



O & M Manual

Equipment: Building Automation System

Project: VA Renovate Space for Logistics (B-1)

Location: Fayetteville, AR

Engineer: Harrell Design Group

Mechanical: Comfort Systems

Submitted for approval by: Virgil Irvin
Northwest Controls Systems, Inc.

Date: 10 June 2026

Contents

- Control Diagrams with Sequences of Operation
- Bill of Materials
- Equipment Data Sheets



VIP-363-HOA

VIP-363-HOA

The VIP-363-HOA is designed for central plant systems, air handling units, clean rooms, fume hoods, large terminal units, and similar control and process equipment.



VIP-363-VAV

VIP-363-VAV

The VIP-363-VAV is designed for pressure-independent control of any single-duct variable air volume (VAV) box; it is ideally suited for critical environment applications such as Laboratory Airflow Tracking, Critical Patient Rooms, Operating Rooms, and other applications requiring precise control of airflows.

The VIP-363-VAV has a field replaceable integral airflow sensor. The airflow sensor is factory calibrated at multiple velocity points. Minimum, maximum, and reheat airflows can be entered using a Microset wall unit or compatible operator workstation software.

The Alerton® VisualLogic® IP Controller (VIP) is a BACnet Building Controller (B-BC) with a real-time clock, high resolution 16-bit universal inputs and outputs, and a 32-bit processor. The VIP controllers include on-board Hand-Off-Auto (HOA) switches for all outputs. It can operate as a stand-alone controller using its own real-time clock.

As a native BACnet B-BC, the VIP controllers integrate seamlessly with your BACnet system, communicating at up to 1000Mbps on BACnet/Ethernet, BACnet/IPv4, or BACnet/IPv6 networks. The VIP controllers have an integral 4-port switch that supports star, daisy-chain, and ring network topologies in addition to Rapid Spanning Tree Protocol (RSTP). Switch ports can be enabled/disabled.

The VIP controllers support the Alerton Microtouch™, as well as the BACtalk® Microset, Microset II, and Microset 4 intelligent wall sensors, which offer convenient data display, setpoint adjustment, and technician access to equipment setup parameters.

All control logic is programmed using Alerton's easy-to-learn graphical programming language, VisualLogic®. The VIP controllers can execute more complex calculations to meet the needs of increasingly demanding sequences of operations for building systems. Programming and setup data are stored in non-volatile flash memory, ensuring stable and reliable operation.

The VIP controllers host automation features such as schedules, trendlogs, alarms, and zones.

The VIP-363-HOA model supports up to eight expansion input/output modules VXIO-322-HOA and VXIO-965-HOA. The VIP-363-VAV does not support the VXIO modules.

VIP-363

UI	BO	UIO	AF
UNIVERSAL INPUTS	BINARY OUTPUTS	UNIVERSAL INPUTS/OUTPUTS (selectable between UI and AO)	AIR-FLOW SENSOR (VIP-363-VAV only)
3	6	3	1

TECHNICAL DATA

POWER – 20 to 30 VAC @ 50-60 Hz. 50 VA minimum (maximum 100 VA across all BO loads). Half-wave rectified. See IMPORTANT NOTE below.

INPUTS – 16-bit universal inputs accept 10k thermistor (type II and III), dry contact, 1k platinum RTD, 0-20 mA, 0-10 V, or dry-contact pulse. External resistor required for 0-20 mA. Pulse input maximum frequency of 100 Hz. Pulse input minimum duty cycle 5ms ON / 5ms OFF.

POWER OUTPUT FOR EXTERNAL SENSORS – 20 VDC $\pm 10\%$ @ 250 MA maximum.

BINARY OUTPUTS – Solid-state relay rated 20-30 VAC @ 50/60 Hz, 1.0 amp continuous, 3.5 amp inrush for 100ms. Hand-Off-Auto (H-O-A) switches for manual override, software controlled, monitored switch position status. See IMPORTANT NOTE below.

ANALOG OUTPUTS – 16-bit universal analog outputs support Voltage Mode: 0-10 VDC @ 10 mA maximum (1k ohm minimum); Current Mode: 4-20 mA @ 550 ohms Maximum; or Binary Mode: 12 VDC @ 20mA maximum relay coil current (for controlling low-coil current 12 VDC relays and solid-state relays). Hand-Off-Auto (H-O-A) switches with potentiometers for manual override, software controlled, monitored switch position and potentiometer status.

MICROSET – Supports BACtalk® Microset, Microset II, or Microset 4 on input 0 (IN-0).

INPUT/OUTPUT TERMINATIONS – Removable header-type screw terminals.

PRESSURE SENSOR (VIP-363-VAV) – 16-bit polarity insensitive pressure sensor. 0-2 in.w.c. (500 Pa) range. 0.0004 in.w.c. (0.1 Pa) zero-point accuracy. 0.5% span repeatability. 1/8-inch x 3/8-inch long barb-fitting. Field replaceable.

MAX DIMENSIONS – 5.32" (135 mm) W x 4.33" (110 mm) H x 2.26" (57.4 mm) D.

MOUNTING – 35mm DIN rail or screw mounting.

ENVIRONMENTAL – Ambient: -20 to 55°C (-4 to 131°F) / Storage: -20 to 85°C (-4 to 185°F) / 5 to 95%RH non-condensing.

COMMUNICATIONS – Built-in 4-port Gigabit Ethernet Switch supports 10/100/1000BASE-T.

PROTOCOLS – BACnet/Ethernet, BACnet/IPv4, BACnet/IPv6, and Rapid Spanning Tree Protocol (RSTP).

PROGRAMMING – Supports Alerton's BD9 DDC file format using Alerton's VisualLogic® toolset.

REAL TIME CLOCK – 24-hour, 365-day, multi-year calendar, with 24-hour power fail backup.

AUTOMATION FEATURES – Supports 100 trendlogs, 100 alarms, 10 schedules, and 1 zone (internal points only)

MICROPROCESSOR – 32-bit ARM Cortex-A9, 800 MHz.

MEMORY – 1GB LPDDR3 RAM and 2GB solid-state disk storage.

I/O MICROCONTROLLER – 32-bit ARM Cortex-M4F, 180 MHz.

SECURITY – Integrated secure boot prevents loading of tampered firmware.

INPUT/OUTPUT EXPANSION – VIP-363-HOA model supports up to a maximum of eight expansion I/O modules VXIO-322-HOA and VXIO-965-HOA. Expansion I/O modules connect directly to VIP-363-HOA or can be remotely located up to 3000 feet away from the VIP-363-HOA. VIP-363-VAV does not support the VXIO modules.

ORDERING INFORMATION

ITEM NUMBER

VIP-363-HOA	ASCENT VISUALLOGIC® IP CONTROLLER
VXIO-322-HOA	ASCENT VISUALLOGIC® EXPANSION I/O MODULE
VXIO-965-HOA	ASCENT VISUALLOGIC® EXPANSION I/O MODULE
VIP-363-VAV	ASCENT VISUALLOGIC® IP CONTROLLER WITH INTEGRAL AIRFLOW SENSOR
VAV-FILTER	SINGLE FILTER FOR VIP-363-VAV

CERTIFICATION AND CONFORMANCE

BACNET CONFORMANCE – BACnet Building Controller (B-BC) level device; BTL listing, certification, and compliance to Revision 18.

UL – Listed with Underwriters Laboratory for Energy Management Equipment (PAZX) under the UL Standard for Safety 60730-1; listing includes both U.S. and Canadian (CSA/cUL) certification. Listed in UL File# E87741. UL 2043 and CAN/ULC-S142 compliance for use in plenum applications.

EMC – EMC Directive 2014/30/EU (European CE Mark).

RoHS – RoHS Directive 2011/65/EU.

FCC – FCC Part 15, Subpart B.

IC – ICES-003 Issue 6.

IMPORTANT NOTE

This device is UL listed and limited to 100VA maximum. Binary output loads are restricted by this maximum VA rating. If all 6 binary outputs are connected and fully loaded (@24VA each) the total VA of the device will exceed the UL listed and limited maximum rating. DO NOT EXCEED 100VA MAXIMUM RATING!



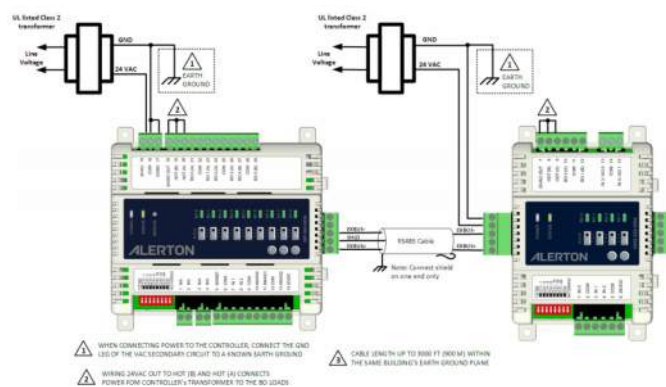
16201 25th Avenue W., Lynnwood, WA 98087
Telephone: (425) 921-4900
alerton.com / sales@alerton.com

EXPANDING THE ALERTON VIP CONTROLLER CAPACITY

The Alerton® VisualLogic® Expansion Input/Output Modules (VXIO) are designed to expand the I/O capacity of Alerton® VisualLogic® IP Controllers (VIP).

The VIP controller is a BACnet Advanced Application Controller (B-AAC) with a real-time clock, high resolution 16-bit universal inputs and outputs, and a 32-bit processor. The VIP-363-HOA model is designed to support up to eight VXIO modules providing the I/O expansion for applications such as central plant systems, air handling units, clean rooms, fume hoods, large terminal units, and similar control and process equipment.

VXIO modules connect directly into the I/O expansion slot of a VIP-363-HOA controller or another VXIO module. Alternatively, VXIO modules can also be mounted remotely with total RS485 cable length of up to 3000 feet.



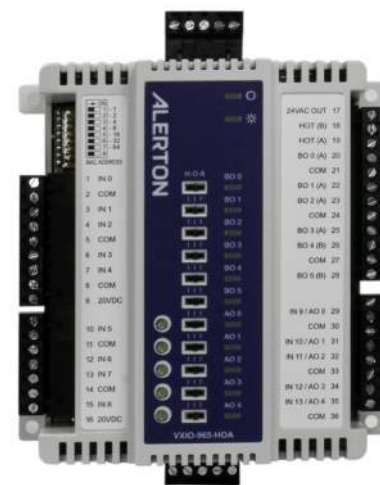
⚠ WHEN CONNECTING POWER TO THE CONTROLLER, CONNECT THE GND USE OF THE VAC SECONDARY CIRCUIT TO A KNOWN EARTH GROUND.

⚠ WIRING 24VAC OUT TO HOT (B) AND HOT (A) CONNECTS POWER FROM CONTROLLER'S TRANSFORMER TO THE BO LOADS.

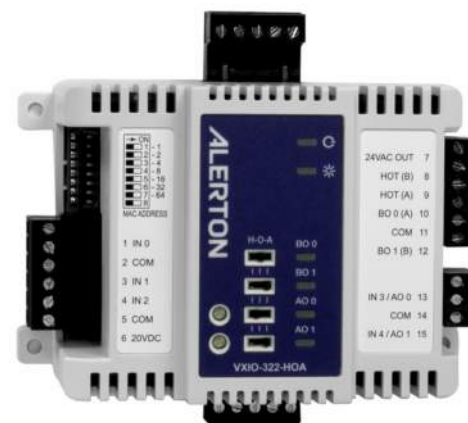
⚠ CABLE LENGTH UP TO 3000 FT (900 M) WITHIN THE SAME BUILDING'S EARTH GROUND PLANE.



VIP-363-HOA controller, VXIO-232-HOA and VXIO-965-HOA expansion modules



VXIO-965-HOA



VXIO-322-HOA

VXIO-322-HOA

UI

UNIVERSAL INPUTS

3

BO

BINARY OUTPUTS

2

UIO

UNIVERSAL INPUTS/OUTPUTS
(selectable between UI and AO)

2

AF

AIR-FLOW SENSOR
(VIP-363-VAV only)

0

VXIO-965-HOA

UI

UNIVERSAL INPUTS

9

BO

BINARY OUTPUTS

6

UIO

UNIVERSAL INPUTS/OUTPUTS
(selectable between UI and AO)

5

AF

AIR-FLOW SENSOR
(VIP-363-VAV only)

0

TECHNICAL DATA

POWER – 20 to 30 VAC @ 50-60 Hz. VXIO-965-HOA: 35 VA minimum / VXIO-322-HOA: 15 VA minimum. (maximum 100 VA across all BO loads). Half-wave rectified. See IMPORTANT NOTE below.

INPUTS – 16-bit universal inputs accept 10k thermistor (type II and III), dry contact, 1k platinum RTD, 0-20 mA, 0-10 V, or dry-contact pulse. Pulse input maximum frequency of 100 Hz. Pulse input minimum duty cycle 5ms ON / 5ms OFF.

POWER OUTPUT FOR EXTERNAL SENSORS – 20 VDC $\pm 10\%$ @ 250 mA maximum for VXIO-965-HOA and 100 mA maximum for VXIO-322-HOA.

BINARY OUTPUTS – Solid-state relay rated 20-30 VAC @ 50/60 Hz, 1.5 amps continuous, 3.5 amp inrush for 100ms. Hand-Off-Auto (H-O-A) switches for manual override, software controlled, monitored switch position status. See IMPORTANT NOTE below.

ANALOG OUTPUTS – 16-bit universal analog outputs support Voltage Mode: 0-10 VDC @ 10 mA maximum (1k ohm minimum); Current Mode: 4-20 mA @ 550 ohms Maximum; or Binary Mode: 12 VDC @ 20mA maximum relay coil current (for controlling low-coil current 12 VDC relays and solid-state relays). Hand-Off-Auto (H-O-A) switches with potentiometers for manual override, software controlled, monitored switch position and potentiometer status.

INPUT/OUTPUT TERMINATIONS – Removable header-type screw terminals.

MAX DIMENSIONS – VXIO-965-HOA: 5.32" (135 mm) W x 4.33" (110 mm) H x 2.26" (57.4 mm) D. / VXIO-322-HOA: 3.35" (85 mm) W x 4.33" (110 mm) H x 2.26" (57.4 mm) D.

MOUNTING – 35mm DIN rail or screw mounting

ENVIRONMENTAL – Ambient: -20 to 55°C (-4 to 131°F) / Storage: -20 to 85°C (-4 to 185°F) / 5 to 95%RH non-condensing.

COMMUNICATIONS – Communications with the VIP controller is a proprietary protocol over RS-485.

MICROCONTROLLER – 32-bit ARM Cortex M4, 120 MHz.

MEMORY – 512KB of on-chip flash and 128KB of RAM.

SECURITY – Integrated secure boot prevents loading of tampered firmware.

ORDERING INFORMATION

ITEM NUMBER

VIP-363-HOA	ASCENT VISUALLOGIC® IP CONTROLLER
VXIO-322-HOA	ASCENT VISUALLOGIC® EXPANSION I/O MODULE

VXIO-965-HOA	ASCENT VISUALLOGIC® EXPANSION I/O MODULE
--------------	--

CERTIFICATION AND CONFORMANCE

UL – Listed with Underwriters Laboratory for Energy Management Equipment (PAZX) under the UL Standard for Safety 60730-1; listing includes both U.S. and Canadian (CSA/cUL) certification. Listed in UL File# E87741. UL 2043 and CAN/ULC-S142 compliance for use in plenum applications.

EMC – EMC Directive 2014/30/EU (European CE Mark).

RoHS – RoHS Directive 2011/65/EU.

FCC – FCC Part 15, Subpart B.

IC – ICES-003 Issue 6.

IMPORTANT NOTE

This device is UL listed and limited to 100VA maximum. Binary output loads are restricted by this maximum VA rating. If all 6 binary outputs are connected and fully loaded (@24VA each) the total VA of the device will exceed the UL listed and limited maximum rating. DO NOT EXCEED 100VA MAXIMUM RATING!



16201 25th Avenue W., Lynnwood, WA 98087
Telephone: (425) 921-4900 / Fax: (425) 921-4872
alerton.com / sales@alerton.com



MICROSET 4

Alerton's Microset 4 wall sensor offers a sleek, modern look that is a perfect fit in any building. Its strengthened glass touchscreen user interface has the capability to display the setpoint, room, and outside air temperatures. Relative humidity and fan status can also be displayed. A configurable LED Status Light indicator displays heating or cooling status at a glance. The Microset 4 sensor offers several options to meet precise job specifications.

The Microset 4 is fully backward compatible with Alerton's BACtalk™ system, providing users with a tenant control interface, test and balance tool, and field service tool, while enabling them to leverage their existing Alerton devices.

The Microset 4 line of wall sensors includes a model with a carbon dioxide (CO2) sensor as well as one with MS/TP capability.

The flexible Microset 4 displays information and allows occupant control according to the application.

Customizable and intuitive operation enables occupants to turn zone HVAC equipment ON or OFF in 30-minute increments for sporadically occupied areas, such as conference rooms, to set window blinds to open or closed, and offers optional control of lights and fan. This makes saving energy easy and supports green standards of building construction and operation.

With its sleek edge-to-edge hardened glass, capacitive touch backlit display, and polished finish, Alerton's Microset 4 wall sensor offers a full complement of features and looks good on any wall.

FEATURES AND HIGHLIGHTS

VERSATILE

- Occupant can view room and outside air temperatures, indoor and outdoor humidity (if enabled in programming), select fan status and change room temperature setpoints. Data and functions are selectable.

ENERGY EFFICIENT

- Occupants can select after-hours operation in 30-minute increments or turn zone equipment ON and OFF.

FLEXIBLE

- Robust and easy-to-use test and balance and field service modes allow maintenance personnel to monitor and adjust parameters.

ATTRACTIVE

- Modern styling enhances any interior, and functional design makes operation intuitive.

TECHNICAL DATA

THERMISTOR

The thermistors are integrated with the device. The thermistors and humidity sensors are processed by an onboard microcontroller.

TYPE - NTC.

RESISTANCE - 100K Ohm at 77 °F (25 °C).

TIME CONSTANT* - 20 minutes (to 63% of new temperature).

STABILITY* - Maximum 0.036 °F (0.02 °C) drift per year.

ACCURACY* - ± 0.36 °F over range of 32 to 116 °F (0 to 47 °C); ± 0.19 °F at 72 °F (22 °C).

**Based on normal operating conditions.*

POWER - 24 VAC.

PROCESSOR & MEMORY - ARM Cortex-M4 processor with onboard flash memory.

DIMENSIONS - 4.5" H x 3"W x .875" D (114.9mm H x 76.6mm W x 22mm D).

MS4-THC: 4.54" H x 3.04"W x 1.25" D (115.2mm H x 77.2mm W x 31.6mm D).

ENVIRONMENTAL - 32 to 140 °F (0 to 60 °C); 0 to 90% RH, non-condensing.

Specifications subject to change without notice.

CO2 SENSOR

OPERATING TEMPERATURE RANGE - 32 to 122 °F (0 to 50 °C).

POWER CONSUMPTION - 1.5 mA for measurement every 30s;
0.74 mA for measurement every 60s; 86 µA for measurement every
15 min; 52 µA for measurement every 60 min.

MEASUREMENT RANGE - 0 to 5000 ppm.

ACCURACY - ± 30 ppm, ± 3% of reading.

HUMIDITY SENSOR

OPERATING TEMPERATURE RANGE - 50 to 113 °F (10 to 45 °C).

REPEATABILITY - Minimum ± 0.5% RH.

ACCURACY - ± 3% at 10 to 90% RH,
± 5% at 0 to 10% and 90% to 100%RH.

COMMUNICATIONS - Microset bus up to 115.2 Kbps.

RATINGS - UL Standard for Safety 916;
EMC Directive 89/336/EEC (European CE Mark)
FCC Part 15.107 & 109, Class B, CFR47-15.

ORDERING INFORMATION

ITEM NUMBER

MS4-TH	Microset 4 with temperature and humidity sensors
MS4-TH-NL	Microset 4 with temperature and humidity sensors and no logo
MS4-TH-MSTP	MS/TP Microset 4 with temperature and humidity sensors
MS4-THC	Microset 4 with temperature, humidity, and CO2 sensors

STYLISH
TOUCHSCREEN
WALL SENSOR WITH
TEMPERATURE AND
HUMIDITY SENSING.

6670 185th Avenue NE, Redmond, WA 98052
Telephone: (425) 869-8400 / Fax: (425) 869-8445
alerton.com / sales@alerton.com

Temperature Sensors

Duct sensors

- Accurate over a wide temperature range
- Tabs for easy installation
- Variety of housings, lengths, harness lengths, and mounting options for versatility



Immersion sensors and wells

- Four-, six-, and eight-inch lengths
- Immersion wells in stainless steel

Wallplate sensors

- Brushed stainless steel is attractive and tamper resistant
- Rugged, reliable design
- Order versions with field service jack, override switch, or both



Outside air sensors

- Gasketed, weathertight enclosures

Duct average sensors

- Six-foot, twelve-foot, or twenty-four-foot versions
- Rigid or flexible probe



See page 2 for ordering and technical information

Technical Data

- **Type**
Uni-curve Type II
- **Resistance**
3k ohm or 10k ohm at 77 deg. F (25 deg. C)
- **Interchangeability**
0.36 deg. F (0.20 deg. C)
- **Time constant***
10 seconds (to 66% of new temperature)
- **Stability***
0.036 deg. F (0.020 deg. C) drift per year
- **Accuracy**
±0.36 deg. F (0.20 deg. C) over range of 32–158 deg. F (0–70 deg. C)

Ordering information

Step 1 Select Type	Step 2 Select Length or Style	Step 3 Select Mounting or Material	Step 4 Select Wiring Harness or Thread	Step 5 Select Resistance
11 = Wallplate (stainless steel) 20 = Duct 21 = Immersion 31 = Immersion well 30 = Pencil 32 = Outside air 40 = Raw thermistor 50 = Duct average	Wallplate 01 = Wallplate only 02 = Override switch 03 = Override switch and communications jack 04 = Communications jack only Duct, immersion, immersion well, and pencil 25 = 2.5 inch 04 = 4 inch 06 = 6 inch 08 = 8 inch 12 = 12 inch (duct only) 25 = 2.5 inch (immersion and immersion well only) Outside air, raw thermistor 00 = N/A Duct average 06 = 6 foot 12 = 12 foot 24 = 24 foot	Wallplate W = Wallplate Duct, immersion F = Flange (duct only) P = Plastic box G = Galvanized box M = Painted steel box C = Stainless steel Pencil, raw thermistor O = N/A Outside air P = Plastic box D = Die-cast box Duct average R = Rigid probe X = Flexible probe	Wallplate A = Wire leads Duct A = Wire leads B = Plenum rated (flange only) Immersion H = ½" NPT (outside diameter) Immersion well I = ½" NPT internal thread, ½" NPT external J = ½" NPT internal thread, ¾" NPT external Pencil A = N/A Raw thermistor B = Plenum rated C = 7 foot standard	03 = 3k ohm 10 = 10k ohm Immersion wells 00 = N/A

TS- - - -AA

Example: 3k ohm duct sensor, 6 inches, with flange, 3-inch leads
TS-2006-FA-03-AA

Example: 10k ohm immersion sensor, 8-inch probe with plastic enclosure and ½" NPT
TS-2108-PH-10-AA

Example: Stainless well for 6-inch immersion sensor with ½" NPT internal thread, ¾" NPT external
TS-3106-CJ-00-AA

*Under normal operating conditions

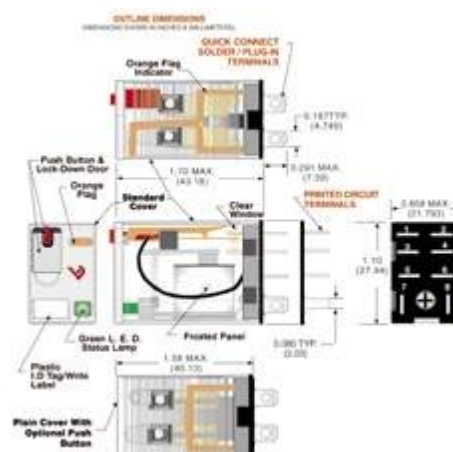
VMD2B-F Series Full-Featured DPDT DIN Socket Relays

12VDC/24VDC/24VAC/120VAC/240VAC

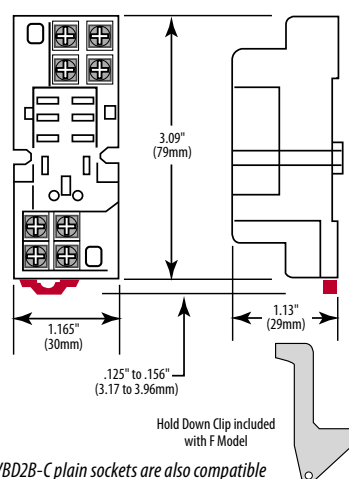


The Veris VMD2B-F Series are full featured DPDT blade style relays for socket/DIN mounting. The VMD2B-F Series are equipped with an LED for coil proof, a flag for contact proof, a push to test button for momentary contact control, and an override lever to hold the contacts in ON position. The VMD1B-F will allow for instant and conclusive troubleshooting. Never wonder if the relay, control system, or mechanical wiring is the cause of a problem. The DIN rail compatible VBD1B-F series sockets feature fingersafe terminals and the an integrated hold down clip.

DIMENSIONS



VBD2B-F Socket



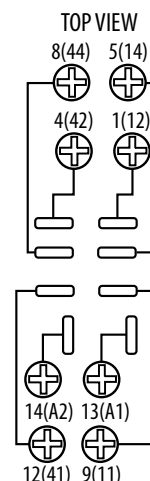
NOTE: VBD2B-C plain sockets are also compatible

WIRING DIAGRAM

Function	NEMA (IEC)* Terminal
Coil (+)*	14(A2)
Coil (-)*	13(A1)
COMM1	9(11)
N.O.1	5(14)
N.C.1	1(12)
COMM2	12(41)
N.O.2	8(44)
N.C.2	4(42)

*Sockets support both numbering systems by labeling each terminal with two numbers.

**Observe polarity for relays with DC coil voltages only



ORDERING INFORMATION

(Coil)	
VMD2B-F	
12D = 12VDC	
24D = 24VDC	
24A = 24VAC	
120A = 120VAC	
240A = 240VAC	

NOTE: All 2B-F models contain an LED, Contact Flag, Push to Test, and Override Lever

Example: VMD2B-F24A = DPDT 15A Relay with 24VAC coil, LED, Contact Flag and Push to Test

SPDT SOCKET ORDERING INFORMATION

MODEL	FINGER SAFE	HOLD DOWN CLIP
VBD2B-C		
VBD2B-F		



E198453



LR 35144

These relays are UL Listed, when used with the Veris sockets.

TYPICAL COIL PERFORMANCE

Coil Power: 0.9 watts DC, 1.2VA (60Hz) AC@25C

CONTACT RATINGS

Voltage	Amperage (r)	Motor Load 50/60Hz.
28VDC	12A	-
110/120VAC	15A	1/2HP
220/277	12A	1HP



DESCRIPTION

The **Cleveland Controls AFS Series Adjustable Differential Pressure Switches** are general-purpose, airflow-proving switches designed for HVAC and building automation applications. The **AFS Series** can be used to sense positive, negative, or differential air pressure. The diaphragm and calibration spring are housed in a plated enclosure with a removable metal guard protecting the set point screw and snap action switch terminals. Electrical connections are made through a 7/8 diameter opening in the metal guard that accepts a conduit connection. Air sampling connections accept OD rigid or semi rigid tubing. The **Model AFS-460** features a manual reset button to close the switch following actuation. For low current applications use **Model AFS-405** with gold contacts.

FEATURES

- Adjustable set point
- For static or differential pressure
- 15A switch rating
- Manual reset (Model AFS-460)
- Gold contacts (Model AFS-405)
- UR, CSA, FM approved
- Two-year warranty

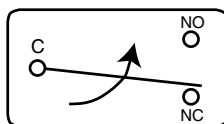
APPLICATION

- Proving fan status
- Monitoring filter for excess pressure drop
- Monitoring duct static pressure
- Proving air flow
- Monitoring damper status

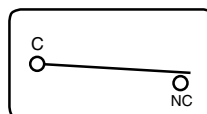


SPECIFICATIONS		
Contact Rating		
AFS-145, 222, 262, 405	15A non-inductive, 277 VAC, 60 Hz	
	24 VAC @ 2.4A	
AFS-460, 460-DSS	15A @ 125-277 VAC	
	1/4 HP @ 125 VAC	
	1/2 HP @ 250 VAC	
	1/2A @ 125 VDC	
Contact Type		
AFS-145, 222, 262, 405	SPDT	
AFS-136, 460-137	SPDT	
AFS-460	SPST N.C.	
AFS-460-DSS	2-SPST N.C.	
Switch Differential		
AFS-145, 222, 262, 405	Progressive, increasing from approximately 0.02" W.C. (5.0 Pa) @ minimum set point to approximately 0.8" W.C. (199 Pa) @ maximum set point	
AFS-460, 460-DSS	None, manual reset	
Overpressure		0.5 psig (3.5 kPa)
Measurement Range		
AFS-145, 222, 405		0.05" to 12.0" W.C. (12.5 to 2989 Pa)
AFS-262		0.05" to 2.0" W.C. (12.5 to 498 Pa)
AFS-460		0.4" to 12.0" W.C. (99.3 to 2989 Pa)
AFS-460-DSS		1.25" to 12.0" W.C. (311 to 2989 Pa)
Life Expectancy		AFS-145, 222, 262, 405: 100,000 cycles minimum @ 0.5 psig (3.5 kPa) maximum pressure each cycle and at maximum electrical load AFS-460: 6000 cycles
Operating Temperature		-40° to 180°F (-40° to 82°C)
Process Connection		
AFS-145		1/8" NPTF
All Others		Ferrule and nut compression for 1/4" OD tubing
Approvals		CE, UL File MH6213, cCSAus, RoHS
Weight		1.2 lb (0.54 kg)
Warranty		2 years

WIRING

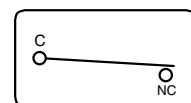


Action on a rise in differential pressure

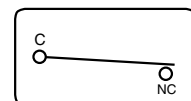


Opens on a rise in differential pressure

Opens on a rise in differential pressure



A Lead



B Lag

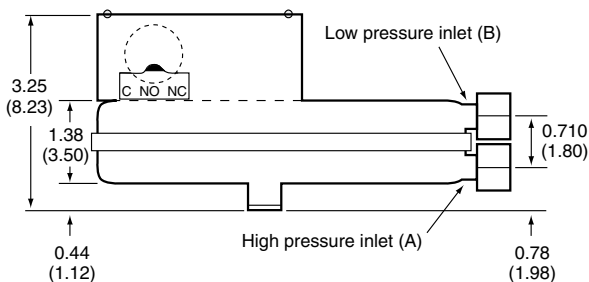
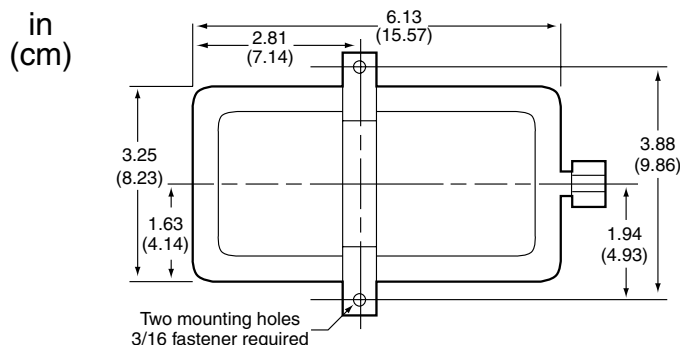


PRESSURE

ADJUSTABLE DIFFERENTIAL PRESSURE SWITCHES

AFS SERIES

DIMENSIONS



OPERATION

Select a mounting location that is free from vibration. The switch must be mounted with the diaphragm in any vertical plane in order to obtain the lowest specified operating setpoint. Avoid mounting with the sample line connections in the up position. Surface mount via the two 3/16" diameter holes in the integral mounting bracket.

The Model AFS-460-DSS has a lead switch (A) and a lag switch (B). The lead switch trips according to the setpoint knob and the lag switch trips after the lead switch. If dual-switch simultaneous operation is required, order AFS-460-136 (120 VAC power) or AFS-460-137 (24 VAC power).

Locate sampling probe a minimum of 1-1/2 duct diameters downstream from the air source. Install the sampling probe as close to the center of the airstream as possible.

Refer to the Dimensions drawing to identify the high pressure inlet (A) and the low pressure inlet (B), and connect the sample lines as follows:

Positive Pressure Only

Connect the sample line to (A);
(B) remains open to the atmosphere.

Negative Pressure Only

Connect the sample line to (B);
(A) remains open to the atmosphere.

Two Negative Samples

Connect the higher negative sample to (B);
Connect the lower negative sample to (A).

Two Positive Samples

Connect the higher positive sample to (A);
Connect the lower positive sample to (B).

One Positive and One Negative Sample

Connect the positive sample to (A);
Connect the negative sample to (B).

ORDERING INFORMATION

MODEL

AFS-145*

AFS-222*

AFS-222-112

AFS-262*

AFS-262-112

AFS-405

AFS-460*

AFS-460-136

AFS-460-137

AFS-460-DSS*

DESCRIPTION

Differential pressure switch 0.05" to 12" W.C. (12.5 to 2989 Pa), 1/8" NPTF

Differential pressure switch 0.05" to 12" W.C. (12.5 to 2989 Pa), 1/4" compression fittings

Differential pressure switch 0.05" to 12" W.C. (12.5 to 2989 Pa), 1/4" barbed fittings

Differential pressure switch 0.05" to 2" W.C. (12.5 to 498 Pa), 1/4" compression fittings

Differential pressure switch 0.05" to 2" W.C. (12.5 to 498 Pa), 1/4" barbed fittings

Differential pressure switch 0.05" to 12" W.C. (12.5 to 2989 Pa), gold contacts

Manual reset differential pressure switch, 0.4" to 12" W.C. (99.3 to 2989 Pa), SPST

Manual reset differential pressure switch, 0.4" to 12" W.C. (99.3 to 2989 Pa), 120 VAC, SPDT

Manual reset differential pressure switch, 0.4" to 12" W.C. (99.3 to 2989 Pa), 24 VAC, SPDT

Manual reset differential pressure switch, 1.25" to 12.0" WC (311 to 2989 Pa), 2 SPST switches

* C models Kele calibration available

RELATED PRODUCTS

21122

6" aluminum impact tube, 1/4" OD connection

PAGE

21122-112

6" aluminum impact tube for 1/8" thru 1/4" ID flexible plastic tubing

1113

60681

Static or total pressure sensing kit

1113

A-301-K

Duct static pressure tip, 1/4" compression

1113

A-302-K

Duct static pressure tip, 1/4" barb

1113

A-308-K

Duct static pressure fitting, 1/4" barb

1113

A-345-K

Flange mounting kit (1 required for each A-301-K or A-302-K)

1113

T-101

1/4" OD black poly tubing, 1 coil, 250 ft (76 m)

901



SPLIT-CORE & SOLID-CORE GO/NO GO CURRENT SWITCHES

**5 Year
Warranty**

H300



**150mA
TURN-ON!**

Micro-housing, install anywhere
US Patent No. 7,193,428; other patents pending

H600



**150mA
TURN-ON!**

Lowest turn-on current in the industry, only 150mA
US Patent No. 7,193,428

H800/H800NC/H800HV



Mini housing with adjustable mounting bracket
for easy installation
US Patent No. 7,193,428

H900



Standard housing for larger conductors

Current Switches: Fixed Trip Point

Hawkeye x00 go/no go current switches provide a cost-effective solution for monitoring status on unit vents, exhaust fans, recirculation pumps, and other fixed loads where belt loss is not a concern.

Veris has applied new technology to the H300, H600, and H800 models to achieve impressive improvement in turn-on levels. The Hawkeye H300 and H600 now have the lowest turn-on current in the industry at a mere 150mA!

APPLICATIONS

- Monitoring on/off status of electrical loads
- Monitoring direct-drive units, exhaust fans, and other fixed loads
- Verifying lighting run times

On/off status for direct-drive fans, pumps, and process motors

- More reliable for status than relays across auxiliary contacts
- Ideal for direct-drive units, unit vents, fan coil units, exhaust fans, and other fixed loads
- Great for lighting status—less expensive than 277V relays
- Low 0.15A turn-on (H300 and H600)...ideal for small exhaust fans (not intended to detect belt loss)
- Removable mounting bracket provides installation flexibility

Monitor status of fans, pumps, motors & other electrical loads

- Split-core H300, H600, and H900 for fast retrofit installation
- Mini solid-core H800 and micro split-core H300 fit in tight enclosures...saves valuable panel space
- 100% solid-state, no moving parts to fail
- Polarity insensitive output
- 5-year limited warranty



SPECIFICATIONS

Sensor Power (N.O. Models)	Induced from monitored current
Insulation Class	600VAC RMS (UL), 300VAC RMS (CE)
Frequency Range	50/60 Hz
Temperature Range	H800, H800NC, H300, H900: -15° to 60°C (5° to 140°F) H600: -15° to 40°C (5° to 104°F) (to 200A); -15° to 60°C (5° to 140°F) (to 150A) H800HV: -40° to 50°C (-40° to 122°F) (to 200A); -40° to 75°C (-40° to 167°F) (to 100A, & 0.25A output)
Humidity Range	10-90% RH, non-condensing
Sensor Power (N.C. Models)	5-30VDC, permanently connected
Off State Leakage (N.C. Models)	34µA@5VDC, 200µA@30VDC
On State Voltage Drop (N.C. Models)	1.9VDC (max.) @0.1A
Terminal Block Maximum Wire Size	14 AWG (16 AWG for H300)
Terminal Block Torque (nominal)	4 in-lbs (7 in-lbs for H300)
Agency Approvals	UL 508 open device listing CE:EN61010-1:2001-02, CAT III, deg. 2, basic insulation

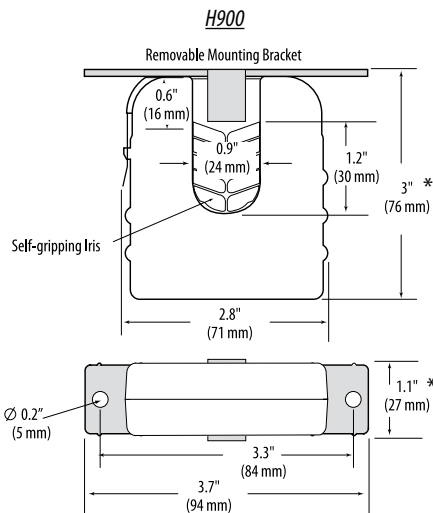
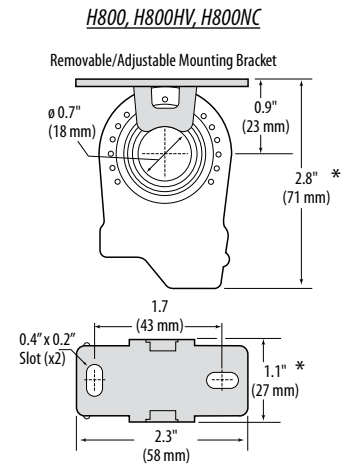
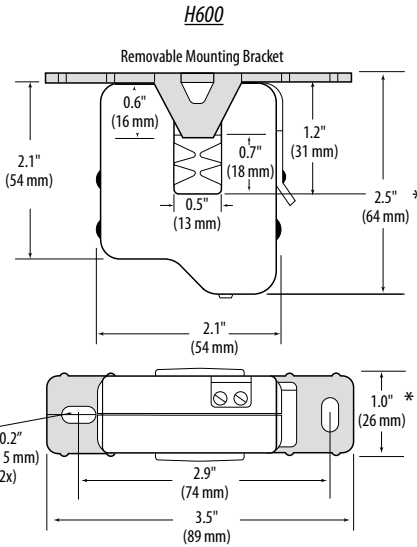
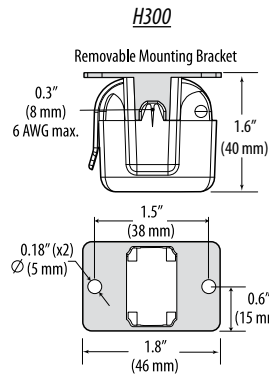
Do not use the LED status indicators as evidence of applied voltage.

For applications requiring double or reinforced insulation, please contact the factory.





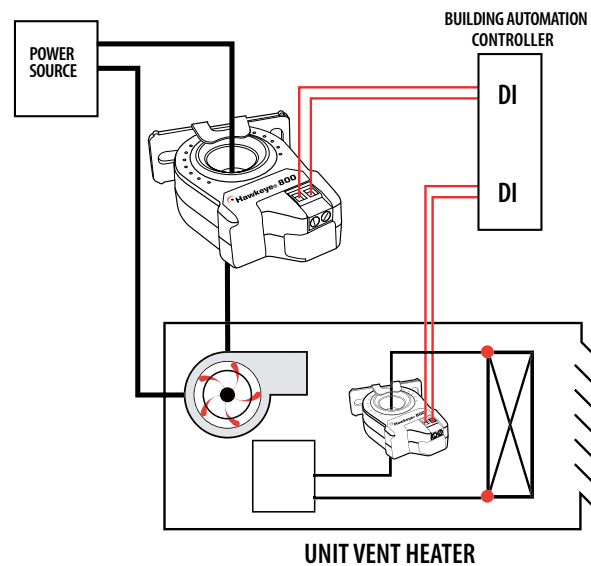
DIMENSIONAL DRAWINGS



* Terminal block may extend up to 1/8" over the height dimensions shown.

APPLICATION/WIRING EXAMPLE

Unit Vent Heater Control



ORDERING INFORMATION



MODEL	AMPERAGE RANGE	STATUS OUTPUT (max.)	TRIP POINT	HOUSING	UL	CE
H300	0.15 - 60A	N.O. 1.0A@30VAC/DC	0.15A or less	Split-core	● ¹	● ²
H600	0.15 - 200A	N.O. 1.0A@30VAC/DC	0.15A or less	Split-core	● ¹	●
H800	0.25 - 200A	N.O. 1.0A@30VAC/DC	0.15A or less	Solid-core	● ¹	●
H800NC	0.5 - 200A	N.C. 0.1A@30VAC/DC	0.5A or less	Solid-core	● ¹	
H800HV	0.75 - 200A	N.O. 0.5A@250VAC/DC	0.75A or less	Solid-core	● ³	
H900	1.5 - 200A	N.O. 1.0A@30VAC/DC	1.5A or less	Split-core	●	●

¹ Listed for use on 75°C insulated conductors.

² Product provides functional insulation only.

³ Listed for use on 90°C insulated conductors.

ACCESSORIES

DIN Rail Clip Set, DIN Rail, and DIN Stop Clip...see page 219.



800.354.8556



503.598.4564

www.veris.com

©2008 Veris Industries



2% DUCT / OSA HUMIDITY TRANSMITTERS MODELS HD20K, HO20K

DESCRIPTION

Models HD20K Duct and HO20K Outside Air 2% Humidity Transmitters have been specifically designed for use in HVAC/BAS applications. These instruments measure relative humidity from 0% to 100%. The standard two-wire, 4-20 mA output provides low-cost duct and outside air monitoring for building control. When accuracy adjustment is necessary, the transmitter can be calibrated with a simple-to-use, handheld calibration tool that plugs into the transmitter board. Both duct and OSA RH transmitters are available with thermistor or RTD temperature sensors.

OPERATION

The transmitter converts the relative humidity into a 4-20 mA signal. The unit has a microprocessor that is based on 10-point calibration from the factory. The microprocessor maintains both high accuracy and low cost with a wide humidity and operational temperature span.



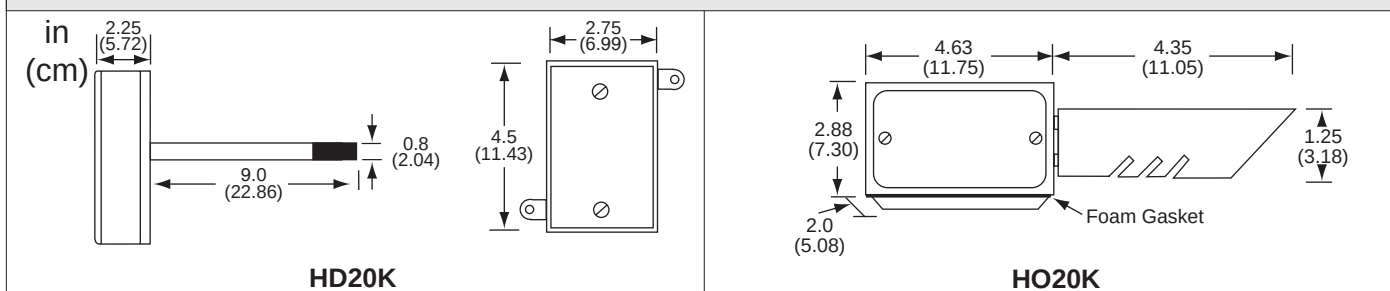
FEATURES

- 0% to 100% RH measurement
- $\pm 2\%$ accuracy (20% to 95% RH)
- One-point calibration with calibration meter
- Two-wire, 4-20 mA output
- Temperature compensated
- Optional thermistor or RTD sensor

SPECIFICATIONS

Sensor	Resistive bulk polymer	Supply voltage	18-36 VDC
Accuracy	$\pm 2\%$ RH @ 77°F (25°C), 20% to 95% RH	Adjustments	One point with calibrator
Temp effect	Temperature compensated with less than 0.06% per °F (0.11% per °C)	Operating range	0% to 100% RH, 4-20 mA
Sensitivity	0.4% RH	Operating temp	-20° to 140°F (-29° to 60°C)
Repeatability	0.5%	Load impedance	700Ω @ 24 VDC
Hysteresis	Less than 1%	Connections	Screw terminals
Long-term stability	Less than 1% drift per year	Enclosure	Aluminum single gang with gasketed cover
Output	Two-wire, 4-20 mA	Weight	1.4 lb (0.63 kg)
Output range	0% to 100% RH	Optional temp	
		Thermistor	Type 3, 21, 22, 24, 27, 42
		RTD	Type 81, 85, 91

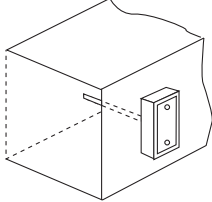
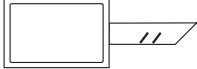
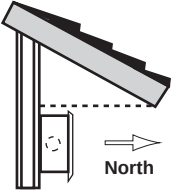
DIMENSIONS

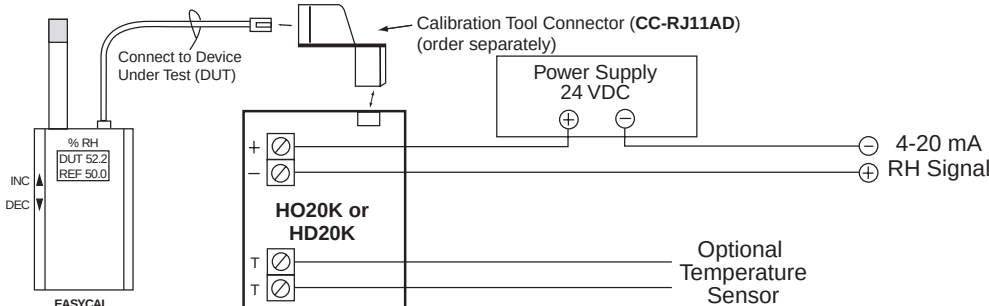




2% DUCT / OSA HUMIDITY TRANSMITTERS

MODELS HD20K, HO20K

MOUNTING DUCT SENSOR	MOUNTING OSA SENSOR
The transmitter should be mounted so that the 9" (22.86 cm) probe is in the center of the duct. The transmitter should be mounted away from fans, corners, heating and cooling coils, and other equipment that will affect the measurement of relative humidity. It should be mounted in a location that will receive adequate air flow for proper operation. The unit may be mounted horizontally or vertically. 	The transmitter should be mounted in a sheltered area, preferably on the north side of a building under the eave. This location will prevent RH at the sensor from being affected by sun-heated air rising up the side of the building. The transmitter should be mounted horizontally with the sensor slots pointing down so that water does not collect in the sensor cavity. Mounting Position Incorrect  Correct  

WIRING


ORDERING INFORMATION

MODEL	DESCRIPTION
HD20K	2% Duct-mount humidity transmitter, 4-20 mA output
HO20K	2% OSA-mount humidity transmitter, 4-20 mA output

OPTIONS	
--	No temperature sensor
T3	10,000Ω thermistor @ 77°F (25°C), type III
T21	2252Ω thermistor @ 77°F (25°C), type II
T22	3000Ω thermistor @ 77°F (25°C), type II
T24	10,000Ω thermistor @ 77°F (25°C), type II
T27	100,000Ω thermistor @ 77°F (25°C), type II
T42	20,000Ω thermistor @ 77°F (25°C), type IV
T81	100Ω 385 platinum RTD
T85	1000Ω 385 platinum RTD
T91	1000Ω 375 platinum RTD

HD20K

-

T3

Example: HD20K-T3 duct-mount humidity transmitter with 10,000Ω type III temperature sensor

EASYCAL
CC-RJ11AD

RELATED PRODUCTS
Handheld calibrator loop powered
Required interface cable for EASYCAL



MISCELLANEOUS CONTROLS

LOW-LIMIT TEMPERATURE CONTROL

MODELS TSA, TF142

DESCRIPTION

Models TSA and TF142 provide low-limit temperature control in operating dampers, valves, compressors, or fan motors in HVAC systems. Manual and automatic reset models are available with SPDT or DPDT switching action.

