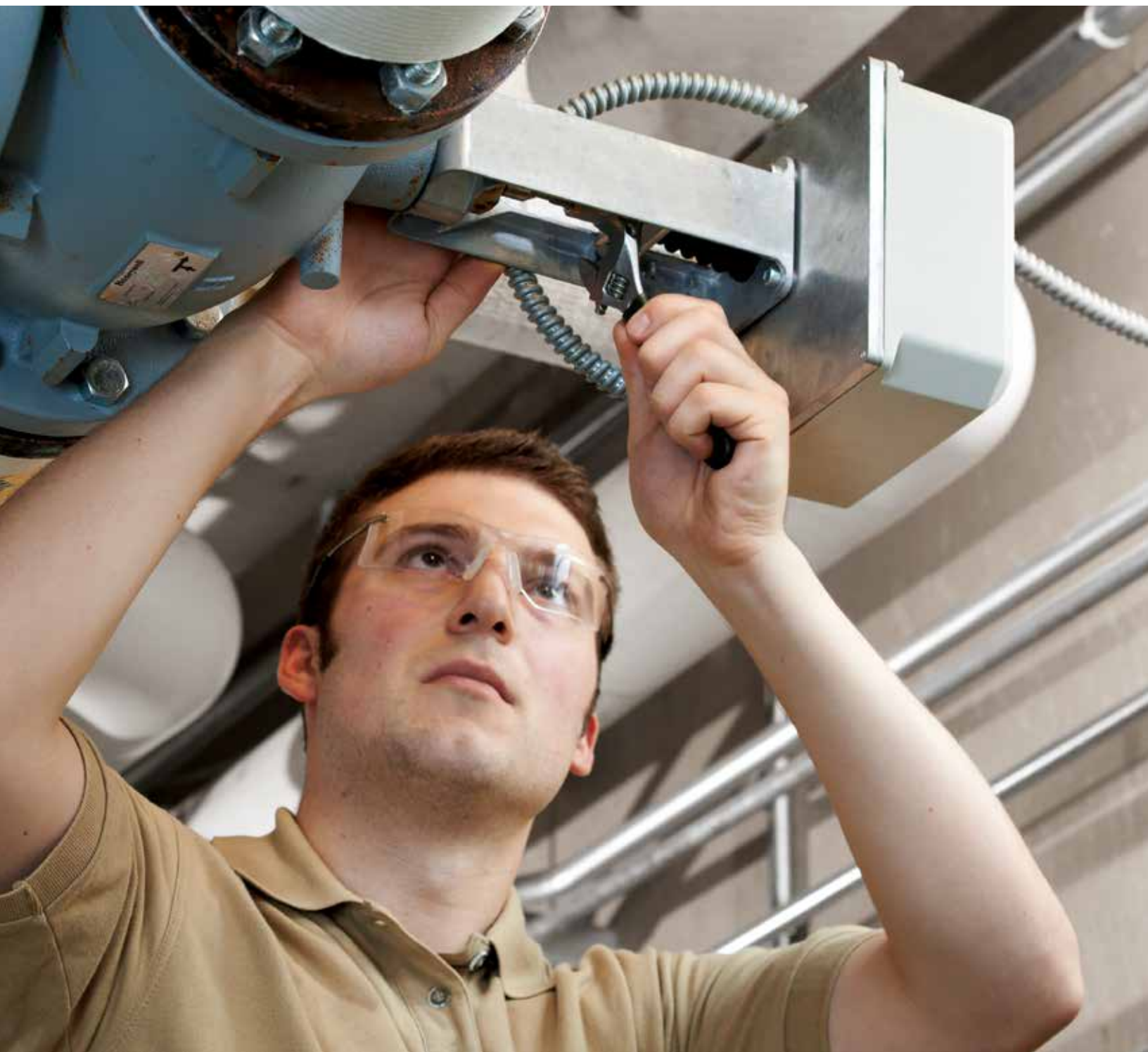


Field Devices

Application and Selection Guide

Commercial HVAC Components — Engineered for Success



About valve selection

The valve selection section is constructed in one of two ways:

For unassembled product:

As a reference, pictures will represent the valves and actuators separately; and part numbers are highlighted in blue. To order a complete product one OS# must be chosen from each blue box.

For factory assembled product:

The complete assembled OS# will be displayed in the body of the chart (except for cartridge cage valves, both an actuator and valve must be chosen). Pictures will also reference the factory assembled configuration.

Additional product information

To find more detailed information on the individual products included in this document, go to: <http://customer.honeywell.com> and use the search text box to quickly locate product specific content.

SUPPORT

Contact Information

Commercial Components

Technical Hotline 888.516.9347

Take-Off Service

Let Honeywell Take-Off Service provide a complete job schedule for your projects for dampers, actuators, valves and VFDs.

E-mail

buildingsproductsupport@honeywell.com

takeoff.service@honeywell.com

Online Resources

Honeywell Product Ordering

Get the information you want and order the products you need.

URL

<http://customer.honeywell.com>

Honeywell Partner Web Site

A web site developed for our partners. Get product information, guide specs, wiring diagrams, training videos, and more.

