

Metasys® Zoning Package Overview

Metasys Zoning Package Overview.....	2
<i>Introduction.....</i>	2
<i>Key Concepts.....</i>	3
Related Information	3
Metasys Zoning Package Components	3
Accessories	6
Metasys Zoning Package Operation	7
Design Guidelines	8
Examples	9
<i>Ordering Information.....</i>	11
Metasys Zoning Package Components	11
Round Dampers	12
Rectangular Dampers	14
Shipping Weights	15
Pressure Drop Curves.....	16

Metasys Zoning Package Overview

Introduction

The Metasys® Zoning Package (MZP) is a Heating, Ventilating, and Air Conditioning (HVAC) system that provides reliable zoning control of standard packaged rooftop units.

This technical bulletin describes:

- related information
- Metasys Zoning Package components
- accessories
- Metasys Zoning Package operation
- design guidelines
- examples
- ordering information

Key Concepts

Related Information

Table 1 lists the location of literature related to the Metasys Zoning Package.

Table 1: Related Information

Documentation	Code Number
<i>HVAC PRO User's Guide</i>	
<i>M9100 Series Electric Non-spring Return Actuators Installation Bulletin</i>	LIT-2681060
<i>N30 Supervisory Controller Protocol Implementation Conformance Statement Technical Bulletin</i>	LIT-6891460
<i>N30 Supervisory Controller Quick Start Technical Bulletin</i>	LIT-6891200
<i>N30 Supervisory Controller Installation Technical Bulletin</i>	LIT-6891100
<i>N30 Supervisory Controller Networking Technical Bulletin</i>	LIT-6891300
<i>N30 Supervisory Controller Point Mapping Technical Bulletin</i>	LIT-6891400
<i>Direct Connect and Dial-Up on Windows® 98 Application Note</i>	LIT-6893350
<i>Direct Connect and Dial-Up on Windows NT® Application Note</i>	LIT-6893400
<i>Direct Connect and Dial-Up on Windows 2000 Application Note</i>	LIT-6893450
<i>N30 Supervisory Controller User's Manual</i>	
<i>Operator Workstation Technical Bulletin</i>	LIT-636013
<i>Operator Workstation Configurations Technical Bulletin</i>	LIT-636013D
<i>Operator Workstation User's Manual</i>	
<i>Unitary Controller (UNT) Technical Bulletin</i>	LIT-6363081
<i>Unitary (UNT) Controller 1100 Series User's Guide</i>	LIT-6363083
<i>Variable Air Volume Modular Assembly (VMA) 1400 Series Overview and Engineering Guidelines Technical Bulletin</i>	LIT-6363120
<i>Mounting and Wiring Variable Air Volume Modular Assembly (VMA) 1400 Series Controllers Technical Bulletin</i>	LIT-6363125
<i>Object Dictionary</i>	
<i>M-Tool Overview and Installation Technical Bulletin</i>	LIT-693100
<i>Project Builder's User's Guide</i>	
<i>Site Book User's Guide</i>	LIT-6893100

Metasys Zoning Package Components

The MZP components include:

Building Automation System

Building Automation System (BAS) is a generic term that refers to the Metasys Network Control Module (NCM), N30 Series supervisory systems, and associated operator workstations. The specific system names are used when referring to system-specific applications.

The Metasys Zoning Package controls any standard, constant volume packaged Rooftop Unit (RTU) which uses select Johnson Controls BAS, digital controllers, and sensors.

Unitary (UNT) Controller

The UNT controller controls the rooftop unit to regulate the temperature of the supply air according to the zone with the highest demand.

The AS-UNT121-1 or the AS-UNT1126-0 Unitary controllers can be used in the Metasys Zoning Package. These are low ambient temperature rated controllers that must be installed in a weatherproof enclosure, unless they are mounted within the enclosed, low voltage electrical compartment of the rooftop unit. Refer to the *Unitary Controller (UNT) Technical Bulletin (LIT-6363081)* for the AS-UNT121-1 or to the *Unitary (UNT) Controller 1100 Series User's Guide (LIT-6363083)* for the AS-UNT1126-0 for more information.

