

VMA1400 Series

# Variable Air Volume Modular Assembly

## Description

The Variable Air Volume Modular Assembly (VMA) is a family of configurable digital controllers. Differing models in the VMA1400 series combine a controller, pressure sensor and/or actuator housed in one pre-assembled unit.

The VMA1400 series is available in four models:

- Cooling Only (VMA1410)
  - Cooling with Reheat and/or Fan (VMA1420)
  - External Actuator (VMA1430)
  - Metasys Zoning Package (VMA1440)
- The VMA1410, VMA1420, and VMA1440 use an integrated actuator with a stepper motor drive for quick and accurate damper positioning.

The VMA1410, 1420, 1430 are designed for pressure-independent, single duct systems. The VMA1420 and VMA1430 can also be used with parallel or series fan-powered boxes, supply/exhaust applications, and dual duct systems.

The VMA1440 is used exclusively as part of the Metasys Zoning Package. See the *Metasys Zoning Package Product Bulletin (LIT-639050)* for details.

## Features

- easy-to-handle unit with a compact footprint
- pre-wired controller with pressure sensor and actuator for reduced installation time (VMA1430 uses external actuator, VMA1440 has no pressure sensor)
- fast response actuator that drives the damper from full open to full closed (90°) in 30 seconds (VMA1410, VMA1420, VMA1440) for reduced commissioning time
- continuous loop tuning through proportional adaptive algorithms using patented P-Adaptive and Pattern Recognition Adaptive Control (PRAC) technologies
- advanced diagnostics that identify and correct system deviations related to flow, damper travel, and energy
- N2 network communications for integrating VMA as a part of a facility management system with an NCM or N30 Series Supervisory Controller
- simple question/answer software format for quick, easy configuration of project-specific applications.

The VMA1400 Balancing Tool (VBT) software can be used with handheld interfaces (such as 3Com® PalmPilot™) to easily read and adjust parameters (not available for VMA1440). VBT software is included in M-Tools or can be ordered separately.



VMA1400

**Software** - The VMA can be configured, downloaded, and commissioned with HVAC PRO software, Release 7.00 or later, which uses a simple Q/A format. Dual duct applications, and TMZ1600 room sensor and supply/exhaust applications require HVAC PRO Rel. 8.01. The TE-7700 RF Temperature Sensor Application requires HVAC PRO Software Release 8.04 or later.

## VMA Functionality

	Inputs/Outputs	Points	Rating	VMA1400 Model			
				1410	1420	1430	1440
<b>Analog Inputs</b>	Zone Temperature	AI-1	1 K Ni, Si, Pt, or 2.25 K NTC	✓	✓	✓	✓
	Zone Setpoint	AI-2	1.6 K ohm Potentiometer	✓	✓	✓	✓
	Sideloop (humidity, dew point) (for 1410, 1420, 1430) or Static Pressure (for 1440)	AI-3	0-10 VDC		✓	✓	✓
	Supply Air Temperature or Supplemental Heat Temperature	AI-4	1 K Ni, Si, Pt, or 2.25 K NTC		✓	✓	✓
	Velocity Pressure	Internal	0-374 pa (0-1.5 in. W.C.)	✓	✓	✓	
<b>Binary Inputs</b>	Temporary Occupied Button	BI-1	Dry contact	✓	✓	✓	✓
	Occupied or User Configurable (for 1440)	BI-2	Dry contact	✓	✓	✓	✓
	Off or Window or Shutdown (for 1410, 1420, 1430) or User Configurable (for 1440)	BI-3	Dry contact	✓	✓	✓	✓
<b>Analog Outputs</b>	Proportional Heat or External Damper (for 1440, AO-2 is Bypass/Slave Damper)	AO-1	0-10 VDC @ 10 mA		✓	✓	✓
		AO-2	0-10 VDC @ 10 mA		✓	✓	✓
<b>Binary Outputs</b>	Lights, Fan, External Damper, Box Heat - On/Off Valve or 1-3 stage Electric, Supplemental Heat - On/Off Valve or Single Stage Electric Heat	BO-1 - BO-5 (BO-1 - BO-4 for 1440)	24 VAC Triac @ 0.5 A each		✓	✓	✓
	Stepper Motor with Position Feedback	Internal	2-phase Stepper (up to 93° rotation at 4 N·m [35 lb·in])	✓	✓	✓	✓