<http://buildingcontrols.honeywell.com>

Honeywell eLearning

A convenient and smart way of learning about our products with 10 to 20 minute training modules. Register at the Honeywell customer website above for access.

<http://customer.honeywell.com/learning>

Configure Price, Quote (CPQ)

The easy-to-use online tool used to configure, price, and quote Honeywell field devices.

www.cpq.honeywell.com

Configure, Price, Quote – CPQ Select

**Product Selection
And Quoting Made Easy**

New CPQ Select saves time and ensures accuracy.

Configure **Price** **Quote**

QUOTE YOUR NEXT JOB WITH CPQ SELECT

The graphic features three red circular icons: a document with a checkmark for 'Configure', a dollar sign for 'Price', and a checkmark in a box for 'Quote'. The text is in a clean, sans-serif font.

Honeywell CPQ Select; the single, easy to use tool to configure, price, and quote Honeywell Field Device products.

No special software is required and it is available and current, 24/7.

Easy to use CPQ Features:

- Quickly find and select the right product for your application
- Compare specifications across different products
- View and download technical literature
- Configure and tag Valve Assemblies
- Create quotations and save automatically to the cloud for future projects
- Export simple quotations or include full submittal documentation

Honeywell Commercial Products Included:

- Control Valves & Actuators
- Control dampers
- Actuators – Direct Coupled Actuators (DCA) and Foot Mounted
- Variable Frequency Drives (VFDs)
- Sensors
- Submeters
- Standalone Controllers
- Pneumatics

CPQ Select Website – Check It Out Today

www.CPQ.Honeywell.com

Damper Pricing Tool

Use the Damper Pricing tool to select and price custom made dampers that are not listed in CPQ. Click on the “Commercial Estimating Tools” link at customer.honeywell.com under “Support and Resources.”

Specification Take-Off Service

The Honeywell Take-Off Service can create product schedules from:

- Product specifications
- Existing schedules
- Drawings
- Obsolete or competitive schedules

Our goal is to help provide you with the best possible solution for each job.



Products Supported by the Take-Off Service

- Commercial Water and Steam Valves
- Valve Actuators (Electric or Pneumatic)
- Commercial Control Dampers
- Custom Dampers
- Damper Actuators (Electric or Pneumatic)
- Variable Frequency Drives

1. Submit your information by Email to takeoff.service@honeywell.com
2. Include your desired turn-around time.
3. Take-Off Service staff will send you a confirmation that your email or fax was received. We always attempt to have your request finished as soon as possible. Please note, however, that the quality of the submitted information largely determines the turn-around time. We will work closely with you to ensure that we have enough information to move forward as quickly as possible.
4. A final product schedule document will be returned to you following take-off completion.

Included In the Final Take-Off Document

We send a comprehensive spreadsheet, which contains:

- A complete product schedule
- Base price
- Directions on how to order Honeywell products
- Links to product submittals
- Quote identification number

Questions

If you have questions about the Honeywell Take-Off Service, please call the dedicated Take-Off Service phone number at 1.888.664.4092 or email us at takeoff.service@honeywell.com.

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Section 1: Dampers

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Use the following guidelines to determine the actuator quantity and torque requirements for your damper configuration.

Determine Damper Actuator Locations

Use the following configuration to determine the amount of actuator locations your damper will require.

Single Section $\leq 48 \times 74$ D2, D3
 $\leq 60 \times 74$ D1

Dampers will never ship more than 2 sections wide and one section high.

Configuration

Dampers less than 96x74 inch size have a single actuator location. Dampers 96x74 and less than 144x74 are made of three sections, and have two actuator locations, one with two thirds of the area (and torque), and the other with one third.

Exception: Three section wide dampers that are less than 42 square feet, have a single actuator location.

If damper exceeds 74" height a second row is necessary. Apply the same logic above to each row of dampers.

For dampers larger than 144 x 144, please contact the Take-Off Service (takeoff.service@honeywell.com) for a quote and actuator location.

Mounting

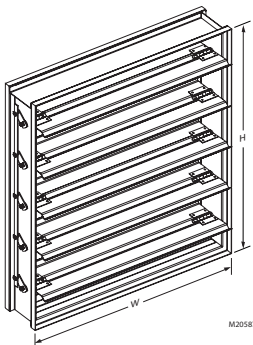
Internal Mount: Only blade drive lever provided. Customer is responsible for providing actuator mounting hardware, and linkage.

External Mount: Actuator shaft will be provided as extension pin to be mounted on side or with jackshaft pre-mounted on damper.

Determining Damper Actuator Torque Requirements

Use the following procedure to determine the required torque for your damper.

NOTE: Damper area is measured using the W and H dimensions.



Measuring Damper Area and Torque Requirements

1. Calculate the damper area by multiplying width by height in inches and divide by 144 to obtain square feet.
2. Multiply the area by the correct torque factor from Table 2 below, to show total torque required.
3. Select an actuator with torque higher than the calculated value.

EXAMPLE:

W dimension = 96 in.

H dimension = 48 in.

$48 \text{ in.} \times 96 \text{ in.} \div 144 = 32 \text{ sq. ft.}$

$32 \text{ sq. ft.} \times 7 \text{ lb-in./sq. ft.} = 224 \text{ lb-in.}$

In this example you need one or more actuators with a combined torque of 224 lb-in or more. Sometimes it's necessary to use more than one actuator in the same actuator location, in which case extra hardware must be used, such as a tandem mounting kit.

