

BUILDING AUTOMATION PRODUCTS

PROGRAMMABLE CONTROLLERS

METASYS® CONTROLLERS

VMA16 / VMA18 / VMA19



VARIABLE AIR VOLUME MODULAR ASSEMBLY

VMA16s (32-bit) and VMA18s are programmable digital controllers tailored for VAV applications that can be switched between MS/TP and N2 communications protocols. When they are used as MS/TP devices, they communicate through the BACnet® MS/TP protocol. In N2 mode, they can be used as replacements for legacy Johnson Controls® controllers.

Note: When a VMA1400 Series controller is replaced on an existing N2 network, the VMA18 Series controller is the preferred device because certain existing sensor models can be reused. VMA18 controllers are intended for use as functional replacements for the VMA1410, VMA1415, VMA1420, and VMA1440 controllers only. VMA18 controllers support field-selectable BACnet MS/TP or N2 protocols. VMA18 controllers support the N2 Open Communications protocol at a maximum rate of 9600 baud.

The VMA1930 programmable controller uses BACnet/IP networking for higher speed communication with the Controller Configuration Tool (CCT) and improved bandwidth. This gives you more flexibility in choosing controllers for your site's specific needs.

The VMA1615, VMA1630, VMA1832, and VMA1930 (32-bit) controllers feature an integral digital differential pressure transducer (DPT), an integral damper actuator, and a 32-bit microprocessor. The controllers' small package size facilitates quick field installation and efficient use of space, while not compromising high-tech control performance. These controllers easily adapt NS Series Network Sensors for zone and discharge air temperature sensing.

The VMA1626 controller is shipped with an actuator but without a differential pressure transducer (DPT), making it well suited for commercial zoning applications or for pressure-dependent VAV box applications where no DPT is required.

The VMA1656 controller is shipped without a differential pressure transducer but with an integrated actuator and ball valve linkage. These controllers are for use on the Johnson Controls VG-1000 1/2 - 1 inch valves and needs to be used primarily as a replacement for the VMA assembly of the VG-1000 Series Smart Valve product. The smart valve product line is ideal for chilled beam applications.

The VMA1628 includes a DPT but does not have an actuator. Without an actuator, this controller is well suited for controlling large VAV boxes that require more than 4 N·m of torque. These features make the VMA16 (32-bit) controllers the product of choice for VAV systems. The wide variety of network sensor models provides options for measuring and displaying zone temperature, occupancy detection, duct temperature, zone humidity and dewpoint determination, carbon dioxide (CO₂) level, setpoint adjustments, VAV box fan speed control, and discharge air temperatures.

The VMA18 models are designed to be functional replacements for the VMA14xx Series Variable Air Volume Modular Assembly controllers. They contain a sensor actuator bus port and accessories well suited for replacing VMA14xx controllers.



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FEATURES

- **Standard BACnet Protocol** – Provides interoperability with other Building Automation System (BAS) products that use the widely accepted BACnet standard.
- **Standard Hardware and Software Platform** – Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows; also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.
- **Switchable communications protocols from BACnet MS/TP to N2 protocols or N2 to BACnet MS/TP protocols**
- **ZFR Wireless FC or SA Bus Interface** – Both the ZFR1800 Series Wireless and WNC1800/ZFR182x Pro Series Wireless Field Bus (ZFR Pro) provide a wireless alternative to hard-wired *Metasys* system counterparts, offering application flexibility and mobility with minimal disruption to building occupants.
- **Bluetooth® Wireless Commissioning** – Provides an easy-to-use connection to the configuration and commissioning tool.
- **Auto-Tuned Control Loops** – Reduce commissioning time, eliminate change-of-season recommissioning, and reduce wear and tear on mechanical devices.
- **Universal Inputs and Configurable Outputs** – Allows multiple signal options to provide input/ output flexibility.
- **Optional Local User Interface Display** – Allows convenient monitoring and adjusting capabilities at the local device.
- **BACnet Testing Laboratories (BTL) Listed and Certified** – Ensures interoperability with other BTL-listed devices. BTL is a third-party agency, which validates that BAS vendor products meet the BACnet industry-standard protocol.
- **32-bit Microprocessor** – Ensures optimum performance and meets industry specifications.
- **BACnet Automatic Discovery** – Supports easy controller integration into a *Metasys* BAS.
- **End-of-Line (EOL) Switch in MS/TP Field Controllers** – Enables field controllers to be terminating devices on the communications bus.
- **Pluggable Communications Bus and Supply Power Terminal Blocks** – Expedites installation VMA Programmable VAV Box Controllers Catalog Page 5 and troubleshooting.
- **Writable Flash Memory** – Allows standard or customized applications to be downloaded from the CCT and enables persistent application data.

