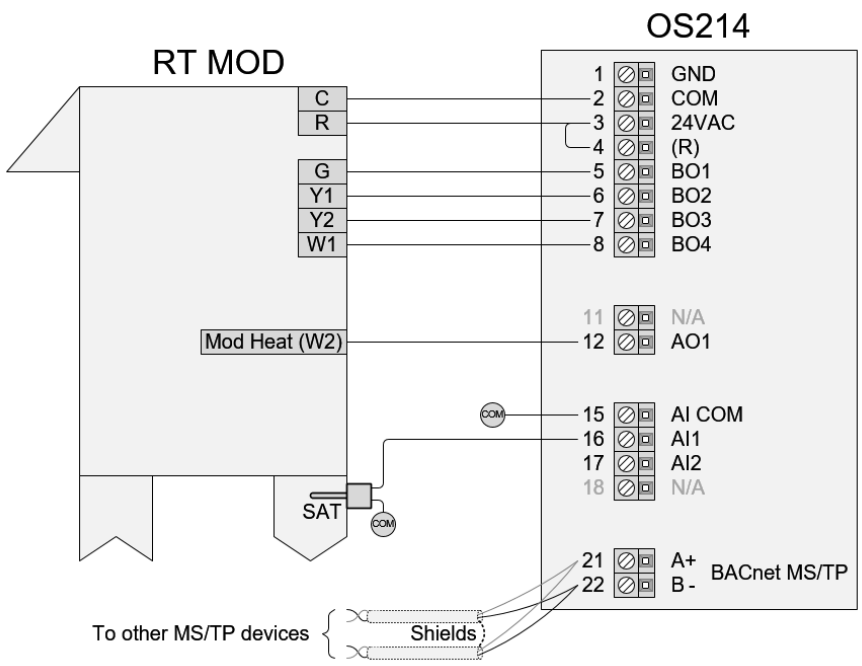
On a call for heating / System mode is Heating or Auto: The reversing valve will be set in heating / non-energized (default O setting). Heat pump stages will be energized according to heating demand AV6 as per % threshold values to maintain room temperature.

Fan operation: The fan will follow the fan mode setting (MSV4 Fan Mode) in occupied mode. Fan On will make the fan run continuously during occupied hours. Fan Auto will only energize the fan on a call for a heating or cooling stage to be energized.

Note: Fan needs to be running 1 minute before cooling or heating stages can be energized. There is 3 minutes anti-cycling OFF delay on cooling and heating stages. There is 3 minutes delay if switching from cooling stages to heating stages (and vice versa). Also a 1 minute delay between each stage.

Rooftop Unit (RTU) – Wiring

Rooftop with 0-10VDC SCR electric heating (RT MOD)



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

RT MOD: Sets for an on/off fan, 1 on/off heat, 2 on/off cooling stages with 0-10 VDC heating RTU unit.

Rooftop Unit (RTU) – Wiring

Sequence of operation

Occupied Mode: Setpoints will revert to those defined by occupied cooling and heating setpoints.

Occupied Override Mode: The system will revert to occupied mode for the duration determined by the "OvrTime_Set AV27" parameter.

On a call for cooling / System mode is Cooling or Auto: Cooling stages will be energized according to cooling demand AV7 as per % threshold values to maintain room temperature. Heating outputs are not energized.

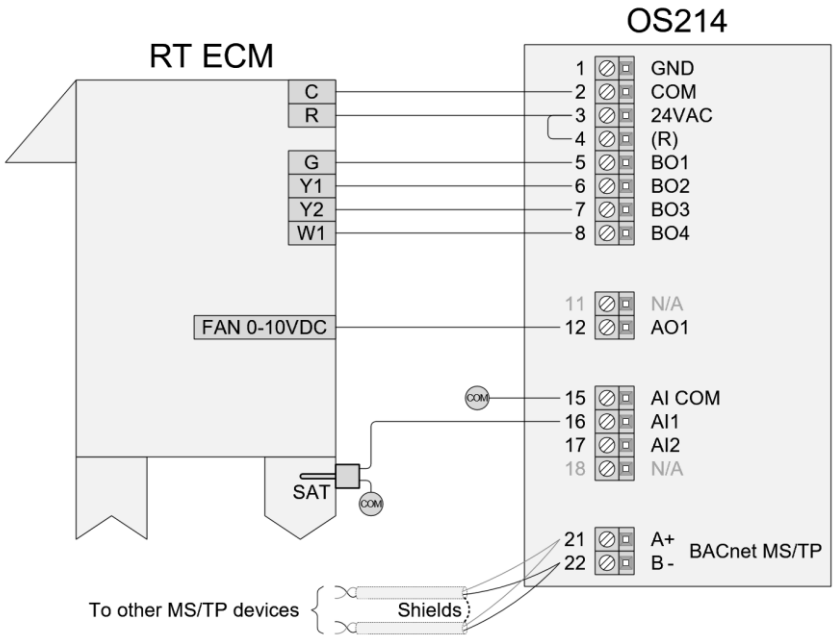
On a call for heating / System mode is Heating or Auto: Modulating heating output and On/Off stage(s) will energize as per % threshold according to heating demand AV6 values to maintain room temperature. Cooling outputs are not energized.

Fan operation: The fan will follow the fan mode setting (MSV4 Fan Mode) in occupied mode. Fan On will make the fan run continuously during occupied hours. Fan Auto will only energize the fan on a call for a heating or cooling stage to be energized.

Note: Fan needs to be running 1 minute before cooling or heating stages can be energized. There is 3 minutes anti-cycling OFF delay on cooling and heating stages. There is 3 minutes delay if switching from cooling stages to heating stages (and vice versa). Also a 1 minute delay between each stage.

Rooftop Unit (RTU) – Wiring

Rooftop with 0-10VDC Variable Fan Speed Control (RT ECM)



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

RT VFD: Sets for a 0-10VDC fan, one on/off heat, two on/off cooling stages RTU unit.

Sequence of operation

Occupied Mode: Setpoints will revert to those defined by occupied cooling and heating setpoints.

Occupied Override Mode: The system will revert to occupied mode for the duration determined by the "OvrTime_Set AV27" parameter.

On a call for cooling / System mode is Cooling or Auto: Cooling stages will be energized according to cooling demand AV7 as per % threshold values to maintain room temperature. Heating outputs are not energized.

On a call for heating / System mode is Heating or Auto: Modulating heating output and On/Off stage(s) will energize as per % threshold according to heating demand AV6 values to maintain room temperature. Cooling outputs are not energized.

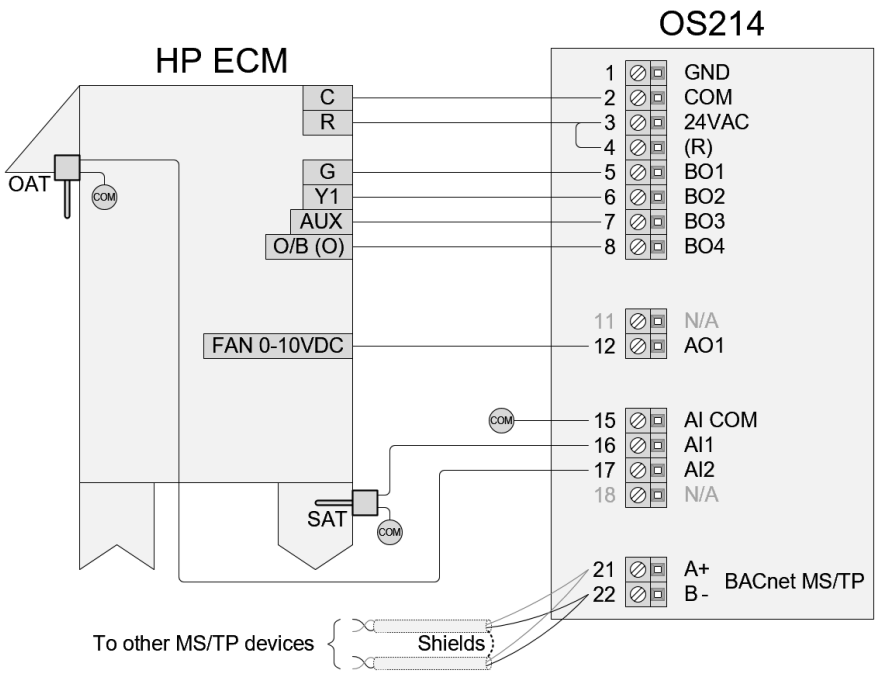
Fan operation: The fan will follow the fan mode setting (MSV4 Fan Mode) in occupied mode. Fan On will make the fan run continuously during occupied hours. Fan Auto will only energize the fan on a call for a heating or cooling stage to be energized.

Fan speed operation: When the fan start it will run according to ECM_min_Set (AV-21) and will increase progressively its speed up to 100% according to CLG_Dem (AV-7) or HTG_Dem (AV-6).

Note: Fan needs to be running 1 minute before cooling or heating stages can be energized. There is 3 minutes anti-cycling OFF delay on cooling and heating stages. There is 3 minutes delay if switching from cooling stages to heating stages (and vice versa). Also a 1 minute delay between each stage.

Rooftop Unit (RTU) – Wiring

Heat Pump with 0-10VDC Variable Fan Speed Control (HP ECM)



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

RT MOD: Sets for an on/off fan, 1 on/off heat, 2 on/off cooling stages with 0-10 VDC heating RTU unit.

Sequence of operation

Occupied Mode: Setpoints will revert to those defined by occupied cooling and heating setpoints.

Occupied Override Mode: The system will revert to occupied mode for the duration determined by the "OvrTime_Set AV27" parameter.

On a call for cooling / System mode is Cooling or Auto: Cooling stages will be energized according to cooling demand AV7 as per % threshold values to maintain room temperature. Heating outputs are not energized.

On a call for heating / System mode is Heating or Auto: Modulating heating output and On/Off stage(s) will energize as per % threshold according to heating demand AV6 values to maintain room temperature. Cooling outputs are not energized.

Fan operation: The fan will follow the fan mode setting (MSV4 Fan Mode) in occupied mode. Fan On will make the fan run continuously during occupied hours. Fan Auto will only energize the fan on a call for a heating or cooling stage to be energized.

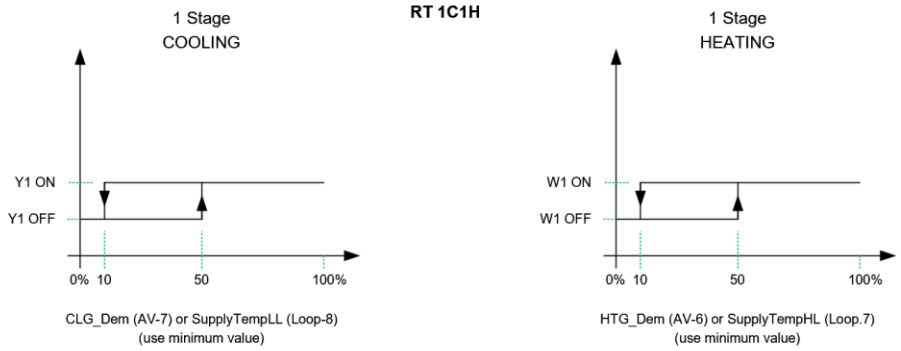
Fan speed operation: When the fan start it will run according to ECM_min_Set (AV-21) and will increase progressively its speed up to 100% according to CLG_Dem (AV-7) or HTG_Dem (AV-6).

Note: Fan needs to be running 1 minute before cooling or heating stages can be energized. There is 3 minutes anti-cycling OFF delay on cooling and heating stages. There is 3 minutes delay if switching from cooling stages to heating stages (and vice versa). Also a 1 minute delay between each stage.