Table 2. Approximate industry standard damper lb-in. per sq ft value.

Leakage	Damper Blades	Face Velocity (fpm)/ Static Pressure (in. wc)				
		500/ 1	1000/ 2	1500/ 3	2000/ 4	2500/ 5
D1 & D2	Parallel	4	7	10.5	12	14
D1 & D2	Opposed	3	5	7.5	8.5	10
D3	Parallel	3	4.5	6.5	7	8
	Opposed	2	3	4.5	5	6

Damper Sizing

Dampers can be sized using two methods; actual sizing or nominal sizing.

Dampers with actual sizing are made exactly to the dimensions specified, meaning a 24x24 damper is exactly 24x24 inches when built.

Nominally sized dampers are undersized by one quarter inch in both dimensions, meaning a 24x24 damper will be 23.75x23.75 inches when built.

Nominal sizing is the most common method, since that is how dampers destined for duct installation should be sized to fit. Actual sizing is more common with flange or wall mounting

Nominal sizing is Honeywell's default method of manufacturing. If actual sizing is required, please specify accordingly at the time of ordering.

Product Selection - Dampers

Standard Rectangular Dampers

HVAC performance is largely dependent on airflow, and Honeywell Control Dampers are built to support improved airflow and heavy use. Honeywell has long been a leading source for commercial control dampers, with products that meet the benchmark AMCA 500D air performance standards. With excellent leakage performance and manufacturing standards, Honeywell control dampers provide efficient and trouble free operation.

Standard Rectangular Dampers



Honeywell D1, D2, and D3 Control Dampers are constructed to be durable. They feature a symmetrical blade design that translates into a damper that is not flow directional, has maximized free area, and reduced actuator torque compared to asymmetrical blade designs.

The Right Choice

There's a Honeywell Control Damper that's just right for your application. The D1 ultra-low leakage airfoil damper has low airflow resistance for a more efficient system, and is typically used in high pressure and velocity applications, such as fan isolation. The D2 model is an ultra-low leakage damper with blade and jamb seals, and it's designed for medium pressure and velocity systems, like outdoor air intake or exhaust. The D3 control damper is built for applications with medium pressure and velocity, and where low leakage is not important, like return air.

Blade Design

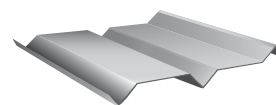
Airfoil Blades - D1 Dampers

Honeywell Airfoil Control Dampers have blades constructed of double skin galvanized steel. Its shape results in increased strength, but also a lower resistance to airflow, which makes it ideal for high pressure systems.

3V Blades - D2 and D3 Dampers

The D2 and D3 models feature a 3V blade design, with three V-grooves that run the length of the blade for structural rigidity and strength. The 3V

blade is primarily designed to be used in low to medium pressure and velocity applications.



Applications And Operation

Honeywell Commercial Control Dampers are designed for isolation or airflow control in medium- to high-pressure and velocity HVAC systems. Typical use includes volume control in zone applications and air handling units, generator room ventilation, stand-alone exhaust air units, or economizer applications. Operating range is from 2000 to 4000 fpm maximum velocity, and 2.5 to 10 inch wg pressure.

Dampers are designed to operate with a wide range of Honeywell actuators and accessories. Spring return and non-fail-safe actuators are available with a wide range of control options and output torque, to insure precise control of your damper application.

Performance

Honeywell certifies that the D1, D2, and D3 models of control dampers are tested according to AMCA Publication 511 and Standard 500D for air performance in pressure drop and leakage.

Both D1 and D2 offer leakage ratings equivalent to both AMCA Class 1A and Class 1. The Class 1A rating offers IECC (International Energy Conservation Code) leakage compliance.

				Material		Frame Gauge		Blade Seals		Jamb Seals	Blade Axle Bearings		Axles		Linkage Material		Flange	
S — Standard O — Optional				Galvanized	Stainless	16	12	TPE	Silicone	Stainless	Synthetic	Stainless	Galvanized	Stainless	Galvanized	Stainless	None	Single, Double, Reverse
Leakage @ 1 in wg cfm/ft2																		
Max Velocity fpm																		
Max Pressure in wg																		
D1 Ultra-Low Leakage				S	O	S	O	S	O	S	S	O	S	O	S	O	S	O
D2 Ultra-Low Leakage				S	O	S	O	S	O	S	S	O	S	O	S	O	S	O
D3 Control Damper				S	O	S	O	n/a	n/a	n/a	S	O	S	O	S	O	S	O

For a copy of the specification sheet the D1 (63-2671) or D2 and D3 (63-2398), visit customer.honeywell.com.

Standard Round Dampers



D690

The D690 round control dampers are available in sizes from 6 to 16 inches, and are used in zone applications controlling airflow in round duct. The dampers are constructed with neoprene and silicone seals for tight close off and low leakage. The DM7600 model consists of a D690 damper, but includes a factory mounted actuator.