Zone Damper Assembly

One zone damper assembly is required for each zone. The Variable Air Volume (VAV) Modular Assembly (VMA) 1440 controller on the zone damper monitors zone temperature to determine a demand for heating or cooling, and reports this demand to the rooftop UNT controller via the BAS. The VMA1440 also monitors supply air temperature at the discharge of the RTU. As the temperature of the supply air changes, the VMA1440 modulates the zone damper to regulate its flow into the zone and satisfy its heating or cooling needs.

The zone damper assembly can be ordered as a round or rectangular damper:

- RZGddEDx (metal controller cover is optional)
- ZOVSE-wwwxhhh (metal controller cover is optional)

Bypass Damper Assembly

An actuator controls the bypass damper. The actuator of the bypass is controlled by the VMA1440 controller on a zone damper assembly. The bypass damper regulates air volume and static pressure through the MZP system. As building load is satisfied and the zone dampers in the system begin to modulate closed, static pressure increases in the ductwork. If system static pressure becomes excessive, the static pressure transducer sends a signal to the VMA1440 controller on the master zone damper. In response, the VMA1440 drives the bypass damper partially open, allowing excess air to flow from the supply side to the return side of the rooftop unit. This eliminates excessive system static pressure, prevents the generation of noise at the diffusers, and prevents the erratic loss of temperature control in the zones.

The bypass damper assembly requires the following components:

- RCGddEDx or BOVAE-wwwxhhh (metal actuator cover is optional)
- AS-DPTKIT-1 static pressure transducer kit (DPT-2015 static pressure sensor mounted in separate metal enclosure with Dwyer A-303 static pressure tip)

SI Damper Applications

The subordinate applications must be installed with one of the following:

- RCGddEDx
- BOVAE-wwwxhhh

VMA1420 Controller

The VMA1420 controller can also be used with the MZP application, but the internal Differential Pressure Transducer (DPT) sensor is only used for monitoring purposes. The VMA1420 is not available as a factory-mounted option and must be field installed. Refer to the *Metasys Zoning Package Commissioning Technical Bulletin (LIT-639250)*.

Zone Temperature Sensor

The recommended zone temperature sensor is the TE-67Nx-1BOO or the AP-TMZ1600-0. Each zone damper assembly supports only one sensor.

Split-Bobbin Transformer

The recommended split-bobbin transformers are the Johnson Controls Y63, Y64, or Y65 Series transformers.

Accessories

Required Accessories

The following accessory is required and must be ordered separately:

Static pressure transducer kit for use with the VMA1440 (AS-DPTKIT-1). This kit is needed for bypass applications and provides input to the VMA1440 zone damper to activate bypass control.

Optional Accessories

The following optional MZP accessories are also available:

- M3 Workstation
- M-Graphics software
- Zone Terminal (UNT controller only)
- carbon dioxide (CO₂) sensor
- room sensor (TE-6700 or TMZ1600)
- humidity sensor

Metasys Zoning Package Operation

A commercial zoning package provides cooling and heating to zones served by a single constant-volume rooftop unit. The rooftop unit delivers warm supply air for heating and cold supply air for cooling. If zones on a single rooftop simultaneously require heating and cooling, and cooling is the priority, the rooftop unit delivers enough cold supply air to satisfy all cooling demands. The zone then switches over to warm supply air for the zones calling for heating. The zone dampers regulate the introduction of this supply air into the zones. The volume of the supply air varies with the zone loads. Optional baseboard or other supplemental zone heating is also available.

