

N2 Field Equipment Controllers and Related Products

Product Bulletin

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Overview

The Metasys® System N2 Field Equipment Controller family comprises a group of versatile controllers and accessories designed to monitor and operate a wide variety of commercial HVAC equipment and can be networked together using the N2 Open Communications protocol. This family of controllers includes the VMA1832 controller, which can be integrated to any supervisory controller capable of managing N2 Open networks and devices, such as the Network Communication Module (NCM) and Network Automation Engine (NAE).

The VMA1832 controller features an advanced design that provides optimum performance and easy access to power, network, and field terminations. These controllers come with 32-bit microprocessors that meet and exceed ever demanding industry standards.

Note: A software download that allows VMA1832 controllers to communicate as BACnet® Multidrop Serial Bus/Token Passing (MS/TP) devices will be available at a future date. This functionality provides a differentiated and cost-effective platform upgrade path for existing customers who are looking for a gradual upgrade strategy and should be considered during installation of the controller.

Our wide variety of network sensor models provides options for measuring and displaying zone temperature, occupancy detection, duct temperature, zone humidity, carbon dioxide (CO₂) level, setpoint adjustments, and discharge air temperatures. The VMA1832 controller's embedded capabilities, in addition to its modular accessories, make it well-suited as a replacement for legacy VMA14xx Series Controllers.

Figure 1: VMA1832 Controller



Features and Benefits

Features	Benefits
N2 Open Communications Protocol	Can be integrated into existing N2 networks, which extends the life of the existing Metasys system installations.
Standard Software Platform	Uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.
Auto Tuned Control Loops	Reduce commissioning time, eliminate change-of-season re-commissioning, and reduce wear and tear on mechanical devices.
Universal Inputs and Binary and Configurable Outputs	Allow multiple signal options to provide input/output flexibility.
Optional Local Controller Display/Keypad (DIS1710)	Allows convenient monitoring and adjusting capabilities at the local device.

Integration to the Metasys System Supervisory Devices

The VMA1832 controllers are designed to integrate into the Metasys system by connecting and communicating directly to the NAE and NCM. With this integration, the building operator can view the N2 Field Equipment Controllers directly from the Metasys system user interface. In addition, the operator can view controller information locally with the local display.

N2 Protocol Compatible

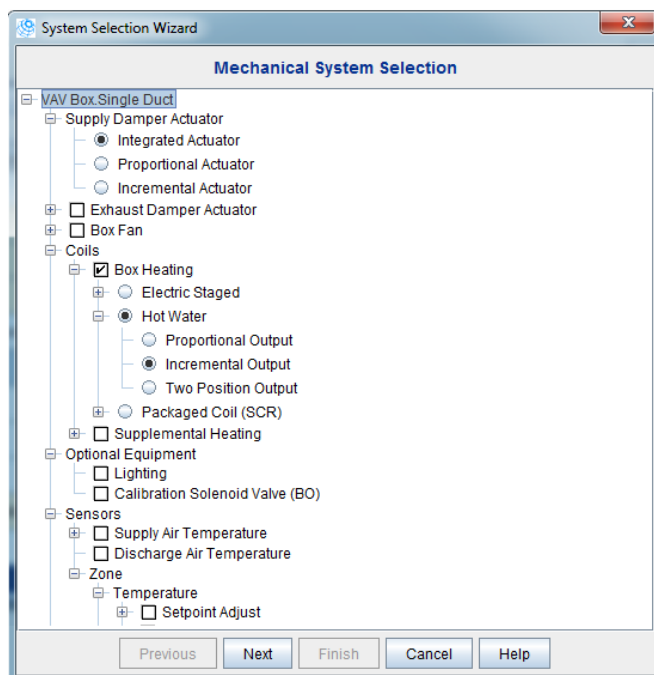
The Metasys system field controllers communicate with the supervisor using the N2 Open Communications protocol. They communicate with Netsensors on the SA Bus using the BACnet MS/TP protocol.

Controller Configuration Tool

The Controller Configuration Tool (CCT) is used to configure, simulate, and commission the VMA1832 controllers on an N2/FC bus.

The **Configuration** mode allows you to select a number of mechanical and control logic options through System Selection Trees for typical air handling, terminal unit, VAV box, and central plant mechanical systems (Figure 2). When required, you can customize the standard logic provided by the system selection process to meet your specialized control logic requirements. Configuration mode also allows you to customize certain display options available to controllers that use a local controller display.