- Oilite bearings for durability
- 90 degree damper travel
- Designed to accept Honeywell direct coupled actuators up to 44 lb-in torque
- Maximum velocity 2,500 fpm
- Temperature range 32°F to 130°F (0°C to 54°C)



DM7600

D690 ROUND DAMPERS SELECTION GUIDE

Product Number	Damper Diameter	
	(inch)	(mm)
D690A1002	6	152
D690A1010	8	203
D690A1028	10	254
D690A1036	12	305
D690A1044	14	356
D690A1051	16	406

DM7600 ROUND DAMPERS SELECTION GUIDE

Product Number	Damper Diameter		Input Signal	Timing (sec, min.)
	(inch)	(mm)		
DM7600A1005	6	152	2 to 10 Vdc or 4 to 20 mA	90 sec
DM7600A1013	8	203	2 to 10 Vdc or 4 to 20 mA	90 sec
DM7600A1021	10	254	2 to 10 Vdc or 4 to 20 mA	90 sec
DM7600A1039	12	305	2 to 10 Vdc or 4 to 20 mA	90 sec
DM7600A1047	14	356	2 to 10 Vdc or 4 to 20 mA	90 sec
DM7600A1054	16	406	2 to 10 Vdc or 4 to 20 mA	90 sec
DM7600B1004	6	152	SPDT floating	90 sec
DM7600B1012	8	203	SPDT floating	90 sec
DM7600B1020	10	254	SPDT floating	90 sec
DM7600B1038	12	305	SPDT floating	90 sec
DM7600B1046	14	356	SPDT floating	90 sec
DM7600B1053	16	406	SPDT floating	90 sec

Custom Dampers

Need a custom damper? Contact the Take-Off Service: 1-888-664-4092 or takeoff.service@honeywell.com.

Below is a sample list of the products we frequently provide.

CUSTOM RECTANGULAR DAMPERS

Number	Description
VCD34	Galvanized Insulated Airfoil Damper
VCD40	Aluminum Narrow Frame Airfoil Damper
VCD42	Aluminum Airfoil Damper (Galvanized Frame)
VCD43	Aluminum Airfoil Damper
VCD45	Aluminum thermally broken insulated Damper

CUSTOM ROUND DAMPERS

Number	Description
VCDR53	Galvanized Round Damper – to 24 inches
VCDRM53	Galvanized Round Multi-Blade Damper – to 36 inches

Submittal Data - Dampers

D1 Series Rectangular Volume Control Dampers



The D1 series control damper is an ultra-low leakage damper, with rugged steel airfoil blades designed to meet the highest standards established. It is leakage and pressure drop tested according to the AMCA 500D standard, and meets leakage Class 1 and Class 1A, which also qualifies the damper for the International Energy Conservation Code (IECC). It is intended for application in medium to high pressure and velocity systems.

PERFORMANCE DATA

D1 Velocity Limits.

Damper Width (in.)	Maximum Velocity (fpm)
12	4000
24	4000
36	3500
48	3000
60	2500

SPECIFICATIONS

Size Range¹

Minimum Size

One Blade6 in. wide by 6 in. high

Two Blade6 in. wide by 10 in. high

Maximum Size

Single Section60 in. wide by 74 in. high

Multiple Section.....Unlimited

Temperature Rating.....180 °F (82 °C) maximum²

Maximum Pressure.....10 in. wg.

Standard Construction³14 gauge galvanized steel,
airfoil shaped

Blade Action.....Parallel or Opposed

Frame³16 gauge galvanized steel
Hat-channel

Blade Axle BearingsSynthetic (Acetal)

Linkage³Steel Side linkage out of
airstream (concealed in frame)

Axles³1/2 in. diameter plated steel

Jamb Seals³304 Stainless Steel

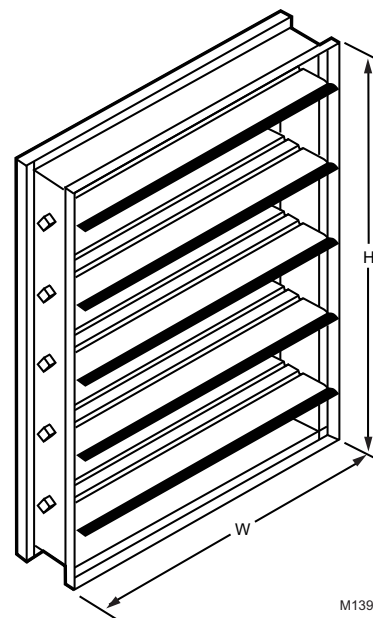
Blade Edge Seals³TPE

¹ Width and height dimensions furnished 1/4 in. undersized - standard

² Temperature rating with standard options

³ Customized options are available

DIMENSIONS DIAGRAM



M13905

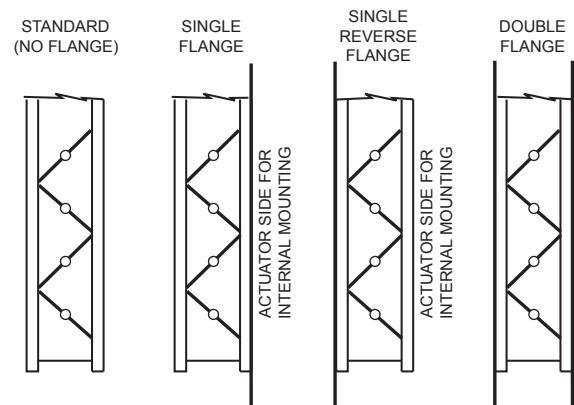
LEAKAGE RATE

Leakage Class Definitions

The *maximum* allowable leakage is defined by AMCA as the following:

- Leakage Class 1A-3 cfm/ft² @ 1 in. wg (class 1A is only defined at 1 in. wg).
- Leakage Class 1
 - 4 cfm/ft² @ 1 in. wg
 - 8 cfm/ft² @ 4 in. wg
 - 11 cfm/ft² @ 8 in. wg
 - 12.6 cfm/ft² @ 10 in. wg

FLANGE OPTIONS



M18986

D2 and D3 Series Rectangular Volume Control Dampers



The D2 series control damper is an ultra-low leakage damper, with strong 3V blades. It is leakage and pressure drop tested according to the AMCA 500D standard, and meets leakage Class 1 and Class 1A, which also qualifies the damper for the International Energy Conservation Code (IECC).

The D3 series features the same blades and hardware as the D2 damper, but lacks the seals, making it a damper intended for applications where low leakage performance is not necessary. D2 and D3 dampers are intended for application in low to medium pressure and velocity systems.

The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Programs. The AMCA Certified Ratings Seal applies to air performance ratings only.

PERFORMANCE DATA

D2, D3 Velocity Limits.

Damper Size in inches.	Maximum Velocity (fpm)
12	3000
24	3000
36	2500
48	2000

Same logic as D1 window above.

SPECIFICATIONS

Size Range ¹	
Minimum Size	
One Blade.....	6 in. wide by 6 in. high
Two Blade.....	6 in. wide by 10 in. high
Maximum Size	
Single Section.....	48 in. wide by 72 in. high
Multiple Section	Unlimited
Temperature Rating.....	180 °F (82 °C) maximum
Maximum Pressure	5 in. wg.
Standard Construction ²	Blade: 16 gauge galvanized steel 3-V
Blade Action	Parallel or Opposed
Frame ²	16 gauge galvanized steel Hat-channel
Blade Axle Bearings	Synthetic (Acetal)
Linkage	Side linkage out of airstream (concealed in frame)
Axles.....	1/2 in. square plated steel
Jamb Seals ³	Compression-type Stainless Steel
Blade Edge Seals ²	TPE
¹ Width and height dimensions furnished 1/4 in. undersized - standard	
² Customized options are available	
³ D2 Dampers only	

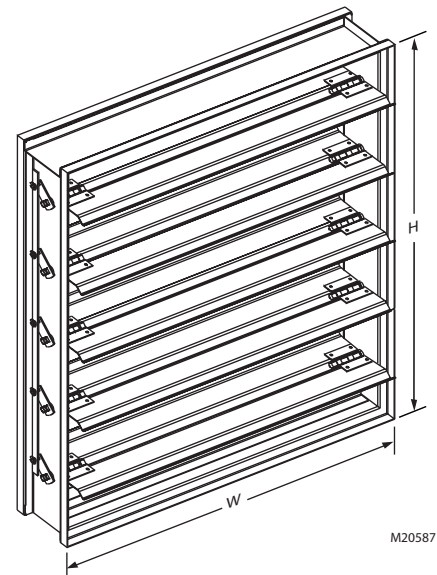
LEAKAGE RATE (Applies to D2 only)

Leakage Class Definitions

The *maximum* allowable leakage is defined by AMCA as the following:

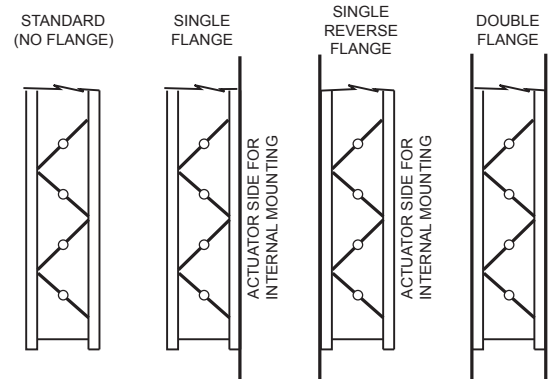
- Leakage Class 1A-3 cfm/ft² @ 1 in. wg (class 1A is only defined at 1 in. wg).
- Leakage Class 1
 - 4 cfm/ft² @ 1 in. wg
 - 8 cfm/ft² @ 4 in. wg

DIMENSIONS DIAGRAM



M20587

FLANGE OPTIONS



M18986

Submittal Data - Dampers

D690 Round Volume Control Dampers



The D690 Round Control Damper is used in commercial air handling system zone applications to control airflow, but is also suitable for residential zoning applications where the ML6161 actuator is used. The damper is designed for use with all low torque Honeywell Direct Coupled Actuators.