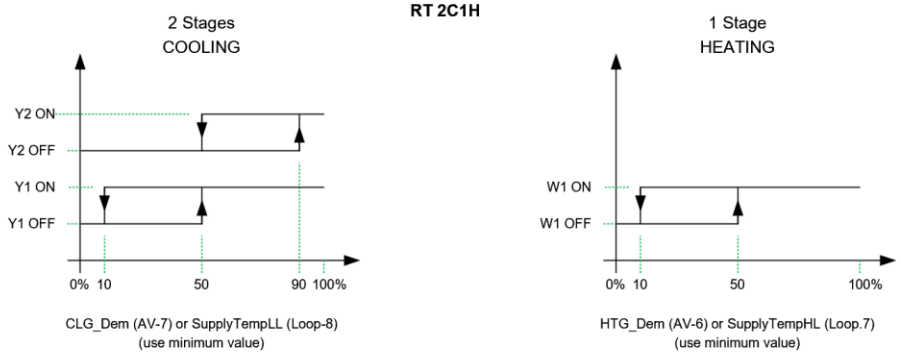
Rooftop Unit (RTU) – Wiring

RTU Control Curves

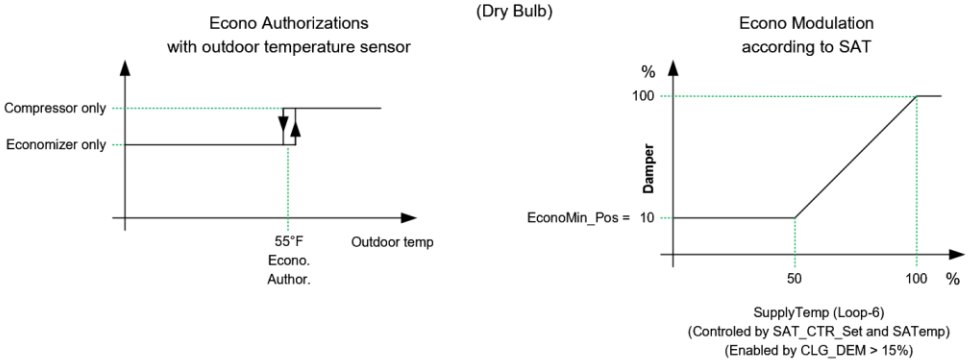
RT 1C1H



RT 2C1H

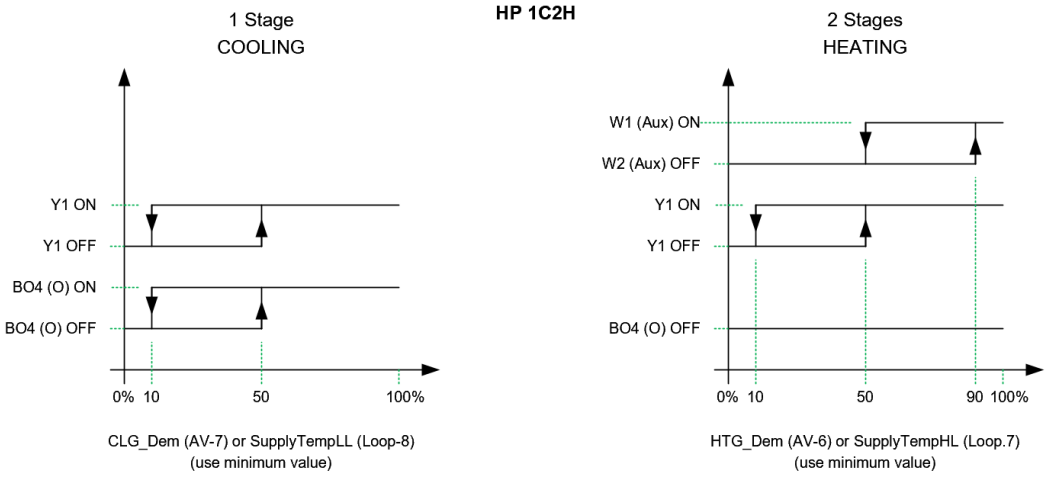


RT ECON
(Dry Bulb)

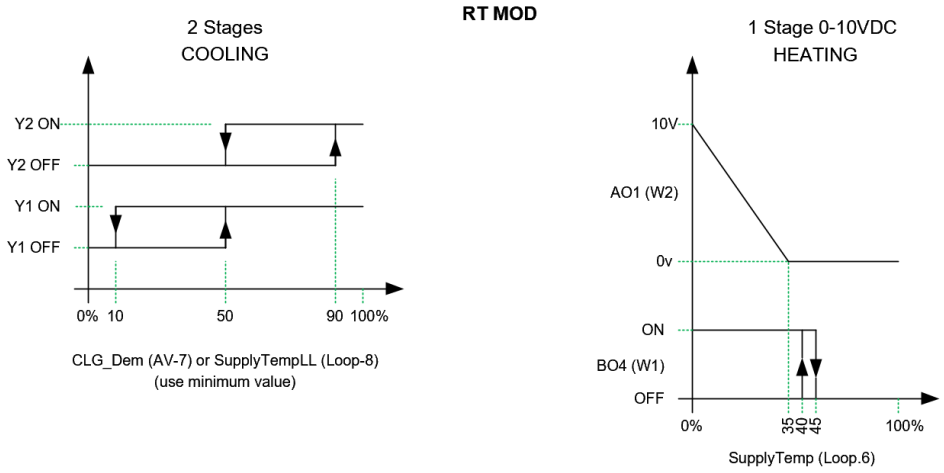


Rooftop Unit (RTU) – Wiring

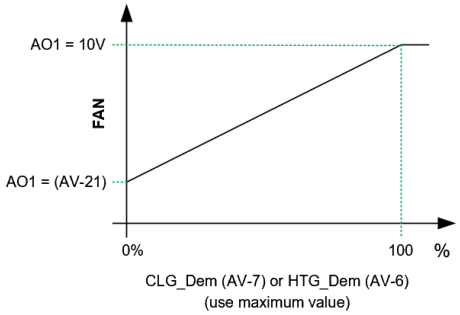
HP 1C2H



RT MOD



RT ECM
and
HP ECM

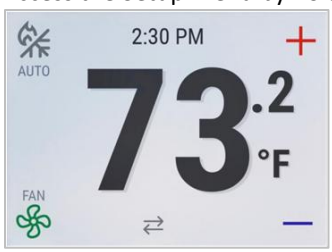


Rooftop Unit (RTU)

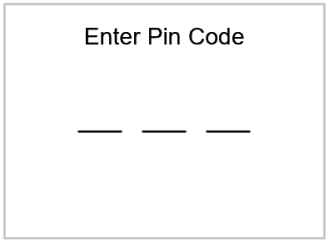
SETUP

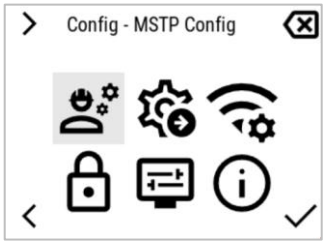
Setup Menu

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

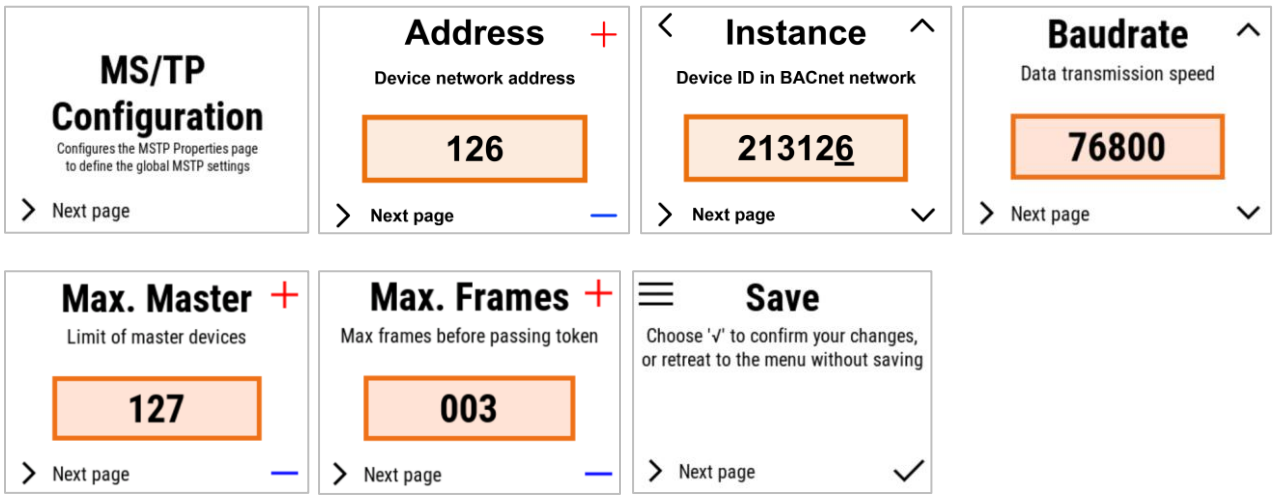




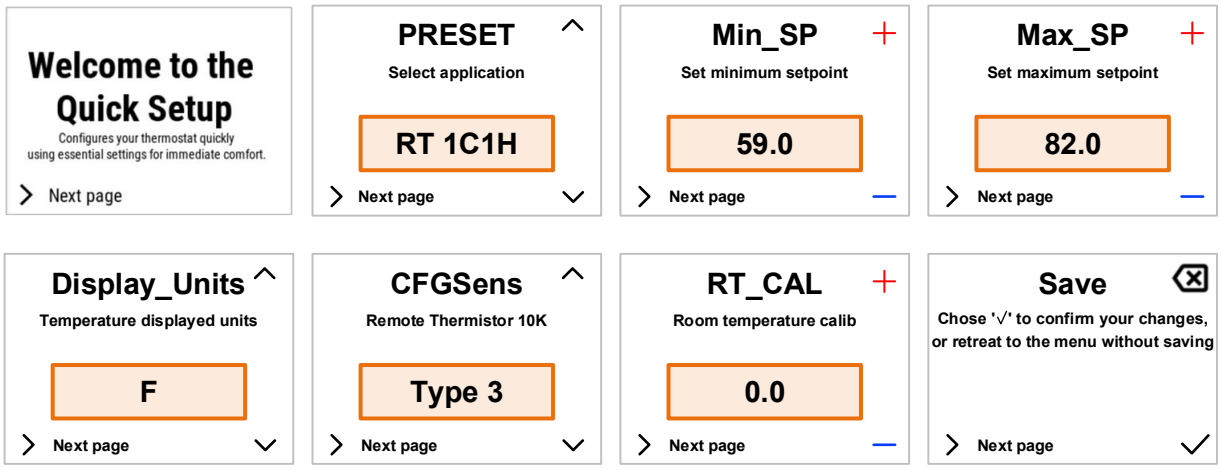
	MSTP Communication Configuration
	Quick RTU Application Setup
	WIFI Configuration
	Buttons Lock Configuration
	Display Configuration
	Display Additional Information About The Thermostat
	Scroll Menu Choices
	Select
	Exit Menus

Rooftop Unit (RTU)

3.  Config - MSTP Config



4.  Config – Quick Setup

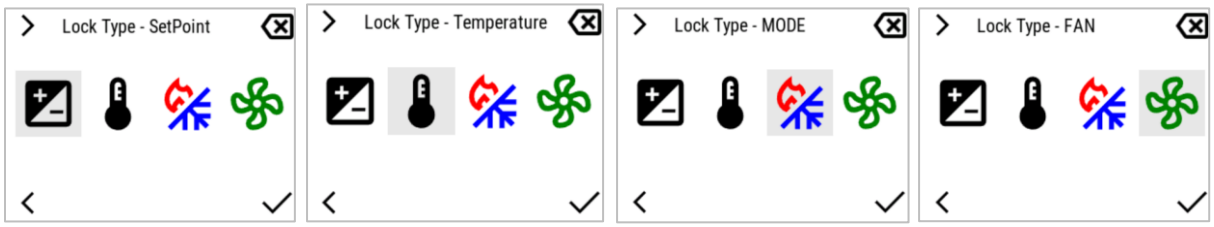


Rooftop Unit (RTU)

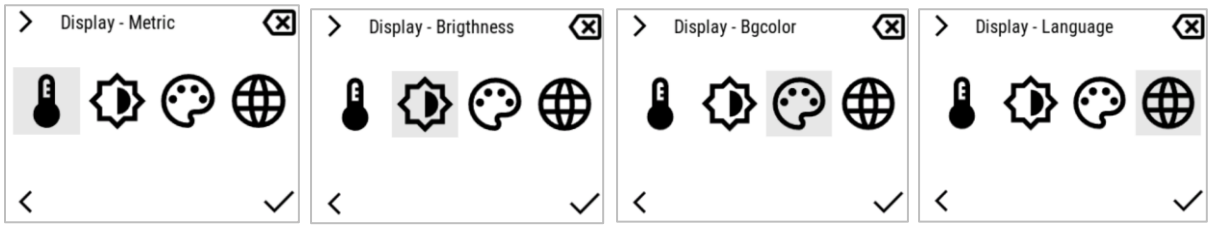
5. Config – WIFI Settings *(Only available for WIFI models)*



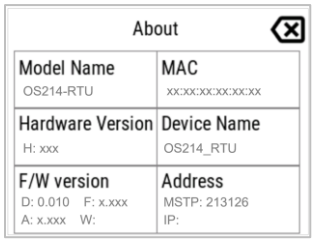
6. Config - Lock Type



7. Config Display



8. Config – About



Rooftop Unit (RTU)

BACnet Objects

Overview

GREEN = Important No Color = Optional depending on equipment

Recommended: MSVs and AV(s) write at default priority (16), everything else priority 8 to 3

Quick Setup: Presets, units, and service inputs
- **MSV-1** 10K remote sensor type
- **MSV-127** Application preset (see the user guide for configurations and I/O)

Fan: Output location and control type
- **MSV-27** Output location and control type
- **AV-21** ECM minimum speed
- **AV-24** Minimum on time

Heating: Stage configuration
- **MSV-16 thru 17** W1 thru W2 control type
- **AV-56** Maximum supply set point at 100% heating demand
- **AV-57** Neutral supply set point

Cooling: Stage configuration
- **MSV-7 thru 8** Y1 thru Y2 control type
- **AV-58** Minimum supply set point at 100% cooling demand

Temperature: Sensor locations and set points
- **MSV-2** Room temperature sensor location
- **MSV-27** Outdoor air temperature sensor location
- **MSV-28** Supply air temperature sensor location
- **MSV-62** Determines how AV-37 deadband is applied to AV-1 set point
- **AV-1** Room temperature set point
- **AV-19** Supply freeze set point
- **AV-33** Minimum cooling set point (AV-1)
- **AV-34** Maximum heating set point (AV-1)
- **AV-37** Room temperature deadband
- **AV-38** Unoccupied cooling set point
- **AV-39** Unoccupied heating set point
- **AV-67** Aux. heating authorization OAT set point

Economizer: Control type and setpoints
- **MSV-30** Output location and control type
- **AV-60** Compressor lockout outdoor air temperature setpoint
- **AV-65** Economizer minimum position
- **AV-68** Economizer authorization OAT set point

Override: Timer
- **AV-27** Button override time
- **MSV-44** Optional override remote input

Scheduler: Schedule location
- **MSV-45** Schedule location

PID Loops:
- **Loop-1** Cooling PID
- **Loop-2** Heating PID
- **Loop-6** Supply PID
- **Loop-7** Supply high-limit PID
- **Loop-8** Supply low-limit PID