The following features are specific to particular models:

- Models that include a DPT feature a state-of-the-art digital non-flow DPT to provide 14-bit resolution with bidirectional flow operation that supports automatic correction for polarity on high- and low-pressure DP tube connections; this pressure sensor eliminates high- and lowpressure connection mistakes.
- A phone jack-style connector on the FC Bus and SA Bus of the VMA16 supports quick connection to the Mobile Access Portal (MAP) Gateway, Wireless Commissioning Converter (BTCVT), ZFR or ZFR Pro Series Wireless Field Bus System wireless routers, and network sensors.
- Models that include an actuator feature a fast response actuator that drives the damper from full open to full closed (90°) in 60 seconds to reduce commissioning time.



ORDERING INFORMATION

VMA16 (32-BIT) SERIES AND VMA1930 (INCLUDING POINT TYPE COUNTS PER MODEL)

	VMA 1615	VMA 1626	VMA 1628	VMA 1630	VMA 1656	VMA 1930
Communication Protocol	BACnet MS/TP, N2					BACnet/IP
Engines	All Model types *					NAE55, NAE85, ODS at R9.0 or later
	* Some NIE models support MS/TP and N2 devices. Refer to the Network Engines Product Bulletin (LIT-12012138) for details.					
Modular Jacks	6-pin SA Bus Modular Port supports one communicating sensor. Or you can wire up to four communicating sensors to the SA Bus Terminal Block. They cannot be used at the same time.					
	6-pin FC Bus for tool support					
Universal Input (UI) <i>Analog Input, Voltage Mode, 0-10 VDC</i> <i>Analog Input, Resistive Mode, 0-2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2)</i> <i>Binary Input, Dry Contact Maintained Mode</i>	3	3	3	3	3	3
Binary Output (BO) <i>24 VAC Triac</i>	2	3	3	3	3	3
Configurable Output (CO) <i>Analog Output, Voltage Mode, 0-10 VDC</i> <i>Binary Output Mode, 24 VAC Triac</i>		2	2	2	2	2
Integrated Actuator <i>Internal</i>	1	1		1	1 with ball valve linkage	1
Differential Pressure Transducer <i>Internal</i>	1		1	1		1
Zone Sensor Input <i>On SA Bus (A total of 10 MS/TP addresses (IOMs), not including sensor addresses, can be used in a single VMA controller.)</i>	Up to 4 NS Series Network Zone Sensors					
	Up to 9 WRZ sensors when using the ZFR or ZFR Pro Series wireless router configuration and up to 5 WRZ sensors when using the one-to-one WRZ-78xx wireless configuration					



ORDERING INFORMATION

VMA18 SERIES (INCLUDING POINT TYPE COUNTS PER MODEL)

	VMA1826	VMA1832
Communication Protocol	BACnet MS/TP, N2	
Engines	NAEs, NCEs, ODS	
Modular Jacks	8-pin SA Bus supports analog non-communicating sensor	
Point Types Signals Accepted		
Universal Input (UI)		
Analog Input, Voltage Mode, 0–10 VDC <i>Analog Input, Resistive Mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A998 SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode</i>	3	3
Binary Output (BO) <i>24 VAC Triac</i>	3	3
Configurable Output (CO) <i>Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac</i>	2	2
Integrated Actuator <i>Internal</i>	1	1
Differential Pressure Transducer <i>Internal</i>		1
Zone Sensor Input <i>On SA Bus (A total of 10 MS/TP addresses (IOMs), not including sensor addresses, can be used in a single VMA controller.)</i>	Up to 4 NS Series Network Zone Sensors Up to 9 WRZ sensors when using the ZFR or ZFR Pro Series wireless router configurations and up to 5 WRZ sensors when using the one-to-one WRZ-78xx wireless configuration	