FEATURES

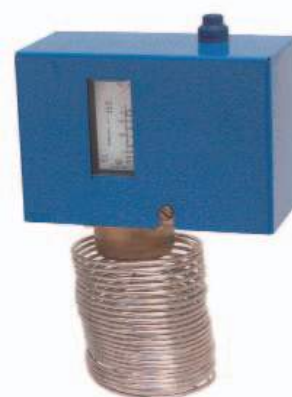
- *SPDT and DPDT models*
- *Manual and automatic reset models*
- *Easy set point adjustment*
- *20' (6.10m) capillary element*
- *Manual test lever*

OPERATION

Models TSA and TF142 respond to the lowest temperature sensed along any 1' (0.3m) section of a 20' (6m) capillary element. The set point is visible through the front cover and is easily adjustable. There is a test lever for manual operation during checkout. Manual reset models cannot be reset until the sensed temperature is approximately 5°F (3°C) above set point. Automatic reset models automatically reset when the sensed temperature rises approximately 5°F (3°C) above set point.



TSA



TF142



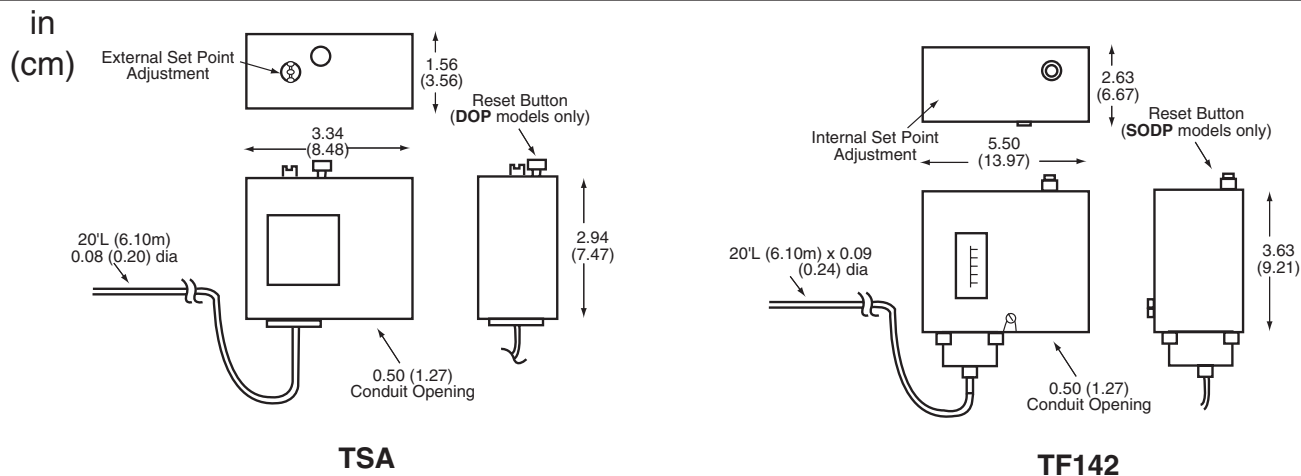
SPECIFICATIONS				
MODEL	TSA-DOP	TSA-COP	TF142-SODP20	TF142-SOAP20
Reset action	Manual	Automatic	Manual	Automatic
Set Point range	35° to 68°F (2° to 20°C)		34° to 70°F (1° to 21°C)	
Differential	4.5°F (2.5°C) fixed		4.5°F (2.5°C) fixed	
Switch action	SPDT, snap acting		DPDT, snap acting	
Electrical ratings				
Inductive	24 FLA, 144 LRA @ 120-240 VAC		14 FLA, 84 LRA @ 120 VAC; 12 FLA, 72 LRA @ 240 VAC	
Pilot duty	2 hp @ 120 VAC; 3 hp @ 240 VAC		3/4 hp @ 120 VAC; 2 hp @ 240 VAC	
	720 VA max @ 120-600 VAC		720 VA max @ 120-600 VAC	
	144 VA max @ 24 VAC		144 VA max @ 24 VAC	
Sensing element	Vapor-filled copper capillary, tin-plated		Vapor-filled copper capillary, tin-plated	
	5/64" (0.2 cm) x 20' (609.6 cm)		3/32" (0.24 cm) x 20' (609.6 cm)	
Temp limits				
Operating	-60° to 160°F (-51° to 71°C)		-60° to 160°F (-51° to 71°C)	
Sensing element	300°F (149°C) max		300°F (149°C) max	
Approvals	UL and ULC listed, CE		UL and ULC listed, CE	
Accessories	M-648 capillary mounting clip		M-648 capillary mounting clip	
	(order separately)		(5 mounting clips supplied with each control)	
Weight	1 lb (0.45 kg)		2.8 lb (1.3 kg)	



MISCELLANEOUS CONTROLS

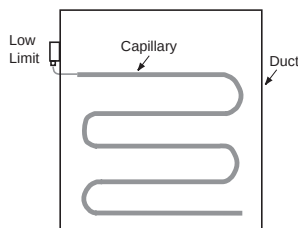
LOW-LIMIT TEMPERATURE CONTROL MODELS TSA, TF142

DIMENSIONS

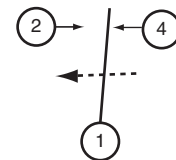


INSTALLATION / WIRING

1. Controller can be mounted in any position. Avoid locations subject to excessive vibration.
2. On manual reset models, position the control to permit convenient access to the reset button.
3. Use mounting holes in the rear of the case for flush mounting to the duct or other flat surface.
4. Install capillary element in a horizontal serpentine pattern across the duct on the downstream side of the coil so it is exposed to areas where low temperatures will occur. Do not kink or apply excessive force to the capillary element.
5. Fasten the capillary at sufficient points to prevent damage from air movement or vibration.
6. Test operation with a built-in test lever or with **ES-1051** freeze spray.

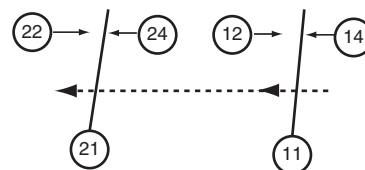


Install capillary in
horizontal pattern only



TSA

Switch action on
decrease in temperature
(Contact 1 to 4 Opens;
Contact 1 to 2 Closes)



TF142

Switch action on
decrease in temperature
(Contacts 11-14 and 21-24 Open;
Contacts 11-12 and 21-22 Close)

ORDERING INFORMATION

MODEL
TSA-DOP
TSA-COP
TF142-SODP20
TF142-SOAP20

DESCRIPTION
Low-Limit Control, SPDT, Manual Reset
Low-Limit Control, SPDT, Automatic Reset
Low-Limit Control, DPDT, Manual Reset
Low-Limit Control, DPDT, Automatic Reset

M-648
ES-1051

RELATED PRODUCTS
Capillary mounting clips
Freeze spray



Knowledge Beyond Measure.

PresSura™ Room Pressure Monitors and Controllers

Models RPM10, RPM20 and RPC30



TSI® PresSura™ Room Pressure Monitors and Controllers help provide safety in isolation rooms, operating rooms, and other specialized spaces, by continually measuring room pressure and indicating room conditions.

The PresSura™ products assist hospitals and engineers to comply with relevant ASHRAE, AIA, CDC and USP standards. TSI's unique thermal-based pressure sensor offers the most precise, accurate, and stable measurement. Over 50,000 hospital rooms in leading healthcare facilities rely on TSI® products every day to provide effective 24/7 monitoring.

Applications

- Isolation Rooms (All & PE)
- Operating Rooms (ORs)
- Compounding Pharmacies
- Pandemic Preparedness Rooms
- Intensive Care Units
- Laboratories and Vivariums
- Burn Units
- Bronchoscopy Suites
- Laundry Areas, Food Prep, Construction

Options

- Basic monitoring of a single room
- Monitor up to two critical rooms plus an anteroom
- Control one room while monitoring an anteroom
- Monitor or control:
 - Temperature
 - Relative humidity
 - Airflow with ACH calculations
 - Door switch
 - Occupancy sensor
- Nurse's remote station to simultaneously monitor up to eight rooms

Features and Benefits

- Accurate room pressure differential measurement for safety and standards compliance
- Industry-leading sensor accuracy within ± 0.00001 in H_2O
- 4.3 in. flush-mounted color touchscreen
- Intuitive interface for simplified programming and monitoring
- Seamless integration to BAS via BACnet® MS/TP, LonWorks®, and Modbus® communications
- Digital interface module has audible and visual alarms to alert users of unsafe conditions
- Multiple levels of password protection provides secure access to controller functions
- No isolation mode disables alarms when room is used for non-infectious patients or is unoccupied
- Optional remote keyswitch allows for secure switching of room modes
- Onboard diagnostics assist with HVAC troubleshooting
- Partner controllers with a fast-acting actuator for immediate response to prevent alarms
- Plug-in terminal strips for fast and accurate wiring installation
- Mounts in a standard depth electrical box to easily fit within a typical framed wall



Specifications

PresSura™ Room Pressure Monitors and Controllers

Bi-Directional Through-the-Wall Sensor

Range	-0.20000 to +0.20000 in H ₂ O (-49.8 Pa to +49.8 Pa)
Accuracy	±10% of reading ±0.00001 in H ₂ O (±0.0025 Pa)
Resolution	5% of reading
Temperature Compensation Range	55 to 95°F (13 to 35°C)

Alarms

Low Alarm	-0.19500 to +0.19500 in H ₂ O (-48.6 Pa to +48.6 Pa)
High Alarm	-0.19500 to +0.19500 in H ₂ O (-48.6 Pa to +48.6 Pa)

Touchscreen Display

Size	4.3 in. (10.9 cm) diagonal
Resolution	QVGA

Dimensions

7 in. x 5.875 in. x 1.75 in. (17.8 cm x 14.9 cm x 4.4 cm)	
Protrusion from wall	0.625 in. (1.6 cm)
Mounts to triple-gang standard depth electrical box	

Inputs

Temperature	1000-ohm platinum RTD
Temperature Setpoint	0-10 VDC
Relative Humidity	0-10 VDC
Supply Flow	0-10 VDC
Exhaust Flow	0-10 VDC
Remote Keyswitch	Open/Closed Signal
Pressure Transducer	0-10 VDC
Room Pressure Sensor	0-10 VDC
Door Switch	Open/Closed Signal
Room Occupancy	Open/Closed Signal

Optional Analog Output

(1) Flow or Room Pressure Differential	0-10 VDC or 4-20 mA
--	---------------------

Optional Control Outputs

(1) Supply	0-10 VDC
(1) Exhaust	0-10 VDC
(1) Temperature	0-10 VDC or 4-20 mA

Contact Outputs

Low Alarm and High Alarm / Room Mode

SPST (NO)

Max Current 2 A

Max Voltage 220 VDC/250 VAC

Communications Protocols

BACnet® MS/TP, Modbus®, Lonworks®

Input Power

24 VAC, 50/60 Hz

15-40 VDC

5 Watt Maximum

Operating Temperature

32 to 120°F (0 to 49°C)

Weight

14 oz (0.40 Kg)

Specifications are subject to change without notice.

TSI, the TSI logo are registered trademarks of TSI Incorporated and PresSura is a trademark of TSI Incorporated in the United States and may be protected under other country's trademark registrations.

Modbus, LonWorks, and BACnet are registered trademarks of Modicon Inc., Echelon Corp., and ASHRAE respectively.

Model	Maximum # Rooms Monitored	Maximum # Rooms Controlled	Configurable Room Modes	Visual and Audible Alarms with Delays	Alarm Relay Contacts	Controls Supply, Exhaust, and Temperature	Accepts Flow Input/ACH	Door Switch Input	Temperature Input	RH Input	BACnet® MS/TP Modbus Compatible	LonWorks® Compatible	Compatible with TSI® Nurse's Station Monitor
RPM10	1	N/A	■	■	■		□	□			■		■
RPM20	3	N/A	■	■	■		□	□	□	□	■	□	■
RPC30	1	1	■	■	■	■	□	□	□	□	■	□	■



Knowledge Beyond Measure.

TSI Incorporated - Visit our website www.tsi.com for more information.

USA	Tel: +1 800 874 2811	India	Tel: +91 80 67877200
UK	Tel: +44 149 4 459200	China	Tel: +86 10 8219 7688
France	Tel: +33 1 41 19 21 99	Singapore	Tel: +65 6595 6388
Germany	Tel: +49 241 523030		

Model MR1 & MR2

MultiSense™ Pressure Transducer

The Setra Model MR1 and MR2 are Setra's newest differential pressure transducer. The Setra MR1/MR2 is the ideal product for any contractor, combining the flexibility of a multi-range with the performance of a single range sensor. The MR1 and MR2 both have 8 selectable ranges and 3 selectable outputs, easily adjustable on the job with a flip of a switch or jumper. The MR1/MR2 uses an IP67/NEMA 4 rated housing and has a conduit fitting for easy wiring, making the MR1/MR2 an ideal solution for any general HVAC application.

Multi-Configurable

The Setra MR1/MR2 design gives the user total flexibility to make changes on the job site. The user has the option to choose the field configurable range, mounting (wall mount, duct mount or DIN Rail), output (mA or Volt) and engineering unit (W.C. or Pascals). This flexibility means that the contractor can use the MR1/MR2 for all of their needs.

8 Field Selectable Ranges

The Setra MR1/MR2 provides 8 field selectable ranges for MR1 (0.1, 0.25, 0.5 and 1.0"W.C.) and 8 for MR2 (1.0, 2.5, 5.0 and 10"W.C.). These ranges can be selected on site by flipping the jumper to the desired range.

IP67/NEMA 4 Rated Housing

The MR1/MR2 housing is a robust IP67/NEMA 4 rated design and is sealed with a gasket to make it wash-down capable for difficult applications. The MR1/MR2 also has a conduit fitting that makes installation and wiring easier.

Capacitive Sensing Technology

Only Setra can claim ownership to the stainless steel capacitive design used in all of our HVAC/R sensors. Our advanced capacitive element provides excellent stability and linearity, while standing above the competitors in our ability to measure low pressure (<0.0001"W.C.) at high accuracy. Our technology has been used in over 8 million installations and has the highest field acceptance rate in the industry.



- Multi-Configurable
- IP67/NEMA 4 Rated Housing
- Field Selectable

Model MR1/MR2 Features:

- Field Configurable Duct Probe
- 4 Digit LCD
- Field Selectable Range
- Field Selectable Output
- Simple 5-Step Setup
- Field Accessible Push-Button Zero & Span
- Unregulated AC/DC Operation

Target Uses:

- Sub-Contractors- Quick Installation
- Flexible for Building Specification Changes
- Service/Retrofit Friendly
- Service Technicians- Quick & Accurate Reconfiguration

Model MR1 & MR2

MultiSense™ Pressure Transducer



ORDERING INFORMATION

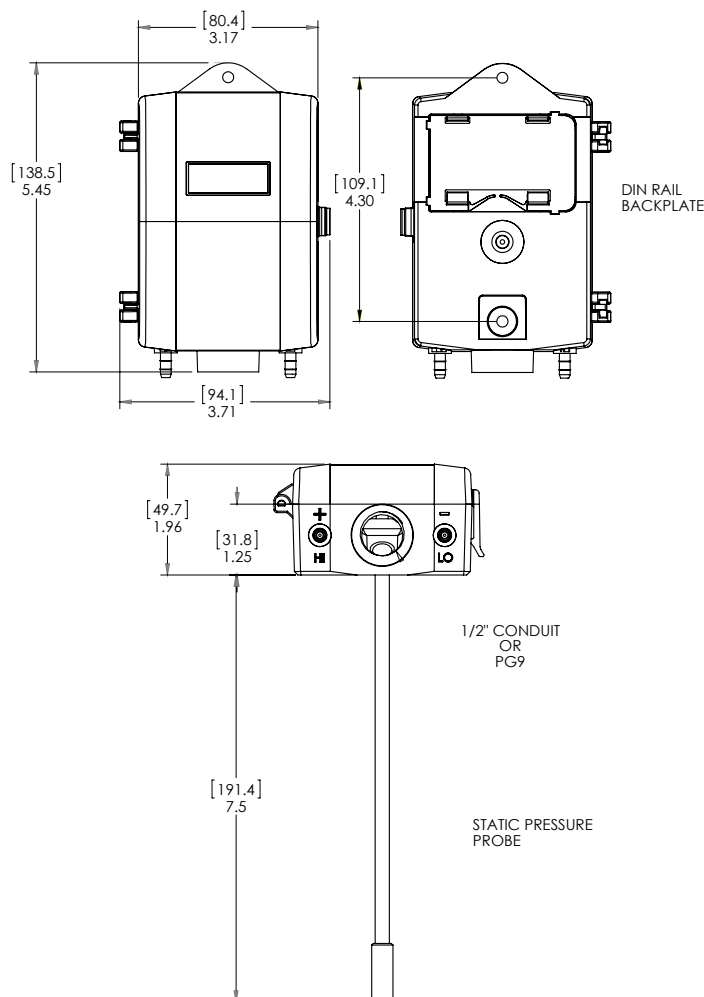
Field Selectable Ranges				Configuration		Electrical Fitting	
MR1		MR2		S Standard (Base Mount)		A 1/2" Conduit	
Unidirectional Pressure Ranges	Bidirectional Pressure Ranges	Unidirectional Pressure Ranges	Bidirectional Pressure Ranges	U	Universal ¹	P	PG9
0.1"W.C. 25 Pa	±0.1"W.C. ±25 Pa	1.0"W.C. 250 Pa	±1.0"W.C. ±250 Pa	D	DIN Rail	C	1/2" Conduit W/ Cal Certification ²
0.25"W.C. 50 Pa	±0.25"W.C. ±50 Pa	2.5"W.C. 500 Pa	±2.5"W.C. ±500 Pa	P	Duct Probe	D	PG9 W/ Cal Certification ²
0.5"W.C. 100 Pa	±0.5"W.C. ±100 Pa	5.0"W.C. 1,000 Pa	±5.0"W.C. ±1,000 Pa				
1.0"W.C. 250 Pa	±1.0"W.C. ±250 Pa	10"W.C. 2,500 Pa	±10"W.C. 2,500 Pa				

¹Code U, Universal unit includes Duct Probe and DIN Rail options.

²Calibration is performed at highest range.

Ordering Example: MR1UA = Model MR1, Universal Configuration, with 1/2" Conduit.

DIMENSIONS



GENERAL SPECIFICATIONS

Performance Data		Environmental Data	
	Standard	Operating Temperature ³	32 to 122°F (0 to 50°C)
Accuracy RSS ¹ (at constant temp)	±1.0% FS	Electrical Data	
Compensated Range °F (°C)	32 to 122°F (0 to 50°C)	Excitation Range	13 to 30 VDC/18 to 24 VAC (Voltage Output) 13 to 30 VDC (4 to 20mA output at terminals)
Thermal Effects ² %FS/°F(°C)	0.03 (0.054)	Current Consumption	30mA (max)
Maximum Line Pressure	10 PSI	Mis-Wiring	Reverse Excitation Protection
Overpressure	Up to 10 PSI (range dependent)	Field Selectable Output ⁴	0 to 5 V, 0 to 10V (3-wire), 4 to 20mA (2-wire)
Long Term Stability (max.)	2.0% FS/YR	Output Resistance (Voltage Output)	10 Ohms (max)
Position Effect		Load Resistance (Voltage Output)	10 K-Ohms (min)
Zero Offset %FS/G	0.5%	Loop Resistance (4-20mA)	0 to 800 Ohms
(Unit is factory calibrated at 0g effect in the vertical position)		Approval	CE & RoHS Compliant
Physical Description		Pressure Media	
Case	Fire-Retardant Polycarbonate (UL 94 V-0 Approved), Hinged Lid	Typically air or similar non-conducting gases.	
Mounting	Two Screw Holes Vertical Position	¹ RSS of Non-Linearity, Hysteresis, and Non-Repeatability. ² Units calibrated at nominal 70°F. Maximum thermal error computed from this datum.	
Electrical Connection Block	Removable Screw Terminal	³ Operating temperature limits of the electronics only. Pressure media temperatures may be considerably higher.	
Pressure Fitting	3/16" O.D. Barbed Brass	⁴ Calibrated into a 50K ohm load, operable into a 10K ohm load or greater.	
Zero	Push Button	⁵ Span (Full Scale) output factory set to within 1%.	
Span	Push Button	⁶ Calibrated at factory with a 24 VDC loop supply voltage and a 250 ohm load.	
Weight (approx.)	8 Ounces	⁷ Span (Full Scale) output factory set to within ±0.16mA.	
Specifications subject to change without notice.			

OpenAir™ GCA Series, Spring Return, 160 lb-in, Electronic Damper Actuators

Description

The OpenAir GCA Series spring return, 160 lb-in (18 Nm) electronic damper actuators provide modulating, two-position and floating control of building HVAC dampers.

Product Number	Operating Voltage			Control				Cables		Built-in Control Options			
	24 Vac ± 20%	24 Vdc ±10%	120 Vac ± 10%	0 to 10 Vdc	2 to 10 Vdc or 0 to 10 Vdc	Floating	2-position	Standard	Plenum	Position Feedback	Dual Auxiliary Switches	Signal Inversion	Offset 0 to 5 Vdc Span 2 to 30 Vdc
GCA121.1U	•	•					•	•					
GCA121.1P	•	•					•		•				
GCA126.1U	•	•					•	•			•		
GCA126.1P	•	•					•		•		•		
GCA221.1U			•				•	•					
GCA226.1U			•				•	•			•		
GCA131.1U	•	•				•		•					
GCA131.1P	•	•				•			•				
GCA132.1U	•	•				•		•		•			
GCA136.1U	•	•				•		•			•		
GCA136.1P	•	•				•			•		•		
GCA151.1U	•	•			•			•		•		•	
GCA151.1P	•	•			•				•	•		•	
GCA156.1U	•	•			•			•		•	•	•	
GCA156.1P	•	•			•			•		•	•	•	
GCA161.1U	•	•		•				•		•			
GCA161.1P	•	•		•					•	•			
GCA163.1U	•	•		•				•		•			•
GCA163.1P	•	•		•					•	•			•
GCA164.1U	•	•		•				•		•	•		•
GCA164.1P	•	•		•					•	•	•		•
GCA166.1U	•	•		•				•		•	•		
GCA166.1P	•	•		•					•	•	•		



Features

- Brushless DC motor technology with stall protection
- Bi-directional fail-safe spring return
- Patented self-centering shaft coupling
- Models available with dual independently adjustable auxiliary switches
- All modulating models offer built-in feedback
- Floating control models available with feedback potentiometer
- All metal housing
- Manual override
- 5° preload as shipped from factory
- Mechanical range adjustment capability by moving shaft coupling to desired position
- Easily visible position indicator
- Precabled
- CE, UL60730, and cUL (C22.2 No. 24-93) listed

Technical Data

24 Vac, 120 Vac Torque: 160 lb-in (18 Nm) running and spring return
 <360 lb-in (40 Nm) maximum

NOTE: At -25°F, spring return is 142 lb-in (16 Nm)

Runtime for 90°: 90 sec. operating,
 15 sec. typical (30 sec. max.) closing on power loss

Frequency: 50/60 Hz

Power consumption: 7 VA/5W (24 Vac/dc; GCA12x, GCA13x)
 Running: 7 VA/5W (24 Vac/dc, GCA15x)
 7 VA/5W (24 Vac/dc GCA16x)
 8 VA (120 Vac GCA22x)

Power consumption: Holding
 5 VA/3W (24 Vac/dc, GCA12x)
 5 VA/3W (24 Vac/dc, GCA13x, GCA15x)
 5 VA (24 Vac/dc, GCA16x)
 6 VA (120 Vac, GCA22x)

Equipment rating (24V): Class 2 per UL/CSA

Noise level: <45 dBA (running)

Angle of rotation: 90° nominal, 95° max.

Shaft dimensions: 3/8-in to 1-in (8 to 25.6 mm) dia.
 1/4-in to 3/4-in (6 to 18 mm) sq.
 3/4-in (20 mm) min. length

Operating temperature: -25°F to 130°F (-32°C to 55°C)

Storage temperature: -40°F to 158°F (-40°C to 70°C)

Ambient humidity: 95% rh (non-condensing)

Pre-cabled connection: 18 AWG, 3 ft (0.9 m) long

Enclosure: NEMA 2, IP54 per EN 60 529

Material: Die cast aluminum alloy

Agency listings: CE, UL60730, cUL C22.2 No. 24-93

Gear Lubrication: Silicone-free

Weight: 4.85 lb (2.2 kg)

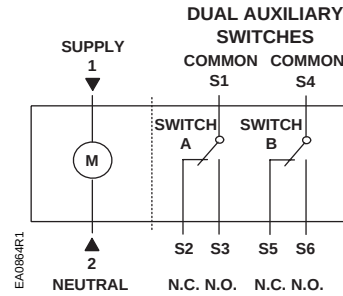
Dimensions: 11-13/16 in (300 mm) H
 4-3/4 in (120 mm) W
 2-7/8 in (72 mm) D

Typical Specifications

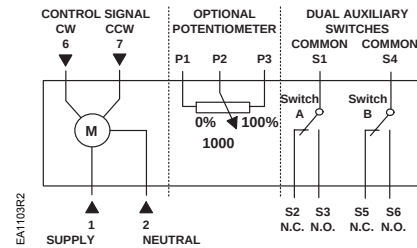
Spring return damper actuators shall be the type that requires no connecting linkages. The spring return actuators shall have a self-centering damper shaft coupling that assures concentric alignment of the actuator's output coupling with the damper shaft and be capable of direct mounting to a shaft up to a 1-inch diameter. Actuators shall use a brushless DC motor and provide stall protection throughout the full range of rotation. All spring return actuators shall be capable of both clockwise and counterclockwise spring return fail-safe operation using a continuously engaged mechanical return spring that returns the actuator to a fail-safe position in <20 seconds in response to a loss of power. All actuators shall provide a means of manually positioning the output coupling in the absence of power. Dual independently adjustable auxiliary switches must be integral to the actuator. All actuators must be precabled and provide an easily readable high contrast yellow on black position indicator. All actuators shall be UL60730 and CSA22.2 listed and manufactured under ISO 9002 and ISO 14000 procedures. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuators rated torque and temperatures. Actuators shall be as manufactured by Siemens Industry, Inc.

Wiring Diagrams

2-Position, 24 Vac/dc:

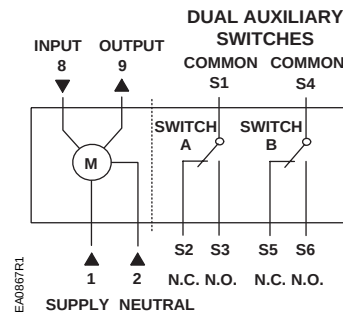


Floating, 24 Vac/dc:

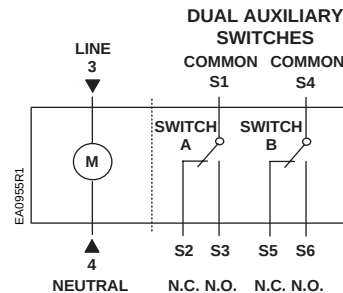


0 to 10 Vdc, GCA16x, 24 Vac/dc;

2 to 10 Vdc, GCA15x, 24 Vac/dc:



2-Position, 120 Vac:



Information in this publication is based on current specifications. The company reserves the right to make changes as design improvements are introduced. OpenAir is a trademark of Siemens Schweiz AG. Product or company names mentioned herein may be the trademarks of their respective owners. © 2012 Siemens Industry, Inc.

Flowrite™ 599 Series, 2-Way Valves, 1/2 to 2-Inch, Threaded, ANSI Class 250, Bronze Body

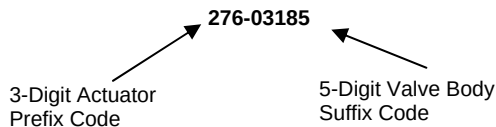


Description

The Flowrite 599 Series two-way valve bodies, ANSI 250, work with a Flowrite series actuator with a 3/4-inch (20 mm) stroke. Typical applications include control of hot or chilled water, 50% water-glycol solutions, or steam.

Product Numbers

Use the product numbers in the tables to order the valve and actuator assembled together. The product number consists of a 3-digit prefix code, a hyphen, and a 5-digit suffix code. The prefix specifies an actuator. The suffix specifies the valve body.



Features

- ANSI Leakage Class IV (0.01% of Cv).
- Normally-open and normally-closed configurations.
- Cartridge-type packing.
- Equal percentage flow characteristics with either brass or stainless steel trim.
- Linear flow characteristic with stainless steel trim.
- High temperature packing available on linear valves.
- Direct-coupled universal bonnet.

Typical Specifications

Automatic control valves shall have NPT threaded type fittings, 1/2 through 2 inch (15 through 50 mm) sizes, and shall be ANSI 250 rated to withstand the pressures and temperatures encountered.

Valves shall have metal-to-metal seats, stainless steel stems, and ethylene propylene O-ring packing. Valves shall be ANSI Leakage Class IV (0.01% of Cv). Valves shall have a 100:1 rangeability or better.

Technical Data

Valve Size	1/2-in. to 2-in. (15 mm to 50 mm)
Body	Globe style, UNS CA 844 bronze, ANSI Class 250
Trim	Brass or stainless steel
Stem	Stainless steel ASTM A582 Type 303, 3/4-inch (20-mm) stroke
Seat	Single seat, metal-to-metal
Packing:	
Normal duty	EPDM O-ring
Steam packing	Teflon® V-ring/EDPM O-ring
Close-off Ratings	According to ANSI/FCI 70-2 See Tables 3 and 5
Controlled Media	Water, steam, 50% water-glycol solutions
Media Temperature	
Normal Duty	20°F to 250°F (-7°C to 120°C)
Steam Packing	337°F (170°C)

NOTE: SAX assemblies are limited to a media temperature ≤ 266°F (130°C).

Maximum Recommended Differential Pressure for Modulating Service:

Media	Bronze Trim	Stainless Steel Trim
Liquid	25 psi (173 kPa)	50 psi (345 kPa)
Steam	15 psi (103 kPa)	50 psi (345 kPa)

Rangeability	>100:1
Leakage Rate	Class IV (0.01% of Cv)
Flow Characteristics	Equal Percentage or Linear
Mounting	NEMA 1 (interior only)

NOTE: To keep this document short, only valves with equal percentage flow characteristics, brass trim, with standard duty packing and female NPT connections are shown.

For complete selection tables, see Flowrite™ 599 Series 1/2- to 2-Inch Valve (2-Way & 3-Way) and Actuator Assembly Selection TB 255 (155-772).

Table 1. Electro-Hydraulic Actuator and Valve Assemblies.

Action	 Valve Body	Flow Rate, Cv (Kvs)	Valve Size, Inches (mm)	NSR	Spring Return	NSR	Spring Return			
										
				Floating		0 to 10 Vdc, 4 to 20 mA				
				SKD82.50U	SKD82.51U	SKD60U	SKD62U	SKB62U		
				Actuator Prefix Codes						
				275	276	267	274	291		
Normally Open	599-03162	1 (0.85)	1/2 (15)	275-03162	276-03162	267-03162	274-03162	—		
	599-03163	1.6 (1.4)	1/2 (15)	275-03163	276-03163	267-03163	274-03163	—		
	599-03164	2.5 (2.2)	1/2 (15)	275-03164	276-03164	267-03164	274-03164	—		
	599-03165	4 (3.4)	1/2 (15)	275-03165	276-03165	267-03165	274-03165	—		
	599-03166	6.3 (5.4)	3/4 (20)	275-03166	276-03166	267-03166	274-03166	—		
	599-03167	10 (8.6)	1 (25)	275-03167	276-03167	267-03167	274-03167	291-03167		
	599-03168	16 (14)	1-1/4 (32)	275-03168	276-03168	267-03168	274-03168	291-03168		
	599-03169	25 (22)	1-1/2 (40)	275-03169	276-03169	267-03169	274-03169	291-03169		
	599-03170	40 (34)	2 (50)	275-03170	276-03170	267-03170	274-03170	291-03170		
Normally Closed	599-03180	1 (0.85)	1/2 (15)	275-03180	276-03180	267-03180	274-03180	—		
	599-03181	1.6 (1.4)	1/2 (15)	275-03181	276-03181	267-03181	274-03181	—		
	599-03182	2.5 (2.2)	1/2 (15)	275-03182	276-03182	267-03182	274-03182	—		
	599-03183	4 (3.4)	1/2 (15)	275-03183	276-03183	267-03183	274-03183	—		
	599-03184	6.3 (5.4)	3/4 (20)	275-03184	276-03184	267-03184	274-03184	—		
	599-03185	10 (8.6)	1 (25)	275-03185	276-03185	267-03185	274-03185	291-03185		
	599-03186	16 (14)	1-1/4 (32)	275-03186	276-03186	267-03186	274-03186	291-03186		
	599-03187	25 (22)	1-1/2(40)	275-03187	276-03187	267-03187	274-03187	291-03187		
	599-03188	40 (34)	2 (50)	275-03188	276-03188	267-03188	274-03188	291-03188		

Table 2. Electro-Mechanical Actuator and Valve Assemblies.

Action	 Valve Body	Flow Rate, Cv (Kvs)	Valve Size, Inch (mm)	Non-Spring Return		Spring Return	
							
				Floating	0 to 10 Vdc, 4 to 20 mA	2-Position	0 to 10 Vdc
				30 second	30 second		
				SAX81.03U	SAX61.03U	599-03611	599-03609
				Actuator Prefix Codes			
373	371	299	298				
Normally Open	599-03162	1 (0.85)	1/2 (15)	373-03162	371-03162	299-03162	298-03162
	599-03163	1.6 (1.4)	1/2 (15)	373-03163	371-03163	299-03163	298-03163
	599-03164	2.5 (2.2)	1/2 (15)	373-03164	371-03164	299-03164	298-03164
	599-03165	4 (3.4)	1/2 (15)	373-03165	371-03165	299-03165	298-03165
	599-03166	6.3 (5.4)	3/4 (20)	373-03166	371-03166	299-03166	298-03166
	599-03167	10 (8.6)	1 (25)	373-03167	371-03167	299-03167	298-03167
	599-03168	16 (14)	1-1/4(32)	373-03168	371-03168	299-03168	298-03168
	599-03169	25 (22)	1-1/2 (40)	373-03169	371-03169	299-03169	298-03169
599-03170	40 (34)	2 (50)	373-03170	371-03170	299-03170	298-03170	
Normally Closed	599-03180	1 (0.85)	1/2 (15)	373-03180	371-03180	299-03180	298-03180
	599-03181	1.6 (1.4)	1/2 (15)	373-03181	371-03181	299-03181	298-03181
	599-03182	2.5 (2.2)	1/2 (15)	373-03182	371-03182	299-03182	298-03182
	599-03183	4 (3.4)	1/2 (15)	373-03183	371-03183	299-03183	298-03183
	599-03184	6.3 (5.4)	3/4 (20)	373-03184	371-03184	299-03184	298-03184
	599-03185	10 (8.6)	1 (25)	373-03185	371-03185	299-03185	298-03185
	599-03186	16 (14)	1-1/4(32)	373-03186	371-03186	299-03186	298-03186
	599-03187	25 (22)	1-1/2 (40)	373-03187	371-03817	299-03187	298-03187
	599-03188	40 (34)	2 (50)	373-03188	371-03188	299-03188	298-03188

**Table 3. PSI (kPa) Close-Off Ratings for Electronic Assemblies,
Equal Percentage.**

Action	Valve Size, Inches (mm)	Electro-Hydraulic		Electro-Mechanical	
		SKB	SKD	SAX (NSR)	599-03609 599-03611
Normally Open	1/2 (15)	250 (1724)	250 (1724)	250 (1724)	250 (1724)
	3/4 (20)	250 (1724)	250 (1724)	211 (1456)	231 (1593)
	1 (25)	250 (1724)	201 (1386)	137 (945)	149 (1028)
	1-1/4 (32)	250 (1724)	124 (855)	85 (586)	92 (634)
	1-1/2 (40)	250 (1724)	80 (552)	55 (379)	59 (407)
	2 (50)	201 (1386)	49 (338)	34 (235)	36 (248)
Normally Closed	1/2 (15)	250 (1724)	250 (1724)	250 (1724)	250 (1724)
	3/4 (20)	250 (1724)	250 (1724)	250 (1724)	250 (1724)
	1 (25)	250 (1724)	203 (1400)	159 (1097)	173 (1193)
	1-1/4 (32)	250 (1724)	117 (807)	92 (634)	100 (690)
	1-1/2 (40)	208 (1334)	73 (503)	57 (393)	61 (421)
	2 (50)	126 (869)	44 (303)	35 (241)	37 (255)

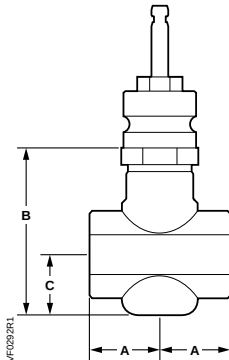
Table 4. Pneumatic Actuator and Valve Assemblies.

Action	 Valve Body	Flow Rate, Cv (Kvs)	Valve Size, Inches (mm)	4-Inch		8-Inch	
							
				Spring Range		W/O Positioner	With Positioner
				3-8 PSI	10-15 PSI		
				599-01081	599-01083	599-01050	599-01050 & 599-00426
				Actuator Prefix Codes			
268	270	277	283				
Normally Open	599-03162	1 (0.85)	1/2 (15)	268-03162	—	277-03162	283-03162
	599-03163	1.6 (1.4)	1/2 (15)	268-03163	—	277-03163	283-03163
	599-03164	2.5 (2.2)	1/2 (15)	268-03164	—	277-03164	283-03164
	599-03165	4 (3.4)	1/2 (15)	268-03165	—	277-03165	283-03165
	599-03166	6.3 (5.4)	3/4 (20)	268-03166	—	277-03166	283-03166
	599-03167	10 (8.6)	1 (25)	268-03167	—	277-03167	283-03167
	599-03168	16 (14)	1-1/4 (32)	268-03168	—	277-03168	283-03168
	599-03169	25 (22)	1-1/2 (40)	268-03169	—	277-03169	283-03169
599-03170	40 (34)	2 (50)	268-03170	—	277-03170	283-03170	
Normally Closed	599-03180	1 (0.85)	1/2 (15)	—	270-03180	277-03180	283-03180
	599-03181	1.6 (1.4)	1/2 (15)	—	270-03181	277-03181	283-03181
	599-03182	2.5 (2.2)	1/2 (15)	—	270-03182	277-03182	283-03182
	599-03183	4 (3.4)	1/2 (15)	—	270-03183	277-03183	283-03183
	599-03184	6.3 (5.4)	3/4 (20)	—	270-03184	277-03184	283-03184
	599-03185	10 (8.6)	1 (25)	—	270-03185	277-03185	283-03185
	599-03186	16 (14)	1-1/4 (32)	—	270-03186	277-03186	283-03186
	599-03187	25 (22)	1-1/2(40)	—	270-03187	277-03187	283-03187
	599-03188	40 (34)	2 (50)	—	270-03188	277-03188	283-03188

Table 5. PSI (kPa) Close-Off Ratings for Pneumatic Valve Assemblies, Equal Percentage.

Action	Valve Size, Inches (mm)	Spring Range				
		3 to 8 psi (21 to 55 kPa)			10 to 15 psi (69 to 103 kPa)	
		4" Actuator	8" Actuator		4" Actuator	8" Actuator
		15 psi (103 kPa)		30 psi (207 kPa)	0 psi (0 kPa)	
Normally Open	1/2 (15)	142 (979)	250 (1724)	250 (1724)	—	—
	3/4 (20)	80 (552)	231 (1593)	250 (1724)	—	—
	1 (25)	52 (359)	150 (1034)	250 (1724)	—	—
	1-1/4 (32)	32 (221)	93 (641)	250 (1724)	—	—
	1-1/2 (40)	20 (138)	60 (414)	198 (1365)	—	—
	2 (50)	12 (83)	37 (255)	123 (848)	—	—
Normally Closed	1/2 (15)	—	—	—	236 (1627)	250 (1724)
	3/4 (20)	—	—	—	155 (1069)	250 (1724)
	1 (25)	—	—	—	91 (627)	250 (1724)
	1-1/4 (32)	—	—	—	52 (359)	148 (1020)
	1-1/2 (40)	—	—	—	32 (331)	92 (634)
	2 (50)	—	—	—	20 (138)	55 (379)

Table 6. Valve Dimensions.

		Action	Valve Size Inches (mm)	A	B	C	Weight lbs. (kg)
	Normally Open		1/2 (15)	1-7/16 (36)	2-15/16 (74)	1-1/4 (32)	3 (1.4)
			3/4 (20)	1-11/16 (43)	3-15/16 (99)	1-7/16 (36)	4 (1.8)
			1 (25)	2 (50)	3-3/4 (96)	1-1/4 (32)	5 (2.3)
			1-1/4 (32)	2-1/2 (62)	4-1/4 (109)	2 (50)	7 (3.2)
			1-1/2 (40)	2-9/16 (65)	4-1/4 (109)	2 (50)	8 (3.6)
			2 (50)	3-1/8 (79)	4-9/16 (116)	2-1/4 (57)	16 (7.3)
Normally Closed			1/2 (15)	1-7/16 (36)	3-13/16 (97)	2-13/16 (55)	3 (1.4)
			3/4 (20)	1-11/16 (43)	3-13/16 (97)	2-13/16 (55)	4 (1.8)
			1 (25)	2 (50)	3-13/16 (97)	2-13/16 (55)	5 (2.3)
			1-1/4 (32)	2-1/2 (62)	3-13/16 (97)	2-13/16 (55)	7 (3.2)
			1-1/2 (40)	2-9/16 (65)	3-7/8 (99)	2-1/4 (58)	8 (3.6)
			2 (50)	3-1/8 (79)	4-1/2 (114)	2-9/16 (65)	16 (7.3)

NOTE: For complete technical details on valves with linear characteristics, stainless steel trim, or union female, angle female, or union male end connections, see *Flowrite™ 599 Series Two-way Valves Technical Instructions*, (155-184P25).

Information in this publication is based on current specifications. The company reserves the right to make changes in specifications and models as design improvements are introduced. Flowrite is a registered trademark of Siemens Industry, Inc. Product or company names mentioned herein may be the trademarks of their respective owners. © 2013 Siemens Industry, Inc.

Powermite 599, ANSI Class 250 MT Series Terminal Unit 2-Way Valves



Description

The Powermite 599 Series ANSI Class 250 MT Series 2-way valve bodies work with any MT Series pneumatic or electronic actuator with a 7/32-inch (5.5-mm) stroke. They are suitable for normally open or normally closed control. Typical applications include control of hot or chilled water, water-glycol solutions up to 50% and steam up to 15 psi (steam only with stainless steel trim). Compatible actuators deliver a minimum of 67 lbs (300 N) of force.

Features

- Direct-coupled universal bonnet
- Internal thread NPT end connections with either brass trim or stainless steel trim.
- ANSI Leakage Class IV (0.01% of Cv)

Product Numbers

Use the product numbers in the tables to order the valve and the actuator assembled together. The product number consists of a 3-digit prefix code, a hyphen, and a 5-digit suffix code. The prefix specifies an actuator. The suffix specifies the valve body.

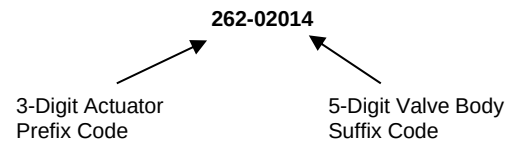


Table 1. 2-Way Valve and Actuator Assemblies with Brass Trim and Internal Thread NPT Connections.

		Valve Size, Inch	Cv (Kvs)	2-Inch Pneumatic Actuators, Spring Return (Fail-safe *)			Electro-mechanical, 24V							
				10-15 psi (69-103 kPa)	3-8 psi (21-55 kPa)	8-13 psi (55-90 kPa)	SSC131.09U Floating, NSR	SSC131.39U Floating, SR	SSC161.05U 0-10V, NSR	SSC161.35U 0-10V, SR	SAS81.03U Floating, NSR	SAS81.33U Floating, SR	SAS61.03U 0-10V/4-20 mA NSR	SAS61.33U 0-10V/4-20 mA SR
														
				Actuator Prefix Code										
				256	257	258	259	260	261	262	363	366	364	365
Normally Closed	599-02000	1/2	0.4 (0.34)	256-02000	257-02000B	258-02000C	259-02000	260-02000	261-02000	262-02000	363-02000	366-02000	364-02000	365-02000
	599-02002	1/2	0.63 (0.54)	256-02002	257-02002B	258-02002C	259-02002	260-02002	261-02002	262-02002	363-02002	366-02002	364-02002	365-02002
	599-02004	1/2	1 (0.85)	256-02004	257-02004B	258-02004C	259-02004	260-02004	261-02004	262-02004	363-02004	366-02004	364-02004	365-02004
	599-02006	1/2	1.6 (1.37)	256-02006	257-02006B	258-02006C	259-02006	260-02006	261-02006	262-02006	363-02006	366-02006	364-02006	365-02006
	599-02008	1/2	2.5 (2.14)	256-02008	257-02008B	258-02008C	259-02008	260-02008	261-02008	262-02008	363-02008	366-02008	364-02008	365-02008
	599-02010	1/2	4 (3.42)	256-02010	257-02010B	258-02010C	259-02010	260-02010	261-02010	262-02010	363-02010	366-02010	364-02010	365-02010
	599-02012	3/4	6.3 (5.38)	256-02012	257-02012B	258-02012C	259-02012	260-02012	261-02012	262-02012	363-02012	366-02012	364-02012	365-02012
	599-02014	1	10 (8.55)	256-02014	257-02014B	258-02014C	259-02014	260-02014	261-02014	262-02014	363-02014	366-02014	364-02014	365-02014
Normally Open	599-02030	1/2	0.4 (0.34)	256-02030A	257-02030	258-02030C	259-02030	260-02030	261-02030	262-02030	363-02030	366-02030	364-02030	365-02030
	599-02032	1/2	0.63 (0.54)	256-02032A	257-02032	258-02032C	259-02032	260-02032	261-02032	262-02032	363-02032	366-02032	364-02032	365-02032
	599-02034	1/2	1 (0.85)	256-02034A	257-02034	258-02034C	259-02034	260-02034	261-02034	262-02034	363-02034	366-02034	364-02034	365-02034
	599-02036	1/2	1.6 (1.37)	256-02036A	257-02036	258-02036C	259-02036	260-02036	261-02036	262-02036	363-02036	366-02036	364-02036	365-02036
	599-02038	1/2	2.5 (2.14)	256-02038A	257-02038	258-02038C	259-02038	260-02038	261-02038	262-02038	363-02038	366-02038	364-02038	365-02038
	599-02041	1/2	4 (3.42)	256-02041A	257-02041	258-02041C	259-02041	260-02041	261-02041	262-02041	363-02041	366-02041	364-02041	365-02041
	599-02044	3/4	6.3 (5.38)	256-02044A	257-02044	258-02044C	259-02044	260-02044	261-02044	262-02044	363-02044	366-02044	364-02044	365-02044
	599-02046	1	10 (8.55)	256-02046A	257-02046	258-02046C	259-02046	260-02046	261-02046	262-02046	363-02046	366-02046	364-02046	365-02046

* Product numbers in gray shading are available as assemblies only.