Figure 2: Mechanical Selection in CCT

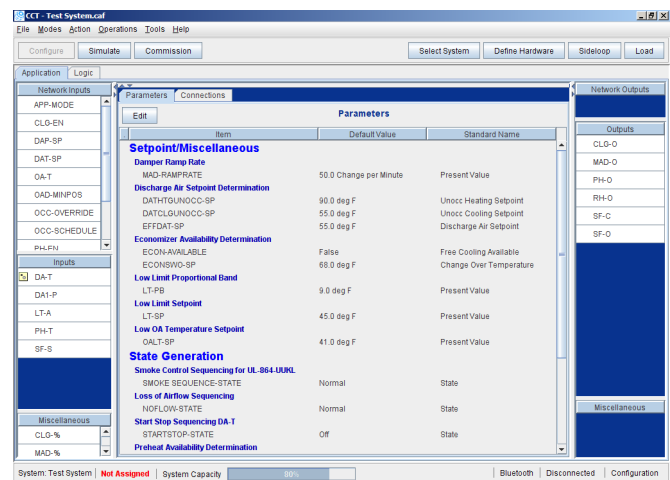


The **Simulation** mode allows you to review, run, or simulate the application logic as if you were commissioning a live system. You can make adjustments to setpoints, inputs, or sensors during a simulation session to validate the logic before or after assigning the configuration to a specific controller.

The **Commissioning** mode manages the downloading of files to the controllers through the Wireless Commissioning Converter (MS-BTCVT) between your laptop and the controllers.

After downloading the controllers, you can use the CCT Commissioning mode to validate the sensor and control point interfaces and adjust key setpoints and setup parameters (Figure 3).

Figure 3: CCT User Interface



For VAV applications, CCT features an optional box flow test to automatically exercise the VAV box to ensure correct mechanical installation and proper configuration of the key flow setup parameters. Additionally, the Metasys system provides multiple configurations of room network sensors and a handheld VAV balancing tool that can be used to perform VAV balancing tasks.

In addition, the Commissioning wizard has a Balancer tab for VAV applications to easily auto calibrate VAV boxes and set flow constants in one location.

A Commissioning mode only version of the CCT software is available to the Johnson Controls® branch offices for jobs or individuals having only commissioning tasks (for example, balancing contractors). The Configuration and Simulation modes are disabled in the CCT Commissioning software.

Sensor Options

The NS Series Network Zone Sensors can be adapted to function directly with Metasys system VMA1832 controllers. Several models of network zone sensors monitor room temperature. Options are available to also monitor zone humidity, carbon dioxide (CO₂), local temperature setpoint adjustments, occupancy, and other variables. This data is transmitted to a field controller on the SA Bus.

The VMA1832 controller is able to reuse existing TE-6xxx Series Sensors from existing VMA14xx installations using an adapter included with the VMA1832 controller. TMZ-1600 applications require use of a new sensor when installing a VMA1832. The VMA1832 controller can be used with a WRZ Series Wireless Sensor and a WRZ-7860 Series One-to-One Receiver. The VMA1832 can also reuse existing TE-700 Series Sensors from existing VMA14xx installations. The VMA1832 also supports the TE-730 Series Sensor.

Figure 4: NS Series Network Zone Sensors



Handheld VAV Balancing Tool

The VAV Balancing Tool allows you to easily adjust and set the required parameters for VAV applications that reside on the Metasys system VMA1832 controllers.

The VAV balancing parameters appear on the tool's LCD. A dial and two buttons let you navigate through intuitive menus to balance the VAV box. The menus are customized to the type of application residing in the controller. The balancing operation features an adjustable time-out parameter that returns the tool and controller to normal operation if you leave the controller in balancing mode.

The Handheld VAV Balancing Tool is lightweight and portable. It can plug into any model of network sensor to access the VAV controller.

Figure 5: Handheld VAV Balancing Tool



Applications

The VMA1832 controllers can be configured for both single-duct and dual-duct VAV box applications. The VMA1832 controllers require an additional damper actuator and Differential Pressure Transducer (DPT) sensor for dual-duct or supply/exhaust applications.

Note: Connecting an Input/Output Module (IOM) to the VMA1832 via the SA Bus connection is not supported.

Hardware

The VMA1832 controllers are enclosed in a plastic housing with an attached metal shield. The controller, transducer, and actuator are all integrated into a single enclosure.

The VMA1832 controllers' housing may eliminate the need for a separate enclosure for the VMA. Check code requirements for appropriate applications.

The N2/FC Bus has removable screw terminals and the SA Bus has spade terminals. Input/Output (I/O) connections to the VMA1832 are easy-to-use spade lugs. Screw terminal I/O connectors are available as optional accessories.

The differential pressure sensor in the VMA1832 controllers provides consistent flow readings with minimal drift and requires minimal auto-zero calibration. There are no filters to change, which helps to ensure very close tolerance to published accuracy.

LEDs, visible through the housing, indicate the status of power to the controller, communications status, and a number of diagnostic indicators.

Installation

Field mounting the VMA1832 controller is straightforward. The VMA1832 controllers require minimal wiring and are mounted to the terminal box using a single sheet metal screw and a single set screw to lock the actuator to the damper shaft. The set screw has a self-locking cup point end to resist loosening due to vibration.