VMA16 / VMA18 / VMA19 - METASYS® CONTROLLERS



ORDERING INFORMATION

VMA16 (32-BIT), VMA18 AND VMA1930 SERIES

CODES	DESCRIPTION
MS-VMA1615-1	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI and 2 BO; 24 VAC; FC Bus, and SA Bus
MS-VMA1626-1	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus; (No DPT)
MS-VMA1628-1	32-bit, Integrated VAV Controller and DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No Actuator)
MS-VMA1630-1	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus
MS-VMA1656-1	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus, Integrated Ball Valve Linkage
MS-VMA1826-1	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus; Includes cable adapters for use when replacing VMA14xx Series controllers. Recommended replacement for VMA1440 controller (No DPT)
MS-VMA1832-1	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI and 2 BO; 24 VAC; FC Bus, and SA Bus, includes cable adapters for use when replacing VMA14xx Series controllers. Recommended replacement for VMA1410, VMA1415, or VMA1420 controller.
MS-VMA1930-0	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; and SA Sensor Port; Integral Real-time Clock; 2 Ethernet Ports for BACnet/IP Communications

VMA16 (32-BIT) ACCESSORIES (PART 1/2)

CODES	DESCRIPTION
IOM Series	Refer to the Metasys® System Field Equipment Controllers and Related Products Product Bulletin (LIT-12011042) for a complete list of available IOM Series Modules.
TL-CCT-0	Metasys Controller Configuration Tool (CCT) software
MS-FCP-0	Metasys Field Controller Firmware Package Files for CCT Mobile Access Portal (MAP) Gateway Refer to the Mobile Access Portal Gateway Catalog Page (LIT-1900869) to identify the appropriate product for your region. Note: The MAP Gateway serves as a replacement for the the BTCVT, which is no longer available for purchase, but continues to be supported.
NS Series Network Sensors	Refer to the NS Series Network Sensors Product Bulletin (LIT-12011574) for specific sensor model descriptions.
MS-DIS1710-0	Local Controller Display: Refer to Local Controller Display Product Bulletin (LIT-12011273) for more information.
NS-ATV7003-0	Handheld VAV Balancing Tool WRZ Series Wireless
Room Sensors	Refer to the WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653) for specific sensor model descriptions.
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 30 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
AP-TBK1002-0	2-Position Screw Terminal that Plugs onto VMA Output Point Spade Lug

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ORDERING INFORMATION

VMA16 (32-BIT) ACCESSORIES (PART 2/2)

CODES	DESCRIPTION
AP-TBK1003-0	3-Position Screw Terminal that Plugs onto VMA Output Point Spade Lugs
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown (Bulk Pack of 10)
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector (Bulk Pack of 10)
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray (Bulk Pack of 10)
AP-TBK2PW-0	Replacement Power Terminal, 2-Position Connector, Gray (Bulk Pack of 10)
AS-CBLTSTAT-0	Cable adapter for connection to 8-pin TE-6700 Series sensors
AS-CBLVMA-1	Cable Adapter, 8-Pin Female Socket to 6-Pin Male Jack (Bulk Pack of 10)
AS-CBLVMA-2	Cable Adapter, 8-Pin Female Socket to 8-Pin Male Jack with 6-Pin Female Socket for Wireless Commissioning Converter (Bulk Pack of 10)
MS-TBKLV03-0	Terminal Block Kit - FAC Line Voltage AC Power - 3 Pieces
MS-TBKRO02-0	Terminal Block Kit - FAC 2-Position Relay Output - 9 Pieces
MS-TBKRO03-0	Terminal Block Kit - FAC 3-Position Relay Output - 6 Pieces
MS-TBKCO04-0	Terminal Block Kit - FAC 4-Position Configurable Output - 6 Pieces
MS-TBKUI04-0	Terminal Block Kit - FAC 4-Position Universal Input - 3 Pieces
MS-TBKUI05-0	Terminal Block Kit - FAC 4-Position Universal Input - 3 Pieces
NS-WALLPLATE-0	Network Sensor Wall Plate
F-1000-325	Replacement Barbed Fitting for use on VMA1615, VMA1630, and VMA1832 for Connecting Tubing (Bulk Pack of 10)
F-1000-326	Flexible Tubing Extension with Barbed Fitting for VMA1615, VMA1630, and VMA1832, 14 in. Length (Bulk Pack of 20). Use to extend tubing that connects between the DPT connectors and the DPT sensors, including when replacing a VMA1400 series controller with a VMA16xx or VMA18xx controller.
TL-BRTRP-0	Portable BACnet/IP to MS/TP Router
WRZ-7860-0	Receiver for One-to-One Wireless Room Sensing Systems - functions with WRZ Series Sensors room sensors
ZFR-USBHA-0	ZFR USB Dongle provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled FEC, FAC, IOM, and VMA16 controllers. Also allows use of the ZFR Checkout Tool (ZCT) in CCT. Note: The ZFR-USBHA-0 replaces the IA OEM DAUBI_2400 ZFR USB dongle. For additional information about the ZFR-USBHA-0 ZFR dongle, refer to the ZFR1800 Series Wireless Field Bus System Technical Bulletin (LIT-12011295) or ZFR1800 Series Wireless Field Bus System Quick Reference Guide (LIT-12011630).



