VIP CONTROLLERS AND VXIO MODULES

Installation and Operations Guide

ALERTON

Safety Information and Installation Precaution

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.

Disposal and Recycling


Waste electrical products should not be disposed of with general waste. Please recycle where these facilities exist. Check with your local authority for recycling advice.

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.

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ABOUT THIS GUIDE

This document provides information about:

- Identifying VIP and VXIO components
- Installing and wiring VIP-363 and VXIO modules in the field
- Connecting and configuring the VIP-363 and VXIO modules for network connectivity and I/O operation.

HOW TO USE THIS GUIDE

This document was created to assist engineers and technicians when installing and programming the VIP-363.

- Check Table 1 below for more information resources.
- Even if you're an expert with Alerton systems, review the "About the VIP-363" section of this document. This section gives you important information on how to apply the VIP-363 to your installation.
- The "Key Illustrations" section is a good starting point for installation technicians and engineers. Browse this section to become familiar with the hardware and unique installation requirements.

OTHER INFORMATION SOURCES

Table 1. Other documentation related to the VIP

Document ID	Contains
VIP-363 Data Sheet	A summary of applications, capabilities, and technical data
VXIO-322/965 Data Sheet	A summary of applications, capabilities, and technical data
VIP Controller / VXIO Modules Installation Instructions (31-00254EF)	Installation instructions for the VIP-363-HOA, VIP-363-VAV, VXIO-322-HOA, and VXIO-965-HOA devices
Compass 1.6.5 Installation and Upgrade Guide (31-00314)	Information for setting up and configuring devices for your Compass system.
Compass 1.6.4 Programmers Guide (31-00215)	Information and instructions for programming DDC sequences for the VIP and reference tables that describe BACnet objects and properties.

KEY POINTS OF INTEREST

BO CHARACTERISTICS

The VIP-363 and the VXIO Extension Modules support two different types of binary objects (BOs). The standard BOs like on other Alerton controllers, 24 VAC switching BOs, but now with Universal Input / Outputs (UIO) which can be used as an Input (AI or BI), Analog Output (AO), or Binary Output (BO). Like an AO that goes between 0 and 10 VDC, the BO is switching between the minimum and maximum output values which are 0 and 12 VDC.

POWER FOR 24 VAC BOS

The source for 24 VAC BO outputs can be supplied either by the controller itself or an external transformer. The 24 VAC BOs are now rated up to 1.5 A as opposed to the typical .5 A of older Alerton controllers, if higher amperage loads are used, external transformers will be needed to maintain Class-2 compliance for power.

POWER FOR UNIVERSAL BOS

Power for the Universal I/O when BO is selected is only supplied by the base controller's power and these are limited to 12VDC.

SCALING AIS AND AOS

Scaling is now supported for both AIs and AOs using a software-controlled Two Point Scaling mechanism which is directly applied to the AI and AO present-values. Scaling is accomplished using a set of AV's associated with each AI and AO object.

I/ O CONFIGURATION VIA SOFTWARE

All configuration for Inputs and Outputs is done via a set of Analog and Multistate Values associated with each Input and Output. All configuration is done via the data display template. There is no header setting in DDC and no configuration file – it is all done through the display template.

HARDWARE MODE

For all physical inputs and outputs, there is a hardware mode associated with it. The default for an AI/BI is resistance or push-button type of input. All configurable hardware points for AIs and the UIOs have a value that can be set for resistance, current, voltage, or pulse. UIOs can be set up as Analog or Binary Outputs as well.

NOTE: IN0 does not support pulse input devices on ANY device – VIP or VXIO modules.

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Data Presentation Option

For AIs, once the hardware mode has been set, there is a data presentation option that defines what the data input is going to look like. The default is counts, like older Alerton products, but also supported are Engineering Units, 10K or 3K Thermistor, PT-1000, and 3 pulse input types.

Engineering Units

The Data Presentation option can be set for Engineering Units which results in the AI present-value reading the actual values and units for whatever the input is set to Voltage, Current, or Resistance – V, mA, or Ohms. For example, an Input with its Hardware Mode set to "2:AI-x (0-10V)", will have an AI present value that reads between 0.0V to 10.0V as the physical input goes from 0-10V.

Object Units

Object units are units used for AI objects to physically read exchanged values. These values are independent of the Device Unit setting. Because the user can configure any AIs as per requirement.

Device Units

Device units are units used for input values of an AI like – voltage, current, degree Celsius (°C), or degree Fahrenheit (°F).

Out of Service Mode

Out of Service mode is supported for AIs/AOs and BIs/BOs and useful as a troubleshooting tool. Setting **Out of Service** TRUE for an input decouples the physical input from what the device is reading. Likewise, setting Out of Service TRUE for an output decouples the software from the hardware and hardware settings. Care must be taken when used with outputs to ensure that all manually adjusted output values are returned to a controlled state prior to returning the point into service.

Microset Detection Mode

A new setting has been added to support Microset detection – **Always Connected**. Always Connected is meant to immediately establish IN0 as a Microset communication bus eliminating an odd state on power-up where the Microset would display odd values rather than the temperature as the VLC was still attempting to sense exactly what the device was. The other settings, **Microtouch only** is the same as *Microset AutoDetect Disabled* in the DDC header for BD4 and BD6 files. **Auto detect** is the same as *Microset AutoDetect Enabled* in BD4 and BD6 headers.

Backup Mode

All Analog and Binary Outputs for the VIP and VXIO devices can be configured for backup mode. Unlike the VLX where the backup mode was just a backup mode value, the VIP and VXIO modules provide an option to use backup mode or not. If you want the controlled point to run as is when communication is lost, set it to **No Change**. Otherwise, on a point-by-point basis Backup Mode support can be enabled and set the **Set to** value to a percentage value or a binary state. The **Delay in Seconds** value is set device-wide (referring to the VIP and all VXIO modules connected to it) to set the time to delay before going into a backup mode when a Comm Loss event occurs. Additionally, the **Minimum Time in Backup Mode** value is defined to prevent short cycling of equipment.

Alarms, Schedules, Trendlogs, and Zones

The VIP Controllers support the configuration of Alarms, Schedules, Trendlogs, and Zones for internal points, similar to the VLCA-1688. The VIP-363 can be configured with 100 Alarms, 100 Trendlogs, and 30 Schedules, with no apparent effect on the performance of devices. Now as with other Alerton devices you can probably configure many more of any of these items with the understanding that it is a shared memory pool. It means if you need more of one item you should probably use less of another. See tables in APPENDIX F: Object and Property references for more information.

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KEY ILLUSTRATIONS

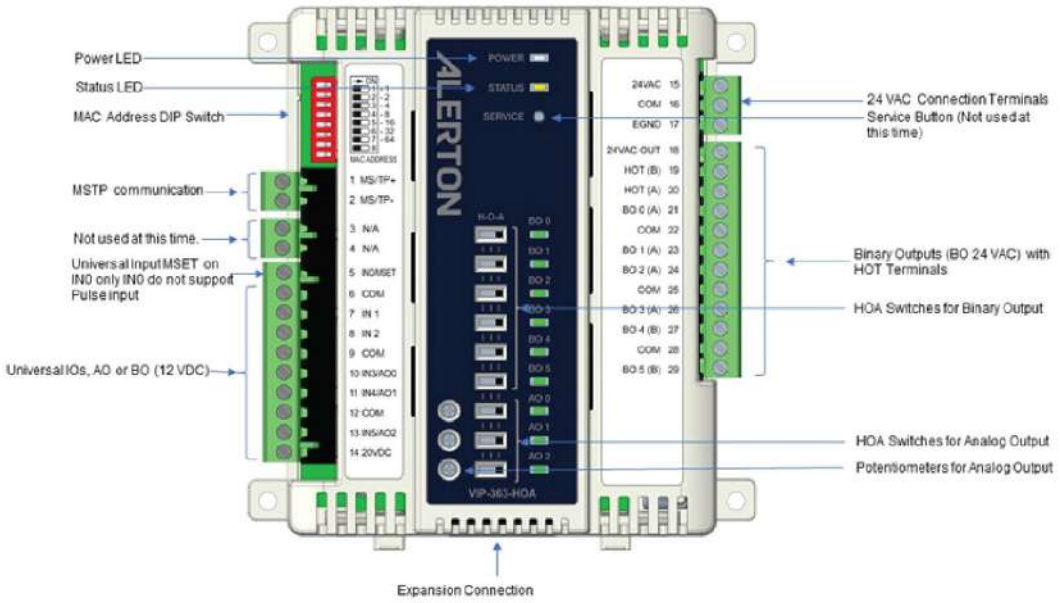

Figure 1. VIP-363-HOA Physical Features

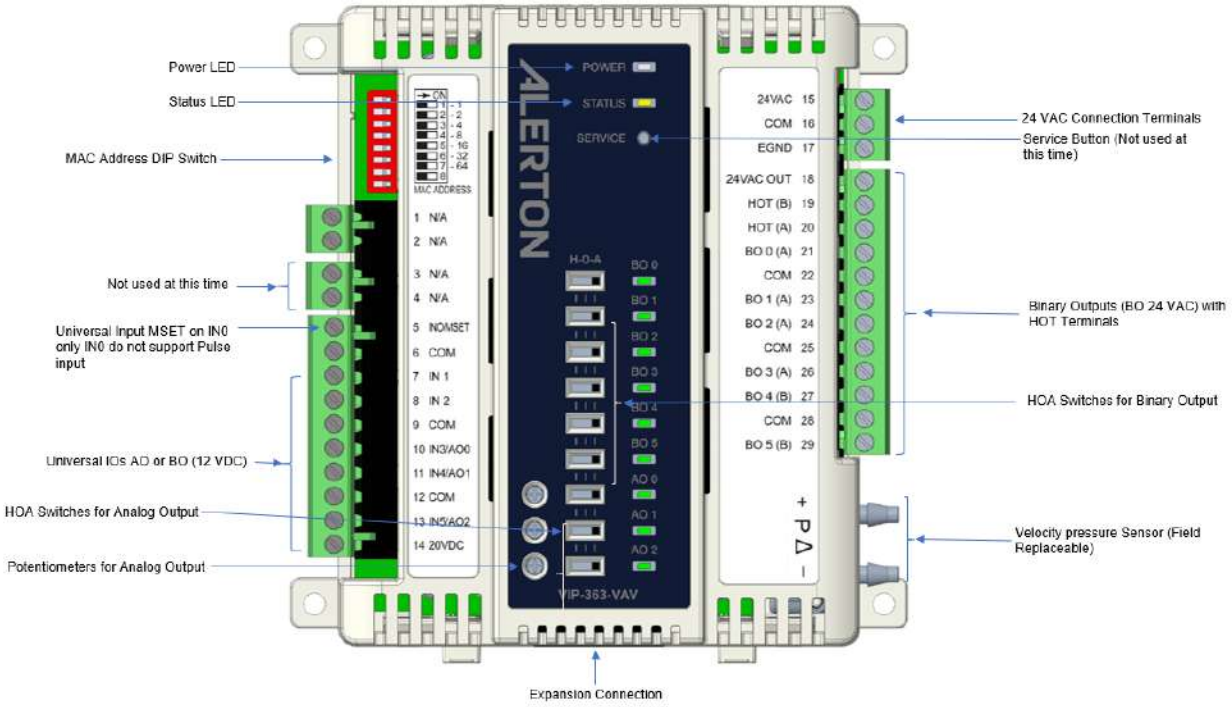

Figure 2. VIP-363-VAV Physical Features

NOTE: The VIP-363-VAV supports only one VXIO Expansion Module.

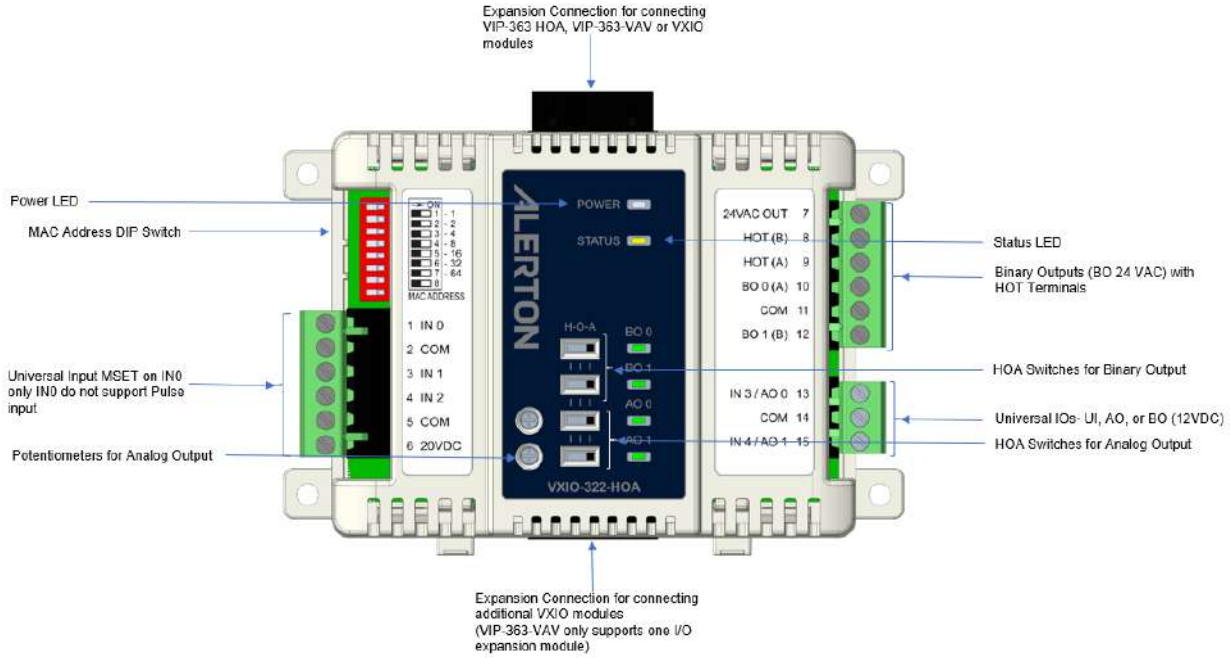

Figure 3. VXIO-322-HOA Physical Features

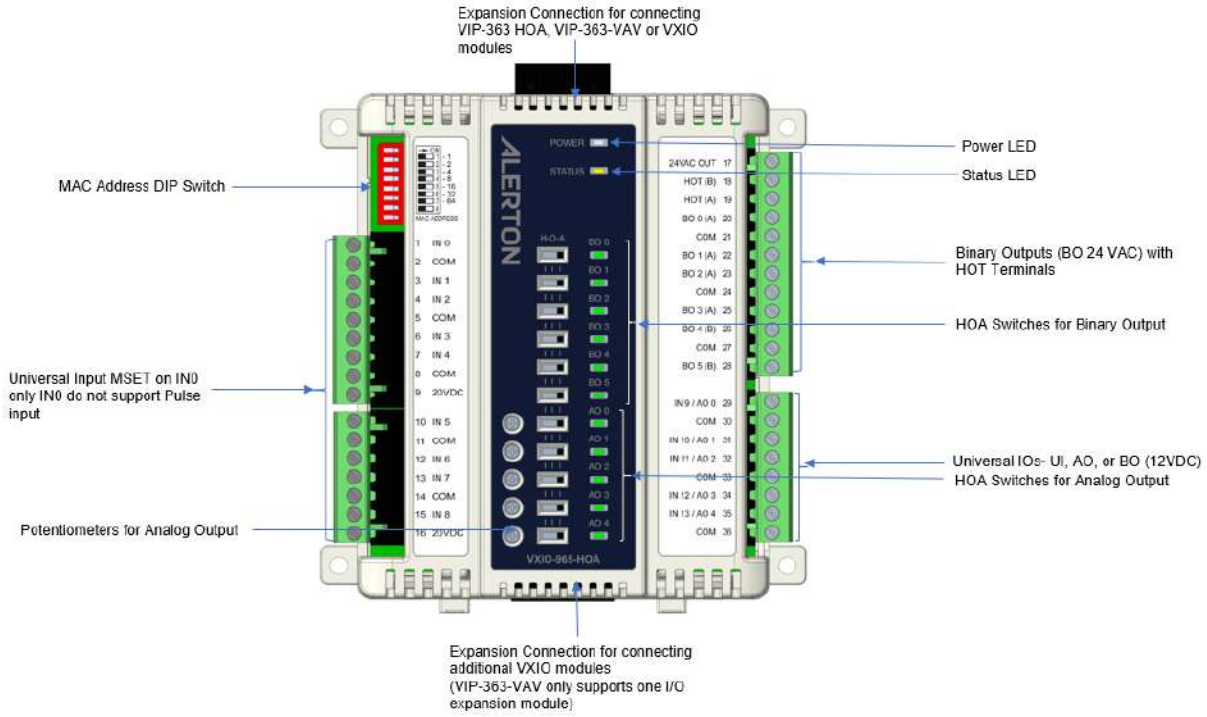

Figure 4. VXIO-965-HOA Physical Features

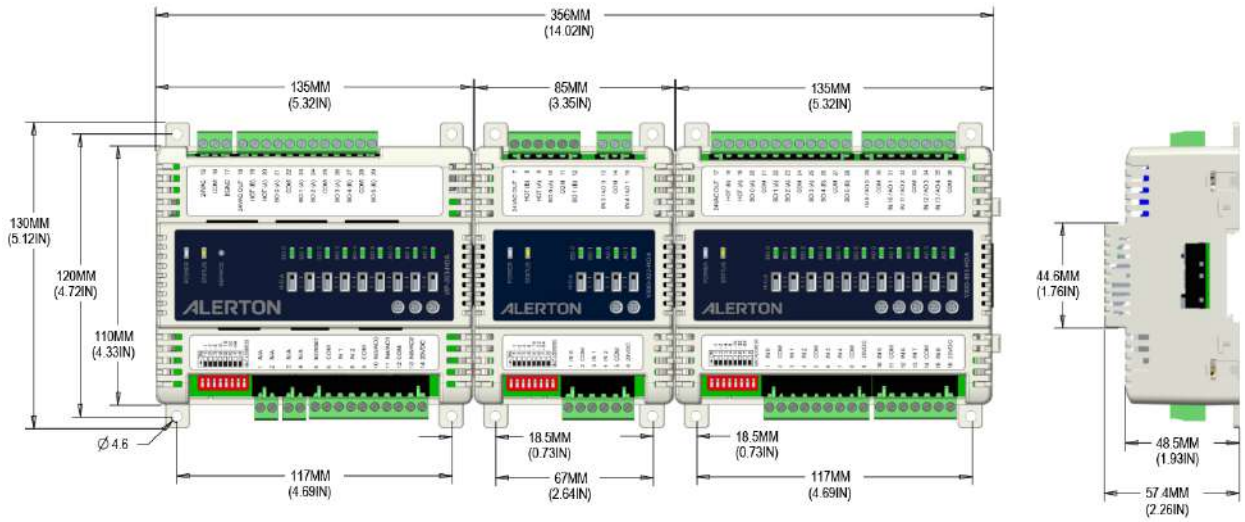

Figure 5. Panel mounting – controller dimensions in mm (inches). Shown above are the VIP-363-HOA Controller and a VXIO-322-HOA and VXIO-965-HOA Expansion Modules.

NOTE: The VIP-363-VV only supports one VXIO Expansion Module.

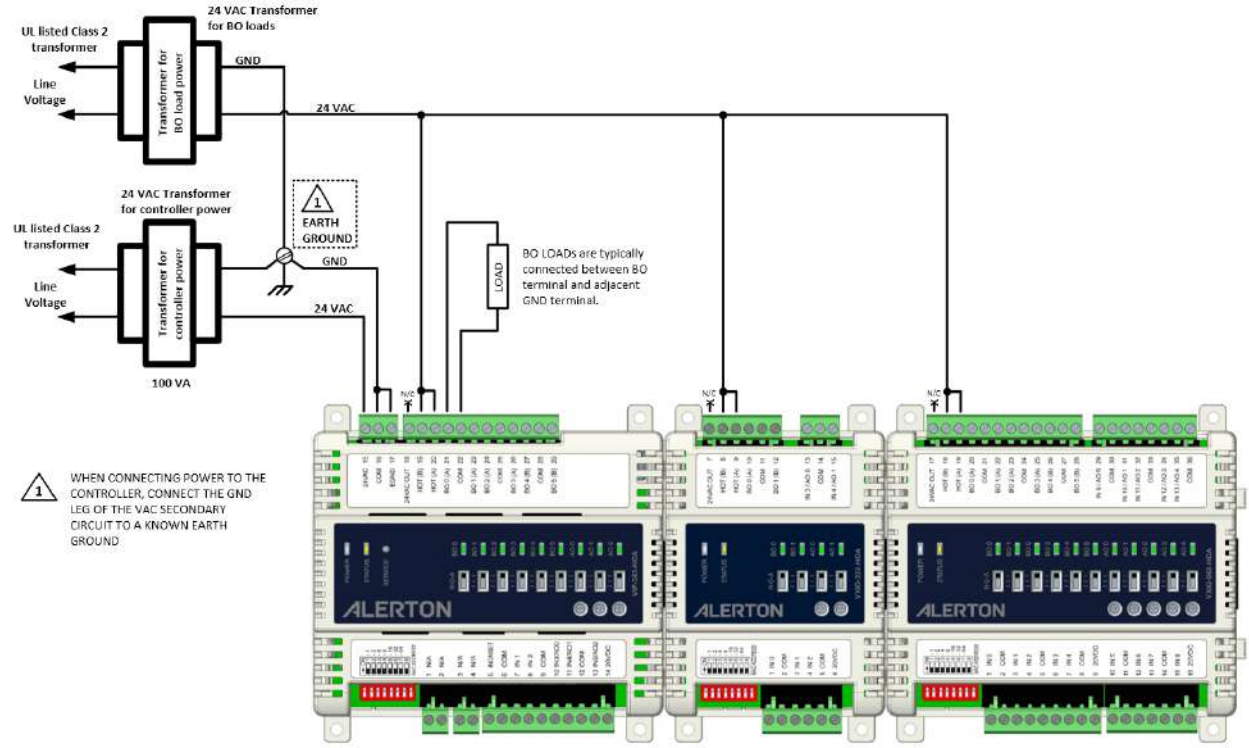

Figure 6. Two transformers – one for controller power, one for BOs (24VAC) loads. Shown above are the VIP-363-HOA and VXIO-322-HOA and VXIO-965-HOA Expansion Modules.

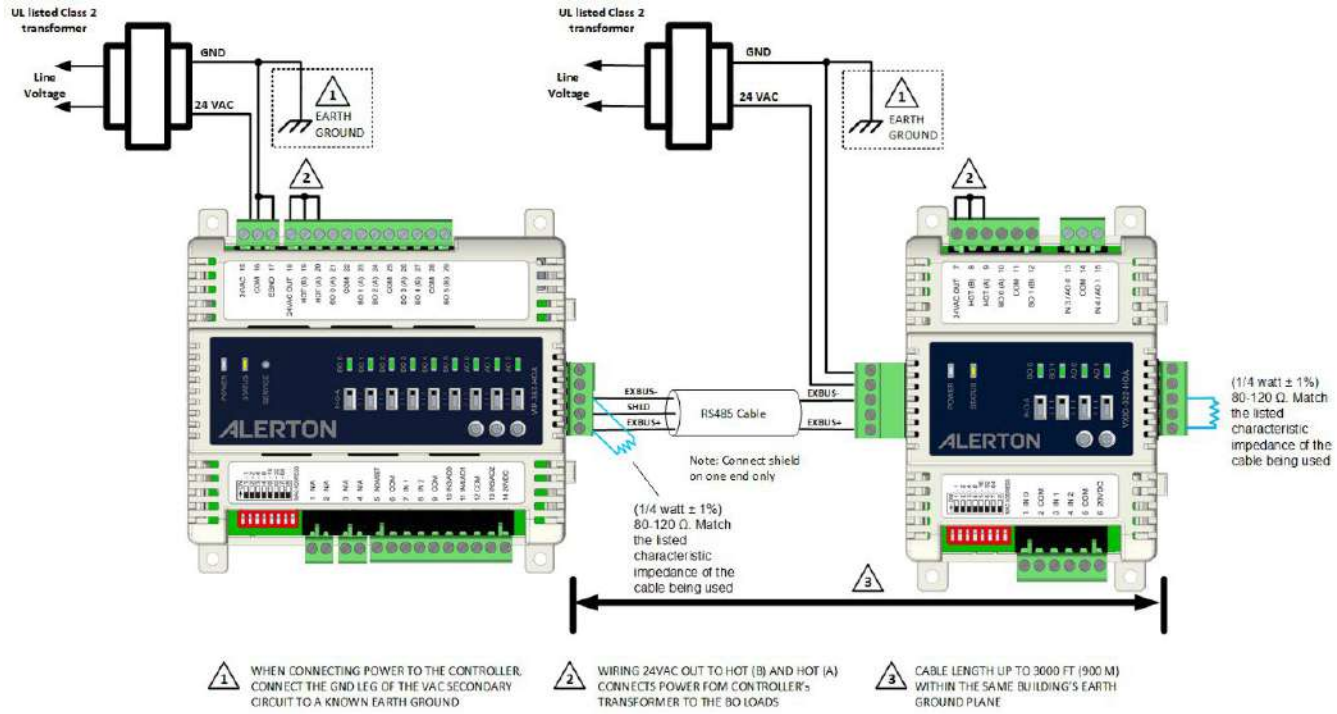

Figure 7. Separate transformers for the controller and I/O modules. Shown above is the VIP-363-HOA Controller connected remotely to a VXIO-322-HOA Expansion Module.

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Key illustrations

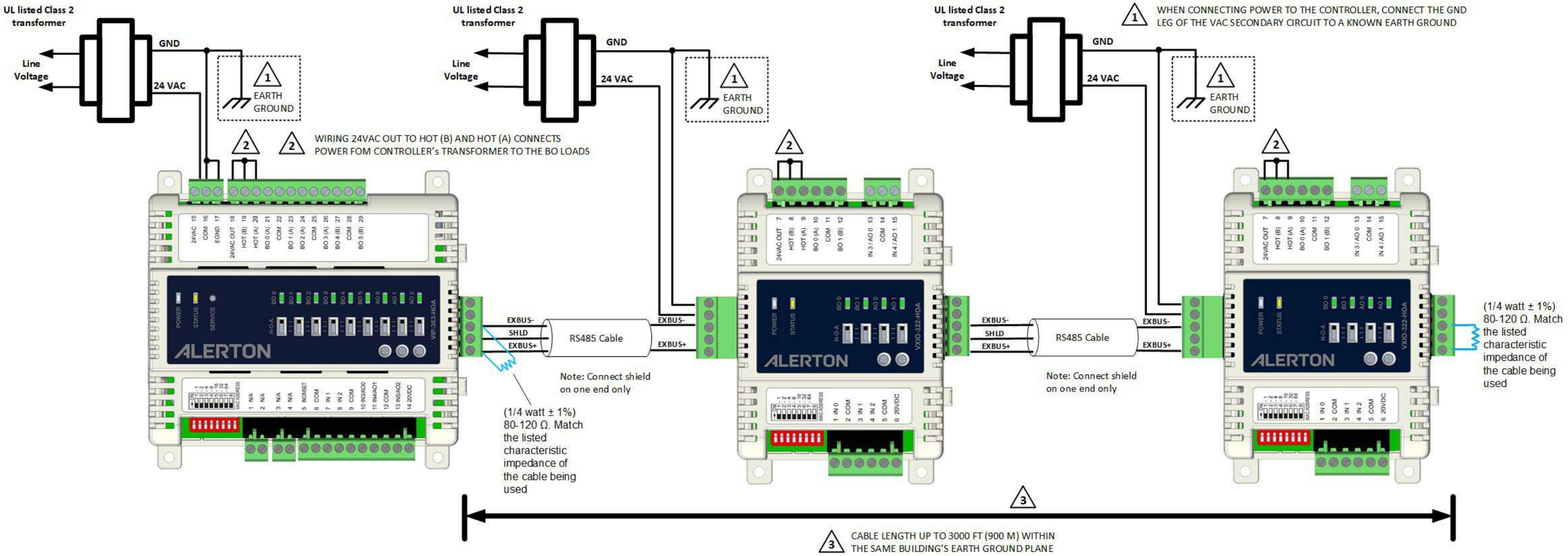
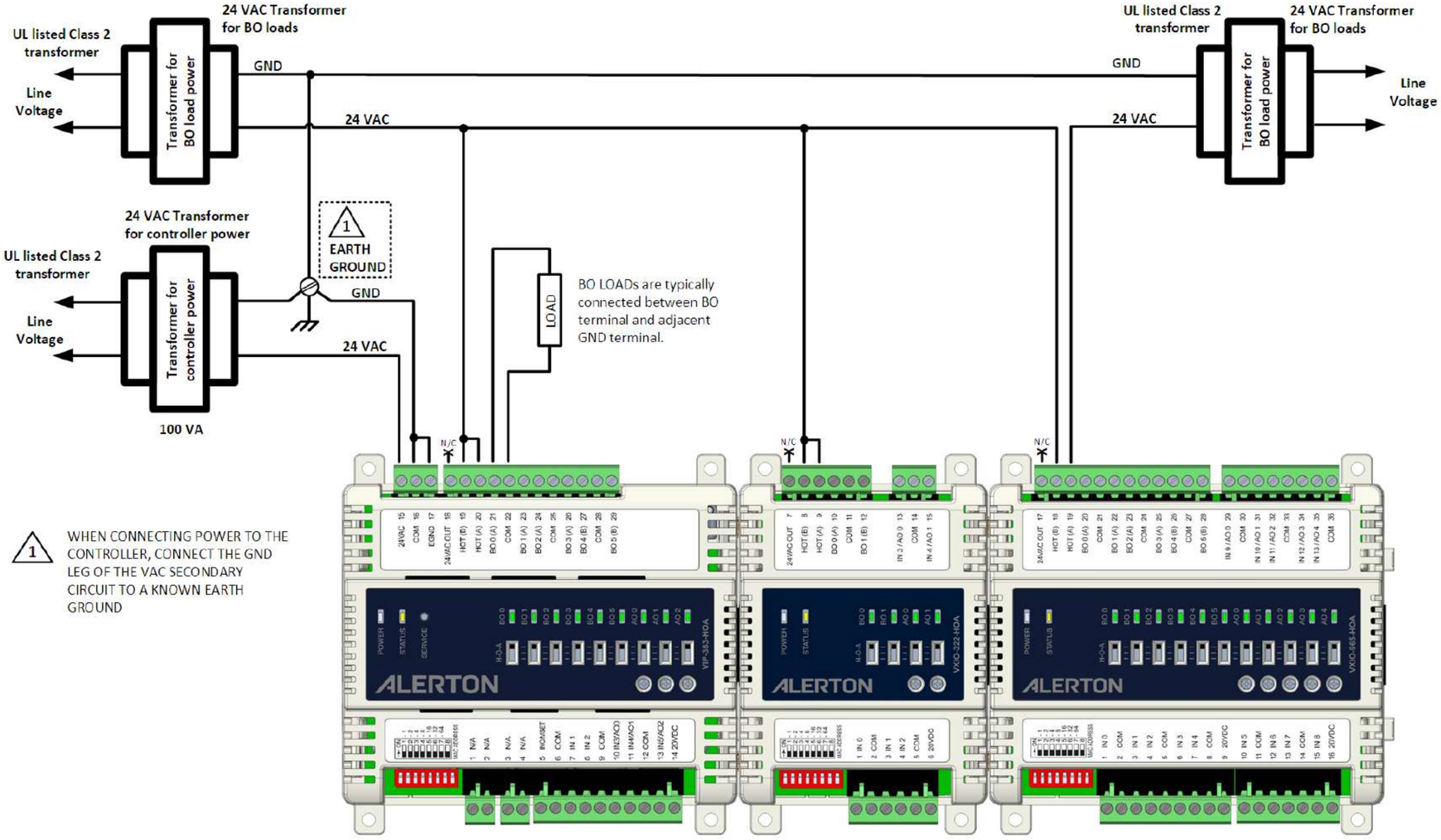


Figure 8. Maximum expansion length

NOTE: The VIP-363-VAV only supports one VXIO Expansion Module.



1 WHEN CONNECTING POWER TO THE CONTROLLER, CONNECT THE GND LEG OF THE VAC SECONDARY CIRCUIT TO A KNOWN EARTH GROUND

Figure 9. Power Options

NOTE: The VIP-363-VAV only supports one VXIO Expansion Module.

About the VIP-363 and VXIO modules

Model identification

Like other Alerton controllers, the VIP-363 product name conveys information about its application and configuration.

The VIP and VXIO's numerical designation indications I/O capabilities. The first number designates universal inputs (UI), the second designates the number of binary outputs (BOs 24VAC), and the third designates the number of universal inputs/outputs (UIO – UI/AO/BO (12VDC))

Table 2. Controller description

Number	Input/Output	Description
3	Universal Inputs	Software configured to accept any of the following: • Resistance (10kΩ thermistor (type II) or 3kΩ thermistor or potentiometers) • Voltage (0 to 10 VDC) • Current (0 to 20mA) • Dry Contact • Solid-state (transistor) switch • Pulse-type inputs (on all inputs OTHER than IN-0)
6	Binary Outputs	Solid-state relays rated 24VAC
3	Universal Inputs / Outputs	Universal inputs/outputs are software configurable to be a Universal Input, Analog Output, or 12VDC Binary Output. Analog Outputs: selectable 0-10VDC or 0-20mA Binary Outputs: 12VDC, 20mA maximum

NOTE: Microset support is only supported on the controller on IN0/MSET, not supported on the VXIO modules.

NOTE: Pulse inputs are not supported on IN0 for VIP controllers AND VXIO modules

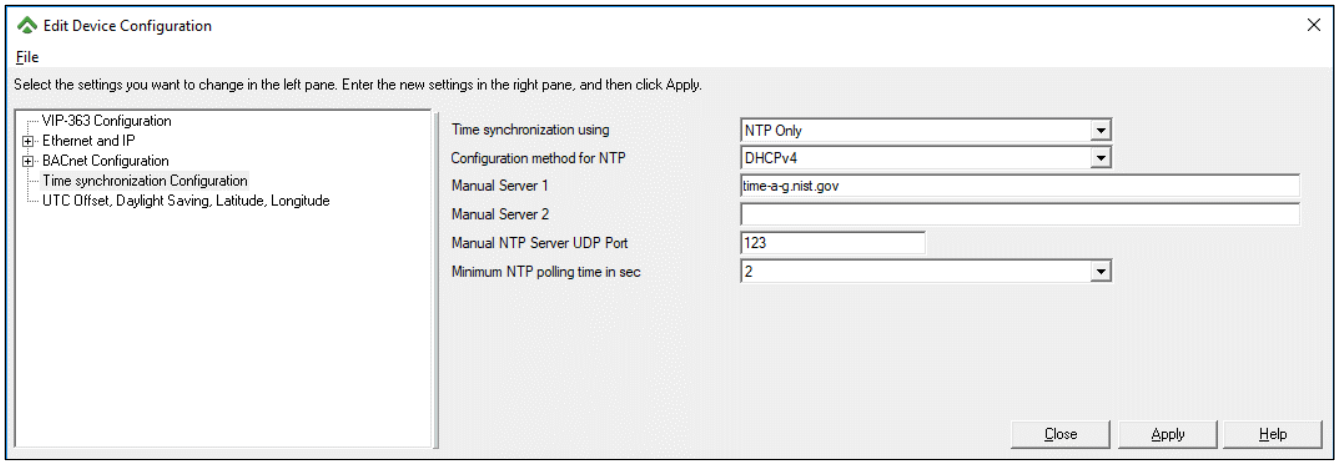
NOTE: THE VIP-363-HOA SUPPORTS UP TO 8 VXIO EXPANSION MODULES. THE VIP-363-VAV SUPPORTS ONLY ONE VXIO EXPANSION MODULE.

FOR VIP-363-VAV TO SUPPORT 1 I/O EXPANSION MODULE, ROC FILE VERSION 1.7.10 OR LATER IS REQUIRED.

VIP-363-VAV AND VIP-363-HOA NETWORK TIME PROTOCOL (NTP) FEATURE

The NTP (Network Time Protocol) client feature allows the user to configure a VIP-363 controller such that it can fetch time from an NTP server. The time of the device gets synchronized with the server based on the polling time configured below. Please note that the VIP-363 controller cannot be configured as an NTP server. It is recommended that the NTP server is located within the LAN as the controller is not designed to be exposed on the internet.

The following parameters are used to configure the NTP client on the VIP-363 in the “Device Configuration Editor”.



The values of the configuration parameters are as shown below:

Table 3. NTP feature description

Parameter	Values	Description
Time synchronization using	BACnet Only NTP Only	This configuration item determines whether time sync is done using the BACnet protocol or using NTP. Default = BACnet Only
Configuration method for NTP	Manual DHCPv4	This allows for the automatic configuration of the NTP servers using DHCP. The adapter on which DHCP is enabled should be specified here. The NTP server information can also be entered manually by choosing the “Manual” option here. Default = Manual
Manual Server 1 Manual Server 2	Any NTP server name or IP address within the LAN. This field allows manual configuration	Two NTP server names or IP address can be configured. Ideally, the server shall be within the LAN. Default = Blank Ensure that the DNS server and Default GW are configured correctly.
Manual NTP Server UDP Port	Any valid UDP port number which the NTP server is listening on	This field allows for the manual configuration of the port used by the manually configured server. The NTP server information obtained by DHCP uses the default port number 123. Default = 123
Minimum NTP polling time in seconds	Allowed values 1,2,4,8,16,32,64,128 ,256,512,1024,4096 seconds	The minimum duration in seconds between each request from the client after the first update. The first-time update happens within 2 seconds on startup. This configuration is used for both Manual and DHCP options. Default = 64 seconds.

HARDWARE INSTALLATION AND OPERATION

MOUNTING GUIDELINES

LOCATION

The VIP controller and VXIO modules are suitable only for indoor mounting. If the devices must be installed in a location exposed to weather, a water-tight, weatherproof enclosure must be used.

Make sure the location selected is dry and free from electrical interference and positioned to allow clearance for wiring, servicing, removal, and terminal block connection.

The VIP-363-HOA, VIP-363-VAV and VXIO expansion modules are suitable for plenum installations.

ENVIRONMENTAL FACTORS

Acceptable environmental ranges for the VIP controller and VXIO modules are as follows:

- Operating temperature: 0°F to 158°F (-17°C to 70°C)
- Humidity: 5% to 95% RH, non-condensing

ORIENTATION

The VIP Controller and VXIO Expansion Modules mount on a standard DIN rail either vertically or horizontally and are maintained in place by a locking clip. Mounting on a DIN rail ensures accurate alignment of the connectors between modules. Alternatively, the controller and extended IO modules can be screw-mounted using the four mounting tabs. These tabs may be broken off if needed to save space when DIN rail mounting.