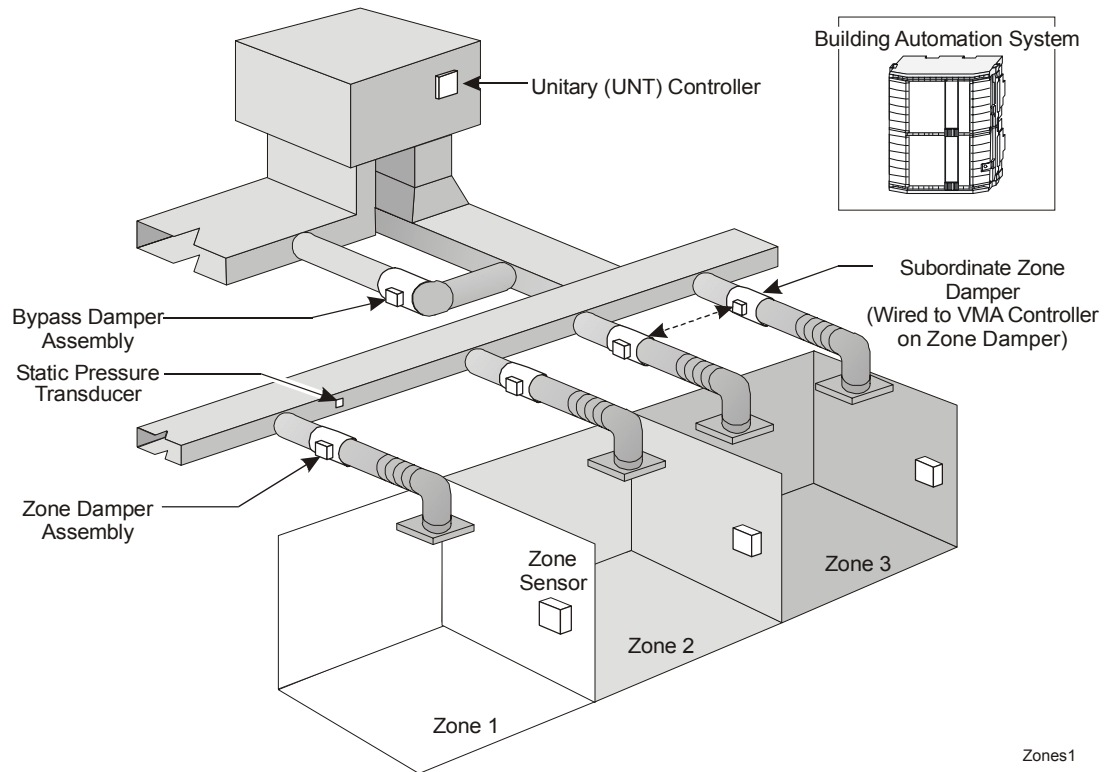


Figure 1: Metasys Zoning Package System Overview

Note: The VMA1440 analog output supports 10 mA.

Design Guidelines

Effective zoning depends upon proper system design. Good temperature control is easiest to maintain if the zones have similar temperature needs. For this reason, proper zone selection and tuning is essential.

Follow these guidelines when designing a Metasys Zoning Package system:

- Follow the best engineering practices for all mechanical equipment being installed or controlled.
- Design the system with sufficient capacity to promptly satisfy heating and cooling needs.
- Select a supply fan with sufficient capacity to meet design loads while minimizing bypass flow.
- Lay out each rooftop unit so that:
 - all zones have similar thermal loads (either all internal or all external zones)
 - adequate ventilation (minimum flow) is provided to all zones during occupied mode
- Lay out each zone so that:
 - all rooms have similar occupancy schedules
 - all rooms have similar internal and external thermal gains
 - all rooms have a similar exposure or window area
 - all rooms have similar HVAC requirements
- Carefully consider the placement of the static pressure sensor. To minimize turbulence, the recommended location is two-thirds of the distance from the supply fan discharge to the last terminal unit on the farthest run.
- Use with 0-10 VDC proportional actuators. Contact Johnson Controls before using other actuators.
- Do not exceed 20 subordinates per VMA controller.
- Do not exceed 5 UNT controllers per supervisory controller.
- Do not exceed 800 objects per Metasys Zoning system.
- Do not exceed 50 N2 devices per supervisory controller.

Note: The above maximum values do not include special applications. For example, trending may require more memory resulting in fewer supported points.

Economic decisions are important, but occupant comfort and safety should be the primary consideration when making zoning decisions.