TECHNICAL SPECIFICATIONS (PART 1/3)

VMA Codes	
<i>MS-VMA1615-1</i>	32-bit, Integrated VAV Controller/Actuator/Pressure Sensor, 3 UI and 2 BO; 24 VAC; FC and SA Bus
<i>MS-VMA1626-1</i>	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No DPT)
<i>MS-VMA1628-1</i>	32-bit, Integrated VAV Controller and DPT, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus (No Actuator)
<i>MS-VMA1630-1</i>	32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, 2 CO; 24 VAC; FC and SA Bus
<i>MS-VMA1656-1</i>	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus, Integrated Ball Valve Linkage (No DPT)
<i>MS-VMA1826-1</i>	32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus, with 8-9 in TSTAT Port, Recommended for use as a replacement for VMA1440 (No DPT)
<i>MS-VMA1930-0</i>	32-bit, Integrated VAV Controller/Actuator/Pressure Sensor - DPT, 3 UI and 3 BO, 2 CO, 24 VAC, and SA Bus, Includes 6-pin Sensor Port for use with TE-7xx Series Non-Communicating Sensors and two Ethernet Ports for BACnet/IP Communications
Communications Protocol	
<i>MS-VMA16xx-x</i> , <i>MS-VMA18xx-x</i>	BACnet MS/TP, N2
<i>MS-VMA1930-0</i>	BACnet/IP
Engines Supported	
<i>MS-VMA16xx-x</i> , <i>MS-VMA18xx-x</i>	All Models
<i>MS-VMA1930-0</i>	NAE55, NAE85, ODS (MS-VMA1930-0 supports R9.0 or later versions of these engines.)
Power Requirement	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Safety Extra-Low Voltage (SELV)
Power Consumption	10 VA typical, 14 VA maximum Note: VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 60 VA (maximum).
Ambient Conditions	
<i>Operating</i>	0 to 50°C
<i>Storage</i>	-40 to 70°C
Terminations	
<i>MS-VMA1615-x</i> , <i>MS-VMA1626-x</i> , <i>MS-VMA1628-x</i> , <i>MS-VMA1630-x</i> , <i>MSVMA1656-x</i>	Inputs/Outputs: 6.3 mm Spade Lugs FC Bus, SA Bus, and Supply Power: 4-Wire and 2-Wire Pluggable Screw Terminal Blocks FC Bus and SA Bus Port: RJ-12 6-Pin Modular Jacks
<i>MS-VMA1826-x</i> , <i>MS-VMA1832-x</i>	Inputs/Outputs, SA Bus, and Supply Power: 6.3 mm Spade Lugs N2/FC Bus: Pluggable Screw Terminal Block TSTAT Modular Port: RJ-45 8-Pin Modular Jack
<i>MS-VMA1930-0</i>	Inputs/Outputs: 6.3 mm Spade Lugs SA Bus and Supply Power: 4-Wire and 2-Wire Pluggable Screw Terminal Blocks SA Bus Modular Ports: RJ-12 6-Pin Modular Jacks