Table 2. Two-Way Valve and Actuator Assemblies with Stainless Steel Trim and Internal Thread NPT Connections.														
 Valve Body	Valve Size, Inches	Cv (Kvs)	2-Inch Pneumatic Actuators, Spring Return (Fail Safe) *			Electro-mechanical, 24 Vac								
			10-15 psi (69-103 kPa)	3-8 psi (21-55 kPa)	8-13 psi (55-90 kPa)	SSC131.09U Floating, NSR	SSC131.39U Floating SR	SSC161.05U 0-10V, NSR	SSC161.35U 0-10V, SR	SAS81.03U Floating, NSR	SAS81.33U Floating, SR	SAS61.03U 0-10V/ 4-20 mA NSR	SAS61.33U 0-10V/ 4-20 mA SR	
														
			Actuator Prefix Code											
			256	257	258	259	260	261	262	363	366	364	365	
Normally Closed	599-02015	1/2	0.4 (0.34)	256-02015	257-02015B	258-02015C	259-02015	260-02015	261-02015	262-02015	363-02015	366-02015	364-02015	365-02015
	599-02017	1/2	0.63 (0.54)	256-02017	257-02017B	258-02017C	259-02017	260-02017	261-02017	262-02017	363-02017	366-02017	364-02017	365-02017
	599-02019	1/2	1 (0.85)	256-02019	257-02019B	258-02019C	259-02019	260-02019	261-02019	262-02019	363-02019	366-02019	364-02019	365-02019
	599-02021	1/2	1.6 (1.37)	256-02021	257-02021B	258-02021C	259-02021	260-02021	261-02021	262-02021	363-02021	366-02021	364-02021	365-02021
	599-02023	1/2	2.5 (2.14)	256-02023	257-02023B	258-02023C	259-02023	260-02023	261-02023	262-02023	363-02023	366-02023	364-02023	365-02023
	599-02025	1/2	4 (3.42)	256-02025	257-02025B	258-02025C	259-02025	260-02025	261-02025	262-02025	363-02025	366-02025	364-02025	365-02025
	599-02027	3/4	6.3 (5.38)	256-02027	257-02027B	258-02027C	259-02027	260-02027	261-02027	262-02027	363-02027	366-02027	364-02027	365-02027
	599-02029	1	10 (8.55)	256-02029	257-02029B	258-02029	259-02029	260-02029	261-02029	262-02029	363-02029	366-02029	364-02029	365-02029
Normally Open	599-02047	1/2	0.4 (0.34)	256-02047A	257-02047	258-02047C	259-02047	260-02047	261-02047	262-02047	363-02047	366-02047	364-02047	365-02047
	599-02049	1/2	0.63 (0.54)	256-02049A	257-02049	258-02049C	259-02049	260-02049	261-02049	262-02049	363-02049	366-02049	364-02049	365-02049
	599-02051	1/2	1 (0.85)	256-02051A	257-02051	258-02051C	259-02051	260-02051	261-02051	262-02051	363-02051	366-02051	364-02051	365-02051
	599-02053	1/2	1.6 (1.37)	256-02053A	257-02053	258-02053C	259-02053	260-02053	261-02053	262-02053	363-02053	366-02053	364-02053	365-02053
	599-02055	1/2	2.5 (2.14)	256-02055A	257-02055	258-02055C	259-02055	260-02055	261-02055	262-02055	363-02055	366-02055	364-02055	365-02055
	599-02058	1/2	4 (3.42)	256-02058A	257-02058	258-02058C	259-02058	260-02058	261-02058	262-02058	363-02058	366-02058	364-02058	365-02058
	599-02061	3/4	6.3 (5.38)	256-02061A	257-02061	258-02061C	259-02061	260-02061	261-02061	262-02061	363-02061	366-02061	364-02061	365-02061
	599-02063	1	10 (8.55)	256-02063A	257-02063	258-02063C	259-02063	260-02063	261-02063	262-02063	363-02063	366-02063	364-02063	365-02063

* Product numbers in gray shading are available as assemblies only.

Technical Data

Valve Size	1/2-inch to 1-inch
Body	Globe style, ANSI Class 250 1/2- and 3/4-inch C37700 Forged brass. 1-inch UNS CA 844 Bronze
Trim	Brass or Stainless Steel
Stem	Stainless steel ASTM A582 Type 303, 7/32-inch (5.5-mm) stroke
Seat	Metal-to-metal
Packing	Ethylene propylene O-ring
Close-off Ratings	According to ANSI/FCI 70-2 See Table 3.

Controlled Medium	Water, water-glycol solutions to 50%, low pressure steam <15 PSI (with stainless steel trim only).
-------------------	--

Media Temperature	35°F to 250°F (2°C to 120°C)
-------------------	------------------------------

Maximum Differential Pressure for Modulating Service:

Media	Brass Trim	Stainless Steel Trim
Liquid	25 psi (173 kPa)	50 psi (345 kPa)
Steam	—	15 psi (103 kPa)

Rangeability	Cv <1 = >50:1, Cv >1 = >100:1
--------------	----------------------------------

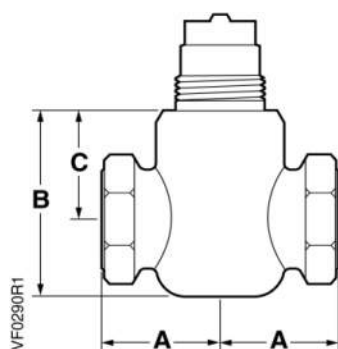
Leakage Rate	Class IV (0.01% of Cv)
--------------	------------------------

Flow Characteristics	Modified equal percentage
----------------------	---------------------------

Mounting	NEMA 1 (interior only)
----------	------------------------

Table 3. Close-Off Ratings in psi (kPa).

Action	Valve Size Inches	Flow Rate, Cv (Kvs)	Electronic Actuator		Close-Off Ratings @ 20 psi (138 kPa)		
			SAS	SSC	2-Inch Pneumatic Actuator		
					3-8 psi (69-103 kPa)	8-13 psi (21-55 kPa)	10-15 psi (55-90 kPa)
NC	1/2	0.4 to 1.6 (0.34 to 1.37)	95 (655)	95 (655)	40 (276)	95 (655)	95 (655)
	1/2	2.5 to 4 (2.15 to 3.44)	50 (345)	50 (345)	28 (193)	50 (345)	50 (345)
	3/4 and 1	6.3 to 10 (5.43 to 8.6)	40 (276)	40 (276)	18 (124)	40 (276)	40 (276)
NO	1/2	0.4 to 1.6 (0.34 to 1.37)	160 (1103)	120 (868)	95 (655)	45 (310)	20 (138)
	1/2	2.5 to 4 (2.15 to 3.44)	85 (586)	65 (448)	45 (310)	25 (172)	15 (103)
	3/4 and 1	6.3 to 10 (5.43 to 8.6)	70 (482)	55 (379)	35 (241)	10 (69)	—



Internal Thread NPT × Internal Thread NPT

Valve Size Inches	A	B		C		Weight lbs (kg)
		NO	NC	NO	NC	
1/2	1-3/8 (35)	2-1/4 (57)		1-5/16 (33)		0.96 (.44)
3/4	1-5/8 (41)	2-3/8 (59)		1-5/16 (33)		1.13 (.51)
1	1-15/16 (49)	2-3/4 (69)		1-9/16 (39)		1.7 (.77)

Figure 1. Two-way Valve Dimensions in Inches (mm).

Typical Specifications

Automatic control valves shall have NPT threaded type fittings, 1/2 through 1-inch sizes, and shall be ANSI rated to withstand the pressures and temperatures encountered.

Valves shall have metal-to-metal seats, stainless steel stems, and Ethylene propylene O-ring packing.

Valves shall be ANSI Leakage Class IV (0.01% of Cv). Valves shall have >50:1 rangeability for Cv<1 rangeability and >100:1 for Cv>1.

All two-way valves shall be provided with equal-percentage contoured throttling plugs.

For complete technical details on valves with stainless steel trim, or union internal thread, angle internal thread, or union external thread end connections, see *Powermite 599 Series, MT Series Terminal Unit Two-way Valves* Technical Instructions, 155-196P25.

Disposal

Do not dispose of valves as household waste.

- Special handling of individual components may be mandated by law or make ecological sense.
- Observe all local and currently applicable laws and regulations.



The actuators are considered electrical and electronic equipment for disposal in terms of the applicable European Directive and may not be disposed of as domestic garbage.

- Dispose of the actuators through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

Information in this publication is based on current specifications. The company reserves the right to make changes in specifications and models as design improvements are introduced. Products or company names mentioned herein may be the trademarks of their respective owners. © 2018-2024 Siemens Industry, Inc.

VAV IP CONTROLLER

The VAV IP is a freely programmable controller designed for pressure-independent control of any single duct Variable Air Volume (VAV), Constant Air Volume (CAV) and Supply/Exhaust terminal units. These controllers are ideally suited for critical environment applications such as Laboratory Airflow Tracking, Critical Patient Rooms, Operating Rooms, and other applications requiring precise control of airflows.

This controller is supported by Alerton's VisualLogic® programming tool and the Compass 2.2.0 and above version supervisor. The VAV IP controller has an integral damper actuator, field replaceable airflow sensor, up to seven flexible universal inputs/outputs (UIO), five solid state relay outputs, and a Microset bus. The controller supports BACnet/IPv4 and BACnet/IPv6.

The integrated Bluetooth® Low Energy (BLE) capability enables easy pairing with mobile apps such as BMS Startup app.



FEATURES AND BENEFITS

COMMUNICATION

- Supports BACnet® IP communication which enables faster download, thereby reducing commissioning time, and increased data bandwidth for increased data sharing.
- Built-in 2-port Ethernet switch supports 10/100 Mbps.
- Supports full duplex IPv4/IPv6 addressing, DHCP, SLAAC, and Link Local addressing modes.
- Supports Rapid Spanning Tree Protocol (RSTP) and Network Time Protocol (NTPv4).
- Features a non-isolated RS-485 interface for Modbus communication (future firmware upgrade required).

CHARACTERISTICS

- Compact design for small enclosures and easy to install on round and square ducts.
- Color-coded, removable terminal blocks to simplify wiring and replacement.
- Real-time clock with super capacitor circuit providing up to 24 hours of date/time retention.
- 20 VDC at 75 mA auxiliary supply for field devices.

- Up to seven Universal Inputs/Outputs (UIO) configurable as analog voltage/current output or as a analog/binary input.
- Up to five 24 VAC solid state relay outputs with 1.5 A continuous and 3.5 A in-rush for 100 milliseconds per SSR output.
- All UI can be used for pulse input. Maximum frequency 100 Hz, Minimum duty cycle (50 % / 50 %) 5 ms ON / 5 ms OFF.
- Integrated 44 in-lbs (5 Nm) modulating actuator with 90 seconds runtime at 60 Hz (108 seconds at 50 Hz) with analog position feedback.
- Field replaceable differential pressure sensor (± 500 Pa; accuracy $\pm 3\%$ of full range).
- The airflow sensor is factory calibrated at multiple velocity points. Minimum, maximum and reheat airflows can be entered using a Microset wall unit or compatible operator workstation software.

SUPPORTS

- 50 trendlogs at 60 seconds interval minimum. (This includes 10 COV trendlogs).

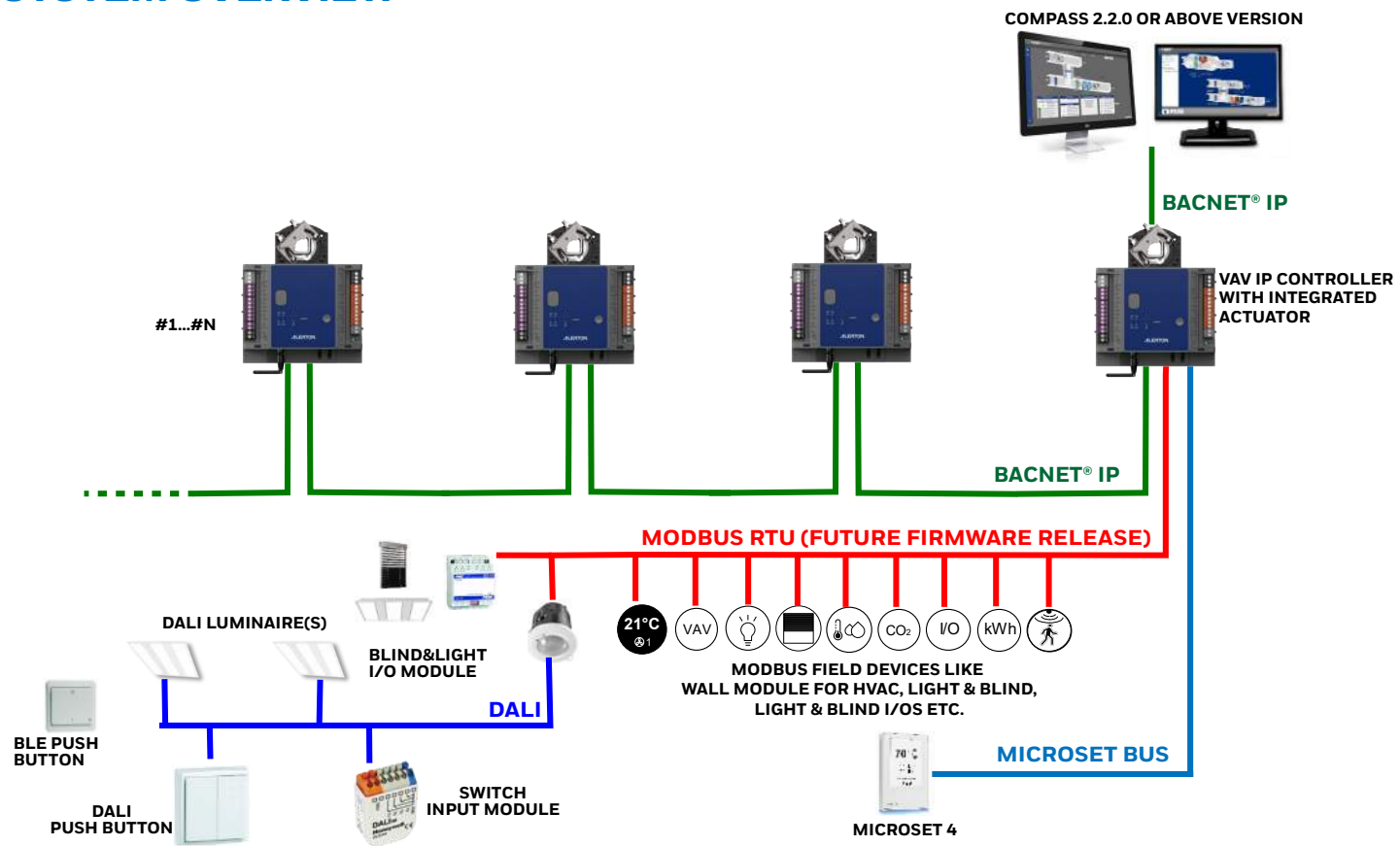
- 3 Schedules and 1 Zone (Optimum Start for internal point only).
- 25 Alarms (Event Enrollment Objects).
- 5 Notification Class Objects.
- Supports BMS Startup - Device Pairing mobile app for device pairing, device numbering and easy deployment using BACnet® "Who Am I" and "You are" messages.

FREELY PROGRAMMABLE

- Supports Alerton's BD9 DDC file format using Alerton's VisualLogic®.
- Extensive library of VAV applications is available, including ASHRAE Guideline 36.
- All control logic is programmed using Alerton's easy-to-learn graphical programming language, VisualLogic®.
- Using BD9 DDC the VAV IP controller can execute more complex calculations to meet the needs of increasingly demanding sequences of operations for building systems.

ALERTON

SYSTEM OVERVIEW



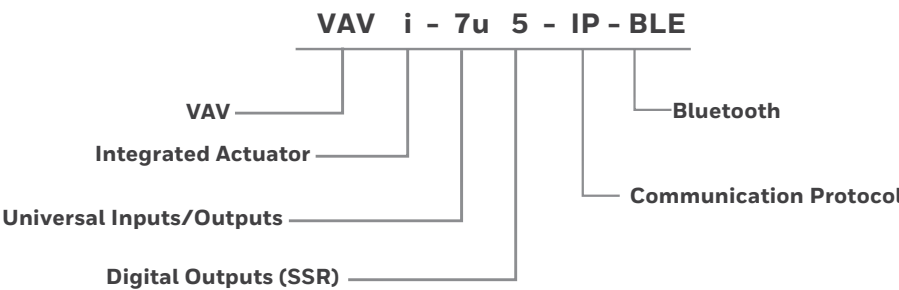
ORDERING NUMBERS

CONTROLLER MODEL	POWER SUPPLY	UIO	SOLID STATE RELAY	INTEGRATED ACTUATOR	COMMUNICATION	BLUETOOTH
VAVi-7u5-IP	24 VAC	7	5	Yes	IP	No
VAVi-0-IP	24 VAC	0	0	Yes	IP	No
VAVi-7u5-IP-BLE	24 VAC	7	5	Yes	IP	Yes

REPLACEMENT PARTS

PART NUMBER	TYPE	DESCRIPTION
SDPPF500PA	Air flow sensor	Replacement air flow sensor for use if the original sensor is damaged, or becomes inoperable. (Sold in pack of 2)

CONTROLLER PART NUMBERS DESCRIPTION



PRODUCT SPECIFICATIONS

HARDWARE

PARAMETER	SPECIFICATION
CPU	Crossover processor NXP LM7, Cortex M7
MEMORY CAPACITY	512 MB QSPI Flash, 128 MB SDRAM
BACnet® IP	2 X RJ-45 Ethernet ports with a protection that allows loop topology to continue the communication with other controllers even if one node fails, when used with an RSTP supporting device.
REAL TIME CLOCK	24-Hours backup after power failure. The controller includes a supercapacitor to power the built-in real time clock for 24-Hours. In case of power failure, the super capacitor retains the time set in controller for 24-Hours. After 24-Hours, the time will reset to default factory time until user perform BACnet Time Sync.
SMALL LEDS	Transmission or Reception of communication Signal (green)
LARGE LEDS	Controller status (green, yellow and red).

COMMUNICATION

PARAMETER	SPECIFICATION
PROTOCOL SUPPORTED	BACnet/IPv4, BACnet/IPv6, BACnet/Ethernet
ETHERNET CONNECTION SPEED	10/100 Mbps
INTERNET PROTOCOL VERSION	IPv4 and IPv6
IP ADDRESSING MODES	Supports Static, DHCP, SLAAC
NETWORKING PROTOCOL	Rapid Spanning Tree Protocol (RSTP) and Network Time Protocol (NTP4)
MICROSET BUS	2 wire, polarity sensitive bus for Microtouch, Microset-BT, Microset II and Microset 4 wall modules

SOLID STATE RELAY

SPECIFICATION
SSR does switch supply voltage, works with AC and DC, however in case of DC no support for synchronous motor.
1.5 A constant; 3.5 A inrush for 0.1 sec per SSR output - Optional bridge provides shared power to all SSRs from 24 VAC powering controller.
Note: SSR will not close the contact unless voltage is present, they cannot be used as dry contact.

UIO (CONFIGURABLE AS ANALOG OUTPUT OR UNIVERSAL INPUT)

PARAMETER	SPECIFICATION
AO	16-bit universal analog outputs support Voltage Mode: 0-10 VDC @ 10 mA maximum (1k ohm minimum); Current Mode: 4-20 mA @ 550 ohms Maximum; or Binary Mode: 11 VDC @ 20 mA maximum relay coil current (for controlling low-coil current 11 VDC relays and solid-state relays).
UI	16-bit universal inputs accept 10 k thermistor (type II and III), dry contact, 1k platinum RTD, 0-20 mA, 0-10 V, or dry-contact pulse. Pulse input maximum frequency of 100 Hz. Pulse input minimum duty cycle 5ms ON / 5ms OFF. NOTE: Some 4-20 mA input sensors may need an external resistor to function properly. Please refer to the sensor's documentation.
Common terminal shared by 2 UIO, protected against 24 VAC mis-wiring and short circuit.	

Important Note: This device is UL listed and limited to 100 VA maximum. Binary output loads are restricted by this maximum VA rating. If all 5 SSR binary outputs are connected and fully loaded (@24 VA each) the total VA of the device will exceed the UL listed and limited maximum rating. DO NOT EXCEED 100 VA MAXIMUM RATING!

ELECTRICAL

PARAMETER	SPECIFICATION
VOLTAGE RANGE	20-30 VAC; Class 2 transformer
POWER CONSUMPTION FOR VAVI-7u5-IP, VAVI-7u5-IP-BLE- AND VAVI-0-IP	Nominal 9.3 VA (actuator at nominal load and IP communication active)
FREQUENCY RANGE	50 to 60 Hz
AUXILIARY OUTPUT	20 VDC @ 75 mA
INTERNAL POWER SUPPLY	Half-wave rectified

OPERATIONAL ENVIRONMENT

PARAMETER	SPECIFICATION
STORAGE	-40 °F to 150 °F (-40 °C to 66 °C)
OPERATION	32 °F to 122 °F (0 °C to 50 °C)
HUMIDITY	5% to 95% RH., non condensing
PROTECTION	IP20, NEMA 1
POLLUTION LEVEL	2

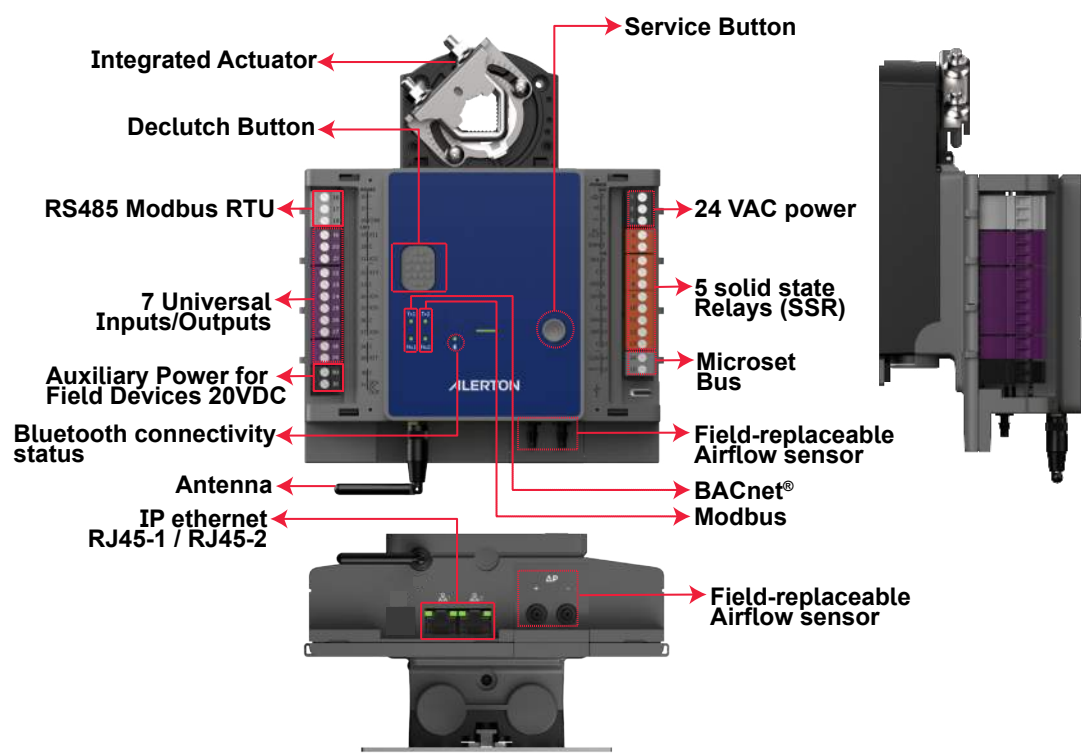
AIR-FLOW SENSOR

PARAMETER	SPECIFICATION
RANGE	± 2 in. w.c. (± 500 Pa)
ZERO-POINT ACCURACY	0.0004 in.w.c. (0.1 Pa)
REPEATABILITY	0.5% of reading
CONNECTION	1/8-inch x 3/8-inch long barbfitting
RESOLUTION	16 bit input

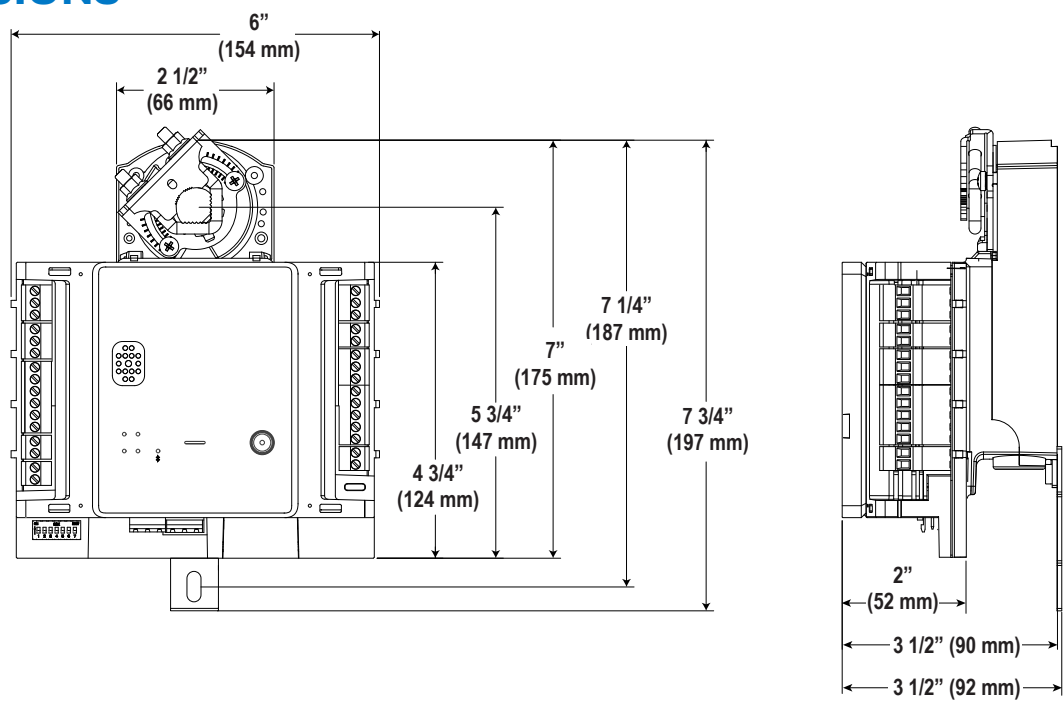
STANDARDS AND COMPLIANCE

SPECIFICATION
BACnet® BTL®-Listed; IP VAV model as BACnet® Advanced Application Controller (B-AAC); (BTL certification is in progress).
FCC Part 15, Class A
IC - ICES-003 Issue 6
UL916, Energy Management Equipment
RoHS
EN 55022. Class A
EN 61000-3-2, 61000
CE

INTERFACE



DIMENSIONS



PARAMETER	SPECIFICATION
DIMENSION (LXWXH)	7 X 6 X 3 1/2 inches (175 X 154 X 92 mm)
WEIGHT	1.5 kg
MOUNTING	Fixation with bracket and shaft

VIP Controller / VXIO Modules Installation Instructions

WARNING! Always install equipment in accordance with these instructions and in the manner consistent with electrical codes and the authority having jurisdiction. Read all instructions before mounting and wiring.

Overview

Alerton® VIP controller models:

- ◆ VIP-363-HOA, a plant controller with expandable I/O capability.
- ◆ VIP-363-VAV, a VAV application controller with support for one I/O expansion module.

Both models offer a high-performance, programmable network programming system utilizing a built-in 4-port Ethernet switch. It supports BACnet/Ethernet, BACnet/IPv4, BACnet/IPv6 and RSTP protocols. The VIP-363-HOA can also be configured for MSTP.

The VIP-363-HOA supports eight I/O expansion modules:

- ◆ VXIO-322-HOA
- ◆ VXIO-965-HOA

The VIP-363-VAV support one I/O expansion modules:

- ◆ VXIO-322-HOA or
- ◆ VXIO-965-HOA

Mounting

The VIP and VXIOs mount on a standard DIN rail:

- ◆ vertically, with the connections on the right and left sides of the device.
- ◆ horizontally, with the connections on top and bottom.

The controller and both I/O expansion modules have a locking clip. Mounting on a DIN rail ensures accurate alignment of connectors between all modules. Or screw-mount the VIP using the four mounting tabs, accessible



under the covers. These mounting tabs may be broken off if needed to save space when DIN rail mounting.

Note: Mount the controller prior to mounting any necessary items (I/O modules).

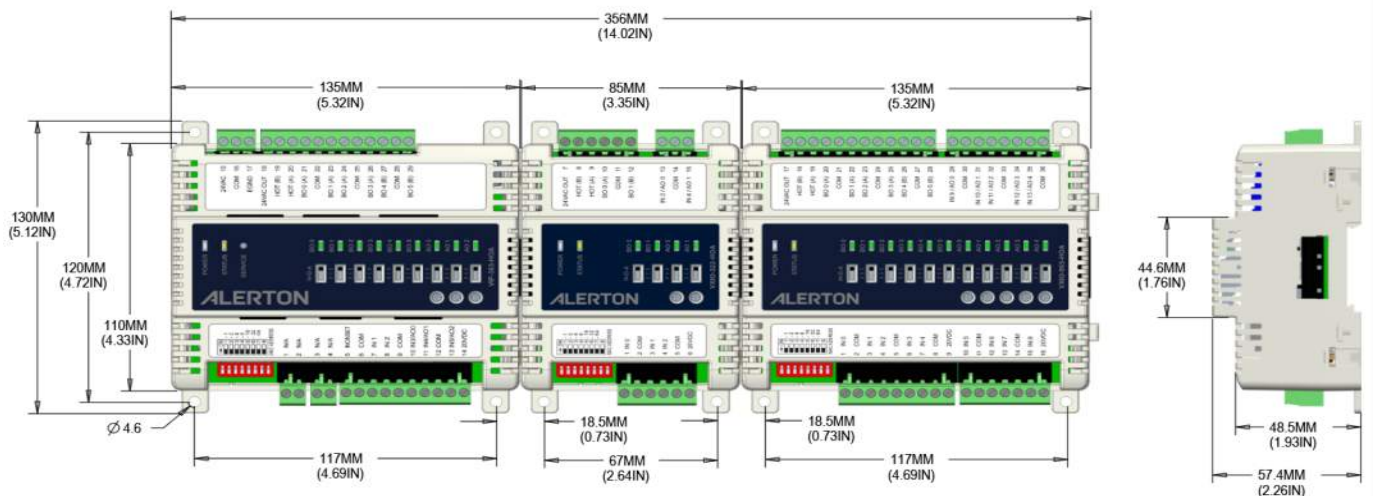
WARNING! Always disconnect the controller and I/O expansion modules from power before mounting.

To mount the devices on a DIN rail:

- 1 Holding the device with its top tilted in towards the DIN rail, hook the two top flex snaps on the back of the device onto the top of the DIN rail.
- 2 Push down and in to latch the two bottom latching tabs of the device onto the DIN rail.
- 3 Properly ground the panel, then terminate grounded components of power, communications, and I/O wiring.

To remove the device from the DIN rail:

- 1 Push straight down from the top to release the bottom tabs.
- 2 Rotate the bottom of the device out towards you and pull the device up and away from the DIN rail to release the bottom latching tabs.



Installation

Mount devices in a position that allows clearance for wiring, servicing, removal, and terminal block connection. The VIP controller and VXIO modules may be mounted in any orientation.

IMPORTANT Avoid mounting in areas where acid fumes or other deteriorating vapors can attack the metal parts of the device, or in areas where escaping gas or other explosive vapors are present.

Power

The VIP controller and expansion modules require a 24 VAC [20 VAC (min), 30 VAC (max)], 50/60 Hz, half-wave power from a UL Listed Class 2, 24 VAC transformer.

WARNING! Half-wave devices and full-wave devices must not use the same AC transformer. Maintain wiring polarity.

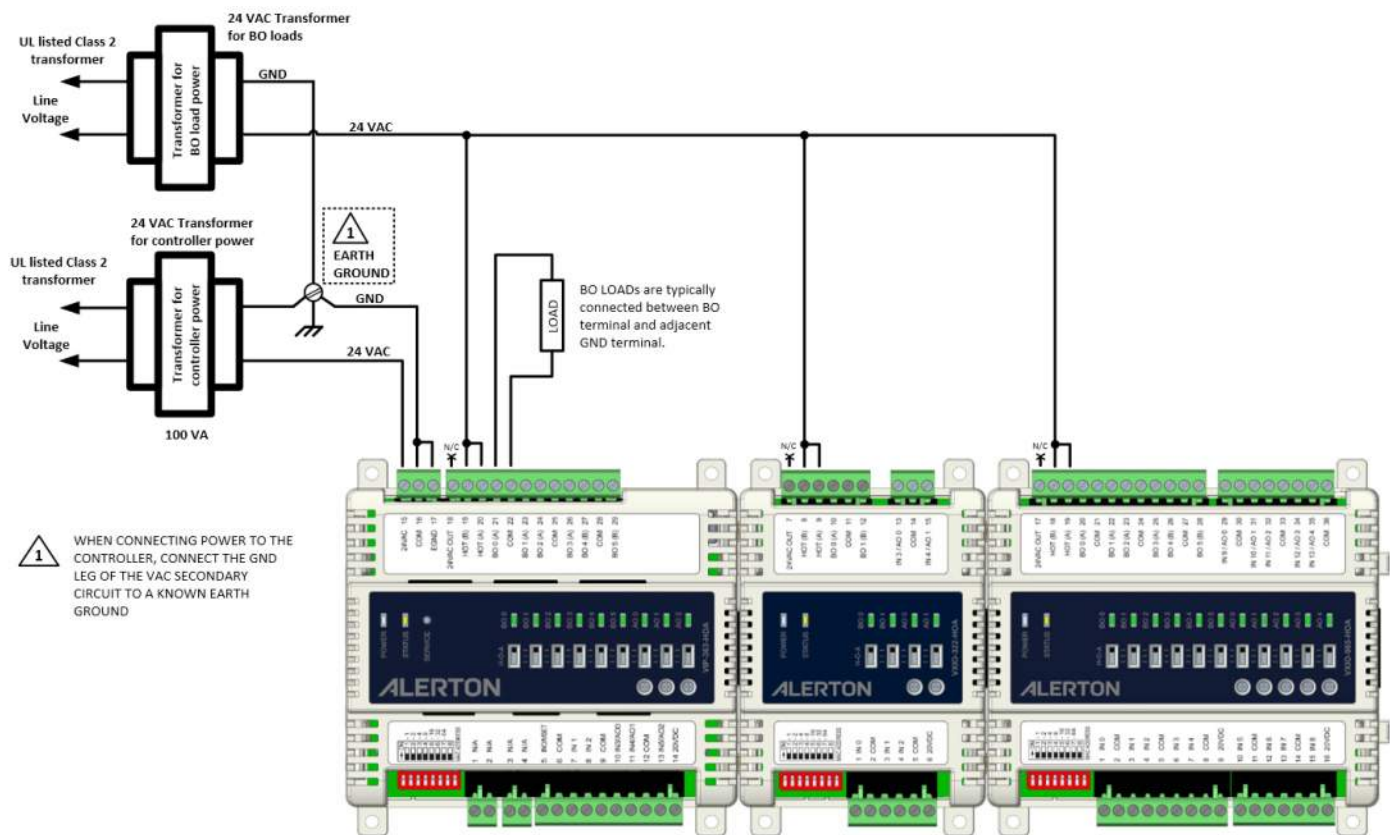


Fig. 1 Use separate transformers for controllers and load power.

Power Consumption

Total power consumption must be based on the sum of the VA rating for each controller and I/O expansion module. The total must not exceed 100 VA. Figures 1 and 3 represent options for powering the I/O expansion modules separate from the VIP-363-HOA controller.

Part	VA Minimum Load (No BO Load)	VA Maximum Load	BO Load (HOT A)	BO Load (HOT B)	BO 24 VAC Load Max
VIP-363-VAV	15 VA	100 VA	100 VA	72 VA	1.5 A
VIP-363-HOA	15 VA	100 VA	100 VA	72 VA	1.5 A
VXIO-322	6 VA	87 VA	72 VA	72 VA	1.5 A
VXIO-965	3 VA	100 VA	100 VA	72 VA	1.5 A

Grounding

Connect the EGND and COM to a good ground point on the secondary side of the transformer as indicated in Figure 1 and Figure 3.

Inputs and outputs

- ◆ 3 universal inputs: software controlled input type selection supports 10k thermistor (type II), dry contact, 0-10 VDC, 0-20 mA, Microset (In-0), and pulse (In-1, -2, -3, -4, -5). Flexible to connect external sensors like 20 KNTC, PT1000 and other resistive sensors.
- ◆ 6 binary outputs: solid-state relays rated 24 VAC @ 1.5 A continuous, 3.5 A inrush for 100 ms
- ◆ 3 universal inputs/outputs: universal inputs described above. Analog outputs: selectable 0-10 VDC or 0-20 mA

Using terminal blocks

The VIP controller uses removable terminal blocks to simplify field wiring of power and cabling. If desired, you can remove the terminal blocks from the unit, terminate cable, and replace the block when you finish.

To terminate cable:

- 1 Strip a wire jacket from the end of the cable.
- 2 Use a small screwdriver to turn the adjustment screw fully counter-clockwise. The clamps in the wire slot separate as you turn the screw.
- 3 When the clamps in the wire slot are fully open, insert the stripped end of the cable (the insulation end must be flush with the terminal block). Be sure to insert all cable strands into the wire slot.
- 4 Hold the cable in place and turn the adjustment screw clockwise to tighten it until the clamps in the wire slot secure the cable. Tug gently on the cable to ensure that it's securely terminated.
- 5 Both I/O modules VXIO-322-HOA and VXIO-965-HOA can connect directly to the VIP-363-HOA or VIP-363-VAV. Note that the VIP-363-VAV only supports 1 VXIO expansion module. See below.



Fig. 2 VIP-363-HOA controller, VXIO-232-HOA and VXIO-965-HOA expansion modules

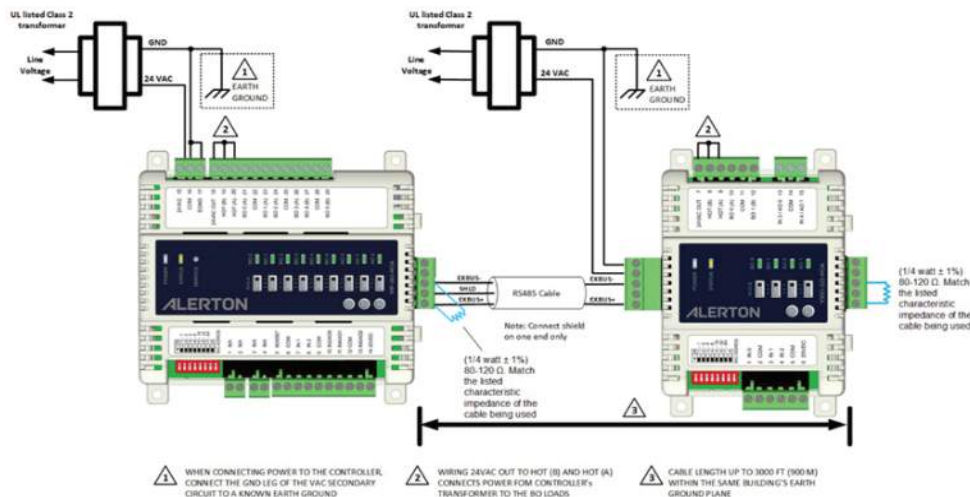


Fig. 3 Remotely mounted expansion module

Input wiring and configuration

Use 18AWG twisted shielded pair (TSP) wire for all inputs. Connect only one end of shielding to ground. DO NOT CONNECT SHIELDING TO ANY TERMINAL ON THE DEVICE; connect shielding to a known earth ground at the panel/enclosure.

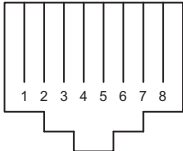
Ethernet connections



Fig. 4 Ethernet Connections

The VIP controller has a built-in four-port Ethernet switch that supports 10BASE-T (10 Mbps), 100BASE-TX (100 Mbps), and 1000BASE-T (1000 Mbps) Ethernet connections. This controller automatically operates at 1000 Mbps if other devices and cabling support it.

Table 1 Ethernet Connections

Ethernet RJ-45 jack	An RJ-45 jack for connection to Ethernet is on top of the VIP controller. Pin designations for the RJ-45 jack are shown.																		
		<table><tr><th>Pin</th><th>Assignment</th></tr><tr><td>1</td><td>Bi-directional pair A+</td></tr><tr><td>2</td><td>Bi-directional pair A-</td></tr><tr><td>3</td><td>Bi-directional pair B+</td></tr><tr><td>4</td><td>Bi-directional pair C+</td></tr><tr><td>5</td><td>Bi-directional pair C-</td></tr><tr><td>6</td><td>Bi-directional pair B-</td></tr><tr><td>7</td><td>Bi-directional pair D+</td></tr><tr><td>8</td><td>Bi-directional pair D-</td></tr></table>	Pin	Assignment	1	Bi-directional pair A+	2	Bi-directional pair A-	3	Bi-directional pair B+	4	Bi-directional pair C+	5	Bi-directional pair C-	6	Bi-directional pair B-	7	Bi-directional pair D+	8
Pin	Assignment																		
1	Bi-directional pair A+																		
2	Bi-directional pair A-																		
3	Bi-directional pair B+																		
4	Bi-directional pair C+																		
5	Bi-directional pair C-																		
6	Bi-directional pair B-																		
7	Bi-directional pair D+																		
8	Bi-directional pair D-																		
Cable type and length	Use an approved Category 5e or better Ethernet drop cable with RJ-45 plugs. Use professionally manufactured cables of no more than 328 feet (100 meters).																		

MS/TP



IMPORTANT! MS/TP is supported on the VIP-363-HOA model only.

Setting the MAC address

Set the MAC address using the first seven switches on the DIP switch. (Valid address range is 0 to 127).

Connecting MS/TP

Connect the VIP-363-HOA to the BACnet system over an MS/TP LAN that uses the EIA-485 signaling standard. Connect the MS/TP+ to Terminal 1 and MS/TP- to Terminal 2 on the VIP-363-HOA. Use shielded 22 AWG, 2 conductor, twisted-pair cabling with characteristic impedance between 100 and 130 Ω @ 4000 ft (1200m) maximum. Distributed capacitance between conductors must be less than 30 pF/foot (100 pF/m). Distributed capacitance between conductor and shield must be less than 60 pF/foot (200 pF/m). Foil or braided shield acceptable.

Matched precision terminating resistors are required at each end of the MS/TP segment. Wire the resistors across + and -. Recommended 120 Ohm resistor value.

Terminate shield drain at one end of the MS/TP segment to ground. Tie shield drain through with a wire nut at each intermediate device and insulate to avoid potential ground contact. Tape shield drain back at other end of segment.

Consideration must be made for the reduced bandwidth associated with MS/TP communications. Alerton recommends doing ROC file and other large file downloads using the Ethernet port and not MS/TP. Consideration must be made for the fact that the VIP-363-HOA is a building controller and will host a greater quantity of trendlogs, schedules and alarms than a VLC. To reduce the potential for communication issues, Alerton recommends reducing the number of other MS/TP devices on the MS/TP network segment and to be diligent when setting up trendlogs and logging intervals to maximize network performance.

Disposal



WEEE Directive 2012/2019/EC Waste Electrical and Electronic Equipment directive

The product should not be disposed of with other household waste. Check for the nearest authorized collection centers or authorized recyclers. The correct disposal of end-of-life equipment will help prevent potential negative consequences for the environment and human health. Do not burn this device.

Electrostatic sensitivity



The VIP controller and its components may be susceptible to electrostatic discharge (ESD). Use appropriate ESD grounding techniques while handling the product. When possible, always handle the product by its non-electrical components.

Canadian conformance statements

This digital apparatus complies with CAN ICES-3 (B)/ NMB-3 (B).

This device complies with Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ◆ Reorient or relocate the receiving antenna.
- ◆ Increase the separation between the equipment and receiver.
- ◆ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

FCC notice

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.

Honeywell Building Technologies

715, Peachtree st. NE
Atlanta, GA 30308.
buildings.honeywell.com

AVERTISSEMENT! Toujours installer l'équipement conformément aux instructions et d'une manière conforme aux codes de l'électricité et à l'autorité compétente. Lire toutes les instructions avant le montage et le câblage.

Présentation

Modèles de contrôleur VIP Alerton® :

- ◆ VIP-363-HOA, un contrôleur d'installation doté de capacités d'E/S extensibles.
- ◆ VIP-363-VAV, un contrôleur d'application VAV avec support d'un module d'extension E/S.

Les deux modèles proposent un système de programmation en réseau performant et programmable exploitant un commutateur Ethernet intégré à quatre ports. Il prend en charge les protocoles BACnet/Ethernet, BACnet/IPv4, BACnet/IPv6 et RSTP. Le contrôleur VIP-363-HOA peut également être configuré pour le protocole MSTP.

Le VIP-363-HOA prend en charge huit modules d'extension d'E/S:

- ◆ VXIO-322-HOA
- ◆ VXIO-322-HOA

Le VIP-363-VAV prend en charge un module d'extension d'entrée/sortie:

- ◆ VXIO-322-HOA or
- ◆ VXIO-322-HOA

Montage

Le contrôleur et les deux modules d'extension E/S sont munis d'une agrafe de verrouillage. Le montage sur un rail DIN assure un alignement précis des connecteurs entre tous les modules. Vous pouvez aussi visser le contrôleur VIP à l'aide de ses quatre pattes de fixation, accessibles sous les couvercles.



Remarque : Montez le contrôleur avant de monter les articles nécessaires (modules d'E/S).

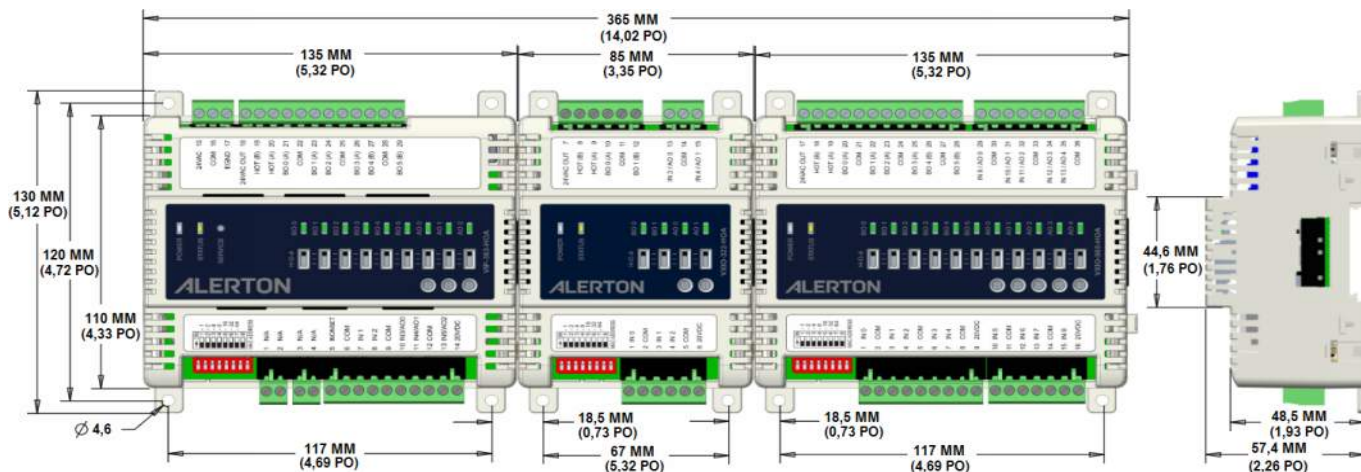
AVERTISSEMENT! Débranchez toujours tous les appareils du bloc d'alimentation avant de les monter.

Pour monter les appareils sur un rail DIN :

- 1 En tenant l'appareil avec sa partie haute inclinée vers le rail DIN, accrochez les deux boutons-pression flexibles du haut à l'arrière de l'appareil sur le dessus du rail DIN.
- 2 Appuyez et abaissez pour verrouiller les deux languettes de verrouillage inférieures de l'appareil sur le rail DIN.
- 3 Raccordez le panneau à la terre de façon adéquate, puis raccordez les composants mis à la terre de l'alimentation, des communications et du câblage d'E/S.

Pour retirer l'appareil du rail DIN:

- 1 Poussez directement vers le bas pour libérer les languettes inférieures.
- 2 Faites tourner le bas de l'appareil vers vous et tirez l'appareil vers le haut en l'éloignant du rail DIN pour libérer les languettes de verrouillage inférieures.



Installation

Montez les dispositifs dans une position qui permet un dégagement suffisant pour le câblage, l'entretien, l'enlèvement et la connexion du bornier. Le contrôleur VIP et les modules VXIO peuvent être montés sans égard à leur orientation.

IMPORTANT Évitez le montage dans les endroits où des vapeurs d'acide ou d'autres vapeurs de détérioration peuvent attaquer les parties métalliques de l'appareil ou dans les endroits où des gaz d'échappement ou d'autres vapeurs explosives sont présents.

Alimentation

Le contrôleur VIP et les modules d'extension nécessitent une alimentation demi-onde de 24 V.c.a. [20 V.c.a. (min), 30 V.c.a. (max)], 50/60 Hz, provenant d'un transformateur 24 V.c.a. de classe 2 homologué UL.

AVERTISSEMENT Les dispositifs demi-onde et les dispositifs pleine onde ne doivent pas utiliser le même transformateur CA. Respectez la polarité du câblage.