Examples

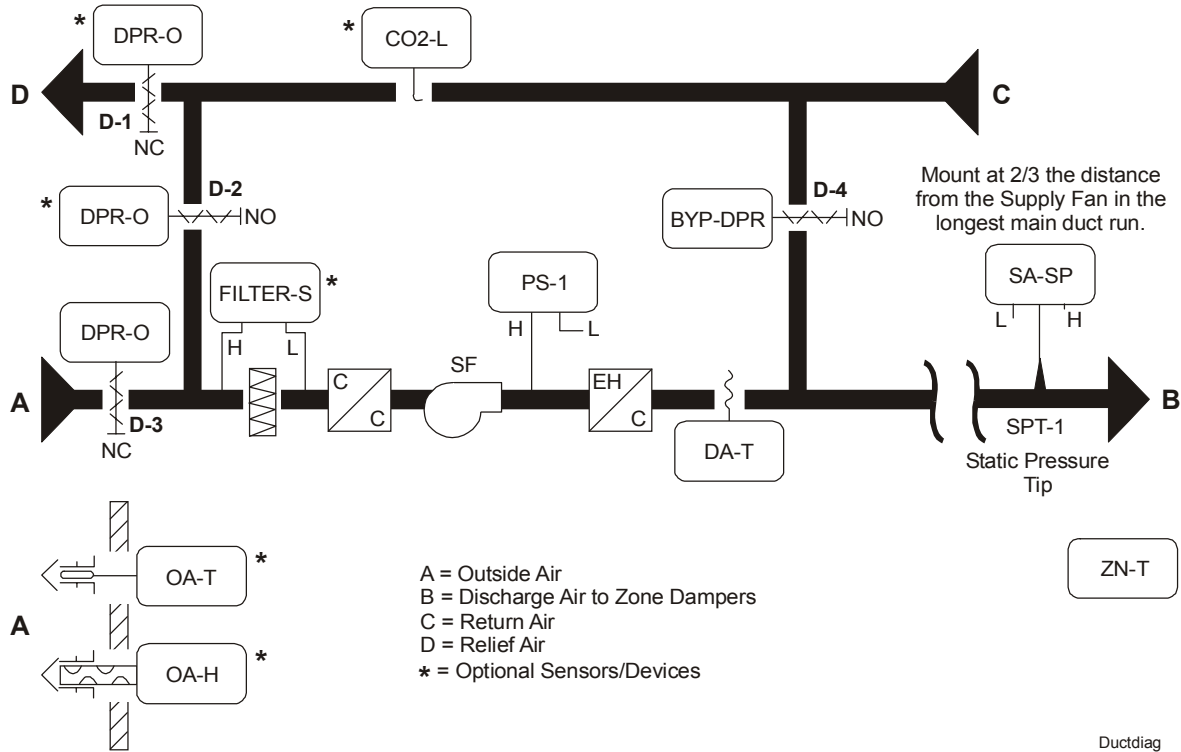


Figure 2: Metasys Zoning Package System (Rooftop Application)

Table 2: Metasys Zoning Package Component Descriptions and Examples

Description	Abbreviation	Part Number Example
Bypass Damper Assembly	BYP-DPR	RCGddEDx or BOVAE-wwwxhxx
Carbon Dioxide Sensor	CO2-L	CD-Pxx-0-0 (duct mounted)
Discharge Air Temperature Sensor	DA-T	TE-6316P-1
Damper with Actuator	DPR-O	M9206-GGA-2 or M9216-GGA-2
Filter Switch	FILTER-S	P32AC-2C
Outdoor Air Humidity/Temperature Sensor	OA-H or OA-T	±3% Accuracy – HE-67N3-ONOOOP or ±2% Accuracy – HE-67N2-ONOOOP
Proof-of-Airflow Switch	PS-1	AFS-460-DSS
Supply Fan Status	SF-S	H-908
Supply Air Static Pressure Sensor	SA-SP	AS-DPTKIT-1 with Dwyer A-303 Static Pressure Tip
Zone Sensor	ZN-T	TE-67Nx-1BOO or AP-TMZ1600-0

Note: The items listed in Table 2 are provided as typical components required for the rooftop application and are not included in the bypass and zone damper assemblies.