## Variable Air Volume Modular Assembly (Continued)

### Selection Chart

Code Number	Description
AP-VMA1410-0	Integrated VAV Controller/Actuator/Pressure Sensor (Cooling only) Single pack
AP-VMA1410-OD	AP-VMA1410 Bulk pack (10 maximum/pack) <sup>1</sup>
AP-VMA1420-0	Integrated VAV Controller/Actuator/Pressure Sensor (with Reheat and Fan-Powered) Single pack
AP-VMA1420-OD	AP-VMA1420 Bulk pack (10 maximum/pack) <sup>1</sup>
AP-VMA1430-0	Similar to AP-VMA1420 without internal actuator Single pack
AP-VMA1430-OD	AP-VMA1430 Bulk pack (10 maximum/pack) <sup>1</sup>
AP-VMA1440-0	VMA1440 for Metasys Zoning Package Single Pack

1. The VMA is bulk packed in 2-10 unit increments, depending on the order. A single *Variable Air Volume Modular Assembly (VMA) Installation Bulletin* is included in each order. Order quantity as you would for the standard single pack VMA.

### Accessories

Description	Code Numbers										
Transformer	AS-XFR050, AS-XFR100, Y63 through Y66 Series										
Screw Terminal Kit	AP-TBK1002-0 - Removable 2-position screw terminal kit (100 pcs) <sup>1</sup> AP-TBK1003-0 - Removable 3-position screw terminal kit (100 pcs) <sup>1</sup> M9000-106 - Removable 4-position screw terminal (1 piece) AP-TBK4N2-0 - Replacement N2 Bus 4-position screw terminal kit (10 pcs)										
Room Sensors	TE-6700, TE-7000 (Europe only), TE-7700 (using HVAC PRO Rel. 8.04 or later), and AP-TMZ1600-0 (using HVAC PRO Rel. 8.01)										
8-pin Room Sensor Communication Cables	<table border="1"> <thead> <tr> <th>Length</th> <th>Part Number</th> </tr> </thead> <tbody> <tr> <td>7.5 m (25 ft.)</td> <td>CBL-STAT25-SW</td> </tr> <tr> <td>15 m (50 ft.)</td> <td>CBL-STAT50-SW</td> </tr> <tr> <td>22.5 m (75 ft.)</td> <td>CBL-STAT75-SW</td> </tr> <tr> <td>30 m (100 ft.)</td> <td>CBL-STAT100-SW</td> </tr> </tbody> </table>	Length	Part Number	7.5 m (25 ft.)	CBL-STAT25-SW	15 m (50 ft.)	CBL-STAT50-SW	22.5 m (75 ft.)	CBL-STAT75-SW	30 m (100 ft.)	CBL-STAT100-SW
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Electronic Fan Speed Controller	S66AA-1C or S66DC-1C For specifications, refer to <i>S66 Series Electronic Fan Speed Control Product/ Technical Bulletin, LIT-121605</i>										
VBT Software	AP-VMAVBT1-0 MW-MTOOL-0, -6 Rel. 5.1 or later										
HVAC PRO Software Release 8.04 or later	WS-EUROPRO-0, Release 8.04 in Europe MW-MTOOL-0 (New User) or MW-MTOOL-6 (Upgrade), Rel 5.1 or later										
Converters	AS-CVTPROx00-0, AS-CBLPRO-2, IU-9100-0 (Europe), MM-CVT101-0 (US)										