The actuator coupling is serrated, providing additional damper shaft grip and minimizing shaft slippage during operation. The coupling accommodates shafts from 10 mm (3/8 in.) square and up to 13 mm (1/2 in.) diameter round. A gear release lever allows easy resetting of the damper to full open or full close.

The housing dimensions of the VMA1832 controllers (165 x 125 x 73 mm [6.5 x 4.92 x 2.9 in.]) meet industry mounting requirements and make the controllers easy to handle.

You can make the controller address unique for each VMA using the DIP switches that are accessible through the VMA controller housing.

The AC power input is isolated from the DC inputs and outputs by an internal transformer. This arrangement eliminates polarity issues, ground loops, and the need for a separate isolation transformer. Power, N2 communications, and binary outputs are all separately isolated.

Models and Capabilities

[Table 2](#) lists the point type counts for the VMA1832 controllers.

Selection Charts

Table 1: VMA1832 Features and Point Type Counts per Model

Point Types	Signals Accepted	VMA1832
Modular Jack		8-pin SA bus supports analog non-communicating sensor.
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
Binary Output (BO)	24 VAC Triac	3
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac	2
Integrated Actuator	Internal	1
Integrated Flow Sensor	Internal	1
Zone Sensor Input	On SA Bus ¹	Up to 4 NS Series Network Zone sensors Up to 9 WRZ sensors when using the ZFR1811 wireless router configuration and up to 5 WRZ sensors when using the one-to-one WRZ-78xx wireless configuration.

¹ A total of 10 SA bus addresses maximum can be used in a single VMA controller.

Table 2: Ordering Information

Product Code Number	Description
MS-VMA1832-0	Replacement Integrated VAV Controller/Actuator/Pressure Sensor, N2/FC Bus, and SA Bus (32-bit Processor)

Ordering Information

Contact your Johnson Controls representative to order Metasys field controllers and related products. See [Table 2](#) and [Table 3](#) for product code numbers and product descriptions.

Repair Information

If the Metasys system field equipment controllers, network sensors, or any related product fails to operate within its specifications, replace the unit. For a replacement device, contact the nearest Johnson Controls representative.

Accessories (Order Separately)

Table 3: VMA1832 Controller Accessories (Order Separately)

Product Code Number	Description
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
AS-CBLVMA-1	Cable Adapter, 8-pin Female Socket to 6-Pin Male Jack (Bulk Pack of 10)
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue, Bulk Pack (10 pack)
AP-TBK1002-0	Removable 2-Position Screw Terminal Kit (100 Pieces)
AP-TBK1003-0	Removable 3-Position Screw Terminal Kit (100 Pieces)
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-BTCVT-1	Wireless Commissioning Converter with Bluetooth® Technology
MS-DIS1710-0	Local Controller Display/Keypad
NS-WALLPLATE-0	Network Sensor Wall Plate (80 mm by 80 mm [3.15 in. by 3.15 in.] square), used with an 80 mm by 80 mm (3.15 in. by 3.15 in.) network sensor and must be mounted to a 0.6 m by 1.2 m (2 ft by 4 ft) wall box
TL-BRTRP-0	Portable BACnet IP to MS/TP Router
NS Series Network Sensors	Refer to the <i>NS Series Network Sensors Product Bulletin (LIT-12011574)</i> for specific sensor model descriptions.

Technical Specifications

Table 4: VMA1832 Controllers

Product Code Numbers	MS-VMA1832-0: Cooling with Reheat and Fan Control
Supply Voltage	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 Note: The 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 to 50°C (32 to 122°F) Storage: -40 to 70°C (-40 to 158°F)
Terminations	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

Table 4: VMA1832 Controllers

Controller Addressing	DIP switch set N2 Open Protocol: Valid field controller device addresses 1–253 BACnet MS/TP: Valid field controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid field controller addresses.)
Communications Bus	N2 Open Protocol: 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 Protocol: SA Bus: 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 devices¹
Input and Output Capabilities	3 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 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 Sensor	Range: -1.5 inches to 1.5 inches H₂O Performance Characteristics: Total Error Band: ±1.3% Full Span Maximum Accuracy: ±0.25% Full Scale Best Fit
Actuator Rating	4 N·m (35 lb·in) minimum shaft length = 44 mm (1-3/4 in.)
Mounting	Mounts to damper shaft using single set screw and to duct with single mounting screw
Dimensions (Height x Width x Depth)	165 x 125 x 73 mm (6.5 x 4.92 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)
	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. 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
	Europe: CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC.
	Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant.

¹ For more information, refer to the *N2 Communications Bus Technical Bulletin (LIT-636018)*.

North American Emissions Compliance VMA1832 Series Controllers

United States Emissions Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this 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 may cause harmful interference, in which case the users will be required to correct the interference at their own expense.

Canadian Emissions Compliance

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.



Building Efficiency

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