



VMA16 (32-bit) and VMA18 VAV Modular Assembly Controller series

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 you use them as MS/TP devices, they communicate using the BACnet® MS/TP protocol. In N2 mode, you can use them as replacements for legacy Johnson Controls® controllers. The VMA1615-xU and VMA1630-xU models are listed for UL 864 10th Edition UUKL/ORD-C100-13 UUKLC Smoke Control System applications.

- ① **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 VMA1832 controller features 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. This specific model was created with a focus on using the N2 Bus and N2 communications but users can also use the FC Bus on the device.

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.

- **Important:** You cannot purchase a similar third-party device and install it in a UL/cUL Listed smoke control system. Doing so voids the UL/cUL Smoke Control Listing. Third-party devices must be provided and labeled by the factory as described in the UL/cUL Smoke Control Listing.
- **Important:** Only those Johnson Controls products identified for use in smoke control applications have been tested and listed by UL for use in a Metasys system UL 864 10th Edition UUKL/ORD-C100-13 UUKLC Smoke Control System. Installation of a product that is not UL/cUL Listed and labeled for this application prevents the entire system from being UL/cUL Listed for smoke control.

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**
- **Wireless ZFR and ZFR Pro support**—Wireless ZFR and ZFR Pro support provides a wireless alternative to hard-wired MS/TP networking, offering application flexibility and mobility with minimal disruption to building occupants, and also simplifies and speeds up replacements.
- **Auto-Tuned Control Loops**—Proportional Adaptive Control (P-Adaptive) and Pattern Recognition Adaptive Control (PRAC) delivers continuous control loop tuning, which reduces commissioning time, eliminates change-of-season recommissioning, and reduces wear and tear on actuators.
- **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)**—Provides 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 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 low-pressure connection mistakes.
- A phone jack-style RJ-12 connector on the FC Bus and SA Bus of the VMA16 supports quick connection to the Mobile Access Portal (MAP) Gateway, 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.

Application Documentation

Refer to the *Metasys System Field Equipment Controllers and Related Products Product Bulletin (LIT-12011042)* for product application details.

VMA16 (32-bit) series and VMA18 series model information (Including point type counts)

Table 1: VMA16 (32-bit) series information (Including point type counts per model)

		VMA 1626	VMA 1628	VMA 1656
Communication protocol		BACnet MS/TP, N2, or Zigbee Wireless (using add-on modules)		
Engines supported		All engine model types		
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. SA Bus Terminations cannot be used at the same time. 6-pin FC Bus for tool support		
Point types	Signals accepted			
Universal Input (UI)	Analog Input, Voltage Mode, 0–10 VDC	3	3	3
	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			
Binary Output (BO)	24 VAC Triac	3	3	3
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC	2	2	2
	Binary Output Mode, 24 VAC Triac			
Integrated Actuator	Internal	1		1 with ball valve linkage
Differential Pressure Transducer	Internal		1	
SA Bus	Supports up to 10 total wired SA Bus devices, including the XPM and IOM series expansion I/O modules and up to 4 NS series network sensors			
WRZ Sensors	Supports up to nine WRZ sensors when using the ZFR or ZFR Pro Series wireless router configuration			
	Supports up to five WRZ sensors when using the one-to-one WRZ-78xx wireless configuration			

Table 2: VMA18 Series information (Including point type counts per model)

		VMA1826	VMA1832
Communication protocol		BACnet MS/TP, N2, or Zigbee Wireless (using add-on modules)	
Engines supported		All model types	
Modular jacks		8-pin SA Bus supports analog non-communicating sensor	
Point types	Signals accepted		

Table 2: VMA18 Series information (Including point type counts per model)

		VMA1826	VMA1832
Universal Input (UI)	Analog Input, Voltage Mode, 0–10 VDC 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	3	3
Binary Output (BO)	24 VAC Triac	3	3
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	2	2
Integrated Actuator	Internal	1	1
Differential Pressure Transducer	Internal		1
SA Bus	Supports up to 10 total wired SA Bus devices, including the XPM and IOM series expansion I/O modules and up to 4 NS series network sensors.		
WRZ Sensors	Supports up to nine WRZ sensors when using the ZFR or ZFR Pro Series wireless router configuration		
	Supports up to five WRZ sensors when using the one-to-one WRZ-78xx wireless configuration		

VMA16 (32-bit) and VMA18 series ordering information

Table 3: VMA16 (32-bit) and VMA18 series ordering information

Product code number	Description
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-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, 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 VMA1410, VMA1415, or VMA1420 controller.