USING TERMINAL BLOCKS

The VIP Controller and VXIO Expansion Modules use removable terminal blocks to simplify field wiring of power and I/Os. If desired, you can remove the terminal blocks from the controller, terminate the wire, and re-seat them when finished. The terminal blocks accept wire from 12 to 24 AWG.

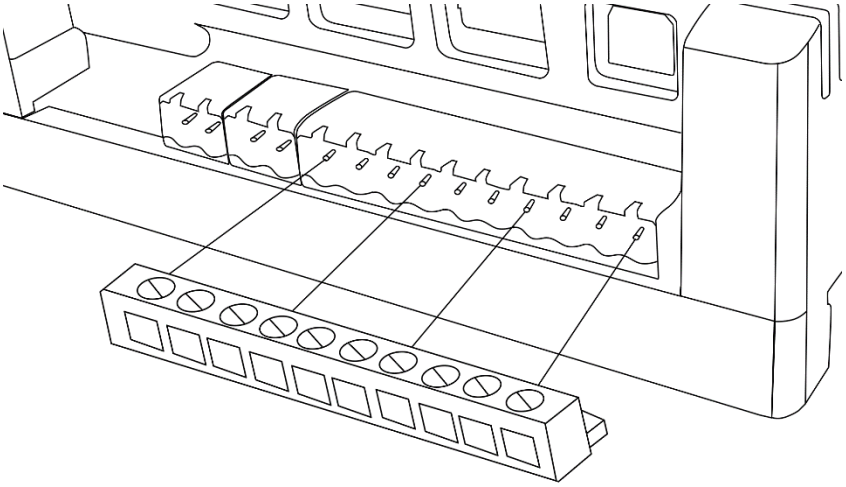


Figure 10. VIP and VXIO terminal blocks

To terminate wire to a VIP Controller or VXIO Expansion Module.

1. Strip approximately 1/8” of the wire jacket from the end of the wire.
2. Use a small flat-tip screwdriver (1/8” max) 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 wire into it. (Try to get the jacket flush with the terminal block)
   - **If using stranded wire:** Insert all strands into the wire slot.
   - **If terminating multiple wires:** Trim wires to the same length and tightly twist the exposed wire together.
4. Hold the wire in place and turn the adjustment screw clockwise to tighten it until the clamps in the wire slot secure the wire.
5. Tug gently on the wire to ensure that it is securely terminated.

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POWER SUPPLY GUIDELINES AND REQUIREMENTS

IMPORTANT! The VIP controller and VXIO modules use 24VAC power from a UL Listed Class 2 24VAC transformer (not provided).

The VIP controller and VXIO modules use a half-wave rectifier to convert the AC power supply to onboard power.

WARNING: HALF-WAVE DEVICES AND FULL-WAVE DEVICES MUST NOT USE THE SAME AC TRANSFORMER.

POWER RATINGS

The VIP controller label shows a minimum and maximum current draw in volt-ampere (VA).

The minimum applies when the VIP supports no BO loads but includes the maximum draw of the 20VDC and all AO loads energized at maximum rating.

The maximum power draw is the minimum VA rating plus the power draw when all BOs are energized at maximum capacity.

The minimum operating voltage is 20VAC. The maximum is 30VAC. The nominal voltage is 24VAC.

IMPORTANT! The 20VDC output will be affected if the AC voltage is low.

SELECTING A TRANSFORMER

The safest way to size a transformer is to ensure that the sum of the maximum VA load rating listed on the cover of each VIP controller and any connected VXIO modules is less than 85% of the nameplate VA rating of the transformer. Even if all outputs are not currently used, this ensures that each VIP has enough power for future equipment additions.

IMPORTANT! Use only UL-listed Class-2 transformers. To stay under the UL Class-2 limit for a maximum power-draw calculation based on all AO loads energized at maximum rating plus all BOs simultaneously energized at maximum capacity, for example, two transformers would be needed: one to power the VIP controller and the other to power the BOs.

SELECTING A POWER-SUPPLY WIRE

Using the right wire size is critical for long power supply wiring runs. If the wire is too small, the resistance can be too high, resulting in a low voltage supply to the VIP device(s). This is known as line loss. The wire size is based on the length of the wire run and the current draw of the VIP to be powered.

Determine wire gauge based on maximum current draw and distance between the transformer and the VIP. Obtain additional information from the transformer manufacturer and electrical codes in your jurisdiction. You must ensure that the line loss does not cause the voltage to drop below the minimum threshold, that the wire is thick enough to handle the current, and that local codes are not violated.

Example of determining appropriate wire type: To arrive at the correct wire gauge, you will need a maximum load figure–in VA–for your application, an acceptable percentage voltage drop between transformer and VIP, and the total length of the wire run. For example, to determine the appropriate wire type with a transformer that is 100 feet from the VIP, perform the following steps:

1. For the VIP, the maximum load is on a label on the end of the controller. (In this example, let the value be 15 VA.)
2. Find the intersection of the 15 VA line on the vertical axis (y) and 100 feet on the horizontal axis (x).
3. Read the diagonal line to the right of the intersection point, as shown. (Select the wire with higher capacity.)

Figure 11. Wire selection chart

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IDENTIFYING POWER SUPPLY TERMINALS

Three terminals are used to connect the 24VAC power supply to the VIP. These are always side-by-side and usually located on the upper-left or right side of the controller, labeled 24VAC, COM, and EGND. The 24VAC terminal is for the hot leg (ungrounded) of the 24VAC circuit. The COM and EGND terminals are used for terminating the grounded leg of the 24VAC circuit.

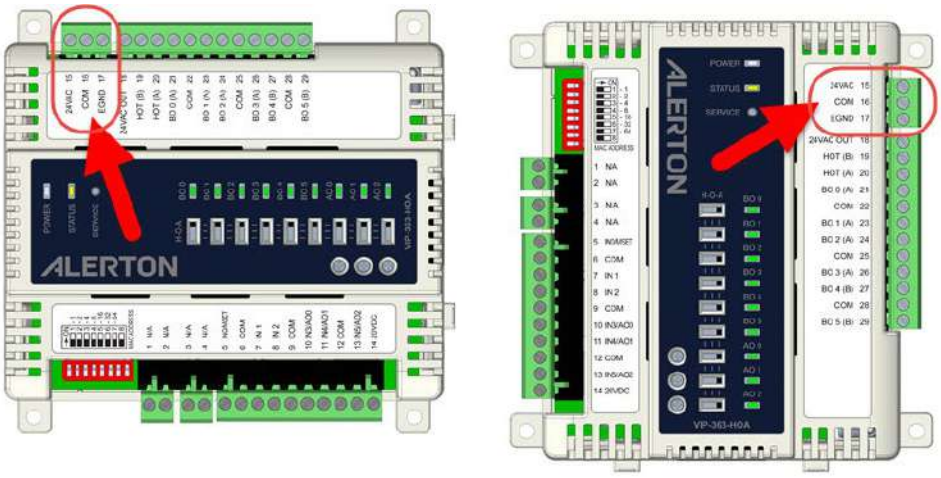

Figure 12. VIP-363 power terminals

POWER SUPPLY GROUNDING AND WIRING

When connecting power to the VIP, ensure that one leg of the VAC secondary circuit connects to known earth ground at the panel/enclosure. Also, ensure that the COM terminal on the VIP connects to the same known earth ground.

One of the most important things you can do to ensure a trouble-free installation is to supply a high-quality ground connection to the VIP and then properly connect the VIP to the ground.

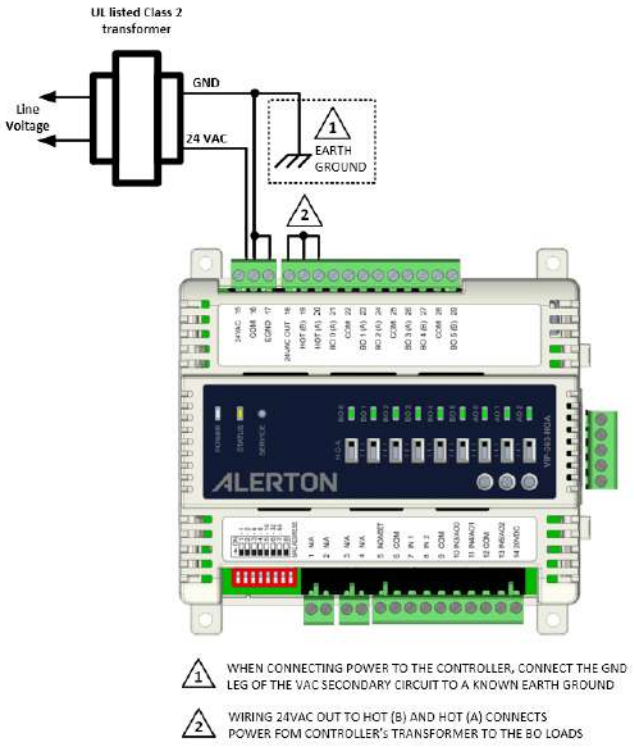

Figure 13. VIP-363 power supply grounding

IMPORTANT! The 24VAC secondary leads are not interchangeable. Once a lead connects to the COM terminal on the VIP-363, it is the grounded lead. Observe and maintain polarity for subsequent connections. The COM terminal provides a reference ground for the circuit board and communications wiring. Use 18 AWG cables for the best results.

WARNING: ENSURE THAT ALL VIP POWER AND I/O CABLING IS GROUNDED ACCORDING TO THESE INSTRUCTIONS AND DEVICE-SPECIFIC INSTALLATION INSTRUCTIONS. FAILURE TO DO SO CAN RESULT IN OPERATIONAL AND COMMUNICATION FAILURES WITH THE CONTROLLER OR EQUIPMENT DAMAGE. SEE FIGURE 7 FOR AN EXAMPLE.

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IDENTIFYING TERMINALS AND TERMINATING WIRE

The labels on the VIP controller and VXIO modules identify the wiring terminals by number and function. Terminals are numbered from the top down if oriented vertically or left to right if oriented horizontally.

IMPORTANT! Always install equipment by the National Electric Code and in a manner acceptable to the local authority having jurisdiction. No guidelines, instructions, installation practices, or other information presented in this guide may be interpreted to supersede or modify the local codes and practices of the authority having jurisdiction.

TERMINAL ASSIGNMENTS

Table 4. Terminal assignments for VIP-363-HOA and VIP-363-VAV

Terminal	Description
1, 2	For VIP-363-HOA: MSTP (1=MS/TP+ and 2=MS/TP-) For VIP-363-VAV: Not used
3, 4	Not used
5	IN0/MSET (UI-0 OR Microset/Microtouch)
6, 9, 12	Common terminals for Universal Inputs & Universal IO (Universal Inputs/AOs/BOs (12VDC))
7, 8	Universal Inputs IN1 and IN2
10, 11, 13	UIO Terminals configurable as UI (IN3-IN5), AO (AO0-AO2), or BO (BO6-BO8)
14	Supplies 20VDC, 250mA of current
15	Controller input supply voltage 24VAC
16	Common terminal for power input
17	Electrical earth ground
18	24VAC output supplied from controller's power (terminal 15) for BO devices
19	HOT B is the terminal to which the source voltage used by BO4 and BO5 will be connected. **NOTE:** The source voltage can either be provided by the 24VAC output (terminal 18), or from an external 24VAC transformer.
20	HOT A is the terminal to which the source voltage used by BO0 - BO3 will be connected. **NOTE:** The source voltage can either be provided by the 24VAC output (terminal 18), or from an external 24VAC transformer.
22, 25, 28	Common terminal for BO-0&1, BO-2&3, BO-4&5 respectively
21, 23, 24, 26	BO0 to BO3. It uses the source voltage from HOT A.
27, 29	BO4 and BO5. It uses the source voltage from HOT B.

Table 5. Terminal Assignments for VXIO-322-HOA

Terminal	Description
1, 3, 4	Universal Inputs IN0, IN1, and IN2
2, 5	Common terminals for Inputs/AO's
6	Supplies 20VDC, 100mA of current ← **NOTE:** THIS IS DIFFERENT FROM THE VXIO-965 AND VIP-363
7	24VAC output
8	HOT B is the terminal to which the source voltage used by BO1 (B) will be connected. **NOTE:** The source voltage can either be provided by the 24VAC output (terminal 7), or from an external 24VAC transformer.
9	HOT A is the terminal to which the source voltage used by BO0 (A) will be connected. **NOTE:** The source voltage can either be provided by the 24VAC output (terminal 7), or from an external 24VAC transformer.
10	BO0 - uses the source voltage from HOT A.
11	Common terminal for BO0&1
12	BO1 - uses the source voltage from HOT B.
13, 15	UIO Terminals configurable as UI (IN3-IN4), AO (AO0-AO1), or BO (BO2-BO3)
14	Common terminals for Universal IO (Universal Inputs/AOs/BOs (12VDC))

Table 6. Terminal Assignments for VXIO-965-HOA

Terminal	Description
1, 3, 4, 6, 7, 10, 12, 13, 15	Universal Inputs IN0 to IN8
2, 5, 8, 11, 14	Common terminals for Universal Inputs
9, 16	Supplies 20VDC, 250mA of current
17	24VAC output
18	HOT B is the terminal to which the source voltage used by BO4 and BO5 will be connected. **NOTE:** The source voltage can either be provided by the 24VAC output (terminal 17), or from an external 24VAC transformer.
19	HOT A is the terminal to which the source voltage used by BO0 – BO3 will be connected. **NOTE:** The source voltage can either be provided by the 24VAC output (terminal 17), or from an external 24VAC transformer.
20, 22, 23, 25	BO0 to BO3. It uses the source voltage from HOT A.
21, 24, 27	Common terminal for BO-0&1, BO-2&3, BO-4&5 respectively
26, 28	BO4 and BO5. It uses the source voltage from HOT B.
29, 31, 32, 34, 35	UIO Terminals configurable as UI (IN9-IN13), AO (AO0-AO4), or BO (BO6-BO10)
30, 33, 36	Common terminals for Universal Inputs & Universal IO (Universal Inputs/AOs/BOs (12VDC))

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GROUND TERMINALS AND COMMON TERMINALS

The VIP-363 and VXIO modules utilize a common ground plane throughout the device. The only terminal marked for ground on the VIP is the EGND for Earth Ground. The Common (COM) terminals (sometimes referred to as VLC ground, common ground, or input signal return ground) provide a low impedance connection for input circuitry to the VIP reference ground. Use these to terminate the return ground for inputs and outputs.

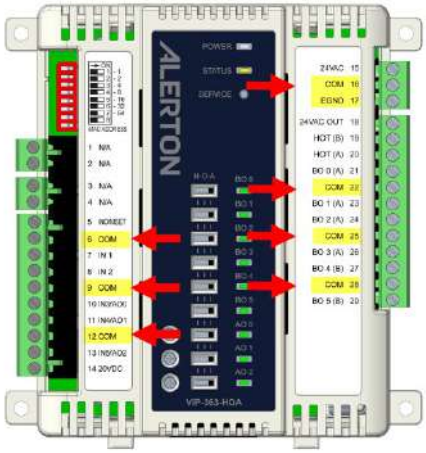

Figure 14. VIP-363 common terminals

NOTE: Though the VIP utilizes a common ground plane across the entire device, it is good practice to always connect input return grounds to input COM terminals, output return grounds to output COM terminals, and power grounds to power COM terminals.

UNIVERSAL INPUT TERMINALS

Use universal input terminals to connect universal inputs. Input terminals accept a variety of signal types. See further below for details on the acceptable input types.

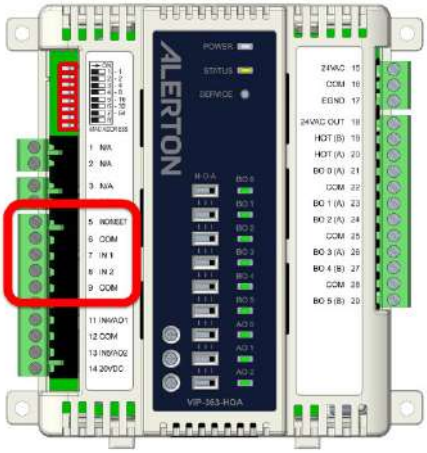

Figure 15. VIP-363 universal input terminals

UNIVERSAL INPUT AND OUTPUT TERMINALS

The VIP controller and VXIO Expansion Modules support universal inputs and outputs (UIO) in that they can be configured as UIs, AOs, or BOs (12VDC).

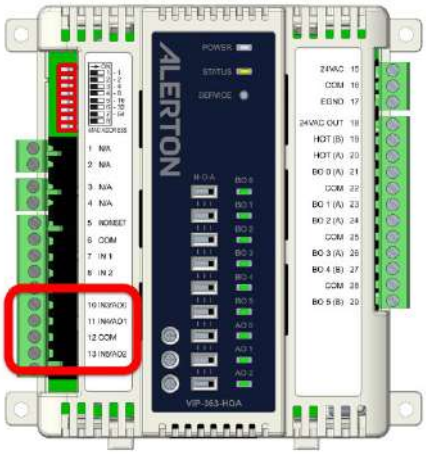

Figure 16. VIP-363 universal input / output terminals

UNIVERSAL INPUTS

Universal inputs on the VIP controller can accept a variety of input types. Typically, a sensor, transducer, or other device producing an output signal that is wired to an input terminal on the VIP controller.

Inputs can be configured to accept any of the following:

- Resistance (typically 10kΩ or 3kΩ thermistors or potentiometers).
- Voltage (0 to 10VDC).
- Current (0 to 20mA).
- Dry contact.
- Solid-state (transistor) switch.
- Pulse-type inputs.

The VIP controller has BACnet objects for only those inputs that exist, unlike older VLCs, which have BACnet objects IN-0 through IN-15 regardless of how many physical inputs exist.

The VIP controller set up of all Inputs and Outputs is software configurable.

Electrical characteristics of the VIP input circuits

The VIP controller has an onboard input filter and a 16-bit analog-to-digital (A/D) converter that converts the electrical input signal to counts. Counts refer to the number in the software that results from the A/D conversion.

Input wiring and configuration tips

This section provides tips, wiring diagrams, and application notes for the most commonly encountered input types.

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Wire shield and shield grounding

Use 18 AWG shielded twisted two-conductor cable for all inputs and analog outputs to reduce electrical interference (noise). A single-point grounding scheme that uses the transformer or panel ground is optimum. Ground only one end of the shield drain wire.

CAUTION: Do not ground shield to any terminal on the VIP controller because any signal on the shield is routed through the VIP controller circuit board to earth ground. Improper grounding can cause equipment damage.

Microset / Microtouch

Microset 4 sensor Part numbers: MS4-TH, MS4-THC, and MS4-TH-NL

BACtalk Microset II sensor Part numbers: MS-2000-BT, MS-200-BT-NL, and MS-2000H-BT

The Microset 4 and Microset II sensors use a three-conductor connection to the VIP-363.

The wiring for the Microset 4 is as follows:

1. Red wire – Terminal 1 on the MS4 to 24VAC terminal on the VIP to power the backlight for the display
2. White wire – Terminal 2 on the MS4 to the terminal labeled Com on the VIP
3. Black wire – Terminal 3 on the MS4 to the terminal labeled IN-0/MSET on the VIP

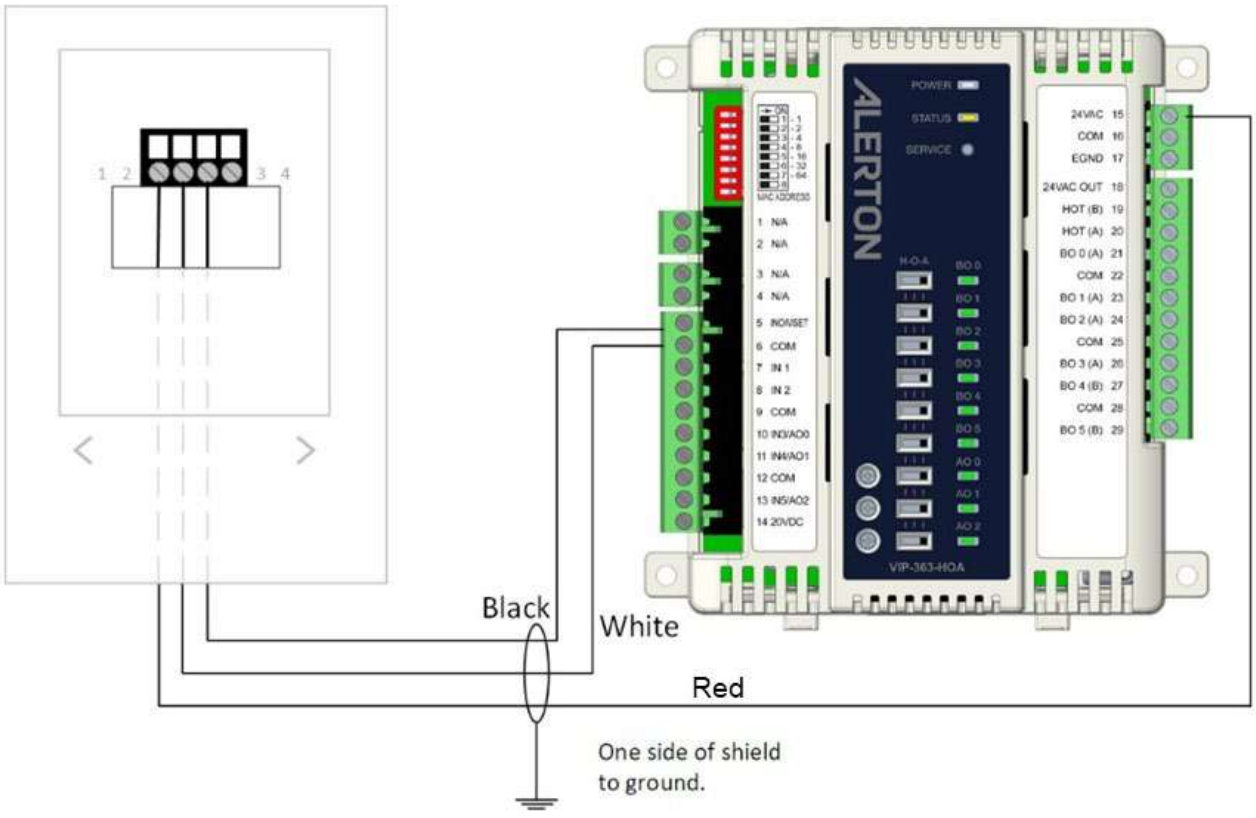

Figure 17. Microset 4 terminal wiring

Wiring is as follows:

- Black wire: Connects to the terminal labeled IN-0/MSET.
- White wire: Terminates to COM.
- Orange wire: Terminates to 24VAC to power the backlight for the LCD.

The Microset sensor uses a 10 kΩ thermistor for its space temperature sensor.

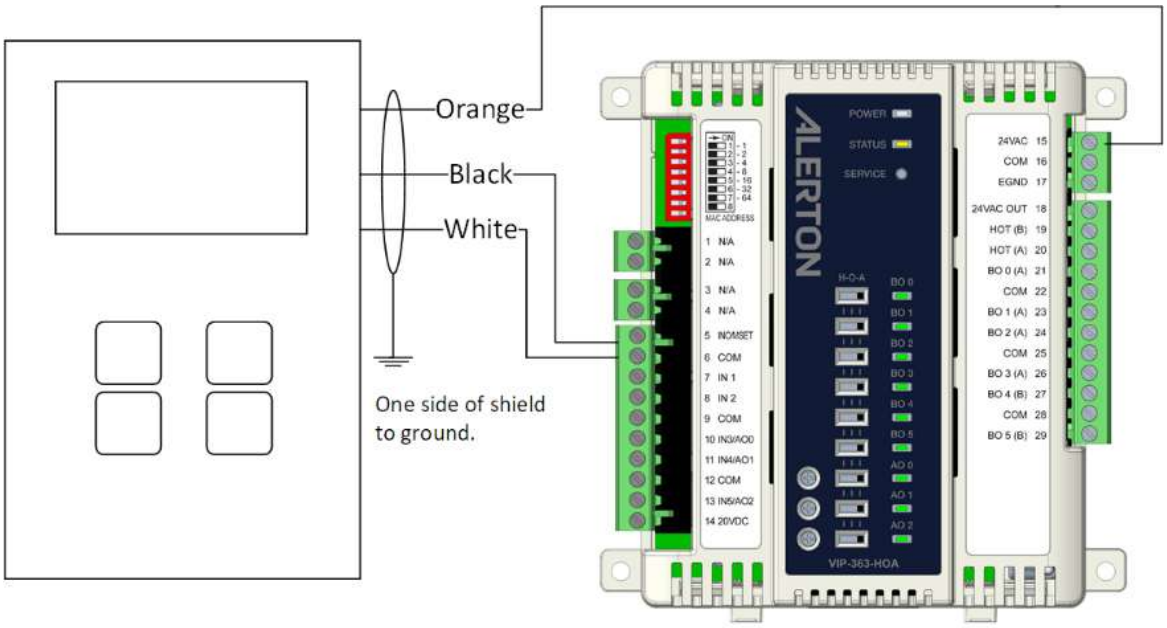

Figure 18. Microset II terminal wiring

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BACtalk Microset™ sensor Part numbers: MS 1010 BT, MS 1010H BT, MS1020 BT, MS 1020H BT, MS 1030 BT, MS 1030H BT

A BACtalk Microset sensor has a two-conductor connection to a VIP-363.

Wiring is as follows:

- Black wire: Connects to the terminal labeled IN-0/MSET.
- White wire: Terminates to COM.

The Microset uses a 10 kΩ. thermistor for its space temperature sensor.

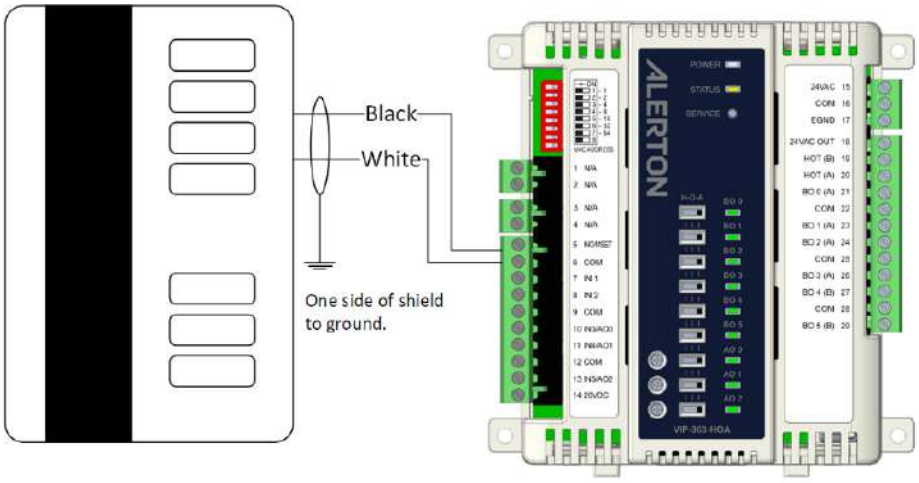

Figure 19. Microset terminal wiring

BACtalk Microtouch™ wall sensor Part Number: TS 1050 BT

A BACtalk Microtouch wall sensor has a three-conductor connection to all VIP-363 devices. It uses two input terminals, IN-0 and IN-1, and a COM terminal. Wiring is as follows:

- Yellow wire: (10 kΩ space temperature thermistor) Terminates to IN-0.
- White wire: (ground) Terminates to COM.
- Red wire: (setpoint bias) Terminates to IN-1.

NOTE: See *Table 13. deviomap.csv header descriptions on page 43* for more information. Mapping required for Microset Setpoint biasing. IN-1 configured as 1: Counts (MV-9031).

The setpoint bias potentiometer is a 5 kΩ single-turn potentiometer that reads 1.9 kΩ to 2.8 kΩ as the setpoint bias lever travels from the C to H position.

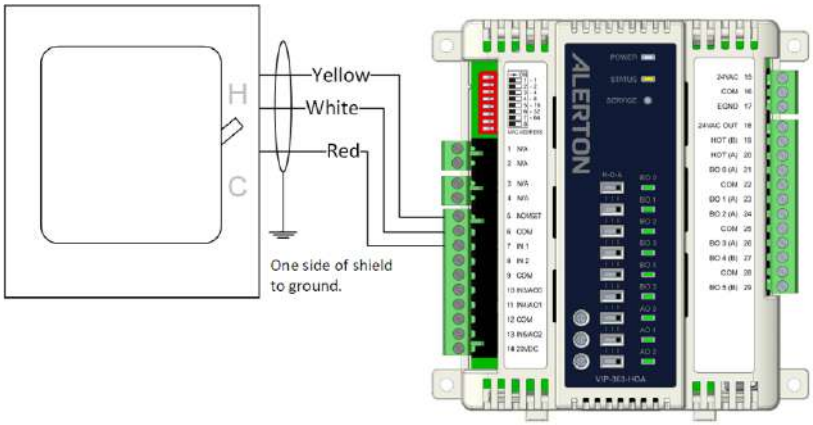

Figure 20. Microtouch terminal wiring

Resistive inputs (thermistors and potentiometers)

When measuring resistive input values, an infinitely great resistance (an open circuit) results in a count near the top of the full range, while an infinitely small resistance (a short circuit) results in a count of 0.

Wire the potentiometer leads across the desired IN terminal and the adjacent COM terminal (no polarity).

Thermistors:

The Alerton sensors utilize a thermistor that has specific characteristics. They are commonly referred to as Type 2 unicurve 10 kΩ at 77 Deg F., and more importantly, follow the R-T curve 16, as noted in the following Honeywell reference:

https://sensing.honeywell.com/sensing.honeywell.com/resistance-temperature-conversion-table-no-162

The most common resistive input types are 10 kΩ thermistors They are recommended for all temperature-sensing applications. BACtalk wall, duct, and immersion sensors, Microset, Microset II, Microset 4, and Microtouch sensors use 10 kΩ thermistors. Both 10 kΩ and 3 kΩ

thermistors have a software setup in the VIP controllers that eliminates the need for custom scaling. Simply specify the type of thermistor and the input reports degrees in Fahrenheit or degrees Celsius as appropriate.

Potentiometers:

Alerton highly recommends 10 kΩ potentiometers for all applications because they yield the best resolution. As the potentiometer moves from 0 to 10 kΩ, raw counts move through half of the full range.

Application conditions and the precision rating of the potentiometer can cause variations. Always confirm the raw count reading when the potentiometer is at minimum and at maximum. Then scale the input in software with appropriate values.

Counts vs resistance:

Use the following equation to calculate the counts from a given resistance and vice-versa:

Counts = (4095 x R)/(4095 + R)

Resistance = (4095 x counts)/(4095 - counts)

Dry Contact inputs

Dry contact inputs are electrically identical to resistive inputs: an open contact (OFF) ideally results in a count of 4095, and a closed contact (ON) results in a count of 0. In software, built-in trigger and restore values determine when the BI transitions ON and OFF:

- BI = ON when raw counts less than or equal to 448.
- BI = OFF when raw counts greater than or equal to 512.
- BI is unchanged when raw counts are in the range of 449 to 511

Test to ensure that the contact produces appropriate count values as wired to produce ON and OFF signals.

Wire the input leads across the desired IN terminal and the adjacent COM terminal (no polarity).

4mA to 20mA inputs

The VIP controller inputs can be configured in software to accept 0-20mA inputs. Do not use external resistors.

0 VDC to 10 VDC inputs

The VIP inputs can be configured in software to accept 0-10VDC inputs. A 0-5VDC input can be attached but will only use half the available range and will need to be scaled appropriately.

Solid-state switch inputs

Solid-state (transistor) switches can be wired to the VIP controller input terminals. The switch should be listed as acceptable for switching DC currents or for direct connection to programmable logic controllers (PLCs) or DDC controllers. The DC switch should use a transistor on the output.

When wiring these types of switches to the VIP controller input, be careful to maintain polarity. Also, ensure that the switch's ON and OFF states produce input counts appropriate to switch the BI in software. Off-state leakage (if present) or other factors can result in inappropriate software counts. Refer to the information under "Dry contact inputs" on page 27 for these threshold values.

WARNING: DO NOT USE SOLID-STATE SWITCHES WITH AN AC OUTPUT. DO NOT USE SOLID-STATE INPUTS ON IN-0.

PULSE-TYPE INPUTS

Pulse-type inputs can be wired to any universal input EXCEPT IN-0.

Three types of pulse-type inputs can be used: consumption rate, totalizer, or frequency. To use two or all pulse information types per meter, wire the meter to a physical input for each type of pulse data used: for example, consumption rate on IN-1, totalizer on IN-2, and frequency on IN-3, as shown in Figure 21.

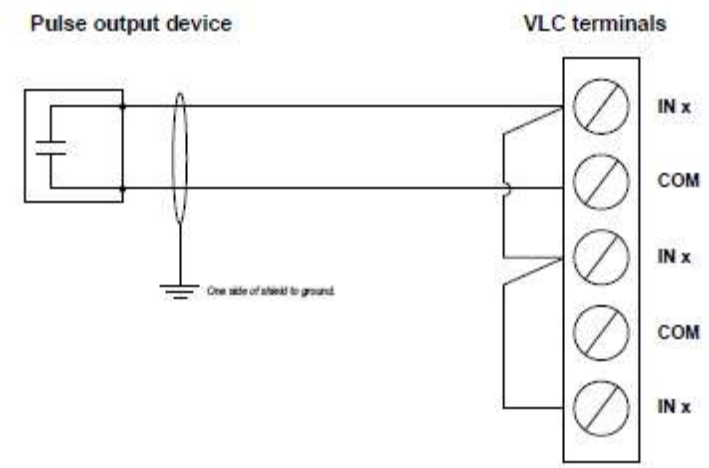

Figure 21. Pulse-type input wiring terminal

The pulse-width range is 10mS to 32 hours. Pulse width is measured from successive trailing edges of consecutive pulses, as shown in Figure 22.

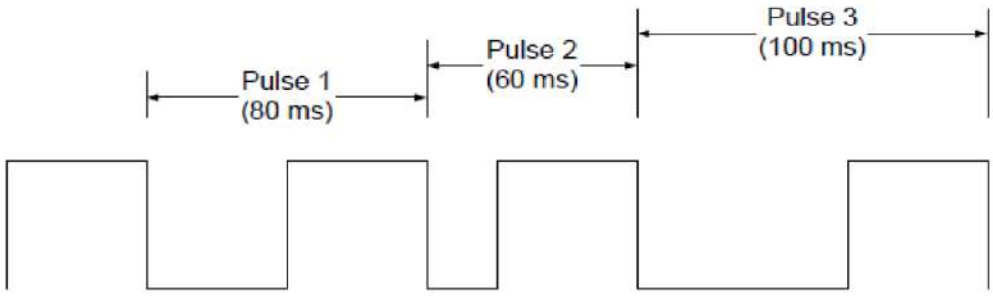

Figure 22. Pulse-width measurement

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NOTE: The fast 10ms pulses are limited to a 50% duty cycle – the pulse must have at minimum a 5ms ON and a 5ms OFF reading to be accurately detected. See pulse 1 above.

If the device generates pulse data, use dry contacts suitable for low current (gold contacts) or a solid-state (transistor) switch.

Analog outputs (AOs)

AOs provide an electrical output signal in response to a software control signal of 0 to 100.

These can be rescaled to fit almost any application. For example, with a BACnet setting of 0-100, the output can provide 0 to 10 V.

WARNING: DO NOT GROUND SHIELD TO ANY TERMINAL ON THE VIP CONTROLLER BECAUSE ANY SIGNAL ON THE SHIELD IS ROUTED THROUGH THE VIP CIRCUIT BOARD TO EARTH GROUND.

For current outputs, there are multiple ways to scale the output; either via provided AVs on the Alerton standard template or with DDC. A 4-to-20mA signal is achieved by scaling the 0-to-100 output signal in software to a 20-to-100 signal with Function 45: Two-point Linear Converter. The same method can be used to obtain a 2 to 10VDC signal. (For details about that function, see the Compass Programmer's Guide and Reference.)

Wire the AO common to the nearest output COM terminal on the VIP controller.

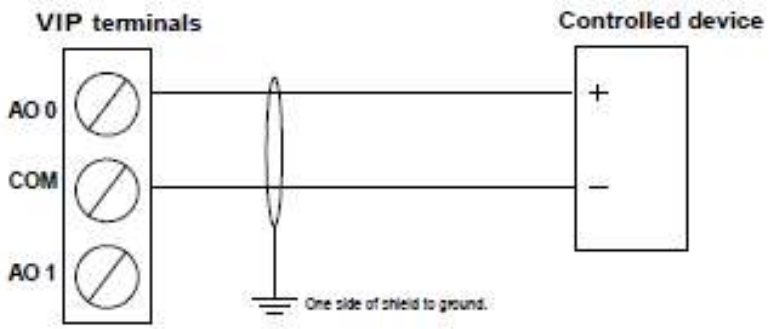

Figure 23. Analog Output COM terminal

Current/ Voltage settings

The VIP controller AOs can be configured to provide either a current (0 to 20mA) or voltage (0 to 10VDC) output.

BINARY OUTPUTS (BO) TERMINALS AND HOT (A) AND HOT (B) TERMINALS

BOs are arranged in groupings (banks). Outputs are labeled BO *n*. Each output has an onboard connection to the HOT terminal for its output bank. HOT terminals are labeled HOT (A) and HOT (B).

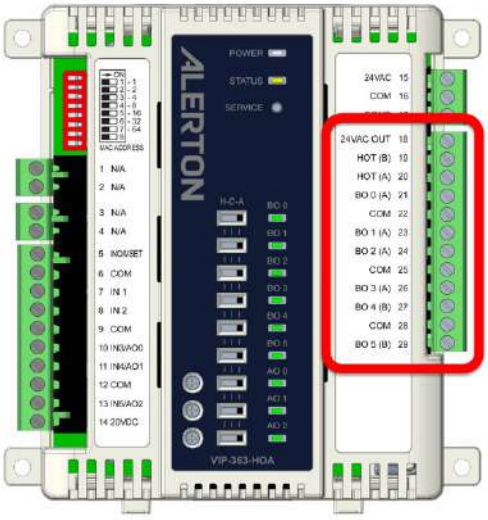

Figure 24. Binary output terminals and HOT (A) and HOT (B) terminals

HOT (A) and HOT (B) terminals can either connect to a dedicated transformer for powering BOs or they can connect to the 24VAC Output terminal and share power with the transformer powering the unit. BO terminals connect to the ungrounded side of the 24V relays or other 24VAC loads.

Table 7. HOT terminal identification and description

Terminal label	Description
HOT (A) or HOT (B)	Use to terminate the hot leg of the 24VAC circuit. This terminal has switched connections to the BO *n* terminals adjacent to it. DO NOT CONNECT THIS TERMINAL TO THE GROUND OR EQUIPMENT DAMAGE WILL RESULT.
BO *n (A|B)*	Use to connect to the ungrounded side of the 24VDC relay or other 24VAC loads. DO NOT CONNECT THIS TERMINAL TO THE GROUND AND MAINTAIN POLARITY FOR ALL CONNECTED LOADS OR EQUIPMENT DAMAGE WILL RESULT.