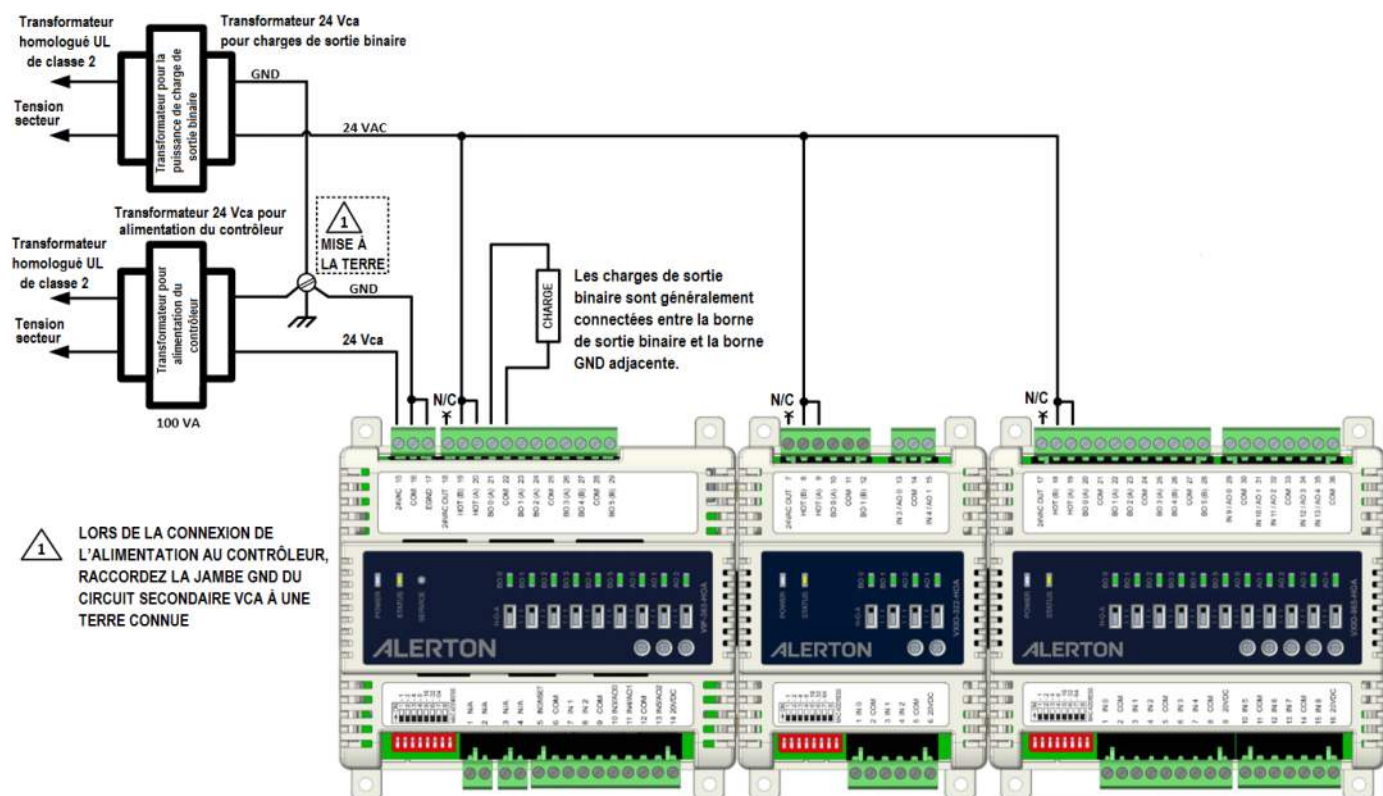


Fig. 1 Utilisez des transformateurs séparés pour les contrôleurs et la puissance de charge.

Consommation d'énergie

La consommation électrique totale doit être basée sur la somme de la valeur nominale VA de chaque contrôleur et module d'extension E/S. Le total ne doit pas dépasser 100 VA. Les figures 1 et 3 représentent les options qui permettent d'alimenter les modules d'extension d'E/S séparément du contrôleur VIP-363-HOA.

Pièce	Charge minimale en VA (sans charge BO)	Charge maximale en VA	Charge BO (HOT A)	Charge BO (HOT B)	Charge BO maximale à 24 V c.a.
VIP-363-VAV	15 VA	100 VA	100 VA	72 VA	1,5 A
VIP-363-HOA	15 VA	100 VA	100 VA	72 VA	1,5 A
VXIO-322	6 VA	87 VA	72 VA	72 VA	1,5 A
VXIO-965	3 VA	100 VA	100 VA	72 VA	1,5 A

Mise à la terre

Connectez les bornes EGND et COM à un point de mise à la terre de qualité sur le côté secondaire du transformateur, comme indiqué sur la figure 1 et la figure 3.

Entrées et sorties

- ◆ 3 entrées universelles : la sélection du type d'entrée contrôlée par logiciel prend en charge la thermistance 10k (type II), le contact sec, 0-10 Vcc, 0 à 20 mA, Microset (In-0), et l'impulsion (In-1, -2, -3, -4, -5). Flexibles, permettent de raccorder des capteurs externes tels que 20KNTC, PT1000 et d'autres capteurs résistifs.
- ◆ 6 sorties binaires : relais statiques classés 24 Vca à 1,5 A en continu, 3,5 A en courant d'appel pendant 100 ms
- ◆ 3 entrées/sorties universelles : entrées universelles décrites ci-dessus. Sorties analogiques : sélectionnable, 0 à 10 Vcc ou 0 à 20 mA.

Utilisation des borniers

Le contrôleur VIP utilise des borniers amovibles pour simplifier le câblage de l'alimentation et du câblage sur place. Si vous le souhaitez, vous pouvez retirer les borniers de l'unité, raccorder le câble, puis replacer le bloc lorsque vous avez terminé.

Pour raccorder le câble :

- 1 Dénudez une gaine de fil à l'extrémité du câble.
- 2 À l'aide d'un petit tournevis, tournez la vis de réglage dans le sens inverse des aiguilles d'une montre. Les pinces dans la fente du fil se séparent lorsque vous tournez la vis.
- 3 Lorsque les pinces de la fente du fil sont complètement ouvertes, insérez l'extrémité dénudée du câble (l'extrémité de l'isolation doit être encastrée dans le bornier). Assurez-vous d'insérer tous les brins de câble dans la fente du fil.
- 4 Tenez le câble en place et tournez la vis de réglage dans le sens horaire pour la serrer jusqu'à ce que les pinces dans la fente du fil sécurisent le câble. Tirez doucement sur le câble afin de vous assurer qu'il est correctement raccordé.
- 5 Les deux modules d'E/S VXIO-322-HOA et VXIO-965-HOA peuvent se connecter directement au VIP-363-HOA ou VIP-363-VAV. Notez que le VIP-363-VAV ne prend en charge qu'un seul module d'extension VXIO. Voir ci-dessous.

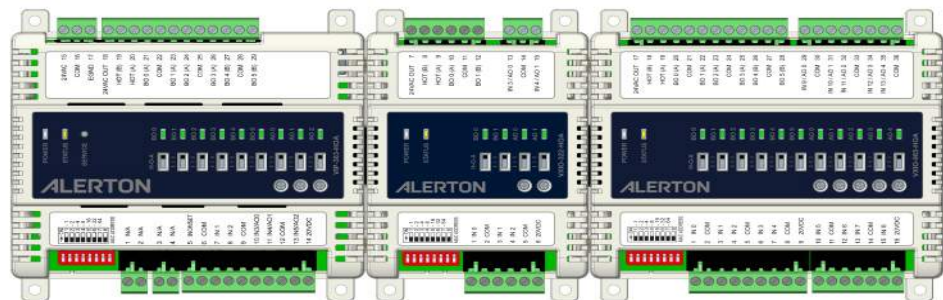


Fig. 2 Contrôleur VIP-363-HOA, modules d'extension VXIO-232-HOA et VXIO-965-HOA

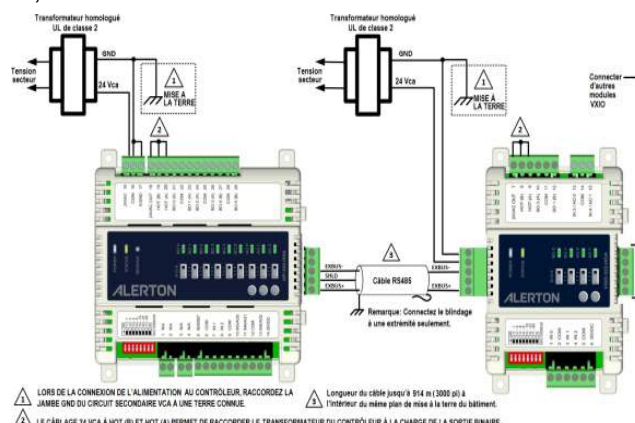


Fig. 3 Module d'expansion monté à distance

Câblage d'entrée et configuration

Utiliser le fil torsadé blindé en pair d'une jauge de 18 AWG pour toutes les entrées. Connecter une seule extrémité du blindage à la terre. **NE PAS CONNECTER LE BLINDAGE À UN TERMINAL SUR L'APPAREIL;** connecter plutôt le blindage à une prise de terre connue du panneau ou de l'enceinte.

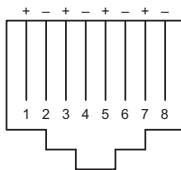
Connexions Ethernet



Fig. 4 Connexions Ethernet

Le contrôleur VIP est doté d'un commutateur Ethernet à quatre ports intégré qui prend en charge les connexions Ethernet 10BASE-T (10 Mb/s), 100BASE-TX (100 Mb/s) et 1000BASE-T (1 000 Mb/s). Ce contrôleur fonctionne automatiquement à 1 000 Mb/s si d'autres appareils et câblages le prennent en charge.

Table 1 Connexions Ethernet

Prise Ethernet RJ-45	Une prise RJ-45 pour la connexion Ethernet se trouve au-dessus du contrôleur VIP. Les désignations des broches pour la prise RJ-45 sont affichées.																		
		<table><tr><th>Broches</th><th>Attribution</th></tr><tr><td>1</td><td>Paire bi-directionnelle A+</td></tr><tr><td>2</td><td>Paire bi-directionnelle A-</td></tr><tr><td>3</td><td>Paire bi-directionnelle B+</td></tr><tr><td>4</td><td>Paire bi-directionnelle C+</td></tr><tr><td>5</td><td>Paire bi-directionnelle C-</td></tr><tr><td>6</td><td>Paire bi-directionnelle B-</td></tr><tr><td>7</td><td>Paire bi-directionnelle D+</td></tr><tr><td>8</td><td>Paire bi-directionnelle D-</td></tr></table>	Broches	Attribution	1	Paire bi-directionnelle A+	2	Paire bi-directionnelle A-	3	Paire bi-directionnelle B+	4	Paire bi-directionnelle C+	5	Paire bi-directionnelle C-	6	Paire bi-directionnelle B-	7	Paire bi-directionnelle D+	8
Broches	Attribution																		
1	Paire bi-directionnelle A+																		
2	Paire bi-directionnelle A-																		
3	Paire bi-directionnelle B+																		
4	Paire bi-directionnelle C+																		
5	Paire bi-directionnelle C-																		
6	Paire bi-directionnelle B-																		
7	Paire bi-directionnelle D+																		
8	Paire bi-directionnelle D-																		
Type de câble et longueur	Utilisez un câble Ethernet de chute approuvé de catégorie 5e ou mieux avec des fiches RJ-45. Utilisez des câbles fabriqués par des professionnels d'au plus 328 pieds (100 mètres).																		

MS/TP



IMPORTANT! MS/TP est pris en charge uniquement par le modèle VIP-363-HOA.

Définition de l'adresse MAC

Définissez l'adresse MAC à l'aide des sept premiers commutateurs du commutateur DIP. (La plage d'adresse valide est comprise entre 0 et 127).

Connexion MS/TP

Connectez le contrôleur VIP-363-HOA au système BACnet via un réseau local MS/TP utilisant la norme de signalisation EIA-485. Connectez le MS/TP+ à la borne 1 et le MS/TP- à la borne 2 du VIP-363-HOA. Utilisez un câble blindé à 2 conducteurs et à paires torsadées de calibre 22, dont l'impédance caractéristique est comprise entre 100 et 130 Ω à 1200 m (4000 pi) maximum. La capacitance répartie entre les conducteurs doit être inférieure à 30 pF/pied (100 pF/m). La capacitance répartie entre le conducteur et le blindage doit être inférieure à 60 pF/pi (200 pF/m). L'emploi d'un bouclier tressé ou en aluminium est acceptable.

Des résistances de terminaison de précision appariées sont nécessaires à chaque extrémité du segment MS/TP. Câblez les résistances entre les pôles + et -. Valeur de résistance recommandée : 120 Ohms.

Raccordez le drain du blindage à la terre à une des extrémités du segment MS/TP. Attachez le drain du blindage avec un écrou à chaque dispositif intermédiaire et isolez pour éviter tout contact potentiel avec la terre. Raccordez le drain du blindage à l'autre extrémité du segment.

Veuillez tenir compte de la bande passante réduite associée aux communications MS/TP. Alerton recommande de télécharger les fichiers ROC et les autres gros fichiers en utilisant le port Ethernet et non le protocole MS/TP. Veuillez tenir compte du fait que le contrôleur VIP-363-HOA est un contrôleur de bâtiment, et qu'il hébergera une plus grande quantité de journaux de tendances, de programmes et d'alarmes qu'un contrôleur VLC. Pour réduire le potentiel de problèmes de communication et pour maximiser la performance du réseau, Alerton recommande de réduire le nombre d'autres unités MS/TP sur le segment de réseau MS/TP et de faire preuve de vigilance lors de la configuration des journaux de tendances et des intervalles d'enregistrement.

Élimination



Directive 2012/2019/CE relative aux déchets d'équipements électriques et électroniques (DEEE)

Le produit ne devrait pas être jeté avec d'autres ordures ménagères. Adressez-vous au centre de collecte ou de récupération autorisé le plus près. L'élimination appropriée de l'équipement en fin de vie aidera à prévenir les conséquences négatives potentielles sur l'environnement et la santé. Ne pas brûler cet appareil.

Sensibilité électrostatique



Le contrôleur VIP et ses composants peuvent être sensibles aux décharges électrostatiques (ESD). Utilisez des techniques appropriées de mise à la terre contre les décharges électrostatiques lors de la manipulation du produit. Dans la mesure du possible, manipulez toujours le produit par ses composants non électriques.

Énoncés de conformité Canadiens

Cet appareil numérique est conforme à la norme Canadienne ICES-3 (B) / NMB-3 (B).

Cet appareil est conforme au Cahier des charges sur les normes radioélectriques (CNR) d'Industrie Canada applicables aux appareils radio exempts de licence. Son fonctionnement est soumis aux deux conditions suivantes : (1) cet appareil ne doit pas causer d'interférences et (2) cet appareil doit accepter toutes les interférences, y compris les interférences pouvant causer le fonctionnement indésirable de l'appareil.

Cet équipement a subi des tests prouvant sa conformité aux limites prescrites pour les appareils numériques de classe B, selon la partie 15 des règlements de la FCC. Ces limites ont été conçues pour fournir une protection raisonnable contre les interférences nuisibles lorsque l'appareil est utilisé dans un environnement résidentiel. Cet équipement génère, utilise, et peut émettre de l'énergie radioélectrique et, s'il n'est pas installé et utilisé conformément aux instructions, peut causer des interférences nuisibles aux communications radio. Toutefois, il n'y a aucune garantie que ces interférences ne puissent survenir dans une installation donnée. Si cet équipement cause des interférences nuisibles à la réception de signaux de radio ou de télévision, ce qui peut être déterminé en l'éteignant et en l'allumant, l'utilisateur peut essayer de corriger ces interférences par les mesures suivantes:

- ◆ Réorienter ou déplacer l'antenne réceptrice.
- ◆ Augmenter la distance entre l'équipement et le récepteur.
- ◆ Brancher l'équipement sur un circuit différent de celui sur lequel le récepteur est raccordé.

Avis de la FCC

Cet appareil est conforme à la partie 15 du règlement de la FCC. Son fonctionnement est soumis aux deux conditions suivantes:

- (1) ce dispositif ne doit pas causer d'interférences nuisibles;
- (2) ce dispositif ne doit accepter aucune interférence reçue, notamment les interférences à l'origine d'un fonctionnement indésirable.

Honeywell Building Technologies

715, Peachtree st. NE

Atlanta, GA 30308.

buildings.honeywell.com



Powered by BACtalk

ALERTON

MICROSET 4 INSTALLATION & OPERATIONS GUIDE

User agreement and limited warranty

IMPORTANT - PURCHASE OF ALERTON PRODUCTS OR USE OF SOFTWARE, FIRMWARE AND / OR ACCOMPANYING DOCUMENTATION (DEFINED BELOW) IS SUBJECT TO LICENSE RESTRICTIONS AND LIMITED WARRANTY. CAREFULLY READ THIS AGREEMENT BEFORE USING ALERTON PRODUCTS, SOFTWARE, FIRMWARE AND/OR DOCUMENTATION.

This is a legal "Agreement," concerning the purchase of Products and use of Software, Firmware and/or Documentation, between you, the "User" (either individually or as an authorized representative of the company that is purchasing, has purchased, or is using the Products, Software, Firmware or Documentation) and Honeywell, 16201 – 25th Ave. West Lynnwood, WA 98087 USA. ("Honeywell").

PURCHASE OF ALERTON PRODUCTS OR USE OF SOFTWARE, FIRMWARE AND / OR ACCOMPANYING DOCUMENTATION INDICATES USER'S COMPLETE AND UNCONDITIONAL ACCEPTANCE OF THE TERMS AND CONDITIONS SET FORTH IN THIS AGREEMENT.

Honeywell provides Alerton products ("Products"), software programs ("Software"), firmware, e.g., protocols, software program code, device drivers and related hardware ("Firmware") and accompanying documentation ("Documentation") and grants a non-exclusive and non-transferable license ("License") to User to use the Software and the Firmware only on the following terms and conditions. Taken together, Products, licensed Software, licensed Firmware and accompanying Documentation are collectively defined as "Alerton Product(s)" in this Agreement.

1. Copyright. The Software, Firmware and Documentation are copyrighted and protected by United States copyright laws and international treaty provisions and laws, contain valuable proprietary products, information and trade secrets, and shall remain the property of Honeywell. User may not and shall not copy or otherwise reproduce or make available to any other party any part or all of the Software, Firmware or Documentation nor decompile, disassemble, reverse engineer, manufacture or modify any portion of the Products, Software, Firmware, Documentation or any portion of the same for any purpose or otherwise attempt to determine the underlying source code of the Software or Firmware or permit any such action; provided however, User may either (a) make one (1) copy of the Software solely for backup or archival purposes, or (b) transfer one (1) image of the Software to a single hard disk, CD or other comparable media, provided User keeps the original solely for backup or archival purposes.

2. License. User is hereby licensed to use one (1) copy of the Software for User's own use in operating the Products. User may not rent, lease or otherwise assign or transfer all or any part of the Software, Firmware or Documentation. In addition, User may not sublicense, assign or transfer this License or Agreement, or any part thereof. Any attempt to do so shall terminate this License and User's right to use the Software and Firmware and shall subject User to liability for damages to Honeywell. LICENSING TO USER OF THE SOFTWARE AND FIRMWARE COMMENCES WHEN USER USES THE SOFTWARE, FIRMWARE AND / OR ACCOMPANYING DOCUMENTATION.

3. Copies, Modification or Merger. Except as specifically set forth in Paragraph 1, User may not copy, modify, transfer all or any portion of the Software, Firmware or Documentation or merge it or them into another program, unless expressly authorized in advance in writing by Honeywell. User must, as a condition of this License, reproduce and include the identifying marks, copyright and proprietary notices on any permitted copy of the Software, Firmware and Documentation. "Copies" shall include, without limitation, any complete or partial duplication on any media, adaptations, translations, compilations, partial copies within modifications, mergers with other material from whatever source and updated works. User will use its best efforts to prevent any unauthorized copying or other activity with respect to the Software, Firmware and Documentation.

4. Third-Party Beneficiary. For any software or other technology under this Agreement licensed by Honeywell from Microsoft (or other licensors, Microsoft or the applicable licensor is a third party beneficiary of this Agreement with the right to enforce the obligations set forth in this Agreement.

5. Warranty. Honeywell warrants Honeywell manufactured or produced Alerton Products to be materially free from defects and to substantially conform to Honeywell's published specifications for a period of twenty-four (24) months from date of shipment from Honeywell (the "Product Warranty Period"). This entire Section 5 is defined as the "Warranty."

Honeywell also warrants Alerton Products that it has previously repaired or replaced for the greater of ninety (90) days from the date of their shipment from Honeywell or the remainder of the Product Warranty Period of the originally shipped Alerton Product (the "Repair/Replacement Warranty Period").

During the Product Warranty or Repair/Replacement Warranty Period, Honeywell will repair or replace the applicable Alerton Products without charge and will add applicable engineering changes and upgrades.

This Warranty only applies to defective materials and workmanship of Alerton Products and excludes defects that result from misuse, neglect, improper installation, unauthorized repair or alteration, damage during or after shipping, accident and/or misapplication of such products. This Warranty does not apply to parts, equipment, software, firmware, components, documentation or any other item that Honeywell does not manufacture or produce. This Warranty is also voided by removal or alteration of Alerton Product identification labels.

Honeywell's sole responsibility with respect to Alerton Products shall be, within the applicable Product Warranty Period, to furnish a replacement Alerton Product (FOB factory) or, at the option of Honeywell, to repair and return (FOB Factory) the defective Alerton Product. HONEYWELL HEREBY EXCLUDES ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES WHATSOEVER WITH RESPECT TO ALERTON PRODUCTS. In no event shall Honeywell be liable for personal injury, loss of profit, loss of production, loss of business or goodwill, business interruption, loss of business information or data, loss due to delays, any other pecuniary loss, any cost or liability of Users or any other parties, to themselves or to others, increased or uncovered operating or fixed costs, inefficiency, or any other special, exemplary, consequential, incidental, indirect or remote damages in any manner, directly or indirectly, related to design, manufacturing, supply, installation or use of, or inability to use, Alerton Products, or any other act or failure to act by Honeywell or its agents or contractors.

HONEYWELL MAKES NO CLAIMS OR WARRANTIES WITH RESPECT TO THE SOFTWARE OR THE FIRMWARE AND SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND EXPRESS OR IMPLIED WARRANTIES THAT THE OPERATION OF THE SOFTWARE OR FIRMWARE OR ANY PORTION THEREOF WILL BE INTERRUPTION OR ERROR FREE. Notwithstanding anything to the contrary contained in this Warranty, Honeywell shall not be liable to Users or any other parties for any damages, including, but not limited to consequential, incidental, indirect, special, exemplary remote or pecuniary damages and any stated or express warranties set forth in this warranty are in lieu of all obligations or liability for any damages arising out of or in connection with the use or performance of, or inability to use, Alerton Products and the licensed Software and Firmware.

User's exclusive remedy and Honeywell's entire liability arising from or in connection with the Alerton Products, Software, Firmware, Documentation and/or this License and Agreement (including, without limitation, any breach of any warranty, express or implied) shall be, at Honeywell's option, the repair or replacement of the Products or Software or Firmware as applicable, as stated above. ACCORDINGLY, HONEYWELL AND ITS DESIGNATED DEALERS AND THEIR DESIGNATED ASSOCIATE DEALERS HAVE EXCLUDED AND DISCLAIM ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHATSOEVER, WITH RESPECT TO THE PRODUCTS, THE SOFTWARE, THE FIRMWARE, THE DOCUMENTATION AND/OR THE LICENSE. USER HEREBY ACKNOWLEDGES THE SAME.

6. Remedies of Honeywell. IF USER BREACHES THIS AGREEMENT, USER'S LICENSE HEREUNDER SHALL BE AUTOMATICALLY TERMINATED. Upon termination, User shall return the Software, Firmware and all Documentation to Honeywell and destroy any copies of the Software, Firmware and the Documentation or any portions thereof which have not been returned to Honeywell, including copies resident on electronic or digital media. If User breaches this Agreement, Honeywell shall be entitled to all damages suffered by Honeywell resulting from such breach and Honeywell shall be entitled to equitable and injunctive relief in addition to all other remedies at law. In this regard, User acknowledges that its breach of any provision of this Agreement will cause Honeywell immediate and irreparable injury for which there are inadequate remedies at law. The prevailing party in any dispute concerning this Agreement shall be entitled to the costs of collection and enforcement, including but not limited to reasonable attorneys' fees, court costs and all necessary expenses, regardless of whether litigation is commenced.

7. Export. Alerton Products are subject to regulation by local laws and United States government agencies, which prohibit export or diversion of certain products, information about the products, and direct products of the products to certain countries and certain persons. User agrees that User will not export in any manner any Alerton Product or direct product of Alerton Product, without first obtaining all necessary approval from appropriate local and United States government agencies.

8. RESTRICTED RIGHTS NOTICE. Alerton Products, Software, Firmware and Documentation have been developed entirely at private expense and are commercially provided with RESTRICTED RIGHTS. Use, duplication or disclosure by the U.S. Government or a U.S. Government subcontractor is subject to the restrictions pursuant to DFARS 227.72013 (October 1988) and DFARS 52.227-19 (June 1987), as amended and as applicable. Manufacturer, licensor and publisher is Honeywell, 16201 – 25th Ave. West Lynnwood, WA 98087 USA.

9. Statute of Limitations. No action for any breach of a warranty, if any, deemed or actual, may be commenced more than one (1) year following the expiration of such warranty.

10. Other. User further agrees that this Agreement is the complete and exclusive statement of the agreement between User and Honeywell and supersedes any proposal or prior agreement or any other communications between Honeywell or any of its representatives and User relating to the use of the Software, Firmware, Documentation and purchase of the Products. This Agreement may only be modified by a physically signed writing between User and Honeywell. Waiver of terms or excuse of breach must be in writing and shall not constitute subsequent consent, waiver or excuse. If any provision of this Agreement is finally determined to be unenforceable, the remaining provisions shall remain in effect. The laws of the State of Washington and the United States, including U.S. copyright laws, shall govern this Agreement. Venue in the event of any suit, proceeding or claim shall be in the courts located in Snohomish County, Washington, USA. If User has any questions regarding this Agreement, User may contact Honeywell by writing Honeywell at the above address.

This Agreement shall inure to the benefit of and be binding upon the parties and their successors, administrators, heirs and permitted assigns. Notwithstanding any termination of this Agreement and not in limitation of any other provision of this Agreement, User shall specifically continue to be fully obligated to comply with all of the requirements of paragraphs one (1) through four (4), as if the Agreement were not terminated and all remedy provisions hereunder shall apply to any breach of such obligations.

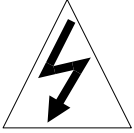
Important safety information and installation precautions

Read all instructions

Failure to follow all instructions may result in equipment damage or a hazardous condition. Read all instructions carefully before installing equipment.

Local codes and practices

Always install equipment in accordance with the National Electric Code and in a manner acceptable to the local authority having jurisdiction.



Electrostatic sensitivity

This product and its components may be susceptible to electrostatic discharge (ESD). Use appropriate ESD grounding techniques while handling the product. When possible, always handle the product by its non-electrical components.

High voltage safety test

Experienced electricians, at first contact, always assume that hazardous voltages may exist in any wiring system. A safety check using a known, reliable voltage measurement or detection device should be made immediately before starting work and when work resumes.

Lightning and high-voltage danger

Most electrical injuries involving low-voltage wiring result from sudden, unexpected high voltages on normally low-voltage wiring. Low-voltage wiring can carry hazardous high voltages under unsafe conditions. Never install or connect wiring or equipment during electrical storms. Improperly protected wiring can carry a fatal lightning surge for many miles. All outdoor wiring must be equipped with properly grounded and listed signal circuit protectors, which must be installed in compliance with local, applicable codes. Never install wiring or equipment while standing in water.



Wiring and equipment separations

All wiring and controllers must be installed to minimize the possibility of accidental contact with other potentially hazardous and disruptive power and lighting wiring. Never place 24VAC or communications wiring near other bare power wires, lightning rods, antennas, transformers, or steam or hot water pipes. Never place wire in any conduit, box, channel, duct or other enclosure containing power or lighting circuits of any type. Always provide adequate separation of communications wiring and other electrical wiring according to code. Keep wiring and controllers at least six feet from large inductive loads (power distribution panels, lighting ballasts, motors, etc.). Failure to follow these guidelines can introduce electrical interference and cause the system to operate erratically.

Warning

This equipment has been tested and found to comply with the limits for a class B 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.

© 2017 Honeywell. All Rights Reserved.
16201 – 25th Ave. West
Lynnwood, WA 98087 USA
PHONE: (425) 921-4900 FAX: (425) 921-4872
Web Site: www.alerton.com

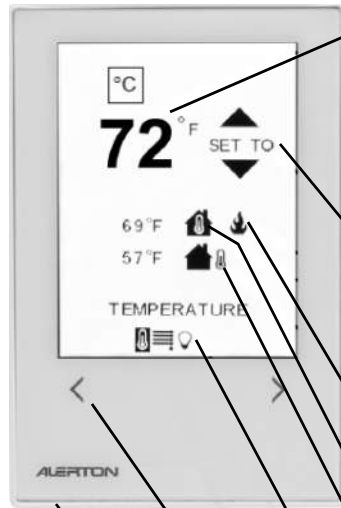
All information in this document is provided as is without warranty of any kind. Honeywell reserves the right to change any information herein without prior notice. No guarantees are given as to the accuracy of information. Trademarks and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. Honeywell disclaims any proprietary interest in trademarks and trade names other than its own.

Contents

Quick reference	5
Introduction	7
Specifications	8
System compatibility	8
Mounting	9
Installation best practices	9
Mounting the wallplate	12
Wiring	14
Wire specifications	14
Power supply guidelines and requirements	14
Microset 4 power ratings	14
Power supply grounding and wiring	14
MS/TP LAN wiring	15
Terminating MS/TP LAN cabling	16
Grounding the MS/TP LAN shield	16
Terminating resistors	16
Operational overview	18
Hotel vs. office modes	18
Fan-control vs. no-fan-control modes	18
Cooling and heating setpoint calculation	18
After-hours override operation	18
Housekeeping override operation	19
English and metric units	19
Outside air temperature (OAT) display	19
LCD backlight operation	19
Operating mode specifics	20
Enabling operating modes	21
Office modes	21
Hotel modes	24
Operating mode screens	27
Service mode	35
Service mode password	35
Field Service mode	38
Settings mode	42
Custom Codes mode	45
Balance mode	46
Locking the screen	47
BACnet object and property reference	48
Microset 4 objects	48
Object properties	49
BV and AV assignments	51
Troubleshooting	53
Appendix	54
Optional MS4 foam air barrier accessory	54
Touch-sensitive areas of the Microset 4	55

Quick reference

Table 1

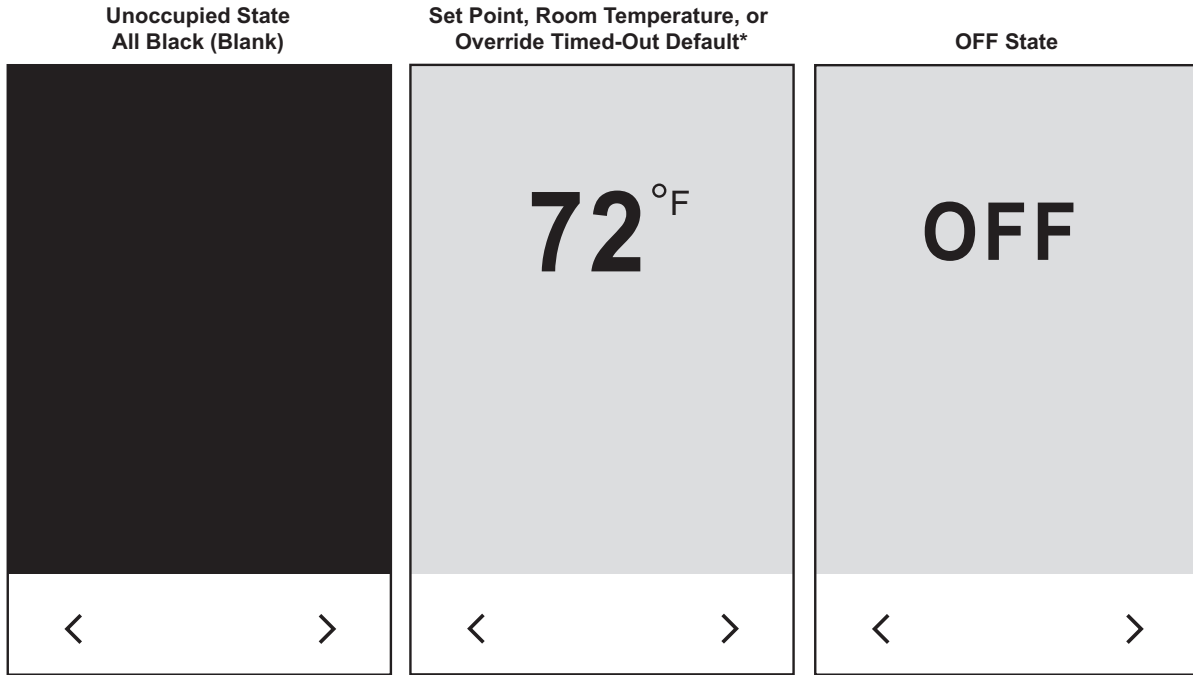


I D	DISPLAY/CONTROL FUNCTION	DESCRIPTION	SOFTWARE REMARKS
1	Setpoint (°F or °C as appropriate) Room temperature Override time remaining ON/OFF status Humidity Air Quality (MS4-THC only) Windows and Lights status (if configured) Value associated with data code (field service mode)	Displays unit setpoint, room temperature, after-hours/housekeeping timer, or ON/OFF status, depending on mode of operation. Also displays humidity value, CO2 concentration (MS4-THC model), and the Windows and/or Light status (if configured). Displays time of day in Across the Room Views only. Will alternate with setpoint or room temperature if BV-82 is turned on.	Setpoint = AV-90. Room temperature = AV-101. Housekeeping timer or after-hours timer = AV-98. Timer upper limit = AV-97. Show ON/OFF mode = BV-65. Occupied/Unoccupied Status = BV-67. Show Space Humidity = BV-84. Humidity = AV-102 CO2 = AV108. THC model only: when BV-75 is ON, the CO2 screen does not display. Windows status = BV-87. Lights status = BV-86.
2	UP/DOWN buttons Adjust setpoint Fan speed control (M4, M5, M8) After-hours time (M2, M5) ON/OFF control (M3, M6) Window blind control Lights ON/OFF Adjust value (field service mode)	UP button visible unless value is at maximum value or ON; DOWN button visible unless value is at minimum value or OFF. Holding UP or DOWN button causes numeric values to count up or down.	Button press for setpoint may affect BV-67 according to mode (see Table 6 on page 21). In fan modes, button press also affects BVs 72–74 (Table 9 on page 51).
3	Heating/cooling status	Displays whether the heating or cooling is active.	Heating icon = BV-77 Cooling icon = BV-78
4	Inside air temperature	Displays inside air temperature.	Inside air temperature = AV-101
5	Outside air temperature (OAT) (optional) Outside humidity (optional)	Displays OAT. Optionally, an outside humidity reading in %RH can display.	OAT = AV-103. Set to -100 to disable OAT at the display. Outside %RH = AV-107. If AV-107 is 0, it will not display.
6	Navigation tray	Icons correspond to the detail screens available for display; reverse-color highlight shows the currently active screen. Only features that are enabled will be shown.	
7	LEFT/RIGHT buttons Scroll through Detail screens or codes (field service mode)	Navigates through other detail screens. Press both buttons to access Service Mode.	
8	LED Status Lights	Default settings - gives visual indication to occupants of the status of the zone where Blue = Cooling, Amber= Heating, Green = Unoccupied/Energy Savings, Red = No communication	LED status Lights can be configured through DDC controlling AV-110.

Quick reference

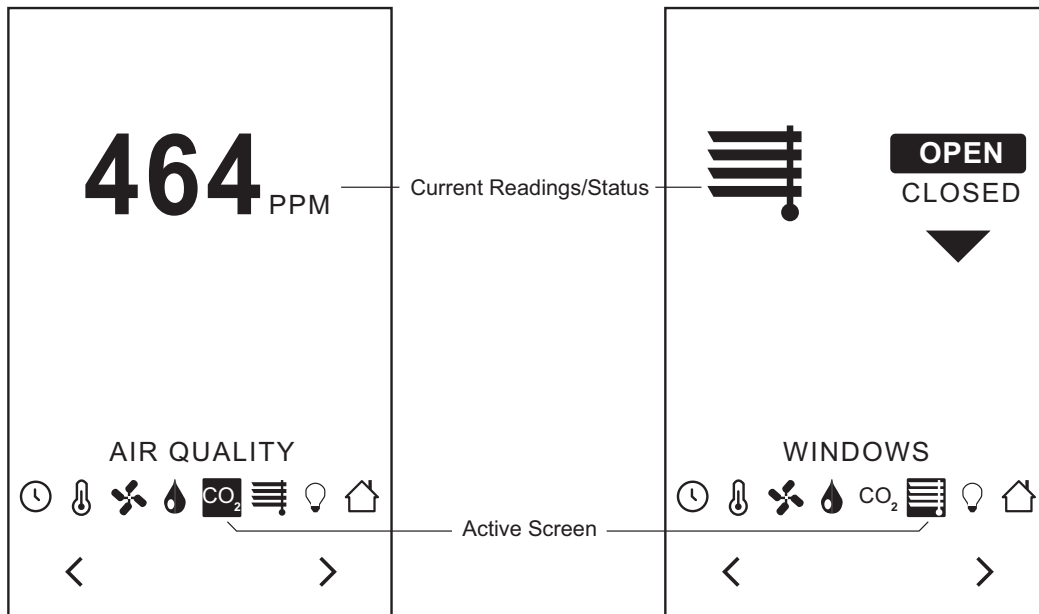
The Microset™ 4 generally displays an Across the Room View when it is not being actively used by a room occupant or a Detail Screen view when it is being used to adjust room settings. The Detail Screens can display a wide range of information depending on Microset 4 model, configuration, and settings.

Across The Room Screen View Examples



* Time of day displayed when BV-82 is ON. The MS/TP Microset 4 or VLC must be time-synced. BV-83 controls format (12- or 24-hour).

Detail Screen View Examples



Introduction

The Microset 4 is a wall-mounted BACnet smart sensor. It is designed for applications with multiple zones, such as a restaurant or a shopping mall; or split zone control sites, like an office setting where occupants share a single zone split into multiple working areas.

Features:

- Supports MS/TP communications (MS4-TH-MSTP model only)
- Optional outside and room humidity display
- Outside and room temperature display
- Fan speed display/adjustment (up to three speeds and Auto)
- Setpoint display/adjustment
- After-hours/housekeeping overrides
- Optional time of day display
- Heating or cooling mode display
- English or metric units (degrees C or F) support
- Optional: allow user to select degrees C or F for all temperature screen displays
- Optional: hide the CO2 icon and PPM display while continuing to sample and report CO2 to a VLC.
- Optional: replace temperature displays with warmer/cooler adjustment controls. Actual temperatures are hidden from the user.
- Optional: MS/TP model only. Use the custom LIGHTS and WINDOWS settings to customize control for something other than lights or window blinds.

Specifications

Table 2 Microset 4 specifications.

Part Numbers	MS4-TH – Base model with temperature and humidity sensing. MS4-TH-NL – Base model with no Alerton logo. MS4-TH-MSTP – Temperature and humidity sensing, BACnet MS/TP bus compatible. MS4-THC – Base model and air quality (CO2) sensor
Power	24 VAC @ 3 VA
MS/TP (MS4-TH-MSTP model)	MS/TP LAN operates up to 115 Kbps
Dimensions (MS4-TH, MS4-TH-NL, MS4-TH-MSTP)	4.370" (111 mm) H x 2.857" (73 mm) W x 0.678" (17.23 mm) or 0.895" (22.73 mm) D
Dimensions (MS4-THC)	4.536" (115.22 mm) H x 3.040" (77.22 mm) W x 1.027" (26.08 mm) or 1.243" (31.58 mm) D
Operating Temp. Humidity Sensor Accuracy Repeatability	50–113 °F (10–45 °C) ±3% RH @ 10–90% RH, ±5% @ 0–10% RH and 90%–100% RH Minimum ±0.5% RH.
CO2 Sensor Operating Temp (CO2 Sensor not available on MS4-TH- MSTP) CO2 Sensor Measurement Range CO2 Sensor Accuracy	-32–122 °F (0–50 °C) -0–5000 ppm ±30 ppm, ±3% at reading
Ratings	EMC Directive 89/336/EEC (European CE Mark). FCC Part 15, Subpart J, Class B. UL 916 Certified

System compatibility

The Microset 4 sensors work with legacy VLCs and ROCs, but also support optional new features that require a new ROC to support. These features include transfer of CO2 data to the VLC, password protection of Service Mode, user control of LEDs, and data support for controlling a room's windows and lights.

Mounting

The Microset 4 is designed to be wall-mounted indoors, with dimensions ideal for mounting to a single-gang electrical box. See Figure 11 on page 17.

Installation best practices

A building's environment may introduce challenges when looking for the ideal installation location and may also impact how a Microset 4 can be installed. For example, architects may not understand how the placement of windows, doors, air registers, printers, and other equipment impact temperature sensors. Or if a Microset 4 can be installed in an all-glass atrium without regard for the direction of the sun.

Properly locate sensors

Sensor location impacts accuracy when sensing air temperature.

To meet requirements of the Americans with Disabilities Act, mount no higher than 48" from the floor and with a minimum clear floor space of 30" X 48" (760 X 1220 mm). See Figure 1.

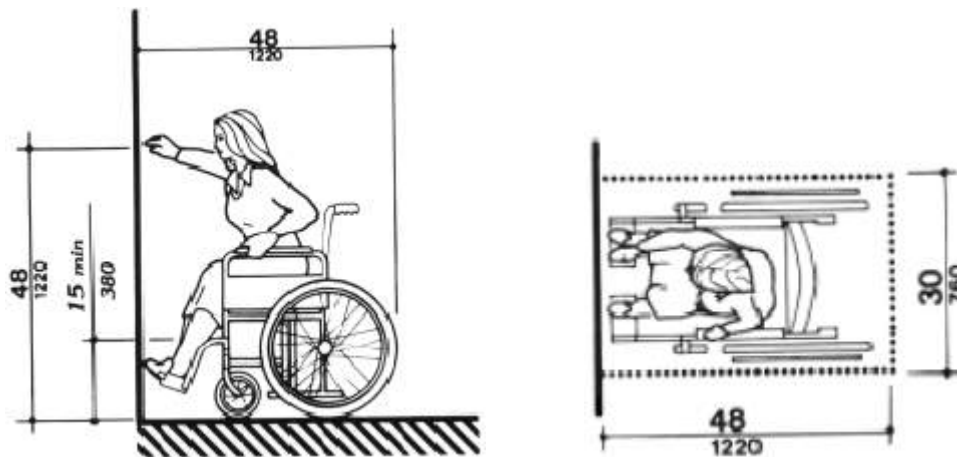


Figure 1 Mounting guidelines for compliance with Americans with Disabilities Act (ADA).

- Do not install the sensor where it will be exposed directly to solar radiation.
- Do not install the sensors into shelving or alcoves.
- Do not install near heat generating equipment, e.g. printers, coffee post, lamps, etc.
- Do not install adjacent to or behind doors.
- Never install behind curtains and/or blinds.
- When installing onto a solid wall (concrete, etc) always use insulated foam backing between the backplate and the wall.
- Do not mount onto walls that conceal hot water pipes.

Diffuser airflow

Do not install sensors directly in line with the air flow coming from air distribution diffusers. Adjust the diffusers to reduce air flow across the wall if you take a reading at the wall where the sensor is located and it is greater than 30 fpm (9.14 mpm).

Prevent air infiltration

Prevent air from infiltrating through wire and screw holes in the Microset 4 backplate by affixing a closed-cell foam barrier to the backplate. The foam covers all holes and provides a barrier between the Microset 4 which prevents the effects of wall coupling. For more information about preventing air infiltration, see "Optional MS4 foam air barrier accessory" on page 54.



Figure 2 Install a closed-cell foam barrier between the Microset 4 backplate and the wall.



Figure 3 Completely cover all holes in the Microset 4 backplate to safeguard against air infiltration.

Alerton recommends the M-D Light Switch Sealers model #03434 (or equivalent closed-cell foam).
Lowes.com Item # 61217.



Figure 4 Example closed-cell foam barrier material.

The mounting location also must not require longer wire lengths than shown in Table 3.

Table 3 Maximum wire length

MODEL	MAX LENGTH (FT)	
	COMM WIRE	24V WIRE
Microset Bus (direct VLC connection)		
MS4-TH	250	*
MS4-THC	250	*
MS4-TH-NL	250	*
MS/TP Bus		
MS4-TH-MSTP	4000	*
*Power wire selection should follow local code recommendations for VA and size		

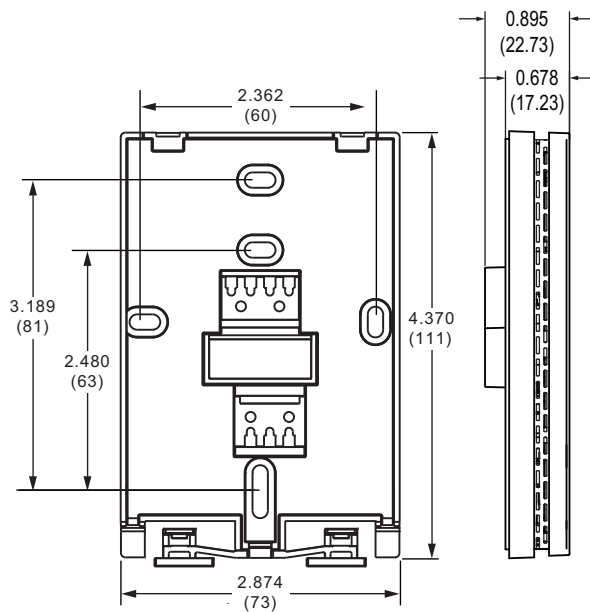


Figure 5 Backplate mounting dimensions.

NOTE Microset 4 with CO2 sensor is larger: 3.040 in. (77.22 mm) wide, 4.536 in. (115.22 mm) high, and 1.27 in. (26.08 mm) or 1.243 in. (31.58 mm) deep.

Two screws attach the backplate to an electrical box, mud ring, or other mounting surface.

Removing Sensor from wallplate

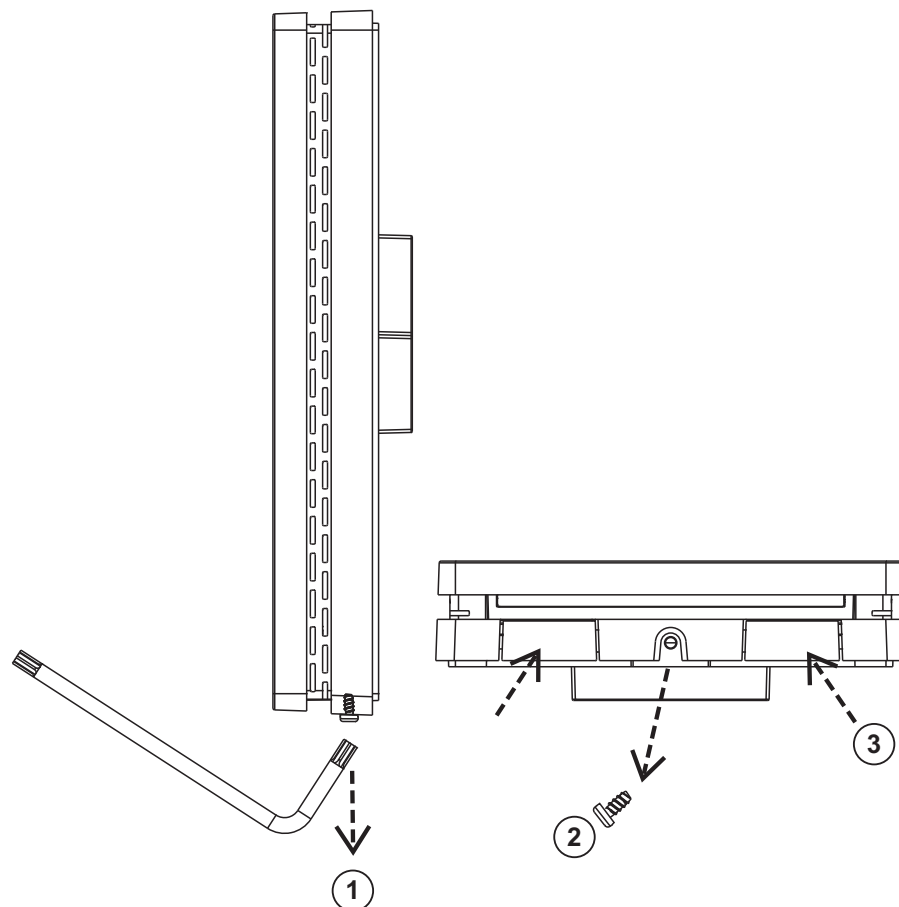


Figure 6 Removal of Microset 4 from the wallplate.