General Operation and Monitoring: Occupancy, status, and set points
- **MSV-3** System mode (heat, cool, auto, off)
- **MSV-4** Fan mode (auto, on)
- **MSV-100** Help message (alarm status)
- **BV-5** Occupancy schedule (can write to for occupancy)
- **AV-1** Room temperature set point
- **AV-6** Heating demand
- **AV-7** Cooling demand
- **AV-9** Effective room temperature
- **AV-16** Supply air temperature
- **AV-29** Outdoor air temperature
- **AV-42** Effective cooling set point
- **AV-43** Effective heating set point

Input and Outputs: Status for inputs and overrides outputs
- **AI-1 thru AI-5** Analog/binary inputs (read-only)
- **AO-1 thru AO-4** Analog outputs
- **BO-1 thru BO-7** Binary outputs

Rooftop Unit (RTU)

Physical Inputs and Outputs

OBJECT INSTANCE	RTU OBJECT NAME	DESCRIPTION	DEFAULT VALUE	TAGS	RANGE
BO-1	BO_1	***1**	Off	Status	Dependent on MSV-127 config
BO-2	BO_2	***1**	On	Status	Dependent on MSV-127 config
BO-3	BO_3	***1**	Off	Status	Dependent on MSV-127 config
BO-4	BO_4	***1**	Off	Status	Dependent on MSV-127 config
AO-1	AO_1	***1**	0%	Status	Dependent on MSV-127 config
AI-1	AI_1	***2**		Status	Dependent on many MSV choices
AI-2	AI_2	***2**		Status	Dependent on many MSV choices
AI-6	RoomT	Room temperature	---	Status	32-122°F (0-50°C)

***1** The configuration of MSV-127 automatically generates BACnet object descriptions for all the BOs and AOs and will refresh automatically when BV-4 = On.*

***2** BACnet object descriptions will be autogenerated according to miscellaneous MSV choices selected (when BV-4 = On)*

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

Rooftop Unit (RTU) – BACnet Objects

Analog Values (AV)

OBJECT INSTANCE	RTU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	RANGE
AV-1	RoomTSP	Room Temperature setpoint	User	72°F (22°C)	54-90°F (12-32°C)
AV-6	HTG_Dem	Heating demand	Status	---	0-100%
AV-7	CLG_Dem	Cooling demand	Status	---	0-100%
AV-9	Eff_T	Effective temperature used for control	Status	---	-40-122°F (-40-50°C)
AV-16	SATemp	Supply temperature	Status	---	-40-122°F (-40-50°C)
AV-19	SATFRSP_Set	Set supply freezing temperature	Cfg	38°F (3°C)	-40-122°F (-40-50°C)
AV-21	ECM_min_Set	Fan analog min. output	Cfg	0%	0-100%
AV-24	Fan_MinOn_Time	Fan minimum ON time	Cfg	1 min	0-60 min
AV-27	OvrTime_Set	Set occupancy override time	Cfg	60 min	0-480 min
AV-28	MotionOvrTime_Set	Motion Set occupancy override time	Cfg	10 min	0-120 min
AV-29	OATemp	Outside air temperature	Status	---	-40-122°F (-40-50°C)
AV-33	Min_SP	Set minimum setpoint	Cfg	59°F (15°C)	54-100°F (12-37.5°C)
AV-34	Max_SP	Set maximum setpoint	Cfg	82°F (28°C)	40-90°F (4.5-32°C)
AV-35	OccCLSP	Set occupied cooling setpoint	User	73°F (23°C)	
AV-36	OccHTSP	Set occupied heating setpoint	User	71°F (21°C)	
AV-37	SP_DB_Set	Set deadband	Cfg	2°	2 to 5°
AV-38	Unoc_CL_Set	Set unoccupied cooling setpoint	Cfg	79°F (26°C)	
AV-39	Unoc_HT_Set	Set unoccupied heating setpoint	Cfg	65°F (18°C)	
AV-40	STBCoolOffset	Set standby cooling offset (+)	Cfg	2°F (1.2°C)	2 to 10°F (1 to 6°C)
AV-41	STBHeatOffset	Set standby heating offset (-)	Cfg	-2°F (-1.2°C)	-2 to -10°F (-1 to -6°C)
AV-42	EffCLSP	Effective cooling setpoint	Status	---	
AV-43	EffHTSP	Effective heating setpoint	Status	---	
AV-50	RT_Cal	Room temperature calib	Cfg	0.0 °F/°C	±9.0°F (±5.0°C)
AV-56	SAT_HL_Set	Set supply air high limit setpoint	Cfg	104°F (40°C)	0-140°F (-17-60°C)
AV-57	SAT_CTR_Set	Set supply air neutral setpoint	Cfg	68°F (20°C)	0-140°F (-17-60°C)
AV-58	SAT_LL_Set	Set supply air low limit setpoint	Cfg	55.4°F (13°C)	0-140°F (-17-60°C)
AV-59	Eff_SAT	Effective supply air calc. setpoint	Status	---	0-140°F (-17-60°C)
AV-60	ComprLockout	Compressor Lockout	Cfg	20°F (-7°C)	0-140°F (-17-60°C)
AV-65	EconoMin_Pos	Eco min position	Cfg	10%	0-100%
AV-67	OATheatOutAuth	Heating authorization (from OAT)	Cfg	70°F (13°C)	0-140°F (-17-60°C)
AV-68	OATeconOutAuth	Econo authorization (from OAT)	Cfg	50°F (13°C)	0-140°F (-17-60°C)
AV-72	OAT_AUX_Auth	OAT AUX authorization	Cfg	40°F (°C)	0-140°F (-17-60°C)

Please note that objects tagged as:

Rooftop Unit (RTU) – BACnet Objects

- **Cfg:** represents configuration properties of the device that are typically only set once during commissioning and start-up.
- **Status:** represent objects or properties typically meant to be displayed on graphics for various required visualizations.

Rooftop Unit (RTU) – BACnet Objects

Binary Values (BV)

OBJECT INSTANCE	RTU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	INACTIVE / ACTIVE TEXT
BV-2	OVRSTAT	Occupancy override status	Status	Normal	Normal / Override
BV-4	AutogenDesc	Autogenerate I/O descriptions	Cfg	On	Off / On
BV-5	Occ_Sch	System occupancy schedule	Status	On	Off / On
BV-7	Freeze_Status	Freeze condition status	Status	Normal	Normal / Active
BV-8	Free_CL_Status	Free cooling authorization status	Status	---	No / Yes
BV-200	LockStPointBtn	Lock Setpoint button	Cfg	Unlock	Unlock / Lock
BV-201	LockModeBtn	Lock Mode button	Cfg	Unlock	Unlock / Lock
BV-202	LockFanBtn	Lock Fan button	Cfg	Unlock	Unlock / Lock
BV-203	WifiStatus	Wifi Status	Status	---	On / Off

Please note that objects tagged as:

- **Cfg:** represents configuration properties of the device that are typically only set once during commissioning and start-up.
- **Status:** represent objects or properties typically meant to be displayed on graphics for various required visualizations.

Rooftop Unit (RTU) – BACnet Objects

Multi-State Values (MSV)

OBJECT INSTANCE	RTU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	STATE TEXTS
MSV-1	CFGSens	Remote thermistor 10K	Cfg	Type 3	Type 3 Type 2
MSV-2	AI_RS	Select room temperature input	Cfg	Intern	Intern AI-1 AI-2
MSV-3	MODE	System mode	User	Off	Off Auto Cool Heat
MSV-4	FAN	Set fan mode	User	Auto	On Auto
MSV-5	Eff_Occ	Effective occupancy mode	Status	---	Occupied Unoccup TempOcc
MSV-6	Loc-Occ	Occupancy command	Cfg	Loc-Occ	Loc-Occ Occupied Unoccup
MSV-7	CFG_Y1	Set cooling output 1 operation	Cfg	None	None Off-On 0-10V DA (*direct*) 0-10V RA (*reversed*) 2-10V DA (*direct*) 2-10V RA (*reversed*) Pulsed DA (*direct*) Pulsed RA (*reversed*)
MSV-8	CFG_Y2	Set cooling output 2 operation	Cfg	None	None Off-On
MSV-16	CFG_W1	Set heating output 1 operation	Cfg	None	None Off-On 0-10V DA (*direct*) 0-10V RA (*reversed*) 2-10V DA (*direct*) 2-10V RA (*reversed*) Pulsed DA (*direct*) Pulsed RA (*reversed*) O (*O/B*) B (*O/B*)

Rooftop Unit (RTU) – BACnet Objects

OBJECT INSTANCE	RTU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	STATE TEXTS
MSV-17	CFG_W2	Set heating output 2 operation	Cfg	None	None Off-On 0-10V DA (*direct*) 0-10V RA (*reversed*) 2-10V DA (*direct*) 2-10V RA (*reversed*) Pulsed DA (*direct*) Pulsed RA (*reversed*) O (O/B) B (O/B)
MSV-23	CFG_FAN	Select fan output	Cfg	BO1	BO-1 BO-1 & AO-1
MSV-27	AI_OAT	Select outside air temp. input	Cfg	None	None AI-1 AI-2 External
MSV-28	AI_SAT	Select supply air temp. input	Cfg	None	*Same as above*
MSV-30	AO_ECO	Select economizer output	Cfg	None	None AO-1
MSV-44	BI_PIR	Select PIR Motion sensor input	Cfg	None	None NO, AI1 (BI) NC, AI1 (BI) NO, AI2 (BI) NC, AI2 (BI) External
MSV-45	BI_SCH_Input	Select schedule input	Cfg	None (On)	None (Off) None (On) Scheduler AI-1 AI-2 External
MSV-62	CFGSetp	Room setpoint displayed	Cfg	Center	Heat SP Center Cool SP
MSV-65	BO_OCC	Select occupied output	Cfg	None	None BO-2 BO-3 BO-4 AO-1

Rooftop Unit (RTU) – BACnet Objects

OBJECT INSTANCE	RTU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	STATE TEXTS
MSV-70	PB	CFG Heating/cooling proportional band	Cfg	5F 2.2C	3F 1.2C 4F 1.7C 5F 2.2C 6F 2.8C 7F 3.3C 8F 3.5C 9F 5.0C 10F 5.6C
MSV-100	HELP_mess	Help message	Status	Normal	Normal SupplyFrozen
MSV-127	Preset	Select application	Cfg	RT 1C1H	RT 1C1H RT 2C1H RT ECON HP1C2H RT MOD RT ECM HP ECM Custom
MSV-200	Brightness	Brightness control	Cfg	Low	Low Med-Low Med
MSV-201	BgColor	Background color	Cfg	White	White Orange Blue Green Red
MSV-202	Display_Main	Main displayed value	Cfg	Temp	Temp Setpoint Nothing
MSV-203	Language	Language selection	Cfg	English	English
MSV-204	Display_Units	Temperature displayed units	Cfg	F	C F

*MSV, 7, 8, 16, 17, 18, 19, 23, 27, 28, 30, 32, 44, 45, 65 are used for "custom" configuration applications. MSV127 will automatically switch to "**Custom**" if changing any of these MSVs.*

Please note that objects tagged as:

- **Cfg:** represents configuration properties of the device that are typically only set once during commissioning and start-up.
- **Status:** represent objects or properties typically meant to be displayed on graphics for various required visualizations.

Rooftop Unit (RTU) – BACnet Objects

Loop(s)

OBJECT INSTANCE	FCU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	RANGE
LOOP-1	RoomT_Cool	Room temp cooling control loop	Status		0-100%
LOOP-2	RoomT_heat	Room temp heating control loop	Status		0-100%
LOOP-6	SupplyTemp	Supply temp control loop	Status		0-100%
LOOP-7	SupplyTempHL	Supply temp high limit control loop	Status		0-100%
LOOP-8	SupplyTempLL	Supply temp low limit control loop	Status		0-100%

Notes on default values:

Loop-1 : Kp = 20, Ki = 0.05, Bias = 0%

Loop-2 : Kp = 20, Ki = 0.05, Bias = 0%

Loop-6 : Kp = 5, Ki = 0.1, Bias = 50%

Loop-7 : Kp = 5, Ki = 0.1, Bias = 50%

Loop-8 : Kp = 20, Ki = 0.05, Bias = 0%

Schedule

OBJECT INSTANCE	FCU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	RANGE
SCH-1	OccSchedule	Occupancy schedule	Cfg	Inactive	Inactive / Active

Fan Coil Unit (FCU)

WIRING

FCU Select Your Equipment

2 Pipes – On/Off N.C.
2 Pipes – On/Off N.O.
2 Pipes – Modulating 0-10 VDC Valves

Fan Control – 3 Speed Fans MSV58 = L-M-H
Fan Control – 2 Speed Fans MSV58 = L-H
Fan Control – Single Speed Fans MSV58 = On-Auto
Optional input

					From "Mode" button selection		
Connector #	**I/O id**	**BACnet Name**	**2 Pipes**		**Fan 3 Speeds**	**Fan 2 Speeds**	**Fan 1 Speed**
1	GND						
2	COM						
3	24V						
4	(R)						
5	BO1	BO_1	Cool/Heat (N.C. or N.O. Valve)				
6	BO2	BO_2	Fan Low		Fan Low	Fan Low	
7	BO3	BO_3	Fan Med		Fan Med		
8	BO4	BO_4	Fan High		Fan High	Fan High	Fan High
11	n/a						
12	AO1	AO_1	Cool/Heat (N.C. or N.O. Valve)				
15	AI COM						
16	AI1	AI_1	Changeover input				
17	AI2	AI_2	Remote Room				
18	n/a						
21	A+ MS/TP						
22	B- MS/TP						

Fan Coil Unit (FCU) – Wiring

2 Pipes – On/Off N.C.

Sequence of operation

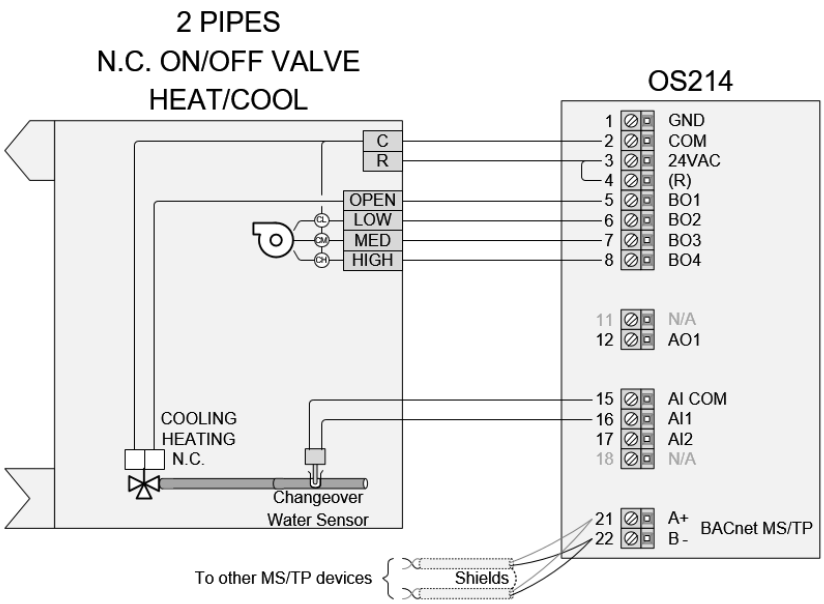
Occupied Mode: Setpoints will revert to those defined by occupied cooling and heating setpoints.