Each BO can deliver a maximum of 36 VA (24VAC @ 1.5A). Each VIP and VXIO has a “BO MAX LOAD” listed on a label on the end of the device, which indicates the maximum consumption in VA when all BOs are energized.

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 (@36VA each) the total VA of the device will exceed the UL listed and limited maximum rating. **DO NOT EXCEED 100VA MAXIMUM RATING!**

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Always use the BO MAX LOAD figure from the device's label to determine the size and number of transformers required to power BO loads. Even if all BOs are not currently used, this ensures that the transformer(s) will not need to be exchanged to accommodate future additions.

A fast fuse is recommended on the hot leg of the 24VAC BO power circuit to prevent equipment damage from a shorted or faulty relay, a failed damper actuator, a failed transformer, or other wiring or system faults. Size the fuse at 125% of the sum of all loads powered by the transformer.

Ground the BO return to the transformer or panel ground rather than the GND terminal on the VIP controller. This helps reduce the chance of noise from contactors, motors, VFDs, and other devices that return to the VIP controller. (See figure 24.)

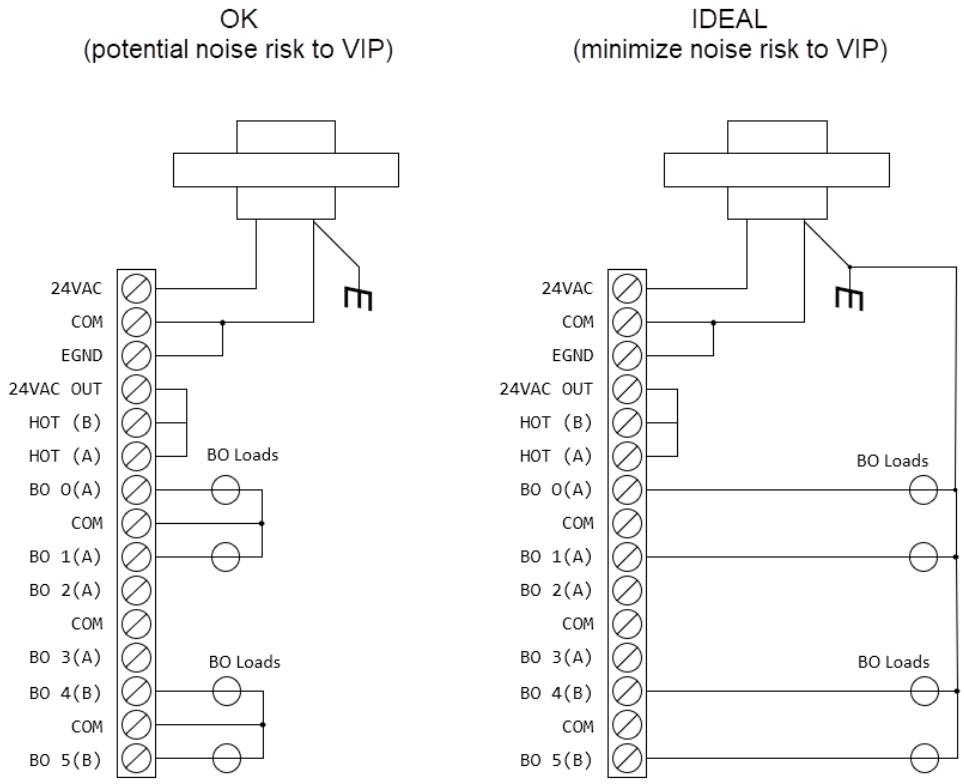


Figure 25. Binary Output noise reduction

See the installation instructions provided with your specific device for more information about wiring requirements.

BO terminals have an adjacent LED that is ON when the corresponding BO is ON. These LEDs are useful to confirm the VIP controller operation during commissioning, check out, and fault isolation.

UIO BOs (12V DC)

UIOs - Universal Input / Outputs can be configured as a 12 VDC BO. The BO switches between the minimum and maximum output values which are 0 and 12 VDC. The 12 VDC for the BO is supplied by the controller itself. Unlike the 24 VAC BOs, there is no way to provide external power for the 12 VDC BOs on the VIP.

Typical usage for both types of BOs (12 VDC and 24 VAC) is controlling pilot relays, though the 24 VAC BOs could power some sort of load elsewhere.

COMMUNICATION

ETHERNET

Ethernet is a high-speed LAN widely installed in commercial buildings.

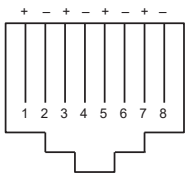
Twisted-pair Ethernet networks use eight conductors (four twisted-pair wires) to carry the network signal. The first pair carries the transmit signal positive and negative. The second pair carries the received signal positive and negative. The other two pairs are bi-directional pairs each with a positive and negative wire. The VIP-363 controller is equipped with a built-in 4-port Gigabit Ethernet switch supporting 10/100/1000BASE-T.

Ethernet RJ-45 jack

An RJ-45 jack for connection to Ethernet. Pin designations for the RJ-45 jack are shown (perspective is looking upside down into the jack).

Table 8. Pin designations for RJ-45 Jack

Pin designations for RJ-45 Jack



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 to connect to an Ethernet switch or from VIP to VIP. Use professionally manufactured cables and a switch that supports 1000 Mbps for best results. Cable length should be no more than 328 feet (100 meters).

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BUILT-IN 4-PORT SWITCH

Port identification

Looking at the ethernet ports directly from the side, port 1 is the port located just above the DIP switch bank. Port 1 is active and cannot be disabled. Ports 2-4 can be disabled in the Device Configuration File (DCF) for security purposes.

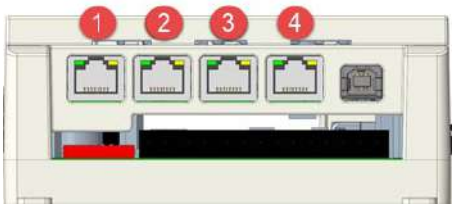

Figure 26. VIP-363 ethernet port identification

Ethernet cabling topology

Controllers can be cascaded with each run between VIP being no more than 328 feet apart (100 meters) – the limit for 10/100/1000Base-T with Cat5e or better cable being used.

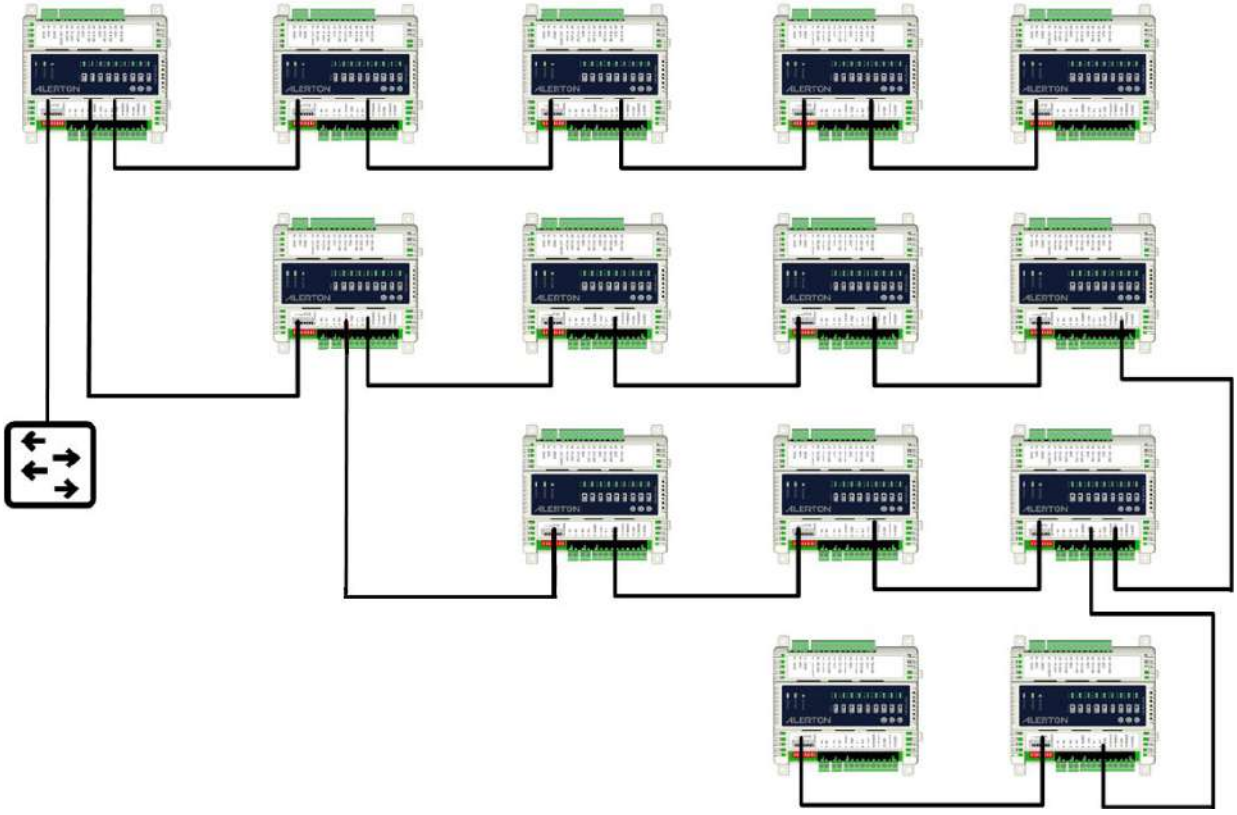

Figure 27. Ethernet cabling topology

WARNING: DO NOT IMPLEMENT LOOPS IN THE ETHERNET CABLING TOPOLOGY WITHOUT ENABLING RSTP. SEE *RSTP ON PAGE 76* FOR MORE DETAILS.

MS/ TP

Use MS/TP LAN communications terminals located on the upper left of the VIP Polarity must be maintained throughout the entire LAN.

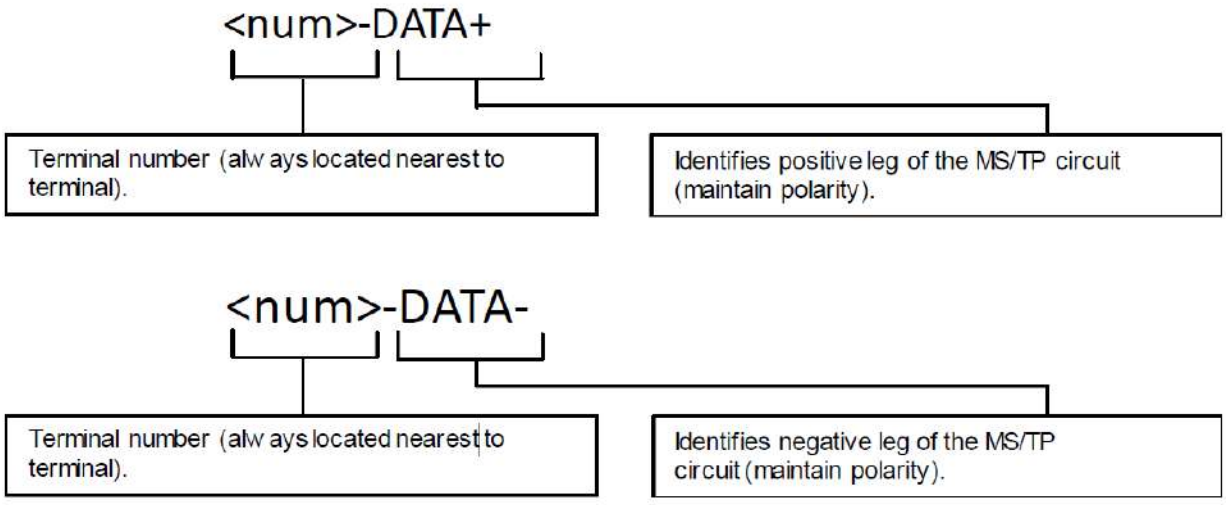

Figure 28.MS/TP LAN Configuration

IO MODULES

A maximum of eight VXIO Expansion Modules can be connected to a VIP-363-HOA Controller via the expansion bus. The VXIO Expansion Modules have male and female connectors which snap into the controller and other VXIO Expansion Modules. The male connector for the VXIO Expansion Module can be snapped into position with the female connector on the VIP-363-HOA controller.

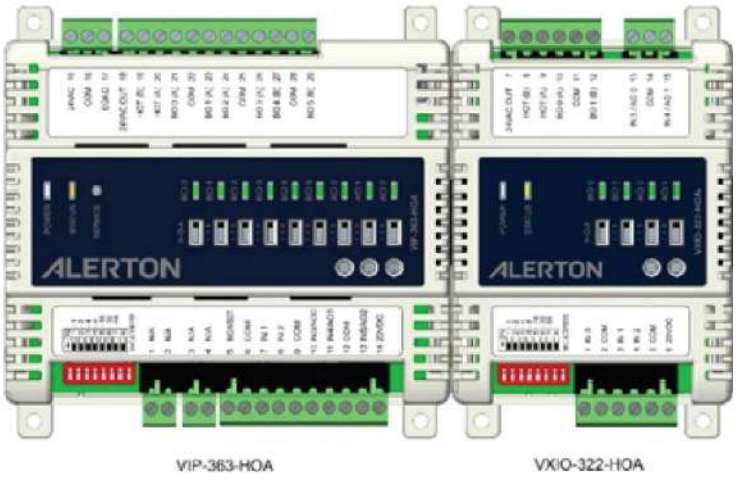

Figure 29. VIP-363-HOA & VXIO-322-HOA modules connected via the expansion bus

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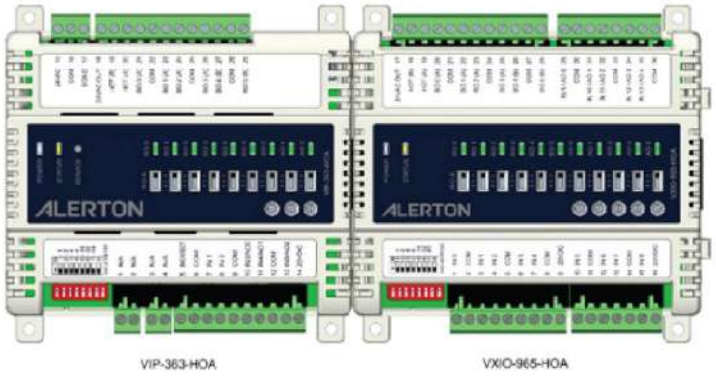

Figure 30.VIP-363-HOA & VXIO-965-HOA modules connected via the expansion bus

NOTE: The VIP-363-VAV supports only one VXIO Expansion Module.

POWER WIRING

The VXIO modules can draw their power from the controller through the expansion bus, or if set up in a remote configuration, draw their power from a separate transformer. Care must be taken to ensure the desired number of VXIO Expansion Modules do not exceed the total VA capability of the transformer powering them – 100VA maximum for a Class 2 rated system. The BOs (24VAC) can draw their power from a separate transformer

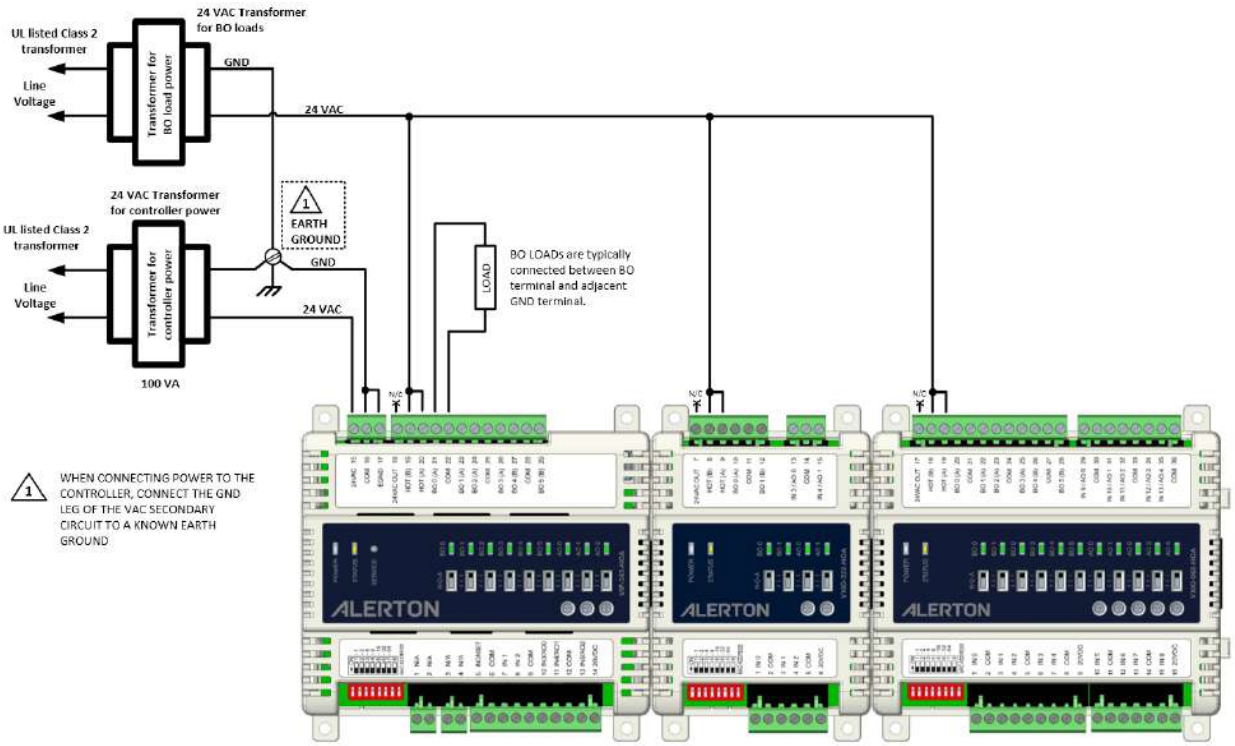

Figure 31. VIP-363-HOA and VXIO Expansion Modules - Separate transformers powering controller and BO loads.

NOTE: The VIP-363-VAV supports only one VXIO Expansion Module.

The following conceptual diagram illustrates some limitations when attempting to maximize the usage of the VIP-363-HOA and VXIO Expansion Modules.

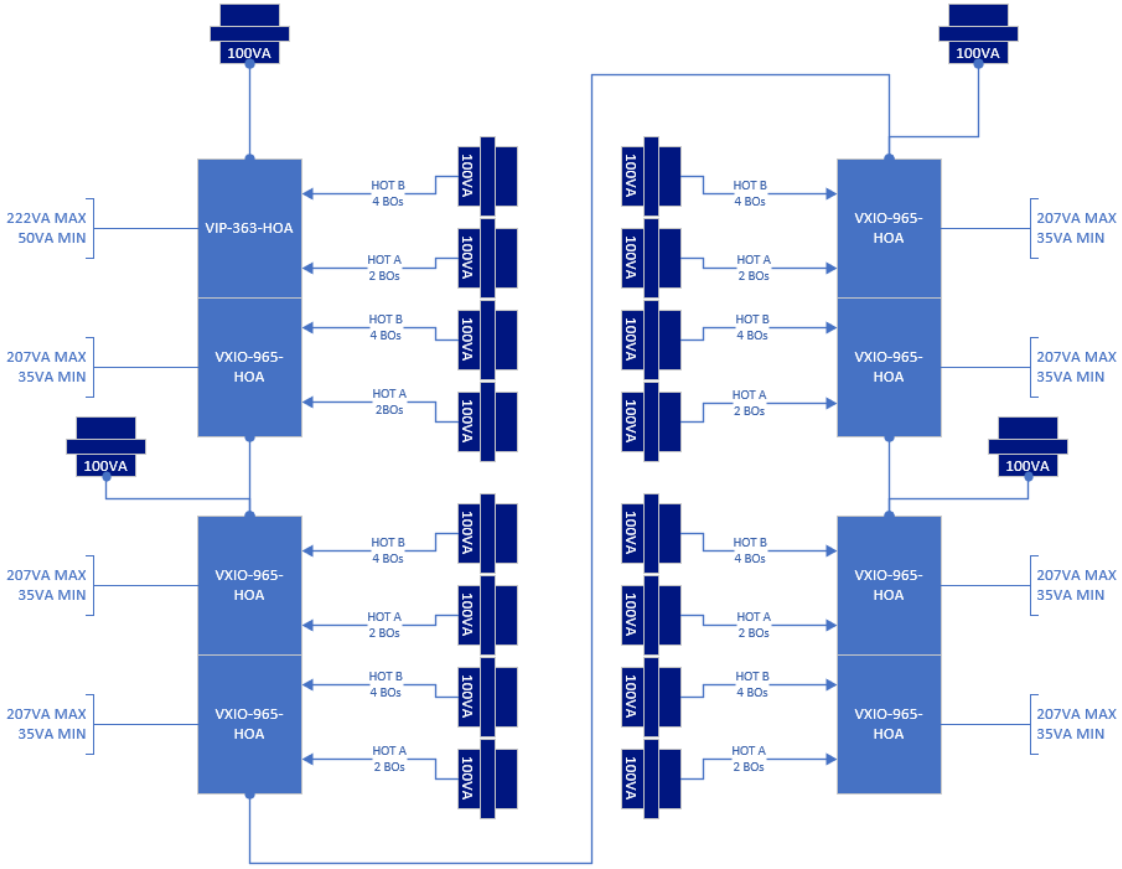

Figure 32. Conceptual example on powering VXIO expansion modules

In this example, the VIP-363-HOA and one VXIO-965-HOA are powered by a single 100VA transformer. Each bank of BOs though are powered by each their own 100VA transformer and are subject to the following limitations or design decisions

Table 9. Transformer sizing for maximum BO output

Each BO is capable of 1.5A MAX OUTPUT (24V @ 1.5A = 36VA)
2 BOs at 1.5A output (72VA) or
4 BOs at 1A output (96VA)

VXIO EXPANSION BUS & CONNECTORS

VXIO Expansion Modules can also be connected remotely to the VIP-363-HOA Controller. When the VXIO Expansion Modules are connected remotely, they need to be powered from a separate transformer.

Expansion Bus communication is based on a proprietary protocol running over multidrop RS-485 LAN; standard RS-485 wiring requirements apply. At the last device on each end of the RS-485 segment, matched terminating resistors wired across EXBUS + and EXBUS – are required for signal integrity (see figure 29).

Typically, precision resistors (1/4 watt ± 1%) in the range of 80-120 Ω 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 RS-485 cable has a listed characteristic impedance of 100 Ω, install 100 Ω matched precision resistors.

CAUTION: Do not mismatch terminating resistors. Ensure that both resistors on a segment have the same value. Using mismatched resistors may result in communication issues and performance degradation.

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

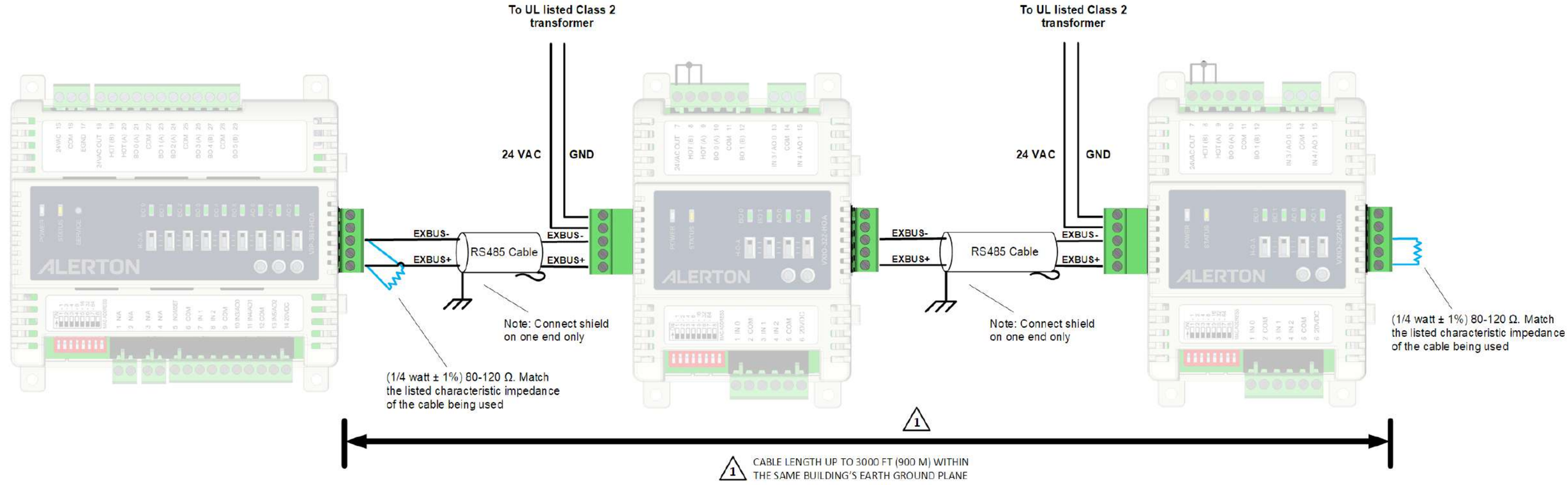

Figure 33. VIP-363-HOA and VXIO Expansion Modules connected remotely via the expansion bus

NOTE: The VIP-363-VAV supports only one VXIO Expansion Module.

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MAC ADDRESSING

Each VXIO Expansion Module must have a unique MAC address using addresses 1 through 8. The MAC address is set by using switches 1 to 4 of the VXIO Expansion Module DIP switch. The physical order of the modules and their MAC address does not matter, but each module must have a unique MAC address. For optimal network performance though, MAC addresses should start with 1 and remain consecutive never exceeding the number set in the “Max VXIO address in use” configuration property of the VIP-363-HOA device.

The DIP switches on the VIP-363-VAV and VIP-363-HOA are not used

Table 10. VXIO Expansion Module MAC address settings

VXIO module Address	Switch #			
	1	2	3	4
1	ON			
2		ON		
3	ON	ON		
4			ON	
5	ON		ON	
6		ON	ON	
7	ON	ON	ON	
8				ON

A warning about gaps in MAC addresses

A user-configurable setting in the device setup provides information to the system as to what the highest MAC address is attached to the VIP-363-HOA. Do not mistake this for the number of VXIO modules attached, though if configured for optimal performance, they should match.

Example:

Three VXIO modules connected to the VIP-363-HOA, and set to MAC addresses 1, 2, & 4. The correct configuration entry would be 4 – not 3. If set to 3, the VIP-363-HOA would limit communication to modules at MAC addresses 1, 2, & 3. The module at MAC address 4 would never be seen. By setting to 4 in this example all 3 modules would be communicated with. The impact here though is that the VIP-363-HOA will believe it has four VXIO modules connected to it and will continuously attempt to contact the missing VXIO at MAC address 3. This results in timeouts attempting to communicate with the missing device and an impact on performance. Thus, the MAC address settings of the VXIO modules must be equal to or lower than the configuration property in the VIP-363-HOA device.

VIP-363 I/O Points Objects

The BACnet object instances associated with the input/output points of the VIP-363 are different than other VisualLogic controllers. With the VIP-363 the BACnet object instances for the controller inputs and outputs are in the 9000-9999 range, example IN-0 is AI-9000 and BI-9000, BO-1 is BO-9001, AO-2 is AO-9002, etc. To make it easier for you to migrate an existing VLC/VAV or VLCA application you can remap the VIP-363 I/O points (including VXIO I/O points) to match your existing application. For example, you can remap AI-9000 to AI-0, thus allowing you to reuse existing applications without having to edit DDC, Displays, and Templates.

The overall point ranges are as follows:

Table 11. Point Object assignments for VIP-363-HOA and VIP-363-VAV.

Input/Output	BACnet Object Assignments
IN-0 to IN-5	AI-9000 to AI-9005 BI-9000 to BI-9005
BO-0 to BO-5|8*	BO-9000 to BO-9005|9008*
AO-0 to AO-2	AO-9000 to AO-9002

* With the UIO terminals configured for BOs, you can have up to 9 BOs (0-8, or 9000-9008)

Table 12. Point Object assignments for VXIO Modules, where x = VXIO module MAC address 1 through 8.

VXIO Model	Input/Output	BACnet Object Assignments
VXIO-322	IN-0 to IN-4	AI-x000 to AI-x004 and BI-x000 to BI-x004
	BO-0 to BO-1|3*	BO-x000 to BO-x001|x003*
	AO-0 to AO-1	AO-x000 to AO-x001
VXIO-965	IN-0 to IN-13	AI-x000 to AI-x013 and BI-x000 to BI-x013
	BO-0 to BO-5|10**	BO-x000 to BO-x005|x010**
	AO-0 to AO-4	AO-x000 to AO-x004

* With the UIO terminals configured for BOs, you can have up to 4 BOs (0-3, or 0x000-x003) on the VXIO-322
** With the UIO terminals configured for BOx, you can have up to 11 BOs (0-10, or x000-x010) on the VXIO-965

NOTE: The base module and expansion I/O points are always accessible in the 1000 to 9999 instance range. These points are always accessible as long as the module is connected. If the module is disconnected (no communication), the associated points disappear from the controller.

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REMAPPING OF IO POINTS

The VIP controllers support the concept of remapping the I/O points. The purpose of point remapping allows you to drop in replace the Alerton VLC, VAV, VLC-E, & VAV-E MS/TP controllers with a VIP configuration. The VisualLogic DDC files after a minor update from .bd4 to .bd9 are a direct drop-in, and the Compass displays and templates are ready to use, no device instance updating required. What point remapping accomplishes is taking the device instance base I/O and assigning it as a new virtual I/O point. For example, base AI I/O is AI-9000. AI-9000 may be remapped as AI-0. DDC loaded into the controller, and Compass graphics and templates that use AI-0, are automatically link to the remapped values. The range of point number remapping is 0-999. Any values greater than 999 will be rejected by the VIP controllers.

CONFIG VIP+VXIO AS VLC-853

As a practical example, let's create a VIP solution for a VLC-853 controller.

The VLC-853 I/O point configuration consists of:

- 8 Analog Inputs
- 8 Binary Inputs
- 5 Binary Outputs
- 3 Analog Outputs

The VIP-363-HOA I/O configurations consist of:

- 3 Analog Inputs
- 3 Binary Inputs
- 5 Binary Outputs
- 3 Analog Outputs

- 5 Analog Inputs
- 5 Binary Inputs
- 5 Binary Outputs
- 0 Analog Outputs

The VXIO-322-HOA I/O configurations consist of:

- 3 Analog Inputs
- 3 Binary Inputs
- 2 Binary Outputs
- 2 Analog Outputs

- 5 Analog Inputs
- 5 Binary Inputs
- 2 Binary Outputs
- 0 Analog Outputs

The VXIO-965-HOA I/O combinations:

- 9 Analog Inputs
- 9 Binary Inputs
- 6 Binary Outputs
- 5 Analog Outputs

Reviewing I/O combinations above, the best fit is a base VIP-363-HOA and a VXIO-322-HOA, as the VXIO-965-HOA is overkill. After analyzing the base universal I/O points on the 363 and 322, the 363 has 3 AOs and the 322 has 2 AOs. The best choice is to reconfigure the VXIO 322's universal I/O and use the 363's AOs as part of the VLC-853 remapping. The following charts illustrate the universal point alignments and how they need to be reconfigured to facilitate the point remapping.

Starting with the VXIO-322 configure the using the "I/O Points Hardware Mode" selections to configure the UI/O.

I/O Points Hardware Mode[1]
AI-0 / BI-0 (resist/PB)
AI-1 / BI-1 (resist/PB/pulse)
AI-2 / BI-2 (resist/PB/pulse)
AO-0 (0-10V)
AO-1 (0-20mA)

I/O Points Hardware Mode[1]
AI-0 / BI-0 (resist/PB)
AI-1 / BI-1 (resist/PB/pulse)
AI-2 / BI-2 (resist/PB/pulse)
AI-3 / BI-3 (resist/PB/pulse)
AI-4 / BI-4 (resist/PB/pulse)

This example uses the MAC address 1 for the VXIO-322. Now the VXIO-322 universal I/O AI-3 and AI-4 are part of the new points for the I/O remapping.

VXIO: 1	Base I/O Point Settings[2]			UIO Remap Instance[3]	
Hdwe Type	Point	Instance	Name	Point	Inst
IN 0	AI	1000	AI 1-0	AI	0
IN 1	AI	1001	AI 1-1	AI	1
IN 2	AI	1002	AI 1-2	AI	2
IN 3|AO0|BO2	AI	1003	AI 1-3	AI	3
IN 4|AO1|BO3	AI	1004	AI 1-4	AI	4
Hdwe Type	Point	Instance	Name	Point	Inst
IN 0	BI	1000	BI 1-0	BI	0
IN 1	BI	1001	BI 1-1	BI	1
IN 2	BI	1002	BI 1-2	BI	2
IN 3|AO0|BO2	BI	1003	BI 1-3	BI	3
IN 4|AO1|BO3	BI	1004	BI 1-4	BI	4
Hdwe Type	Point	Instance	Name	Point	Inst
BO 0 (A)	BO	1000	BO 1-0	BO	0
BO 1 (A)	BO	1001	BO 1-1	BO	1
IN 3|AO0|BO2	BO		BO 1-2	X	2
IN 4|AO1|BO3	BO		BO 1-3	X	3
Hdwe Type	Point	Instance	Name	Point	Inst
IN 3|AO0|BO2	AO		AO 1-0	X	0
IN 4|AO1|BO3	AO		AO 1-1	X	1

The VIP-363-HOA's points shall be renumbered (remapped) to point instances consistent with the VLC-853. The VXIO points shall remain as their original values. The following illustrates the remapped points (yellow highlights). Configure the I/O points to correctly align with the VLC-853 I/O points.

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1	Base I/O Point Settings[2]			JIO Remap Instance[3]	
Hdwe Type	Point	Instance	Name	Point	Inst
IN 0 / MSET	AI	9000	AI 0	AI	5
IN 1	AI	9001	AI 1	AI	6
IN 2	AI	9002	AI 2	AI	7
IN 3 | AO0 | BO6	AI		AI 3	X	3
IN 4 | AO1 | BO7	AI		AI 4	X	4
IN 5 | AO2 | BO8	AI		AI 5	X	5
					Inst
IN 0 / MSET	BI	9000	BI 0	BI	5
IN 1	BI	9001	BI 1	BI	6
IN 2	BI	9002	BI 2	BI	7
IN 3 | AO0 | BO6	BI		BI 3	X	3
IN 4 | AO1 | BO7	BI		BI 4	X	4
IN 5 | AO2 | BO8	BI		BI 5	X	5
					Inst
BO 0 (A)	BO	9000	BO 0	BO	2
BO 1 (A)	BO	9001	BO 1	BO	3
BO 2 (A)	BO	9002	BO 2	BO	4
BO 3 (A)	BO	9003	BO 3	BO	5
BO 4 (B)	BO	9004	BO 4	BO	6
BO 5 (B)	BO	9005	BO 5	BO	7
IN 3 | AO0 | **BO6**	BO		BO 6	X	6
IN 4 | AO1 | **BO7**	BO		BO 7	X	7
IN 5 | AO2 | **BO8**	BO		BO 8	X	8
					Inst
IN 3 | **AO0** | BO6	AO	9000	AO 0	AO	0
IN 4 | **AO1** | BO7	AO	9001	AO 1	AO	1
IN 5 | **AO2** | BO8	AO	9002	AO 2	AO	2

The VIP-363-HOA's IN0 AI/BI 0, IN1 AI/BI 1, and IN2 AI/BI 2 are changed to IN0 A I /BI 5, IN1 AI/BI 6, and IN2 AI/BI 7.

Now a comma-separated value file, **DevIOMap.csv**, needs to be created using a text editor, Microsoft Excel, or the Alerton VIP-363-HOA and VIP-363-VAV builder tools.

There are four columns of the following:

Table 13. deviomap.csv header descriptions

Column header	Description
Type	Type of point to be remapped – AI, AO, BI, BO
Inst	The target point instance for the mapping
Origin Type	Originating point type being mapped – AI, AO, BI, BO
Origin Inst	Originating point instance being mapped.

For reference, the **DevIOMap.csv** file contains the original point instance and the remapped point instance id for a specific type of point as shown in Figure 33:

```
Type,Inst,Origin Type,Origin Inst
AI,5,AI,9000
AI,6,AI,9001
AI,7,AI,9002
,,,
BI,5,BI,9000
BI,6,BI,9001
BI,7,BI,9002
,,,
BO,2,BO,9000
BO,3,BO,9001
BO,4,BO,9002
BO,5,BO,9003
BO,6,BO,9004
BO,7,BO,9005
,,,
AO,0,AO,9000
AO,1,AO,9001
AO,2,AO,9002
,,,
AI,0,AI,1000
AI,1,AI,1001
AI,2,AI,1002
AI,3,AI,1003
AI,4,AI,1004
,,,
BI,0,BI,1000
BI,1,BI,1001
BI,2,BI,1002
BI,3,BI,1003
BI,4,BI,1004
,,,
BO,0,BO,1000
BO,1,BO,1001
```

Figure 34. Example of deviomap.csv file

This file should be named **DevIOMap.csv** file and MUST be saved in the corresponding device folder within the Compass Rep/Job (for example, “Dev9999”). This file (when present), will be sent to the VIP device when a Point Data Send is performed from Compass Device Manager.

VIP CONFIGURATION

BEFORE YOU BEGIN

What you'll need

1. A standard USB 2.0 printer cable – USB-Type A (M) to USB-Type B (M) – see Figure 34.
2. A serial terminal program like PuTTY
3. A serial port driver
4. An installation of Compass version 1.6.3 or later
5. (Optional) edit registry as described in APPENDIX C: COM port registry edit to prevent allocating a new COM port for each device.

Figure 35. USB 2.0 printer cable

COMPATIBILITY INFORMATION FOR ALERTON DEVICES

The VIP is optimized to work with Compass operator workstation software version 1.6.3 or later.

NOTE: The ability to configure a VIP controller from the console is not supported from VIP-363 ROC v 1.5.3 and later.

TERMINAL PROGRAM SETTINGS

There are several available serial terminal programs available to choose from. For demonstration and documentation purposes we are using PuTTY.

Configure your terminal program to use the following settings:

Serial Line / Port = COM4*
Speed (Baud) = 115200
Data Bits = 8
Stop Bits = 1
Parity = Non
Flow control = XON/XOFF

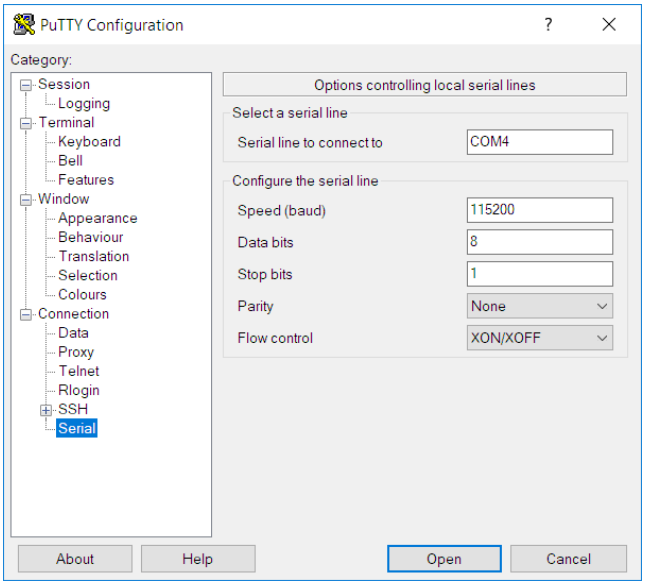

Figure 36. PuTTY settings

* The COM port used will vary from computer to computer. Use Windows Device Manager to identify which COM port is actively being used for your computer. See *APPENDIX B: Serial port driver download & installation* for steps to see if your COM port is properly identified.