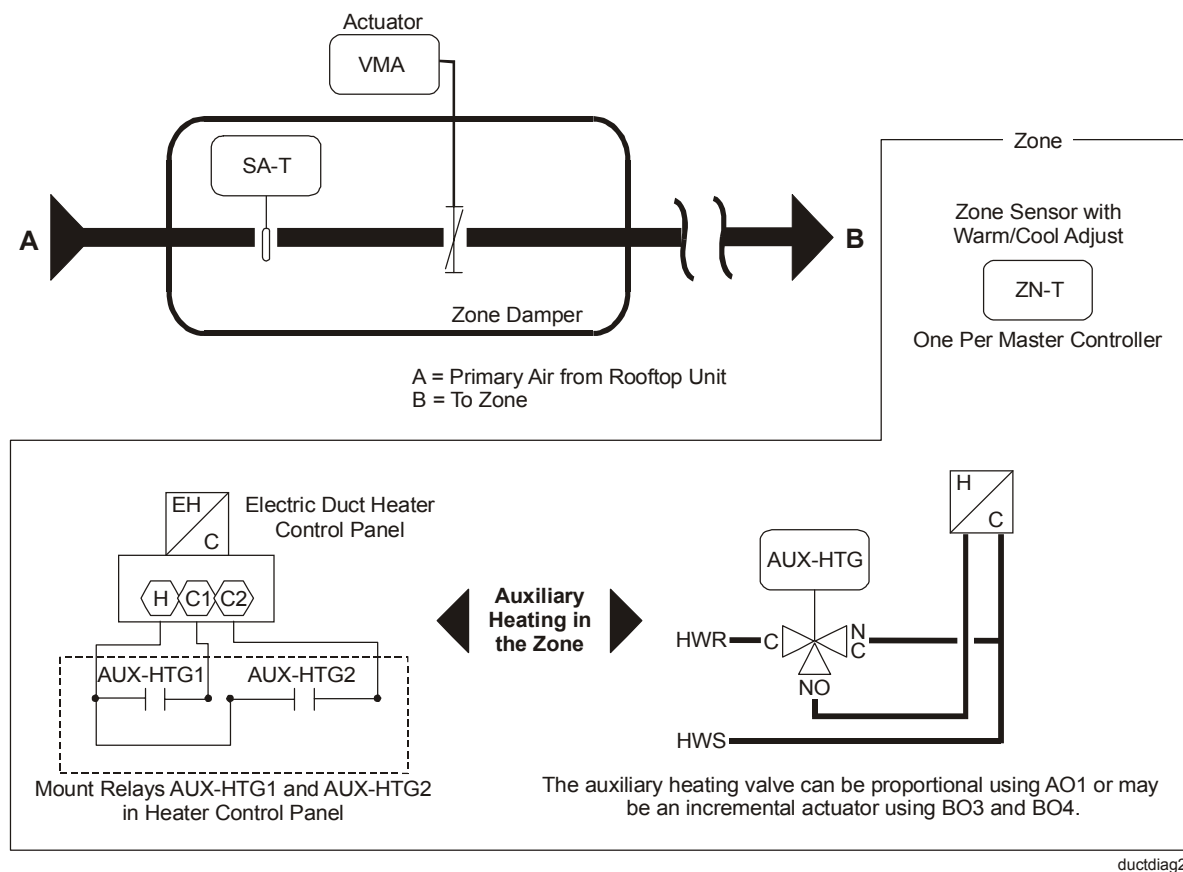


Figure 3: Zone Damper Assembly

Table 3: Metasys Zoning Package Component Descriptions and Examples

Description	Abbreviation	Part Number Example
Supply Air Temperature Sensor	SA-T	TE-6300-601
Zone Sensor	ZN-T	TE-67Nx-1BOO or AP-TMZ1600-0
Auxiliary Heating RLY 1SPDT, 10-30 VAC/DC or 120 VAC, Light-Emitting Diode (LED) @ LEC	AUX-HTG1 and AUX-HTG2	CVR-11C-0

Note: The items listed in Table 3 are provided as typical components required for the rooftop application and are not included in the bypass and zone damper assemblies

Ordering Information

Metasys Zoning Package Components

Table 4 lists the required Metasys Zoning Package components:

Table 4: Metasys Zoning Package Components

Item	Part Number
Building Automation System (BAS)	Only one of the following is required:
Metasys Network	NU-NCM300 Series
Metasys N30 Supervisory Controller with N2 Field Bus and Ethernet Peer Bus	MS-N301310-1
Metasys N30 Supervisory Controller with N2 Field Bus	MS-N301010-1
Rooftop Controller (UNT)	AS-UNT121-1 or AS-UNT1126-0
Bypass Damper Assembly	Refer to Table 8 and Table 10 to select part numbers.
Zone Damper Assembly	Refer to Table 7 and Table 9 to select part numbers.
Zone Temperature Sensor	TE-67Nx-1BOO or AP-TMZ1600-0
Split-Bobbin Transformer	Y6xxx-x Refer to the <i>Series Y63, Y64, Y65, Y66, Y69 Transformers Product Bulletin (LIT-125755)</i> .