1. Use a Torx key or screwdriver to loosen the setscrew (if present) on the bottom.
2. Remove the setscrew (if present), but keep it to re-install after the Microset 4 is mounted.
3. Push up the two tabs shown in Figure 6, then pull the bottom of the Microset 4 away from the wallplate. Lift the Microset 4 from the wallplate.

Mounting the wallplate

See the mounting template in Figure 7.

New Construction

In new construction, rough-in for the Microset 4 is standard 2 in. x 4 in. (50.8 mm x 101.6 mm) single gang wiring box or a single-gang mud-ring. Skip to Step 6.

Remodel or Retrofit

Use a single-gang old work (or remodel) box or mud ring. Skip to Step 6.

Mount the Microset 4 vertically on the wall.

1. Position and level the wallplate (for appearance only) or use the template in Figure 7.
2. Use a pencil to mark the mounting holes and the wiring opening (dashed line in Figure 7).
3. Cut the wiring opening.
4. Drill two pilot holes in the wall, on your marks.
For drywall, drill 3/16-in. holes.
For plaster or firmer material, drill 7/32-in. holes.

5. Gently tap anchors into the pilot holes until flush with the wall.
6. Pull the wires through the wiring opening, and position the wallplate over the mounting holes.
7. Insert the screws into the holes and tighten.

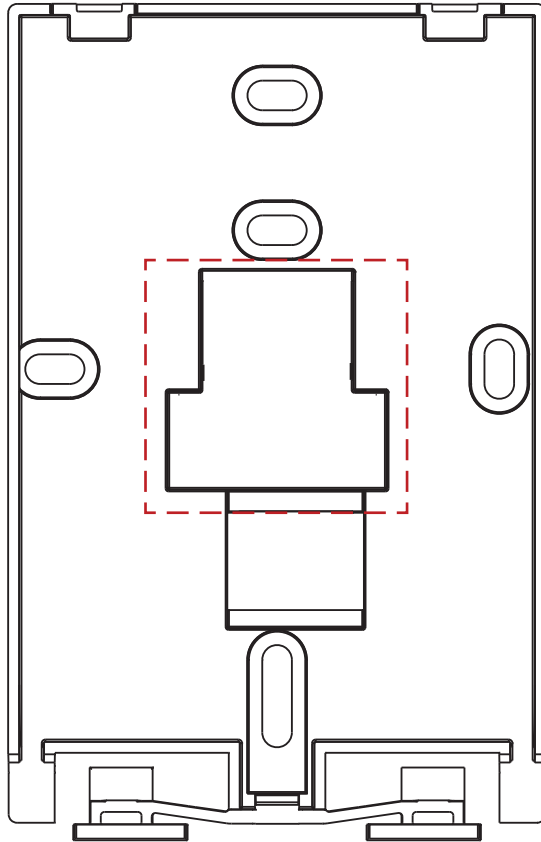


Figure 7 Microset 4 mounting template.

Wiring

CAUTION Half-wave devices and full-wave devices must not use the same AC transformer. You must maintain wiring polarity. Failure to do so can result in equipment damage.

Wire specifications

Maintain polarity of the wire run throughout the LAN.

NOTE Do not run Microset 4 wire in the same conduit or alongside building power cables. This can cause interference. If power cables must be crossed, cross at 90°.

Power supply guidelines and requirements

The wall sensor uses 24 VAC power from a UL Listed Class 2, 24 VAC transformer (not provided). The wall sensor uses a half-wave rectifier to convert the AC power supply to onboard power. Multiple half-wave devices may be powered from one, grounded transformer.

CAUTION If a Microset 4 will share its power supply with another device, make sure that the other device utilizes a half-wave rectifier and that polarity of wiring is maintained. Failure to do so can result in equipment damage.

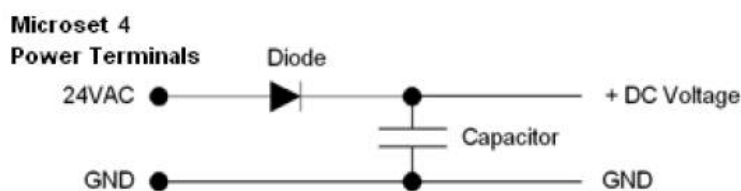


Figure 8 Internal Microset 4 power wiring schematic, half-wave rectifier.

Microset 4 power ratings

The Microset 4 minimum current draw is 24 VAC @200mA leading to 3VA.

Power supply grounding and wiring

When connecting power to the Microset 4, ensure that one leg of the VAC secondary circuit connects to a known earth ground.

Supplying a high-quality ground connection to a Microset 4 is one of the most important things you can do to ensure a trouble-free installation.

The 24VAC secondary leads are not interchangeable. Once a lead connects to the GND wire on the Microset 4, it is the grounded lead. Observe and maintain polarity for subsequent connections. The GND terminal provides a reference ground for the circuit board and communications wiring. Use 18 AWG cable for best results.

WARNING Ensure that all Microset 4 power and communications cabling are grounded according to these instructions. Failure to follow these instructions may result in Microset 4 operational and communication failures or equipment damage.

Power supply wire selection

If you are considering long power supply wiring runs, using the right wire size is critical. If the wire is too small, the resistance may be too high, resulting in a low voltage supply. This is known as *line loss*. The wire size is based on the length of the wire run and the current draw of the Microset 4. Use Figure 9 to determine wire size; obtain additional information from the transformer manufacturer.

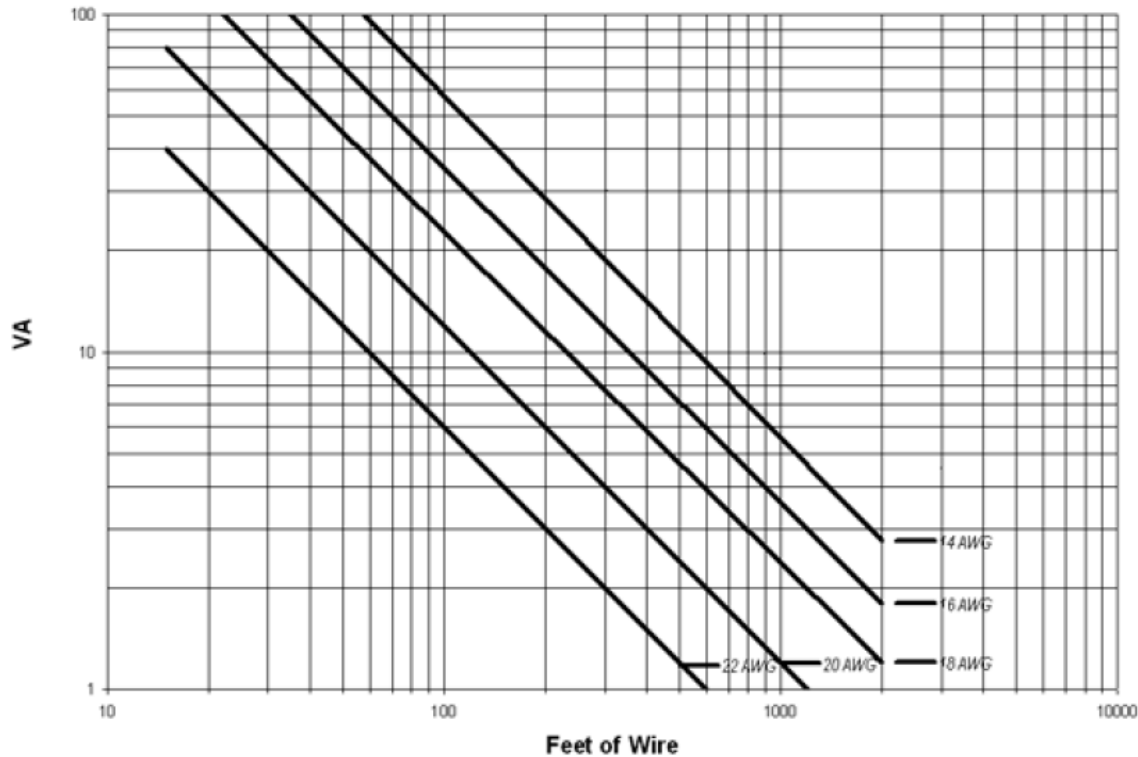


Figure 9 Microset 4 wiring recommendations

MS/TP LAN wiring

The MS/TP Microset 4 communicates on the site-wide BACnet system over a twisted-pair MS/TP LAN, which uses the EIA-485 signaling standard. MS/TP Microset 4s are master devices on the MS/TP LAN.

Each MS/TP Microset 4 employs a high-quality EIA-485 transceiver and exerts 1/4 unit load on the MS/TP LAN. The maximum number of MS/TP Microset 4 units that can be installed per MS/TP segment depends on the device the MS/TP Microset 4s are being connected to. Refer to the BACtalk System Design Guide, LTBT-TM-SYSDSGN, for more information, or the user documentation of the global controller that provides the MS/TP trunk to determine how many devices it can support.

Table 4 MS/TP LAN facts

Transmission speed	9.6, 19.2, 38.4, 76.8, 115.2Kbps (configured at global controller).
Layout	Bus.
Cabling	BACnet specifies the following: Shielded, twisted-pair cabling with characteristic impedance between 100 and 130Ohms. Distributed capacitance between conductors must be less than 30 pF/foot (100 pF/m). Distributed capacitance between conductor and shield must be less than 60 pF/foot (200 pF/m). Foil or braided shield acceptable.
Segment length	4000 ft. (1219 m.) per segment using recommended wire at transmission speeds up to 76.8Kbps. 2500 ft. (762 m.) per segment using recommended wire at transmission speed of 115.2Kbps.
Maximum devices overall	Maximum number of devices is 127. This includes VLCs, BACtalk global controllers (all are considered masters) and any other devices, regardless of their relative unit loads.
Maximum devices per segment	Depends on relative unit load of devices. MS/TP Microset 4 exerts 1/4 unit load.
Repeaters	Required when making runs longer than 4000 ft. Three repeaters maximum between any two devices. MS/TP-LAN repeater does not support 115.2Kbps.

Table 4 MS/TP LAN facts (Continued)

Terminating resistors	Matched resistors required at each end of segment bus wired across (+) and (–). Use matched precision resistors rated $\frac{1}{4}W \pm 1\%$ / 80–130 Ohms. Smoke control applications with the VAV-SD-S or the VLC-1188-S may require UL-864 listed terminating resistors.
Shield grounding	Ground shield drain wire at single point earth (panel) ground, <i>not</i> Microset 4 ground. Tape off shield drain wire at other end. Tie shield drain wire through at each MS/TP Microset 4.

Terminating MS/TP LAN cabling

IMPORTANT Always use communications grade connectors, such as 3M Scotchlok or equivalent, when splicing pigtails with LAN cabling.

Grounding the MS/TP LAN shield

Proper shield grounding of the cabling can help minimize the risk of communications problems and damage to equipment because of transient voltage spikes (for example, lightning strikes).

Follow these guidelines for grounding cable shields:

- Each segment must have a single point of shield ground, as close to the middle of the cabling run as possible (see Figure 10).
- Do not ground the shield directly to a Microset 4 wire.
- Never ground both ends of a shield because differences in potential between the grounds may induce current on the shield, causing interference.
- At connecting termination points, tie the shield through with a wire nut.
- At ungrounded, exposed shield points (the end of a segment), tape back the shield to the wire jacket or, for optimum transient shunting, use 100V gas discharge tubes or 120V MOVs between the shield and ground. See Figure 10.

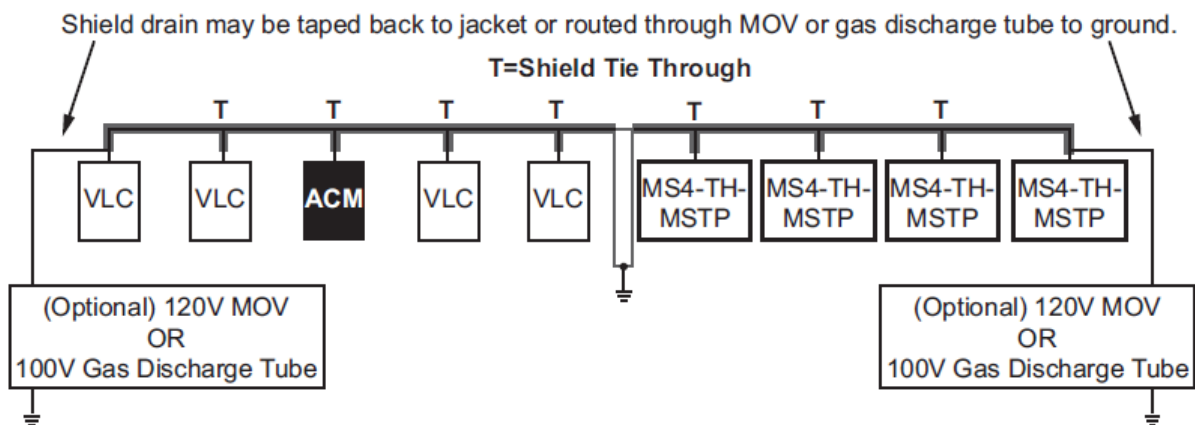


Figure 10 Shield drain termination and tie through.

Terminating resistors

At the last device on each end of the MS/TP segment, matched terminating resistors wired across MS/TP+ and MS/TP– are required for signal integrity.

Optimum segment performance typically requires “tuning,” a process by which the value of the terminating resistors is selected based on the wave form of signals on the segment. View wave forms using an industrial scope meter. The goal is to have as square a wave form as possible with an amplitude greater than 200 mV. Resistors affect the wave form as follows:

- When the resistance value decreases, the amplitude of the wave form decreases and becomes more square.
- When the resistance value increases, the amplitude of the wave form increases and becomes less square.

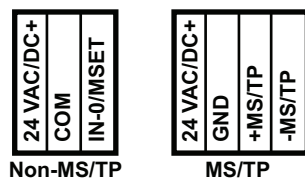
Typically, precision resistors in the range 80-130 Ohms ($\pm 1\%$) yield acceptable results. Ideally, the value of the terminating resistors should match the rated characteristic impedance of the installed cable. For example, if the installed cable has a listed characteristic impedance of 100 Ohm, install 100 Ohm matched precision resistors.

CAUTION Do not mismatch terminating resistors. Ensure that both resistors on a segment have the same value.

Wiring the wall sensor

CAUTION Power must not be connected while wiring. Wiring a unit that is powered may result in electrical shock and/or equipment damage.

1. Connect wires to the terminal blocks. The terminals are as follows:



2. Secure backplate to mounting surface with screws (provided).
3. Push excess wire back into the hole and plug the hole with non-flammable insulation to prevent drafts from affecting the wall sensor. Check for loose or frayed wire that may cause a short.

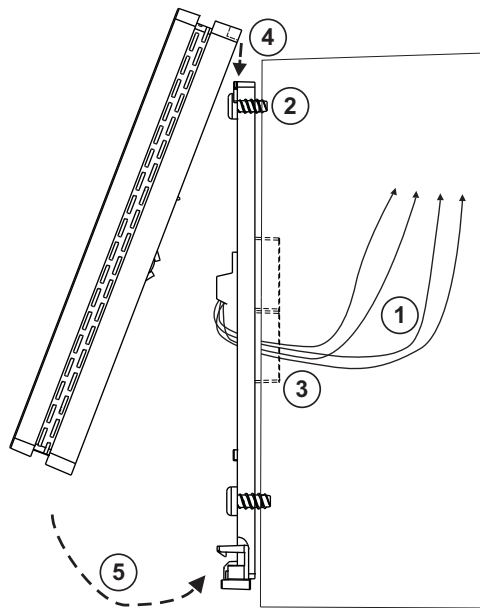


Figure 11 Microset 4 mounting connections.

Mounting the wall sensor on the wallplate

4. Insert Microset 4 tabs into backplate slots. See Figure 11.
5. Push bottom of Microset 4 until it clicks into position. See Figure 11.
6. (Optional) Install security setscrew.

Operational overview

The Microset 4 operates in one of nine modes. In each mode, the Microset 4 displays data and has operational features unique to that mode. Operating modes are listed in Table 5 on page 20 and Table 6 on page 21.

Review the different Microset 4 modes and determine which one is best for your application. Then set BVs 64, 65, 80, and 81 according to Table 6 on page 21.

BACtalk data displays can directly reference data points in the Microset 4 reserved for Microset operations. This offers the system operator flexibility and ease of use: with a mouse click, the system operator can control Microset 4 operations.

Hotel vs. office modes

BV-81 controls hotel and office mode (BV-81 ON = hotel). The primary difference between hotel and office mode is the function of the after-hours timer as compared to the function of the housekeeping timer. See “After-hours override operation” and “Housekeeping override operation” herein. Other operational details vary as well. See “Operating mode specifics” on page 20.

Fan-control vs. no-fan-control modes

BV-80 determines fan control mode (BV-80 ON = fan-control mode).

In fan-control modes, the occupant can select fan speed at the Microset 4. Fan-control modes are typically used in fan-coil, air conditioning, or unit ventilator applications.

In no-fan-control modes, the occupant is unable to select fan speed. No-fan-control modes are typically used in VAV or heat pump applications.

Cooling and heating setpoint calculation

The VLC calculates current heating and cooling setpoints (AV-99 and AV-100) using different logic in occupied and unoccupied modes (as read from BV-67). Using the current setpoints (AV-99 and AV-100) in your control DDC is most efficient because the VLC automatically calculates these setpoints according to the operating status of the VLC.

Occupied setpoint logic (BV-67 ON)

- Current cooling setpoint (AV-99) = Occupant-selected space temperature setpoint^a (AV-90) + Cooling offset (AV-93) + Demand offset (AV-106)
- Current heating setpoint (AV-100) = Occupant-selected space temperature setpoint^a (AV-90) – Heating offset (AV-94) – Demand offset (AV-106)

Unoccupied setpoint logic (BV-67 OFF)

- Current cooling setpoint (AV-99) = Unoccupied cooling setpoint (AV-95)
- Current heating setpoint (AV-100) = Unoccupied heating setpoint (AV-96)

After-hours override operation

Unoccupied office modes (M2 and M5) offer an after-hours override feature, which enables the occupant to override a scheduled unoccupied status at the Microset 4.

In override, the unit calculates current setpoints (AV-99 and AV-100) using occupied setpoint logic (see “Cooling and heating setpoint calculation” on page 18). The occupant can increase or decrease the timer to the next half-hour increment. The occupant can also adjust the setpoint and fan speed (if applicable).

^aThe system's setpoint high limit (AV-91) and setpoint low limit (AV-92) limit this value.

The after-hours timer (available in software as AV-98) automatically counts down whenever it is set to a non-zero value.

To disable this feature, set the after-hours timer limit (AV-97) to zero.

DDC can read override status from BV-66, which is ON if the after-hours timer is non-zero. When BV-64 (occupied/unoccupied command) is ON, the after-hours timer automatically resets to zero.

Housekeeping override operation

Vacant hotel modes (M7 and M9) offer a housekeeping override. This is similar to the after-hours override in that it causes occupied setpoint logic to be in effect. However, there are important differences: the occupant can only start and stop the timer (timer adjustment is not allowed); the override timer limit (AV-97) is read in minutes, not hours.

This feature can be disabled by setting the override timer limit (AV-97) to zero.

DDC can read override status from BV-66, which is ON if the housekeeping timer is non-zero. When BV-64 (occupied/unoccupied command) is ON, the housekeeping timer automatically resets to zero.

English and metric units

You can set the Microset 4 to display English or metric units based on the selection in the DDC header file or you can toggle that status in software. The English or metric setting is referred to as the native units mode.

BV-69 can be set ON to reverse native units mode for the Microset 4 display. Thus, if the Microset 4 is set to English, and BV-69 is ON, the Microset 4 displays units in appropriate metric equivalents. This enables the system to display units at the Microset 4 according to occupant preference without a programmer having to write separate DDC sequences around each unit of measure.

Outside air temperature (OAT) display

For OAT read at another unit to display at the Microset 4, the OAT value must be written in BCM DDC to the Present Value of AV-103 in the Microset 4 or the VLC. Set AV-103 to -100 to disable the OAT display.

LCD backlight operation

In Occupied mode, or during Unoccupied mode with After-hours Override and with BV-79 Backlight Control set to Inactive, the backlight dims to the Across the Room View (ARV) after 20 seconds of no button activity. If BV-79 Backlight Control is set to Active, the display will be Dark (as in Normal Unoccupied Mode) until it is touched.

Operating mode specifics

This topic provides LCD, button operation, for each of the operating modes. Use Table 5 to compare operating mode features.

Use Table 6 on page 21 to determine values to set for enabling each operating mode.

Table 5 Operating mode feature comparison.

MODE ID		MODE NAME	FEATURES					
			OCCUPANT SETPOINT ADJUSTMENT	OCCUPANT FAN SPEED CONTROL	OCCUPANT ON/OFF CONTROL	AFTER-HOURS OVERRIDE	HOUSEKEEPING TIMER	ALTERNATE TIME OF DAY DISP.
Office Modes								
	No fan control							
M1	Office, no fan, occupied	x					x	
M2	Office, no fan, unoccupied	x ^a			x		x	x
M3	Office, no fan, ON/OFF	x		x			x	
	Fan control							
M4	Office, fan, occupied	x ^b	x				x	
M5	Office, fan, unoccupied	x ^a	x ^a		x4		x	x
Hotel Modes								
	No fan control							
M6	Hotel, no fan, rented	x		x			x	
M7	Hotel, no fan, vacant					x		
	Fan control							
M8	Hotel, fan, rented	x ^b	x				x	
M9	Hotel, fan, vacant					x		

^a Available only when after-hours override is active.

^b Available only when fan is running.

Enabling operating modes

Combinations of values for BVs 64, 65, 80, and 81 control operating modes. In each mode, BV-67 (a read-only point) reports occupied/unoccupied status. Use this data point in DDC as a flag to control occupied and unoccupied operating sequences.

Table 6 lists data point settings for the various operating modes and indicates the action of BV-67 in each mode. See Table 9 on page 51 for further detail.

Table 6 Data point settings for Microset 4 operating modes, with BV-67 status.

MODE	DESCRIPTION	BV-64 OCCUPIED	BV-65 ON/OFF	BV-80 FAN- CONTROL	BV-81 HOTEL	BV-67 (READ ONLY) OCCUPIED/UNOCCUPIED STATUS
M1	Office, no fan, occupied	ON	OFF	OFF	OFF	ON
M2	Office, no fan, unoccupied	OFF	OFF	OFF	OFF	OFF unless after-hours timer (AV-98) is non-zero.
M3	Office, no fan, ON/OFF	ON	ON	OFF	OFF	ON/OFF button on screen controls BV-67 to match occupant selected ON/OFF status.
M4	Office, fan, occupied	ON	ON ^a	ON	OFF	BV-67 is ON when fan is on (BV72, 73, or 74 ON), OFF when fan is OFF
M5	Office, fan, unoccupied	OFF	ON ^a	ON	OFF	OFF unless after-hours timer (AV-98) is non-zero.
M6	Hotel, no fan, rented	ON	ON ^a	OFF	ON	ON/OFF button on screen controls BV-67 to match occupant selected ON/OFF status.
M7	Hotel, no fan, vacant	OFF	ON ^a	OFF	ON	OFF unless housekeeping timer (AV-98) is non-zero.
M8	Hotel, FC, Rented	ON	ON ^a	ON	ON	BV-67 is ON when fan is on (BV72, 73, or 74 ON), OFF when fan is OFF
M9	Hotel, FC, Vacant	OFF	ON ^a	ON	ON	OFF unless housekeeping timer (AV-98) is non-zero.

^a The Microset turns BV-65 ON in these modes.

Office modes

Office modes are typically used in commercial use environments. Screens might not appear on the Microset 4 in the order shown, or at all, depending on Microset 4 model, configuration, and settings.

M1—Office, No Fan Control, Occupied

Set BV-64 ON and BV-65, BV-80, and BV-81 OFF. The screen in the Across the Room View shows the value of occupant-selected space temperature setpoint (AV-90) or the room temperature (AV-101) alternating with the current time-of-day (if enabled). The unit controls HVAC equipment to keep space temperature within occupied setpoints.

When the unit is displaying the Across the Room View, the occupant can press anywhere on the screen to display the Temperature screen. Once at the Temperature screen, the occupant can press the UP/DOWN arrows to increase or decrease the Occupied Temperature Setpoint.

This mode's counterpart is M2, which is activated by setting BV-64 OFF.

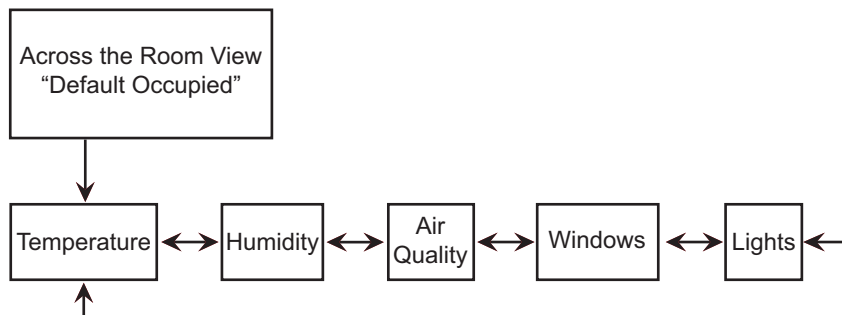


Figure 12 M1 screen flow sequence.

M2—Office, No Fan, Unoccupied

Set BVs 64, 65, 80, and 81 OFF. In unoccupied mode, the screen in Across the Room View will be black, or if the After-hours Override timer is set above zero the screen in Across the Room View will show the override time remaining.

NOTE After Hours Timer AV-96 counts down by increments of 30 minutes, and override time on the screen counts down by increments of 1 minute, so the display will show :00 during the last half-minute of override.

The occupant can press anywhere on the screen to activate the unit, and then press the RIGHT navigation arrow to select after-hours override. Once at the Override screen, the occupant can press the UP/DOWN arrows to increase or decrease the override time.

When the override time is greater than zero, the unit controls HVAC equipment to maintain space temperature within occupied-mode temperature setpoints.

If desired, after-hours operation can be disabled by writing a 0 value to the after-hours timer limit (AV-97).

This mode's counterpart is M1, which is activated by setting BV-64 ON.

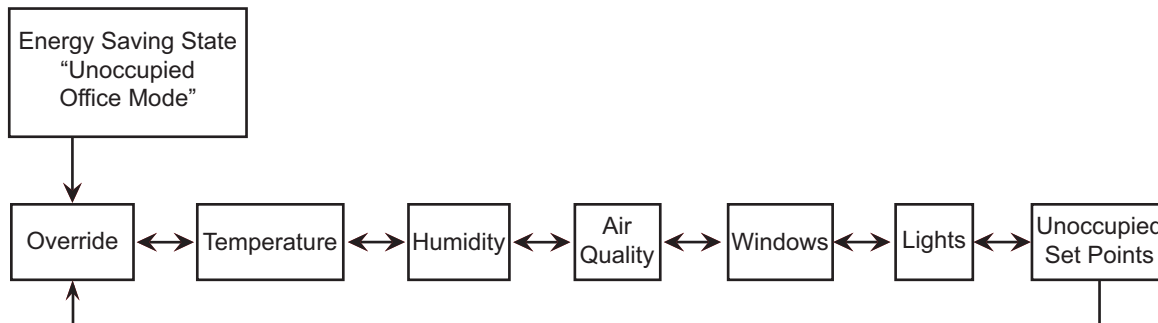


Figure 13 M2 screen flow sequence.

M3—Office, No Fan, Occupied, ON/OFF

Set BV-64 and BV-65 ON and BV-80 and BV-81 OFF. When the unit is displaying the Across the Room View, the occupant can press anywhere on the screen to display the ON/OFF screen. Once at the Temperature screen, the occupant can press the UP/DOWN arrows to turn the operation of the HVAC system ON or OFF.

In the ON condition, the Across the Room View will display the occupant-selected space temperature setpoint or the room temperature. The unit controls HVAC equipment to maintain space temperature within occupied setpoints.

In the OFF condition, the Across the Room View will display the word OFF. The unit controls HVAC equipment to maintain space temperature within unoccupied setpoints.

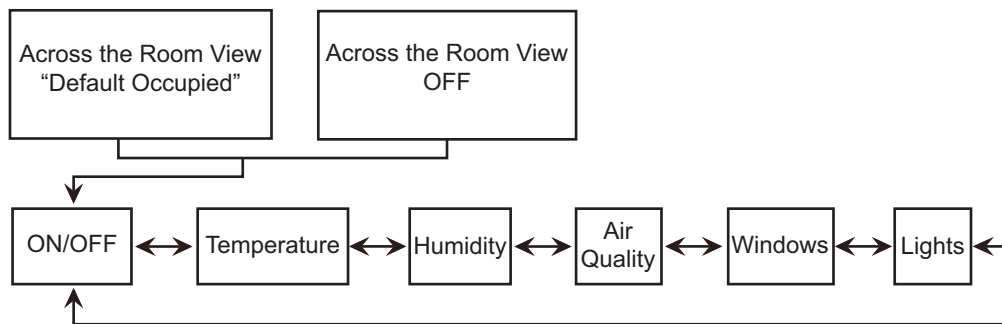


Figure 14 M3 screen flow sequence.

M4—Office, Fan, Occupied

Set BVs 64 and 80 ON and BV-81 OFF. Operation depends on whether the fan is running or stopped. If the fan is running, the screen in the Across the Room View shows the value of occupant-selected space temperature setpoint (AV-90) or the room temperature (AV-101) alternating with the current time of day (if enabled). When the unit is displaying the Across the Room View, the occupant can press anywhere on the screen to display the Temperature screen, on which the occupant-selected space temperature setpoint can be adjusted. The unit controls HVAC equipment to maintain space temperature within the occupied setpoints.

If the fan speed is set to Auto, the Across the Room View is a blank screen and the temperature screen does not allow adjustment of the space temperature setpoint. The unit controls HVAC equipment to maintain space temperature within the unoccupied setpoints.

This mode's counterpart is M5, which is activated by setting BV-64 OFF.

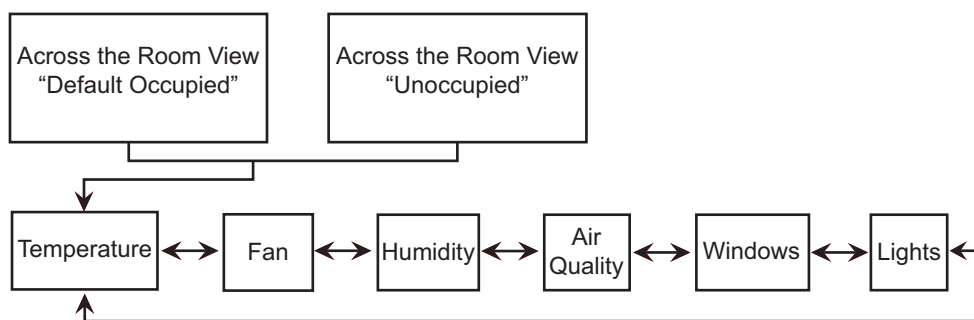


Figure 15 M4 screen flow sequence.

M5—Office, Fan, Unoccupied

Set BV-64 and BV-81 OFF and BV-80 ON. The Across the Room View is a blank screen, the Temperature screen does not allow adjustment of the space temperature setpoint, and the Fan screen shows a non-adjustable fan speed of Auto. The unit controls HVAC equipment to maintain space temperature within the unoccupied setpoints.

If the After-hours Override timer is set above zero (0:00), the screen in Across the Room View shows the override time remaining, the Temperature screen allows adjustment of the space temperature setpoint, and the fan speed is adjustable. The unit controls HVAC equipment to maintain space temperature within the user-selected occupied setpoints.

This mode's counterpart is M4, which is activated by setting BV-64 ON.

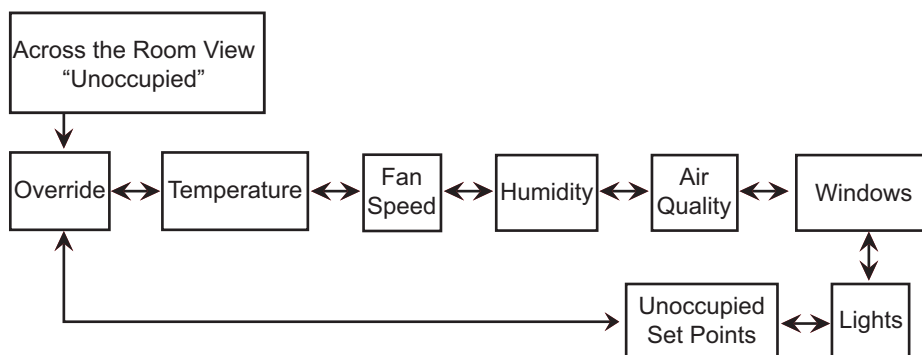


Figure 16 M5 screen flow sequence.

Hotel modes

Hotel modes have a feature set typically used in the hospitality industry. Screens might not appear on the Microset 4 in the order shown, or at all, depending on Microset 4 model, configuration, and settings.

M6—Hotel, No Fan, Rented

Set BV-64 and BV-81 ON and BV-80 OFF. Operation depends on whether the unit is ON or OFF. When the unit is displaying the Across the Room View, the occupant can press anywhere on the screen to display the ON/OFF screen. Once at the Temperature screen, the occupant can press the UP/DOWN arrows to turn the operation of the HVAC system ON or OFF.

In the ON condition, the Across the Room View will display the occupant-selected space temperature setpoint (AV-90) or room temperature (AV-101). The unit controls HVAC equipment to maintain space temperature within occupied setpoints.

In the OFF condition, the Across the Room View will display the word OFF. The unit controls HVAC equipment to maintain space temperature within unoccupied setpoints.

This mode's counterpart is M7, which is activated by setting BV-64 OFF.

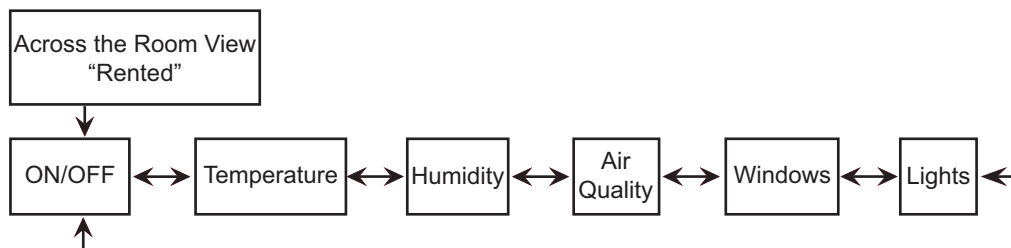


Figure 17 M6 screen flow sequence.

M7—Hotel, No Fan, Vacant

Set BV-81 ON and BV-64 and BV-80 OFF. The unit controls HVAC equipment to maintain space temperature within unoccupied heating and cooling setpoints. The display is blank.

This mode's counterpart is M6, which is activated by setting BV-64 ON.

Vacant mode offers a temporary housekeeping override function. Housekeeping can press the screen to select override. Once at override screen, housekeeping can then press the UP arrow, which sets the timer to the override limit (AV-97), interpreted as minutes and fractions of a minute (e.g. the maximum AV-97 value of 9.5 becomes 9 min. 30 sec.). When the override time is greater than zero, housekeeping can press the DOWN arrow, which sets the timer to zero and restores normal Vacant operation.

When active, the housekeeping override function allows changing the user-selected Rented temperature setpoint, and the unit controls HVAC equipment to maintain the space temperature at the Rented setpoint; the Across the Room View shows the remaining minutes and seconds of override time. Housekeeping override can be exited by pressing the DOWN arrow, which reduces the remaining override time to zero and restores normal Vacant operation.

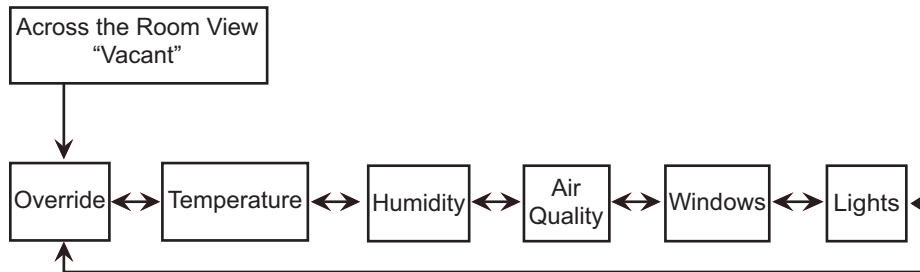


Figure 18 M7 screen flow sequence.

M8—Hotel, Fan, Rented

Set BVs 64, 80, and 81 ON. Operation depends on whether the fan is running or stopped. If the fan is running, the screen in the Across the Room View shows the value of occupant-selected space temperature setpoint (AV-90) or room temperature (AV-101), alternating with the current time-of-day (if enabled). When the unit is displaying the Across the Room View, the occupant can press anywhere on the screen to display the Temperature screen, on which the occupant-selected space temperature setpoint can be adjusted.

If the fan speed is set to Auto, the Across the Room View screen is blank and the temperature screen does not allow adjustment of the space temperature setpoint.

This mode's counterpart is M9, which is activated by setting BV-64 OFF.

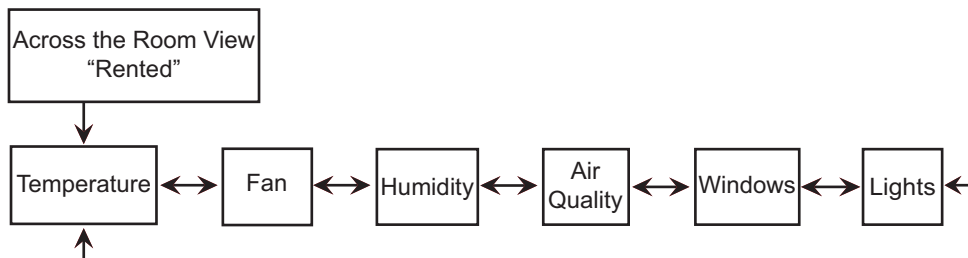


Figure 19 M8 screen flow sequence.

M9—Hotel, Fan, Vacant

Set BV-64 OFF and BV-80 and BV-81 ON. The Across the Room View screen is blank, the fan screen shows OFF, which cannot be adjusted, and the Temperature screen does not allow adjustment of the space temperature setpoint. The unit controls HVAC equipment to maintain space temperature within the unoccupied setpoints.

If the Housekeeping Override timer is set above zero (0:00), the screen in Across the Room View shows the override time remaining in minutes and seconds, the Temperature screen allows adjustment of the space temperature setpoint, and the fan speed is adjustable.

During override the unit controls HVAC equipment to maintain space temperature within the user-selected occupied setpoints.

This mode's counterpart is M8, which is activated by setting BV-64 ON.

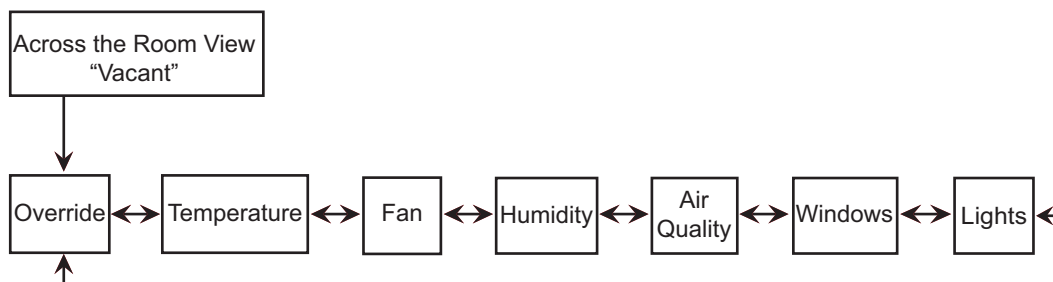


Figure 20 M9 screen flow sequence.

Vacant mode offers a temporary housekeeping override function. Housekeeping can press the screen to select override. Once at override screen, housekeeping can then press the up arrow, which sets the timer to the override limit (AV-97), interpreted as minutes and fractions of a minute (e.g. the maximum AV-97 value of 9.5 becomes 9 min. 30 sec.). When the override time is greater than zero, housekeeping can press the down arrow, which sets the timer to zero and restores normal Vacant operation.

When active, the housekeeping override function allows changing the user-selected Rented temperature setpoint, and the unit controls HVAC equipment to maintain the space temperature at the Rented setpoint; the Across the Room View shows the remaining minutes and seconds of override time.

Housekeeping override can be exited by pressing the DOWN arrow, which reduces the remaining override time to zero and restores normal Vacant operation.

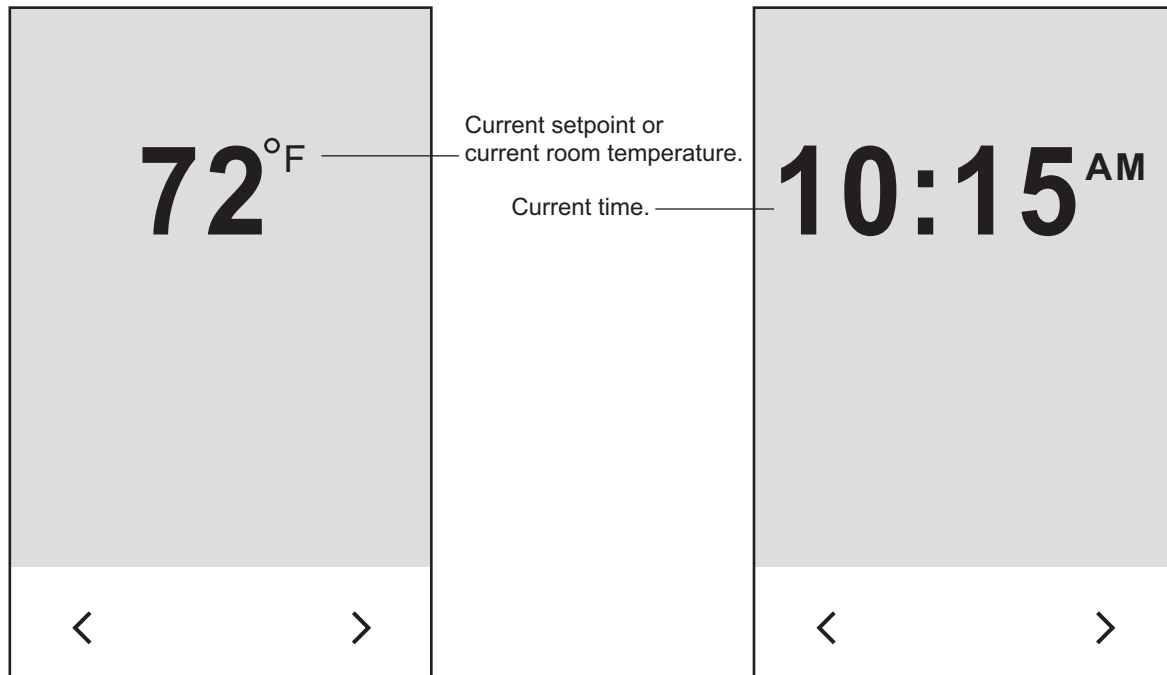
Operating mode screens

When the values shown on screens are adjustable by the user, UP and DOWN arrows (or one of them) are shown for the user to make an adjustment. If the value cannot be adjusted higher, the UP arrow is blanked; if the value cannot be adjusted lower, the DOWN arrow is blanked.

Screen and icons might not appear on the Microset 4 in the order shown, or at all, depending on Microset 4 model, configuration, and settings.

Across the Room View - Occupied screen

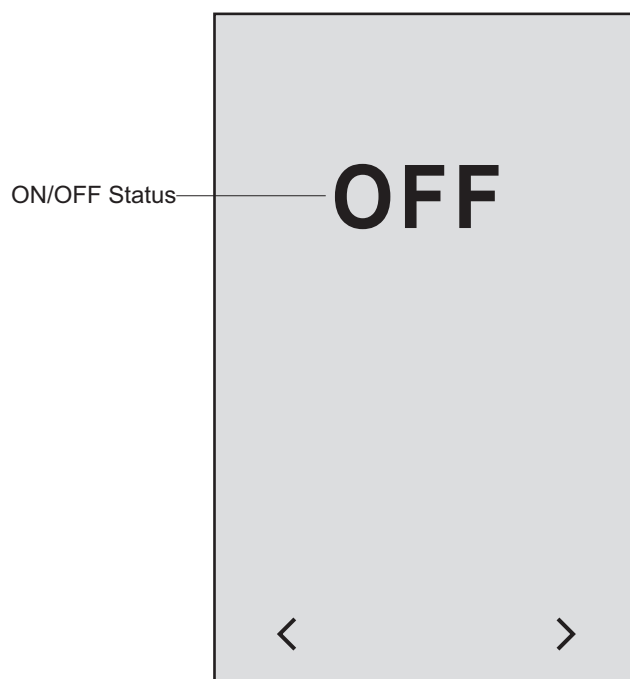
If BV-82 is turned on, Current Setpoint or Current Room Temperature and Current Time will alternate approximately every 4 seconds.



The Across the Room View screen while in After Hours override mode:



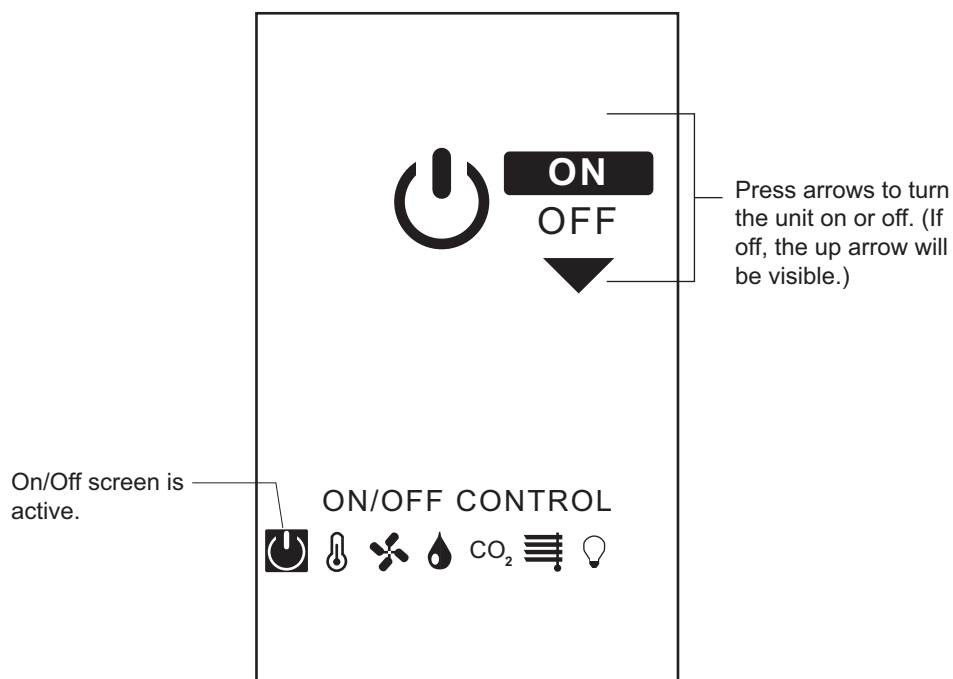
The Across the Room View for ON/OFF modes M3 or M6, in the OFF state:



Unoccupied or Vacant Across the Room View screen

In an unoccupied or vacant room, the default screen display is blank with the green status light on. The status light can be disabled by setting BV-85 active. To activate the unit, touch anywhere on the screen.

ON/OFF screen



Operation when ON

The LCD displays the occupant-selected space temperature setpoint (AV-90). The unit controls to occupied setpoints.

The occupant can press the **LEFT** or **RIGHT** navigation arrow to scroll through the additional screens and change their values as normal.