Unoccupied Mode: Setpoints will revert to those defined by unoccupied heating and cooling setpoints.

Occupied Override Mode: The system will revert to occupied mode for the duration determined by the "OvrTime" parameter

Cooling Call: If the supply water temperature is less than 63°F (17.0°C) AV13, the valve will open to maintain room temperature. If the supply water temperature exceeds 65°F (18.5°C) AV13, the valve will close.

Heating Call: If the supply water temperature exceeds 65°F (18.5°C) AV13, the valve will open to maintain room temperature. If the supply water temperature is less than 63°F (17.0°C) AV13, the valve will close.



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

Fan Coil Unit (FCU) – Wiring

2 Pipes – On/Off N.O.

Sequence of operation

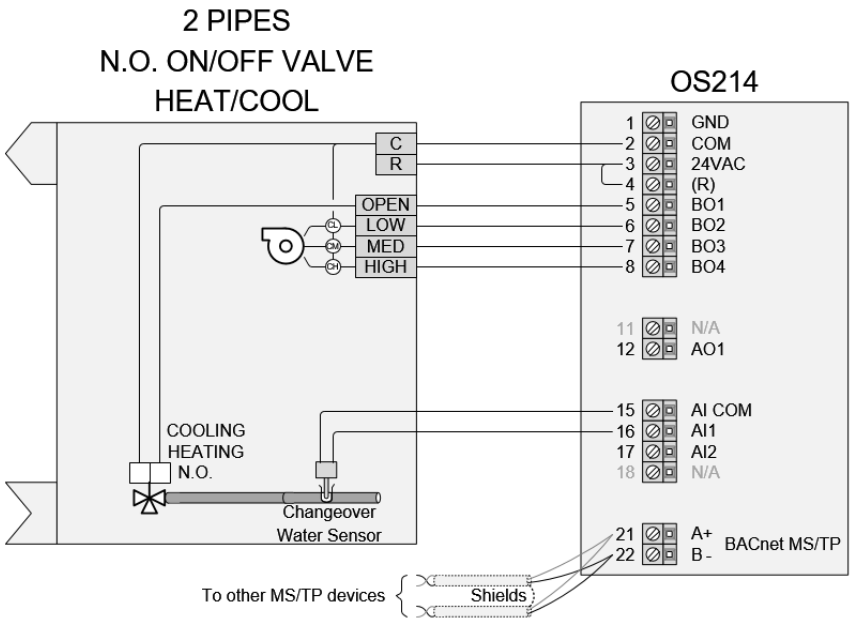
Occupied Mode: Setpoints will revert to those defined by occupied cooling and heating setpoints.

Unoccupied Mode: Setpoints will revert to those defined by unoccupied heating and cooling setpoints.

Occupied Override Mode: The system will revert to occupied mode for the duration determined by the "OvrTime" parameter

Cooling Call: If the supply water temperature is less than 63°F (17.0°C) AV13, the valve will open to maintain room temperature. If the supply water temperature exceeds 65°F (18.5°C) AV13, the valve will close.

Heating Call: If the supply water temperature exceeds 65°F (18.5°C) AV13, the valve will open to maintain room temperature. If the supply water temperature is less than 63°F (17.0°C) AV13, the valve will close.



Add a 24VAC transformer when the power is not supplied by the equipment.

Fan Coil Unit (FCU) – Wiring

2 Pipes – Modulating 0-10 VDC Valves

Sequence of operation

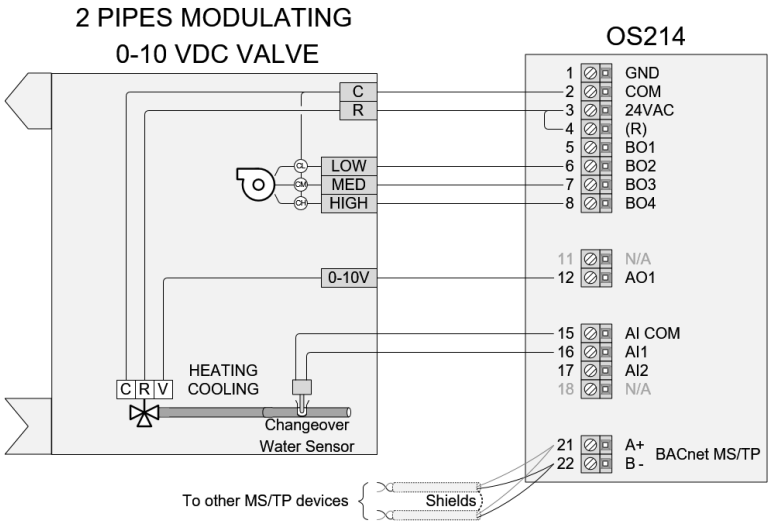
Occupied Mode: Setpoints will revert to those defined by occupied cooling and heating setpoints.

Unoccupied Mode: Setpoints will revert to those defined by unoccupied heating and cooling setpoints.

Occupied Override Mode: The system will revert to occupied mode for the duration determined by the "OvrTime" parameter.

Cooling Call: If the supply water temperature is less than 63°F (17.0°C) AV13, the valve will be modulated to maintain room temperature. If the supply water temperature exceeds 65°F (18.5°C) AV13, the valve will close.

Heating Call: If the supply water temperature exceeds 65°F (18.5°C) AV13, the valve will be modulated to maintain room temperature. If the supply water temperature is less than 63°F (17.0°C) AV13, the valve will close.



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

Fan Coil Unit (FCU) – Wiring

Fan Control – 3 Speed Fans MSV58 = L-M-H

Occupied Mode:

Fan = **Auto** mode will modulate the fan from low to high speed simultaneously with the main PI cooling and heating demand.

With the fan mode set to **Low**, the fan will drive to Low speed.

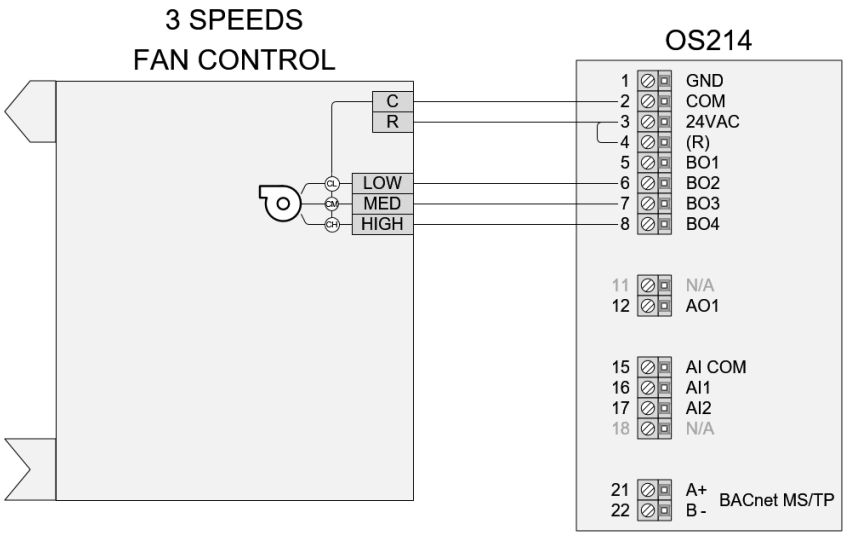
With the fan mode set to **Medium**, the fan will drive to Medium speed.

With the fan mode set to **High**, the fan will drive to High speed.

In the controller deadband between heating and cooling setpoints, Auto demand (Keepfan BV66) = FanLow allows the fan to stay at Low fan speed, and (Keepfan BV66) = FanOff will shut down the fan completely.

Unoccupied Mode:

The fan will always operate in Auto mode during Unoccupied periods.



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

Fan Coil Unit (FCU) – Wiring

Fan Control – 2 Speed Fans MSV58 = L-H

Fan sequence of operation

Occupied Mode:

Fan = **Auto** mode will modulate the fan from low to high speed simultaneously with the main PI cooling and heating demand.

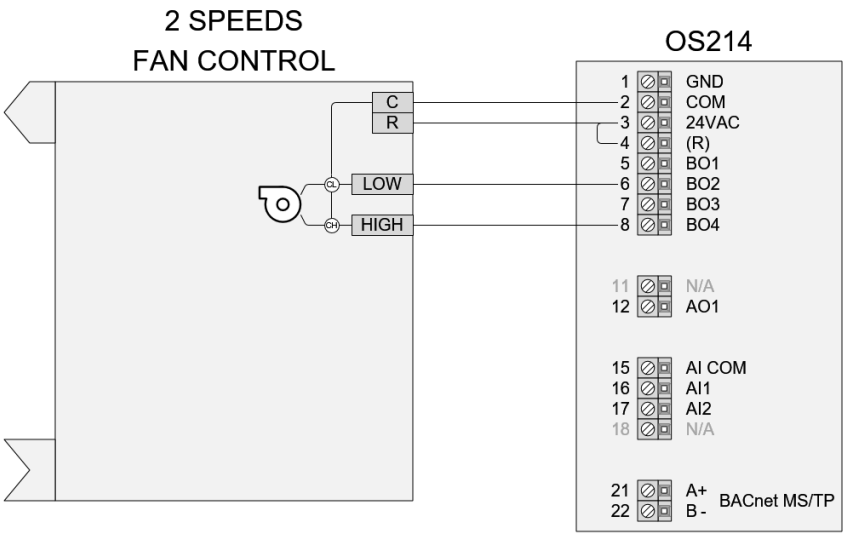
With the fan mode set to **Low**, the fan will drive to Low speed.

With the fan mode set to **High**, the fan will drive to High speed.

In the controller deadband between heating and cooling setpoints, Auto demand (Keepfan BV66) = FanLow allows the fan to stay at Low fan speed, and (Keepfan BV66) = FanOff will shut down the fan completely.

Unoccupied Mode:

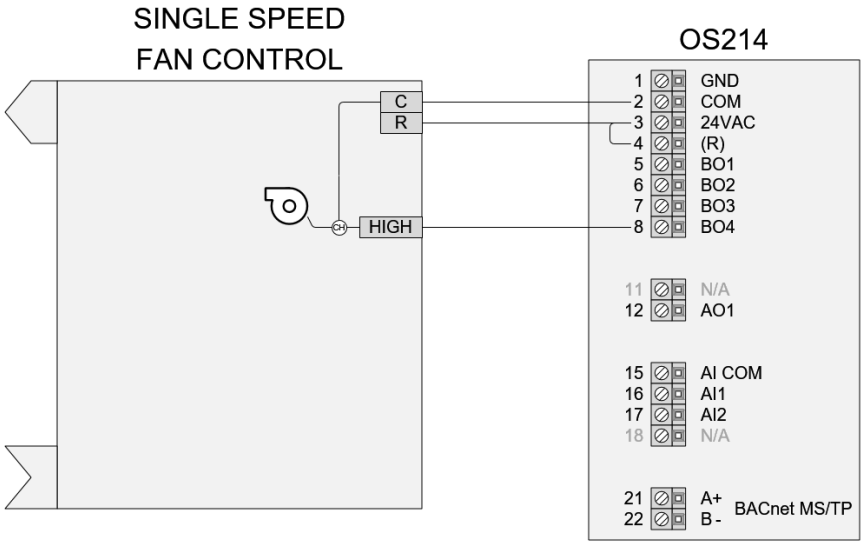
The fan will always operate in Auto mode during Unoccupied periods



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

Fan Coil Unit (FCU) – Wiring

Fan Control – Single Speed Fans MSV58 = On-Auto



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

Fan sequence of operation

Occupied Mode:

Fan = **Auto** mode will energize the fan when the main PI cooling and heating demands are above 1% demand.