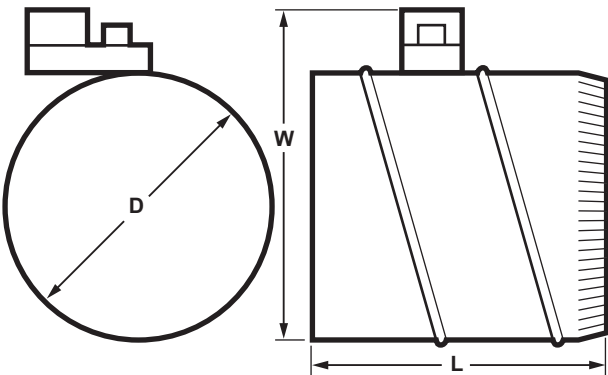
FEATURES

- Neoprene seal for tight closing and low leakage.
- Oilite bearings for long life.

SPECIFICATIONS

ApplicationHeating, cooling, ventilating
Type of BladeSingle-blade, round
Temperature Range.....32 °F to 130 °F (0 °C to 54 °C)
Used With.....All Honeywell direct coupled actuators up to 44 lb-in torque.

DIMENSIONS DIAGRAM



DAMPER DIAMETER (D)		WIDTH (W)		LENGTH (L)	
in.	mm	in.	mm	in.	mm
6	152	9-1/2	241	12	305
8	203	11-1/2	292	12	305
10	254	13-1/2	343	12	305
12	305	15-1/2	394	13	330
14	356	17-1/2	445	15	381
16	406	19-1/2	495	17	432

M17412

Submittal Data - Dampers

DM7600 Round Volume Control Dampers



The DM7600 Commercial Zone Damper is used in zoning systems to control airflow. The damper consists of a D690 Control damper, with a Honeywell floating ML6161 or modulating ML7161 Direct Coupled Actuator that is factory mounted to simplify field installation.

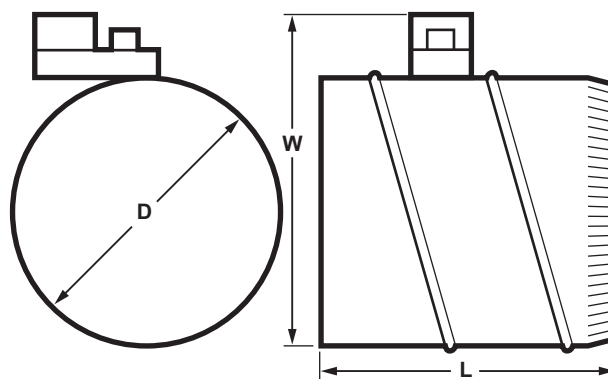
FEATURES

- Neoprene seal for tight closing and low leakage.
- Oilite bearings for long life.
- Magnetic coupling requires no limit switches or mechanical stops.

SPECIFICATIONS

ApplicationHeating, cooling, ventilating
 Type of Blade.....Single-blade, round
 Temperature Range.....32 °F to 130 °F (0 °C to 54 °C)
 Voltage.....24 Vac
 Frequency50 Hz; 60 Hz

DIMENSIONS DIAGRAM



DAMPER DIAMETER (D)		WIDTH (W)		LENGTH (L)	
in.	mm	in.	mm	in.	mm
6	152	9-1/2	241	12	305
8	203	11-1/2	292	12	305
10	254	13-1/2	343	12	305
12	305	15-1/2	394	13	330
14	356	17-1/2	445	15	381
16	406	19-1/2	495	17	432

M17412

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Overview - Actuators

Direct Coupled Actuators



Spring Return,
Low Torque



Spring Return,
Low Torque



Spring Return,
High Torque



Non-Spring Return,
Low Torque



Non-Spring Return,
High Torque

Precise, reliable performance. Lasting value.

Ease of installation. Everything you look for in direct-coupled actuators hinges on quality. And quality engineering is what makes Honeywell's complete line of actuators the top performers in the industry. Our global engineering team designs and tests our direct-coupled actuators to exceed rigorous global standards — and to meet Honeywell's own demanding life testing.

But we don't stop there. Thanks to our continuous improvement process, Honeywell actuators are now easier than ever to install. You'll also benefit from consistent wiring regardless of signal type, common accessories and a simplified selection process.

Honeywell's complete line of building control products, including valves and actuators, are already proven in more than three million buildings worldwide. So when you need spring or non-spring return actuators for your damper and valve applications, specify Honeywell. We make precision easy.

Improve Installation Time

- Self-centering shaft adapter provides mounting flexibility and greater clamping force.
- Common wiring among families for every signal saves installation time.

Decrease Material Cost

- Detachable access cover allows direct wiring without a junction box.

Reduce Inventory

- Signal mode switch adapts models to two-position, floating (tri-state) or modulating (proportional) applications.

Increase Control and Accuracy

- More than 200 reposition steps for modulating models provide precise control.