Note: For Zone Applications, order the appropriate damper (for example, round, rectangular, size) with a VMA1440 controller. For bypass or subordinate applications, order the appropriate damper (for example, round, rectangular, size) with an M9106-GGA-2 actuator.

Table 5 lists the optional Metasys Zoning Package components:

Table 5: Metasys Zoning Package Optional Components

Item	Part Number
Operator Workstation	WS-SWOPMI-0 and WS-SWOGPL-0
M3 Workstation	MW-M3WHCI-0 and MW-MGRAPH-0
Carbon Dioxide Sensor	CD-WOO-OO-0 (wall mounted) or CD-Pxx-0-0 (duct mounted)
Outdoor Air Humidity/Temperature Sensor	±3% Accuracy – HE-67N3-ONOO or ±2% Accuracy – HE-67N2-ONOO
Discharge Air Temperature Sensor	TE-6316T-1

Table 6 lists the Metasys Zoning Package replacement parts:

Table 6: Metasys Zoning Package Replacement Parts

Item	Part Number
Bypass and Subordinate Damper Assemblies Proportional Actuator	M9106-GGA-2
Static Pressure Kit	AS-DPTKIT-1 (includes DPT-2015-1 with Dwyer A-303 static pressure tip)
Zone Damper Assembly VMA1440 Controller	AP-VMA1440-0
Supply Air Sensor	TE-6300-601

Round Dampers

Use Table 7 to select the ordering code for the round zone damper or Table 8 for the round control dampers for bypass/subordinate applications. See Figure 4 for the dimensions of the round damper and the optional metal cover.

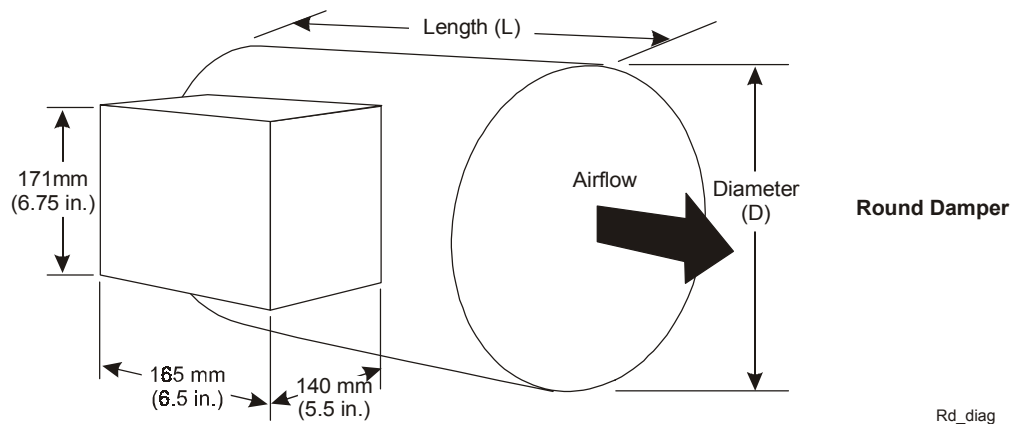


Figure 4: Round Damper with Optional Metal Cover

Table 7: Round Zone Damper Selector

	Code Number	Damper					Actuator		
		R	Z	G	dd	E	D	NO	C
Product Family	R = Round Dampers								
Application	Z = Zone Control								
Material	G = Galvanized								
Diameter (dd)	06 to 22 inches (1-inch increments) with Actuator								
Actuator/ Controller	E = VMA1440 Controller								
Control Signal	D = Default Control Signal								
Operation	NO = Normally Open								
Factory-Installed Options	C = Steel Actuator Cover								

Notes: The RZG round zone damper is a master which includes the TE6300-601 SA Sensor and VMA1440 controller.