With the fan mode set to **ON**, the fan will always energize during Occupied periods.

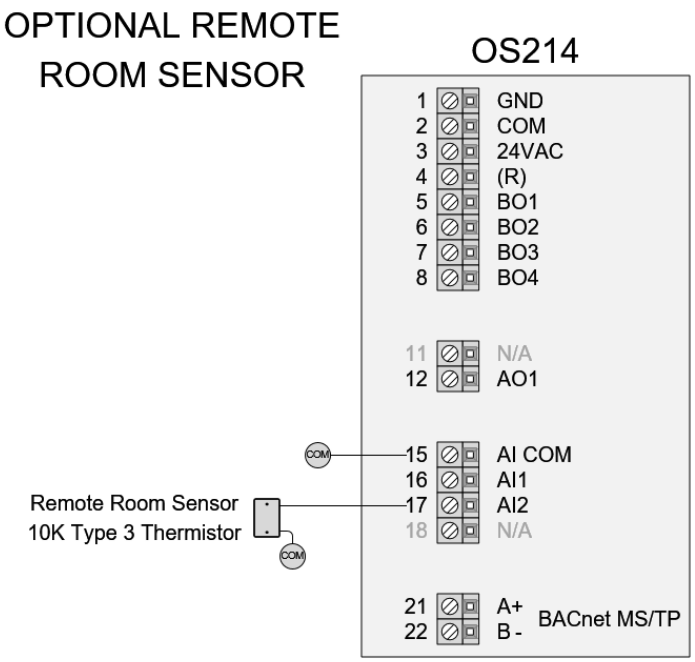
In the controller deadband between heating and cooling setpoints, Autodemand (Keepfan BV66) = FanLow allows the fan to stay ON, and (Keepfan BV66) = FanOff will shut down the fan completely.

Unoccupied Mode:

The fan will always operate in Auto mode during Unoccupied periods

Fan Coil Unit (FCU) – Wiring

Optional input



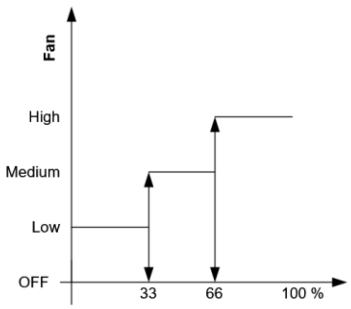
Optionally connect a 10K type 3 remote thermistor room sensor. MSV2 default setting is “AutoDet”; so, detecting the remote sensor will replace internal thermostat temperature sensor. Changing MSV2 to “Intern” will keep internal temperature sensor for control; this provides a way to read remote temperature from AI2 for monitoring purpose.

Fan Coil Unit (FCU) – Wiring

FCU Control Curves

Fan Speed Control

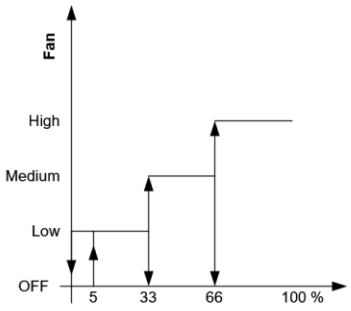
Speed Auto Occupied



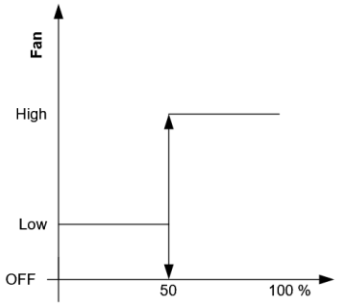
Fan_CL_Demand or Fan_HT_Demand

3 Speeds

Speed Auto Unoccupied

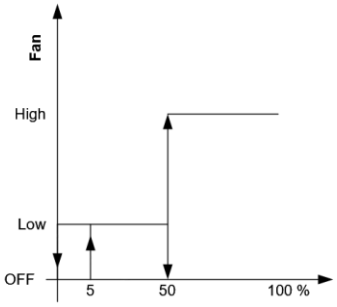


Fan_CL_Demand or Fan_HT_Demand

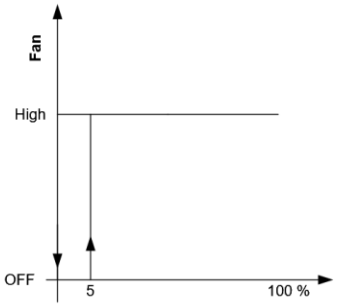


Fan_CL_Demand or Fan_HT_Demand

2 Speeds



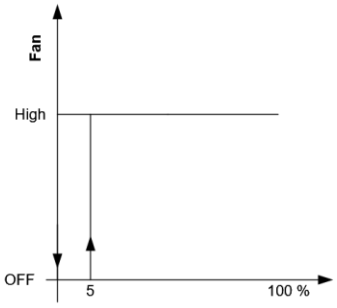
Fan_CL_Demand or Fan_HT_Demand



Fan_CL_Demand or Fan_HT_Demand

(will use Occupied Setpoints)

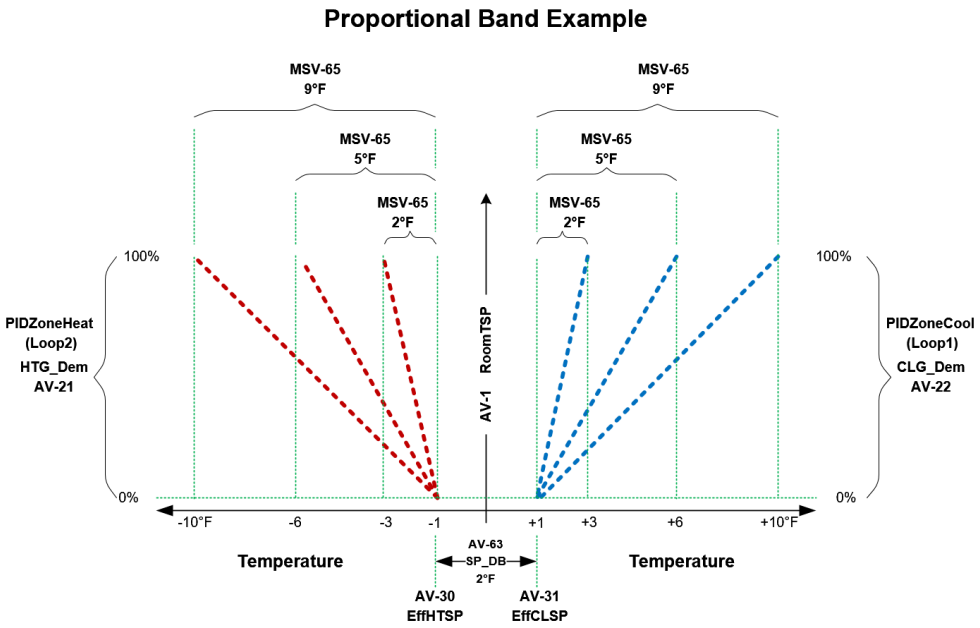
Single Speed

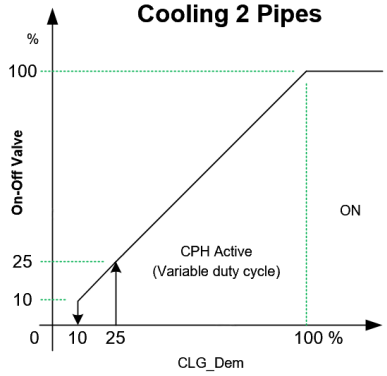


Fan_CL_Demand or Fan_HT_Demand

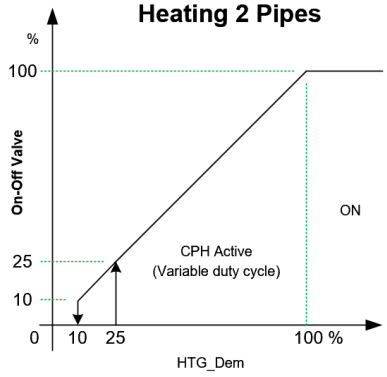
(will use Unoccupied Setpoints)

Fan Coil Unit (FCU) – Wiring





Note: CLG_Dem must be > 25% for at least 30 seconds



Note: HTG_Dem must be > 25% for at least 30 seconds

Fan Coil Unit (FCU) – Wiring

Configuration of AI1 input

Analog input 1 configuration	Changeover input	Changeover status	Control sequence of operation	System Mode	2 PIPES SYSTEMS
MSV-48	AI1	BV-40	MSV-15	MSV-16	

AI1_CFG	AI1 Input	Ch_Over	SeqOper	AVAILABLE MODE	Note:
None	Contact open (unused)	Cool ←	Cool →	Off / Cool	If **SeqOper** is set from BACnet network to "Cool", then "System Mode" will automatically switch to "Cool"; except if already in "Off" mode.
	Contact closed (unused)	Heat ←	Heat →	Off / Heat	If **SeqOper** is set from BACnet network to "Heat", then "System Mode" will automatically switch to "Heat"; except if already in "Off" mode.

AI1_CFG	AI1 Input	Ch_Over	SeqOper	AVAILABLE MODE	Note:
COC/NH	Contact open →	Heat →	(unused) →	Off / Heat	If **AI1 input contact** is "open", then "System Mode" will automatically switch to "Heat"; except if already in "Off" mode.
	Contact closed →	Cool →	(unused) →	Off / Cool	If **AI1 input contact** is "close", then "System Mode" will automatically switch to "Cool"; except if already in "Off" mode.

AI1_CFG	AI1 Input	Ch_Over	SeqOper	AVAILABLE MODE	Note:
COC/NC	Contact open →	Cool →	(unused) →	Off / Cool	If **AI1 input contact** is "open", then "System Mode" will automatically switch to "Cool"; except if already in "Off" mode.
	Contact closed →	Heat →	(unused) →	Off / Heat	If **AI1 input contact** is "close", then "System Mode" will automatically switch to "Heat"; except if already in "Off" mode.

AI1_CFG	AI1 Input	Ch_Over	SeqOper	AVAILABLE MODE	Note:
COS	Temperature lower than 63°F →	Cool →	(unused) →	Off / Cool	If **AI1 input temperature reading** lower than 63°F, then "System Mode" will automatically switch to "Cool"; except if already in "Off" mode.
	Temperature higher than 65°F →	Heat →	(unused) →	Off / Heat	If **AI1 input temperature reading** higher than 65°F, then "System Mode" will automatically switch to "Heat"; except if already in "Off" mode.

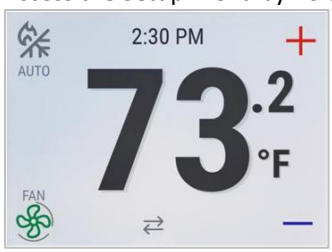
AI1_CFG	AI1 Input	Ch_Over	SeqOper	AVAILABLE MODE	Note:
SS	Used for monitoring (ex: supply temperature)	Cool ←	Cool →	Off / Cool	If **SeqOper** is changed from BACnet network to "Cool", then "System Mode" will automatically switch to "Cool"; except if already in "Off" mode.
		Heat ←	Heat →	Off / Heat	If **SeqOper** is changed from BACnet network to "Heat", then "System Mode" will automatically switch to "Heat"; except if already in "Off" mode.