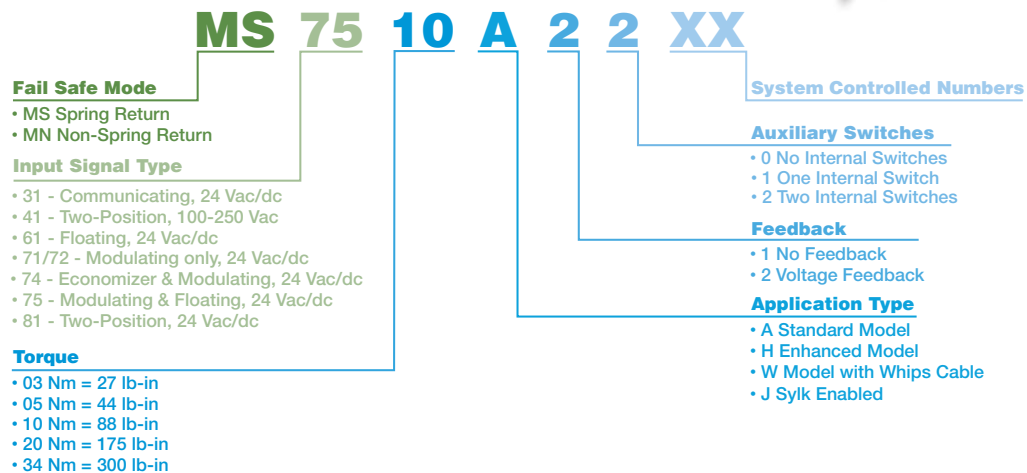
Increased Flexibility

- Select models are available with or without three foot actuator whips cable.

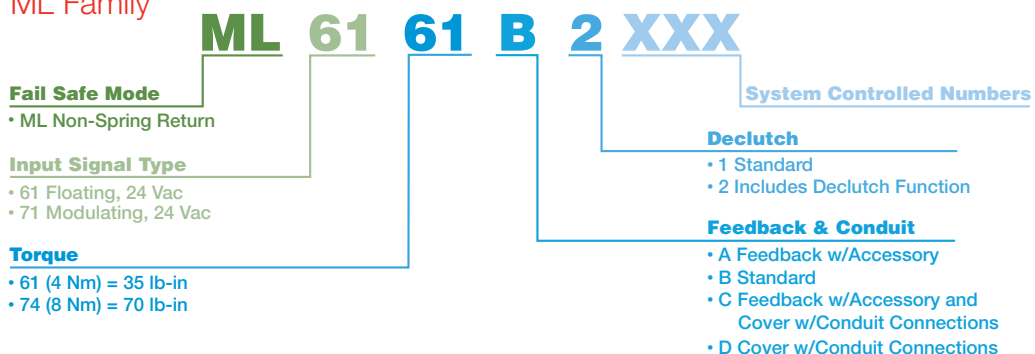
**5-YEAR
LIMITED
WARRANTY**

EASY-TO-SELECT MODEL NUMBERS

MS, MN, and Diamond Families



ML Family



Product Selection - Actuators

Fire and Smoke Damper Actuators

Honeywell's complete line of two position, fast-acting spring-return actuators meets all of your needs for fire and smoke control applications. All models are designed to meet the UL-555 and UL-555S high temperature requirements for fire dampers and combined fire and smoke dampers.

Safety First

As a life safety system component Honeywell is dedicated to meeting the UL-555 and UL-555S requirements. The elevated temperature test can be performed at the temperature ratings of 250°F or 350°F. Honeywell only offers models at 350°F to meet UL-555 and UL-555S for fire and combined fire and smoke applications to support the highest level of safety for building occupants.

Largest Torque Range in the Industry

Honeywell's fire and smoke actuators are available in 30, 80 and 175 lb-in with the 175 lb-in being the highest torque commercial fire and smoke actuator available on the market today.

Features

- Integral spring return that ensures the proper level of torque
- Patented design that eliminated limit switches, reducing power consumption
- Reliable service in smoke control systems requiring Underwriter's Laboratories Inc. UL-555 and UL-555S
- Robust die-cast aluminum housing ensures the proper level of torque
- Full life of two-position spring return fire and smoke actuators rated up to 350°F for all critical applications
- Fast acting with a maximum spring return timing of 15 seconds
- No audible noise during holding
- Reversible ("flippable") design enables one model to be used for both clockwise and counterclockwise spring return applications

Fire and Smoke Spring Return Actuators



Torque	Model Number	Voltage	SPST Aux Switch	Legacy Honeywell	Belimo Cross	Siemens Cross
30 lb-in (3.4 Nm)	MS4104F1010	120 Vac	0	ML4115A1009 ML4115A1017 ML4115B1008 ML4115B1016 ML4115H1002 ML4115J1009 ML4202F1000 ML4302F1008	FSLF120 US	None
	MS4104F1210	120 Vac	2 Internal	None	FSLF120-S US	None
	MS4604F1010	230 Vac	0	ML4115C1007 ML4115C1015 ML4115D1006 ML4115D1014 ML4702F1009 ML4802F1007	FSLF230 US	None
	MS4604F1210	230 Vac	2 Internal	None	FSLF230-S US	None
	MS8104F1010	24 Vac	0	ML8115A1005 ML8115A1013 ML8115B1004 ML8115B1012 ML8115H1008 ML8115J1005 ML8202F1006 ML8302F1004	FSLF24 US	None
	MS8104F1210	24 Vac	2 Internal	None	FSLF24-S US	None
80 lb-in (9 Nm)	MS4109F1010	120 Vac	0	MS4209F1007 MS4309F1005	FSNF120 US	GND221.1U
	MS4109F1210	120 Vac	2 Internal	None	FSNF120-S US	GND226.1U
	MS4609F1010	230 Vac	0	MS4709F1014 MS4809F1012	FSNF230 US	GND321.1U
	MS4609F1210	230 Vac	2 Internal	None	FSNF230-S US	GND326.1U
	MS8109F1010	24 Vac	0	MS8209F1003 MS8309F1001	FSNF24 US	GND121.1U
	MS8109F1210	24 Vac	2 Internal	None	FSNF24-S US	GND126.1U
175 lb-in (20 Nm)	MS4120F1006	120 Vac	0	None	FSAF120 US	GGD221.1U
	MS4120F1204		2 Internal		FSAF120-S US	None
	MS4620F1005	230 Vac	0		FSAF230 US	GGD321.1U
	MS4620F1203		2 Internal		FSAF230-S US	None
	MS8120F1002	24 Vac	0		FSAF24 US	GGD121.1U
	MS8120F1200		2 Internal		FSAF24-S US	None