Accessories

- ① **Note:** The accessories marked with an asterisk (*) in the table are not qualified for use with a UL 864 UUKL/UUKLC 10th Edition Listed Smoke Control system.

Table 4: VMA16 (32-bit) Accessories

Product Code Number	Description
IOM Series	Refer to the <i>Metasys System Field Equipment Controllers and Related Products Product Bulletin (LIT-12011042)</i> for a complete list of available IOM Series Modules.
TL-CCT-0	Controller Configuration Tool (CCT) software
MS-FCP-0	Field Controller Firmware Package Files for CCT
Mobile Access Portal (MAP) Gateway	Refer to the <i>Mobile Access Portal Gateway Catalog Page (LIT-1900869)</i> to identify the appropriate product for your region.
NS Series Network Sensors	Refer to the <i>NS Series Network Sensors Product Bulletin (LIT-12011574)</i> for specific sensor model descriptions.
M4-DLK0350-0 *	Local Controller Display, 3.5 in. (89 mm) color display with navigation keypad. For more information, refer to the <i>DLK0350 Product Bulletin (LIT-12014001)</i> .
MS-DIS1710-0 *	Local Controller Display, 3.0 in. (76 mm) monochrome display with navigation keypad. For more information, refer to the <i>Local Controller Display Product Bulletin (LIT-12011273)</i> .
NS-ATV7003-0	Handheld VAV Balancing Tool
WRZ Series Wireless Room Sensors *	Refer to the <i>WRZ Series Wireless Room Sensors Product Bulletin (LIT-12011653)</i> for specific sensor model descriptions.
WRZ-7860-0 *	Receiver for One-to-One Wireless Room Sensing Systems - functions with WRZ Series Sensors room sensors
WRZ-SST-120	Refer to the <i>WRZ-SST-120 Wireless Sensing System Tool Installation Instructions (LIT-24-10563-55)</i> for usage instructions.
ZFR-HPSST-0	Wireless System Survey Tool. For use with the higher power WRG1830/ZFR183x System and lower power WRZ Sensors (10 mW). Refer to the <i>High Power Wireless Sensing System Tool Installation Instructions (LIT-24-11461-00012)</i> for usage instructions.
WRG1830/ZFR183x Pro Series Wireless Field Bus System	For more information on products needed for wireless field bus installations and for a list of available products, refer to the <i>WRG1830/ZFR183x Pro Series Wireless Field Bus System Catalog Page (LIT-1901153)</i> .
ZFR-USBHA-0	ZFR USB Dongle provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled VMA controllers. It also allows use of the ZFR Checkout Tool (ZCT) in CCT. ⓘ Note: The ZFR-USBHA-0 is not compatible with the WRG1830/ZFR183x Pro Series. ⓘ 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 <i>ZCT Checkout Tool Help LIT-12012292</i> or the <i>WNC1800_ZFR182x Pro Series Wireless Field Bus System Technical Bulletin (LIT-12012356)</i> .
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
Y65A13-0*	Transformer, 120 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 8 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
Y65T31-0 *	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AR+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2

Table 4: VMA16 (32-bit) Accessories

Product Code Number	Description
AP-TBK1002-0	2-Position Screw Terminal that Plugs onto VMA Output Point Spade Lug
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)
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
MS-VMAACT-701	VMA Actuator Assembly Gearbox Replacement Kit
NS-WALLPLATE-0	Network Sensor Wall Plate
F-1000-325	Replacement Barbed Fitting for use on VMA1832 for Connecting Tubing (Bulk Pack of 10)
F-1000-326	Flexible Tubing Extension with Barbed Fitting for 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 VMA18xx controller.
TL-BRTRP-0 *	Portable BACnet/IP to MS/TP Router

VMA16 (32-bit) and VMA18 series technical specifications




Table 5: VMA16 (32-bit) and VMA18 series

	Description
Product Code Numbers	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-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 (No DPT) MS-VMA1826-1: 32-bit, Integrated VAV Controller and Actuator, 3 UI, 3 BO, and 2 CO; 24 VAC; FC Bus, and SA Bus, with 8-9in TSTAT Port, Recommended for use as a replacement for VMA1440 (No DPT) MS-VMA1832-1: 32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, 2 CO; 24 VAC; FC and SA Bus, with 8-pin TSTAT Port. Recommended for use as a replacement for VMA1410, VMA1415, or VMA1420
Communications Protocol	MS-VMA16xx-x and MS-VMA18xx-x: BACnet MS/TP, N2
Engines Supported	MS-VMA16xx-x and MS-VMA18xx-x: All Model types