Fan Coil Unit (FCU) – Setup

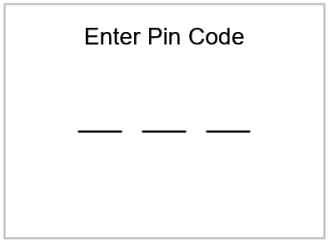
SETUP

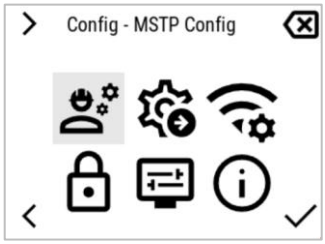
Setup Menu

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



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

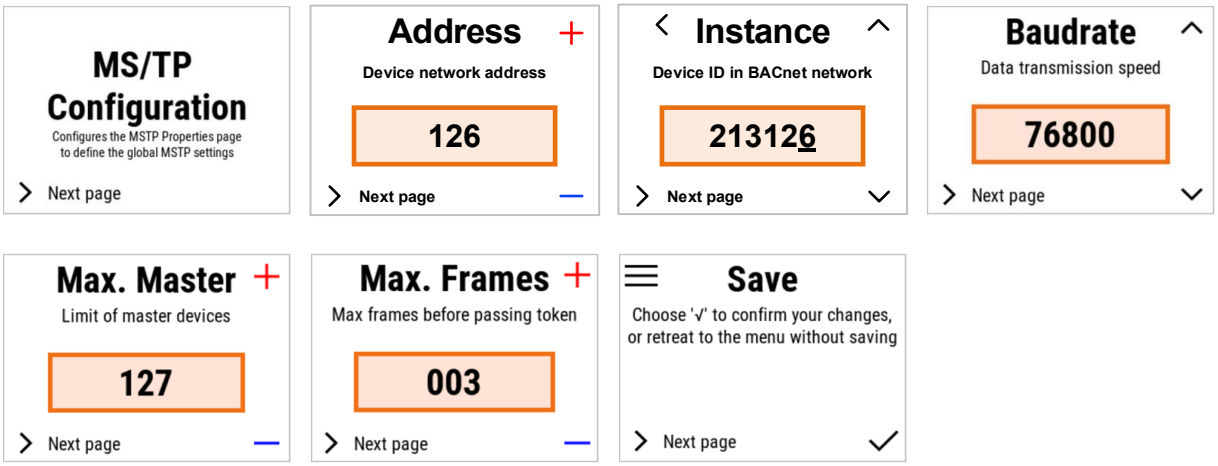




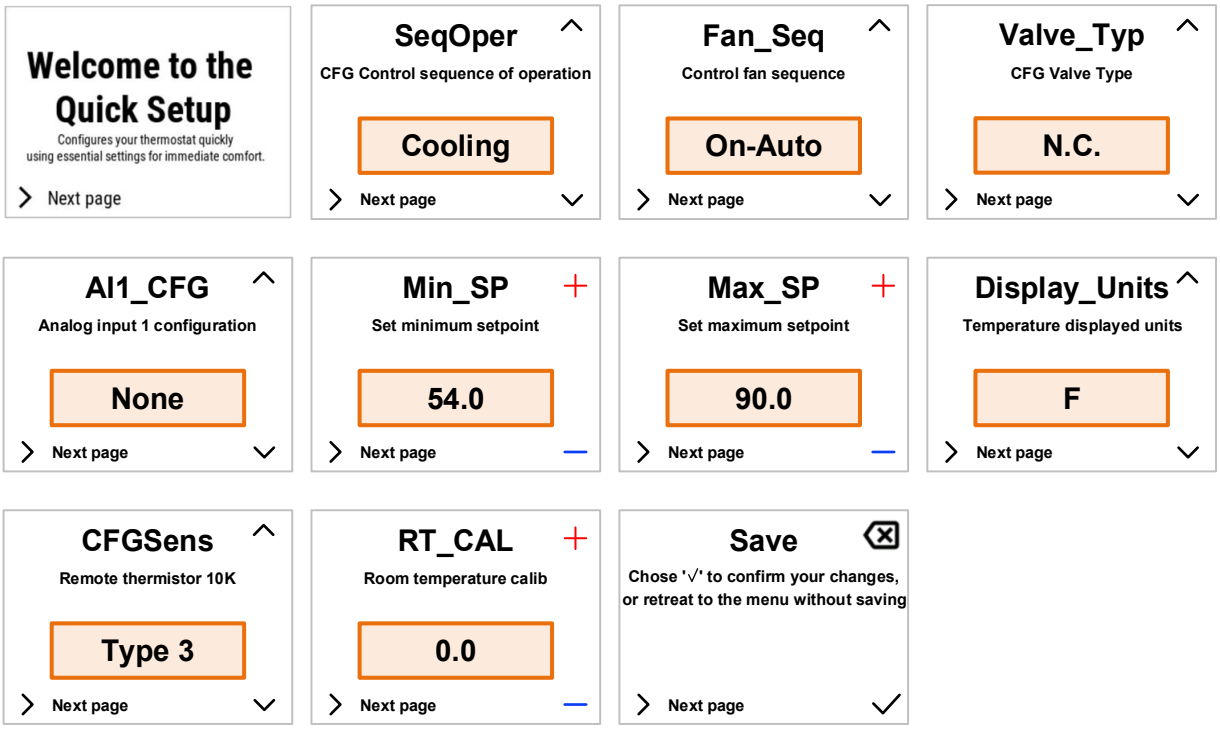
	MSTP Communication Configuration
	Quick RTU Application Setup
	WIFI Configuration
	Buttons Lock Configuration
	Display Configuration
	Display Additional Information About The Thermostat
	Scroll Menu Choices
	Select
	Exit Menus

Fan Coil Unit (FCU) – Setup

1. Config - MSTP Config



2. Config – Quick Setup

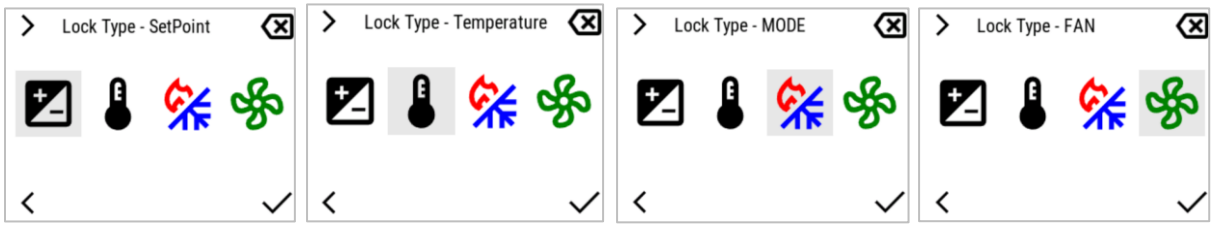


Fan Coil Unit (FCU) – Setup

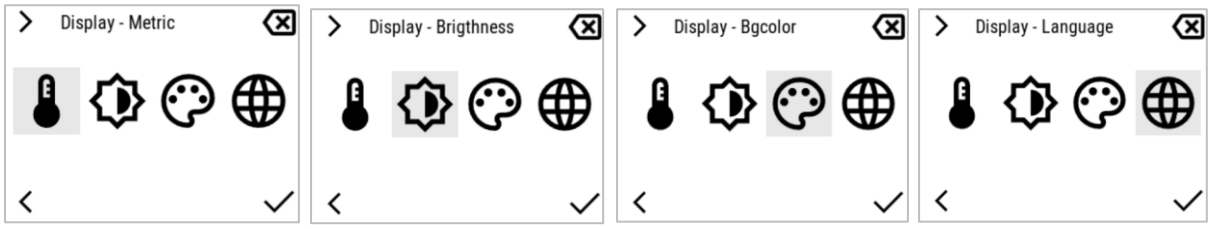
3. Config – WIFI Settings



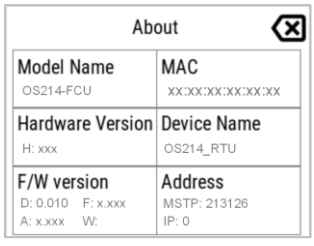
4. Config - Lock Type



5. Config Display



6. Config – About



Fan Coil Unit (FCU) – BACnet Objects

BACnet Objects

Overview

GREEN = Important No Color = Optional depending on equipment

Recommended: MSVs and AV(s) write at default priority (16), everything else priority 8 to 3

Quick Setup: Sequence, units, and service inputs

- **BV-50** Auto mode authorization
- **MSV-15** Control sequence operation
- **MSV-48** AI-1 configuration

Fan: Output location and control type

- **MSV-17** Fan mode
- **MSV-58** Fan control sequence
- **BV-66** Fan speed with no demand

Valve: Configuration

- **MSV-14** Valve BO1 = N.C. or N.O.
- **BV-78** Valve AO1 = Direct 0V-10V or Reverse 10V-0V
- **MSV-77** Output cycles per hour

PID Loops:

- **Loop-1** Cooling PID
- **Loop-2** Heating PID

T Set points: Sensor locations and set points

- **MSV-2** Temperature input location
- **MSV-65** Heating/cooling proportional band
- **MSV-70** Setpoint displayed for user
- **AV-1** Room temperature set point
- **AV-43** Unoccupied heating set point
- **AV-44** Unoccupied cooling set point
- **AV-58** Maximum heating set point
- **AV-59** Maximum cooling set point
- **AV-63** Room temperature set point deadband

Temporary Occupancy Button:

- **MSV-62** Override time delay

General Operation and Monitoring: Occupancy, status, and set points

- **MSV-16** System mode (heat, cool, auto, off)
- **MSV-17** Fan mode (auto, low, med, high)
- **MSV-18** Occupancy command
- **MSV-33** Effective occupancy (status)
- **AV-1** Room temperature set point
- **AV-7** Effective room temperature
- **AV-21** Heating demand
- **AV-22** Cooling demand

Input and Outputs: Status for inputs and overrides outputs

- **BO-1 thru BO-4** Binary outputs
- **AI-1 and AI-2** Analog/binary inputs
- **AO-1** Analog valve output

Fan Coil Unit (FCU)

Physical Inputs and Outputs

OBJECT INSTANCE	FCU OBJECT NAME	DESCRIPTION	DEFAULT VALUE	TAGS	RANGE
BO-1	BO_1	Valve	Off	Status	Off-On
BO-2	BO_High	High-speed fan output	Off	Status	Off-On
BO-3	BO_Med	Medium-speed fan output	Off	Status	Off-On
BO-4	BO_Low	Low-speed fan output	Off	Status	Off-On
AO-1	AO_1	Valve 0-10Vdc	0%	Status	0-100%
AI-1	AI_1	Analog input 1		Status	Dependent on MSV-48
AI-2	AI_2	Analog input 2		Status	Dependent on MSV-2
AI-6	RoomT	Room temperature		Status	32-122°F (0-50°C)

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

Analog Values (AV)

OBJECT INSTANCE	FCU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	RANGE
AV-1	RoomTSP	Room Temperature setpoint	User	72°F (22°C)	54-90°F (12-32°C)
AV-7	Eff_T	Effective temperature used for control	Status	---	-40-122°F (-40-50°C)
AV-13	Chov_T	Changeover temperature	Status	---	-40-122°F (-40-50°C)
AV-21	HTG_Dem	Heating demand	Status	---	0-100%
AV-22	CLG_Dem	Cooling demand	Status	---	0-100%
AV-23	Fan_HT__Demand	Fan heating demand	Status	---	0-100%
AV-24	Fan_CL__Demand	Fan cooling demand	Status	---	0-100%
AV-30	EffHTSP	Effective heating setpoint	Status	71°F (21°C)	---
AV-31	EffCLSP	Effective cooling setpoint	Status	73°F (23°C)	---
AV-39	OccHTSP	Occupied heating setpoint	Cfg	71°F (21°C)	---
AV-40	OccCLSP	Occupied cooling setpoint	Cfg	73°F (23°C)	---
AV-43	Unoc_HT_SP	Unoccupied heating setpoint	Cfg	62°F (16.5°C)	---
AV-44	Unoc_CL_SP	Unoccupied cooling setpoint	Cfg	80°F (26.5°C)	---
AV-50	RT_Cal	Room temperature calib	Cfg	0	-5 to 5
AV-58	MaxHTSP	Maximum heating setpoint	Cfg	90°F (32°C)	40-90°F (4.5-32°C)
AV-59	MinCLSP	Minimum cooling setpoint	Cfg	54°F (12°C)	54-100°F (12-37.5°C)
AV-63	SP_DB	Setpoint deadband	Cfg	2	2 to 5

Please note that objects tagged as:

- **Cfg:** represents configuration properties of the device that are typically only set once during commissioning and start-up.
- **Status:** represents objects or properties typically meant to be displayed on graphics for various required visualizations.

Binary Values (BV)

OBJECT INSTANCE	FCU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	INACTIVE / ACTIVE TEXT
BV-8	OVRSTAT	Occupancy override status	Status	Normal	Normal / Overrid
BV-29	AI1Stat	Analog input 1 binary contact status	Status	Deactivated	Deactivated / Activated
BV-40	Ch_Over	Change over status	Status	Cool	Cool / Heat
BV-50	AutoMod	Auto mode authorized	Cfg	Yes	No / Yes
BV-66	KeepFan	Fan auto mode	Cfg	Fan Low	Fan Low / Fan Off
BV-78	AO1_Dir	CFG AO1 action	Cfg	Direct	Direct / Reverse
BV-200	LockStPoint	Lock Setpoint	Cfg	Unlock	Unlock / Lock
BV-201	LockMode	Lock Mode	Cfg	Unlock	Unlock / Lock
BV-202	LockFan	Lock Fan	Cfg	Unlock	Unlock / Lock
BV-203	WifiStatus	Wifi Status	Status	---	Off / On

Please note that objects tagged as:

- **Cfg:** represents configuration properties of the device that are typically only set once during commissioning and start-up.
- **Status:** represents objects or properties typically meant to be displayed on graphics for various required visualizations.

Multi-State Values (MSV)

OBJECT INSTANCE	FCU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	STATE TEXTS
MSV-1	CFGSens	Remote thermistor 10K	Cfg	Type 3	Type 3 Type 2
MSV-2	Tsource	Temperature input location	Cfg	AutoDet	AutoDet Intern AI-1 AI-2
MSV-14	Valve_Type	Change operation of BO1 and AO1	Cfg	N.C.	N.C. N.O.
MSV-15	SeqOper	Control sequence of operation	Cfg	Cooling	Cooling Heating
MSV-16	MODE	System mode	User	Auto	Off N/A Cool Heat
MSV-17	FAN	Fan mode	User	Auto	Lo Med Hi Auto
MSV-18	Occ_Cmd	Occupancy command	Cmd	Loc_Occ	Loc_Occ Occupied Unoccup
MSV-28	FanStat	Fan status	Status		Off Low Med High
MSV-33	Eff_Occ	Effective occupancy mode	Status		Occupied Unoccup TempOcc
MSV-48	AI1_CFG	Analog input 1 configuration	Cfg	COS	None COC/NH (*Normally Heat ChangeOver Contact*) COC/NC (*Normally Cool ChangeOver Contact*) COS (*ChangeOver Sensor*) SS (*Supply sensor remote monitoring 10K sensor*)
MSV-58	Fan_Seq	Control fan sequence	Cfg	L-M-H-A	L-M-H L-H L-M-H-A L-H-A On-Auto *(use for single speed)*
MSV-62	OvrTime	Override time delay	Cfg	2 hours	0 - 24 hours

OBJECT INSTANCE	FCU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	STATE TEXTS
MSV-65	PB	Heating/Cooling proportional band	Cfg	5 F 2.2 C	3 F (1.2 C) - 10 F (5.6 C)
MSV-70	Display_SP	Setpoint displayed for user	Cfg	Center	Heating Center Cooling
MSV-77	Valve_CPH	Valve output cycle per hour	Cfg	4 CPH	3 - 8 CPH
MSV-200	Brightness	Brightness control	Cfg	Med	Low Med-Low Med
MSV-201	BgColor	Background color	Cfg	White	White Orange Blue Green Red
MSV-202	Display_Main	Main displayed value	Cfg	Temp	Temp Setpoint Nothing
MSV-203	Language	Language selection	Cfg	English	English
MSV-204	Display_Units	Temperature displayed units	Cfg	F	C F

Please note that objects tagged as:

- **Cfg:** represents configuration properties of the device that are typically only set once during commissioning and start-up.
- **Status:** represent objects or properties typically meant to be displayed on graphics for various required visualizations.