The code RZG08EDNO specifies a round zone damper with 8-in. diameter, VMA1440 controller, default control signal, normally open actuator operation, and no metal actuator cover.

Table 8: Round Control Damper Selector for Bypass/Subordinate Applications

	Code Number	Damper					Actuator		
		R	C	G	dd	E	D	NC	C
Product Family	R = Round Dampers								
Application	C = Control Damper for Bypass/Subordinate								
Material	G = Galvanized								
Diameter (dd)	06 to 22 inches (1-inch increments) with Actuator								
Actuator	E = Electric Actuator Non-spring Return M9106-GGA-2 (no controller)								
Control Signal	D = Proportional								
Operation	NC = Normally Closed								
Factory-Installed Options	C = Steel Actuator Cover								

Rectangular Dampers

Use Table 9 to select the ordering code for the rectangular zone damper or Table 10 for the rectangular damper for bypass/subordinate applications. See Figure 5 for the dimensions of the rectangular damper and the optional steel cover.

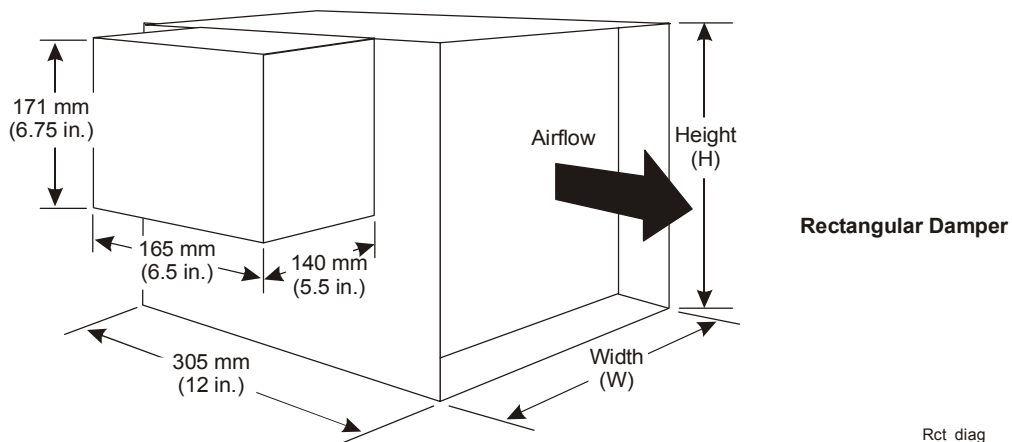


Figure 5: Rectangular Damper with Optional Steel Cover

Note: The recommended duct slot width for installing the damper is 101.6 mm (4 in.).

Table 9: Rectangular Zone Damper Selector

	Code Number	Z	O	V	S	E	-	0	w	w	x	0	h	h	C
Application	Z = Zone														
Blade Operation	O = Opposed														
Blade Type	V = One-piece Blade														
Bearings/Seals	S = Standard Temperature-Acetal Bearings/No Seals														
Actuator/Controller	E = VMA1440 Controller														
Width Dimensions	008 to 030 inches (1-inch increments)														
Height Dimensions	006 to 030 inches (1-inch increments)														
Factory-Installed Options	C = Steel Actuator or Controller Cover														

Notes: The ZOVSSE rectangular damper is a master which includes the TE6300-601 SA Sensor and VMA1440 controller.

The code ZOVSSE-008x012C specifies a rectangular zone damper with opposed blade operation, one-piece blade, standard temperature acetal bearings without seals using a VMA1440 controller, 8-inch wide x 12-inch high, complete with steel cover.

Rectangular damper assemblies are shipped with a 305 mm (12-inch) wide side plate that inserts into a sheet metal shroud supplied by installation contractor.

Table 10: Rectangular Damper Selector for Bypass/Subordinate Applications

	Code Number	B	O	V	A	E	-	0	w	w	x	0	h	h	C
Application	B = Bypass/Subordinate														
Blade Operation	O = Opposed														
Blade Type	V = One-piece Blade														
Bearings/ Seals	A = Acetal Bearings/No Seals														
Actuator	E = Electric Actuator M9106-GGA-2 (no controller)														
Width Dimensions	008 to 030 inches (1-inch increments)														
Height Dimensions	006 to 030 inches (1-inch increments)														
Factory-Installed Options	C = Steel Actuator Cover														

Notes: The BOVAE rectangular damper for Bypass/Subordinate applications includes a factory-installed actuator without sensors.