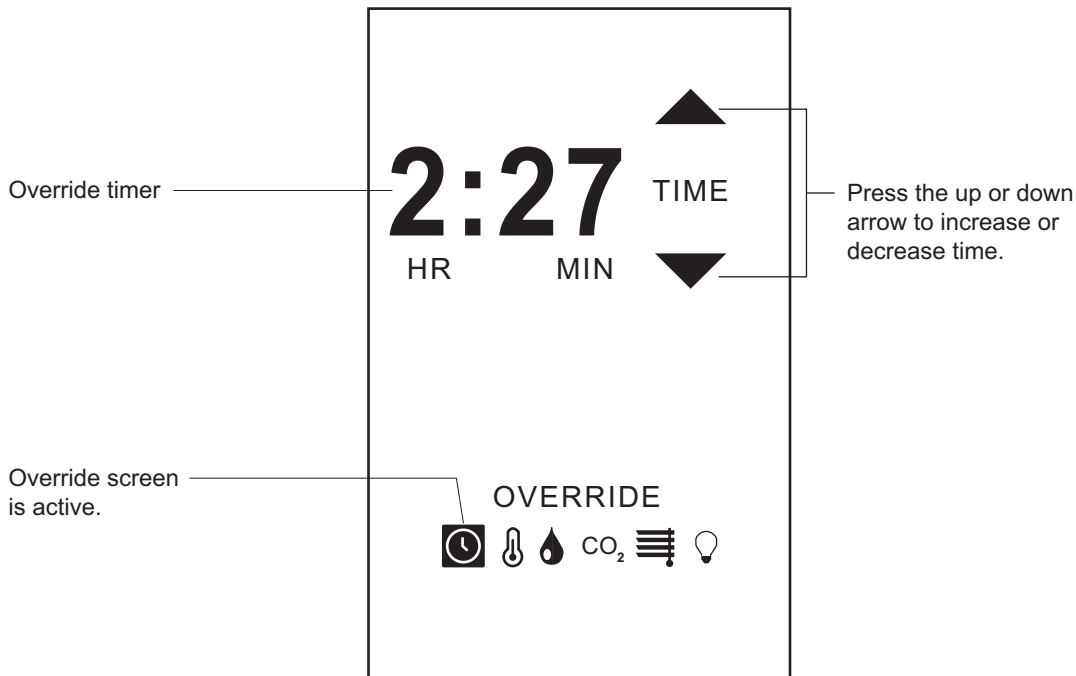
Operation when OFF

The LCD displays the word **OFF**. The unit controls to unoccupied setpoints.

The occupant can press the **LEFT** or **RIGHT** navigation arrow to scroll through additional screens, but the occupant cannot change the values on those screens.

Override screen

In office mode:



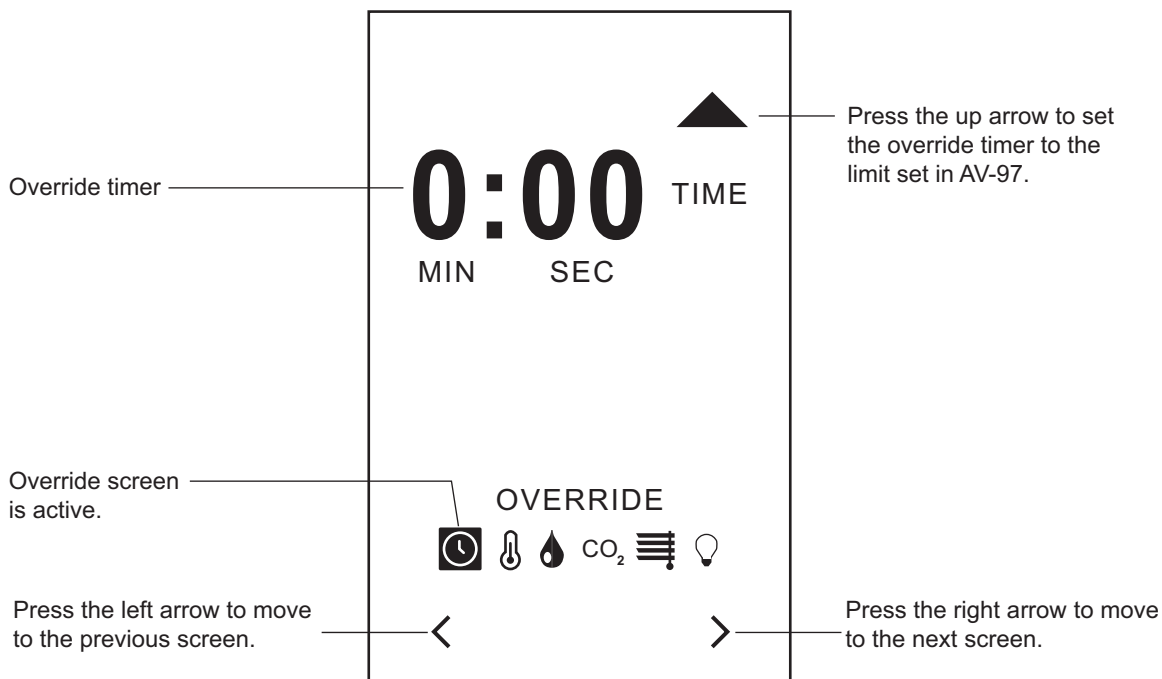
After-hours override operation (office mode)

When after-hours override is in effect, the after-hours timer (AV-98) automatically decrements, and the LCD displays the current timer value. The unit controls to occupied setpoints while the after-hours timer is non-zero.

At any time, the occupant can use the **UP/DOWN** arrow to increase or decrease the timer to the next half-hour increment up to the timer limit (AV-97).

The after-hours timer automatically resets to zero if the zone is set to occupied (BV-64 ON).

Housekeeping Override (hotel mode):

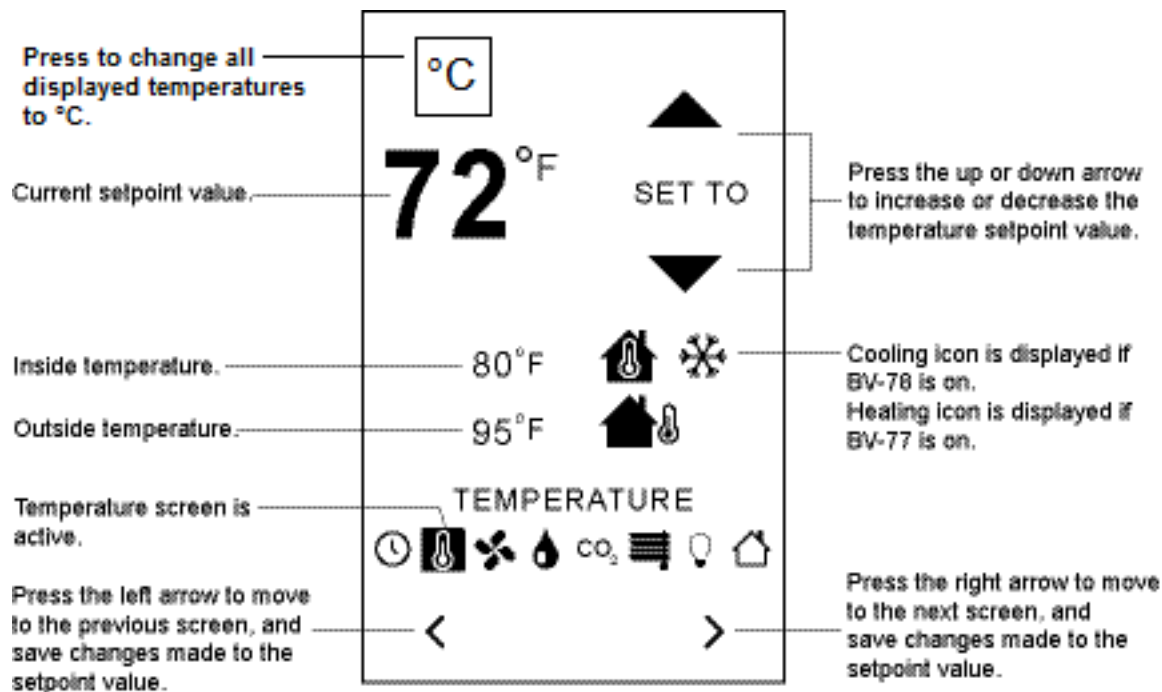


After-hours operation (hotel mode)

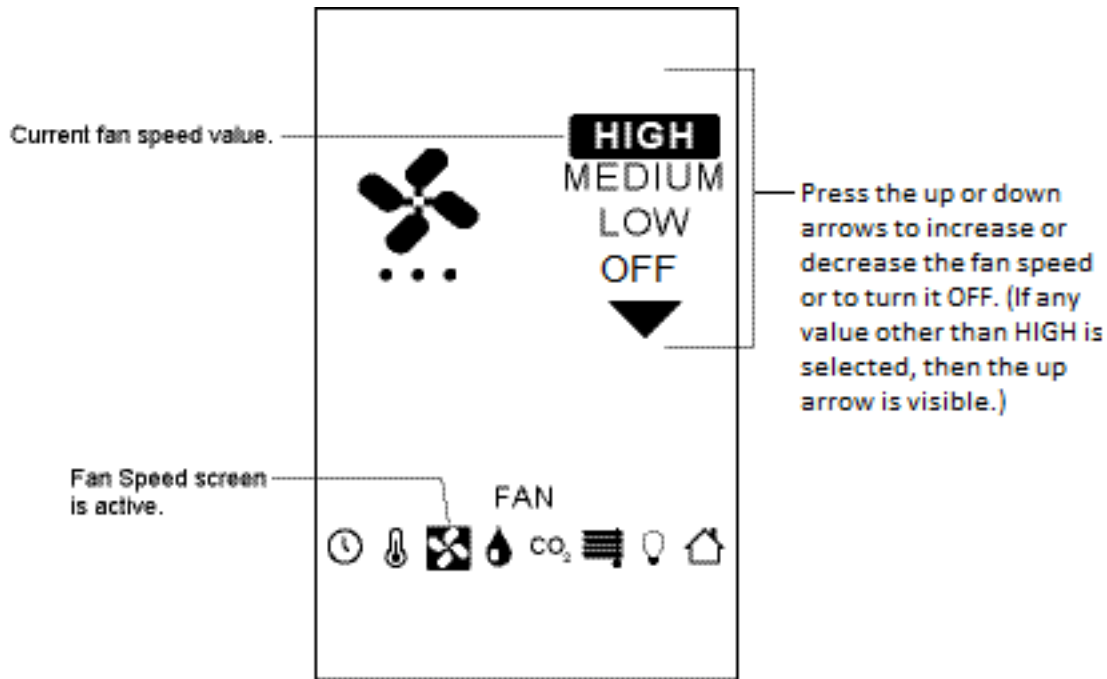
The LCD displays the override time remaining. The unit controls to occupied setpoints while the override timer (AV-98) is non-zero.

Housekeeping can press the **DOWN** arrow to cancel the override. The timer can't restart until it has timed down or been canceled.

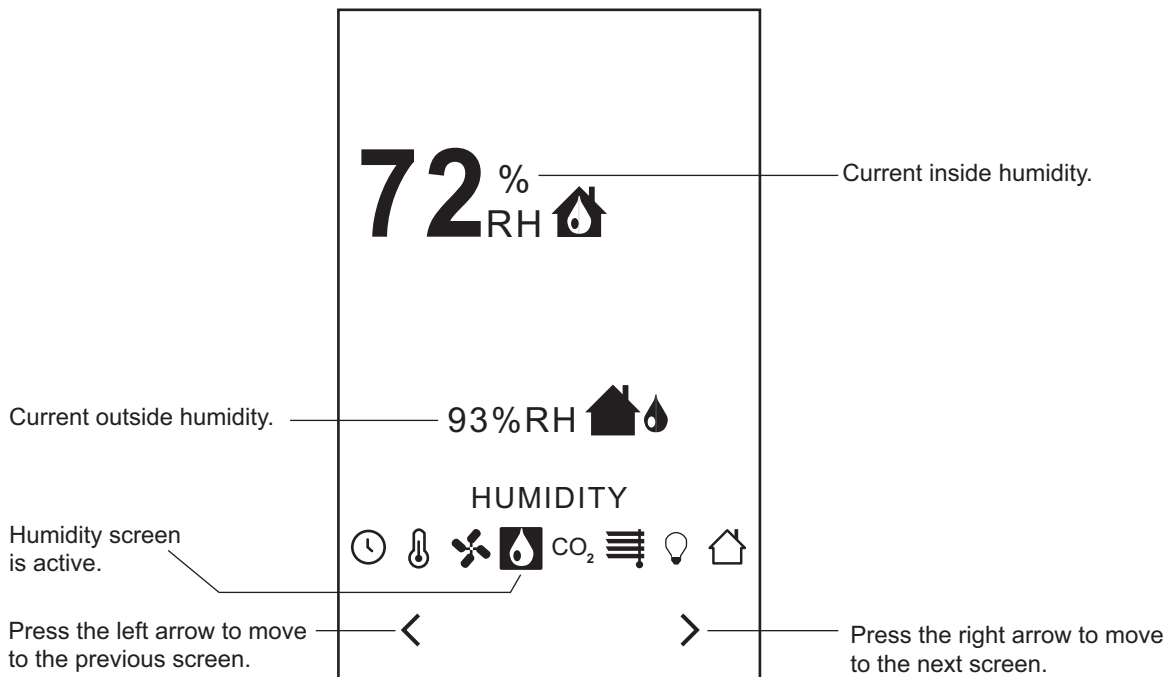
Temperature screen



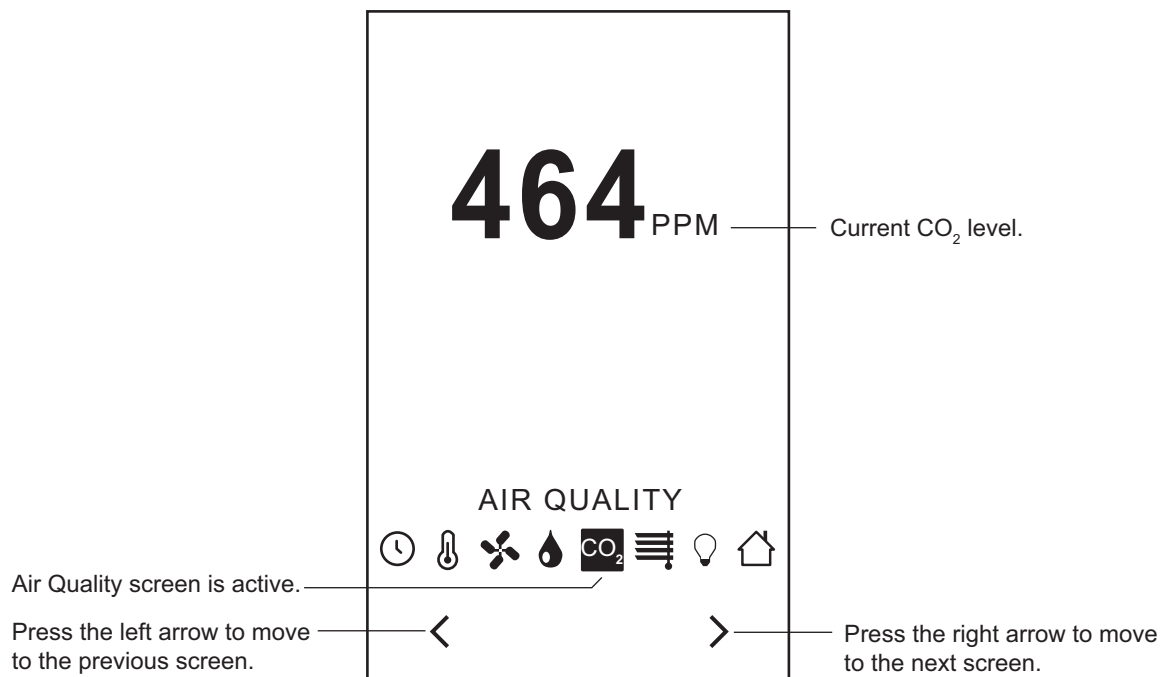
Fan speed mode



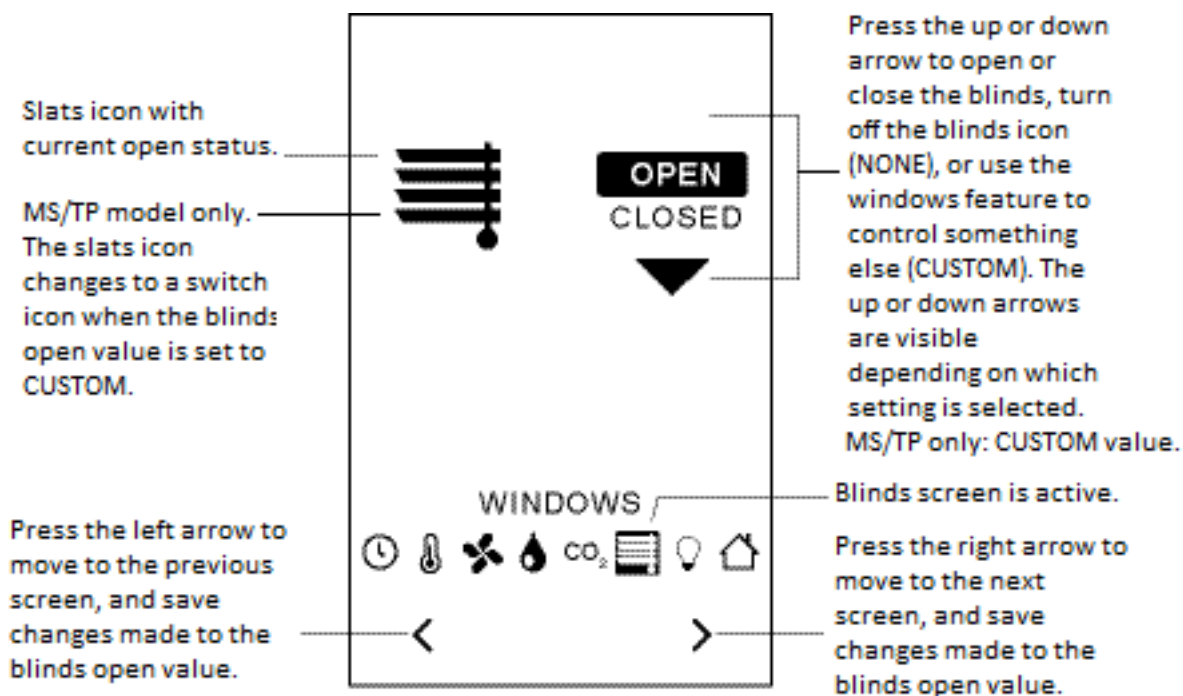
Humidity Screen



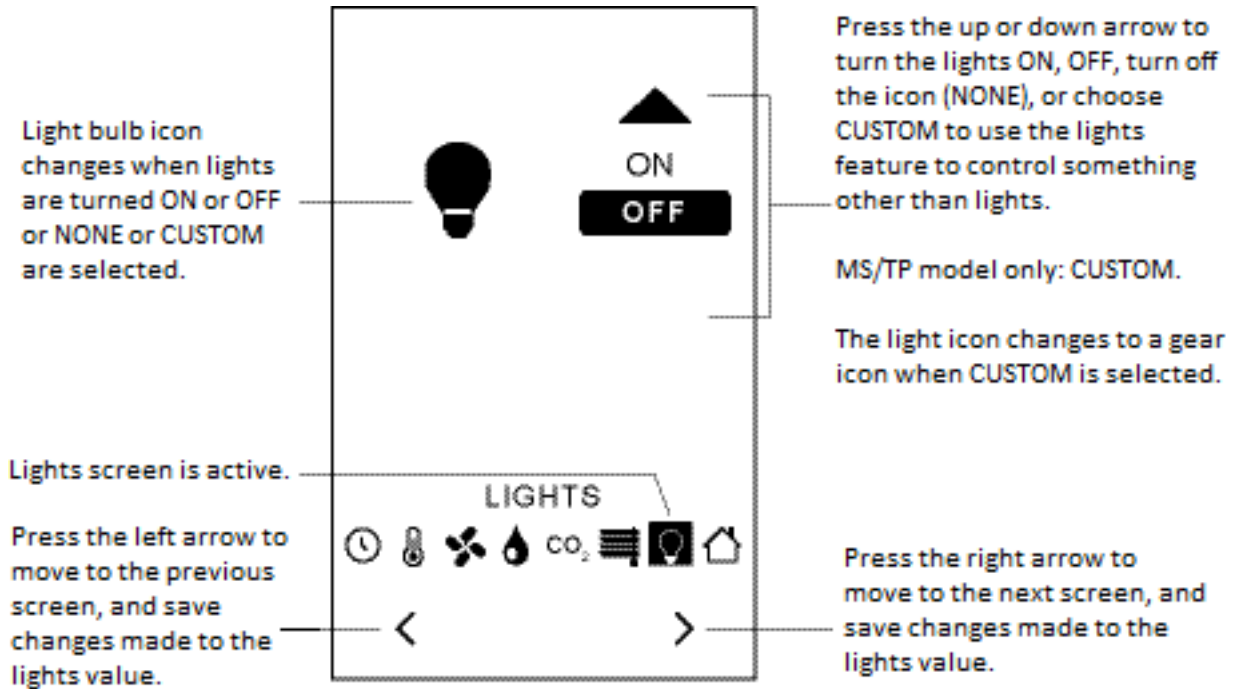
Air Quality screen



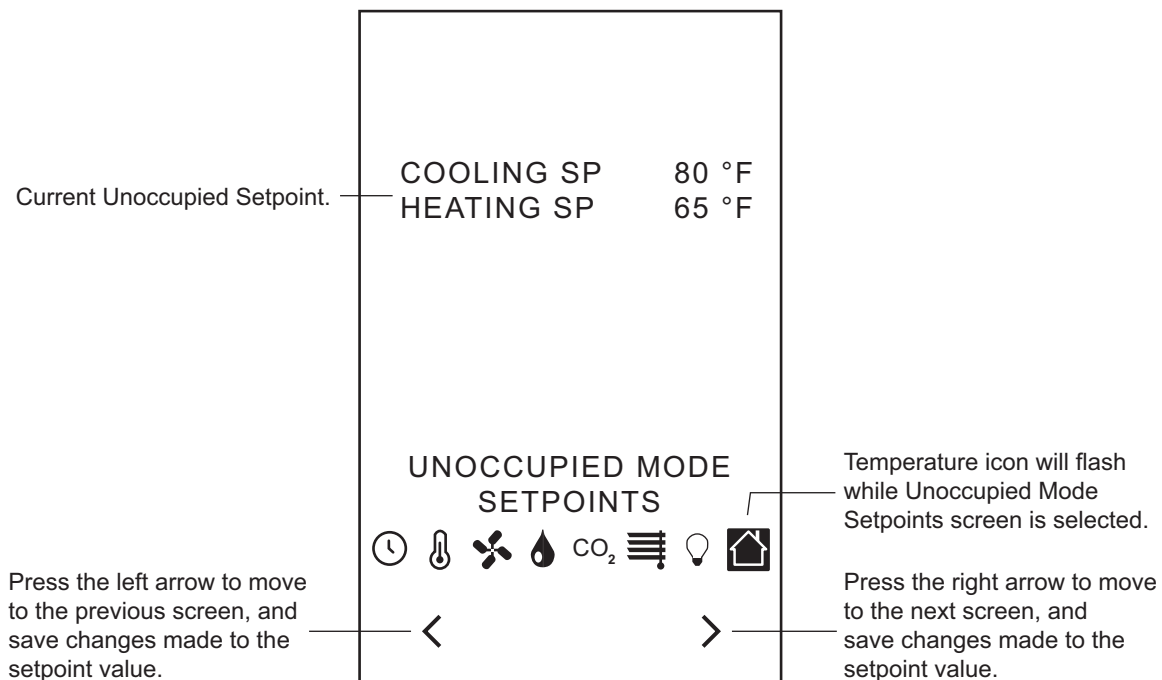
Windows screen



Lights screen



Unoccupied Mode Setpoints screen



Setting the MAC address and BACnet device instance (MS4-TH-MSTP only)

Set the MAC address and BACnet device instance on the display using the MAC/Device Instance screens in field service mode. NOTE: There are no DIP switches on the Microset 4.

NOTE Two-digit codes only used for Custom Codes settings. In Field Service Mode, display shows MS/TP MAC, not Ad, BACNET DEV INSTANCE HIGH, not D0 and BACNETDEV INSTANCE LOW, not D1.

Table 7 MAC/Device Instance Mode

DESCRIPTION	RANGE
MS/TP MAC Address	0-127
BACNET Dev Instance High	0-4,194
BACNET Dev Instance Low	0-999 (or 0-303 if Dev Instance High is at 4,194)

To set the MAC address and BACnet device instance

1. Enter Configuration mode.
2. Select the Field Service Button.
3. Press the RIGHT navigation arrow to get to the MAC selection screen.
4. Press the UP/DOWN arrow until MAC Address desired is displayed.
5. Press the RIGHT navigation arrow to accept your change and scroll to the BACNET Dev Instance High Screen.
6. Press the UP/DOWN arrow on the screen to adjust the High (thousands) setting for the Device instance.
7. Press the RIGHT navigation arrow to accept your change and scroll to the BACNET Dev Instance Low Screen.
8. Press the UP/DOWN arrow on the screen to adjust the Low (ones) setting for the Device instance.

The up or down counting of values for MS/TP MAC or BACnet Device Instance automatically continues when you maintain pressure on the arrow, and accelerates to allow making large changes more quickly.

You may also set the BACnet device instance using the BACtalk front-end, like you can with VLCs. See the *VLC Installation and Operations Guide* (LTBT-TM-Gen4VLC-IOG) for more information.

Service mode

Service Mode enables technicians to change settings within four areas in the unit. These four areas are: Field Service, Custom Codes, Settings, and Balance.

If BV-68 (Field Service Lockout) is set to ON, this will deny access to Service mode.

Service mode password

Service Mode can be secured using an optional password when the Microset 4 is attached to a VLC with new ROC. If the Microset 4 is attached to a VLC without the new ROC support, the password screen is not available.

The password is set in AV-109, and can be any four-digit number (0000–9999). If the selected password is outside that range, the password is ignored and the password screen is skipped. For passwords using zeros, blanks on the password login screen are equal to zeros. For instance, the password 0000 can be entered by pressing NEXT, NEXT, NEXT, LOGIN.



Figure 21 Password login screens.

If the password entered is incorrect, the user will see this screen. Press any key to return to the password screen. After 45 minutes of inactivity, the Password screen and the Incorrect Password screen will exit automatically.

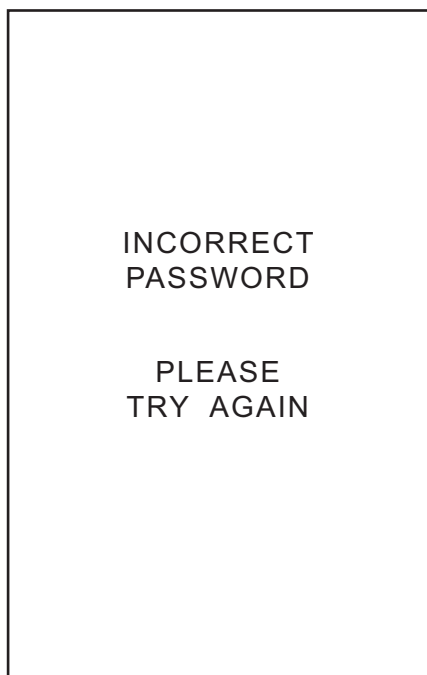


Figure 22 Incorrect password screen.

To enter Service mode

1. Hold the LEFT and RIGHT navigation arrows simultaneously.

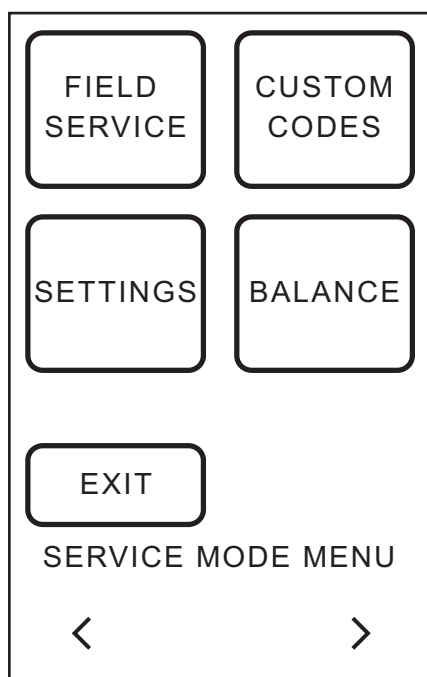


Figure 23 Service Mode Menu.

2. If necessary, enter the password and press the LOGIN button.

To adjust values of variables within each mode (Field Service, Settings, Custom Codes, and Balance.)

1. Press the Field Service, Settings, Custom Codes, or Balance button on the screen. (Balance button not available in MS4-TH-MSTP model.)
2. Press the LEFT/RIGHT navigation arrow until the variable you want to adjust appears.
3. Press the UP/DOWN arrow on the screen to adjust the setting.
4. Press the LEFT/RIGHT navigation arrow to accept your change and scroll to a different variable.

To exit configuration mode

- Press the LEFT and RIGHT navigation arrows simultaneously.
- After 45 minutes of inactivity, Service mode will exit automatically.

Field Service mode

Field Service mode enables technicians to query and adjust key operating settings in the Microset 4. In Field Service mode a technician uses the LEFT/RIGHT buttons to scroll through variables (one screen for each variable) and use the UP/DOWN arrows on the screen to change the setting for that variable.

Table 8 Adjustment Ranges of Field Service Mode Variables

SETPOINT	ADJUSTMENT RANGE
Occupied Setpoint	Occupied Low Limit Setpoint–Occupied High Limit Setpoint
Occupied Setpoint High Limit	40–99
Occupied Setpoint Low Limit	0–Occupied High Limit Setpoint
Current Cooling Setpoint	Not Adjustable
Current Heating Setpoint	Not Adjustable
Unoccupied Cooling Setpoint	45–99 °F
Unoccupied Heating Setpoint	44.5–0.5 below Unoccupied Cooling Setpoint
Cooling and Heating Setpoint Offsets	0–20
Override Limit	0–9.5
Cooling Duct Diameter	0–63 if the Microset 4 is connected to a VAV-SD or VAV-DD
Heating Duct Diameter	0–63 if the Microset 4 is connected to a VAV-DD\
Cold Airflow	Not Adjustable
Hot Airflow	Not Adjustable

Field Service mode ends automatically if there is no button activity for 45 minutes.

To start Field Service mode

1. Enter Service mode.
2. Press the FIELD SERVICE button on the screen.

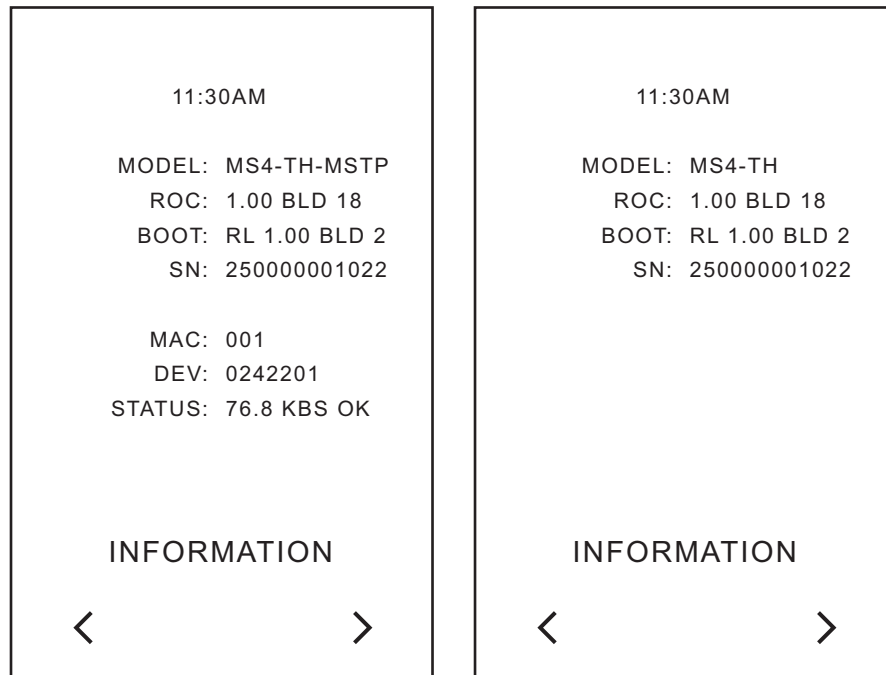


Figure 24 Field Service Mode Information screen (MS4-TH-MSTP model, left; MS4-TH model, right).

To adjust variable settings in Field Service mode

1. Press the LEFT/RIGHT navigation arrow until the variable you want to adjust appears. See Figure 26 for Field Service Mode screen flow sequence for MS4-TH, -THC, and -NL; see Figure 27 for Field Service Mode screen flow sequence for MS4-TH-MSTP.

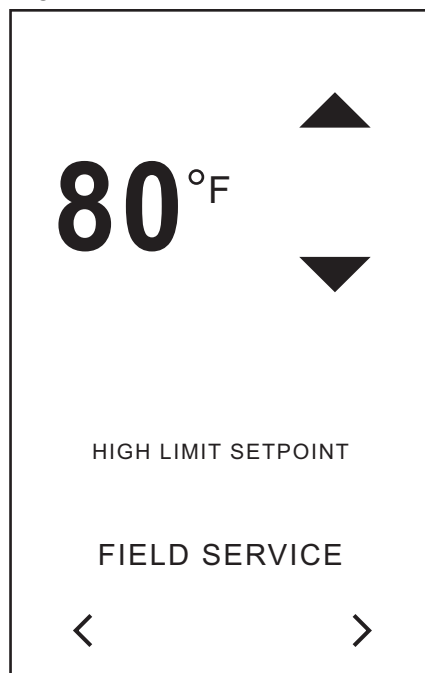


Figure 25 Field Service Mode High Limit Setpoint screen.

2. Press the UP/DOWN arrow on the screen to adjust the setting.

3. Press the LEFT/RIGHT navigation arrow to accept your change and scroll to a different variable.

To exit Field Service mode

- Press the LEFT and RIGHT navigation arrows simultaneously to return to the Service Mode Menu, then (if desired) the EXIT button to return to normal operation.
- After 45 minutes of inactivity, Service mode will exit automatically.

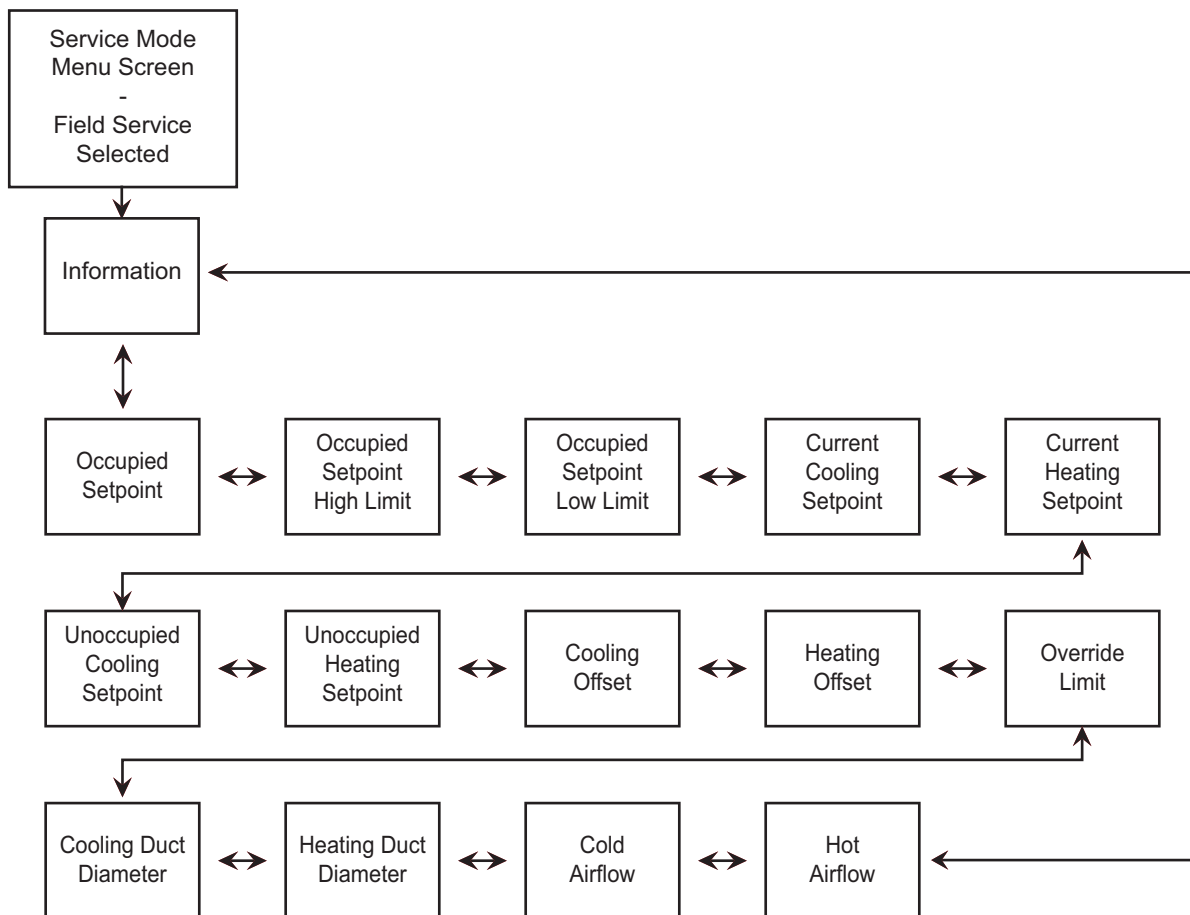


Figure 26 Field Service Mode screen flow sequence for MS4-TH, -THC, and -NL.

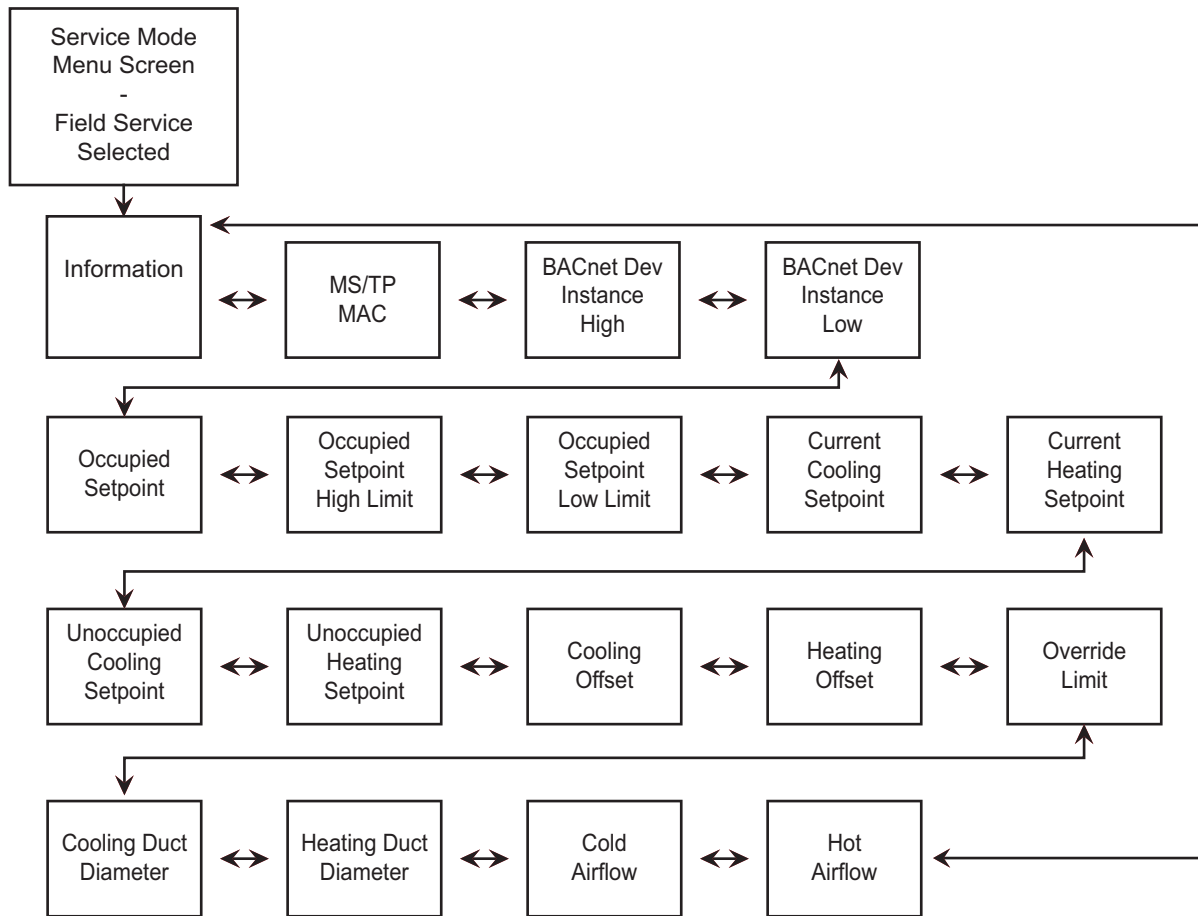


Figure 27 Field Service Mode screen flow sequence for MS4-TH-MSTP.

Settings mode

Settings mode enables technicians to adjust specific settings that are stored in the flash memory of the Microset 4.



Available settings are:

- **LIGHTS (NONE, ON-OFF).** When NONE is selected, then the light bulb icon does not show up in the navigation tray at the bottom the display screen and user control of lighting is disabled. When ON-OFF is selected, then the light bulb icon does show up in the navigation tray at the bottom of the screen and the user can control turning lights ON and OFF.
For MS/TP model only: (NONE, ON, OFF, CUSTOM). A technician can use CUSTOM to control something other than lighting. When CUSTOM is selected, the light bulb icon is replaced with a gear icon and the user can then turn BV-86 ON or OFF. The BACnet description for BV-86 defines what text displays at the bottom of the icon. ie: LIGHTS
The ON/OFF choices of the lights (gear icon) control screen are replaced by the BV-86 BACnet Active_Text and Inactive_Text strings, if assigned. The strings are limited to 29 characters.
- **WINDOWS (NONE, OPEN-CLOSE).**When NONE is selected, then the window blinds icon does not show up in the navigation tray at the bottom the display screen and user control of window blinds is disabled. When OPEN-CLOSE is selected, then the window blinds icon does show up in the navigation tray at the bottom of the screen and the user can control opening and closing window blinds.
For MS/TP model only: (NONE, OPEN-CLOSE, CUSTOM). A technician can use CUSTOM to control something other than window blinds. When CUSTOM is selected, the window blinds icon is replaced by a switch icon and the user can turn BV-87 ON or OFF. The BACnet description for BV-87 defines what text displays at the bottom of the icon. ie: WINDOWS. The OPEN/CLOSED choices of the windows (switch icon) control screen are replaced by the BV-87 BACnet Active_Text and Inactive_Text strings, if assigned. The strings are limited to 29 characters.
- **OFFSET (adjust to ± 2 °F).** Offset is a setting in the Microset 4 that allows an optional temperature bias adjustment to compensate for a difference between the Microset's temperature measurement and other room thermometers. It allows a service technician to set any value between -2.0 and +2.0 °F, with 0.1 degree resolution, to be added to the actual room temperature measured by the Microset. The factory default setting for temperature bias adjustment is 0.0 °F.
- **ARV (setpoint/AV-101).** This allows a service technician to specify what temperature value is shown in Across the Room View: either the room setpoint temperature (AV-90) or the actual room temperature (AV-101). The factory default is setpoint.
- **DEG C/F (User adjustments in Celsius are made in increments of .5 degrees C; user adjustments in Fahrenheit are made in 1 degree F per arrow push).** The user can choose to view temperature values in degrees Celsius or Fahrenheit.
- **NO TEMP (ENABLED or DISABLED).** When enabled, this option removes the actual temperature value from the display so users will focus on how comfortable they feel rather than the exact actual temperature value displayed on the screen. When NO TEMP is enabled, then the ARV and Temperature screens are replaced with a bar that indicates the temperature is somewhere between WARMER (AV-91) and COOLER (AV-92). User adjustments in Celsius are made in increments of .5 degrees C; user adjustments in Fahrenheit are made in 1 degree F per arrow push. The unoccupied setpoints screen is disabled (does not display in the navigation) when NO TEMP is enabled.

To start Settings mode

1. Enter Service mode.
2. Press the SETTINGS button on the screen. Settings Menu is displayed.

To adjust values for variables in Settings mode

1. Press the button for the variable you want to adjust.
2. Press the UP/DOWN arrow on the screen to adjust a numeric setting or enable/disable an on/off setting.
3. Press the LEFT/RIGHT navigation arrow to accept your setting and return to the Settings Menu.

To exit Settings mode

- Press the EXIT button, or the LEFT and RIGHT navigation arrows simultaneously to return to the Service Mode menu.
- After 45 minutes of inactivity, Settings mode will exit automatically.

Custom Codes mode

To start Custom Codes mode

1. Enter Service mode.
2. Press the CUSTOM CODES button on the screen.

Available Custom codes:

- 5A, Hg, Cg, dA, CP, Ad, Cd, HF, LF, FL, Fh, oP, cL, Lc.

To adjust settings for variables in Custom Codes mode

1. Press the LEFT/RIGHT navigation arrow until the variable you want to adjust appears.
2. Press the UP/DOWN arrow on the screen to adjust the setting.
Custom Codes for binary points are shown with the value of 0 = Inactive or 1 = Active.
3. Press the LEFT/RIGHT navigation arrow to accept your setting and scroll to a different variable. Up to 26 different points may be defined with custom codes in the DDC Header. Each may be designated as writable/read-only, decimal format (xx.x) or not (xxx), and positive-only/can go negative.

To exit Custom Codes mode

- Press the LEFT and RIGHT navigation arrows simultaneously.
- After 45 minutes of inactivity, Custom Codes mode will exit automatically.

Balance mode

Balance mode is similar to field service mode, except the data list is shorter, and the cold- and hot-duct VAV airflow are adjustable. Airflow balancing technicians can use this mode to calibrate the box and to set the high and low airflow limits while in the zone.

Set BV-68 ON (field service lockout) to deny access to balance mode.

To start Balance mode

1. Enter Configuration mode.
2. Press the BALANCE button on the screen.

To adjust settings for variables in Balance mode

1. Press the LEFT/RIGHT navigation arrow until the variable you want to adjust appears. See Figure 28 for Balance Mode screen flow sequence.
2. Press the UP/DOWN arrow on the screen to adjust the setting associated with the variable.
3. Press the LEFT/RIGHT navigation arrow to accept your setting and scroll to a different variable.

To exit Balance mode

- Press the LEFT and RIGHT navigation arrows simultaneously.
- After 45 minutes of inactivity, balance mode will exit automatically.

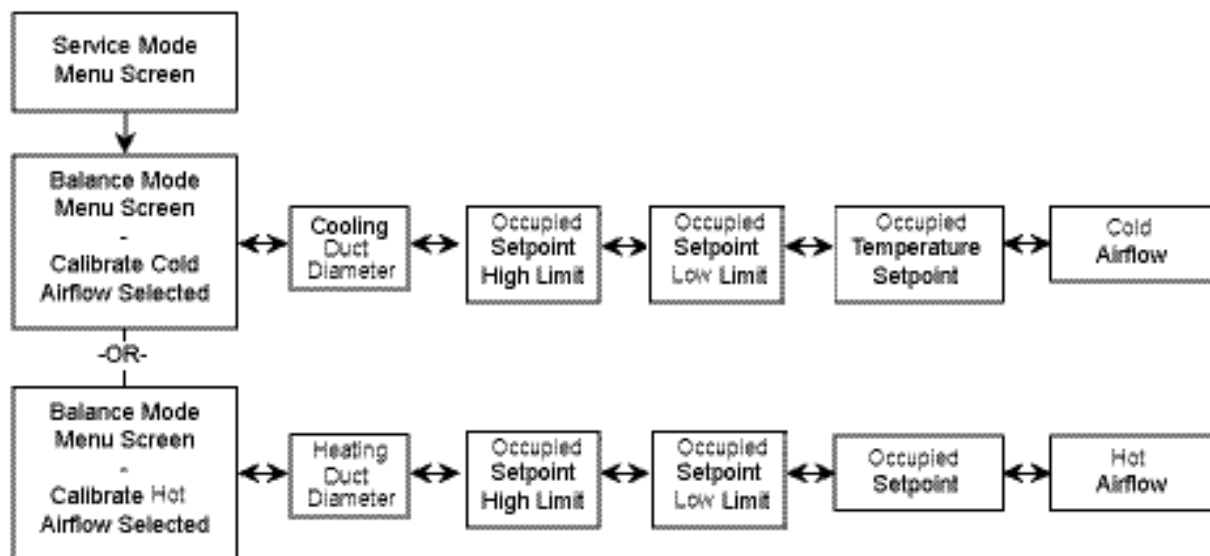


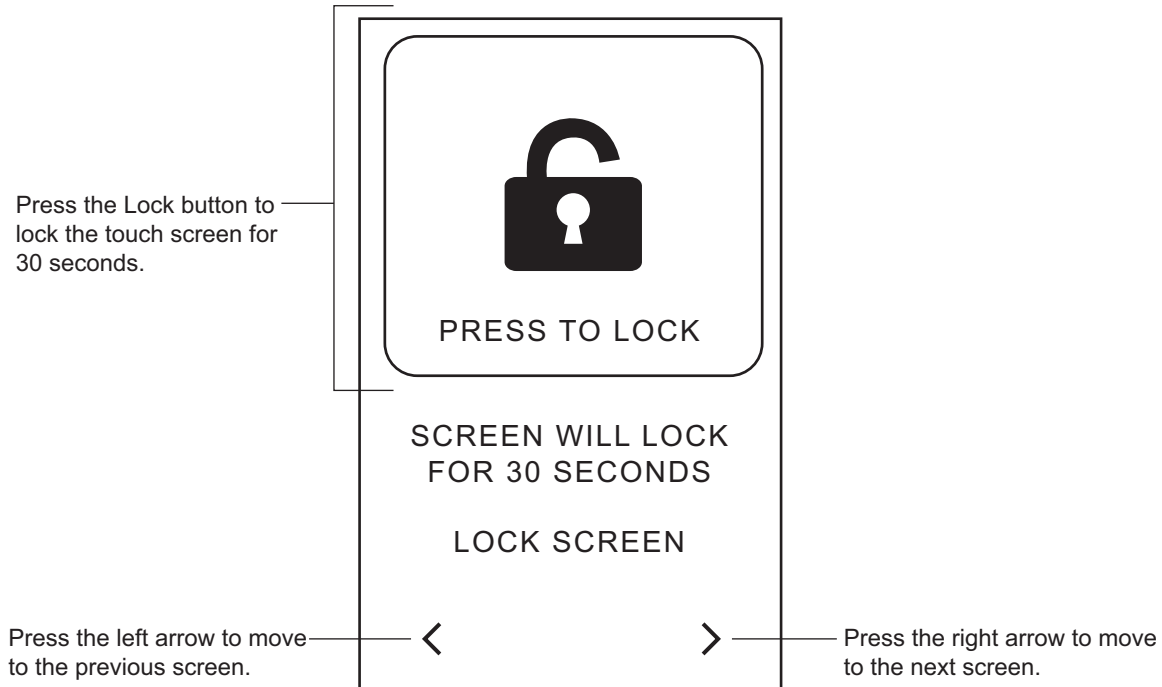
Figure 28 Balance Mode screen flow sequence.