Loop(s)

OBJECT INSTANCE	FCU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	RANGE
LOOP-1	PIDZoneCool	PID Zone cooling	Status and Cfg	---	0-100%
LOOP-2	PIDZoneHeat	PID Zone heating	Status and Cfg	---	0-100%

Notes on default values:

Loop-1 : Kp = 20, Ki = 0.05, Bias = 0%

Loop-2 : Kp = 20, Ki = 0.05, Bias = 0%

Schedule

OBJECT INSTANCE	FCU OBJECT NAME	DESCRIPTION	TAGS	DEFAULT VALUE	RANGE
SCH-1	OccSchedule	Occupancy schedule	Cfg	Active	Inactive / Active

Network

MS/TP Wiring

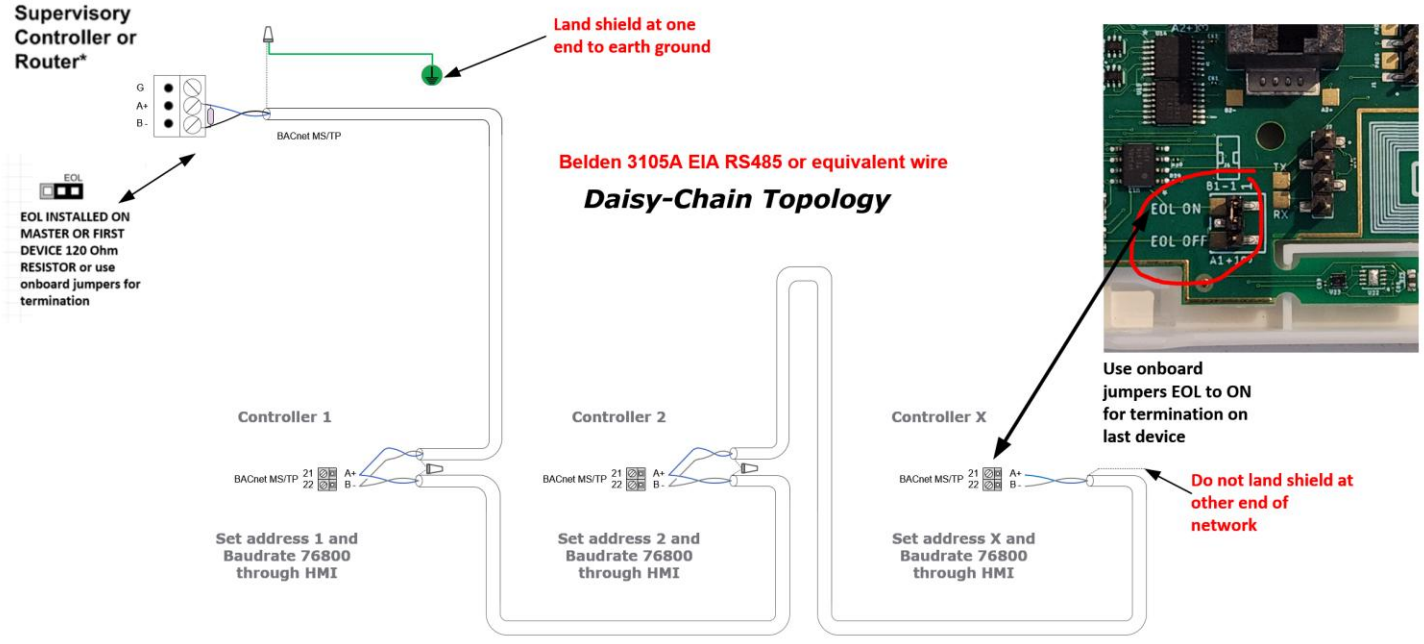
RS-485 Network Guidelines

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

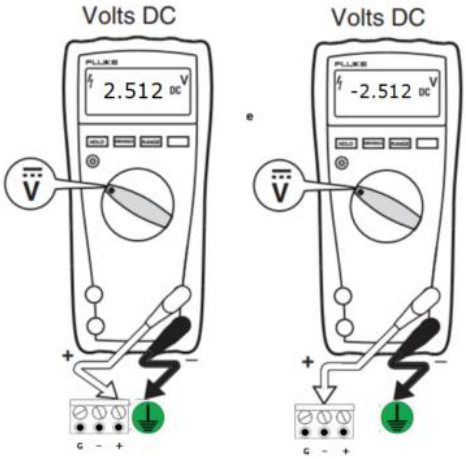
Connecting a multidrop 485 network.

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 "-".

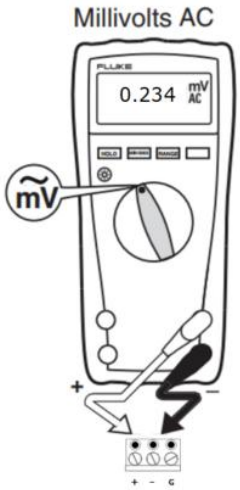
Do not forget the Signal Ground. *While a differential signal does not require a signal ground to communicate, the ground wire serves an important purpose. Over hundreds of thousands of feet, there can be significant differences in the voltage level of "ground". The function of the signal ground wire 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.*



Testing Wiring

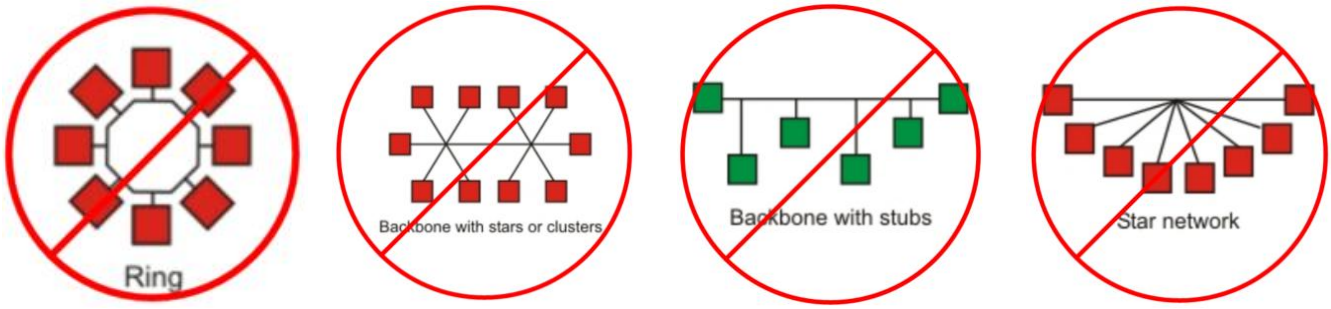


On a connected RS-485 network, measure with your **RMS** multi-meter from either "+" or "-" to earth ground. You should read about 2.5VDC. If you read higher than 2.75VDC, you are encountering noise and either you do not have a shielded twisted pair cable, you have a grounded shield on both sides, or the integrity of your cable is compromised. If you are reading lower than 2.1VDC, then a device on your network or front end is either limiting the biasing circuit or causing an issue such as no termination on both ends of the network, etc.

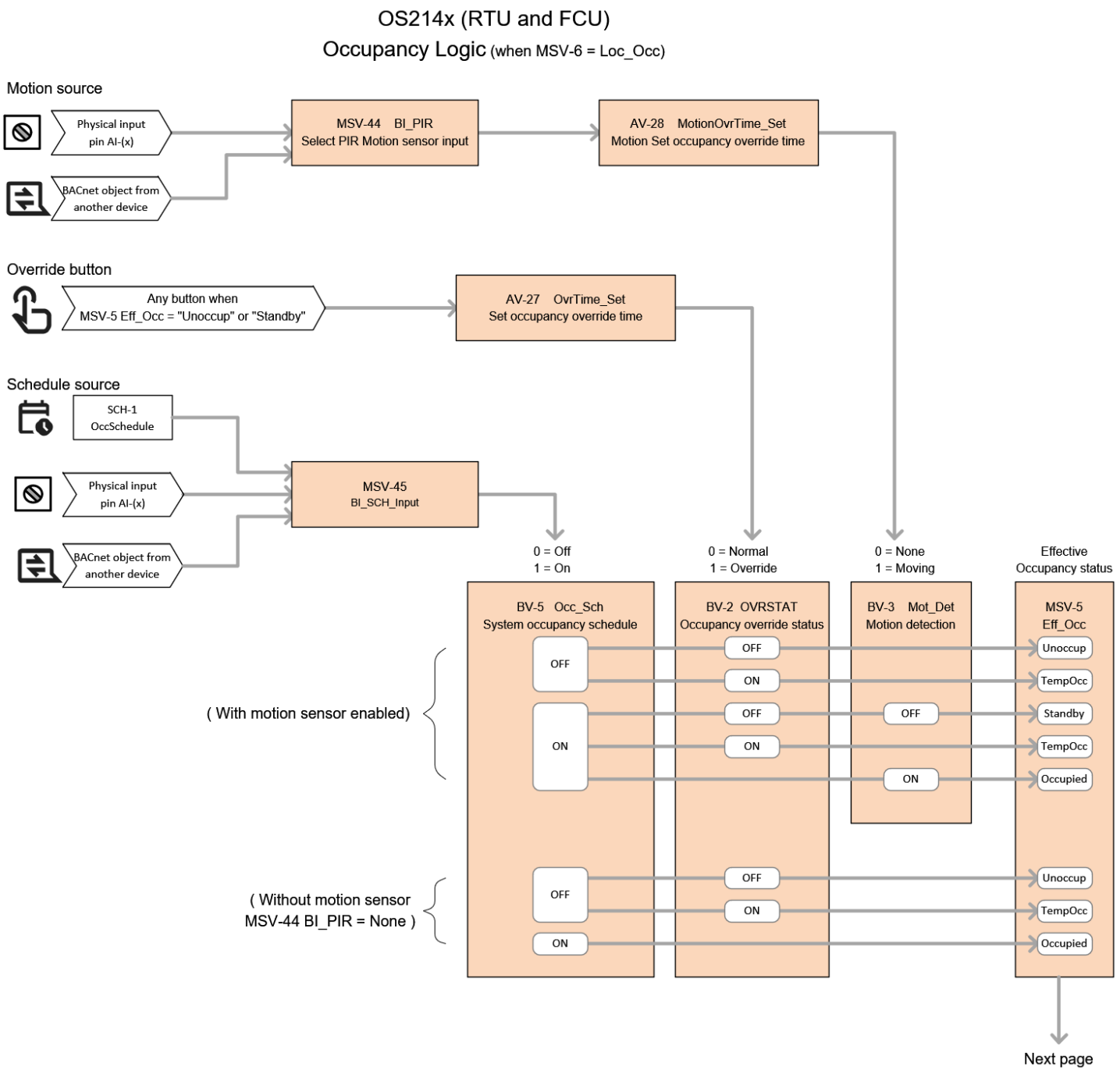


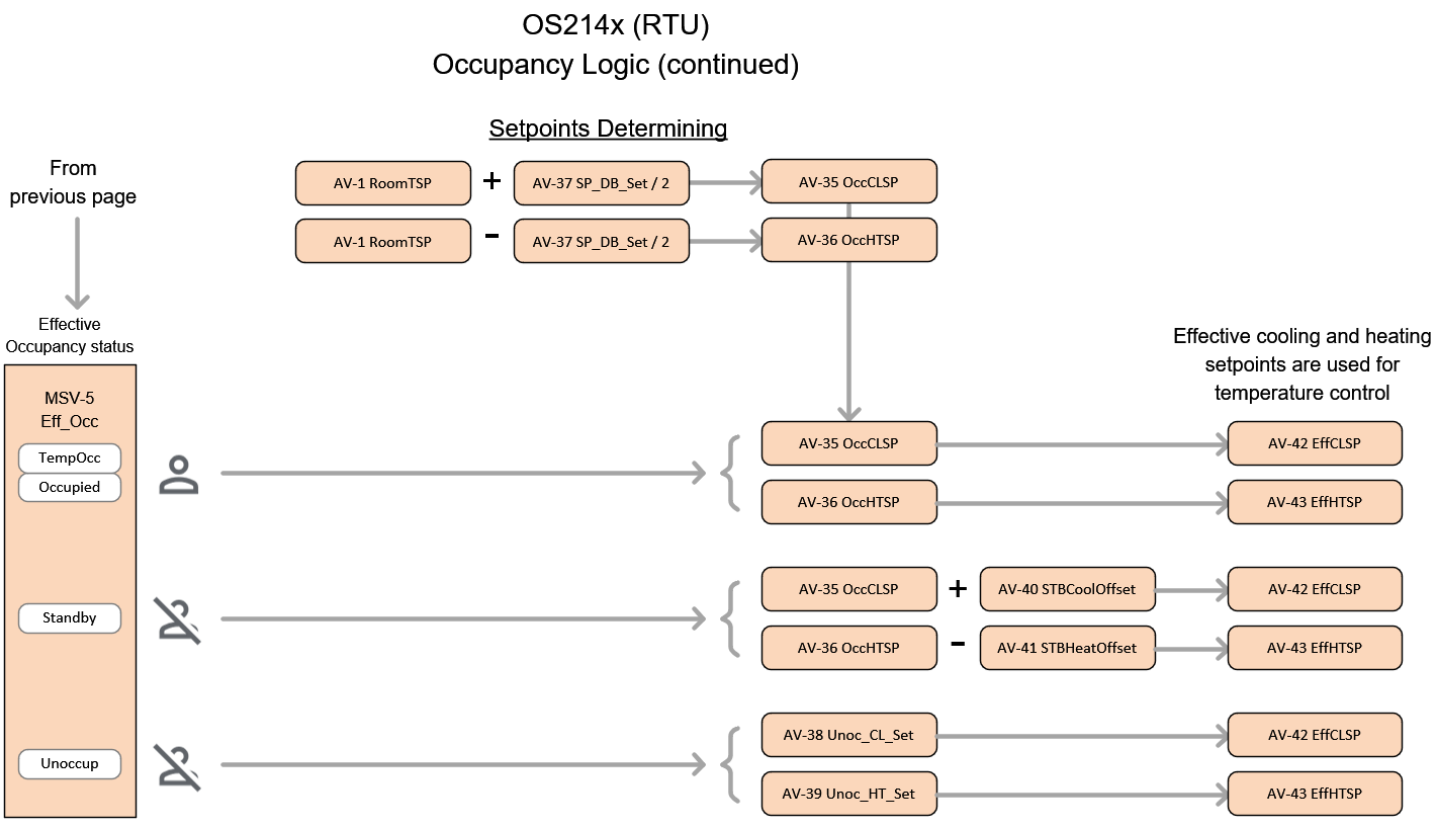
Measure with your multi-meter from "+" to "-" while the RS-485 network is connected. You should read between 200mVAC to 600mVAC average. If you read higher than 700mVAC average, a device may be compromising your network, or you may not have your shield landed in one location of your controller grounded