COMPASS DEVICE CONFIGURATION

The configuration of the VIP controller can be completed like most other Alerton controllers by doing the following:

1. From the Compass menu, click **Device Manager.**
2. Click Device Scan.
3. Choose the option Scan configurable Alerton devices.
4. Click **Scan.**
5. As soon as the VIP-363 device appears, click **Stop.**
6. Click Configure.

RECOVERING FROM A MISCONFIGURATION

If the communication with VIP-363 is not possible due to incorrect or unknown configuration, then the user can use Compass's "Scan for configurable devices" feature via BACnet/ Ethernet. In case the VIP-363's ports 2-4 are disabled, you may have to do this through port 1.

INITIAL SCREEN

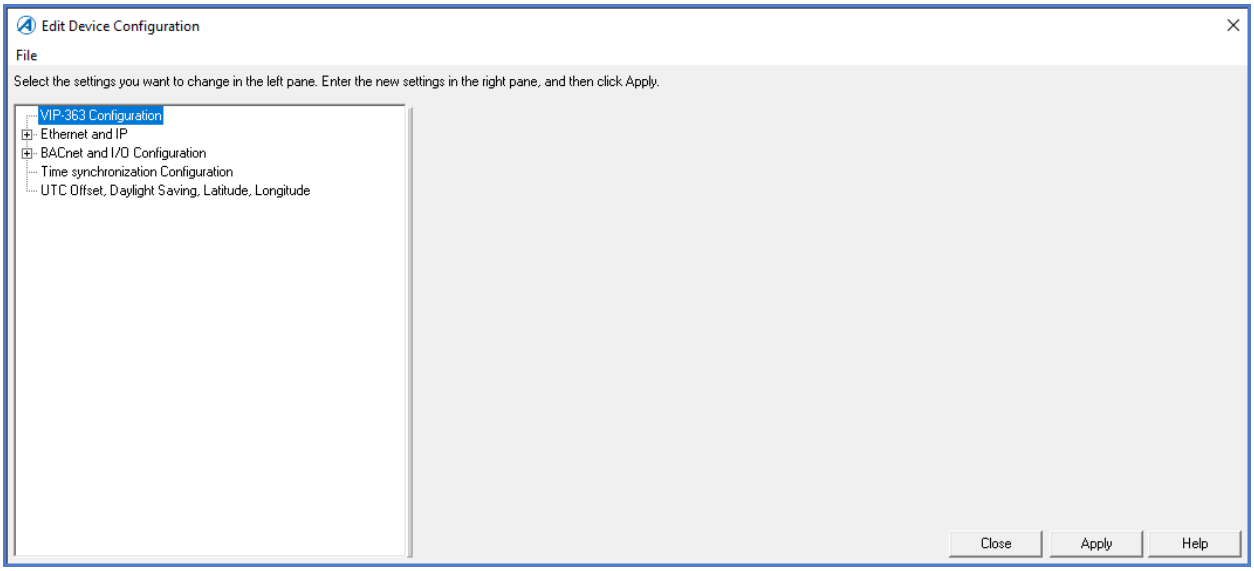

Figure 37. Edit Device Configuration

ETHERNET AND IP

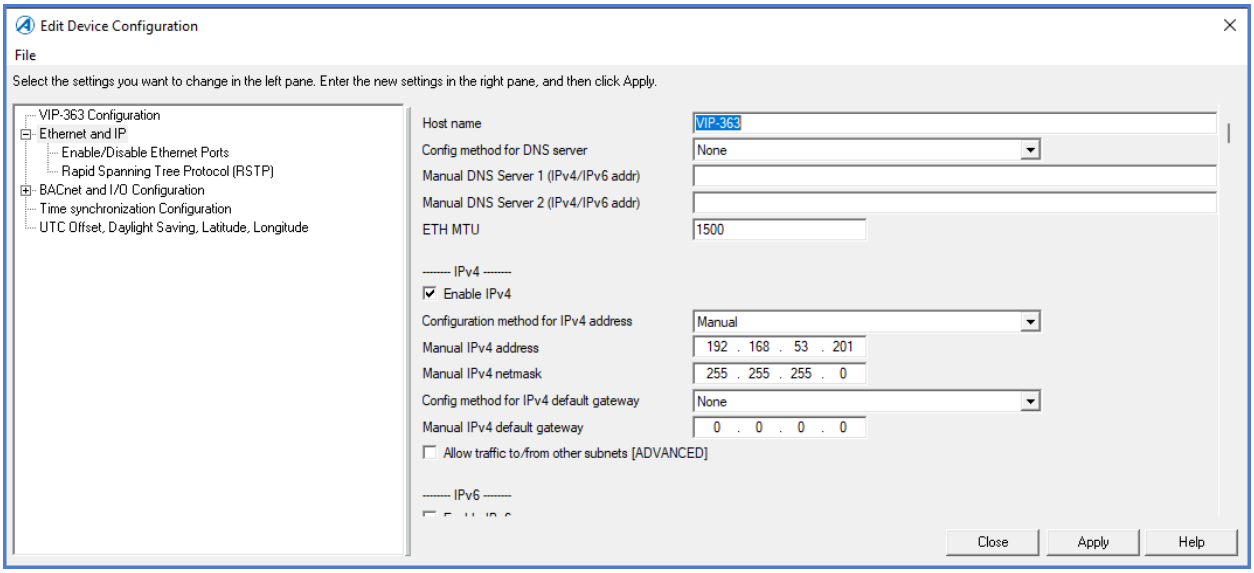

Figure 38. Edit Device Configuration, Ethernet, and IP Settings

Table 14. Ethernet and IP Settings

Configuration Parameter	Values	Description	Default
Host name		Must be valid hostname and not contain an underscore "_".	VIP
Config method for DNS server	DHCPv4 | SLAAC | Manual | None	Method how DNS will be configured for this device.	None
Manual DNS Server 1 (IPv4/IPv6 addr)		Manual entry for DNS entry. Only valid if Manual was selected as the Config method for DNS server above.	Blank
Manual DNS Server 2 (IPv4/IPv6 addr)		Manual entry for DNS entry. Only valid if Manual was selected as the Config method for DNS server above.	Blank
ETH0 MTU		The Maximum Transmission Unit (MTU) in bytes. Default is 1500 (typical for Ethernet networks).	1500
IPv4 Info			
Enable IPv4	Y | N	Enable/Disable the IPv4 Protocol	Y
Configuration method for IPv4 address	DHCP | Manual	How will IPv4 address be obtained	Manual
Manual IPv4 address		IP address input if manual IPv4 address configuration was selected above	192.168.1.100
Manual IPv4 netmask		Subnet mask input if manual IPv4 address configuration was selected above.	255.255.255.0
Config method for IPv4 default gateway	DHCP | Manual | None	How will default gateway selection be set	None
Manual IPv4 default gateway		Default gateway input if manual default gateway configuration was selected above.	0.0.0.0

Configuration Parameter	Values	Description	Default
Allow traffic to/from other subnets [ADVANCED]	Y | N	Security feature to prevent devices from another subnet from reaching this device.	N
IPV6 Info			
Enable IPv6	Y | N	Enable/Disable the IPv4 Protocol	N
Configuration method for IPv6 address	SLAAC | Manual	How will IPv6 address be obtained	SLAAC
Manual IPv6 address		IPv6 address input if manual IPv6 address configuration was selected above	: :
Manual IPv6 prefix bits		Manual entry for IPv6 network prefix	64
Config method for IPv6 default gateway	None | SLAAC | Manual	Configuration setting for the method used for setting IPv6 default gateway	None
Manual IPv6 default gateway		Default gateway input if manual IPv6 address configuration was selected above.	: :
Allow traffic to/from other subnets [ADVANCED]	Y | N	Security feature to prevent devices from another subnet from reaching this device.	N
Enable/Disable Ethernet Ports >>		Advance to sub-menu to enable or disable ethernet ports 2, 3, & 4.	

BACnet and IO Configuration

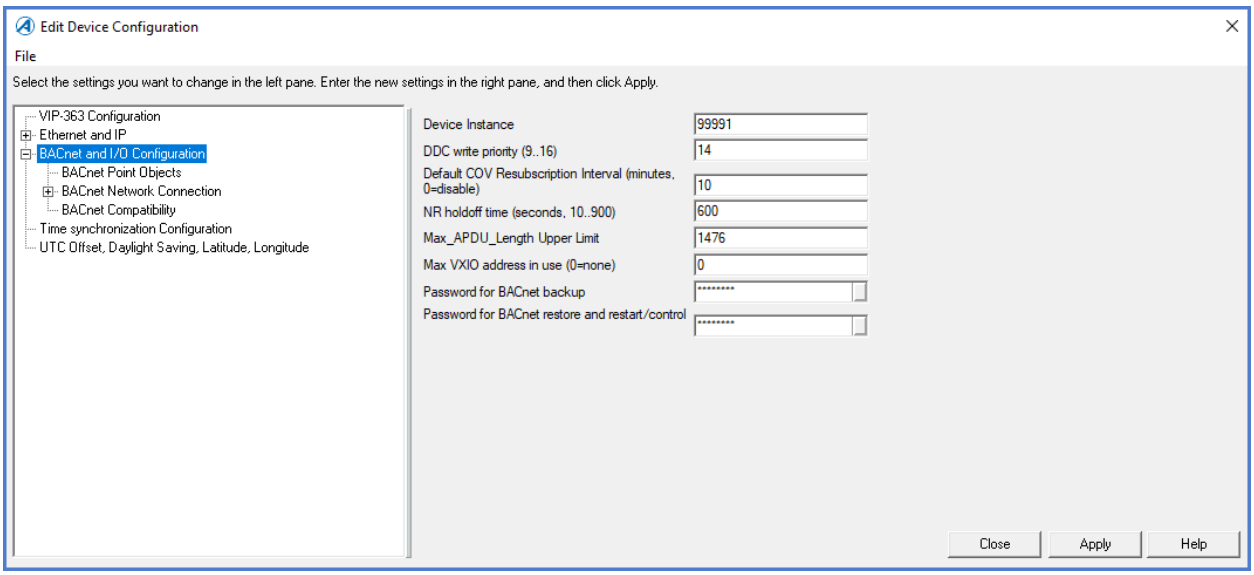

Figure 39. BACnet and IO Configuration

Table 15. BACnet and IO Configuration

Configuration Parameter	Values	Description	Default
Device Instance		The numeric instance of the VIP as a device on the BACnet network (must be unique for the entire system).	9999
DDC write priority (9 to .16)	9 to 16	A higher priority for writing takes precedence over lower priorities. The highest priority is 1, the lowest is 16. These are also called indexes of the priority array. This table depicts the typical priorities used. Feature / Priority for writing Global DDC: 9 Event schedule: 13 Unitary DDC: 14 Holiday schedule: 15 Standard schedule: 16	14
Default COV Resubscription Interval (minutes, 0=disable)	0 to 10	This value is the interval in minutes that the VIP will use for re-subscribing to external points to be notified on changes of value (if the external device does not support the change of value notifications, the VIP will default to polling). **NOTE:** A value of 0 will disable the VIPs ability to send COV Subscriptions.	10
NR holdoff time (seconds, 10 to .900)	10 to 900	To enhance performance and reduce wasted bandwidth when devices are not present, or temporarily offline, the VIP will fall back to a periodic communications check for devices to which it has stopped receiving responses. The NR Holdoff Time specifies the time in seconds the VIP will wait after determining a device is offline before trying to talk to it again. It is recommended to set this value low for the initial setup (1-2min), then bump it up once everything is up and working. Minimum of 10 seconds, maximum of 900 seconds (15 minutes) default is 600 seconds (10 minutes).	600

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Max_APDU_Length Upper Limit	1024 to 1476	Maximum BACnet message size the device can/will accept. Typically associated with complex data or read property multiple requests. For IPv6 installations, it is recommended to drop this down to 1440 or lower.	1476
Max VXIO address in use (0=none) (VIP-363-HOA model only)	0 to 8	Highest VXIO module MAC address the VIP will talk to. Minimum is 0, maximum is 8, default is 0. This setting impacts access to the VXIO modules and the performance of the VIP. If not set to the highest MAC address of the VXIO module connected, the VIP will not see the attached VXIO. Alternatively, if this number is higher than the number of VXIO modules attached to it, performance will be impacted as the VIP attempts to poll for the missing VXIO module and will experience timeout conditions. It is recommended to keep the expansion modules numbered in series from 1 to 8 from the first VXIO Expansion Module to minimize potential confusion.	0
Password for BACnet Backup **NOTE:** This setting is only available in the Device Configuration screens within Compass		This is the password used for the BACnet Device Communications Control (Backup Password limit is between 8 and 64 characters.	
Password for BACnet Restore and Restart/Control: **NOTE:** This setting is only available in the Device Configuration screens within Compass		This is the password used for the BACnet Device Communications Control (Enable/Disable communications, and Restore), and Reinitialize Device (Reinitialize Warmboot and Reinitialize Coldboot) services. Password limit is between 8 and 64 characters	

BACnet Network Configuration

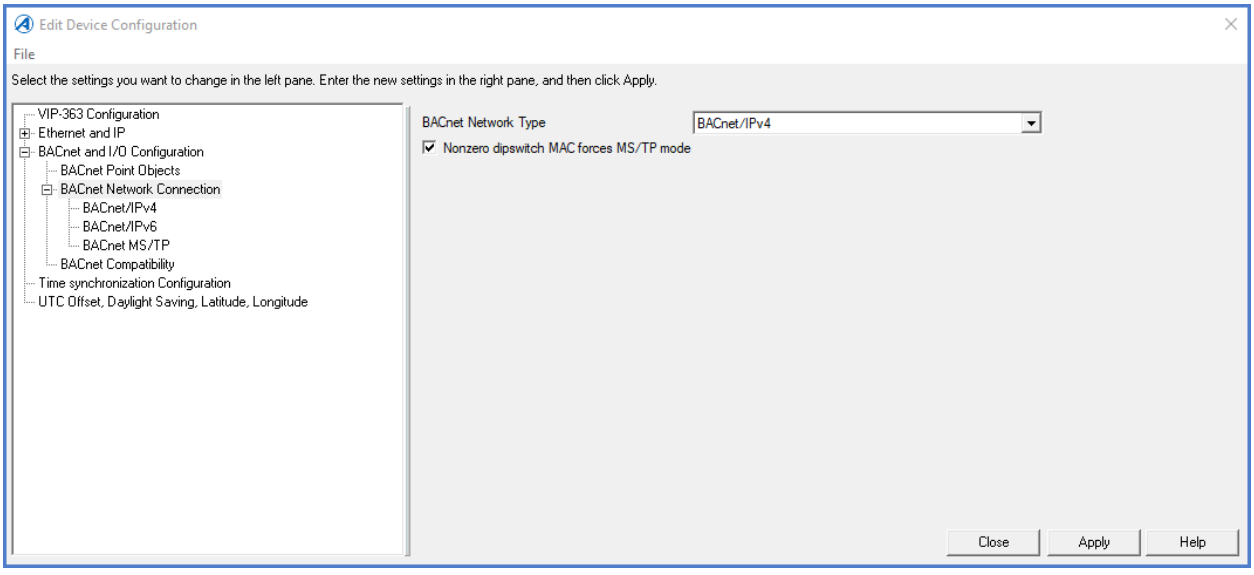

Figure 40. BACnet Configuration

Table 16. BACnet Network Configuration

Configuration Parameter	Values	Description	Default
BACnet Network Type	BACnet IPv4		
Nonzero dipswitch MAC forces MS/TP Mode	Y | N		

BACnet Point Objects

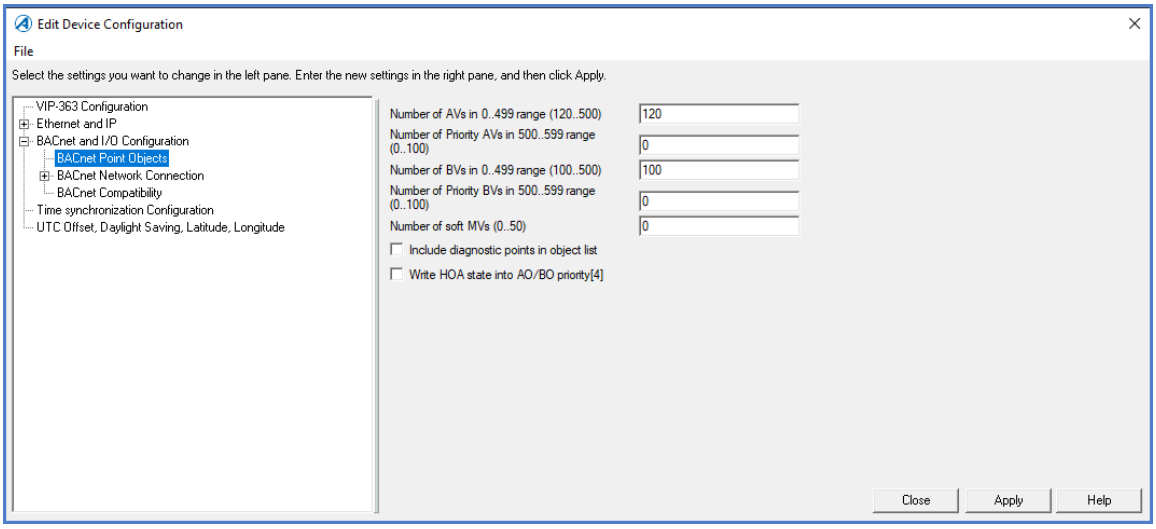

Figure 41. BACnet Point Objects

Table 17. BACnet Point Objects

Configuration Parameter	Values	Description	Default
Number of AVs in 0to499 range (120 to 500)	`0 to 499`	This is the number of general-purpose AVs the VIP will support (Maximum number of 500, starting at 0, default is 120). Includes Reserved Microset/Microtouch Points if a Microset/Microtouch is used.	`120`
Number of Priority AVs in 500 to 599 range (0 to 100)	`0 to 100`	AVs with priority arrays	`0`
Number of BVs in 0 to 499 range (100 to 500)	`0 to 499`	This is the number of general-purpose BVs the VIP will support (Maximum number of 500, starting at 0, default is 100). Includes Reserved Microset/Microtouch Points if a Microset/Microtouch is used.	`100`
Number of Priority BVs in 500 to 599 range (0 to 100)	`0 to 100`	BVs with priority arrays	`0`
Number of soft-MVs (0 to 50)	`0 to 50`	This is the number of general-purpose MVs the VIP will support (Maximum number of 50, starting at 0, default is 0) The number of States and the State-Text values for MV's is configured via Data Displays.	`0`
Include diagnostic points in the object list	Y | N	Diagnostic points in the 100,000+ range will be listed in the Object List property. This allows them to be accessed via Compass's "BACnet Object Explorer" feature.	N

		NOTE: If enabled, diagnostic points will also be saved into the device's point data MDB file, which may not be desirable.	
HOA State into AO & BO	Y | N	Select the checkbox for "HOA state" to check the priority of AO and BO. The commanded output will determine the output values. **NOTE:** It is recommended to label the devices if the "Ignore HOA switches" is selected or HOA switches are disabled.	

BACnet/IPv4

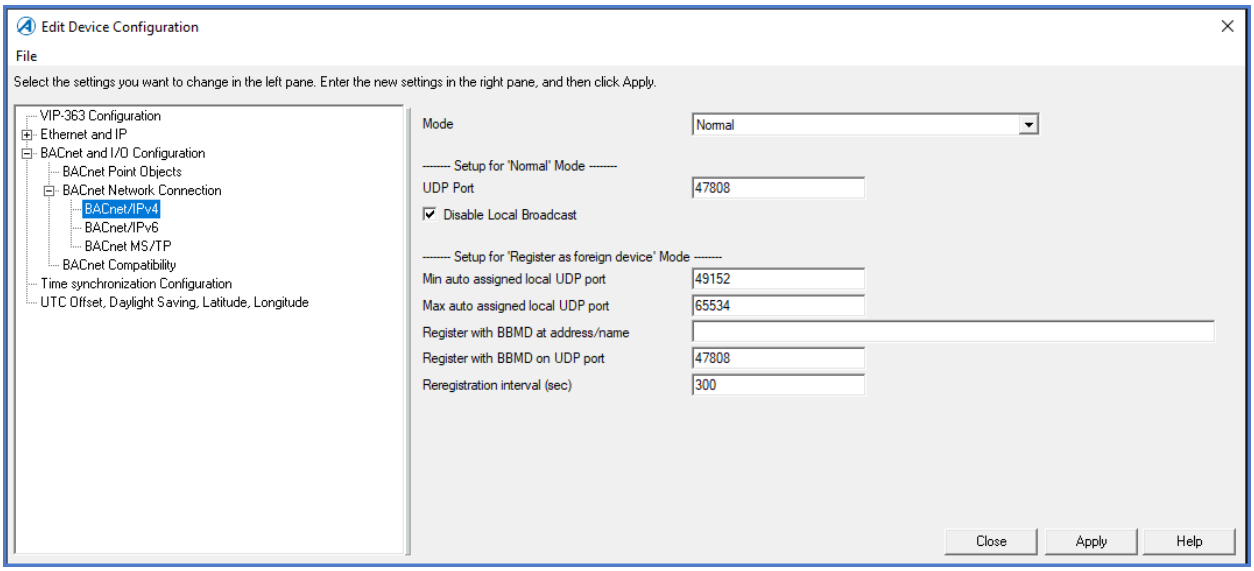

Figure 42. BACnet/IPv4

Table 18. BACnet/IPv4

Configuration Parameter	Values	Description	Default
Mode	Normal | Register as foreign device	Controls the mode of participation on the BACnet network	Normal
Normal mode settings			
UDP Port		Specifies the UDP Port number to be used by BACnet/IPv4. The range is 1-65534, but many numbers are reserved or used for common services unrelated to BACnet (contact the site's IT department for any limitations and restrictions). The default value is 47808 (which corresponds to 0xBAC0 in hexadecimal).	47808
Disable Local Broadcast	Y | N	Prevent the VIP from sending and Broadcast messages on the specified IP network.	N
Register as foreign device mode settings			
Min auto-assigned local UDP port		Automatically assign the minimum UDP Port value to the VIP controller while Registering as a Foreign Device.	49152
Max auto-assigned local UDP port		Defines the maximum UDP Port value for auto assigning to the VIP controller when Registering as a Foreign Device.	65534

Register with BBMD at address/name		Input IP address or Host Name for BBMD to register with. **NOTE:** Host Name Lookup requires setting up a valid DNS Server reference.	
Register with BBMD on UDP port		Specifies the UDP Port number of the BBMD to which you want to register. The range is 1-65534, but many numbers are reserved, or used for common services unrelated to BACnet (contact the site's IT department for any limitations and restrictions). Default is the BACnet standard 47808 (which corresponds to 0xBAC0 in hexadecimal).	47808
Reregistration interval (sec)		Specifies frequency re-registration of the VIP controller with the BBMD. Since Foreign Devices must register with a BBMD to enable broadcast traffic to be received from, and sent to the Foreign Device, and since Foreign device registration is not required to be persisted in the event of a BBMD reset, it is important to select a value for reregistration that balances data criticality with network performance. In most cases the default 300sec (5 minutes), reregistration interval is more than adequate for ensuring the foreign device has connectivity into the system, but in some cases where you have critical data being passed to/from the foreign device, you may want to bump the reregistration up to 60sec, or even the minimum value of 10sec (a full range is 10-3600sec).	300

BACnet/IPv6

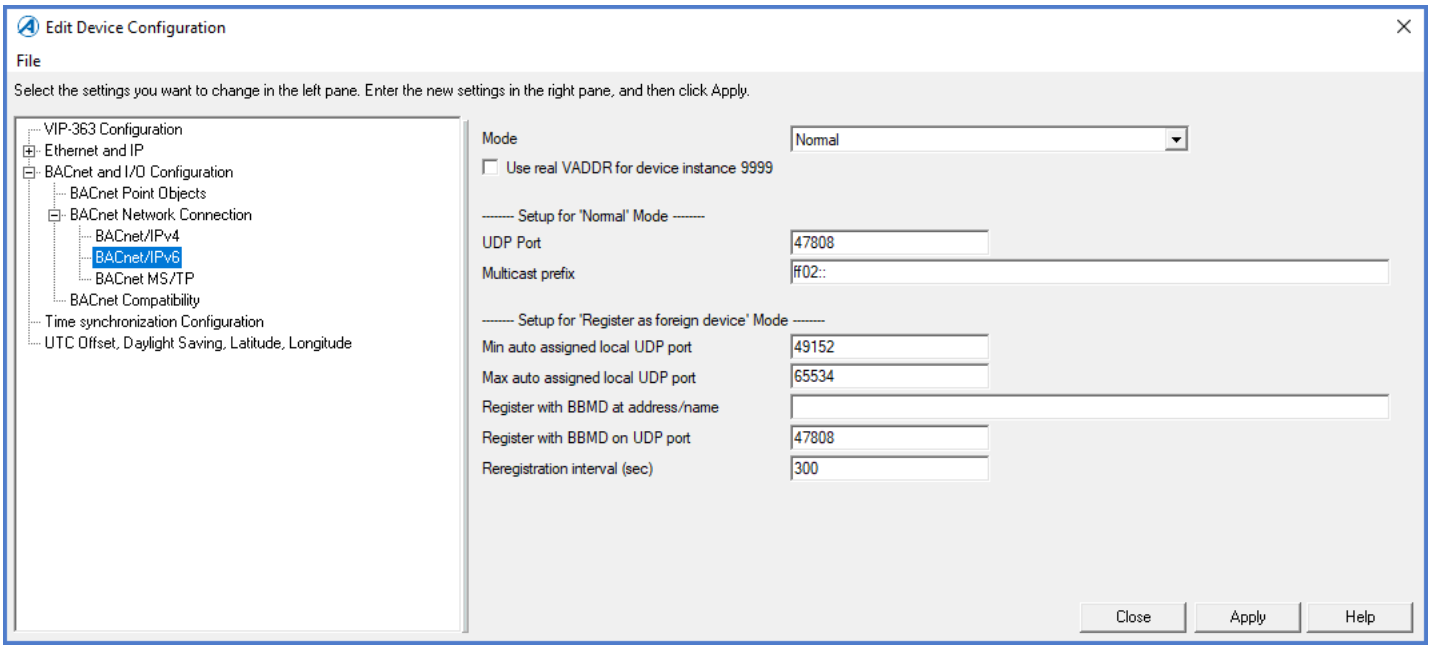

Figure 43. BACnet/IPv6

Table 19. BACnet/IPv6

Configuration Parameter	Values	Description	Default
Mode	Normal | Register as foreign device	Control the mode of participation on the BACnet network.	Normal
Use real VADDR for device instance 9999	Y | N	Enables/Disables the use of the device's real VADDR when the device instance is set to 9999. The default setting is disabled. For IPv6 devices, the MAC address is a very large value. To shorten the values BACnet passes across the network and to simplify device identification a Virtual MAC is used that equals the devices Device Instance. In the event two IPv6 devices had the same device instance (as in the case of the default instance 9999), this could result in difficulties communicating with and re-configuring the devices (as the devices Net and MAC would appear there same). For this reason, a random Virtual Address “VADDR” is chosen for devices with the default device instance 9999 to ensure each device has a unique address. Enabling this feature will result in the VMAC getting set to the device's real instance of 9999. **NOTE:** It is never recommended to use the default device instance, so enabling this feature should not be necessary.	N
Normal mode settings			
UDP Port		Specifies the UDP Port number to be used by BACnet/IPv6. The range is 1-65534, but many numbers are reserved or used for common services unrelated to BACnet (contact the site's IT department for any limitations and restrictions). The default value is 47808 (which corresponds to 0xBAC0 in hexadecimal).	47808
Multicast prefix		Specifies the multicast prefix to be used by your IPv6 network. This multicast prefix defines the scope of the multicast transmission, or how far the multicast address will propagate (this is dependent on the network configuration and the Site setup, so contact the local IT specialist for specifics).	ff02::
Register as foreign device mode settings			
Min auto-assigned local UDP port		Automatically assign the minimum UDP Port value to the VIP controller while Registering as a Foreign Device.	49152
Max auto-assigned local UDP port		Defines the maximum UDP Port value for auto assigning to the VIP controller when Registering as a Foreign Device.	65534
Register with BBMD at address/name		The name or IPv6 address of BBDM to register with can be used. If the name is used, DNS must be configured and working properly.	
Register with BBMD on UDP port		Specifies the UDP Port number of the BBMD to which you want to register. The range is 1-65534, but many numbers are reserved, or used for common services unrelated to BACnet (contact the site's IT department for any limitations and restrictions).	47808
Reregistration interval (sec)		Specifies how often the VIP controller will re-register with the BBMD. Since Foreign Devices must register with a BBMD to enable broadcast traffic to be received from, and sent to the Foreign Device, and since Foreign device registration is not required to be	300

		persisted in the event of a BBMD reset, it is important to select a value for reregistration that balances data criticality with network performance. In most cases the default 300sec (5 minutes), reregistration interval is more than adequate for ensuring the foreign device has connectivity into the system, but in some cases where you have critical data being passed to/from the foreign device, you may want to bump the reregistration up to 60sec, or even the minimum value of 10sec (a full range is 10-3600sec).	

BACnet MS/TP

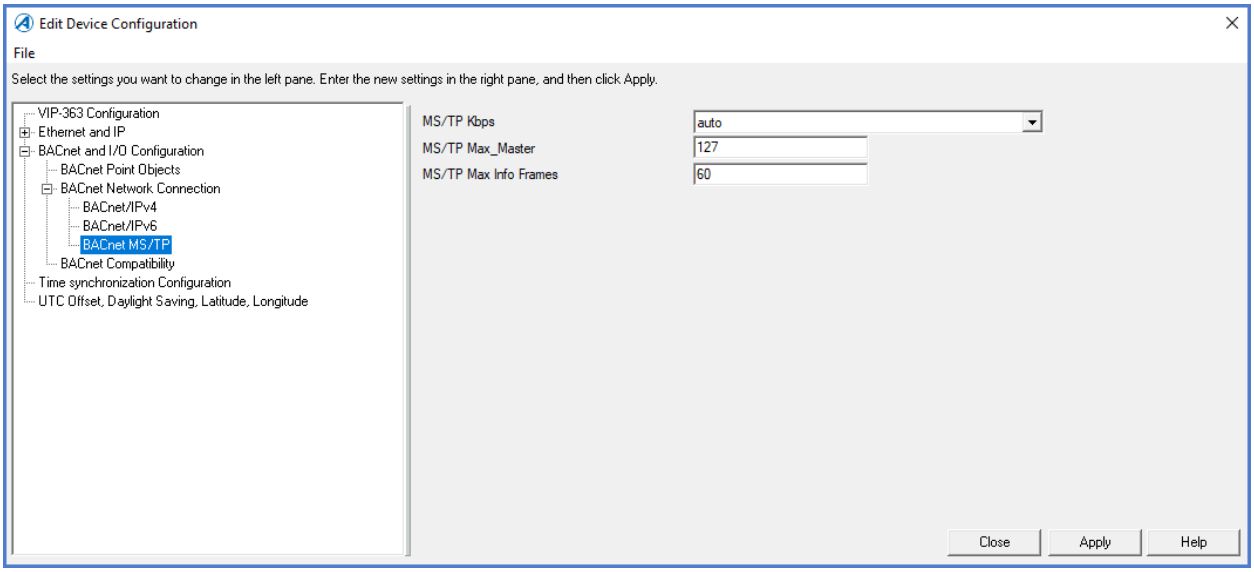

Figure 44. BACnet MS/TP Configuration

Table 20. BACnet MS/TP

Configuration Parameter	Values	Description	Default
MS/TP Kbps	Auto		
MS/TP Max_Master	127		
MS/TP Max Info Frames	60		

BACnet Compatibility

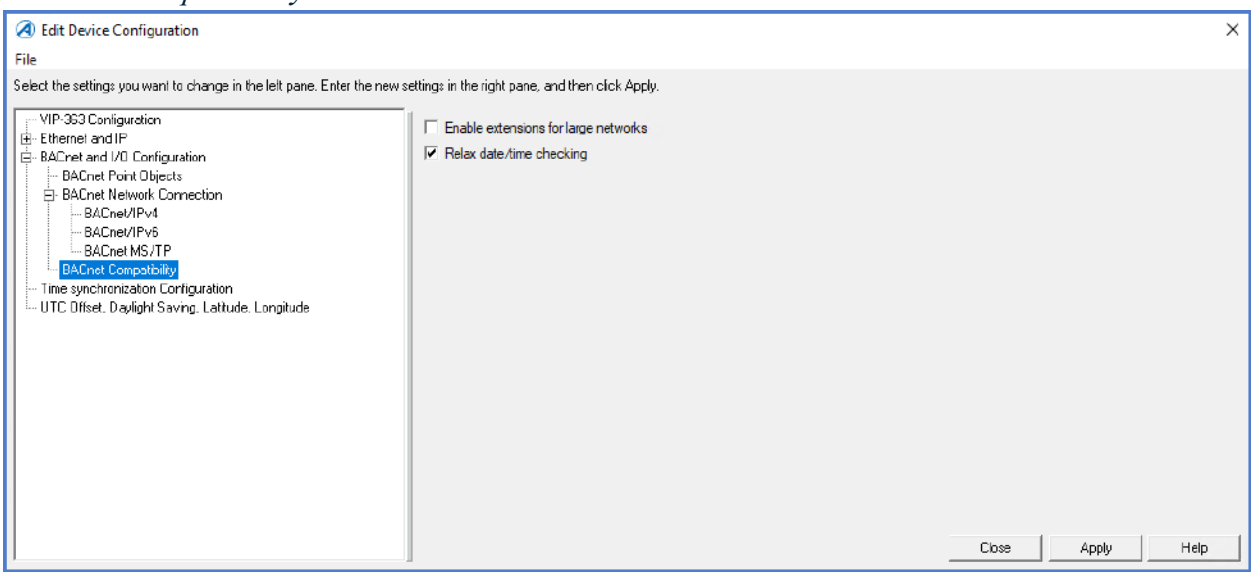

Figure 45. BACnet Compatibility

Table 21. BACnet Compatibility

Configuration Parameter	Values	Description	Default
Enable extensions for large networks	Y | N	This feature attempts to space out initial Trendlog notifications on VIPs that have many Trends setups with the same interval (to distribute the load on the server).	N
Relax date/time checking	Y | N	In BACnet Protocol Revision 13, the BACnet specification was updated to more closely define where wildcards can be used in Dates and Times. To meet the specification for a protocol beyond 13 the VIP had to enforce these new requirements, which made some of the default values use by Alerton Frontends to be no longer allowed. To maintain compatibility with Alerton workstation software older than Compass 1.4 Update 1, this option was added to disable the more restrictive wildcard checking.	N

Time Synchronization Configuration

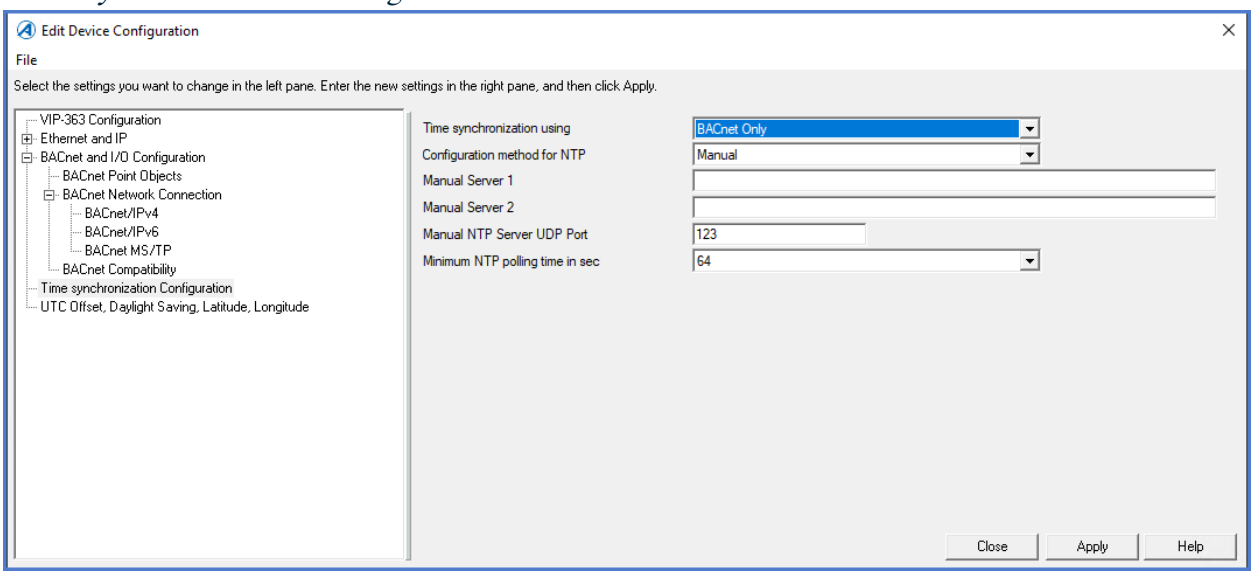

Figure 46. Time Synchronization Configuration

Table 22. Time Synchronization Configuration

Configuration Parameter	Values	Description	Default
Time synchronization using	BACnet only		
Configuration method for NTP	Manual		
Manual Server 1			
Manual Server 2			
Manual NTP Server UDP Port	123		
Minimum NTP polling time in sec	64		

UTC Offset, Daylight Saving, Latitude, Longitude

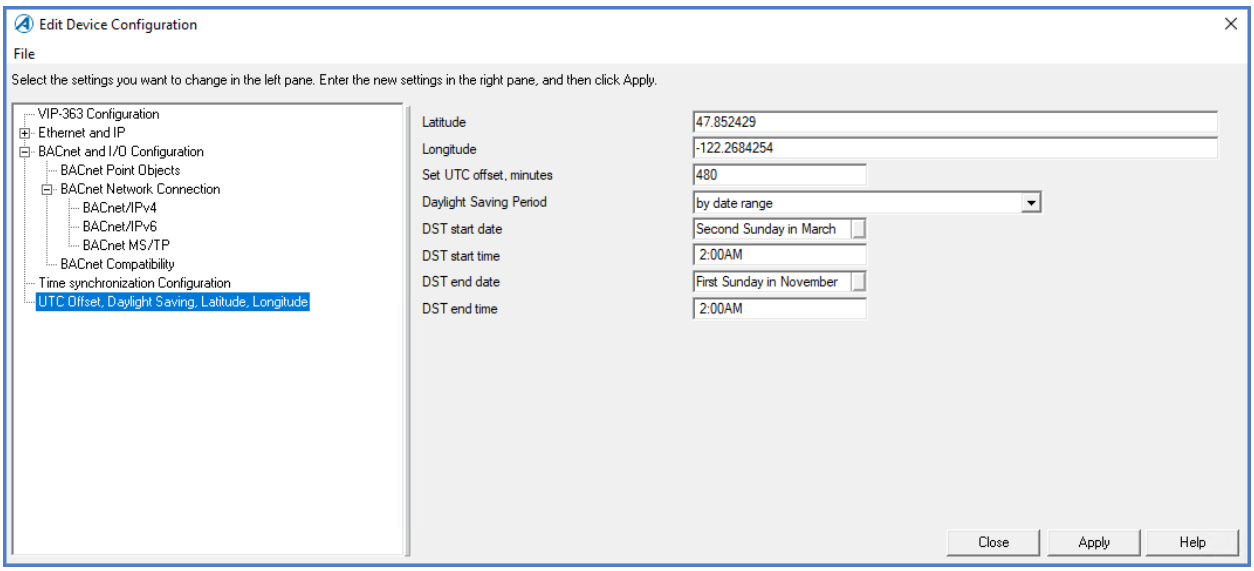

Figure 47. UTC Offset, Daylight Savings, Lat & Lon

Table 23. UTC Offset, Daylight Savings, Lat & Lon

Configuration Parameter	Values	Description	Default
Latitude		User input latitude of controller location	47.852429
Longitude		User input longitude of controller location	-122.2684254
Set UTC offset, minutes		Type the UTC offset, in minutes, that corresponds to the difference between UTC and local standard time where the VIP operates. Time zones to the West of the zero-degree meridian are positive values and those to the East are negative values. Coordinated Universal Time (UTC) is equivalent to Greenwich Mean Time, which refers to time kept on zero-degree meridian (Greenwich meridian). Use the UTC offset to specify the time zone in which the VIP is operating. Typical UTC offsets for the US are listed. Atlantic Standard Time: +240 Eastern Standard Time: +300 Central Standard Time: +360 Mountain Standard Time: +420 Pacific Standard Time: +480 Alaska Standard Time: +540 Hawaii-Aleutian Standard Time: +600 Samoa Standard Time: +660	0
Daylight Saving Period **NOTE:** Additional parameters, DST START DATE & TIME, and DST END DATE & TIME fields are not accessible via the serial configuration.	Disabled | By date range		By date range

CONFIGURING ALL INPUTS AND OUTPUTS (TEMPLATES)

Configuring the I/O for the VIP and VXIO modules is different from other Alerton products. Please be sure to read through this section in its entirety.