Additional codes after Cold/Hot Airflow:

- 5A, Hg, Cg, dA, CP.

Locking the screen

To access the Lock Screen option, press and hold anywhere on the Across the Room View screen for 4 seconds. The Lock Screen option will appear. Press the **LOCK** button on the screen to lock the touch screen for 30 seconds. During this time, the touch areas are all inactive, so the screen may be cleaned without causing any HVAC actions.



BACnet object and property reference

This section shows the BACnet objects available in the MS/TP Microset 4. The tables that follow list individual points and give details about the properties of each object listed.

Microset 4 objects

OBJECT (INSTANCE RANGE)	REMARKS
AI-(0)	AI-0 is the Microset 4 internal temperature sensor analog input object.
AV-(90–107)	RESERVED AVs for Alerton legacy Microset behavior.
AV-(0-47)	General use AVs.
BV-(0-47)	General use BVs. BV-40 supports the priority-array property. BV-40 is typically used by Alerton DDC applications to receive scheduled occupancy commands from a global controller. The priority array allows a BACnet user to override the occupancy command. When in Occupancy mode with an internal schedule enabled, internal schedule commands are written to BV-40 priority 16, therefore DDC applications that use BV-40 can easily use either internal or external scheduling.
BV-(99)	Disable unoccupied setpoint deadband
File (254)	Provides information about the ROC file.

Object properties

Device object properties

PROPERTY	ACCESS	NOTES
Object Identifier	R	
Object Name	R/W	
Object Type	R	
System Status	R	OPERATIONAL
Vendor Name	R	Alerton
Vendor Identifier	R	18
Model Name	R	MS4-TH MS4-TH-NL MS4-TH-MSTP MS4-THC
Firmware Revision	R	RL 1.00 (build x)
Application Software Version	R	1.00 (build y)
Location	R/W	
Description	R/W	
Protocol Version	R	1
Protocol Revision	R	4
Protocol Services Supported	R	atomicReadFile, atomicWriteFile, readProperty, readPropertyMultiple, writeProperty, writePropertyMultiple, deviceCommunicationsControl, reinitializeDevice, i-Am, unconfirmedPrivateTransfer, timeSynchronization, who-Has, who-Is, utcTimeSynchronization
Protocol Object Types Supported	R	analog-input, analog-output, analog-value, binary-input, binary-output, binary-value, device, file, program, schedule
Object List	R	Too large to return in a single request, so returns "segmentation not supported". Individual array entries can be read.
Max APDU Length Accepted	R	480
Segmentation Supported	R	no-segmentation
Local Time	R	Default = "00:00:00". Changed using TimeSync or UTCTimeSync.
Local Date	R	Default = "Jan 1, 1900". Changed using TimeSync or UTCTimeSync.
UTC Offset	R/W	Default = 0
APDU Timeout	R/W	Default = 6000, limited to 100..60000
Number of APDU Retries	R/W	Default = 3, limited to 0..16
Max Master	R	127
Max Info Frames	RW	Default = 3, limited to 1..60
Device Address Binding	R	Empty List

AI-object properties

Applies to AI-0 only since that is the only analog input object in the Microset 4.

PROPERTY	ACCESS	NOTES
Object Identifier	R	
Object Name	R/W	AI-0.
Object Type	R	
Present Value	R/W	Value handled as described in the sequence of operation
Description	R/W	
Status Flags	R	All false
Event State	R	NORMAL
Out Of Service	R	FALSE
Units	R	

AV-object properties

PROPERTY	ACCESS	NOTES
Object Identifier	R	
Object Name	R/W	"AV-nnn" by default.
Object Type	R	
Present Value	R/W	As described below
Description	R/W	
Status Flags	R	No flags set
Event State	R	Normal
Out Of Service	R	FALSE
Units	R	As described below

BV-object properties

PROPERTY	ACCESS	NOTES
Object Identifier	R	
Object Name	R/W	"BV-nnn" for most BVs by default.
Object Type	R	
Present Value	R/W	As described below
Description	R/W	
Status Flags	R	No flags set
Event State	R	NORMAL
Out Of Service	R	FALSE
Priority Array	R/W	BV-40 only
Relinquish Default	R/W	BV-40 only

BV and AV assignments

Each Microset 4 has a number of pre-assigned data points—Binary and Analog Values (BVs and AVs). These data points are available from the Microset 4 as BACnet objects; BACnet-compliant devices can access the properties of these objects. For a complete reference of objects and properties available in Microset 4s, see the *Programmer's Guide and Reference for BACtalk Systems (LTBT-TM-PRGRMR)*.

Table 9 and Table 10 are concerned only with the Present Value property of the AV and BV objects. These are listed as Data Points.

Table 9 BV assignments for the Microset 4.

DATA POINT	READ ONLY	DESCRIPTION	ON ACTION/STATUS	OFF ACTION/STATUS
BV-64		Controls occupied/unoccupied, rented/vacant status (see Table 6 on page 21).	Sets Microset 4 to occupied or rented operation.	Sets Microset 4 to unoccupied or vacant operation.
BV-65		Enables and disables ON/OFF mode (see Table 6 on page 21).	Enable ON/OFF mode.	Disable ON/OFF mode.
BV-66	X	Override status. Activated in unoccupied/vacant modes when the user initiates override from the Microset 4.	ON when override timer (AV-98) is non-zero.	OFF when override timer (AV-98) is zero.
BV-67	X	Occupied status. Reflects value of BV-64 or BV-66 as appropriate. Also reflects user selection of ON/OFF mode when BV-64 is ON (see Table 6 on page 21). Use this as a flag in DDC to control equipment occupied/unoccupied operation.	Space is occupied. Current setpoints (AV-99, AV-100) calculated using occupied logic.	Space is unoccupied. Current setpoints (AV-99, AV-100) calculated using unoccupied logic.
BV-68		Service modes lockout.	Lockout field service mode and balance mode.	Allow field service mode and balance mode access.
BV-69		English/metric mode swap. See "English and metric units" on page 19.	Swap native units mode from English to Metric or vice versa.	Use units as determined by native units mode.
BV-70	X	Microset 4 connection status.	Microset 4 connection detected.	Microset 4 not detected.
BV-71	X	Native units mode status.	English units.	Metric units.
BV-72 ^a		Fan low speed.	Enable fan low speed status indicator at Microset 4.	
BV-73 ^a		Fan medium speed.	Enable fan medium speed indicator at Microset 4.	
BV-74 ^a		Fan high speed.	Enable fan high speed indicator at Microset 4.	
BV-75		THC model only. Disables CO2 display.	Display CO2.	Hide CO2.
BV-76		Reserved for future fan auto icon.	n/a	n/a
BV-77		Display/hide heating icon.	Display heating icon.	Hide heating icon.
BV-78		Display/hide cooling icon.	Display cooling icon.	Hide cooling icon.
BV-79		Backlight control	Screen is dark unless it is in hotel maid override mode.	Across the Room View (ARV) backlight is on.
BV-80		Fan control mode (see Table 6 on page 21).	Fan control mode.	No-fan-control mode.
BV-81		Select office mode or hotel mode operation (see Table 6 on page 21).	Hotel mode.	Office mode.
BV-82		Space temperature and time displays alternate.	Enable alternate time of day display.	Disable alternate time of day display.
BV-83		Select 12- or 24-hour time format.	Display time in 24-hour format.	Display time in 12-hour format.
BV-84		Display/hide room humidity.	Display room humidity.	Hide room humidity.
BV-85		LED Disable with new ROC for VLCs	Disables LEDs.	Factory default; LEDs enabled.
BV-86		Lights Command with new ROC for VLCs	Display Lights Command	
BV-87		Window Command with new ROC for VLCs	Display Window Command	

^a These BVs can be written to in DDC. They are also affected by the occupant selection of fan speed. Only one of these BVs can be ON at once; otherwise, the fan displays high fan status. When fan is OFF, these BVs are OFF.

Table 10 AV assignments for the Microset 4

DATA POINT	READ ONLY	DESCRIPTION
AV-90		Occupant-selected space temperature setpoint. May be written to in DDC.
AV-91		Setpoint high limit. Value of AV-90 can't exceed this value.
AV-92		Setpoint low limit. Value of AV-90 can't be below this value.
AV-93		Cooling offset in degrees. Added to the value of AV-90 in calculation of AV-99. See "Cooling and heating setpoint calculation" on page 18.
AV-94		Heating offset in degrees. Subtracted from the value of AV-90 in calculation of AV-100. See "Cooling and heating setpoint calculation" on page 18.
AV-95		Unoccupied cooling setpoint.
AV-96		Unoccupied heating setpoint.
AV-97		Override timer limit. After-hours override timer limit is in hours—3.5 = 3 hours 30 minutes. Housekeeping timer limit is in minutes—3.5 = 3 minutes 30 seconds.
AV-98		After-hours/housekeeping override timer value. Resets to 0 when BV-64 is ON.
AV-99	X	Current cooling setpoint. Equal to AV-90 + AV-93 + AV-106 while occupied (BV-67 ON). Equal to AV-95 while unoccupied (BV-67 OFF).
AV-100	X	Current heating setpoint. Equal to AV-90 – AV-94 – AV-106 while occupied (BV-67 ON). Equal to AV-95 while unoccupied (BV-67 OFF).
AV-101 ^a		Space temperature to display. Range is 0–127 °F (-18–53 °C).
AV-102	X	Humidity, read directly from Microset 4 humidity sensor.
AV-103		Outside air temperature (OAT) to display on Microset 4. Temperature range is -99–127 °F (-73–53 °C). Not displayed if set to -100.
AV-106 ^b		Demand offset.
AV-107 ^c		Outside humidity (in %RH) to display on Microset 4.
AV-108		CO ₂ PPM with new ROC for VLCs THC model only
AV-109		MS4 Password - with new ROC for VLCs
AV-110		LED ON/OFF controls. Uses the following real data values for AV-110: AV-110 = 0–16, All LEDs are OFF AV-110 = 17, Blue LED is ON AV-110 = 18–19, Amber LED is ON AV-110 = 20–23, Green LED is ON AV-110 = 24–31, Red LED is ON

^a MS/TP model only. The temperature read by the Microset 4 is available as AI-0. BV-75 controls transfer of AI-0 to AV-101.

^b Typically, this is a demand offset value controlled by a BACtalk demand limiting program or by an global controller DDC demand limiting algorithm.

^c This value displays while AV-107 is non-zero. If another unit reads outside humidity, DDC writes this value to AV-107.

Troubleshooting

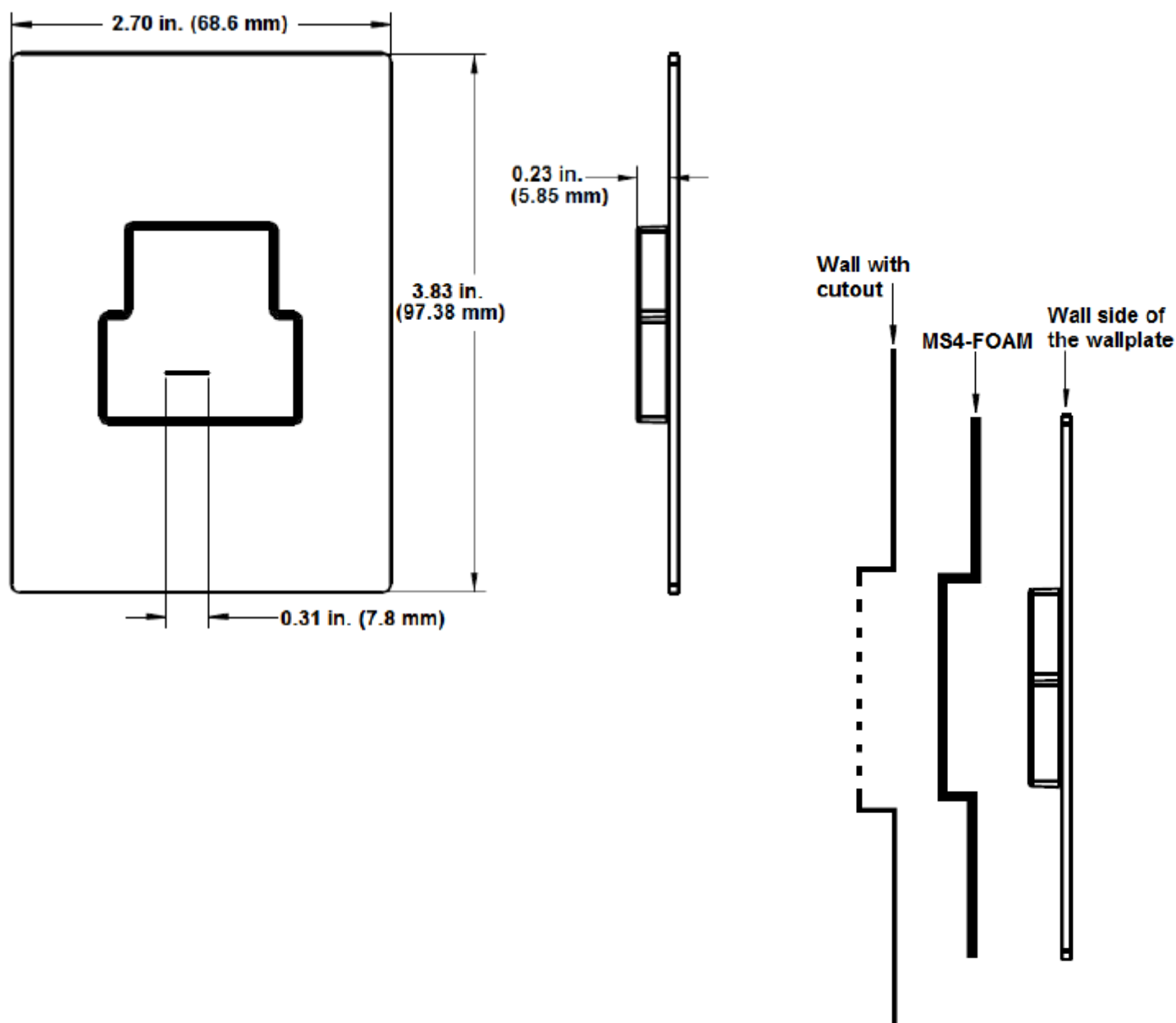
Table 11 Troubleshooting

ISSUE	CAUSE	RESOLUTION
Solar exposure heats the sensor.	Microset 4 is mounted near a window or glass door where it sits in direct sunlight for at least part of the day.	- Physically move the Microset 4 so it is not installed in direct sunlight. - Engineering should closely review mechanical design drawings for sensor locations and diffuser locations. - Do not install on external walls.
Air infiltration Air flowing into or out from the wall cavity penetrates through the Microset 4 backplate.	Pressure differences in controlled spaces (the stack effect). Especially in high-rise buildings, the stack effect is induced by warm air rising resulting in varying pressure levels. Lower floors experience negative pressures while upper floors experience positive pressurization.	- Affix a closed-cell foam barrier between the Microset 4 backplate and the wall, sealant, and/or putty. See "Installation best practices" on page 9 and "Optional MS4 foam air barrier accessory" on page 54. Completely cover the wiring opening and all backplate screw holes. - Add insulation into the wall cavity when mounting the Microset 4.
Temperature difference between wall cavity temperature and space temperature can contribute to air infiltration and impact the wall's surface temperature.	Temperature differences can impact air flow.	- Affix a closed-cell foam barrier between the Microset 4 backplate and the wall, sealant, and/or putty. See "Installation best practices" on page 9 and "Optional MS4 foam air barrier accessory" on page 54. Completely cover all backplate screw holes. - Add insulation into the wall cavity when mounting the Microset 4. - Do not install on external walls.
Air flow across wall surface is too high	Improperly designed or aimed diffusers can cause down drafts along walls which can impact sensor readings.	- Engineering should closely review mechanical design drawings for sensor locations and diffuser locations. - Adjust diffusers so that air is not directed toward the Microset 4.
No air flow at the sensor	Blockages on the wall around the sensor.	- Remove blockages or move the Microset 4 to a new, clear location. - Engineering should closely review mechanical design drawings for sensor locations and diffuser locations.

Appendix

Optional MS4 foam air barrier accessory

The optional MS4-FOAM is a vacuum-formed foam air barrier designed to prevent air infiltration from airflow inside the wall cavity once the Microset 4 is installed.



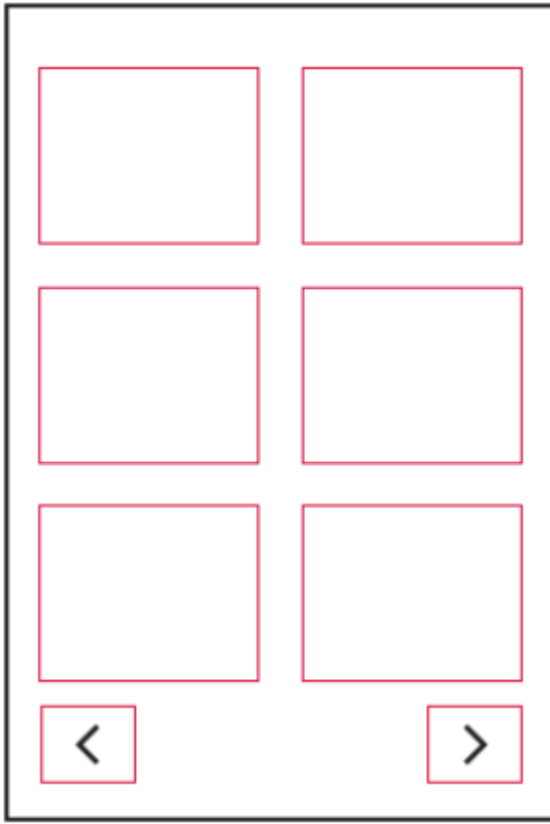
Installing the foam barrier

Fit the foam barrier onto the Microset 4 wallplate and easily pass wires through the pre-cut slit.

To install the MS4-FOAM accessory:

1. Position the foam barrier onto the wall side of the Microset 4 wallplate with the vacuum-formed foam fit over the terminal block protrusion near the center.
2. Insert the wires through the pre-cut slit in the foam.
3. Insert the screws into the holes of the backplate and through the foam and then tighten.

Touch-sensitive areas of the Microset 4





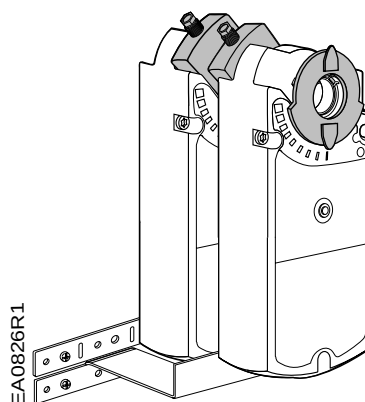
Powered by BACtalk

Alerton.com

16201 25th Ave. West
Lynnwood, WA 98087
(425) 921-4900
Fax: (425) 921-4872
tech.support@alerton.com

OpenAir™ Electronic Damper Actuators

GCA Series Master/Slave Spring Return Rotary 24 Vac - Modulating Control



Description The OpenAir™ direct coupled master/slave, 24 Vac, spring return, electronic actuators are designed for modulating control of building HVAC dampers.

- Features**
- Brushless DC motor technology with stall protection
 - Bi-directional fail-safe spring return
 - Unique self-centering shaft coupling
 - Manual override
 - 5° preload as shipped from factory
 - Offset and span adjustment model with independently adjustable dual auxiliary switches available
 - Plenum cable
 - All metal housing
 - UL and C-UL listed

Product Numbers

Table 1.

Function	24 Vac Operating Voltage	
	Standard	Dual Auxiliary Switches and Span/Offset Adjustable
Master	GCA161.1P/MAS	GCA164.1P/MAS
Slave	GCA161.1P/SLA	—

Ordering information The master and slave actuators are ordered separately. Select the desired model of the master actuator and slave actuator from Table 1 and the ASK73.1 tandem mounting bracket.

Application

These actuators are used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers requiring up to 284 lb-in (32 Nm) torque. They are designed for applications that require the damper to return to a fail-safe position when there is a power failure.

Warning/Caution Notations

WARNING		Personal injury/loss of life may occur if a procedure is not performed as specified.
CAUTION:		Equipment damage or loss of data may occur if the user does not follow a procedure as specified.

Specifications

Power supply

Operating voltage (G–G0)	24 Vac $\pm$ 20%
Frequency	50/60 Hz
Power consumption for one master/one slave combination	
running	18 VA
holding	10 VA

Control signal

Master input signal (Y–G0)	
voltage-input	0 to 10 Vdc (max. 35 Vdc)
input resistance	>100K Ohms

Feedback signal

Master position output signal (U–G0)	
voltage-output	0 to 10 Vdc
max. output current	$\pm$ 1 mA

Equipment rating

Class 2, in accordance with UL/CSA

Auxiliary features

Master unit only

Control signal adjustment	
Offset (start point)	Between 0 to 5 Vdc
Factory setting	0 Vdc
Span	Between 2 to 30 Vdc
Factory setting	$\approx$ 10 V
Dual auxiliary switch contact rating	4 A resistive, 2 A inductive
Voltage	24 Vac/24 Vdc
Switch Range	
Switch A	0 to 90° with 5° intervals
Recommended range usage	0 to 45 °
Factory setting	5°
Switch B	0 to 90° with 5° intervals
Recommended range usage	45 to 90°
Factory setting	85°
Switching hysteresis	2°

Specifications, Continued	Running torque for one master/one slave combination	284 lb-in (32 Nm)
	Spring return torque	284 lb-in (32 Nm)
	Maximum torque	<720 lb-in (80 Nm)
	Runtime for 90° operating with motor	90 seconds
	closing (on power loss) with spring return	15 seconds typical (30 seconds max.)
Mounting	Nominal angle of rotation	90°
	Maximum angular rotation	95°
	Shaft size	3/8 to 1-inch (8...25.6 mm) diameter 1/4 to 5/8-inch (6...18 mm) square
	Minimum shaft length	4 inches (100 mm)
Housing	Enclosure	NEMA 2 in vertical to horizontal 90° See <i>Figure 10</i> IP40 according to EN60529
	Material	Die cast aluminum alloy
	Gear lubrication	Silicone free
Ambient conditions	Ambient temperature operation	-25 to 130°F (-32 to 55°C)
	storage and transport	-40 to 158°F (-40 to 70°C)
	Ambient humidity (non-condensing)	95% R.H.
Agency certification		UL873 C-UL certified to Canadian Standard C22.2 No. 24-93
Miscellaneous	Cables	
	Master/slave connection	AWG 22
	All other connections	AWG 18
	Cable lengths	3 feet (0.9 m) length
	Life cycle	50,000 full strokes and 5,000,000 repositions at rated torque and temperature.
	Dimensions	See <i>Figures 14 and 15</i>
Weight		4.85 lbs. (2.2 kg) each actuator

Accessories

NOTE: The auxiliary switches and the control signal adjustment cannot be added in the field. Order the product number that includes these options.

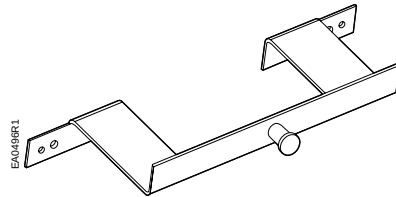


Figure 1. Tandem Mounting Bracket.

ASK73.1 This tandem mounting bracket provides an extended anti-rotation pin that allows the master/slave OpenAir actuators to directly drive a single damper shaft.

This bracket must be ordered for the installation of the master/slave.

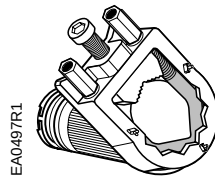


Figure 2. Special Shaft Adapter.

ASK74.1U This shaft adapter will attach to a 1.05-inch (26.6 mm) diameter shaft; whereas, the standard self-centering adapter will accept up to a 1.00-inch (25.4 mm) diameter shaft. This special adapter can be used for coupling to 1-inch jackshafts that are slightly oversized. This shaft adapter is 13/16-inches (20 mm) shorter than the height of the self-centering shaft adapter.



Figure 3. Conduit adapter.

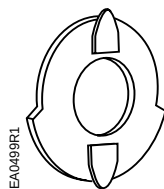
985-036P25 Conduit adapter for a 1/2-inch NPT connector (package of 25).



Figure 4. Dual Conduit adapter.

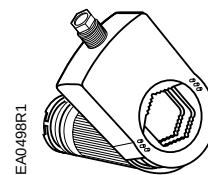
985-037P20 Conduit adapter for a 1/2-inch NPT connector (package of 20). Use when wires exit through two openings.

Service Parts



985-003

Position indicators (package of 10).



985-004

Standard shaft adapter



985-006

Mounting (anti-rotation) bracket

Figure 5. Orderable Service Parts.

Actuator Components

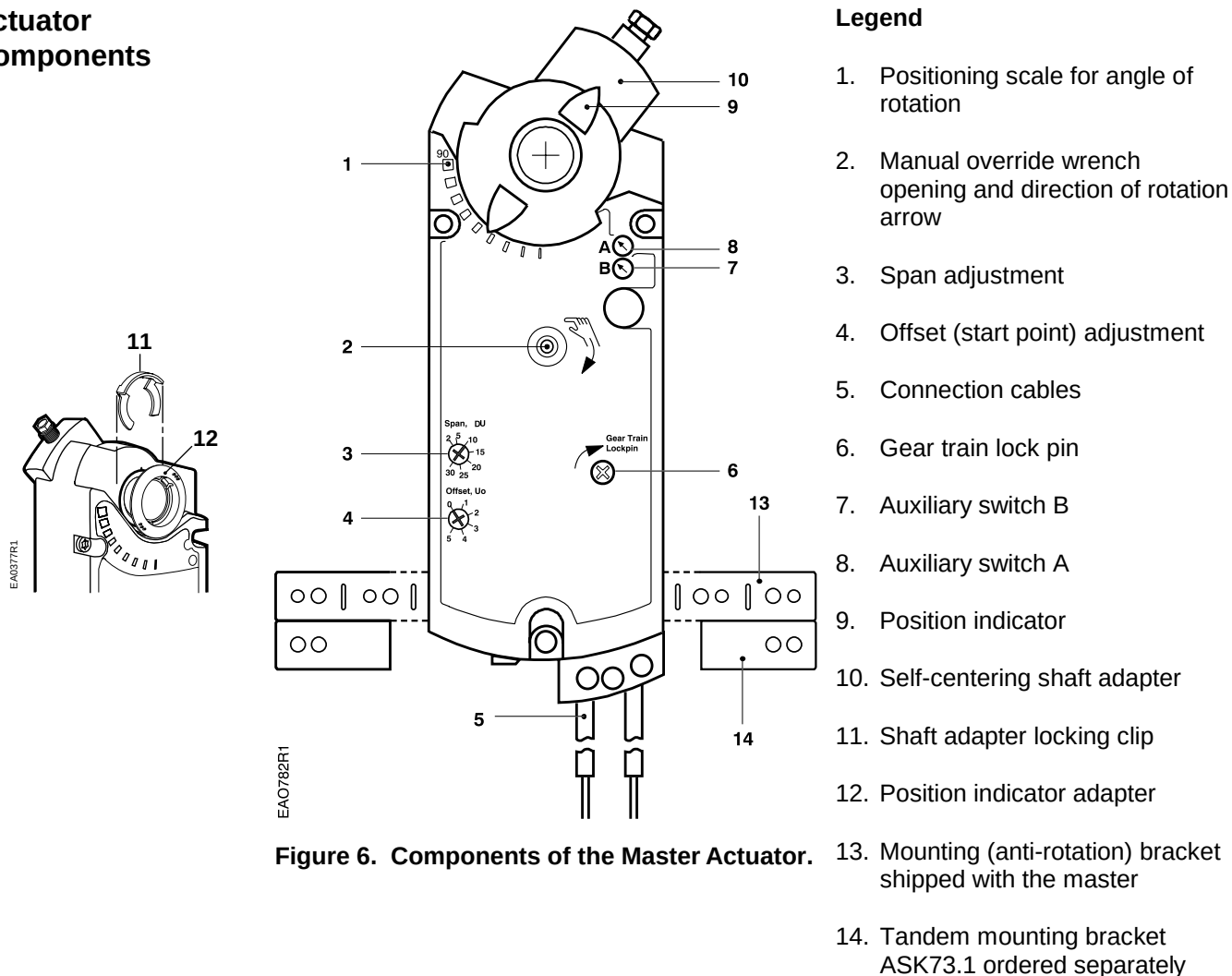


Figure 6. Components of the Master Actuator.

Operation

Apply a continuous 0 to 10 Vdc control signal between the master wire Y (8, gray) and wire G0 (2, black) to operate the damper actuator. The angle of rotation is proportional to the control signal. A 0 to 10 Vdc position feedback output signal is available between wires U (9, pink) and G0 (2, black) to monitor the position of the damper motor.

The master actuator controls the slave actuator through wires MS1 (white with black stripe) and MS2 (blue).

In the event of a power failure or when the operating voltage is shut off, the actuators return to the "0" position.

In the event of a blockage in the damper, the actuators are overload protected over the full range to prevent damage to the actuator.

Life expectancy

An improperly-tuned loop will cause excessive repositioning that will shorten the life of the actuators.

Operation,
continued

Control signal
adjustment
GCA164.1P/MAS

The offset (start point) and span of the control signal can be adjusted. The offset, U_o , can be adjusted between 0 to 5 Vdc. The span, ΔU , can be adjusted between 2 to 30 Vdc.

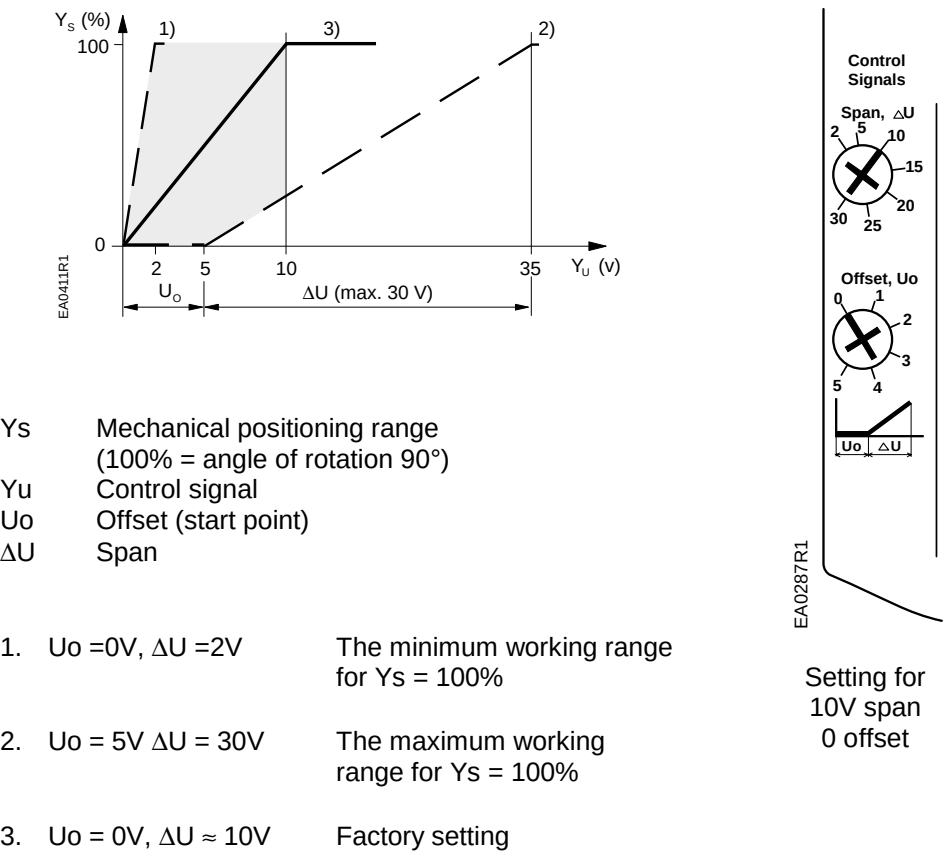


Figure 7. The Minimum and Maximum Control Signal Adjustment.

Operation, continued

Control signal adjustment, cont'd.

Example:

Open the actuators from 0% to 50% (45°) using a control signal of
 $U_{min} = 2V$ to $U_{max} = 10V$.

Calculating the value of ΔU :

$$\Delta U = \frac{100 \% (U_{max} - U_{min})}{\text{Working angle of rotation in } \%} = \frac{100 \times (10 - 2)}{50} = 16 \text{ V}$$

Settings

$U_0 = 2$; $\Delta U = 16V$

U_{min} = minimum control signal
 U_{max} = maximum control signal

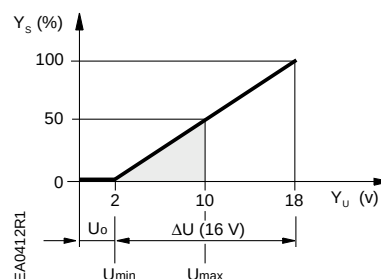
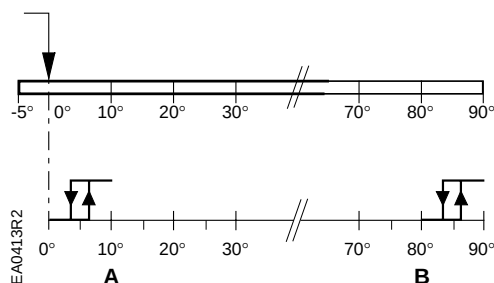


Figure 8. Example.

Dual auxiliary switch GCA 164.1P/MAS



Actuator rotary range with the shaft adapter
mounted at position 0.

Setting range for Switches A and B
Setting interval: 5°
Switching hysteresis: 2°

To change the settings of A and B:

- Make sure the actuator is in the "0" position. The scale is valid only in the "0" position.
- Use a flat-blade screwdriver to turn the switch adjustment dials to the desired setting at which a signal is to be given.

Factory setting

Switch A	5°
Switch B	85°

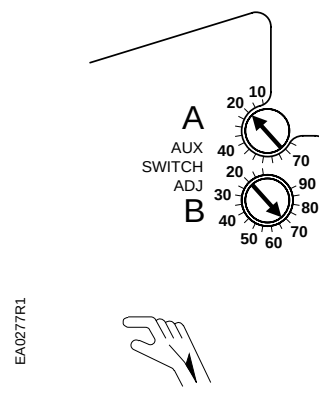


Figure 9. Dual Auxiliary Switch Dials.

Sizing

The type of actuator required depends on several factors.

1. Obtain damper torque ratings (ft-lb/ft² or Nm/m²) from the damper manufacturer.
2. Determine the area of the damper.
3. Calculate the total torque required to move the damper:

$$\text{Total Torque} = \frac{\text{Torque Rating} \times \text{Damper Area}}{\text{SF}^1}$$

¹ Safety Factor: When calculating the total torque required, a safety factor should be included for unaccountable variables such as slight misalignments, aging of the damper, etc. A suggested safety factor is 0.80.

For required torque greater than 142 lb-in (16 Nm) and less than 284 lb-in (32 Nm), use the master/slave actuators or any combination of GCA161.xx and GCA166.XX actuators with tandem mounting bracket ASK73.2U.

Mounting and Installation

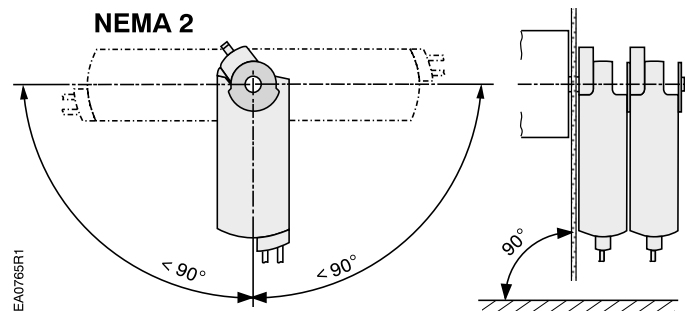


Figure 10. Acceptable NEMA 2 Positions.

The actuators can be mounted for clockwise or counterclockwise rotation of the damper shaft by selecting the side of each actuator with the hand/arrow that matches the direction of the rotation.



The minimum damper drive shaft length is 4 inches (100 mm).

See *Specifications* for the minimum and maximum damper shaft dimensions.

The master/slave actuator pair is intended for use on the same mechanical load.

The actuators are shipped from the factory with a 5° preload of the spring to ensure tight close off of the damper.

The standard mounting (anti-rotation) bracket is included with the master actuator.

Mounting and Installation, continued

Order the tandem mounting bracket ASK73.1 separately.

Detailed mounting instructions are included with each actuator.

Manual override

Setting Manual Override. See Figure 11.

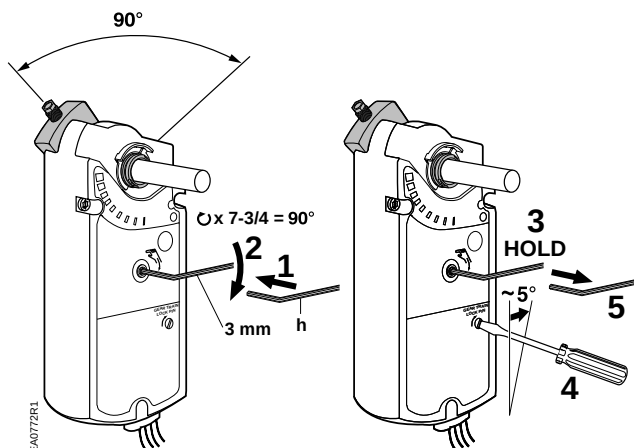


Figure 11. Manual Override.

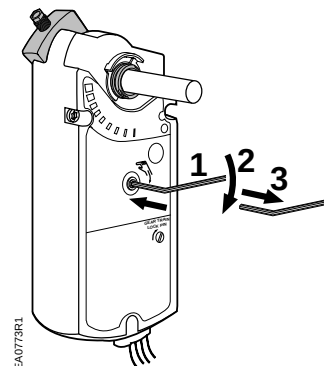


Figure 12. Resetting to "0" Position.

NOTE: Remove the master actuator and perform the following steps on the slave actuator.

1. Insert the 3 mm hex key in the override opening.
2. Turn the key in the direction of the arrow on the hand symbol until you reach the desired degree of opening.
3. Hold the key in place.
4. Insert a small flat-blade screwdriver into the gear train lock pin. Turn the screwdriver in the same direction as the arrow until you hear a click or meet slight resistance.



CAUTION:

When you lock the gear train lock pin, be careful to turn only about 5 degrees until you hear a click or meet slight resistance. Turning too far will strip the lock pin.

5. Remove the key or keep it in place.

Releasing manual override. See Figure 12.

1. Insert the 3 mm hex key in the override opening.
2. Turn the key in the direction of the arrow only a short distance.
3. Remove the key.

The actuator will return to the "0" position.

Mounting and Installation, continued

Manual override

Remounting and installing after manual override

1. Remove the slave actuator from the damper shaft.

NOTE: To remove the slave, it may be necessary to remove one screw of each mounting bracket and swing the brackets out of the way.

2. Remove the shaft adapters from both actuators.
3. Perform steps of *Releasing manual override* on **each** actuator to ensure they have no preload.
4. To set a preload, do the following on **each** actuator.
 - a. Place the shaft adapter as close to the end stop as possible.
 - b. With the hex key inserted in the manual override opening, turn the key about 180 degrees or until the alignment mark is visible.
 - c. Hold the key and lock the gear train lock pin.
5. Follow the instructions for *Mounting the Slave Actuator* and *Mounting the Master Actuator* found in the installation instructions.

Mechanical range adjustment

The angular rotation is adjustable between 0 and 90° at 5 degree intervals.

NOTE: To use this feature, you must set up each actuator individually to the same position.

To limit the range of shaft movement:

1. Remove the locking clip and self-adjusting shaft adapter. (*Figure 12, steps 1 and 2*)
2. Rotate the damper blade shaft to its failed position.
3. Rotate the shaft coupling to the desired position. (*Figure 12, step 3*)
4. Insert the shaft adapter into the actuator (*Figure 12, step 4*)
5. Fasten it with the locking clip. (*Figure 12, step 5*)

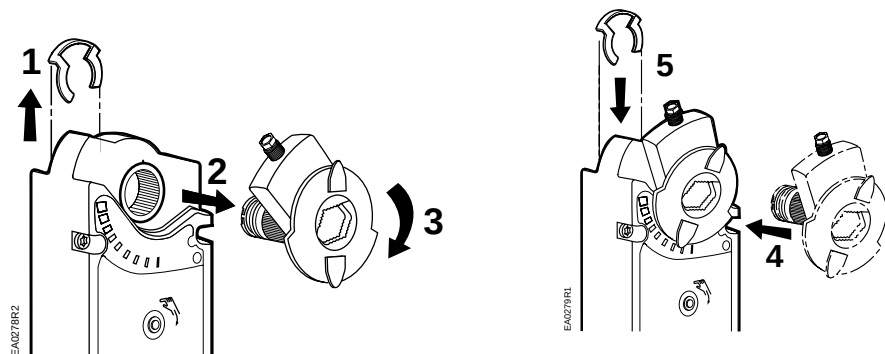


Figure 13. Mechanical Range Adjustment.

Wiring

All wiring must conform to NEC and local codes and regulations.

Use earth ground isolating step-down Class 2 transformers. Do not use auto transformers.

The maximum rating for a Class 2 step-down transformer is 100 VA. An 80% safety factor is recommended for the sum of all actuator VAs. Operating more actuators requires additional transformers or separate 100 VA power trunks.



CAUTION:

The actuator housing of both the master and the slave must be grounded for proper operation.

Master/Slave Application

Use the same 24 Vac power supply for both the master and the slave.

- Connect the 2 (black) wire of the master and the 2 (black) wire of the slave together and then connect them to the power supply.
- Connect the 1 (red) wire of the master and the 1 (red) wire of the slave together and then connect them to the power supply.
- Connect the MS1 wire from the master to the MS1 wire of the slave, and connect the MS2 wire from the master to the MS2 wire of the slave.



CAUTION:

- Extending the wire lengths between the master and slave is not recommended.
- Never connect MS1 to MS2 or MS2 to MS1.

Master Stand-alone Application



CAUTION:

If the master actuator is ever used in a stand-alone application, the MS1 and MS2 wires must be separately covered with the two wire nuts provided.

Wire Designations

The MS1 and MS2 wires have a plastic shrink tube for their identification. The other wires have the symbol printed on them. See *Table 2*.

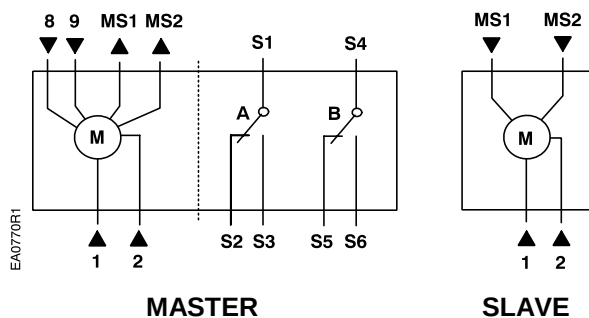


Table 2.

Symbol	Function	Designations	Color
1	Supply (SP)	G	Red
2	Neutral (SN)	G0	Black
8	0 to 10 Vdc input signal	Y	Gray
9	Output for 0 to 10 Vdc position indication	U	Pink
MS1	Master output/slave input signal 1	MS1	White with black stripe
MS2	Master output/slave input signal 2	MS2	Blue
S1	Switch A Common	Q11	Gray/red
S2	Switch A N.C.	Q12	Gray/blue
S3	Switch A N.O.	Q14	Gray/pink
S4	Switch B Common	Q21	Black/red
S5	Switch B N.C.	Q22	Black/blue
S6	Switch B N.O.	Q24	Black/pink

Troubleshooting

- Check that the wires are connected correctly.
- Check that offset (start point) and span are set correctly, if used.
- Connect wires 1 (red) and 2 (black) to a Digital Multimeter with the dial set at Vac to verify that the operating voltage is within range.
- If the actuators are not working, check the damper for blockage. If blocked, remove the obstacle and cycle the actuators' power off and on. The actuators should resume normal operating mode.

Service



Warning:

Do not open the actuators.

If the actuators are inoperative, replace the units.

Dimensions

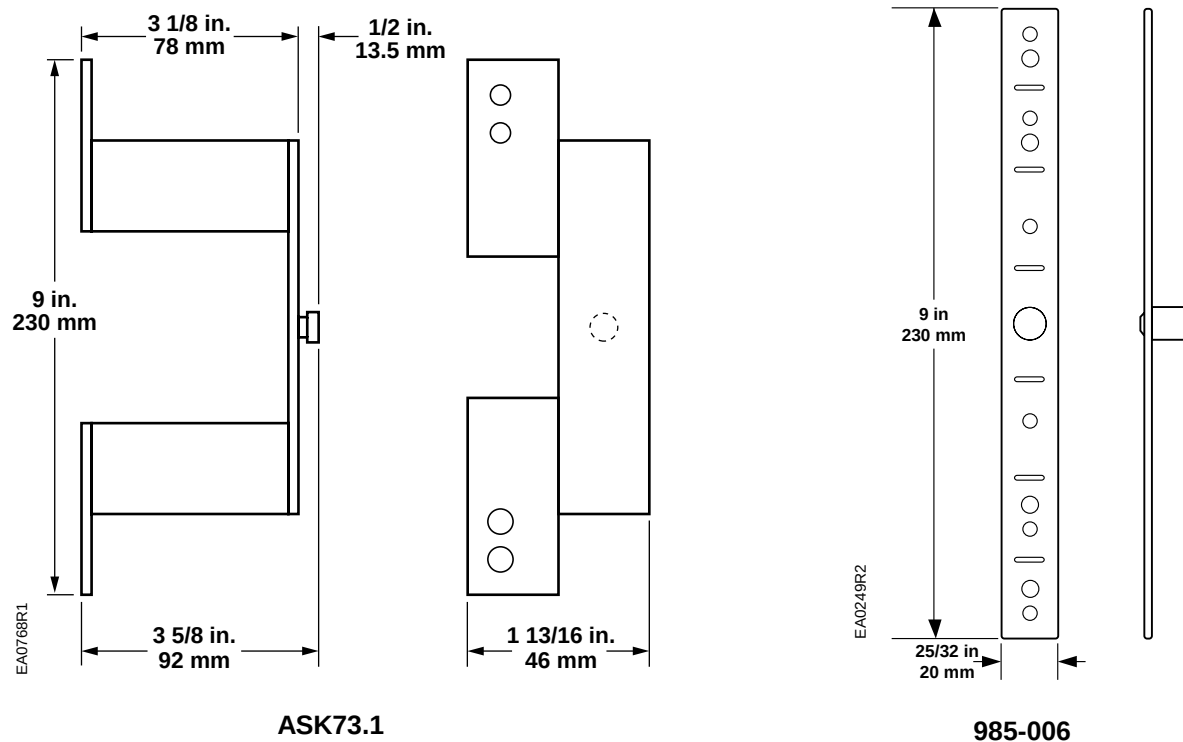


Figure 14. Dimensions of the Mounting Brackets used with the Master/Slave.