Table 5: VMA16 (32-bit) and VMA18 series

	Description
Power Requirement	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Power Supply Class 2 (North America), Safety Extra-Low Voltage (SELV) (Europe)
Power Consumption	10 VA typical, 14 VA maximum ① 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	Operating: 0°C to 50°C (32°F to 122°F) Storage: -40°C to 70°C (-40°F to 158°F)
Terminations	MS-VMA1626-x, MS-VMA1628-x, and MS-VMA1656-x: Inputs/Outputs: 6.3 mm (1/4 in.) 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 MS-VMA1826-x and MS-VMA1832-x: Inputs/Outputs, SA Bus, and Supply Power: 6.3 mm (1/4 in.) Spade Lugs N2/FC Bus: Pluggable Screw Terminal Block TSTAT Modular Port: RJ-45 8-Pin Modular Jack
Controller Addressing	For BACnet-configured controllers: DIP switch set: valid field controller device addresses 4–127 (device addresses 0–3 and 128–255 are reserved) For N2-configured controllers: DIP switch set; valid control device addresses 1–254
Communications Bus	MS-VMA16xx and MS-VMA18xx models: 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 ① Note: For more information, refer to the <i>MS/TP Communications Bus Technical Bulletin (LIT-12011034)</i> .
Processor	MS-VMA16 (32-bit) and MS-VMA18 models: RX630 32-bit Renesas® microcontroller
Memory	MS-VMA16 (32-bit) and MS-VMA18 models: 1 MB Flash Memory and 512 KB RAM
Input and Output Capabilities	MS-VMA1626-x, MS-VMA1628-x, MS-VMA1656-x, MS-VMA1826-x, and MS-VMA1832-x: 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	Analog Input: 15-bit resolution on UIs Analog Output: 0–10 VDC ± 200 mV
Differential Pressure Transducer	Range: -1.5 in. to 1.5 in. W.C. Performance Characteristics: Accuracy +/-1.3% Full Span Maximum (+/- .039 in. w.c.) ① Note: Combined error due to offset, non-linearity, and temperature variation. Typical accuracy at zero (null) pressure is +/-0.2% fullscale ① Note: Includes error due to non-linearity.

Table 5: VMA16 (32-bit) and VMA18 series

	Description
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 mm x 125 mm x 73 mm (6.5 in. x 4.92 in. x 2.9 in.) Center of Output Hub to Center of Captive Spacer: 135 mm (5-5/16 in.)
Weight	0.65 kg (1.45 lb)
Compliance	United States: UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment. Suitable for use in other environmental air space (plenums) in accordance with Section 300.22(C) of the National Electric Code (1626, 1628, 1656, 1832, 1826). UL1995 Plenum Rated (Models other than 1626, 1628, 1656, 1832, 1826). UL Listed, File S4977, UL 864 UUKL/UUKLC 10th Edition Listed, Smoke Control Units and Accessories for Fire Alarm Systems Equipment (models with U product code suffix only) FCC Compliant to CFR47, Part 15, Subpart B, Class A.
	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003 UL Listed, File S4977, UL 864 UUKL/ORD-C100-13 10th Edition Listed, Smoke Control Units and Accessories for Fire Alarm Systems (models with U product code suffix only)
	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and RoHS Directive.
	Australia and New Zealand: RCM Mark, Australia/NZ Emissions Compliant.
	BACnet International: MS-VMA16xx and MS-VMA18xx models: BACnet Testing Laboratories (BTL) Protocol Revision 7 Listed BACnet Application Specific Controller (B-ASC)
	United Kingdom: Johnson Controls declares that this product is in compliance with Electromagnetic Compatibility Regulations, The Electrical Equipment (Safety) Regulations, and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations.

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.

Repair Information

If the product fails to operate within its specifications, replace the product. For a replacement product, contact the nearest Johnson Controls® representative.

Product warranty

This product is covered by a limited warranty, details of which can be found at www.johnsoncontrols.com/buildingswarranty.

Software terms

Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any,

is subject to applicable end-user license, open-source software information, and other terms set forth at www.johnsoncontrols.com/techterms. Your use of this product constitutes an agreement to such terms.

Patents

Patents: <https://jciapat.com>

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