The Alerton/Standard templates are used for configuring the I/O of the VIP controllers.

From Device Manager, with the VIP controller selected, press [F12]

At template 99999999 use the navigation buttons on the left, click **Alerton VLCs**

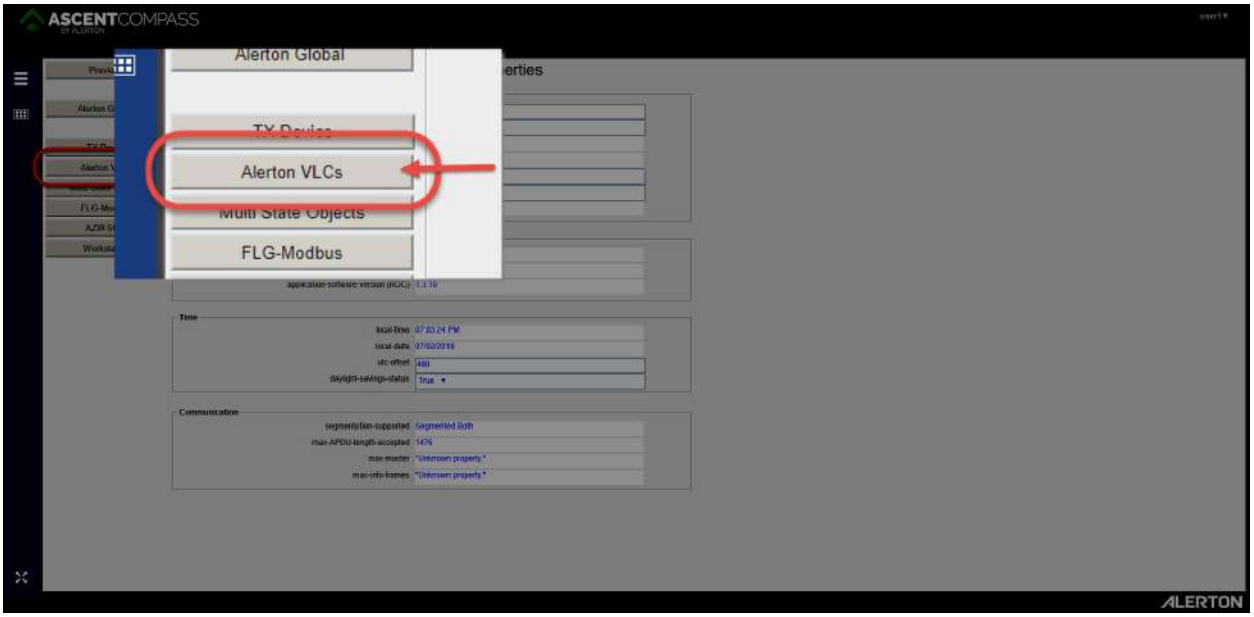

Figure 48. VIP Configuration template

Click **VIP-### - Config**

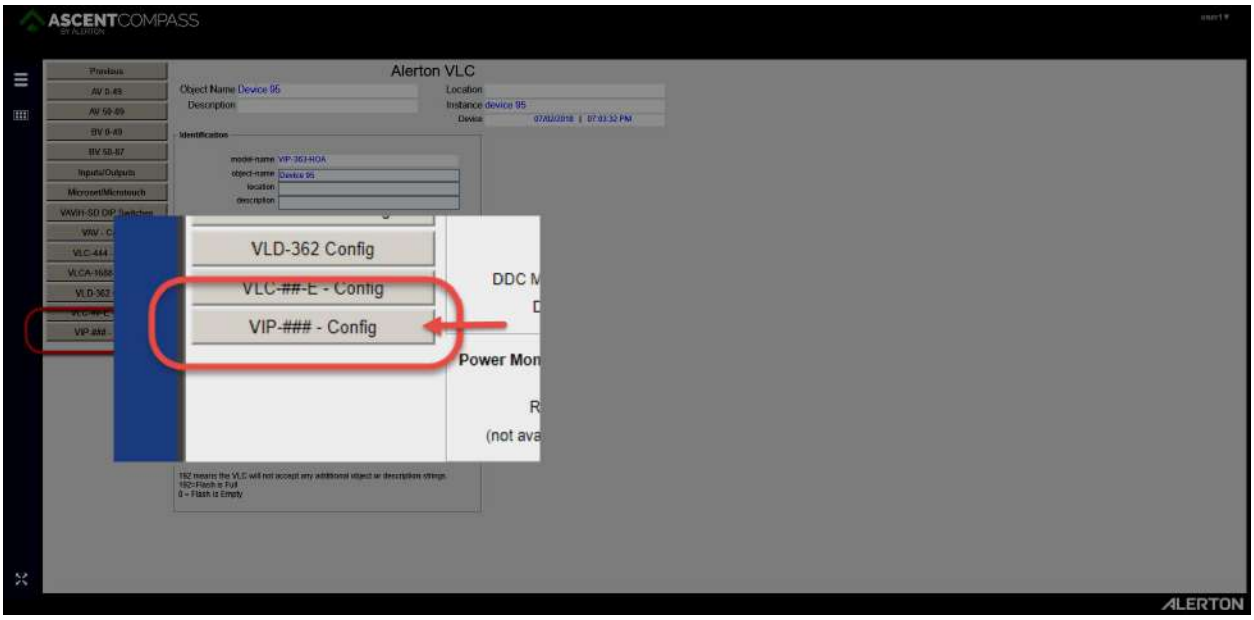

Figure 49. VIP-### - Config

Primary VIP/VXIO I/O Configuration Screen

Here you can configure the I/O of the BASE module and any connected VXIO modules.

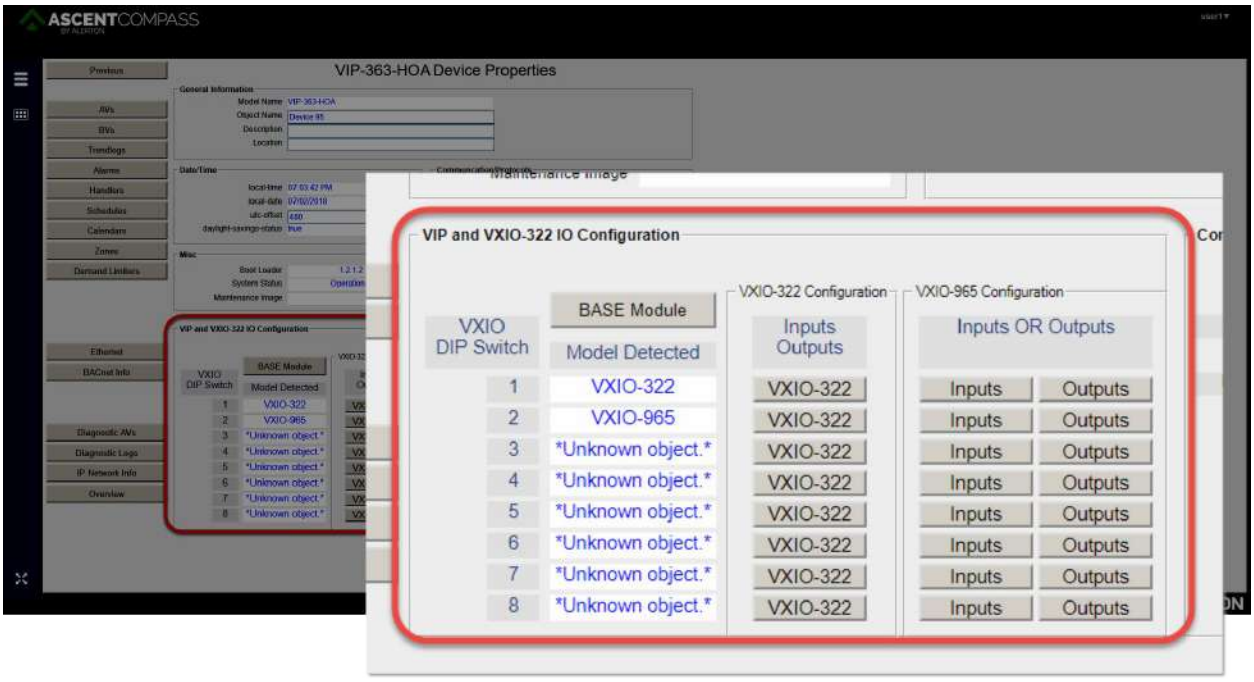

Figure 50. VIP/VXIO I/O Configuration

Clicking on BASE Module brings you to the I/O configuration screen for the VIP

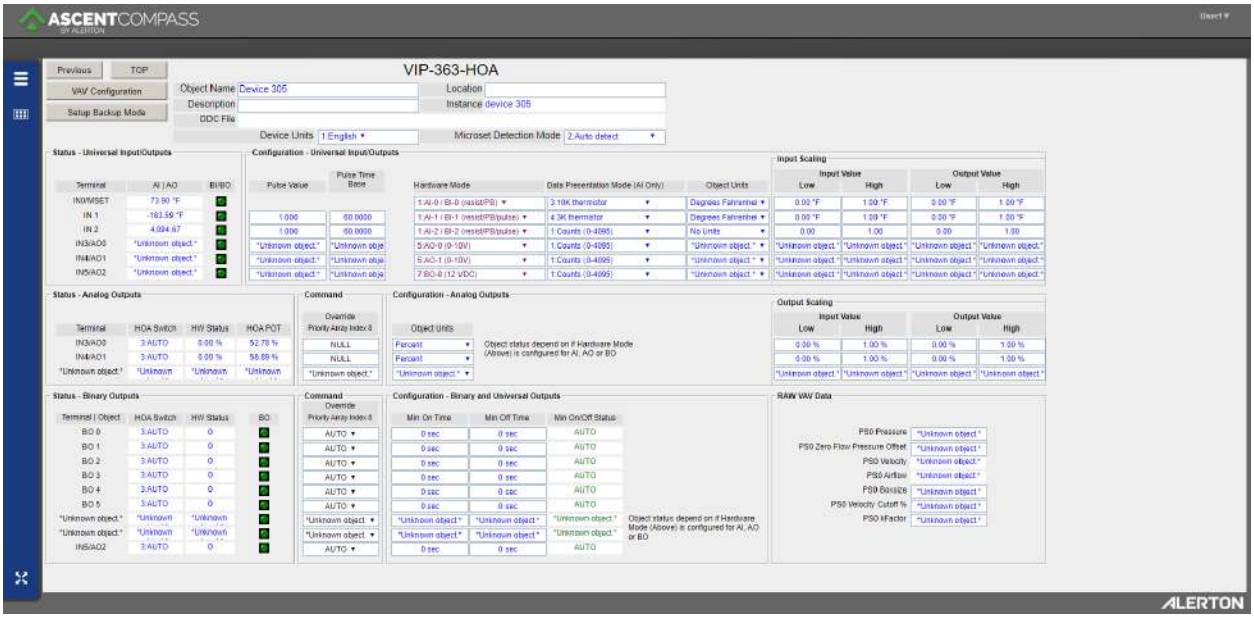

Figure 51. I/O Configuration

INPUTS

DEVICE UNITS

A setting option of English or Metric that determines the scaling of the input and the input units. Example: °F for English and °C for Metric.

MICROSET DETECTION MODE.

There are 3 possible settings: Microtouch Only, Auto Detect, and Always Connected.

Auto detect (same as *Microset AutoDetect=enabled* in DDC headers) - this will poll every 12 seconds to see if a Microset is present.

Microtouch Only (same as *Microset AutoDetect=disabled* in DDC headers) - this will disable the polling for a Microset. This setting is helpful if you have a dry contact or push button or anything sensitive to having voltage sent to it during the Microset detection. **NOTE:** Use of a Microset Field Service Tool is not possible if using *Microtouch Only* detection mode.

Always Connected (new setting) – Set if a Microset is present. This setting will switch AI-0 to be a temperature sensor and will attempt to talk to the sensor right away. This eliminates the state of power-up where the Microset hasn't yet been detected and odd numbers are displayed.

HARDWARE MODE

Here the hardware mode of physical terminals can be set as an input, analog output, or binary output (12 VDC). The Universal Input (UI) terminals on the VIP and VXIO modules are input only and can be set up for resistance, push-button, voltage (0-10V), or current (0-20mA).

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Terminal IN0/MSET on the VIP is the only terminal to accept a Microtouch or Microset for input. Terminal IN0 on both the VIP and VXIO modules is the only terminal that cannot be set for pulse input. All other Universal Input Terminals can be configured for pulse input.

Data Presentation Mode

Defines how the input data is presented under Input Value for analog inputs. The default is counts like other VLCs but can be set to several other possible modes to provide a more user-friendly view of the input data reading.

Based on this setting, under the Input Values for Input Scaling, the low and high values will display the proper engineering unit. For example, if the input is set to a resistance input, and the data presentation mode is set to engineering units, the input values will display in Ohms. Likewise, if the input is set to voltage, setting the data presentation mode again to engineering units, the Input Values would be displayed as Volts.

Pulse Value

Pulse value is a configuration parameter when using a pulse input, this setting will provide the value for every pulse. For example, if the hardware mode is set to pulse totalizer it will count the number of pulses and multiply it against the pulse value. If a pulse value is set to 12 to indicate 12 gallons used every time it pulses, the totalizer will show how many gallons have been used over the total number of pulses counted.

Pulse Time Base

Pulse Time Base is used as a configuration parameter when using a pulse input of consumption rate. The pulse time base is indicated in seconds. In conjunction with pulse value, using the gallons example from above, a time interval can be applied. For example, if set to 60, every pulse will indicate gallons per minute, if set to 1, every pulse will indicate gallons per second.

Input Scaling

All inputs can be scaled via a 2-point scaling mechanism by defining Input Value – Low (X1), Input Value – High (X2), Output Value – Low (Y1), and Output Value – High (Y2). The default is X1=0, X2=1, Y1=0, Y2=1.

For example, an Analog Input (AI) is set to voltage (0-10V) to measure inches water column and that setting is -.5 to 1.5 you would set the input low value to 0, input high value to 10, then the output low value to -.5 and the output high to 1.5 – the AI is now displaying inches water column.

Another example, if a temperature reading is reading a degree high, scaling could be set up to adjust the output value reading – set the output value low to -1 and output value high to 0, the output of the temperature reading should read 1 degree lower.

NOTE: The Hardware Status (HW Status) section and the HOA POT (Hand Off Auto Potentiometer) values are calculated after all scaling.

OBJECT UNITS

The object units display the desired units for an analog input present value. For example, if set to Liters, the values will display as Liters in the unit.

OUTPUTS

HARDWARE MODE

Universal Input / Output (UIO) Terminals in addition to the input modes supported by as noted above, can also support analog output and binary output (12VDC). For more information on this BO type, see the section below on Binary Outputs (BO 12VDC)

OUTPUT SCALING

Like input scaling, outputs are scaled via a 2-point scaling mechanism as well. For example, if we set Input Value – Low (X1) to 0, Input Value – High (X2) to 100, and then Output Value – Low (Y1) to 20 and Output Value – High (Y2) to 100, as we command the AO from 0 to 100 percent DDC signal, it will take the output value and scale it between 2 and 10 VDC. So, if outputting a current output, it'll be between 4 and 20 milliamps. Outputs can be scaled however you want depending on the output type and range. **NOTE:** The Hardware Status (HW Status) section and the HOA POT (Hand Off Auto Potentiometer) values are calculated after all scaling and has been applied on the controller. This Output Scaling feature removes the need for using a two-point linear scaler in DDC.

OUT OF SERVICE (FOR INPUTS AND OUTPUTS)

Out of Service is now supported directly for AIs/AOs and BIs/BOs and useful as a troubleshooting aid. For inputs, setting Out of Service to TRUE decouples the physical input from the what the device is reading. The input now behaves like an AV while in this state. This helps test control routines without having to re-write DDC.

While in **Out of Service** mode, the **Out of Service** flag is set to TRUE, the **Fault** flag is set to TRUE, and **Reliability** will be set to OPEN LOOP. An example use case is say a temperature sensor goes bad. The AI can be placed into Out of Service mode and the present value can be manually set to a typical running value and everything will run as normal until you replace the temperature sensor. Once the sensor is replaced, return the point to normal operation and the sensed value will now be used.

Out of Service mode for outputs behaves much the same as inputs, the software is decoupled from the hardware and the hardware settings will remain at their last value and allow for testing of control routines.

NOTE: Care must be taken though to ensure that any manually adjusted outputs are returned to a controlled state before returning to service as the adjusted outputs will be treated as the last value and controlled as such.

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Placing an input or output into Out of Service

Placing an input or output into Out of Service mode is simple but performed a couple of different ways because of available screen real estate of the template.

For inputs on the VIP, you can use the context menu to navigate to the object Properties template using the following steps:

1. Locate the terminal of the point to be put into Out of Service mode, in the image below it is IN 2 which is configured as an Analog Input. Right-click on the present value of that AI to raise the context menu.
2. Click Displays
3. Then click Analog Input Template

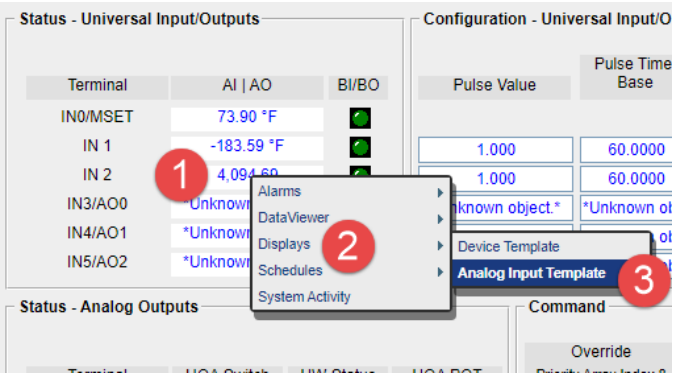

Figure 52. Accessing the Analog Input Template

Once to the AI Object Template, you can toggle the out_of_service property from False to True.

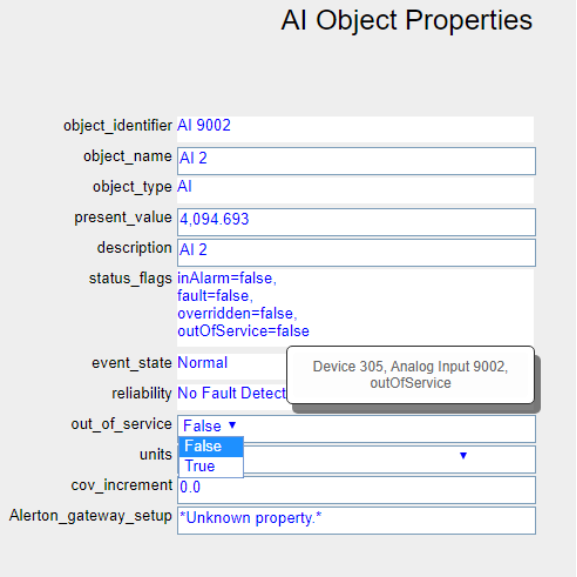

Figure 53. AI Object Properties

Outputs would be set similarly by locating a point of the object such as HW Status. Again, right-clicking to raise the context menu and then navigating to the **Analog Output Template**.

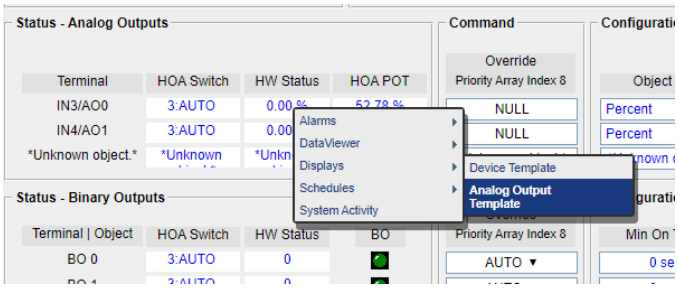

Figure 54. Status - Analog Outputs

For the VXIO inputs and outputs, it is like the VIP. From the VIP Device Properties template, click the **Inputs** button for the VXIO module to be accessed.

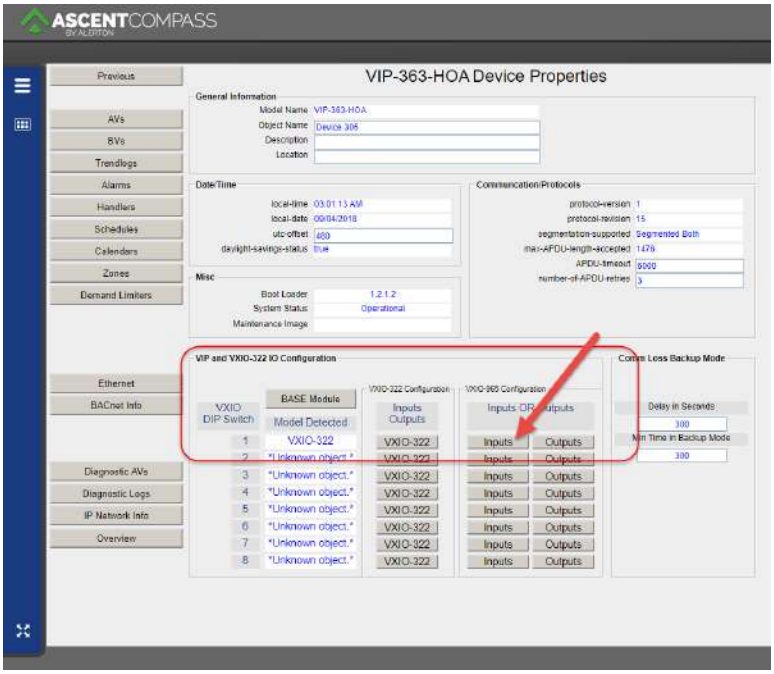

Figure 55. Accessing the Inputs for a VXIO Module

Right-click on the AI in question to access its object properties.

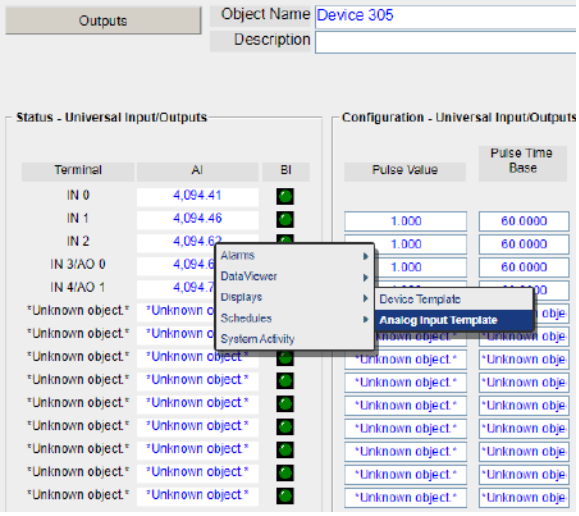

Figure 56. Accessing VXIO Analog Input Template

For outputs, it's a little easier for the VXIO. From the Device Properties template of the VIP, click the Outputs button for the VXIO module in question.

The VXIO template for outputs will have the Out of Service property exposed.

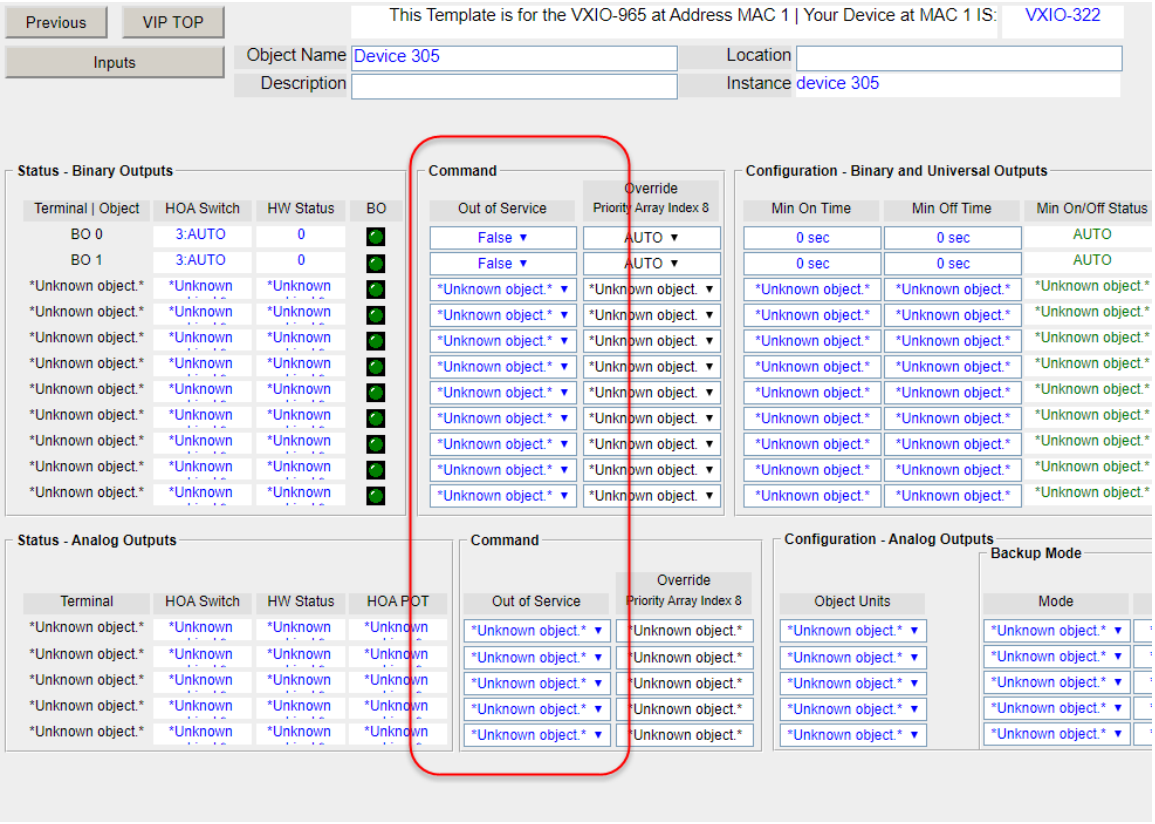

Figure 57. Outputs - Out of Service property

BINARY OUTPUTS (BO 12VDC)

These binary outputs are different in that they switch between the minimum and maximum output values – or 0 and 12 VDC. Power for BO (12VDC) is only supplied by the base controller's power. Typical usage for the 12VDC BOs is controlling pilot relays.

When the Universal Inputs Outputs are configured as **Binary Outputs** using the **Hardware Mode** selection box, the rest of the configuration is done in the Lower section.

In the lower section, you can view the status of the **HOA switch** and if the **Binary Output** is Off (shown as a Zero ~ Green Animation dim) or On (shown as a One ~ Green Animation bright). **Binary Outputs** can be configured with Minimum Off and On times and the status of these timers is shown.

The **HW status** is the actual hardware status and may not match the "Present Value" depending on the **HOA** status. **NOTE:** The Minimum ON and OFF enforcement is done at Priority 6 in the priority array for the BO. As such, the present value should reflect this as long as the present value is not being commanded at a priority higher than 6 (in which case the Min ON/OFF would NOT be enforced). The HOA however, will completely bypass the priority array.

Also shown is priority array index value 8 which is commonly placed on templates for operator overrides to quickly determine if the point is in override or not.

NOTE: The HOA status displays "5:N/A" when the HOA switches are disabled.

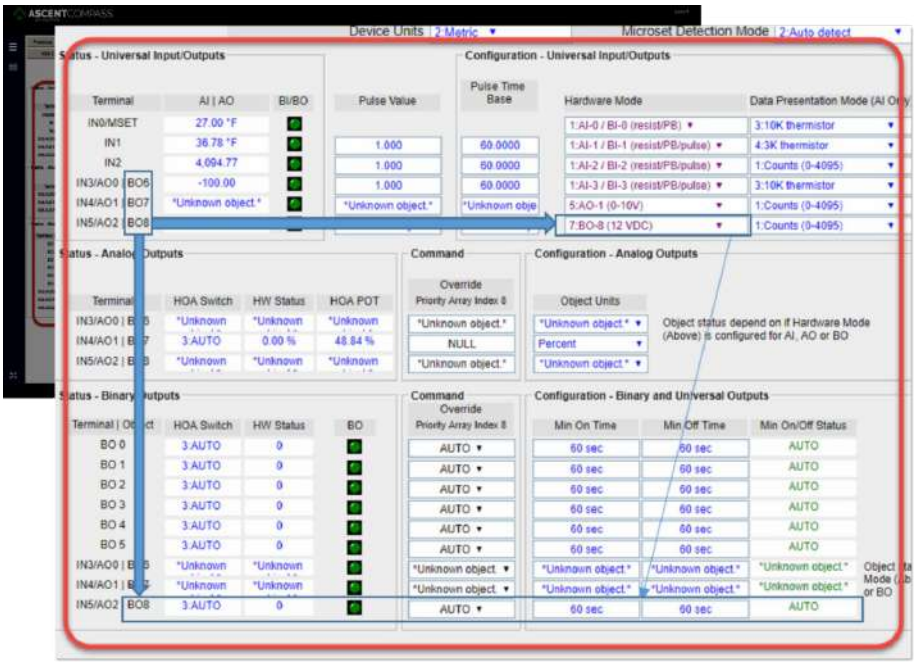

Figure 58. Universal I/O - Binary Output – Configuration and Scaling

Output scaling

Identical to input scaling except rather than scaling the input value, the scaling here applies to the output values. It too is a 2-point linear scale.

VIP/ VXIO OPERATION AND MAINTENANCE

REAL-TIME OPERATING CODE (ROC) FILES

The VIP ships with the system boot code and real-time operating code (ROC) file pre-loaded at the factory

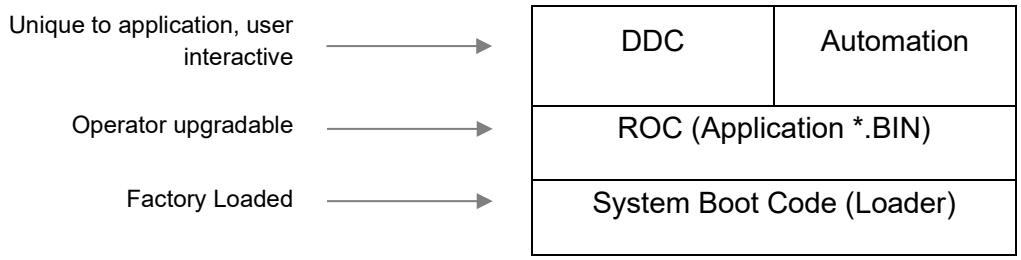

Figure 59. Relationship of VIP system boot code, ROC, and application files

The ROC file is the foundation of controller operations and is required for the VIP to host DDC and automation features. Although an initial ROC file is loaded at the factory, periodic updates may be required (for example, adding new features or making bug fixes).

Download ROC files from the <Compass root>\system directory using Compass operator workstation software. See Compass software online Help for more information about downloading ROC files or checking ROC file versions.

UNAVAILABILITY FOR UPWARDS OF 10 MINUTES

Figure 60. ROC file distribution

The VIP ROC file is different from other Alerton devices as it effectively is four ROC files all within the App30.bin file. For the VIP-363 itself, it uses two of the contained files – one for the base I/O PCB board and one for the mezzanine PCB board. The other two files are used by the VXIO-322 and VXIO-965 IO modules respectively.

When a VIP ROC file is sent to the device, the VIP will apply the appropriate files to its base and mezzanine PCB bards and then send the appropriate files to any connected VXIO modules. During this process, the entire chain of devices could be unavailable for upwards of 10 minutes. Therefore, it is advised to plan ROC file updates accordingly.

STATUS LEDS

Table 24. Status LEDs

POWER LED	Common to all VIP-363 controllers		
On	Unit has 24VAC Power		
Off	No Power, or unit not functional		
STATUS LED	**VIP-363-VAV and VIP-363-HOA (pre - ROC 1.7.6)**	**VIP-363-HOA (post - ROC 1.7.6)**	**VIP-363-VAV (post - ROC 1.7.6)**
Off	Unit Initializing	Unit Initializing, or MS/TP Not Enabled	Always Off (no MS/TP support)
Single Flash	Firmware Running, No I/O Communications	MS/TP Enabled, No Communications	N/A
Double Flash	N/A	MS/TP Enabled, MS/TP Token passing detected	N/A
Triple Flash	Firmware Running, with I/O Communications	MS/TP Enabled, MS/TP read/write Message received	N/A

USING HOA SWITCHES AND TRIMPOTS

For each AO and BO terminal on a VIP-363 or VXIO Expansion Module, a Hand-Off-Auto (H-O-A) switch enables manual override of the commanded output status. For AOs, the H-O-A switch is combined with a trimpot, which drives the output when the corresponding H-O-A switch is in the H position.

H-O-A switches always override all software commands and backup mode values. HOA switches function only when power is applied to the controller and/or VXIO module.

H-O-A switch status and trimpot values are reported through reserved AVs in the VIP for use in software.

Table 25. H-O-A switch position and BO and AO operation

Switch position	BO operation	AO operation
A (default)	Software controlled	Software controlled
O	OFF	OFF (0% of the full range). The one-second delay between switch set and output response to accommodate transitions from H to A through this position.
H	ON	Trimpot control. Use small screwdriver to adjust the trimpot corresponding to the output. Fully counter-clockwise = 0% (0mA or 0VDC), Fully clockwise = 100% (20mA or 10VDC).

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BACKUP MODE SEQUENCE OF OPERATION

In backup mode, all VIP/VXIO outputs are set to backup mode values. These values are programmed using AVs and BVs. There is a difference between a *Module* going into **Backup Mode** and an *Output* getting set to a **Backup Value**.

If communications to a *module* are lost for more than the **Communications Failure Delay Time** then the *module* itself will go into Backup Mode, but the *outputs* connected to that module may, or may not switch to their configured **Backup Values**.

If an *Output* is configured with its **Backup Mode** point set to **Enabled** (or "**Set to:**"), then the point will switch to its configured **Backup Value** when the *Module* enters **Backup Mode**. If an *Output* is configured with its **Backup Mode** point set to **Disabled** (or "**No Change**"), then the *Output* will remain at its last commanded state, when the *Module* goes into **Backup Mode**

Once a VIP/VXIO enters backup mode, it remains in backup mode for the user-configurable **Minimum Time in Backup Mode** value (default 5 min). After the minimum Backup Mode period, on the first receipt of a message from the VIP-363-HOA, the VXIO resumes normal operation. You can manually return a VXIO to normal operation by cycling VXIO power while VIP communication is present.

The VXIO enters backup mode under the following conditions.

Table 26. Backup mode conditions

Condition	Actions
Lost communications	The VXIO loses VIP communication for more than **Communication Failure Delay Time**. Unless overridden by the H-O-A switch, outputs remain in their last commanded state for the delay period until backup mode activates. Then outputs are set to configured values. When communication is reestablished – after the expiration of the **Minimum Time in Backup Mode** value, outputs are immediately commanded to AO or BO present-value. **NOTE:** It should be noted that the VIP Base I/O board and all VXIO modules will "lose communications" for ~2min during a ROC update. If the user has a **Communications Failure Delay Time** that is too short, it will force all I/O modules to go into Backup Mode for the **Minimum Time in Backup Mode** period before being able to regain control of I/O after the ROC update. Care should be taken when setting the **Communications Failure Delay Time** and **Minimum Time in Backup Mode** values.

BACKUP MODE OF OUTPUTS

Backup mode is the default state that either the AO or BO takes when there is a loss of communication with the controller. We can configure the **Delay in Seconds** value to the number of seconds to hold off before going into a backup state. The default value is 300 seconds (5 minutes). Once the device enters this state, the **Min Time in Backup Mode** will determine how long it remains in this state even once communications have been re-established. During this time, there is no communication with the I/O. The default Min Time to Backup Mode setting is 300 seconds (5 minutes). These two settings are per-device settings – VIP or VXIO module.