Dimensions

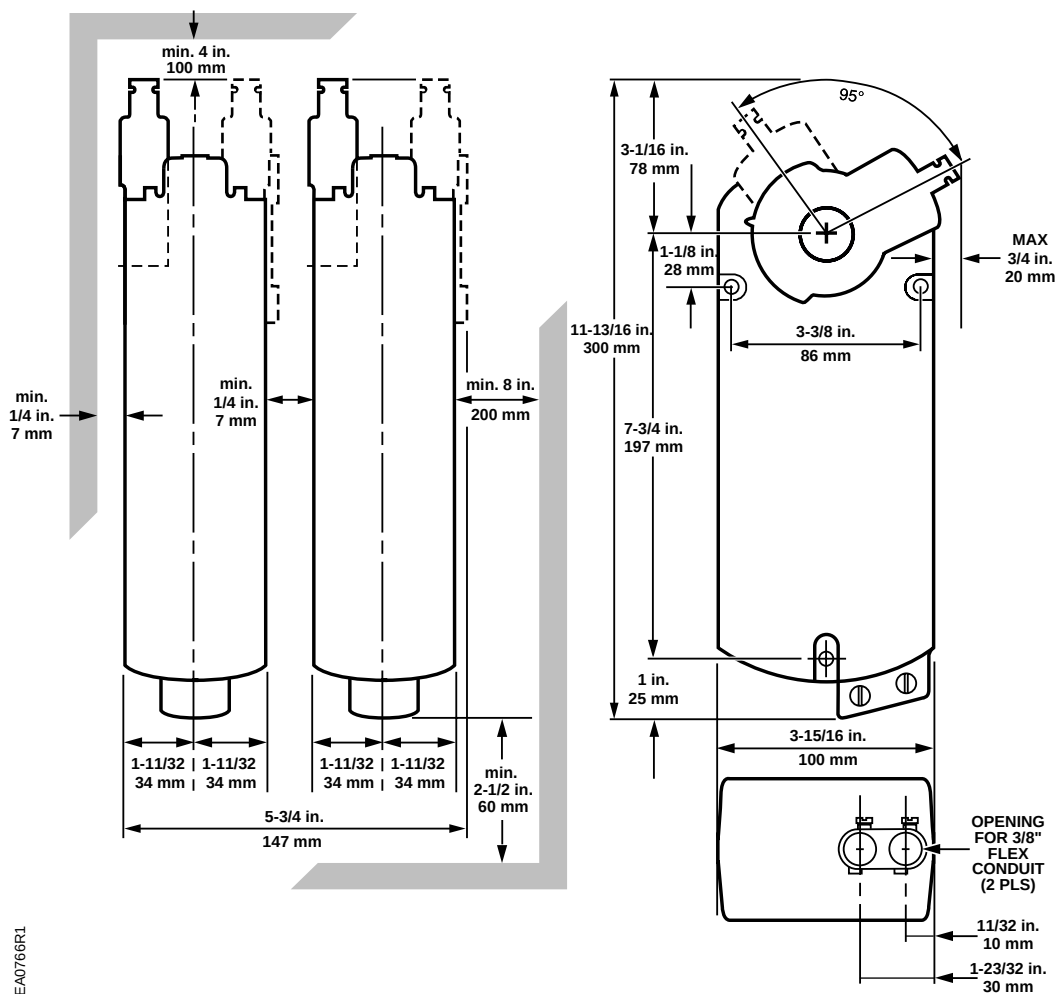


Figure 15. Dimensions and Service Envelope of the GCA Series Master/Slave OpenAir Actuators.

Information in this publication is based on current specifications. The company reserves the right to make changes in specifications and models as design improvements are introduced. OpenAir is the trademark of Siemens Building Technologies, Inc.
© 2000 Siemens Building Technologies, Inc.



ALERTON®

VA Renovate Space for Logistics (B-1)

Table of Contents

Page 1	Cover Sheet
Page 2	System Architecture
Page 3	1-AHU-LOG Control Detail
Page 4	1-AHU-LOG Control Wiring Diagram
Page 5	VAV Cooling Only Control Wiring Diagram (VAV-LOG-6)
Page 6	VAV w/ HW Reheat Control Wiring Diagram
Page 7	Ductless Split System Control Detail
Page 8	Pressure Monitor Control Diagram
Page 9	Valve Schedule
Page 10	Proposed Communication Trunk
Page 11	Control Wiring Schedule and General Notes

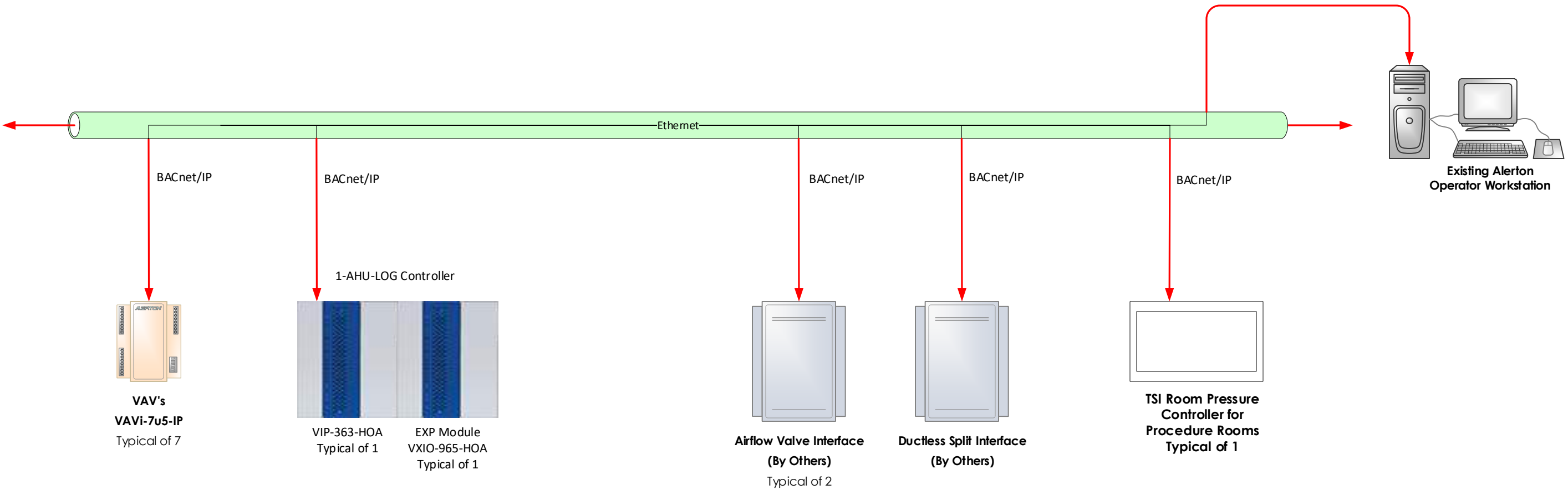
Project number: 24-13676
Application Engineer: VWI
Drawn by: VWI
Checked by: AL

Project name: VA Renovate Space for Logistics (B-1)
Architect: Harrell Design Group
Engineers: Harrell Design Group
Mechanical: Mountain Mechanical
Phase: Asbuilt
Creation Date: 1/1/2024
Revision Date: 6/10/2026

Northwest Controls
3241 West Huntsville Rd.
Springdale, AR 72762
Ph: (479) 872-9000 Fax: (479) 756-9866

System Architecture

Typical of 1



Project number: 24-13676
Application Engineer: VWI
Drawn by: VWI
Checked by: AL

Project name: VA Renovate Space for Logistics (B-1)
Architect: Harrell Design Group
Engineers: Harrell Design Group
Mechanical: Mountain Mechanical
Phase: Asbuilt
Creation Date: 1/1/2024
Revision Date: 6/10/2026

Northwest Controls
3241 West Huntsville Rd.
Springdale, AR 72762
Ph: (479) 872-9000 Fax: (479) 756-9866

1-AHU-LOG Control Detail

Typical of 1

Sequence of Operation

GENERAL BUILDING AUTOMATION SYSTEM NOTES

1. ALL NEW BUILDING AUTOMATION CONTROLS SHALL BE BY ALERTON.

2. IN ADDITION TO THE BUILDING AUTOMATION POINTS SHOWN ON THIS SHEET, ALERTON SHALL PICK UP ANY ADDITIONAL INTERLOCK POINTS PROVIDED TO THE EXSTING AHU CONTROLLER.

3. ALERTON SHALL PROVIDE GRAPHICS FOR ALL AHU SYSTEMS INDICATING ALL POINT VALUES AND SETPOINTS.

4. ALL POINTS SHALL BE COMMUNICATED BACK TO THE ALERTON CENTRAL CAMPUS OWS.

SEQUENCES OF OPERATIONS: 1-AHU-LOG

1. GENERAL

1.1 UNIT IS NORMALLY STARTED AND STOPPED REMOTELY AT THE CENTRAL BAS OWS. H-O-A SWITCH SHALL BE KEPT IN THE 'AUTO' POSITION AND" AUTO 'OFF' POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN THE UNIT IS 'OFF' D-1 SHALL BE FULLY CLOSED. WHEN THE UNIT IS 'ON' D-1 SHALL BE FULLY OPEN.

2. TEMPERATURE CONTROL

OCCUPIED MODE:

2.1 SPACE TEMPERATURE, SENSED BY SPACE AIR TEMPERATURE SENSOR, SHALL BE MAINTAINED AT SETPOINT VIA DIGITAL CONTROL PANEL BY MODULATING V-1A AND V-1B OR V3 IN SEQUENCE.

2.2 DURING MECHANICAL COOLING OPERATION, THE COOLING COIL CHILLED WATER VALVE SHALL MODULATE TO MAINTAIN THE DISCHARGE TEMPERATURE SETPOINT (SATSP). NOMINALLY 55° F DB (ADJ.), AS MEASURED BY THE SUPPLY AIR TEMPERATURE (DAT) SENSOR. THE COOLING SATSP SHALL BE RESET UPWARD TO 60°F DB OR LESS (ADJ.) BASED ON ZONE COOLING DEMAND FEEDBACK TO MAINTAIN THE ZONE WITH THE GREATEST COOLING REQUIREMENT. IF ZONE COOLING DEMAND INCREASES, THE SATSP SHALL BE RESET DOWNWARD TO 55° F DB OR GREATER (ADJ.).

2.3 DURING HEATING OPERATION, THE HEATING COIL STEAM VALVES SHALL MODULATE TO MAINTAIN A SPACE TEMPERATURE SETPOINT. (DAT), WHICH CAN BE RESET FROM THE OWS.

UNOCCUPIED MODE

2.4 WHEN DISABLED BY THE BUILDING AUTOMATION SYSTEM, THE SUPPLY FAN VFD SHALL RAMP THE SUPPLY FAN SPEED DOWN TO STOP. THE COOLING COIL CHILLED WATER VALVE, HEATING COIL STEAM VALVE, HUMIDIFIER VALVE AND OUTDOOR AIR DAMPER SHALL EACH CLOSE.

3. STEAM HUMIDIFIER CONTROL

OCCUPIED MODE

3.1 EXHAUST AIR HUMIDITY SHALL BE MONITORED. ON A CALL FOR HUMIDIFICATION, HUMIDIFIER VALVE V-4 SHALL MODULATE TO MAINTAIN THE EXHAUST AIR HUMIDITY SET POINT TO 30% (ADJUSTABLE). PRIOR TO ACTIVATION OF V-4, THE ON OFF CONTROL VALVE V-3 SHALL BE ENABLED THROUGH ECC AND JACKET TEMPERATURE SENSED BY THE TSH SHALL BE WARM ENOUGH TO PREVENT CONDENSATION. THE HIGH LIMIT HUMIDITY SENSOR, LOCATED IN THE SUPPLY AIR DUCT 3000MM (10 FEET) AWAY FROM THE HUMIDIFIER SHALL DISABLE THE HUMIDIFIER AND GIVE AN ALARM SIGNAL TO THE ECC, IF THE SUPPLY AIR HUMIDITY EXCEEDS 90% RH (ADJUSTABLE). THE DASP SHALL PROVE AIRFLOW BEFORE HUMIDITY CONTROLS ARE ACTIVATED.

UNOCCUPIED MODE

3.2 SEE TEMPERATURE CONTROL 2.4 FOR UNOCCUPIED MODE.

4. AIR FLOW CONTROL

4.1 THE SUPPLY AIR FLOW SHALL BE CONTROLLED BY THE DIGITAL CONTROL PANEL MODULATING THE SUPPLY FAN VARIABLE SPEED MOTOR CONTROLLER TO MAINTAIN DUCT STATIC PRESSURE SETPOINT.

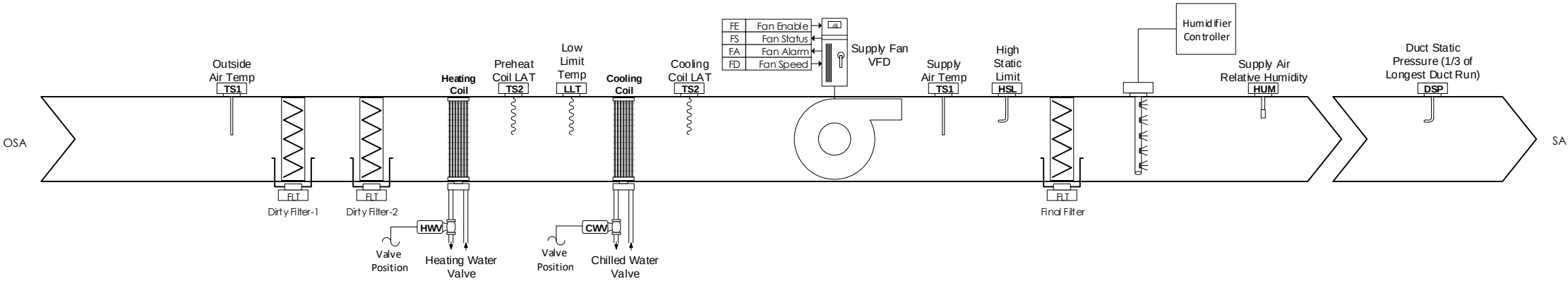
5. FREEZE PROTECTION

5.1 IF THE AIR TEMPERATURE AS SENSED BY TT-3 FALLS BELOW 45°F, AN ALARM SIGNAL SHALL INDICATE AT THE DCP AND ECC. IF THIS TEMPERATURE FALLS BELOW 40° F, AS SENSED BY F2-1, THE SUPPLY FAN SHALL SHUT DOWN THE OUTSIDE AIR DAMPER SHALL CLOSE, THE STEAM VALVE (V-1A) SHALL OPEN AND A CRITICAL ALARM SHALL INDICATE AT THE DIGITAL CONTROL PANEL AND BAS OWS.

6. AUTOMATIC SHUTDOWN RESTART

6.1 FAN SHALL SHUT DOWN FROM A SIGNAL FROM THE BUILDING FIRE ALARM SYSTEM.

NWC SHALL INSTALL ANY
FACTORY FURNISHED LOOSE
SHIPPED LOW VOLTAGE
CONTROL DEVICES.



Project number: 24-13676
Application Engineer: VWI
Drawn by: VWI
Checked by: AL

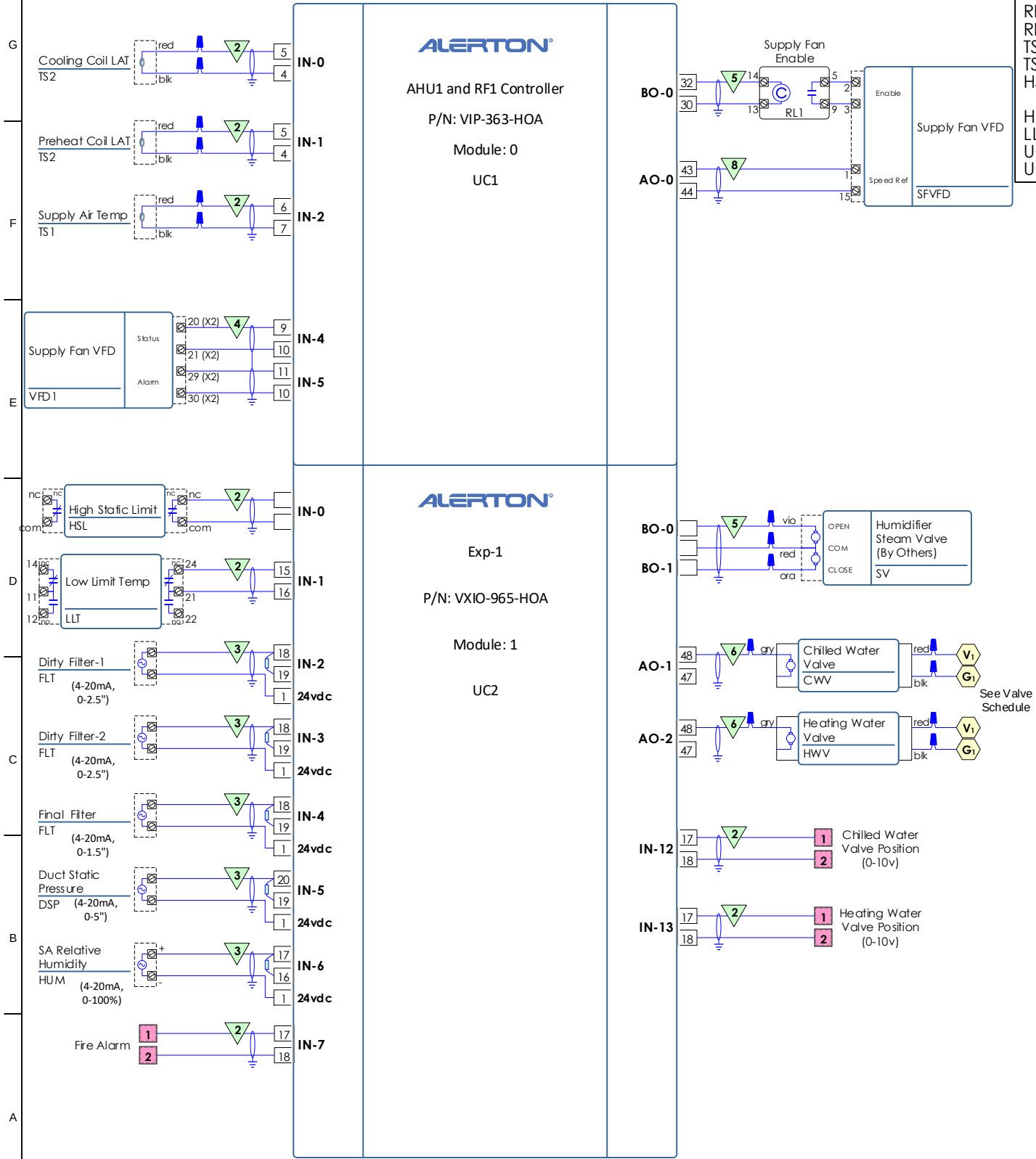
Project name: VA Renovate Space for Logistics (B-1)
Phase: Asbuilt
Creation Date: 1/1/2024
Revision Date: 6/10/2026

Architect: Harrell Design Group
Engineers: Harrell Design Group
Mechanical: Mountain Mechanical

Northwest Controls
3241 West Huntsville Rd.
Springdale, AR 72762
Ph: (479) 872-9000 Fax: (479) 756-9866

1-AHU-LOG Control Wiring Diagram

Typical of 1



TAG	QTY.	PART NO.	MANUFACTURER	DESCRIPTION
DSP, FLT	4	MR2-S-A	Setra	Dry media pressure transducer with LCD display, universal mount, 0-10"wc range, 2-wire 4-20ma or 3-wire 0-5V/0-10VDC
RL1	1	V-VMD2B-F24A	Alerton	Veris VMD2B-F24A; 15A DPDT socket/DIN relay; Full,24VAC
RL1	1	V-VBD2B-C	Alerton	Relay Base DPDT
TS1	1	TS-2006-FB-10-AA	Alerton	10K duct sensor, 6" probe w/ flange and 6' plenum cable
TS2	2	TS-5024-XD-10-AA	Alerton	10K duct average sensor, w/ 24' flexible wire
HSL	1	AFS-460-137	Kele	AFS-460-137 Manual reset differential pressure switch, 0.4" to 12" W.C. (99.3 to 2989 Pa), 24 VAC, SPDT
HUM	1	HD20K	Kele	Duct humidity transmitter 2%
LLT	1	TF142-SODP20	Kele	Low temp limit, Manual reset, DPDT, 34 to 70 deg F
UC1	1	VIP-363-HOA	Alerton	Field controller, 3 universal inputs, 6 binary outputs, 3 analog inputs/outputs
UC2	1	VXIO-965-HOA	Alerton	Exp module, 9 universal inputs, 6 binary outputs, 5 analog inputs/outputs

Project number: 24-13676
Application Engineer: VWI
Drawn by: VWI
Checked by: AL

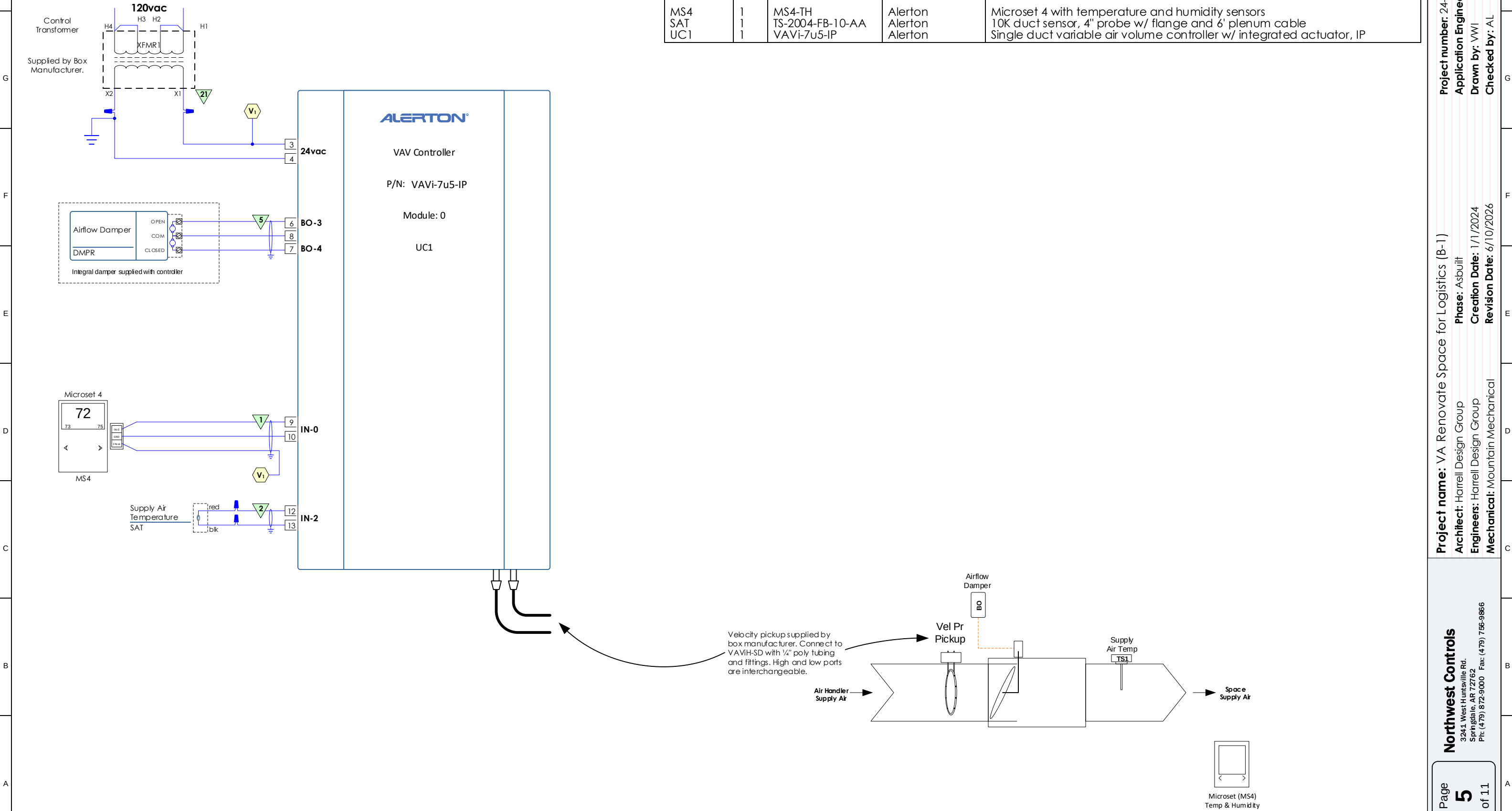
Project name: VA Renovate Space for Logistics (B-1)
Architect: Harrell Design Group
Engineers: Harrell Design Group
Mechanical: Mountain Mechanical
Phase: Asbuilt
Creation Date: 1/1/2024
Revision Date: 6/10/2026

Northwest Controls
3241 West Huntsville Rd.
Springdale, AR 72762
Ph: (479) 872-9000 Fax: (479) 756-9866

VAV Cooling Only Control Wiring Diagram (VAV-LOG-6)

Typical of 1

TAG	QTY.	PART NO.	MANUFACTURER	DESCRIPTION
MS4	1	MS4-TH	Alerton	Microset 4 with temperature and humidity sensors
SAT	1	TS-2004-FB-10-AA	Alerton	10K duct sensor, 4" probe w/ flange and 6' plenum cable
UC1	1	VAVi-7u5-IP	Alerton	Single duct variable air volume controller w/ integrated actuator, IP



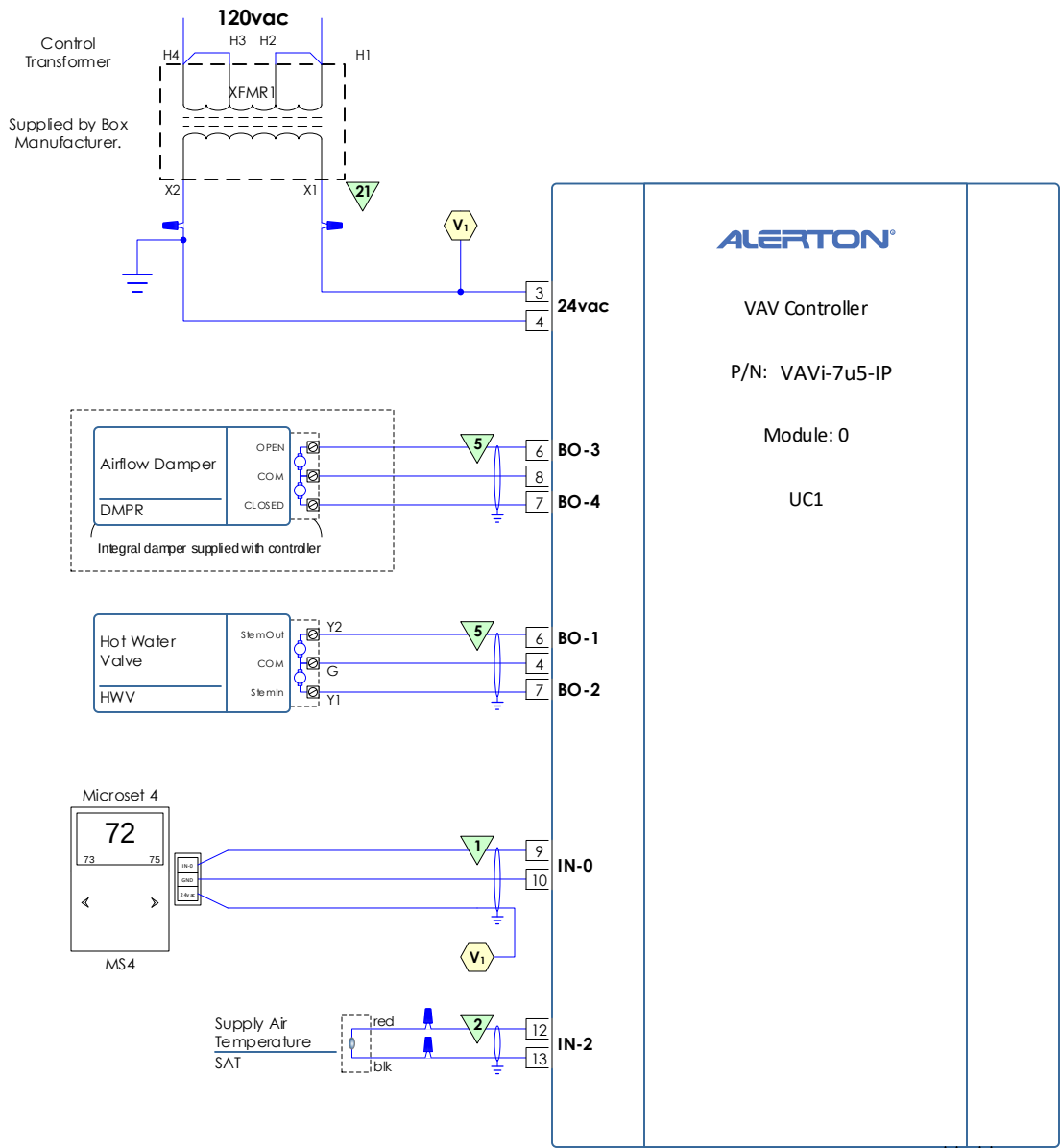
Project number: 24-13676
Application Engineer: VWI
Drawn by: VWI
Checked by: AL

Project name: VA Renovate Space for Logistics (B-1)
Architect: Harrell Design Group
Engineers: Harrell Design Group
Mechanical: Mountain Mechanical
Phase: Asbuilt
Creation Date: 1/1/2024
Revision Date: 6/10/2026

Northwest Controls
3241 West Huntsville Rd.
Springdale, AR 72762
Ph: (479) 872-9000 Fax: (479) 756-9866

VAV w/ HW Reheat Control Wiring Diagram

Typical of 6



TAG	QTY.	PART NO.	MANUFACTURER	DESCRIPTION
MS4	6	MS4-TH	Alerton	Microset 4 with temperature and humidity sensors
TS1	6	TS-2004-FB-10-AA	Alerton	10K duct sensor, 4" probe w/ flange and 6' plenum cable
UC1	6	VAVi-7u5-IP	Alerton	Single duct variable air volume controller w/ integrated actuator, IP

Sequence of Operation

CONSTANT VOLUME TERMINALS:

A. SET POINTS SHALL BE SET AS FOLLOWS:

COOLING 66° F (ADJ)
HEATING 72° F (ADJ)
DEADBAND OF 31° F BETWEEN HEATING AND COOLING SET POINTS WILL BE MAINTAINED.

B. UPON DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT 0.5° F. THE ADJUSTABLE TOLERANCE OF 0.5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING.

C. THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.

VARIABLE VOLUME TERMINALS:

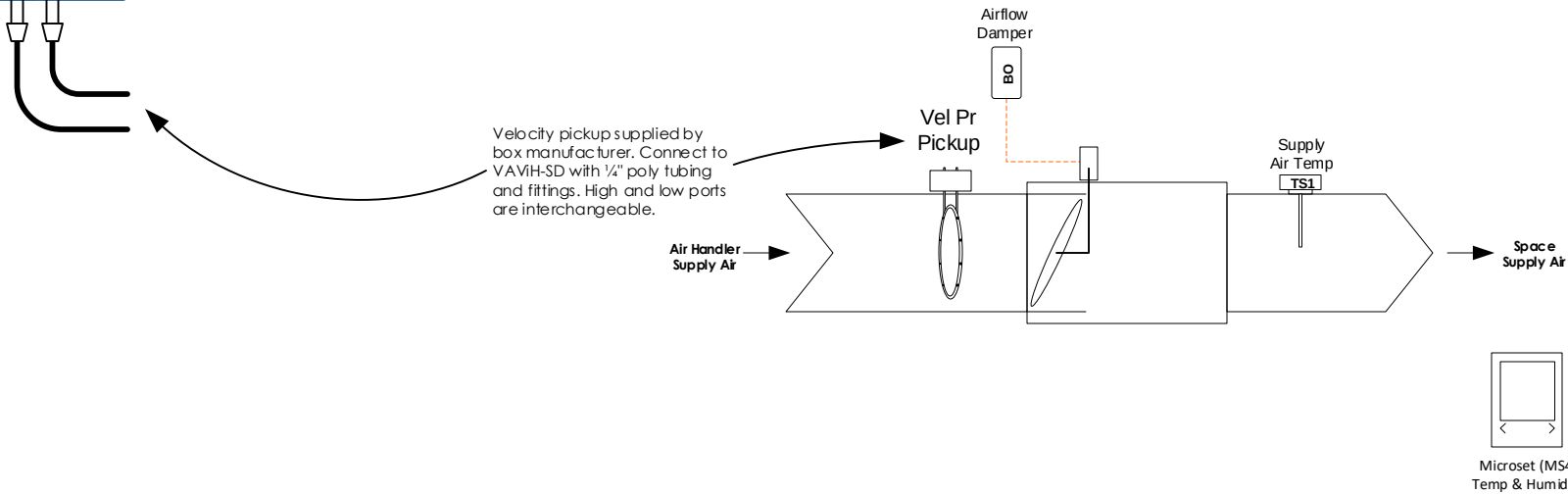
A. SET POINTS SHALL BE SET AS FOLLOWS:

COOLING 74° F (ADJ) HEATING 71° F (ADJ)
DEADBAND OF 3° F BETWEEN HEATING AND COOLING SET POINTS WILL BE MAINTAINED.

B. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION.

C. UPON FURTHER DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT 0.5° F. THE ADJUSTABLE TOLERANCE OF 0.5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING.

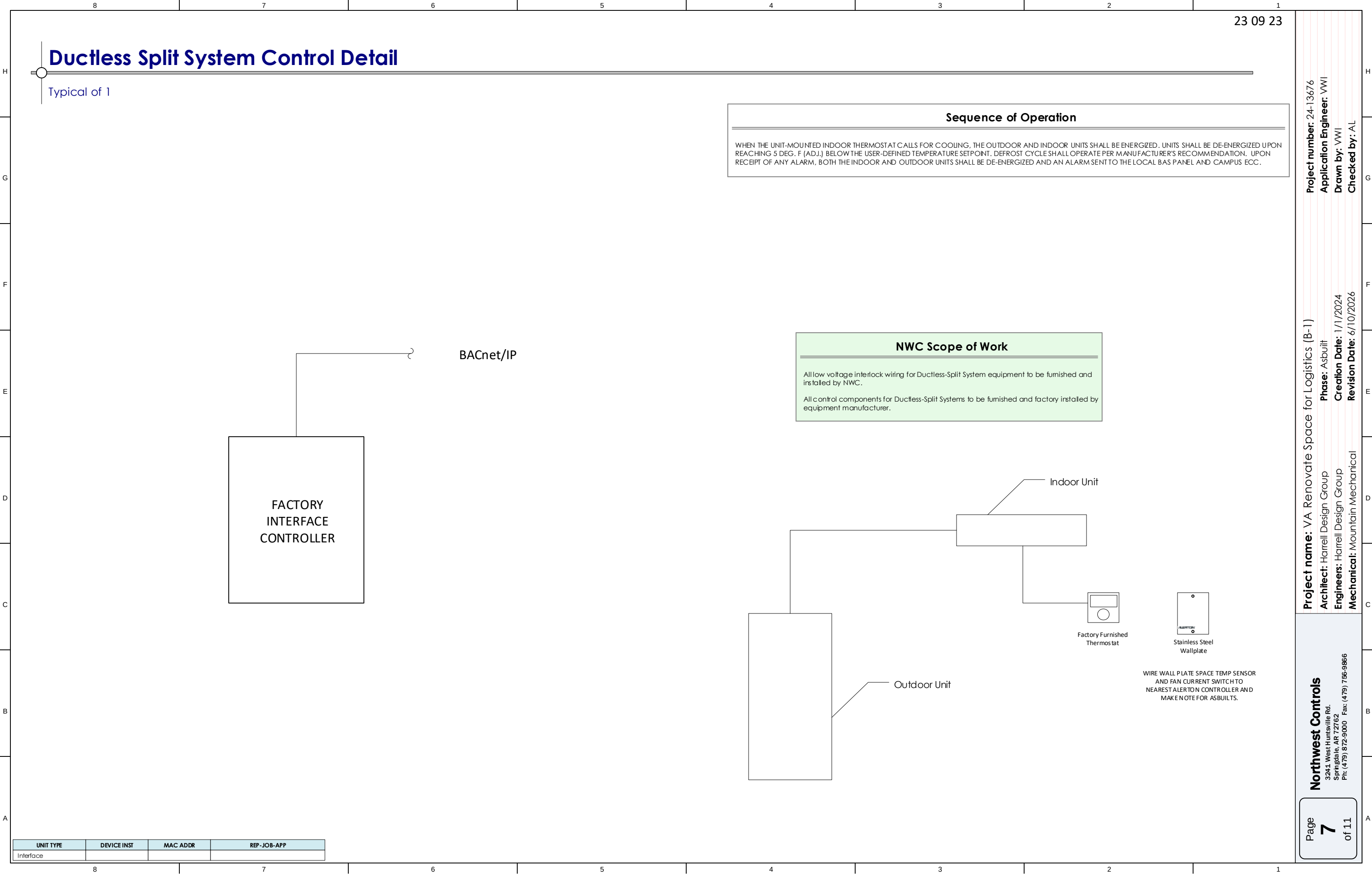
D. THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.



Project number: 24-13676
Application Engineer: VWI
Drawn by: VWI
Checked by: AL

Project name: VA Renovate Space for Logistics (B-1)
Architect: Harrell Design Group
Engineers: Harrell Design Group
Mechanical: Mountain Mechanical
Phase: Asbuilt
Creation Date: 1/1/2024
Revision Date: 6/10/2026

Northwest Controls
3241 West Huntsville Rd.
Springdale, AR 72762
Ph: (479) 872-9000 Fax: (479) 756-9866



Typical of 1

EA CONTROL VALVE

ALL REQUIRED LOW
VOLTAGE FIELD WIRING
TO BE FURNISHED /
INSTALLED BY NWC.

NWC SHALL INSTALL ANY
FACTORY FURNISHED LOOSE
SHIPPED LOW VOLTAGE
CONTROL DEVICES.

Project name: VA Renovation		
Architect: Harrell Design Group		
Engineers: Harrell Design Group		
Mechanical: Mountain Mechanical		

Northwest Controls
3241 West Huntsville Rd.
Springdale, AR 72762
Ph: (479) 872-9000 Fax: (479) 756-9866

Valve Schedule

Typical of 1

								PRESSURE DROP AT		
VALVE TAG	QUANT	PRODUCT NUMBER	SIZE	CONFIG.	BODY STYLE	FLOW (GPM)	DESIGN PRESS. DROP (PSI)	CALCULATED Cv	CHOSEN Cv	DESIGN FLOW
TU-10-007	1	259-02030	1/2"	2-W MOD.	GLOBE	0.5	4	0.25	0.4	1.56
VAV-LOG-1	1	259-02034	1/2"	2-W MOD.	GLOBE	1.6	4	0.80	1	2.56
VAV-LOG-2	1	259-02030	1/2"	2-W MOD.	GLOBE	0.5	4	0.25	0.4	1.56
VAV-LOG-3	1	259-02036	1/2"	2-W MOD.	GLOBE	2.4	4	1.20	1.6	2.25
VAV-LOG-4	1	259-02030	1/2"	2-W MOD.	GLOBE	0.5	4	0.25	0.4	1.56
VAV-LOG-5	1	259-02030	1/2"	2-W MOD.	GLOBE	0.6	4	0.30	0.4	2.25
VAV-LOG-6	1	Cooling Only								
AHU-LOG CWV	1	298-03186	1-1/4"	2-W MOD.	GLOBE	26	4	13.00	16	2.64
AHU-LOG HWV	1	298-03166	3/4"	2-W MOD.	GLOBE	10.8	4	5.40	6.3	2.94

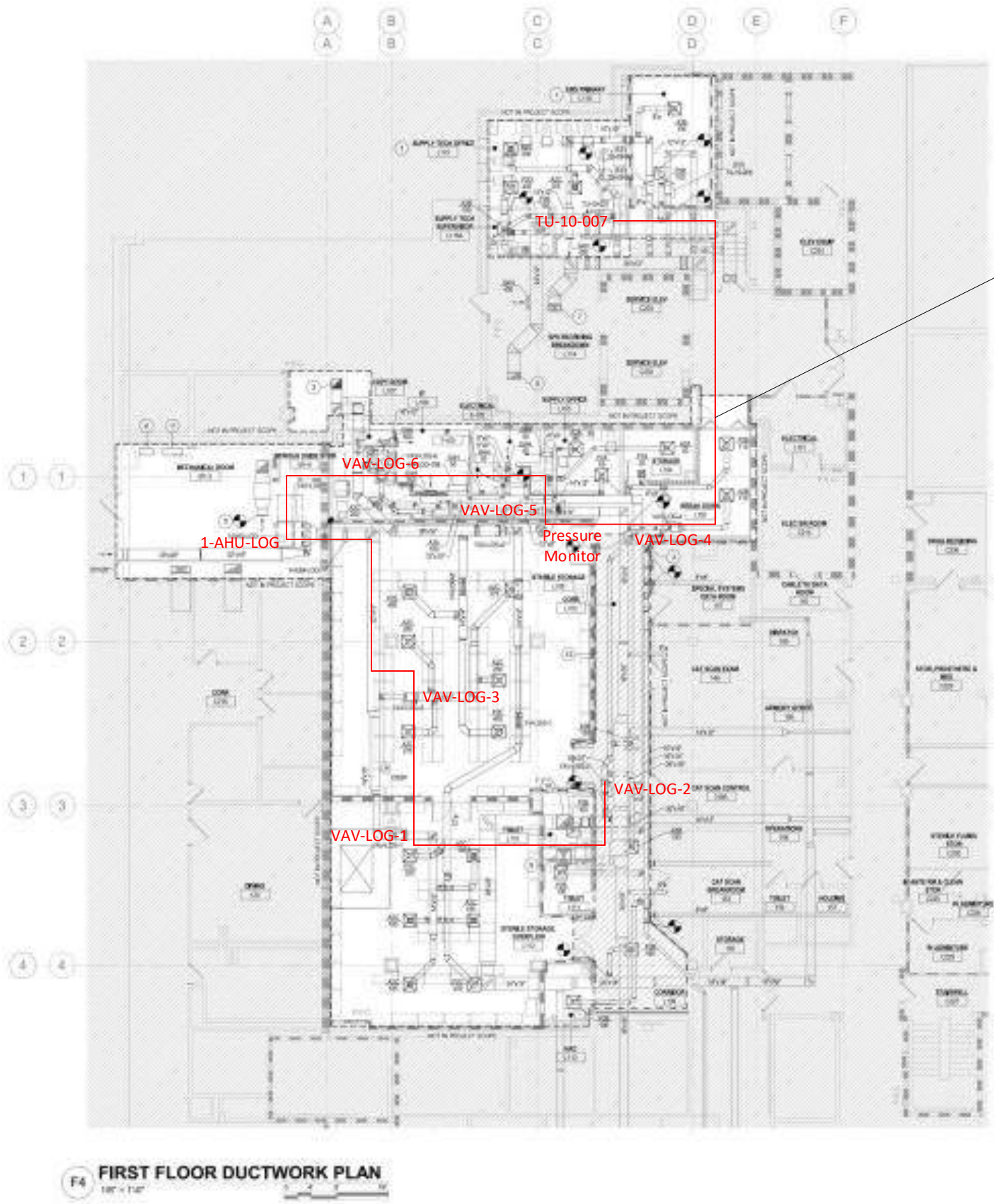
Project number: 24-13676
Application Engineer: VWI
Drawn by: VWI
Checked by: AL

Project name: VA Renovate Space for Logistics (B-1)
Architect: Harrell Design Group
Engineers: Harrell Design Group
Mechanical: Mountain Mechanical
Phase: Asbuilt
Creation Date: 1/1/2024
Revision Date: 6/10/2026

Northwest Controls
3241 West Huntsville Rd.
Springdale, AR 72762
Ph: (479) 872-9000 Fax: (479) 756-9866

Propossed Communication Trunk

Typical of 1



PROPOSED BAS
COMMUNICATION
TRUNK

Project number: 24-13676
Application Engineer: VWI
Drawn by: VWI
Checked by: AL

Project name: VA Renovate Space for Logistics (B-1)
Architect: Harrell Design Group
Engineers: Harrell Design Group
Mechanical: Mountain Mechanical
Phase: Asbuilt
Creation Date: 1/1/2024
Revision Date: 6/10/2026

Northwest Controls
3241 West Huntsville Rd.
Springdale, AR 72762
Ph: (479) 872-9000 Fax: (479) 756-9866

8

7

6

5

4

3

2

1

23 09 23

GENERAL WIRING NOTES

All controller inputs, outputs and communications trunks must be run separate from any circuits containing voltages greater than30vac.
Do not run signal or communication wires near high voltage sources such as ballasts, transformers or transmitters.
Wires in conduit must not be nicked, stretched or compromised in any way. Use pulling force of less than 50 lbs.
Wires attached to building structures must be suspended in a way that does cause undue stress on the wire. Do not use any securing method that compresses the wire beyond the outside jacket.

All inputs and analog outputs require shielded wire. Use single-point grounding point in each cabinet or controller location Do not ground any shield to the GRN or COM terminals of modules.

Additional general installation information can be found in the following Alerton manuals:

LTBT-TM-SYSDSGN	System design Manual	LTBT-TM-VLX	VLX Installation Manual
LTBT-TM-GEN4VLC	VLC installation manual	LTBT-TM-NETWRK	Network Design and Installation Manual

CONTROL WIRING SCHEDULE

SYMBOL	DESCRIPTION	PART NUMBER	INSTALLATION NOTES
1	BACtalk thermostats	Connect Air P/N W233C-2560 White jacket, 3 #18 conductor w/shield, plenum rated	Max distance for a BACtalk Microset or Microtouch is 250 feet. Maximum distance for Microset II is 1000ft.
2	Thermistor/resistor inputs	Connect Air P/N W181P-2540 Mint green jacket, 2 #18 conductors w/shield, plenum rated.	Maximum distance is 1000 feet.
3	2 wire inputs 4-20ma, 0-5volts, 0-10volts	Connect Air P/N W181P-2540 Mint green jacket, 2 #18 conductors w/shield, plenum rated.	Most 4-20ma inputs require input resistors. Consult module page for verification. Do not power controller or attach sensor until verified! Input 0 of the VLC series of controllers require a 470 ohm resister in series with any dry contact.
4	3 or 4 wire inputs 4-20ma, 0-5 volts or 0-10 volts	3-wire use Connect Air P/N W233C-2560 White jacket, 3 #18 conductor w/shield, plenum rated 4-wire use Connect Air P/N W181P-2540 Mint green jacket, 2 #18 conductors w/shield, plenum rated. Run 2 cables, one for signal and 1 for power.	Most 4-20ma inputs require input resistors. Consult module page for verification. Do not power controller or attach sensor until verified.
5	Binary outputs	Use #18 conductors within the mounting cabinet or when the distance to the output load is less than 50 feet (W181P-2540 wire is acceptable). For longer distances consult engineering department.	Return BO loads to transformer ground - not to the controller terminal. Exception are when switching ground based outputs or when the controller load is a pilot relay within 50 feet. Shielded wire can be substituted (of appropriate rating) when in an extremely noisy environment. Connect shield to panel/earth ground at controller end only.
6 7	Analog outputs	Connect Air P/N W181P-2540 Mint green jacket, 2 #18 conductors w/shield, plenum rated.	Maximum distance is 1000 feet.
21 22	Unitary controller power	Match power source conductor size to controller or distribution terminals. Always use #18 conductor or larger to controller terminals.	None
31	MS/TP Communications	Connect Air P/N W221P-2544 Raspberry jacket, 2 #22 conductors w/shield, low capacitance, plenum rated.	Maximum segment length (end-to-end) 4000 ft. All devices must be wired in a BUS or daisy-chained wiring arrangement (including global controllers) with termination resistors at each end of the bus. Ground shield drain wire at single point earth (panel) ground --not VLC ground. Tape off shield drain wire at other end. Tie shield drain wire through at each VLC. DO NOT GROUND SHIELD AT MULTIPLE LOCATIONS! The preferred location for grounding is in the physical center of the bus. MS/TP repeaters may be required to extend distance. Consult engineering department before using.
41	Ethernet (IEEE 8802.3) Cat 5 Wiring preferred	Connect Air P/N W244P-2030 or W244P-1026 or equivalent.	Maximum segment length is 328 ft. Multiple units require Ethernet hub or switch. See system architecture page for details. End terminations must follow the TIA/EIA-568-A pinout using color code option #1.

Project number: 24-13676

Application Engineer: VWI

Drawn by: VWI

Checked by: AL

Project name: VA Renovate Space for Logistics (B-1)

Architect: Harrell Design Group

Engineers: Harrell Design Group

Mechanical: Mountain Mechanical

Phase: Asbuilt

Creation Date: 1/1/2024

Revision Date: 6/10/2026

Northwest Controls

3241 West Huntsville Rd.
Springdale, AR 72762
Ph: (479) 872-9000 Fax: (479) 756-9866

Page 11 of 11

8

7

6

5

4

3

2

1