Rectangular damper assemblies are shipped with a 305 mm (12-inch) wide side plate that inserts into a sheet metal shroud supplied by installation contractor.

Shipping Weights

Table 11 lists the approximate shipping weights for round and rectangular dampers.

Table 11: Approximate Shipping Weights in lb (kg)

Height (inches)	Width (inches)			
	12	18	24	30
6	11 (5.0)	14 (6.4)	15 (6.8)	17 (7.7)
12	15 (6.8)	18 (8.2)	19 (8.6)	21 (9.5)
18	19 (8.6)	25 (11.3)	27 (12.2)	29 (13.2)
24	24 (10.9)	27 (12.2)	32 (14.5)	37 (16.8)
30	25 (11.3)	29 (13.2)	36 (16.3)	42 (19.1)

Notes: Length for all rectangular dampers is 305 mm (12-inch).

Weights do not include packaging.

Pressure Drop Curves

Figure 6 shows the pressure drop curves for round dampers.

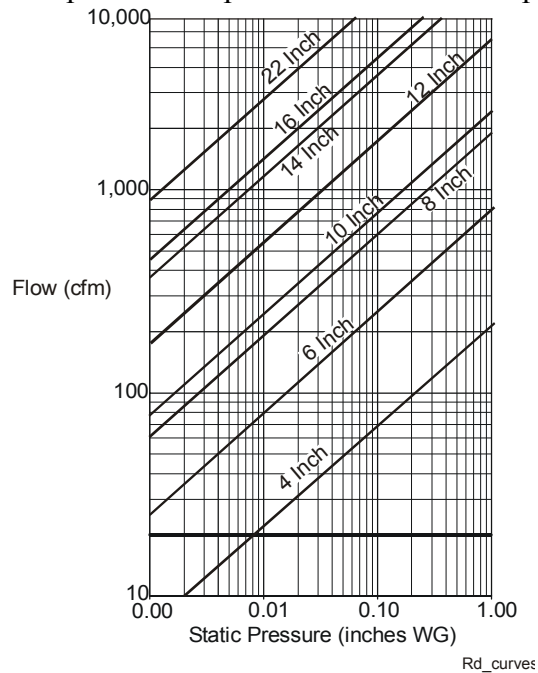


Figure 6: Round Damper Pressure Drop

Figure 7 shows the pressure drop curves for rectangular dampers.

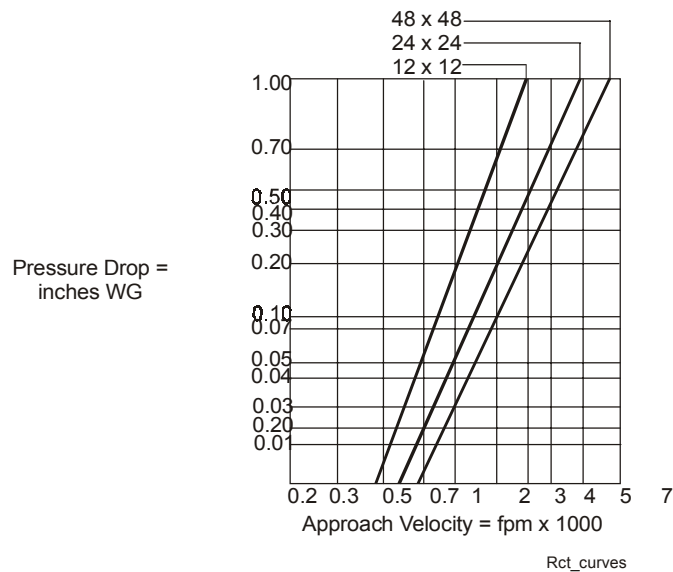


Figure 7: Rectangular Damper Pressure Drop

**JOHNSON
CONTROLS**

Controls Group
507 E. Michigan Street
P.O. Box 423
Milwaukee, WI 53201

www.johnsoncontrols.com
Published U.S.A.