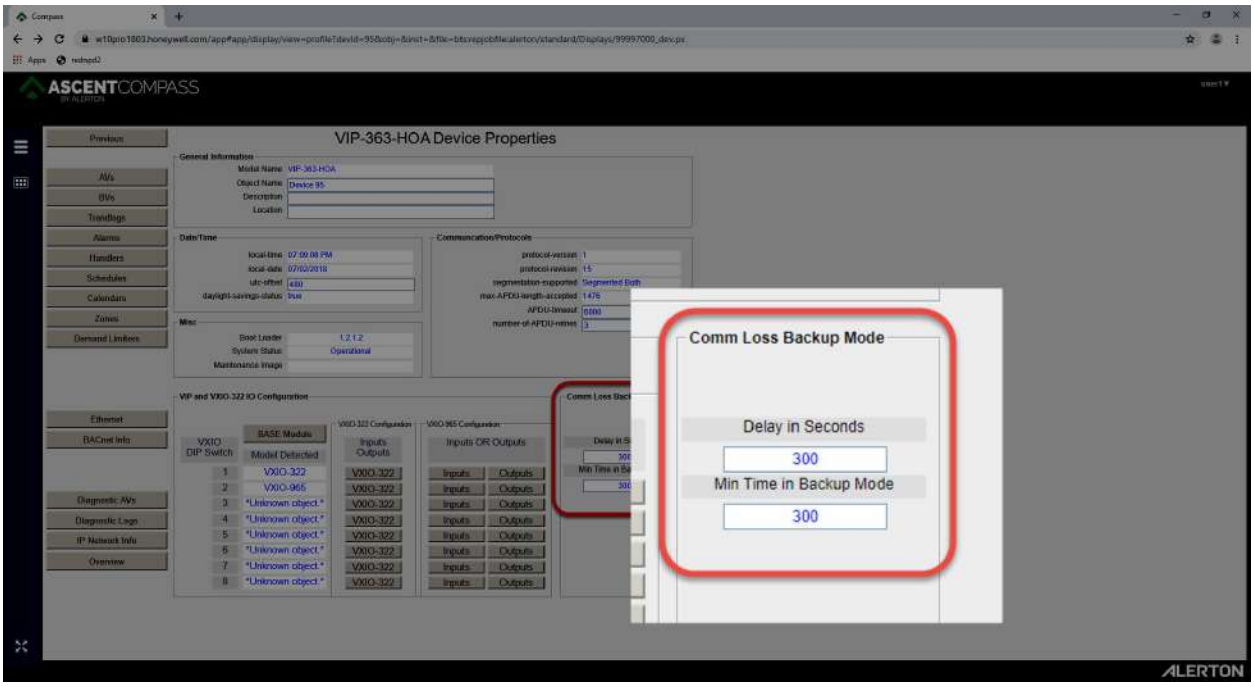

Figure 61. Global comm loss backup mode time settings

One can also configure the default state of an AO or BO once it enters backup mode on a point-by-point basis. Figure 61 below provides an example of a point-by-point for the AOs and BOs of a VXIO-322 module. Valid options for the mode for each point are **Set To (enable)** or **No Change (disable)**. Configuring the point's mode as **Set To** then requires the Setting value to be set. A user-configurable value to command the output value when entering a backup state. The valid options are a percentage value for an AO (x %) or a binary value for a BO (OFF). Leaving the mode to **No Change** will leave backup mode disabled for the point and the point will continue at its current state at the time of comm loss until comm has been restored and the **Min Time in Backup Mode** has been exhausted.

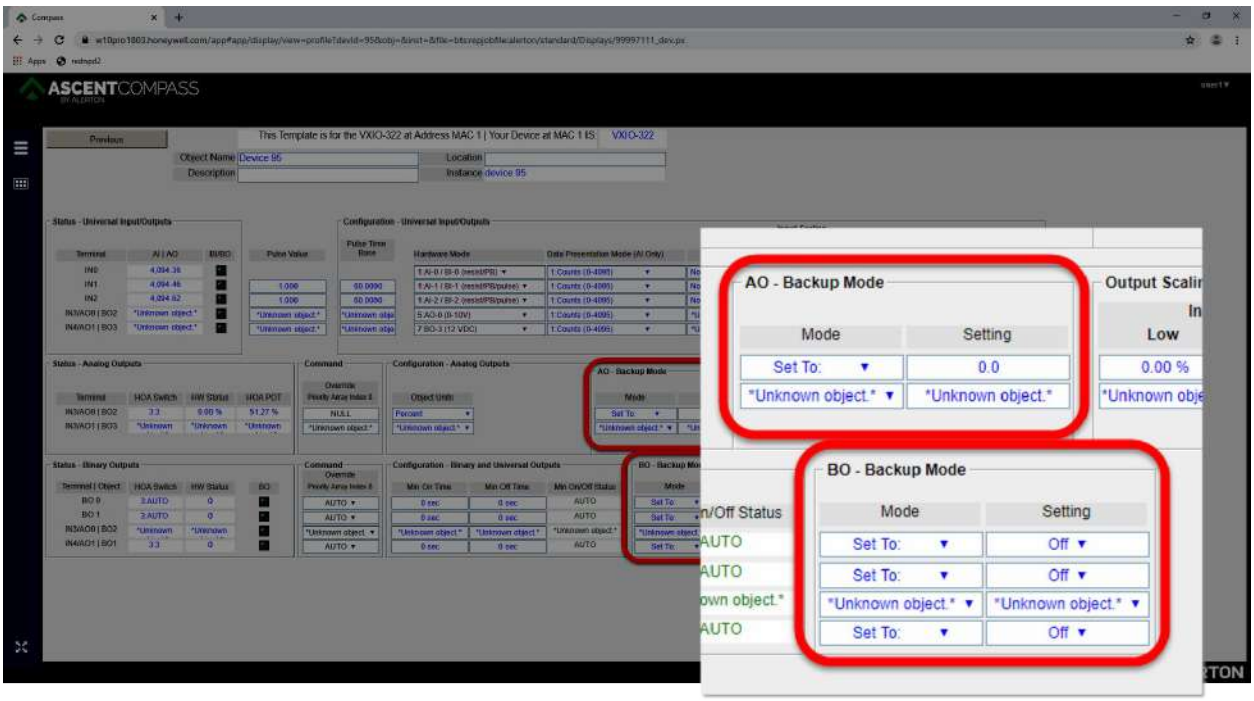

Figure 62. Point-by-point Backup Mode Settings

VAV Sensor and VAV Parameters

The VIP-363-VAV controller is nearly identical to the non-VAV model with the following exceptions:

1. Includes a field replaceable, 16-bit polarity insensitive pressure sensor
2. Does not support the VXIO modules

NOTE: AV 246, 250, 251, & 252 are read only values updated their corresponding points AV 9901, 9904, 9905 & 9906.

Table 27. VAV Sensor and VAV parameters

Control Point	Object Name	Units	R / W	Default	REMAPPED AV Object	Compass Data
PS0 (SD or Cold Deck)	**	**				
AV 9900	PS0 Pressure	in-water or Pa	R/O			
AV 9901	PS0 Zero-flow pressure offset	in-water or Pa	R/W		AV 246	PS0 zero-flow pressure offset
AV 9902	PS0 velocity	fpm or m/s	R/O			
AV 9903	PS0 airflow	cfm or lps	R/O			
AV 9904	PS0 box Size	in or cm	R/W	8	AV 250	PS0 box Size
AV 9905	PS0 velocity cutoff %		R/W	5	AV 251	PS0 velocity cutoff %
AV 9906	PS0 kFactor		R/W	1	AV 252	PS0 kFactor

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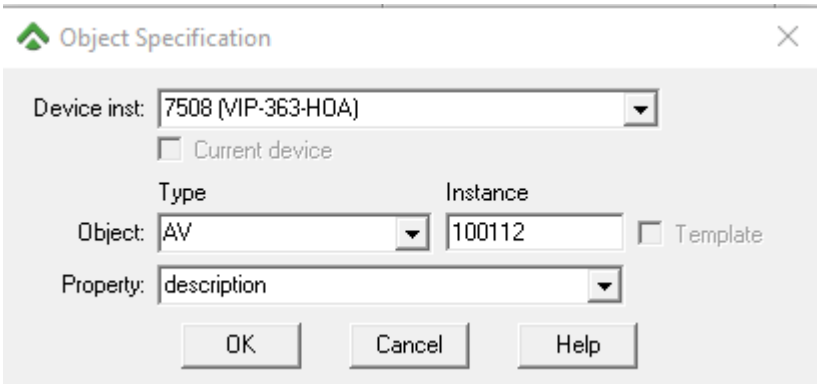
DISPLAYING THE MAC ADDRESS

Add a Read-Only property to display the MAC address of the VIP-363 controller on a Compass Display. Set the Object to Read AV-100112 (Ethernet MAC diagnostic AV) and set the property to description (as shown in the example below). This will display the MAC address for the controller as 6-character hexadecimal.



RSTP

INTRODUCTION

The requirements for the Rapid Spanning Tree Protocol (RSTP) are published in the IEEE802.1w Standard. RSTP is a development from the Spanning Tree Protocol (STP), defined in IEEE802.1d. RSTP converges faster than STP because it uses a handshake mechanism based on point-to-point links instead of the timer-based process used by STP. RSTP is used to manage redundant network topologies so that the network is functional even when a primary link fails.

RSTP works by first nominating a single device to be the Root Bridge. The nominated Root Bridge device acts as an anchor point for the system. It gives all other bridges a reference point for choosing the best path to open and connect for routing. Bridge Protocol Data Units (or BPDU's), are passed between bridge ports to communicate Root Bridge and local port information. BPDU's are key to managing the RSTP network as they are used to assign the Port Roles of all the ports on the Bridge devices. The RSTP resides on layer 2 (data link) of the OSI 7-layer model.

CAUTION: When adding VIP-363 controllers with RSTP turned on, first ensure that the entire network is running RSTP. Please note that if any link in the existing network is running just STP, then RSTP functions as STP on that single link. RSTP is backward compatible with STP, however, If there exists just a single link running STP, then the advantage of "rapid convergence" offered by RSTP is lost and the network will take longer to converge (possibly up to 50 seconds) whenever there is a change in network topology. The best choice is to always segregate different protocols.

CAUTION: To ensure that the RSTP protocol functions correctly within each network, RSTP must be turned on for all VIP-363 controllers, therefore all VIP-363 controllers deploying RSTP must be firmware version 1.6.8 ROC or later.

CAUTION: Only enable RSTP in the VIP-363 controllers if there are redundant paths in the network. This has an impact on firmware download situations. When RSTP is enabled, all the switch ports are turned off when the VIP-363 controller reboots. This will result in a temporary loss of connectivity when there are no redundant links in the network.

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RSTP SCENARIO

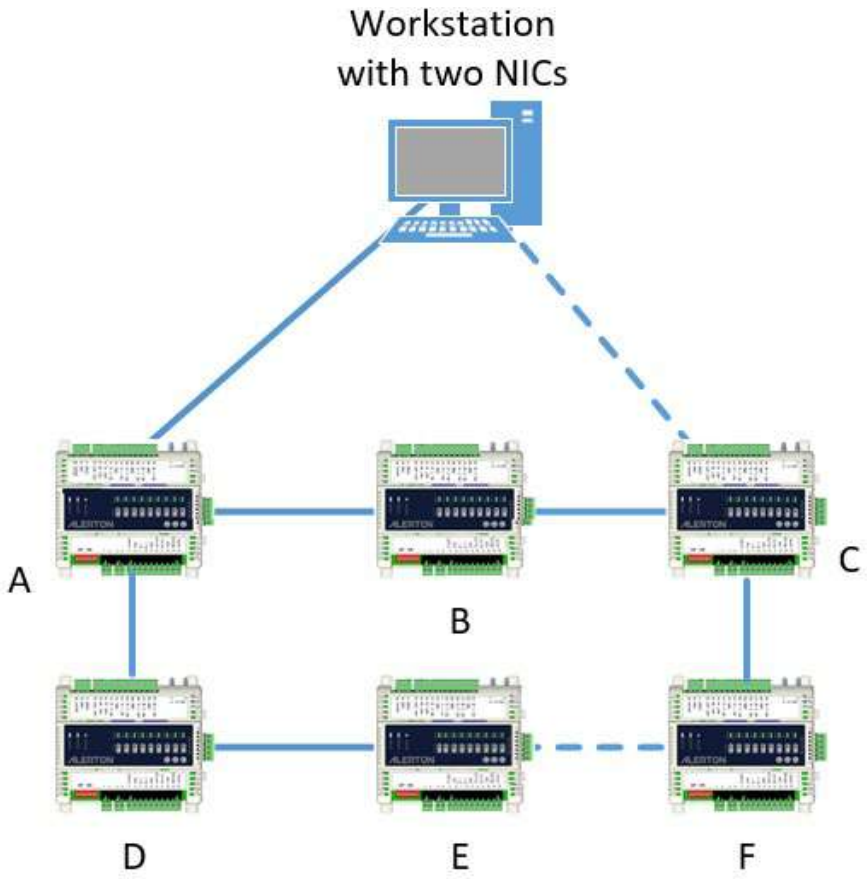

Figure 63. Scenario diagram 1

RSTP must be enabled in the VIP-363 controllers when there is a loop between devices that provide network redundancy. In scenario diagram 1 the dashed lines represent additional connections that facilitate an alternative path (loop) for the VIP-363 controllers labeled A through F. For example, if a device fails such as VIP-363 controller A then VIP-363 controller C will activate its connection to a second NIC in the workstation, in addition, the connection between E and F will establish a new path for the controllers on the bottom row. By adding a second NIC to the Workstation, VIP-363 controller C provides an alternative route if VIP-363 controller A fails, without this connection VIP-363 controller A would be a risk. This simple network provides each controller with two different paths to the Workstation.

ROOT BRIDGE FEATURES

1. Only one Root Bridge per network
2. Automatically assigned to the device that has the lowest Bridge ID
3. Bridge ID = Bridge Priority and MAC address (note the MAC address is used in the event of tied Bridge Priorities)
4. Bridge Priority is a configurable property, the default value is 49152 and is adjusted in increments of 4096
5. MAC address is the NICs non-configurable MAC address

ROOT BRIDGE SELECTION

There are both advantages and disadvantages to the Root Bridge being selected automatically. But careful consideration must be taken when deciding which Ethernet Switch or VIP-363 controller is the nominated device to take on this responsibility. The risk of allowing the devices to automatically select the Root Bridge is that there is the potential for the Root Bridge to get assigned to a device that may not be in the most logical location on the network. It would make the most sense to make the switch or VIP controller closest to the Core Network connection the Root Bridge. In addition, consider system redundancy and think about which device would be the most sensible backup in case the Root Bridge lost power, the whole point of RSTP is to facilitate redundancy. Referring to the Scenario 1 diagram VIP-363 controller A should be assigned the Root Bridge role, and VIP-363 controller C would be a logical backup. To achieve this, as an example assign the following Bridge Priority numbers to the following devices –

VIP-363 controller A = 28672
VIP-363 controller C = 32768
VIP-363 controllers B, D, E, F = 49152 (actual default value)

Cisco switches use 32768 as the default Bridge Priority, any 3rd party devices must be taken into consideration when assigning the Bridge Priority.

It is important to work with the customer's IT team and understand the network architecture as well as knowing other site-specific functions such as the location of default gateways.

The diagram below (figure 59) shows an example of a Three-Tier Network Design Model. This type of topology allows for logical expansion and scalability for a large campus.

1. **Core Layer:** Provides optimal transport between sites (backbone). The design will provide a level of resilience that offers the ability to recover quickly after a network failure at this level.
2. **Distribution Layer:** Provides policy-based connectivity and boundary control between the Access and Core layers.
3. **Access Layer:** Provides access by devices to the network, this is where VIP-363 controllers will be deployed.

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For a smaller campus, the Core and Distribution layers may be combined into a single layer. Whichever topology is employed one of the switches at the Core Layer should be assigned the role of Root Bridge.

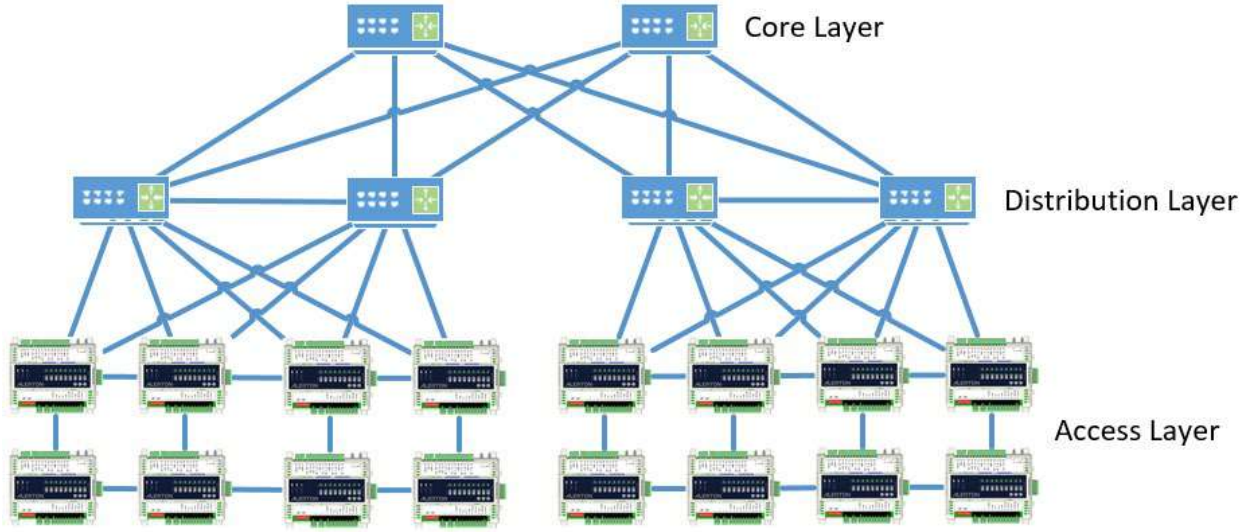

Figure 64. Three Tier Network Design Model

Root Bridge Example 1

In this example, VIP-363 controller A takes on the responsibility of being the Root Bridge due to having a lower Root Priority (28672).

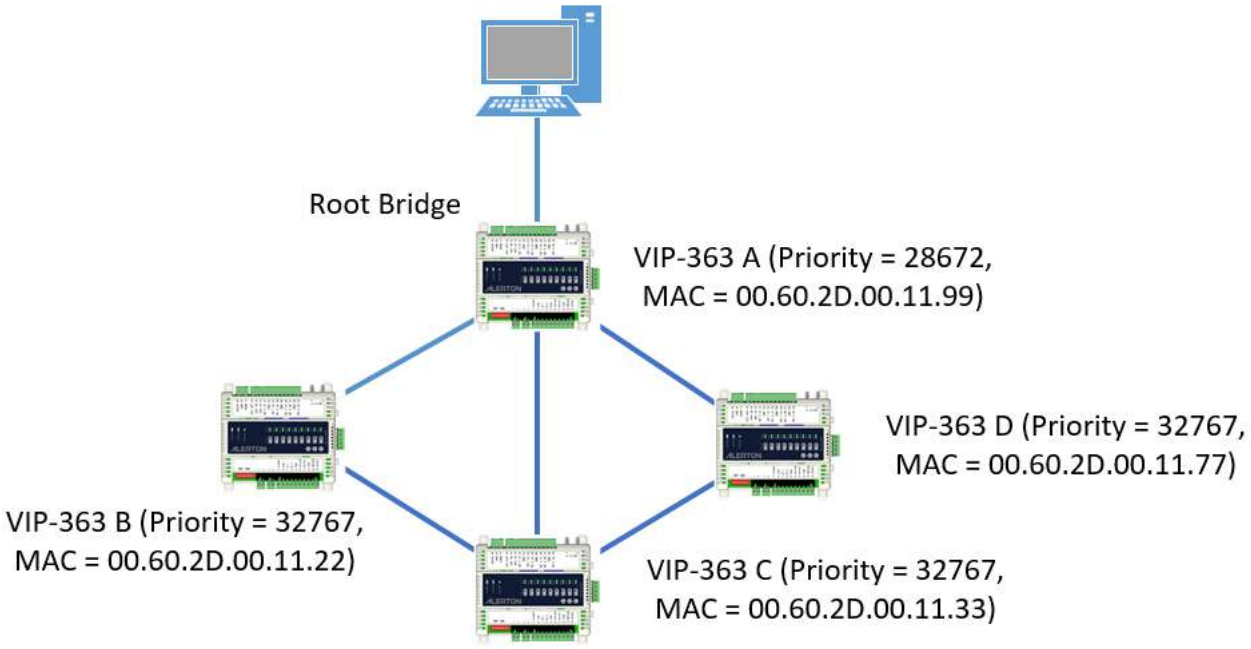

Figure 65. Root Bridge Example 1

Root Bridge Example 2

In this example, VIP-363 controller B takes on the responsibility of the Root Bridge. With the Root Priority values being tied then the next check used is to compare MAC addresses and nominate the device that has the lowest MAC address. This example intends to highlight the impracticality of allowing the VIP-363 controllers to negotiate amongst themselves which device is the Root Bridge. In reality, VIP-363 controller A is effectively the Core switch therefore Root Bridge Example 1 should be deployed.

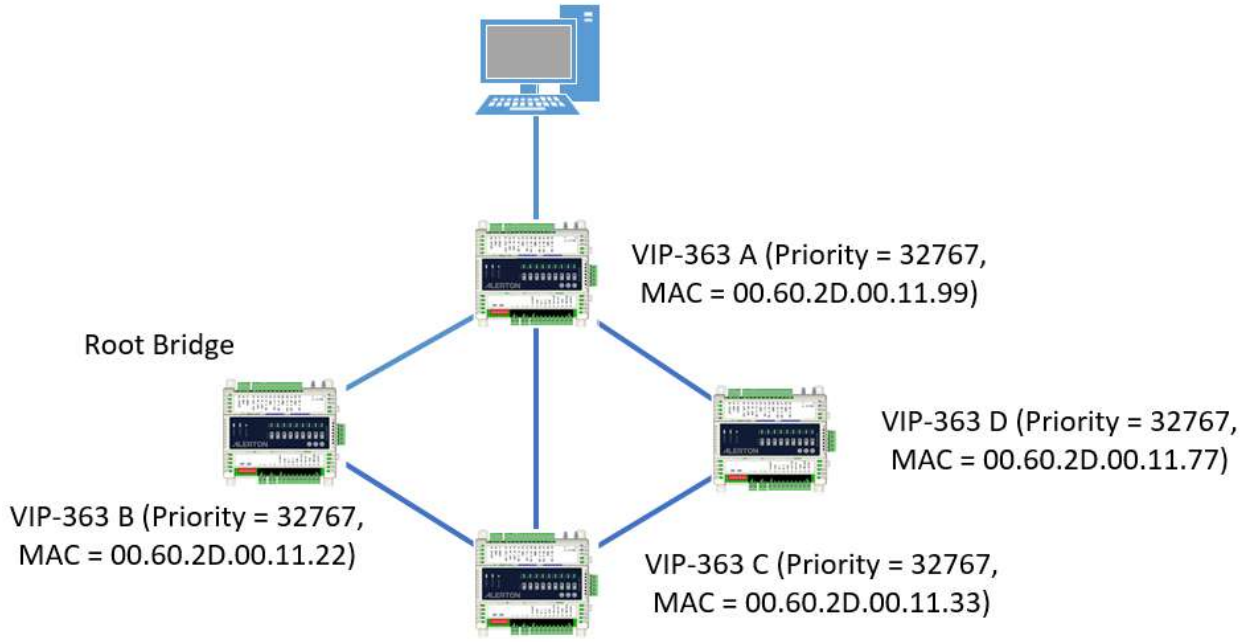

Figure 66. Root Bridge Example 2

PORT ROLES

Once the Root Bridge device is determined the selected device will set its own ports to the Designated Port Role. Designated Ports will generate and receive Bridge Protocol Data Unit (BPDU) messages. BPDU messages are important to all devices that make up the RSTP network. BPDU messages contain the Root Bridge device Bridge ID and a Cost to Path parameter that accumulates the further a device is from the Root Bridge. BPDU message generation is repetitive and they are created within 2 seconds of each other. The Non-Root Bridge devices when receiving the BPDU messages will assign the Root Port role to the port that is closest to the Root Bridge device, this is determined by comparing the Cost to Path values on each connected port. In Scenario diagram 2, if the VIP-363 controller B is declared to be the Root Bridge its 3 populated ports default to Designated Ports. Via BPDU message the VIP-363 controllers A, C and E will assign Root Port (RP) roles to the ports directly connected to VIP-363 controller B, the remaining ports will default to the Designated Port (DP) role and they will generate their own BPDU messages. VIP-363 Controllers D and F will compare the BPDU messages received on both of their ports to determine the most efficient path to the Root Bridge. VIP-363 controllers D and F could potentially have a tied Cost to Path score for either of

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their two ports as both have a valid path to the Root Bridge across an equal number of segments. In the event of a tied Cost to Path then the lowest Bridge ID will be nominated as the Root Port.

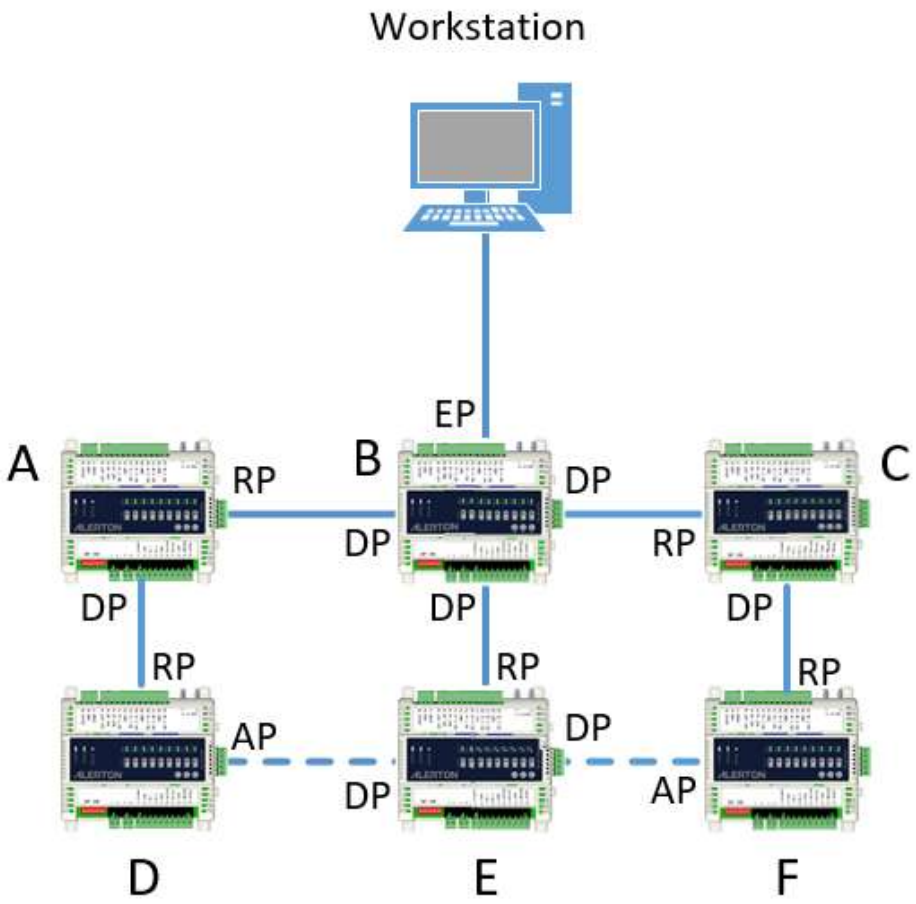

Figure 67. Scenario diagram 2

If a device determines that two or more of its ports can reach the Root Port, the port with the lowest Cost to Port takes the Root Port Role, the remaining ports inherit the Designated Port role. In the case where there are two Designated Ports facing each other, the bridge with the lowest Bridge ID will remain as a Designated Port, and the unit with the higher Bridge ID will switch its role to Alternative Port (AP). Alternative Ports only receive BPDU messages they do not send them. If a link fails, the Alternative Port changes to a Root or Designated Port role. If the link fails due to an event that will affect the port link status such as a cable getting unplugged or cut, the bridge will detect this immediately and switch to an Alternative port. As an additional fail-safe mechanism, the Ports will respond if they do not receive 3 consecutive BPDU messages (also referred to as Hello Time).

Edge Port (EP) roles are assigned to ports that connect to Host devices such as the Workstation that does not support the RSTP protocol. Edge Ports do not receive BPDU messages and go to the Forwarding State immediately (see Port Status).

PORT STATUS

The Port Status provides feedback on what condition the port is. Ports will be in one of three states:

1. **Learning** – Port is mapping but not sending data yet.
2. **Forwarding** – Port is functioning correctly and sending data.
3. **Discarding** – Port is not sending data, typically indicating that a loop has been detected and the Port Role is set to Alternative Port.

RSTP IMPLEMENTATION CONSIDERATIONS

RSTP allows for many more network topologies to be implemented, although Ethernet Switches help with reducing collision domains we still need to understand that a linear bus topology that is easy to troubleshoot will eventually cause potential issues with bandwidth as every message is transmitting on one pipeline. The best way to think of a topology to employ for RSTP is to think of a tree, where the Root Bridge is the ‘root’ of the tree, then use the lowest cost path to map the ‘branches’ out to reach every device using the ‘least cost to path’ criteria. Once the core design is mapped, add the loop connections to give every device at least one more alternative path to the Root Bridge, careful consideration must be applied as the cost of the installation could spiral.

Care must be taken during commissioning, from ROC version 1.6.8 VIP-363 controllers will have RSTP enabled as default. This will allow the network to be wired with loops included. As each VIP-363 controller is powered up they will automatically start the Convergence Process to negotiate the Root Bridge and Port Roles, this will also affect other RSTP devices on the network to do the same as they detect new devices coming on line and the least cost to path values change.

If the intention is to not utilize RSTP then it is important that RSTP is disabled on all of the VIP-363 controllers prior to sending a ROC file update to any of the VIP-363 controllers. The Enable RSTP parameter manages a link between the onboard switch and the ROC within the controller. If RSTP is enabled then the switch behaves as being part of the VIP-363 controller as it has dependencies on parameters within the ROC file, therefore the switch will shut down as the VIP-363 controller is rebooted. Care must be taken as there is the potential for a temporary loss of communications to devices that do not have a redundant path to downstream devices, the recommendation would be to perform ROC updates one at a time. If the RSTP parameter is NOT enabled then the switch is detached from the ROC file and will not be affected during the ROC update process and behave normally.

When a ROC update is performed on a VIP-363 controller that is pre-version 1.6.8 then the RSTP enabled parameter will be enabled. If a ROC update is performed on a controller with ROC 1.6.8 or later then the RSTP enabled parameter will be retained.

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Network	Enable RSTP parameter	Expected Operation
RSTP Required (Network has Loops)	Enabled	VIP-363 controllers will deploy RSTP correctly.
	Disabled	Expect Broadcast Storms and the network to crash the moment a loop is created.
RSTP Not Required (Network is a Bus topology with no loops)	Enabled	Expect communication loss of up to 5 minutes when ROC file updates are performed. RSTP is unnecessarily being deployed.
	Disabled	This is the correct setting when VIP-363 controllers are wired as a single bus and there are no loops

CONFIGURATION OF RSTP

RSTP functionality is supported from VIP-363 ROC version 1.6.8 and later. Access the Device Configuration via Compass.

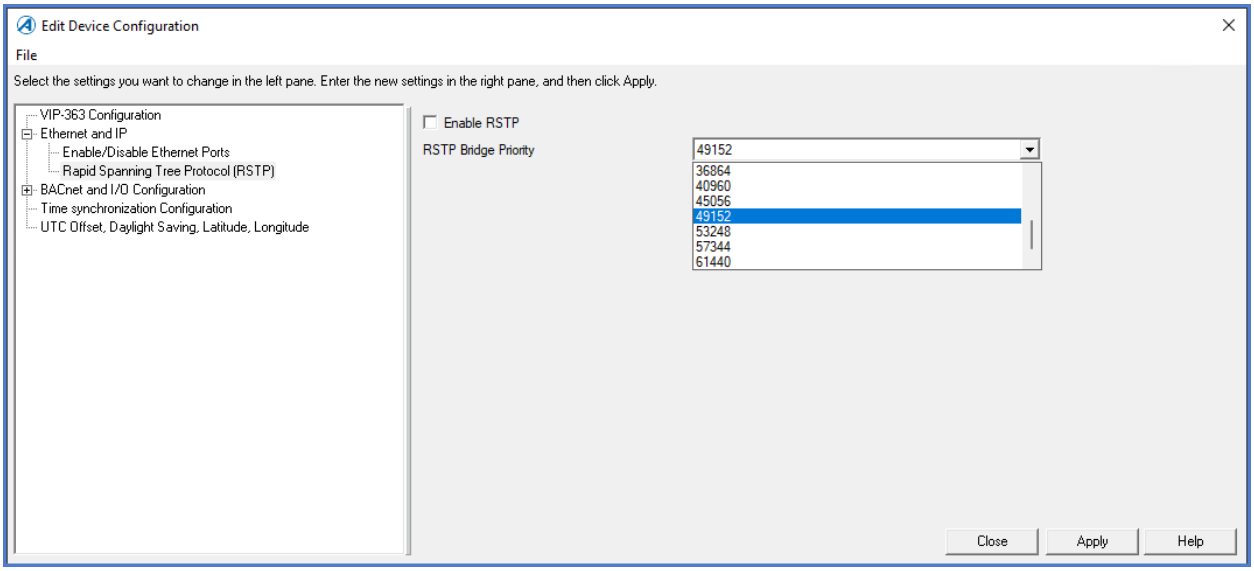

Figure 68. RSTP Enable/Disable and set Bridge priority

The Ethernet and IP configuration contains:

1. Enable Rapid Spanning Tree Protocol
2. RSTP Bridge Priority, select the Bridge Priority from the drop-down (values 0 ... 61440), the Bridge Priority values are set in blocks of 4096.

Menu	Values	Description	Default
Enable/ Disable Rapid Spanning Tree Protocol	Enable /Disable	Enable / Disable RSTP	Disable
Bridge Priority	0.. 61440	Controls which VIP node / Managed switch is the root bridge. The Bridge Priority is set in increments of 4096 between the ranges of 4096 to 61440 (For example 4096, 8192, 12288…).	49152

RSTP DIAGNOSTICS:

The AV's 170000 to 170099 are reserved for RSTP Diagnostics regardless of whether RSTP has been enabled or not. Allocated Diagnostic AV's for the VIP-363 Controller are:

AVs	Description
AV 170000	Spanning Tree type. RSTP is supported by VIP-363. Displays "RSTP" when enabled and displays "None" when RSTP is disabled.
AV 170001	Bridge ID – Shows the Bridge priority followed by the MAC ID of the node. Example: 49152-00:60:2D:08:00:67
AV 170002	Bridge Priority – Priority of the Bridge. Lower values result in the node being elected Root Bridge
AV 170003	Root Bridge ID – Bridge priority followed by the MAC ID of the Root Bridge of the entire network.
AV 170004	Hello Time – Maximum time in seconds between consecutive BPDU messages (also called the heartbeat time). BPDU messages may come in faster during network Syncing. Always 2 seconds (2s)
AV 170005	Max Age – Used to age out old information. Message age is incremented upon receipt and discarded if message age is greater than Max age. Always 20 seconds (the 20s). Used when operating in STP mode.
AV 170006	Forward Delay – Delay before the root and Designated port can start sending and receiving messages. Always 15 seconds (15s). Used when operating in STP mode.
AV 170007	Number of Days, Hours, Minutes, and Seconds since the last Topology Change in the network. Topology change happens when non-Edge ports move to a forwarding state.

Information for each port is represented in AVs and BVs starting from (170n00 – 170n99) for each port, where n represents port 1 to port 4.

AVs	Description
AV 170n00	Spanning tree mode that the link works in. This can be "None" when RSTP is disabled or link is down "RSTP" when RSTP is enabled and the node connected is using RSTP or "STP" when RSTP is enabled and the node connected is using STP.
AV 170n01	Adapter. Always eth0.
AV 170n02	Port RSTP Role – Role that the port is playing in the Rapid Spanning Tree network. "Disabled" – Port is disabled. "Root" – Port leads to the "Root Bridge". "Designated" – Port connects other nodes to Root Bridge. "Alternate" – Port discarding traffic. "N/A" – Link is down.
AV 170n03	Port RSTP status – Status of the port. "Learning" – Port is learning MAC address, but not forwarding traffic. "Discarding" – Port is discarding traffic as there is a loop in the network. "Forwarding" – Port is sending and receiving traffic. "N/A" – Link is down.
AV 170n04	Neighbor Bridge ID – The Bridge ID that this port is connected to. "N/A" – Link is down "Bridge ID" – The bridge ID of the neighbor sending traffic to this port is displayed. "Edge" – Neighbor is not participating in the RSTP network.

BVs	Description
BV 170n00	Displays the link status.
BV 170n01	Displays the configured DCF port status.

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Device Templates and Graphics can be used to display Diagnostic AV data to assist with troubleshooting or managing the RSTP network.

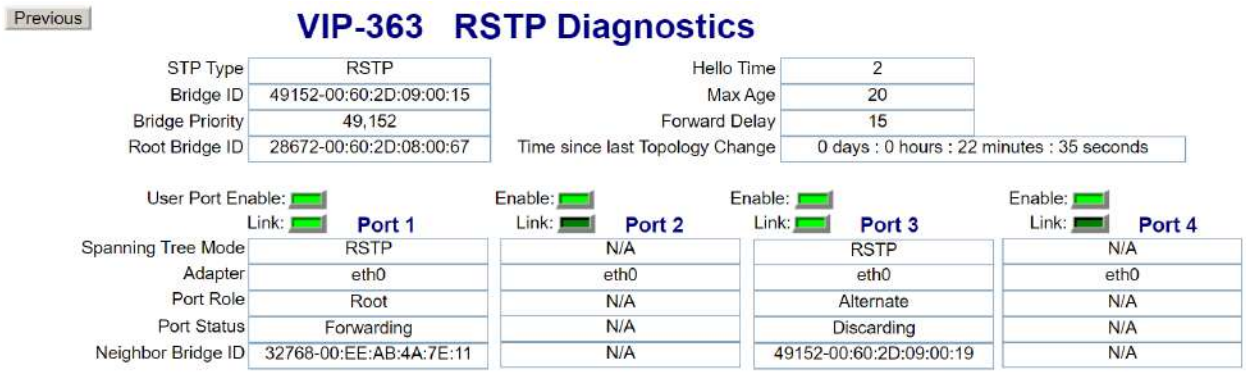

Figure 69. RSTP Diagnostics with enabled RSTP

When RSTP is disabled the STP Type shows “None” which indicates that RSTP has been disabled in the Device Configuration.