1. These terminals fit over the existing I/O spade lugs.

### Technical Specifications

VMA1400 Series Variable Air Volume Modular Assembly (Part 1 of 2)	
Supply Voltage	20 to 30 VAC at 50 or 60 Hz
Optional Fuse Current	0.6 ampere for VMA1410; 2.0 ampere for a VMA1420 and 1440; 1.2 ampere for VMA1430
Power Consumption	VMA1410/1420/1440:10 VA maximum (Relay and valve requirements not included.) VMA1430:3 VA maximum (Damper actuator, relay, and valve requirements not included.)
Ambient Operating Conditions	0 to 50°C (32 to 122°F) 10 to 90% RH non-condensing, limited by a 30°C (86°F) maximum dew point

VMA1400 Series Variable Air Volume Modular Assembly (Part 2 of 2)	
Ambient Storage Conditions	-40 to 70°C (-40 to 158°F)
Terminations	6.3 mm (1/4 inch) spade lugs (Communications has removable screw terminals included)
Optional Terminations	2, 3 or 4-position screw terminals that plug into spade lugs (accessories)
RS-485 Serial Interfaces	N2 Bus and Zone Bus
N2 Controller Addressing	DIP switch set (1 to 253) or through software
Communications Bus	N2 between VMA controller and N3x or NCM Zone Bus between VMA controller and room sensor (either 8-pin phone jack or spade lugs) (not available when TE-7700 used)
Mounting	One screw mounts the VMA to the VAV box One screw attaches damper shaft to the actuator, 8 mm (5/16 in.) square-head set screw with 44 N.m (375 lb.in) of axial holding power for 13 mm (1/2 in.) round damper shaft Minimum damper shaft length is 44.5 mm (1-3/4 in.)
Housing	Plastic housing for controller, sensor, and actuator with UL 94-5VB Plenum Flammability Rating
Dimensions (L x W x H)	VMA1410/1420/1440: 153 x 102 x 102 mm (6 x 4 x 4 in.) VMA1430: 153 x 102 x 83 mm (6 x 4 x 3.25 in.)
Actuator Rating	4 N-m minimum (35 lb-in)
Shipping Weight	VMA1410/1420/1440: 13.1 kg (29 lb) for a box of ten, 1.3 kg (2.8 lb) each VMA1430: 5 kg (10.6 lb) for a box of ten, 0.5 kg (1.06 lb) each
Velocity Pressure	Velocity Pressure for 0 to 374 Pascal (0 to 1.5 inch W.C.)
Electrical Inputs	Analog Inputs: Nickel, silicon, or platinum (1K ohm) or NTC (2.25K) RTD room sensors, 1.6K setpoint potentiometer (2-wire) Voltage input for 0-10 VDC (humidity or pressure sensor) Binary Inputs: Dry contacts Input configurations vary based on model type.
Outputs	No outputs on AP-VMA1410-0, except Stepper Motor Binary Outputs: 24 VAC triac switched; 25 to 500 mA loads Stepper Drive: 2 to 767 steps per second (23,000 step resolution) Analog Outputs: 0 to 10 VDC at 10 mA
Agency Compliance	CSA 22.2 No. 205 UL 916 UL 864 (UUKL) UL 94-5VB FCC Part 15, Subpart B, Class A and B C-tick Australia/NZ, AS/NZS 4251.1, CISPR 22, Residential Class B CE Directive (89/336/EEC, EN50081/1, EN50082/2) Industrial and Residential IEEE 472 ANSI C62.41 A/B (IEEE 587 Category A/B) IEC 950 IEC 801-2, -3, -4, -6, -7, -8 For details on smoke control compliance requirements, refer to the <i>Metasys Smoke Control Wiring Technical Bulletin (LIT-636331)</i> .

For wiring details, refer to *VMA Installation Bulletin Part No. 24-8740-1* (VMA1410 and VMA1420), *P/N24-8986-18* (VMA1430), and *Part No. 24-9590-0* (VMA1440).