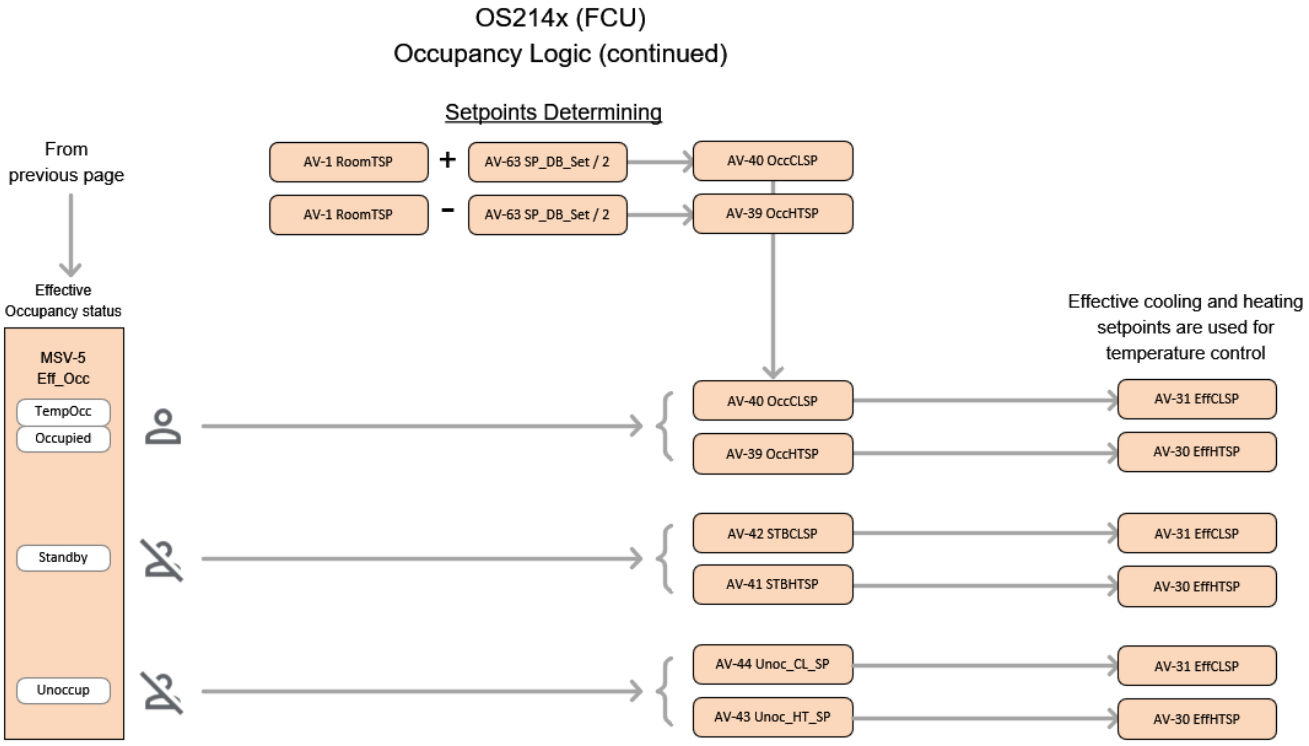
NON-FUNCTIONING TOPOLOGIES



Occupancy Logic




OS214x (RTU)
Occupancy Logic (continued)
Setpoints Determining
From previous page
Effective Occupancy status
MSV-5 Eff_Occ
TempOcc
Occupied
Standby
Unoccup
AV-1 RoomTSP
+
AV-37 SP_DB_Set / 2
AV-35 OccCLSP
AV-1 RoomTSP
-
AV-37 SP_DB_Set / 2
AV-36 OccHTSP
Effective cooling and heating setpoints are used for temperature control
AV-35 OccCLSP
AV-42 EffCLSP
AV-36 OccHTSP
AV-43 EffHTSP
AV-35 OccCLSP
+
AV-40 STBCoolOffset
AV-42 EffCLSP
AV-36 OccHTSP
-
AV-41 STBHeatOffset
AV-43 EffHTSP
AV-38 Unoc_CL_Set
AV-42 EffCLSP
AV-39 Unoc_HT_Set
AV-43 EffHTSP


OS214x (FCU)
Occupancy Logic (continued)
Setpoints Determining
From previous page
Effective Occupancy status
MSV-5 Eff_Occ
TempOcc
Occupied
Standby
Unoccup
AV-1 RoomTSP
+
AV-63 SP_DB_Set / 2
AV-40 OccCLSP
AV-1 RoomTSP
-
AV-63 SP_DB_Set / 2
AV-39 OccHTSP
Effective cooling and heating setpoints are used for temperature control
AV-40 OccCLSP
AV-39 OccHTSP
AV-31 EffCLSP
AV-30 EffHTSP
AV-42 STBCLSP
AV-41 STBHTSP
AV-31 EffCLSP
AV-30 EffHTSP
AV-44 Unoc_CL_SP
AV-43 Unoc_HT_SP
AV-31 EffCLSP
AV-30 EffHTSP

Occupancy Sequence of operation:

1. The thermostat determines occupancy using multiple inputs: Motion sensor, schedule input, user push buttons, or reading external BACnet object from the network. FCU can also use door and window contacts.
2. The **following sequences assume** that Occ_Cmd (MSV-6) = “Loc_occ” (*Local Occupancy)*.
   Else effective occupancy status (MSV-5) will follow the Occ_Cmd *“Occupied” or “Unoccup”*
3. Motion detection is selected using MSV-44 BI_PIR input; it can be from internal Radar “M” models, physical inputs Ai1 to Ai5 or external BACnet network binary status.
4. If motion is detected, the system enters a “Moving” state, triggering an internal “Motion” timer linked to AV-28 “MotionTimer_Set”. Typically, 10 minutes.
5. The motion detection output is represented by BV-3 Mot_Det “Set to Moving”. Once the timer expires, if no motion is detected again, BV-3 change to “None” (inactive).
6. BV-5 (Occ_Sch) represents the effective schedule status. It is set according to “Select schedule input” (MSV-45) input chosen. The choices are the “internal occupancy schedule” (SCH-1), any physical inputs Ai1–Ai5 or an external BACnet network binary status.
7. When BV-5 schedule is active “ON” and a motion source has been selected, the effective occupancy status (MSV-5) will switch from “Standby” to “Occupied” on motion detection.
8. When BV-5 schedule is active “ON” and MSV-44 BI_PIR input is set to “None”, the effective occupancy status (MSV-5) will be “Occupied”.
9. When BV-5 schedule is inactive “OFF”, the effective occupancy status (MSV-5) will be “Unoccupied”.

   The unoccupied  icon will be displayed on LCD.
10. If user presses any button, AV-27 will set the internal override timer. Typically, 60 minutes.

    The occupied  icon will be displayed on LCD.
11. Effective cooling (AV-42) and heating (AV-43) setpoints are used for controlling the system.
    They are calculated according to the “effective occupancy status” (MSV-5). See the previous flowchart.

OS214

OPENSTAT CONFIGURABLE WALL BACNET MS/TP & WI-FI CONTROLLER

Strato Automation

OPEN STAT



Description

- Configurable Wall Controller
- ASHRAE G36 Compliant Applications
- Simple: FCU, RTU, HP
- **7 I/O:** 2 UI, 1 AO, 4 BO
- Sensors: Temperature
- Wi-Fi 6: WPA3/2.4 GHz **(W MODEL)**
- BACnet MS/TP: ***B-BC BTL Certification (Pending)***
- BACnet WiFi6 IP w/ WEB services: ***B-BC BTL Certification (Pending)***

Model	Temperature	BACnet Wi-Fi 6	MSTP
OS214	X		X
OS214W	X	X	X

c UL us

Application

The OS214 controller streamlines the management of standard HVAC equipment, including electric heating, as well as Simple FCU, RTU and Heat Pump. OS214 provides multiple configuration profiles, offering flexibility to align with diverse project requirements.

Technical Specifications

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

Current Consumption:
- 1.5 VA controller only
- 96 VA Max, including BO's 2A each

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
- Optional WiFi6 2.4Ghz BACnet IP module with integrated WEB services that fully support REST API's
- 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 embedded WEB page services (**MOBILE CONFIG**), local interface, writing to BACnet configuration objects, or utilizing Strato Software tools.

Inputs:
2 Universal Inputs (AI/BI)
- Thermistor 10KΩ (type 2 or 3)
- Dry contact
- Voltage 0 - 10 Vdc (Input impedance of 20 K Ω)
- Resolution: 12 Bits (4096 segments)

Outputs:
4 Binary Outputs
- MOSFET Solid State Relays, Isolated
- 10 to 30VAC, 2.0A max

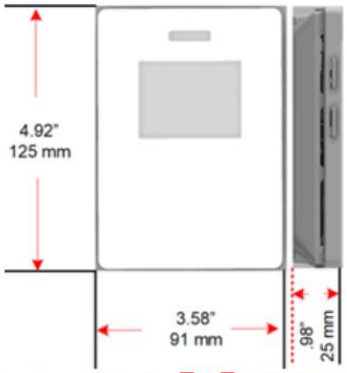
1 Analog Outputs
- Voltage 0 - 10 VDC linear

Temperature Sensor
- ±0.2 °C @ 0 °C to 60 °C
- ±0.36 °F @ 32 °F to 140 °F

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 listing (pending)
- FCC Class A digital device, pursuant to part 15 of the FCC Rules



Designed and assembled in CANADA

End User Operation Guide (RTU)

Select System Mode

Select Fan Mode



Increase Temperature Setpoint

Decrease Temperature Setpoint

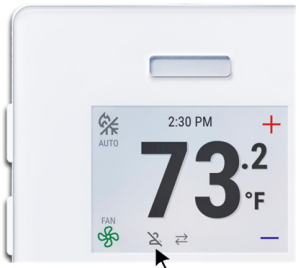
Normal display:

	System Status: *OFF / No Cooling / Cooling / No Heating / Heating*
	System Status Auto Mode: *No demand / Heat demand / Cool demand*
	Fan Status: *OFF / ON / Auto OFF / Auto ON*
	Status: Unoccupied / Occupied
	BACnet MSTP communication is connected.
	Service needed on equipment (select mode Off for 10 sec before retry)

Left Buttons Choices:

	Select System Mode: *OFF / Auto Heat-Cool / Cooling Only / Heating Only*
	Select Fan Mode: *ON / Auto*

When Schedule is Unoccupied:



Indicate "Unoccupied" state.
Pressing any button will trigger a 60 minutes temporary override.
The icon will change to "Occupied" during this period.

End User Operation Guide (FCU)

Select System Mode

Select Fan Speed



Increase Temperature Setpoint

Decrease Temperature Setpoint

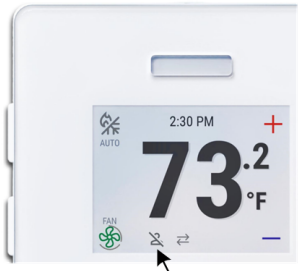
Normal display:

	System Status: *OFF / No Cooling / Cooling / No Heating / Heating*
	System Status Auto Mode: *No demand / Heat demand / Cool demand*
	Fan Status: *OFF / ON / Auto OFF / Auto ON*
	Status: Unoccupied / Occupied
	BACnet MSTP communication is connected.
	Service needed on equipment (select mode Off for 10 sec before retry)

Left Buttons Choices:

	Select System Mode: *OFF / Auto Heat-Cool / Cooling Only / Heating Only*
	Select Fan Speed: *Low / Med / High / Auto*

When Status is Unoccupied:



Indicate "Unoccupied" state.
Pressing any button will trigger a 60 minutes temporary override.
The icon will change to "Occupied" during this period.