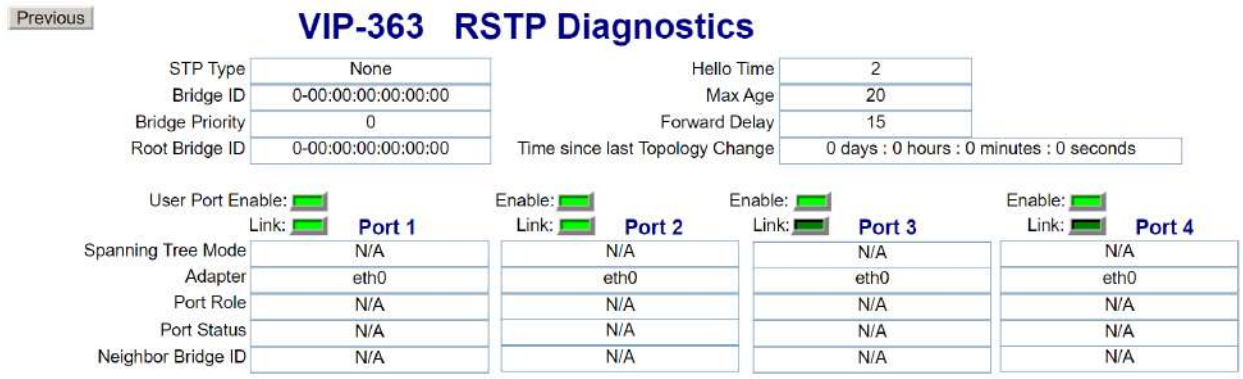

Figure 70. RSTP Diagnostics with disabled RSTP

TROUBLESHOOTING RSTP

If it is determined that some VIP-363 controllers are responding very slowly or not at all, check the steps listed below:

1. Check that all VIP-363 Controllers and other switches on the network have RSTP enabled. If using Diagnostic graphics (AV-170000) for each VIP-363 Controller the “Spanning Tree Type” should display “RSTP” if RSTP is enabled.
2. If any managed third-party switch is used ensure that “RSTP” is enabled.
3. Verify that all the VIP-363 controllers have the same Root Bridge ID (AV-170001).
4. Use AV-170007 to check the time elapsed since the last Topology change, use this as an indicator to see how frequently the RSTP structure is changing. This indicates how long the network has been stable.
5. All links (ports) should display “RSTP” in the “Spanning Tree Mode” AV-170n00 (n = port #).

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DISABLE UNUSED PORT FEATURE

The Port disables feature is used by BV's to manage the access to unused Ethernet Ports by looking at the LINK Status for each Port. If there is no LINK detected, it will close the port.

The unused ports can be disabled if VIP-363 Controller has an open connection or does not have any active communication going on which does not result in LINK status.

The Auto-Disable Unused Ports (BV 4100000) is based on Link Status.

Ethernet Port 1 is always enabled. It is advisable to always use Ethernet Port 1 as the primary communication port.

The following BV's are used to manage and diagnose the Ethernet Switch Port status.

BVs	Description
BV 4100000	Disable Unused Ports (Read/Write) Switch ports 2, 3, and 4 will be disabled if BV 4100000 is ENABLED (unused port). Port 1 will always be ON. Ports 2, 3, and 4 can be disabled or enabled using this BV (BV's4100011-4100013). A disabled port cannot be enabled using this BV. BV will be OFF by default until and unless triggered by user action. The BV will be ON for 5 sec before automatically turning OFF. Please note that BV4100000 should ALWAYS be OFF (as it is only a momentary ON type point). Use the DDC programing to turn BV ON for one pass of DDC and the BV should not have a continual ON value written.
BV 4100010 (port 1) BV 4100011 (port 2)	Port Configuration (Read/Write) Displays the port configuration
BV 4100030 (port 1) BV 4100031 (port 2)	Port Link Status (Read-only) Displays the link status.

For example, to enable Ethernet Port 2 if it was disabled, Enable BV 4100011. It is not necessary to have a cable plugged in to Enable a disabled port. Toggle the appropriate BV (4100011-4100013), for the desired port. Monitor the Ethernet Port 2 via BV 41000301.

If the Auto-Disable Ports BV (4100000) is enabled again before a cable is plugged, the port will get disabled again. If the user requires, the port can remain in an Enabled state without connecting the cable. This will help to use the same enabled port later to plug in a Laptop for Troubleshooting or Maintenance purposes.

To manage and disable unused Ethernet Ports for multiple VIP-363 Controllers, one option is to use a Summary Page display:

An example summary page shown below can be created. This Summary page can then be used to read the current status and control the ports of multiple VIP-363 Controllers using a single display enabling easy remote diagnostics and control for the ports.

For more details on setting up the Summary page display, refer to Compass Web Interface User Guide (31-00309).

As shown in this example summary template, the first column shows the Disable Unused Ports (BV 4100000) and is set up to be writable from the summary template. The remaining columns show the Port Configuration Status (BV 4100010) and Port Link Status (BV 4100030).

When the Disable Port BV 4100000 is set to Enabled it will take about 10 seconds to update the status of Switch Ports 2, 3, and 4. The Port x Configuration BVs can be used to turn on the ports.

Alternatively, a display template such as the below can also be created for a single VIP-363 Controller This example shows Ethernet cables connected to Ethernet Ports 1 (Link Status). Ethernet Ports 2, 3, and 4 are enabled even though the Link Status shows no connected cables.

When the Close Unused Ports (2..4) BV 4100000 is Enabled, the BV remains enabled for 5 seconds duration.

After 5 seconds BV 4100000 is turned off, the unused Ethernet Ports (2, 3, and 4) are turned off as shown below after about 10 seconds duration.

VIP UNUSED ETHERNET PORTS

	Close unused ports 2 to 4	Port 1 Configuration	Port 1 Link	Port 2 Configuration	Port2 Link
Device 230360	Disable	Enable	Enable	Enable	Enable
Device 230363	Disable	Enable	Enable	Enable	Disable

MS/ TP

PROCEDURE TO ENABLE MS/ TP IN VIP-363-HOA

The VIP-363-HOA is designed to allow an installer to install a VIP in an MS/TP application without having to connect up to Compass via Ethernet first to configure the MS/TP. As such the minimum for enabling MS/TP in a VIP should be as follows.

NOTE: The following assumes a New Unit from the factory, or a freshly upgraded unit (since the default for both of these cases is that the “Nonzero dipswitch MAC forces MS/TP mode” option is enabled).

Pre-requisite: The VIP-363-HOA must be updated and running a ROC v1.7.6 or later.

Enabling MS/TP:

1. Ensure VIP-363-HOA is powered down (Off).
2. Set the dipswitch corresponding to the MS/TP MAC Address to a non-zero value in the range of 1-127 (with the “Nonzero dipswitch MAC forces MS/TP mode” defaulting to enabled, this should force the unit into MS/TP mode).
3. Connect the building MS/TP to the Terminal 1 (MS/TP Data +) and the Terminal 2 (MS/TP Data -).
4. Power up the VIP-363-HOA (On).

Verifying MS/TP Communications:

5. Use the Status LED to Verify and Monitor MS/TP communications (see Status LEDs on page 70).
6. Open Compass Device Manager and scan the network for BACnet Devices (VIP-363-HOA should get detected with appropriate MS/TP Network Number and MAC address).

Optional:

In some cases the VIP-363-HOA may be running an older ROC, or the “Nonzero dipswitch MAC forces MS/TP mode” option may have been disabled. In these cases it will be necessary to connect to the unit with Compass over a BACnet/Ethernet connection to upgrade the ROC, or re-configure the Network Settings.

1. Ensure Compass is setup to talk BACnet/Ethernet.
2. Power up the VIP-363-HOA and connect an Ethernet cable to the unit.
3. Open Compass Device Manager and Scan the Network for BACnet devices.

NOTE: If you cannot scan VIP-363-HOA with a normal Scan BACnet Devices option, try selecting the Scan configurable Alerton devices option and re-scan. If detected, check configuration to ensure it is capable of communicating to Compass via Ethernet.

4. Save VIP-363-HOA device to Device Manager Table (It can only be done after a normal Scan BACnet devices).

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5. View Diagnostics Template to ensure VIP-363-HOA version, and update ROC if necessary.
6. Once the ROC is up to date, open Compass Device Manager and Scan the Network for configurable Alerton devices.
7. Choose the VIP-363-HOA from the scan list and select the “Configure” button.
8. Navigate to the BACnet Network Connection section and check settings.
9. Enable the “Nonzero dipswitch MAC forces MS/TP mode” option if you would like to control MS/TP mode via the dipswitch, or disable this setting if you would like to control MS/TP mode via the Network Type setting. With the “Nonzero dipswitch MAC forces MS/TP mode” option enabled a MS/TP MAC of zero will cause the unit to communicate via the Network Type specified by the BACnet Network Type setting. If a nonzero MAC is set, then the unit will override the BACnet Network Type setting and force the unit into MS/TP mode.
10. For security, you can also go into the Ethernet and IP section and Enable/Disable the Ethernet Ports as desired.

The process to enable and verify the MS/TP is really simple (by design), but there are a number of optional steps that might be necessary if the device is in a non-default configuration, or if user want to go beyond the simple setup.

NOTE: Ethernet Port 1 can ONLY be disabled if the unit is running in MS/TP mode. In any other mode Ethernet Port 1 can NOT be disabled. In case, if all Ethernet ports are disabled and if the device is switched out of the MS/TP mode then the device is provised to automatically enable Ethernet Port 1. This is intended to prevent the scenario where all communication options are disabled.

NOTE: Communicate to the VIP-363-HOA controllers via MS/TP for normal operations (Avoid using this method for ROC updates due to the length of time taken to complete this task > 60 minutes).

NOTE: In MS/TP mode, all Enabled Ethernet Ports will operate as engineering ports (with BACnet/Ethernet enabled).

WARNING: Consideration must be made for the reduced bandwidth associated with MS/TP communications. Alerton recommends that ROC file and other large file downloads are performed via 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 with setting up TrendLogs and logging intervals to maximize network performance.

NOTE: It is important to be aware that when MS/TP is enabled in the VIP-363-HOA controllers it does not make the VIP-363-HOA controller into a MS/TP routing device.

TO RE-ENALBE THE ETHERNET

There are two ways for switching a unit out of MS/TP mode and back to an Ethernet based communications mode.

1) Setting the dipswitch back to zero value:

In this scenario the Network Type could have been left in any mode, and by simply setting the dipswitch back to zero, user can return the unit to communicating via the mode specified by the Network Type (recommended).

2) Editing the devices DCF to change the Network Type:

In this scenario the user would need to edit the devices DCF and change the Network Type to the desired type. The user would also need to either set the dipswitch to zero, OR uncheck the option for "Nonzero dipswitch MAC forces MS/TP mode".

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About MS/ TP Protocol

The BACnet Master-Slave Token Passing (MS/TP) protocol is used to relay and exchange information between building devices. The MS/TP is based on the BACnet standard protocol and is a peer-to-peer, multiple master protocol based on token passing. A token is information packets in the form of a pulse signal that is passed between devices on a network.

To enable MS/TP from the Device Configuration, select BACnet and I/O configuration. Select BACnet Network Connection and then from the BACnet Network Type, select MS/TP from the drop-down list.

The user can also enable the MS/TP mode by the "Nonzero dipswitch MAC forces MS/TP mode" option by simply setting a non-zero MAC address.

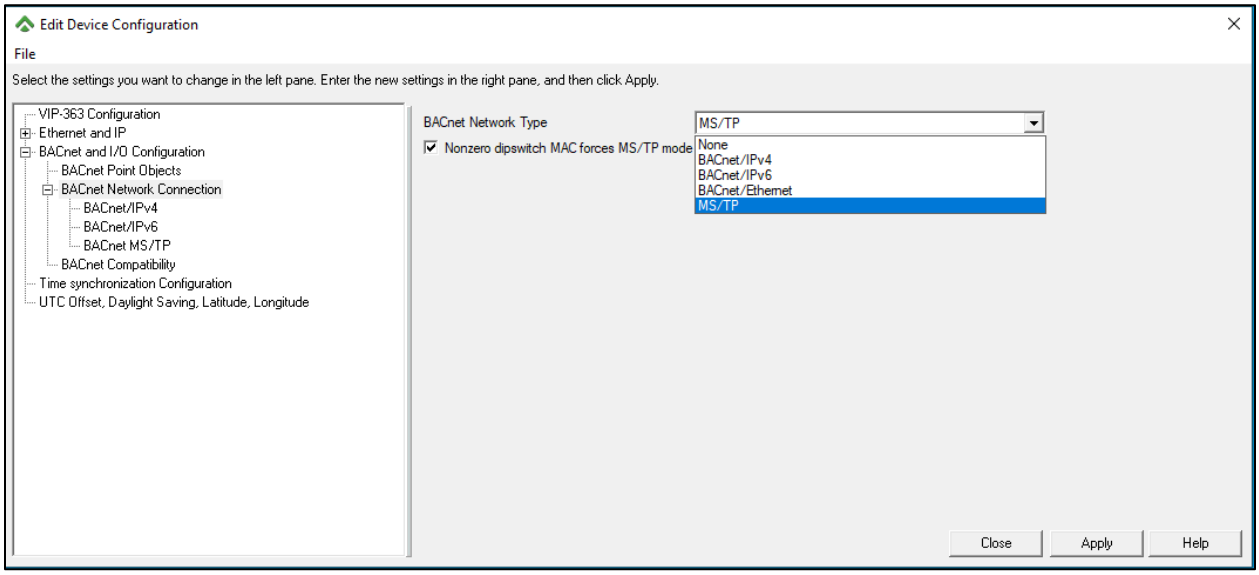


Figure 71. Configuration of MS/TP BACnet Network type

The above figure shows the path to access the BACnet Network Type options via the BACnet and I/O Configuration and then BACnet Network Connection.

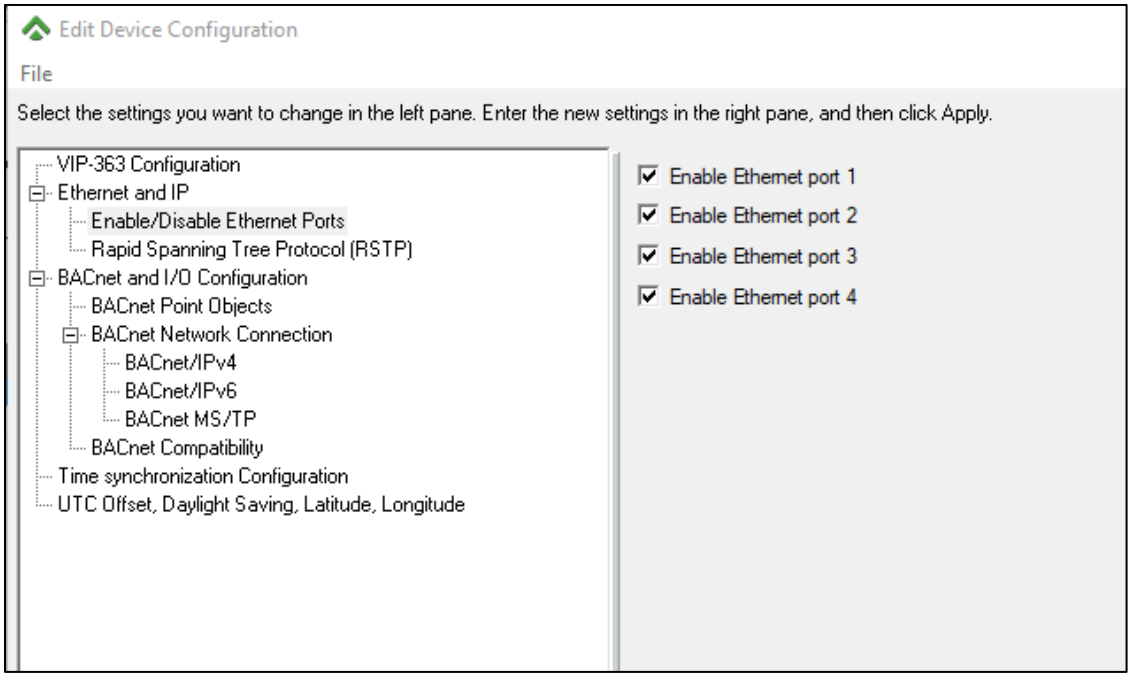
BACnet Network Type

Parameter	Description
None	Sets the controller to operate in a ‘Stand-alone’ mode, the Ethernet Ports can be used to re-configure parameters, etc.
BACnet/IPv4	Enables BACnet/IPv4
BACnet/IPv6	Enables BACnet/IPv6
BACnet/Ethernet	Enables BACnet/Ethernet
MSTP	Enable MSTP port (Terminals 1 and 2). Supports MSTP communication speeds up to 115.2 Kbps. Switches Ethernet Ports to function as a non-routing engineering port, use port Enable checkboxes to disable each of the Ethernet Ports.

ETHERNET PORT BEHAVIOR

The VIP-363-HOA controller comprises of a Controller with an Ethernet Switch. Ethernet Port 1 is the recommended Port that should communicate with the VIP-363-HOA controller. Ports 2-4 are switched with Port 1 and could be used as either additional or alternative Engineering Ports.

To secure the controller, Port 1 through 4 should be disabled in the Device Configuration by unchecking the Enable Ethernet Ports 1 through 4 check boxes in the Enable/Disable Ethernet Ports section of the Device Configuration as shown below.



If the Ethernet Ports need to be re-enabled, this can be performed by Scan Configurable Alerton Devices via MS/TP then re-enable the Ethernet Ports and send the Device Configuration.

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EIA-485

The BACnet MS/TP protocol uses EIA-485 (RS-485) as the physical layer standard for data transmission. VIP-363-HOA controllers also use the BACnet MS/TP protocol over an EIA-485 standard for communicating with third-party routers, gateways, or master controllers.

CONNECTING TO MS/ TP

The following table lists key features enabled with MS/TP selected as the BACnet Network type.

BACnet MS/TP Features	
Terminal 1	MS/TP data + connection
Terminal 2	MS/TP data - connection
8 Block DIP Switch	Set the MS/TP MAC address in the range of 1 to 127. Do not use address 0
Status LED (Amber LED below Power)	LED flashes in accordance with the following schedule 1. Flash per second = No communication 2. Flashes per second = Token received but no direct communication 3. Flashes per second = Messages being received and sent.
Baud Rate	Default Baud Rate is to Auto Baud, i.e. defaults to the baud rate set in the Global Controller. The baud rate can be changed if required, see page 96.

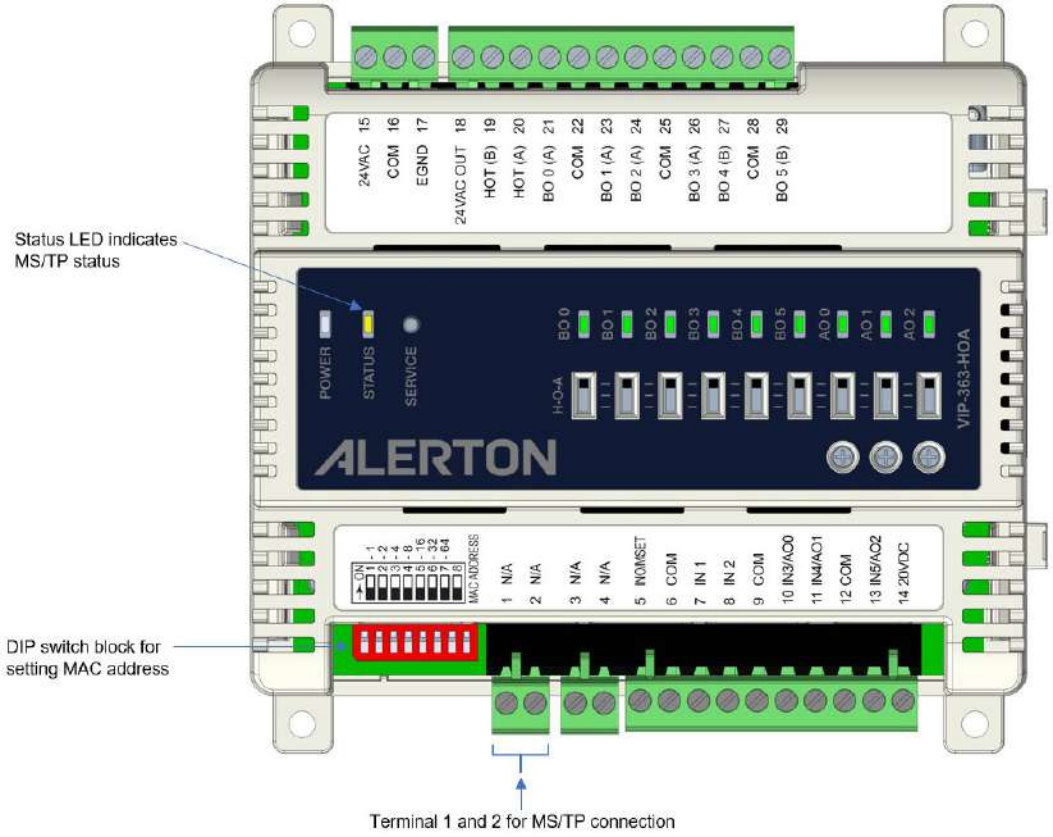

Figure 72. Details of MS/TP connection on VIP-363-HOA Controller

To change the Baud Rate via Device Configuration, under the BACnet and I/O Configuration select BACnet MS/TP to access the MS/TP Kbps settings. Note the default is auto, 9.6 Kbps, 19.2 Kbps, 38.4 Kbps, 76.8 Kbps, and 115.2 Kbps are options.

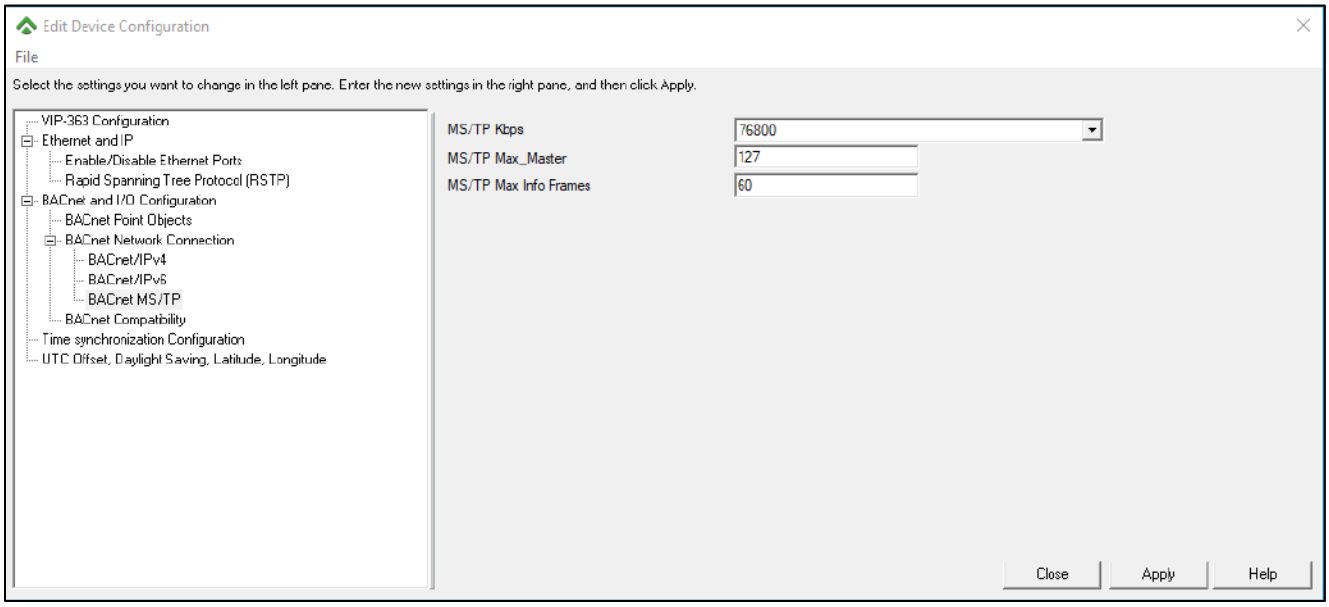

Figure 73. BACnet MS/TP Edit Device Configuration

Connect the VIP-363-HOA to the BACnet system over an MS/TP LAN that uses the EIA–485 signaling standard. Use shielded, twisted-pair cabling with characteristic impedance between 100 and 130Ω. The distributed capacitance between conductors must be less than 30 pF/foot (100 pF/m). The distributed capacitance between conductor and shield must be less than 60 pF/foot (200 pF/m). Foil or braided shield acceptable.

The communication wiring must be installed in a proper daisy chain format. Daisy chain configuration means that there is only one main cable and every network device is connected in parallel directly along its path. It is important to keep the same color for all the + wiring and a different color for all the - wiring. Do not use a free topology and/or star configuration on the network. This will cause reflection issues.

Use MS/TP LAN communications terminals to connect the BACnet MS/TP LAN to the VIP-363-HOA. Polarity must be maintained throughout the entire LAN.

COMMUNICATION WITH MS/ TP

VIP-363-HOA controllers are master devices on the MS/TP LAN.

Each VIP-363-HOA controller employs a high-quality EIA-485 transceiver and exerts ¼ unit load on the MS/TP LAN. The below table describes details about the LAN.

BACnet MS/TP Features	
Transmission speed	9.6, 19.2, 38.4, 76.8, 115.2 Kbps
Layout	Bus
Cabling	BACnet specifies the following. 11. Shielded, twisted-pair cabling with characteristic impedance between 100 and 130 Ώ • Distributed capacitance between conductors must be less than 30 pF/foot (100 pF/m). 12. The distributed capacitance between conductor and shield must be less than 60 pF/foot (200 pF/m). 13. Foil or braided shield is acceptable.
Segment length	4000 ft. (1071 m) per segment using recommended wire.
Maximum devices overall	Depends on the classification of devices as master or slave. The maximum number of master devices is 128. The maximum number of slave devices or devices overall (mixed master and slave) is 255. 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 the relative unit load of devices.
Repeaters	Required when making runs longer than 4000 feet. Three repeaters maximum between any two devices.
Terminating resistors	Matched resistors required at each end of the segment bus wired across (+) and (–). Use matched precision resistors rated ¼ W ±1% / 80 to 130 Ώ.
Shield grounding	Ground shield drain wire at single point earth (panel) ground, not VIP-363 ground. Tape off shield drain wire at the other end. Tie shield drain wire through at each VIP-363-HOA.

Setting the MS/ TP Mac Address

DIP switches on the VIP-363-HOA are used to set the unit's MAC address. Each VIP-363-HOA on an MS/TP LAN must have a unique MAC address in the range 0 to 127.

NOTE: Avoid address 0 because it is the factory default MAC address for all MS/TP devices.

To set the MS/ TP mac address

1. Find an unused MAC address on the MS/TP LAN to which the VIP-363-HOA connects.
2. Locate the DIP switch bank on the VIP-363-HOA for addressing. This is labeled MAC ADDRESS.
3. Power down the VIP-363-HOA.
4. Set the desired DIP switches for the MAC address. Add the value of DIP switches set to ON to determine the MAC address. Use the below table.

Table 28. DIP switch values for MS/TP LAN MAC address

DIP Switch	1	2	3	4	5	6	7	8
Value	1	2	4	8	16	32	64	Not Used

Terminating MS/ TP LAN cabling

Locate MS/TP terminations (labeled Data+ and Data–). Maintain polarity of the MS/TP wire run throughout the MS/TP LAN.

NOTE: This guide provides only basic information about MS/TP terminations at the VIP-363-HOA. For more detailed information and limitations with respect to MS/TP LANs—such as distance requirements, unit loads, and repeater architectures—see BACtalk System Design Guide (LTBT-TM-SYSDSGN).

Communications Status LED

The VIP-363-HOA utilizes the STATUS LED to indicate the status of communications on the MS/TP LAN when MS/TP mode is selected.

- **One flash:** No communications detected.
- **Two flashes:** Messages detected, but none directed to this VIP-363-HOA. In most cases, indicates that multiple MSTP Devices are passing the token between themselves, but the global controller is not communicating. Also occurs when a global controller is communicating on the same MS/TP and there are no messages directed to that particular VIP-363-HOA.
- **Three flashes:** Messages (other than token passing) detected that are directed to this VIP-363-HOA. Generally, indicates that the control system is communicating properly. Occurs if any point in the VIP-363-HOA is referenced in global controller DDC, such as alarms, trendlogs (depending on sampling frequency), or an open Compass display.

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Ethernet Port Operation in MS/ TP Mode

When MS/TP mode is selected the Ethernet ports default to BACnet/Ethernet mode. This is to allow:

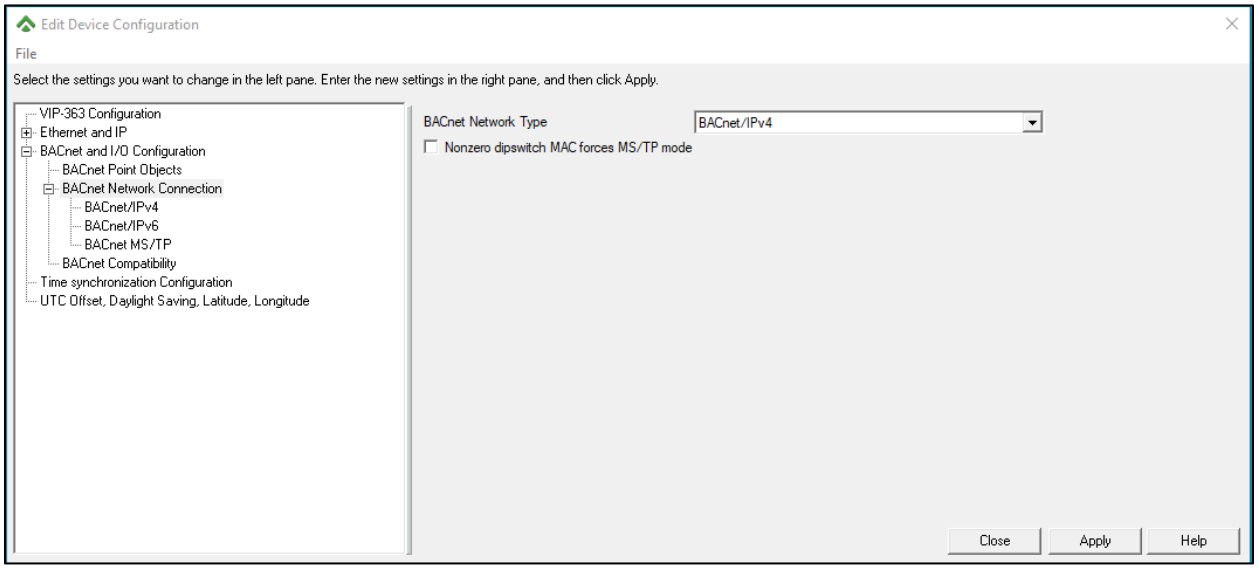
a. Device manager Configuration.

b. Compass and VisualLogic functionality which is non-routing.

To enable/disable the Ethernet Ports, read the Ethernet Port Behavior section on page 94.

Disable MS/ TP MAC Address Feature

To prevent an IP installed VIP-363-HOA controller from being set to operate in MS/TP mode unintentionally. The Auto MS/TP mode feature can be disabled by unchecking the Nonzero dipswitch MAC forces MS/TP Mode checkbox within the BACnet Network Connection settings as shown below.



To summarize the availability of the different BACnet Network Types for the different combinations possible with setting the MAC address and the Nonzero Dipswitch MAC forces MS/TP mode setting.

Table 29. DIP switch values for MS/TP LAN MAC address

MAC Address	Nonzero dipswitch MAC forces MS/TP mode	BACnet Network Type available
0	Checked	None, BAC/Eth, BAC/IPv4, BAC/IPv6, MS/TP (MS/TP through device configuration only)
0	Unchecked	None, BAC/Eth, BAC/IPv4, BAC/IPv6
1 through 127	Checked	Automatic MS/TP only
1 through 127	Unchecked	None, BAC/Eth, BAC/IPv4, BAC/IPv6 **NOTE:** MS/TP is supported only if the Network Type is specifically set to MS/TP.

Considerations for Upgrading a VLCA-1688 to VIP-363-HOA MSTP

The VIP-363-HOA controller supports .BD3 and .BD9 while the VLCA-1688 supports .BD4 and .BD6, this will mean the following differences in the DDC programming need to be considered:

1. The following are not supported in .BD3 and .BD9 DDC

a.special point – Comm Fail, this will require DDC function modules to perform a communications check.

b. The input scaling on the VIP-363-HOA is configured via Device Templates and VIP Builder, the input scaling information should be exported from the VLCA-1688 controllers DDC first.

c. RED/WED DDC functions, DDC function module inputs/outputs would need to be configured to include Device Instance as well as the Device Object to read or write to BACnet Objects in other controllers, for example 8000:BV-24.

For the installation, to achieve a comparable point count to a VLCA-1688 a VXIO-595 will be required. However, this will equate to 31 I/O being available compared to 32 on the VLCA-1688. Due to the terminal layout and footprints being different between the VLCA-1688 and VIP-363-HOA key considerations are:

1. Footprint and orientation of the controllers, the location of the I/O being different between the two models of the controller will require some re-wire work which may include the need to lengthen some wires.

2. To accommodate the extra length created when connecting a VIP and VXIO module this may require some repositioning of other items in the control panel.

a. Dimensions of a VLCA-1688 = 9” (230mm) H, 7.1” (180mm) W, 1.5” (38mm) D

b. Dimensions of a VIP-363-HOA with a single VXIO-595 = 10.6” (270mm) H, 5.1” (130mm) W, 2.25”(57mm) D

3. Additional power would be required to power the VXIO and Binary outputs on the controller, it is highly likely that a second transformer may be required based upon the following power requirements:

a. Power for a VLCA-1688 = 24VAC @ 50VA

b. Power for a VIP-363-HOA = 24VAC @ 50VA

c. Power for VXIO-965-HOA = 24VAC @ 35VA

d. In addition, each BO could possibly draw = 36 VA (24 VAC @ 1.5A)

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4. Binary Outputs on the VLCA-1688 are Triac 24 VAC @ 0.5A, onboard the VIP and VXIO the fixed Binary Outputs are solid-state relays 24 VAC @ 1.5A.

APPENDIX A: TECHNICAL DATA

TECHNICAL SPECIFICATIONS

Table 30. VIP-363-HOA and VIP-363-VAV Controller Specifications

Power Consumption	**AC:** min 50VA, max 222VA (24VAC = 100 VA, HOT(A) = 100 VA, HOT(B) = 72 VA)
Rated Input Voltage	20-30 VAC; 50/60Hz; half-wave
Ambient Temperature	-4°F to 131°F (-20°C to 55°C)
Storage Temperature	-4°F to 131°F (-20°C to 55°C)
Operating Temperature	0°F to 158°F (-17°C to 70°C)
Humidity	5% to 95% RH, non-condensing
Programming Software	Compass and VisualLogic supporting BD3 and BD9 DDC file format
Differential Pressure Sensor Range (VIP-363-VAV model)	0-2” WC (0 to 500 Pa) 32°F to 122°F (0°C to 50°C)
Universal Inputs	3 Terminals fixed as Universal Inputs (UI)
Binary Outputs (24VAC)	6 Terminals fixed as BO's (switching 24VAC)
Universal Inputs & Outputs (can be selected for AI, BI, AO, and BO)	Software configurable as AI, BI, AO, or BO (note that in BO mode the output signal is 12VDC)
Output H-O-A Switches	Yes
Input Resolution	16 Bit A/D converter
Pulse Input Minimum Duty Cycle	5ms ON / 5ms OFF
Binary Output Type / Rating	Solid-State Relay, 1.5A Continuous, 3.5A Inrush for 100ms
Binary Output Voltage Rating	20 to 30VAC @ 50/60 Hz
Binary Output Type / Rating (Universal Input or Output terminals only)	Solid-State Relay - Coil rating of the external relay must be 12 VDC at 20 mA or lower

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Table 31. VXIO-322 & VXIO-965 Specifications

Power Consumption	**VXIO-322:** AC: min 15VA; max 87VA (24VAC = 87VA, HOT(A) = 36VA, HOT(B) = 36VA) **VXIO-965:** AC: min 35VA; max 207VA (24VAC = 100VA, HOT(A) = 100VA, HOT(B) = 72VA)
Rated Input Voltage	20-30VAC; 50/60Hz; half-wave
Ambient Temperature	-4°F to 131°F (-20°C to 55°C)
Storage Temperature	-4°F to 131°F (-20°C to 55°C)
Operating Temperature	0°F to 158°F (-17°C to 70°C)
Humidity	5% to 95% RH, non-condensing
Programming Software	Compass and VisualLogic supporting BD3 and BD9 DDC file format
Universal Inputs	**VXIO-322:** 3 Terminals fixed as Universal Inputs (UI) **VXIO-965:** 9 Terminals fixed as Universal Inputs (UI)
Binary Outputs (24VAC)	**VXIO-322:** 2 Terminals fixed as BO's (switching 24VAC) **VXIO-965:** 6 Terminals fixed as BO's (switching 24VAC)
Universal Inputs & Outputs	**VXIO-322:** 2 software configurable as UI, AO, or BO (12VDC) **VXIO-965:** 5 software configurable as UI, AO, or BO (12VDC)
Output H-O-A Switches	Yes
Input Resolution	16 Bit A/D converter
Pulse Input Minimum Duty Cycle	5ms ON / 5ms OFF
Binary Output Type / Rating	Solid-State Relay, 1.5A Continuous, 3.5A Inrush for 100ms
Binary Output Voltage Rating	20 to 30VAC @ 50/60 Hz
Binary Output Type / Rating (Universal Input or Output terminals only)	Solid-State Relay - Coil rating of the external relay must be 12 VDC at 20 mA or lower

APPENDIX B: SERIAL PORT DRIVER DOWNLOAD & INSTALLATION

SERIAL PORT DRIVER CHECK

1. Open Windows device manager.

Plug in the USB Serial port cable to the VIP controller and your computer.

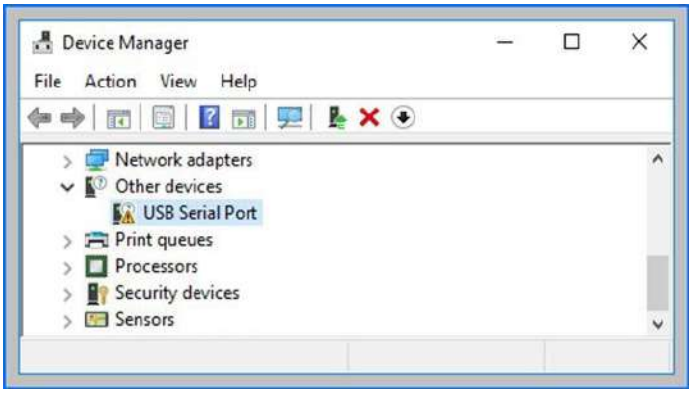

Figure 74. Serial port error

If under Other Devices the item USB Serial Port is displayed with a yellow triangle, user will need to install the driver. If a yellow triangle is not present, then all is working well. Record the com port assignment as depicted in Figure 76.