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TECHNICAL SPECIFICATIONS (PART 2/3)

Controller Addressing	
<i>For BACnet-configured controllers</i>	DIP switch set: valid field controller device addresses 4–127 (device addresses 0–3 and 128–255 are reserved)
<i>For BACnet/IP controllers</i>	3 rotary switches to assign a unique number for each controller on the subnet to identify it in the Controller Tool for uploading, downloading, and commissioning
<i>For N2-configured controllers</i>	DIP switch set; valid control device addresses 1–254
Communications Bus	
<i>MS-VMA16xx and MS-VMA18xx models</i>	RS-485, field selectable between BACnet MS/TP and N2 communications: N2/FC Bus: 1.5 mm (18 AWG) standard 3-wire, twisted, shielded cable recommended between the supervisory controller and field controllers BACnet MS/TP: 0.6 mm (22 AWG) stranded, 4-wire (2-twisted pairs) shielded cable recommended from the VMA controller for network sensors and other sensor/actuator devices; includes a terminal to source 15 VDC supply power from VMA to SA Bus devices Note: For more information, refer to the MS/TP Communications Bus Technical Bulletin (LIT-12011034).
<i>MS-VMA1930-0</i>	BACnet/IP: Two Ethernet ports; 10/100 Mbps; 8-pin RJ-45 connector
Processor	
<i>MS-VMA16 (32-bit) and MS-VMA18 models</i>	RX630 32-bit Renesas® microcontroller
<i>MS-VMA1930-0</i>	RX63N 32-bit Renesas microcontroller
Memory	
<i>MS-VMA16 (32-bit) and MS-VMA18 models</i>	1 MB Flash Memory and 512 KB RAM
<i>MS-VMA1930-0</i>	16 MB serial flash memory and 8 MB of SDRAM
Input and Output Capabilities	
<i>MS-VMA1615-x</i>	3 - Universal Input: Defined as 0–10 VDC, 0–600k ohm, or Binary Dry Contact 2 - Binary Outputs: Defined as 24 VAC Triac (internal power source)
<i>MS-VMA1626-x, MS-VMA1628-x, MS-VMA1630-x, MS-VMA1656-x, MS-VMA1826-x, MS-VMA1832-x, MS-VMA1930-0</i>	3 - Universal Input: Defined as 0–10 VDC, 0–600k ohm, or Binary Dry Contact 3 - Binary Outputs: Defined as 24 VAC Triac (internal power source) 2 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO
Analog Input/Analog Output Accuracy	
<i>Analog Input</i>	15-bit resolution on UIs
<i>Analog Output</i>	0–10 VDC ± 200 mV

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TECHNICAL SPECIFICATIONS (PART 3/3)

Differential Pressure Transducer	Range: -1.5 in. to 1.5 in. W.C.
<i>Performance Characteristics</i>	Accuracy +/-1.3% Full Span Maximum (+/- .039 in. w.c.) Note: Combined error due to offset, non-linearity, and temperature variation. Typical accuracy at zero (null) pressure is +/-0.2% fullscale Note: Includes error due to non-linearity.
Mounting	Mounts to damper shaft using single set screw and to duct with single mounting screw.
Actuator Rating	4 N·m (35 lb·in.) minimum shaft length = 44 mm (1-3/4 in.)
Dimensions (Height x Width x Depth)	165 x 125 x 73 mm Center of Output Hub to Center of Captive Spacer: 135 mm
Weight	0.65 kg
CE Compliance	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive.
<i>BACnet International</i>	MS-VMA16xx and MS-VMA18xx models: BACnet Testing Laboratories (BTL) Protocol Revision 7 Listed BACnet Application Specific Controller (B-ASC) MS-VMA1930-0: BACnet Testing Laboratories (BTL) Protocol Revision 15 Listed and Certified BACnet Advanced Application Controller (B-AAC)