DOWNLOAD THE SERIAL PORT DRIVER

Use any of these links to download the serial driver:

- https://www.ftdichip.com/Drivers/D2XX.htm
- https://www.ftdichip.com/Drivers/CDM/CDM21228_Setup.zip
- https://s3.amazonaws.com/alerton.files/VIP/CDM21228_Setup.zip

Read the installation guides for support from the following link:

https://www.ftdichip.com/Support/Documents/InstallGuides.htm

THE SERIAL PORT DRIVER INSTALLATION

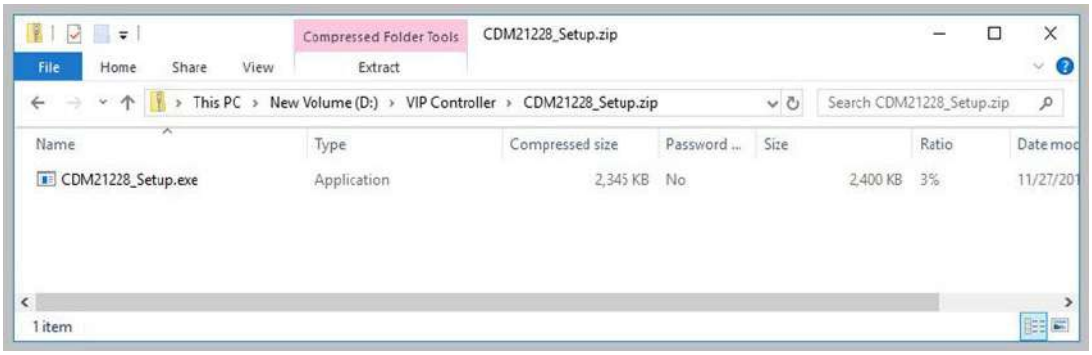

Figure 75. Serial port driver file

1. Double-click CDM21228_Setup.exe to run the setup routine; Windows UAC (User Access Control) may prompt for Administrator rights.
    a. Follow the instructions to install the driver
    b. In case of difficulties with the driver installation, refer to the manufacturer's documentation at the following link:

    https://www.ftdichip.com/Support/Documents/InstallGuides.htm

Figure 76. The serial port driver installation

Windows Device Manager should reflect a successful driver installation with a USB Serial Port (COMxx) now defined. Take note of the COM Port number assignment.

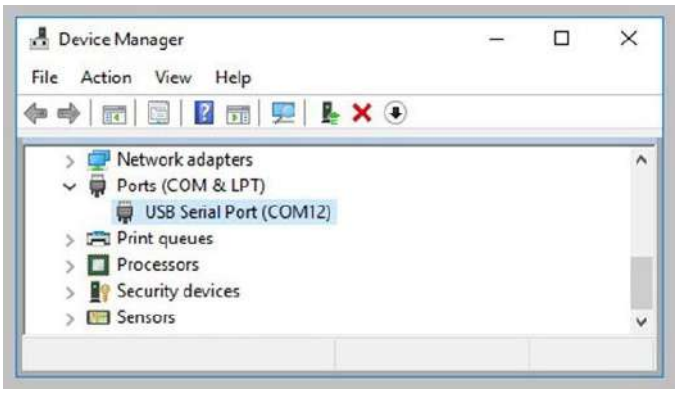

Figure 77. Device manager – com port defined

If you are plugging in different controllers to the same USB port, you will want to perform an edit to the Windows Registry to prevent new COM ports from being created each time a new controller is plugged in. See APPENDIX C: COM port registry edit.

APPENDIX C: COM PORT REGISTRY EDIT

To prevent Windows from generating a new COM port each time a new VIP controller is connected via a USB port, you can lock down the port effectively associating the serial port driver with that COM port so long as the same USB port is used.

Using your favorite txt editor, create a new file and input the following text:

```
REGEDIT4

[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\usbflags]
"IgnoreHWSerNum04036001"=hex:01
```

NOTE: The above registry key line should be a single line of text.

Save the file to ensure it has a file extension of .reg.

To import the changes above into your registry, double-click on the .REG file and follow the prompts.

The first time you plug in a COM port will be generated, but the COM port number will remain the same going forward if the same port is used.

APPENDIX D: RESET TO FACTORY DEFAULT SETTINGS

Should the VIP get into a misconfigured state, the device can be reset to factory default settings by connecting to the console port.

Pre-requisites for factory reset are as follows:

1. A standard USB 2.0 printer cable (USB-Type A (M) to USB-Type B (M)) refer figure shown below

Figure 78, USB 2.0 Printer Cable

2. A serial terminal program like PuTTY
3. A serial port driver
4. An installation of Compass version 1.6.3 or later.
5. (Optional) edit registry as described in APPENDIX C: COM port registry edit to prevent allocating a new COM port for each device.

During boot, the user can reset to Factory default by pressing “[Ctrl] + [R]” as shown below in Figure 62. The key combination “[Ctrl] + [R]” should be pressed while the boot countdown is still going on (Time until the normal boot is non- zero). This would return the controller to a state where it is fresh from the factory.

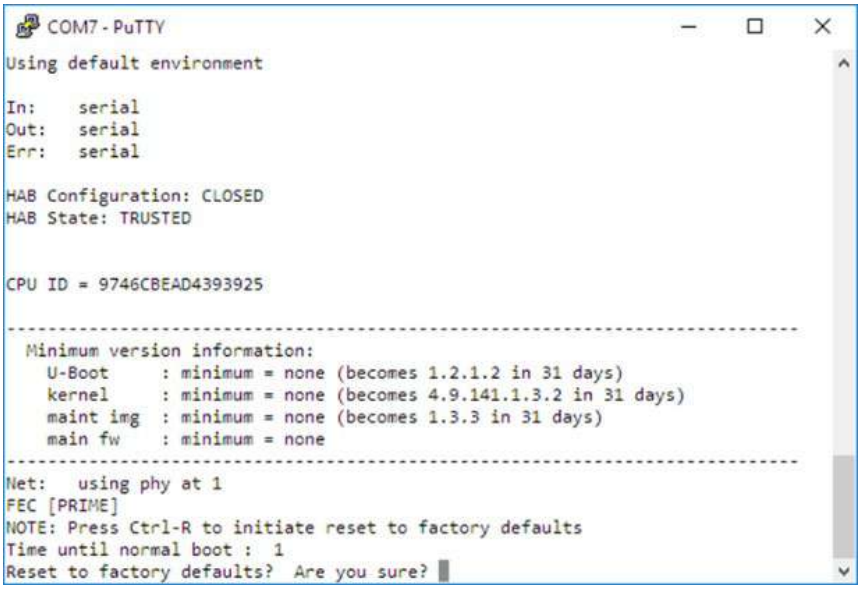

Figure 79. Factory Reset Via Boot Menu

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APPENDIX F: OBJECT AND PROPERTY REFERENCES

OBJECTS IN THE VIP CONTROLLER

Object (instance range)	Function
AI (9000 – 9005)	Analog input objects associated with physical, universal input terminals on VIPs.
AO (9000 – 9005)	Analog output objects associated with physical output terminals on VIPs.
AV (0 – 89)	User AVs without priority arrays.
AV (120 – 499)	Zero or more user AVs without priority arrays. The total number depends on DCF settings.
AV (250 – 252)	For VIP-363-VAV AA 9904 is mapped to AV 250, AV 9905 is mapped to AV 251 and AV 9906 is mapped to AV 252.
AV (500 – 599)	Zero or more users AVs with priority arrays. The number depends on DCF settings.
BV (0 – 63)	Users BVs without priority arrays, except BV 40.
BV (100 – 499)	Zero or more users BVs without priority arrays. The number depends on DCF settings.
BV (500 – 599)	Zero or more users BVs with priority arrays. The number depends on DCF settings.
BI (9000 – 9005)	Binary input objects associated with physical, universal input terminals on VIPs.
BO (9000 – 9005, 9008*)	Analog output objects associated with physical output terminals on VIPs. *With the UIO terminals configured for BOs, you can have up to 9 BOs (0-8, or 9000- 9008)
Calendar	Describes a list of calendar dates, special event dates, holiday dates, and date ranges.
Device	Provides general information about a device.
Event Enrollment	Defines an event and connects the occurrence of the event to the transmission of an event notification. Primarily used for alarms in BACtalk.
File (0)	Provides information about the real-time operating code (ROC) file.
File (1024)	Provides information about the current DDC file.
File (2048)	Provides information about the DDC trap file.
Notification Class	Stores a list of available recipients for the distribution of event notifications (alarms, trend-log gathering, and so on).
Program 0	Stores information about the ROC/controller program.
Program 1024	Stores program status information about the current DDC program.
Schedule	Controls designated properties by periodic schedule that may recur during a range of dates.
Zones	Proprietary Alerton object containing the individual properties and references required to support the optimum start and tenant activity features of Envision for BACtalk.
Trendlogs	BACnet Trendlog objects.

OBJECTS IN THE VXIO-322 EXPANSION MODULE

Object (instance range)	Function
AI (x000 – x004)	Analog input objects associated with physical, universal input terminals on VXIO-322.
AO (x000 – x001)	Analog output objects associated with physical output terminals on VXIO-322.
BI (x000 – x004)	Binary input objects associated with physical, universal input terminals on VXIO-322.
BO (x000 – x001, x003*)	Analog output objects associated with physical output terminals on VXIO-322. *With the UIO terminals configured for BOs, you can have up to 4 BOs (0-3, or x000-X003) on the VXIO-322.

NOTE: The VIP supports a maximum of 1000 active COV subscriptions.

OBJECTS IN THE VXIO-965 EXPANSION MODULE

Object (instance range)	Function
AI (x000 – x013)	Analog input objects associated with physical, universal input terminals on VXIO-965.
AO (x000 – x004)	Analog output objects associated with physical output terminals on VXIO-965.
BI (x000 – x013)	Binary input objects associated with physical, universal input terminals on VXIO-965.
BO (x000 – x005 | x010*)	Analog output objects associated with physical output terminals on VXIO-965. *With the UIO terminals configured for BOs, you can have up to 11 BOs (0-10, or x000- X010) on the VXIO-965.

NOTE: AV's and BV's are stored in the VIP controller. For more details of available AV's and BV's, see the *Objects in the VIP controller*.

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PROPERTIES OF VIP AI OBJECTS

Property	W	Type	Example	Remarks
Description	Yes	Character string		Initially set to something like "AI n. "Example: Occupied Set Point
Object- Identifier		BACnet Object Identifier		This property consists of the object- type property and the object instance, which is a numeric code that identifies the object of interest. Example: AI 1.
Object- Name	Yes	Character string		Initially set to "AI n" CANNOT BE SET BLANK. Example: AI 001
COV-Increment	Yes	Real	0	If the present value changes by this amount or greater, then a change-of- value notification is sent to sub- scribed devices.
Present- Value	Yes	Real		The range is 3 x 1038 (six significant digits of resolution) Example: 76.4
Units	Yes	Enumerated	no-units	Indicates the unit of measure, in BACnet engineering units, that the AI is expressed in. Example: Deg F

Status Properties	W	Type	Default Value	Notes
Event-State		Enumerated	“normal”	
Out-Of- Service	Yes	Boolean	FALSE	De-couples the Physical Input from the Logical Input, allowing the user to write to the present-value and reliability properties for Testing or Override.
Status-Flags		Bit string		A four-position bit string that indicates the status of the AI. If status bit=1, then the status is TRUE.

PROPERTIES OF VIP AO OBJECTS

Property	W	Type	Example	Remarks
Object- Identifier		BACnet Object Identifier	AO n	This property consists of the object-type property and the object instance, which is a numeric code that identifies the object of interest.
Object- Name	Yes	Character string	AO n	CANNOT BE SET BLANK. Example: HGT CMD.
Object- Type		Enumerated	AO	
Present- Value	Yes	Real		Example: 76.4%
Description	Yes	Character string	AO n	Example: Heating Valve Command.
Status- Flags		Bit string		A four-position bit string that indicates the status of the AO. If status bit=1, then the status is TRUE.
Event- State		Enumerated	“normal”	
Reliability	[Yes]	BACnet Reliability		Normally is Read-Only and reports “no fault detected”. Gets set to “Open Loop” (and is writable), when Out-of-Service is set to TRUE. Gets set to “Open Loop” if HOA is set to Hand or OFF, and Reliability_Evaluation_Inhibit is FALSE.
Out-Of- Service	Yes	Boolean	FALSE	Decouples the Physical Output from the Logical Output, allowing the user to Test the AO control logic without affecting the physical Output.
Units	Yes	Enumerated	no units	Indicates the unit of measure, in BACnet engineering units, that the AO is expressed in. Example: Volts.
Priority- Array	Yes	BACnet Priority Array	all null	16 index prioritized array of AO Commands.
Relinquish-Default	Yes	Real	0.0	Value of the AO Present-Value when the Priority-Array is all NULL.
Reliability-Evaluation-Inhibit	Yes		FALSE	Disables the Reliability reporting when HOA is set to HAND, or OFF.
Property- List				List of all supported properties of an Object (except Object- Identifier, Object-Name, Object-Type, and Property-List, which are always required for ALL BACnet Objects).
Aler-Interface-Value		Real		Value of Physical AO.

PROPERTIES OF VIP AV OBJECTS

Property	W	Type	Example	Remarks
Description	Yes	Character string		Initially set to "AV n". Example: Occupied Set Point.
Object-Identifier		BACnet Object Identifier		This property consists of the object-type property and the object instance, which is a numeric code that identifies the object of interest. Example: AV 1.
Object-Name	Yes	Character string		Initially set to something like "AV n" CANNOT BE SET BLANK. Example: AV 001.
Object-Type		Enumerated	AV	Example: AV.
Property-List				

Core Properties	Write	Type	Default Value	Notes
COV-Increment	Yes	Real	0	If the present value changes by this amount or greater, then a change-of-value notification is sent to subscribed devices.
Present-Value	Yes	Real	0	The range is 3 x 1038 (six significant digits of resolution) Example: 76.4.
Priority- Array	Yes	BACnet Priority Array	all null	Only present on user AVs with priority array (AV 500..599).
Relinquish-Default	Yes	REAL	0	Only present on user AVs with priority array (AV 500..599).
Units	Yes	Enumerated	no-units	Indicates the unit of measure, in BACnet engineering units, that the AV is expressed in. Example: Deg F.

Status Properties	Write	Type	Default Value	Notes
Event-State		Enumerated		
Status-Flags		Bit String		A four-position bit string that indicates the status of the AV. If status bit=1, that status is TRUE.

PROPERTIES OF MICROSET VIP AV OBJECTS

Property	W	Type	Example	Remarks
Description	Yes	Character string		These are initially set (upon reset to factory defaults) to the default values shown in the section on Microset point allocations but can be changed to other values thereafter. Example: Occupied Set Point.
Object-Identifier		BACnet Object Identifier		This property consists of the object-type property and the object instance, which is a numeric code that identifies the object of interest. Example: AV 1.
Object-Name	Yes	Character string		These are initially set (upon reset to factory defaults) to the default values shown in the section on Microset point allocations but can be changed to other values thereafter, CAN NOT BE SET TO BLANK. Example: AV 001.
Object-Type		Enumerated	AV	Example: AV.
Property-List				

Core Properties	Write	Type	Default Value	Notes
COV-Increment	Yes	Real	0.0	If the present value changes by this amount or greater, then a change-of-value notification is sent to subscribed devices.
Present-Value	Yes	Real		The range is 3 x 1038 (six significant digits of resolution) Example: 76.4.
Units	Yes	Enumerated		Indicates the unit of measure, in BACnet engineering units, that the AV is expressed in. Example: Deg F.

Status Properties	Write	Type	Default Value	Notes
Event-State		Enumerated		
Status-Flags		Bit String		A four-position bit string that indicates the status of the AV. If status bit=1, that status is TRUE.

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PROPERTIES OF VIP BI OBJECTS

Property	W	Type	Exampl	Remarks
Object-Identifier		BACnet Object Identifier	BI n	This property consists of the object-type property and the object instance, which is a numeric code that identifies the object of interest.
Object-Identifier		BACnet Object Identifier	BI n	This property consists of the object-type property and the object instance, which is a numeric code that identifies the object of interest.
Object- Name	Yes	Character string	BI n	CANNOT BE SET BLANK. Example: Exh Fan.
Object- Type		BACnet Object Type	BI	
Present-Value	[Yes]	BACnet Binary BV		Example: Active.
Description	Yes	Character string	BI n	Example: Exhaust Fan Status.
Status-Flags		Bit string		A four-position bit string that indicates the status of the BI. If status bit=1, then the status is TRUE.
Event-State		Enumerated	“normal”	
Reliability	[Yes]	BACnet Reliability		Normally is Read-Only and reports “no fault detected”. Gets set to “Open Loop” (and is writable), when Out-of-Service is set to TRUE.
Out-Of-Service	Yes	Boolean	FALSE	Decouples the Physical Input from the Logical Input, allowing the user to write to the present-value and reliability properties for Testing or Override.
Polarity		BACnet Polarity	“normal”	Indicates the polarity of the BI (normal or reversed).
Inactive- Text	Yes	Character string		Specifies Text that can be used when BI is Inactive.
Active-Text	Yes	Character string		Specifies Text that can be used when BI is Active.
Change-Of-State-Time		BACnet Date Time		Indicates the Time of the last State Change.
Change-Of-State-Count	Yes	Unsigned		Indicates the total number of State Changes (can be reset to 0).
Time-Of-State- Count-Reset		BACnet Date Time		Indicates the time of the last State Count reset.
Elapsed-Active-Time	Yes	Unsigned32		Indicates the total Elapsed Active Time in seconds (can be reset to 0).
Time-Of-Active- Time-Reset		BACnet Date Time		Indicates the time of the last Elapsed Active Time reset.
Reliability-Evaluation-Inhibit	Yes	Boolean	FALSE	Does nothing for BI.
Property- List				List of all supported properties of an Object (except Object-Identifier, Object-Name, Object-Type, and Property-List, which are always required for ALL BACnet Objects).

PROPERTIES OF VIP BO OBJECTS

Property	W	Type	Example	Remarks
Object-Identifier		BACnet Object Identifier	BO n	This property consists of the object-type property and the object instance, which is a numeric code that identifies the object of interest.
Object- Name	Yes	Character string	BO n	CANNOT BE SET BLANK. Example: Circ Pump.
Object- Type		BACnet Object Type	BO	
Present-Value	Yes	BACnet Binary BV		Example: Active.
Description	Yes	Character string	BO n	Example: Circulation Pump Command.
Status-Flags		Bit string		A four-position bit string that indicates the status of the BO. If status bit=1, that status is TRUE.
Event-State		Enumerated	“normal”	
Reliability	Yes	BACnet Reliability		Normally is Read-Only and reports “no fault detected”. Gets set to “Open Loop” (and is writable), when Out-of-Service is set to TRUE. Gets set to “Open Loop” if HOA is set to Hand or OFF, and Reliability_ Evaluation_Inhibit is FALSE.
Out-Of-Service	Yes	Boolean	FALSE	Decouples the Physical Output from the Logical Output, al- lowing the user to test the BO control logic without effecting the physical Output.
Polarity		BACnet Polarity	“normal”	Indicates the polarity of the BO (normal or reversed).
Inactive- Text	Yes	Character string		Specifies Text that can be used when BO is Inactive.
Active-Text	Yes	Character string		Specifies Text that can be used when BO is Active.
Change-Of-State-Time		BACnet Date Time		Indicates the Time of last State Change.
Change-Of-State-Count	Yes	Unsigned		Indicates the total number of State Changes (can be reset to 0).
Time-Of-State- Count-Reset		BACnet Date Time		Indicates the time of the last State Count reset.
Elapsed-Ac-tive-Time	Yes	Unsigned32		Indicates the total Elapsed Active Time in seconds (can be reset to 0).
Time-Of-Active- Time-Reset		BACnet Date Time		Indicates the time of the last Elapsed Active Time reset.

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Property	W	Type	Example	Remarks
Minimum-Off-Time	Yes	Unsigned32	0	Specifies the Minimum Time the BO will be held OFF when transitioning from ON to OFF (minimum Time Enforced at Priority 6 in priority-array).
Minimum-On-Time	Yes	Unsigned32	0	Specifies the Minimum Time the BO will be held ON when transitioning from OFF to ON (minimum Time Enforced at Priority 6 in priority-array).
Priority- Array	Yes	BACnet Priority Array	all null	16 index prioritized array of BO Commands.
Relinquish-Default	Yes	BACnet Binary BV	Inactive	Value of the BO Present-Value when the Priority-Array is all NULL.
Reliability-Evaluation-	Yes	Boolean	FALSE	Disables the Reliability reporting when HOA is set to HAND, or OFF.
Property- List				List of all supported properties of an Object (except Object- Identifier, Object-Name, Object-Type and Property-List, which are always required for ALL BACnet Objects).
Aler-Inter-face-Value		BACnet Binary BV		Value of Physical BO.

PROPERTIES OF VIP BV OBJECTS

Property	W	Type	Example	Remarks
Description	Yes	Character String	BV n	Initially set to "BV *n*".
Object-Identifier		BACnet Object Identifier		This property consists of the object-type property and the object instance, which is a numeric code that identifies the object of interest. Example: BV 1
Object- Name	Yes	Character String	BV n	Initially set to "BV *n*".
Present-Value	Yes	Enumerated	Inactive	
Priority- Array	Yes	BACnet Priority Array	all null	Only present on user AVs with priority array (BV 40 and BV 500..599).
Relinquish-Default	Yes	REAL	Inactive	Only present on user AVs with priority array (BV 40 and BV 500..599).

Status Property	Write	Type	Default Value	Notes
Event-State		Enumerated		Example: Normal
Status-Flags		Bit String		A four-position bit string that indicates the status of the object. If status bit=1, that status is TRUE. Example: In Alarm=0, Fault=0, Overridden=0, Out of Service=0

Runtime Accumulators	Write	Type	Default Value	Notes
Change-Of-State-Count	Yes			Indicates the total number of State Changes (can be reset to 0).
Change-Of-State-Time				Indicates the Time of last State Change.
Elapsed-Active-Time	Yes			Indicates the total Elapsed Active Time in seconds (can be reset to 0).
Time-Of-Active- Time-Reset				Indicates the time of the last Elapsed Active Time reset.
Time-Of-State- Count-Reset				Indicates the time of the last State Count reset.

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PROPERTIES OF MICROSET VIP BV OBJECTS

Property	W	Type	Example	Remarks
Description	Yes	Character String		These are initially set (upon reset to factory defaults) to the default values shown in the section on Microset point allocations but can be changed to other values thereafter.
Object-Identifier		BACnet Object Identifier		
Object-Name	Yes	Character String		These are initially set (upon reset to factory defaults) to the default values shown in the section on Microset point allocations but can be changed to other values thereafter. CAN- NOT BE BLANK.
Object-Type		Enumerated	BV	
Property-List				

Core Properties	Write	Type	Default Value	Notes
Present-Value	Yes	Enumerated	Inactive	

Status Property	Write	Type	Default Value	Notes
Event-State		Enumerated		
Status-Flags		Bit String		A four-position bit string that indicates the status of the object. If status bit=1, then status is TRUE. Example: In Alarm= 0, Fault=0, Overridden=0, Out of Service=0.

PROPERTIES OF THE VIP DEVICE OBJECTS

Property	W	Type	Example	Remarks
apdu-segment-timeout	Yes	Unsigned	6000	The time after transmission of a “segment” until the lack of a reply means it was assumed to be lost (in milliseconds, 1000 = 1 sec). Default = 6000.
apdu- timeout	Y	Unsigned	6000	The time after transmission of an APDU until the lack of a reply means it was assumed to be lost. The APDU time-out value for this device in milliseconds (1000 = 1 sec). Default = 6000.
application-software-version		Character string	1.4.5	Indicates the ROC file version.
daylight-savings-status	Y	Boolean	FALSE	Indicates whether daylight savings is in effect (TRUE) or not (FALSE). Not used at present.
description	Y	Character string	Second floor controller	Assigned by the user to de- scribe the device’s function.
device-address-binding		List		Empty.
firmware-revision		Character string	1.4.5	Indicates the VIP boot code Version.
local-date	Y	Date	Sunday, 02/24/ 2002	Indicates date: day of the week, month/day/year. Writable through Time Sync.
local-time	Y	Time	10:15:56.00 am	Indicates the time stored in the device. Writable through Time Sync.
location	Y	Character string	East Wing	Indicates the physical location of the device.
max-apdu-length-accepted		Unsigned	1476	The maximum message packet size that the device can handle.
model- name		Character string	VIP-363-HOA	Assigned by the vendor to indicate the device model.
number-of-apdu-retries	Y	Unsigned	3	The number of times a message is resent after it is assumed to be lost.
object-identifier		BACnet_ Object_Identifier	Device 200	This property consists of the object-type property and the device instance, which is a numeric code that identifies the device of interest.
object-list		Array		An array whose elements list the object-identifier properties of all objects the device supports.
object- name		Character string	Device 200	No two devices are permitted to have the same object name.

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Property	W	Type	Example	Remarks
object-type		Enumerated	Device	
protocol-object- types-supported		Bit string	<Bit string>	An internally used bit string. Indicates which BACnet object types reside in the device.
protocol-services-supported		Bit string	<Bit string>	An internally used bit string. Indicates which BACnet services the device can process.
protocol-version		Unsigned	1	Indicates the version of the BACnet protocol supported by the device.
segmentation - supported		Enumerated	segmented both	Device is capable of segmenting both transmission and reply messages.
system- status		Enumerated	Operational	Other possible values are operational - read-only, download-required, download-in-progress, non-operational.
utc-offset	Y	Signed	0	Coordinated Universal Time offset, in minutes. Not used at present.
vendor-identifier		Unsigned	18	A unique code assigned by ASHRAE to the manufacturer, in this case, Alerton.
vendor- name		Character string	Alerton	Indicates the device manufacturer.

PROPERTIES OF VIP EVENT-ENROLLMENT OBJECTS

Property	W	Type	Example	Remarks
acked-transitions	Y	bit string	To-offnormal=1, To-fault=1, To-normal=1	Indicates whether the corresponding transitions have been acknowledged. A 1 indicates that the transition was acknowledged.
description	Y	Character string	Event enrollment 0	A description assigned to describe the object's function.
event- enable	Y	bit string	To-offnormal=1 , To-fault=1, To-normal=1	Indicates whether notifications are enabled for these event transition types. A 1 indicates that the transition is reported. Set in the Event Enrollment Editor at the operator workstation.
event-parameters		BACnetEvent Parameter	change_of_ bitstring	
event-state		Enumerated	NORMAL	Indicates the current state of the event.
event-type	Y	Enumerated	CHANGE_OF_ BITSTRING	Indicates the type of event algorithm to be used to detect events.
notification-class		Enumerated	1	Indicates the notification class to be used for event transitions. Set in the Event Enrollment Editor at the operator workstation.
notify-type		Unsigned	alarm	Indicates whether the object is set up for alarms or events.
object-identifier		BACnet_Ob-ject_Identifier	Event-enrollment 0	Consists of the object-type property and the object in- stance, which is a numeric code that identifies the object of interest.
object- name		Character string	Alarm	Assigned at the operator workstation.
object-property-reference	Y	Boolean	FALSE	Indicates whether the file has been saved for backup.
object-type		Event enrollment		

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PROPERTIES OF VIP FILE OBJECTS

Property	W	Type	Example	Remarks
archive	Y	Boolean	FALSE	Indicates whether the file has been saved for backup.
description	Y	Character string	ROC File	A description assigned to describe the object's function.
file-access-method		Enumerated	stream access	
file-size		Unsigned	983040	The of the file, in bytes.
file-type		Character string	ROC	Also, DDC or TRAP.
modification-date		Time	4/29/2020 10:22:20:00a	The data and time the file was last modified.
object-identifier		BACnet_Object_Identifier	file 0	This property consists of the object-type property and the object instance, which is a numeric code that identifies the object of interest.
object- name		Character string	File 0	
object-type		Enumerated	file	
read-only		Boolean	TRUE	Indicates whether the file can be written to by BACnet services.

PROPERTIES OF VIP NOTIFICATION-CLASS OBJECTS

Property	W	Type	Example	Remarks
ack- required	Y	Bit string	To offnormal=1, to fault=1, to normal=1	Indicates whether an acknowledgment is required for event transitions. A 1 indicates that acknowledgment is required. Set up at the operator workstation.
description	Y	Character string	Alarm Handler	An editable description of the object's location and function.
object-identifier		BACnet_Object_Identifier	Notification- class 1	This property consists of the object-type property and the object instance, which is a numeric code that identifies the object of interest.
object- name	Y	Character string	Alarm Handler 1	
object-type		Enumerated	Notification- class	
recipient- list	Y	List	<List of BACnet Destination>	Lists the devices that receive notification when the notification class transitions. Set up at the operator workstation.
priority	Y	Array of Unsigned		Indicates the priority to be used for event notifications for TO-OFFNORMAL, TO-FAULT, and TO-NORMAL events, respectively.

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PROPERTIES OF VIP PROGRAM OBJECTS

Property	W	Type	Example	Remarks
description	Y	Character string	Occupied Setpoint	A description assigned to describe the object's function.
description-of-halt		Character string	Program halted by request	
instance-of		Character string	MYREP MYJOB Sun- rise901*000000 *	Header information for the file. Program 0 does not support this property.
object-identifier		BACnet_ Object_Identifier	program 1024	This property consists of the object-type property and the object instance, which is a numeric code that identifies the object of interest.
object- name		Character string	Program Object 1024	
object-type		Enumerated	Program	
out-of- service		Boolean	FALSE	
program-change	Y	Enumerated	READY	Used to command the program state. A program can be stopped using the HALT command, for example, and started again with RESTART.
program-location		Character string	DDC Sequence= 60	Set when program stops.
program-state		Enumerated	RUNNING	Possible states include RUNNING, IDLE, HALTED.
reason-for-halt		Enumerated	PROGRAM	
status-flag		Bit string	In alarm=0, fault=0, overrid- den=0, out of service=0	A four-position bit string that indicates the status of the object. If a status bit =1, that status is TRUE.

PROPERTIES OF VIP SCHEDULE OBJECTS

Property	W	Type	Example	Remarks
description	Y	Character string	Weekend Gym	A description assigned to describe the object's function.
effective-period	Y	Sequence	<BACnet Date Range>	Assigned in schedule setup at the operator workstation.
exception-schedule	Y	Sequence	<Array of BAC- net Special Event>	Assigned in schedule setup at the operator workstation.
list-of-property-references	Y	List	<List of BACnet Object Property Reference>	The list of objects that this schedule commands.
object-identifier		BACnet Object Identifier	schedule 0	This property consists of the object-type property and the object instance, which is a numeric code that identifies the object of the interest.
object- name	Y	Character string	schedule 000	Assigned in schedule setup at the operator workstation.
object-type		Enumerated	schedule	
present-value	Y		ACTIVE	Indicates the value most recently written to a referenced object property. May be analog, binary, or other. depending on the controlled property.
priority-for-writing	Y	Unsigned	16	Assigned in schedule setup at the operator workstation.
weekly-schedule	Y	Sequence	<Array of BAC- net Daily Schedule>	Assigned in schedule setup at the operator workstation.

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PROPERTIES OF VIP TRENDLOG OBJECTS

Property	W	Type	Example	Remarks
acked_ transitions		BACnetEvent-TransitionBits	111	Conveys flags that indicate the receipt of acknowledgements for events.
buffer_size	Y	Unsigned32	256	The maximum number of records the log file can hold.
client_cov_ increment	Y	Double	1.00 {ok}	The amount of change required to cause a log record to be written. Only non-negative numbers allowed.
cov_resub-scription_ interval	Y	Integer	300	How often the trendlog resubscribes to the monitored point. Units are seconds. Valid values are 1 to 86,400 inclusive.
description	Y	Character-String	Device 65555, BODESC_0	Description of the trendlog.
event_ enable	Y	BACnetEvent-Transition Bits	001	Enables or disables reporting of TO-FAULT and TO-NOR-MAL events.
event_state			Normal, Fault, Offnormal, HiLi- mit, LowLimit, Life Safety Alarm	
event_time_ stamps		BACnetAR- RAY [3] of BACnetTi-meStamp	[1] ****-**-**-***_**:**:**.** [2] ****-**-**-***_**:**:**.** [3] 2020- 03-25-Wed_ 13:22:28.00	The time an event occurred.
last_notify_ record		Unsigned32	441785	Sequence number of the log record that triggers a notification.
log_buffer		BACnetLog-MultipleRe- cord		A list of BACnetLog- MultipleRe- cord records. Only readable through ReadRange service
log_device_ object_ property	Y	BACnetAR- RAY of BAC-netDeviceOb-jectPropertyR-eference	BO 1000, proprietary1135	Specifies the properties to be logged. May reference only internal objects.
log_interval	Y	Unsigned	0	The interval at which monitored properties are logged. Set to zero for TRIGGERED Log-ging_Type.
logging_ type	Y	BACnetLog-gingType	Polled, COV, Triggered	Specifies whether records are collected by polling or by triggered acquisition.

Property	W	Type	Example	Remarks
notification_class	Y	Unsigned	1	The notification class used when handling event notifications.
notification_threshold	Y	Unsigned32	80	Specifies the number of records (since the last notification) at which a notification is sent.
notify_type	Y	BACnetNotifyType	Alarm, Event, Ack Notification	Defines if notifications will be events or alarms.
object_identifier		BACnetObjectIdentifier	Trend-log 1	A numeric identifier for the associated object.
object_ name	Y	Character String	Trendlog 30	The name of the trendlog object. Default is “Trendlog n”.
object_type		BACnetObjectType	TREND-LOGMULTIPLE	The object type of the trendlog.
record_ count		Unsigned32	256	Represents the number of log records currently in the Log_ Buffer.
records_ since_ notification		Unsigned32	27	The number of log records since the last notification.
start_time	Y	BACnetDateTime	****-**-**-*** **:**:**.**	The date and time that logging will start.
stop_time	Y	BACnetDateTime	****-**-**-*** **:**:**.**	The date and time that logging will stop.
stop_when_ full	Y	Boolean	False	Specifies whether logging should stop when the log buffer is full. TRUE stops logging. FALSE causes the oldest log re- cords to be overwritten.
total_record_count		Unsigned32	441973	Total number of log records collected by the Trend Log Multiple object since creation. Wraps back to 1 after reaching 2(to the power 32) - 1.
trigger	Y	Boolean	False	Causes the trendlog to log a record when the value of the trigger property is changed from FALSE to TRUE.

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PROPERTIES OF VIP ZONE OBJECTS

Property	W	Type	Example	Remarks
Object- Identifier		BACnet Object Identifier	Zone n	This property consists of the object-type property and the object instance, which is a numeric code that identifies the object of interest.
Object- Name	Yes	Character string	Zone n	CANNOT BE SET BLANK. Example: Bob Off
Object- Type		BACnet Object Type	Zone	
Present- Value		Enumerated	UnOcc	Status Types: Occupied, Unoccupied, Warmup, Cooldown and Tenant Override
Description	Yes	Character string		Example: Bob's Office
Status- Flags		Bit string		A four-position bit string that indicates the status of the BO. If status bit=1, that status is TRUE.
Units	Yes	Enumerated	Deg F	Indicates the unit of measure, in BACnet engineering units, that the Zone is expressed in. Example: Deg F
Aler-Ref- Device	Yes	BACnet Object Identifier		Device Instance to which the Zone is Linked.
Aler- Weekly-Sched- Inputs		Enumerated		Weekly Schedule Status
Aler- Weekly-Sched- Objects		BACnet Object Property Reference		Weekly Schedule Reference
Aler-Holiday-Sched- Inputs		Enumerated		Holiday Schedule Status
Aler-Holiday-Sched- Objects		BACnet Object Property Reference		Holiday Schedule Reference
Aler-Event- Sched-Inputs		Enumerated		Event Schedule Status
Aler-Event- Sched-Objects		BACnet Object Property Reference		Event Schedule Reference
Priority- for-Writing	Yes	Unsigned	13	Priority at which the Zone Object writes to Commanded Objects.
Aler-Persistence-Rate	Yes	Unsigned	300	Frequency (in seconds), at which the Zone Object writes to Commanded Points (range 60-300).
Aler-Re- fresh-Rate	Yes	Unsigned	300	Frequency (in seconds), at which the Zone Object reads Input Points (range 10-900).
Aler-Opti- mum-Start-Mode	Yes	Enumerated	"none"	Status Options: None, Standard, and Manual.
Aler-Maxi- mum-Ad- vance- Time	Yes	Unsigned	240	Maximum Time (in minutes), that Optimum Start may Start Zone.

Property	W	Type	Example	Remarks
Aler-OA- Temp-Reference	Yes	BACnet Object Property Reference	AV-103	Reference to BACnet Object containing OA Temp.
Aler-OA- Temp-Value		Real		Value of Outside Air Temp Sensor.
Aler-Humidity-Reference	Yes	BACnet Object Property Reference		Reference to BACnet Object containing Humidity.
Aler-Humidity-Value		Real		Value of Humidity Sensor
Aler-OA- Limit	Yes	Real	65	Used for Optimum Start
Aler-Building-Mass	Yes	Real	4	Used for Optimum Start
Aler- Warmup-Factor	Yes	Real	1	Used for Optimum Start
Aler-Cool- down-Factor	Yes	Real	1	Used for Optimum Start
Aler-Alt- Warmup-Factor	Yes	Real	0	Used for Optimum Start
Aler-Alt- Cooldown-Factor	Yes	Real	0	Used for Optimum Start
Aler-Tuning-Factor	Yes	Real	0.5	Used for Optimum Start
Aler-Cooling-Temp- Rate	Yes	Real	3	Used for Optimum Start
Aler-Heating-Temp- Rate	Yes	Real	3	Used for Optimum Start
Aler-Occupied-Cmd- Value		Enumerated		
Aler-Occupied-Cmd- Ref	Yes	BACnet Object Property Reference		
Aler- Warmup-Cmd-Value		Enumerated		
Aler- Warmup-Cmd-Ref	Yes	BACnet Object_ Property Reference		
Aler-Cool- down-Cmd-Value		Enumerated		
Aler_Cool- down_ Cmd_Ref	Yes	BACnet Object Property Reference		
Aler-Zone- Temp-Value		Real		
Aler-Zone- Temp-Reference	Yes	BACnet Object Property Reference		

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Property	W	Type	Example	Remarks
Aler-Occ- Htg-SP-Value		Real		
Aler-Occ- Htg-SP-Reference	Yes	BACnet Object Property Reference		
Aler-Occ- Clg-SP-Value		Real		
Aler-Occ- Clg-SP-Reference	Yes	BACnet Object Property Reference		
Aler-Tenant-Over-ride-Value		Enumerated		
Aler-Tenant-Over-ride- Reference	Yes	BACnet Object Property Reference		
Aler- Refresh	Yes	Boolean		Force Refresh
Aler- Diagnostics		Octet String		
Aler-Tenant-	Yes	BACnet Object Property Reference		
Activities- Recipient				
Aler-Zone- Main-Truth- Table		Octet String		
Aler-Zone-Command- Mode	Yes	Enumerated	Binary	Types: Binary or MultiState

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