Note: Honeywell's spring return fire and smoke actuators are designed to pass UL-555 and UL-555S 350°F requirements. They are not designed for HVAC applications. UL-555 and UL-555S requires that all new construction fire and smoke damper jobs have the actuator assembled and tested at the damper manufacturer. A like for like retrofit replacement or technically equal UL-555 and UL-555S approved device is recommended.



MS7103 and MS7503 Spring Return Direct Coupled Actuators (DCA) are used within heating, ventilating and air-conditioning (HVAC) systems. They can drive a variety of quarter-turn, final control elements requiring spring return fail-safe operation.

FEATURES

- Brushless DC submotor with electronic stall protection
- Self-centering shaft adaptor (shaft coupling) for wide range of shaft sizes
- Fast test mode
- MS7103 models for use with 2-10 Vdc control
- MS7503 universal models for use with floating, 0(2)-10 Vdc or 10-(2)0 Vdc control
- Models available with two internal end switches
- Durable plastic housing with built-in mechanical end limits
- Spring return direction field selectable
- Shaft position indicator and scale
- UL (cUL) listed and CE compliant
- Plenum rated actuator and control/power cable

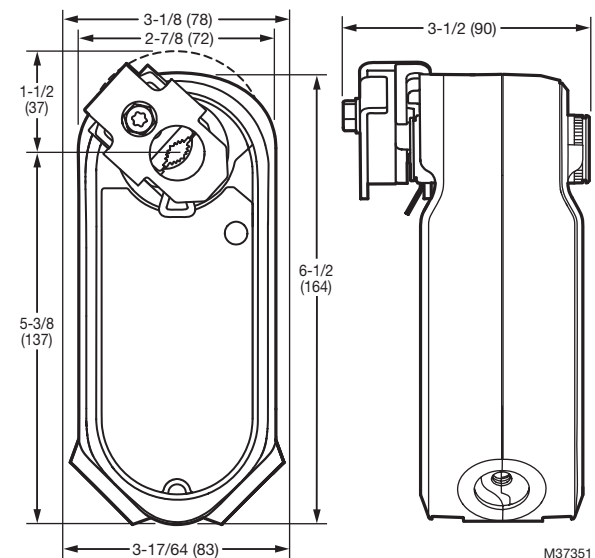
SPECIFICATIONS

Actuator Type	Damper; Valve
Rotational Stroke	95 ±3 degrees
Fail Safe Mode	Spring Return
Torque	27 lb-in. (3 Nm)
Spring Return Torque	27 lb-in (3 Nm)
Spring Return Direction.....	By orientation
External Auxiliary Switches Available...	No
Cable Specification	300 V, 75° C, Plenum Rated, 3 ft (0.914 m) length from end of access cover, 18 AWG
Ingress Protection Rating.....	IP54
Environmental Rating	NEMA2
Frequency	50 Hz; 60 Hz
Mounting	Direct Coupled
Maximum Noise Rating, Driving (dBA @ 1m)	40
Maximum Noise Rating, Spring Return (dBA @ 1m).....	65
Rotation to Open	By switch
Rotational Stroke Adjustment	Mechanically limited 5 degree increments
Compatible Damper Shafts.....	3/8 to 5/8 in. round or 1/4 to 1/2 in. square (9 to 16 mm round or 6 to 13 mm square)
Shaft Adapter Type	Self-centering clamping
Materials.....	Plenum rated plastic housing
Operating Humidity Range (% RH).....	5 to 95% RH, non-condensing
Ambient Operating Temperature.....	-40 F to +150F (-40 C to +65 C)
Shipping and Storage Temperature.....	-40 F to +150F (-40 C to +65 C)
Weight	1.7 lb (0.78 kg)
Includes.....	Mounting bracket, self- centering shaft adapter

APPROVALS

CE.....	EMC 2004/108/EC; Certification Low Voltage Directive 2006/95/EC; IEC 60730-1 and Part 2-14
C-Tick.....	N314
Underwriters Laboratories, Inc.....	UL 60730; UL 1097 for Double Insulation

DIMENSIONS DIAGRAM



Submittal Data - Actuators

Spring Return S03 Series



MS4103, MS7403, MS7503 and MS8103 Spring Return Direct Coupled Actuators (DCA) are used within heating, ventilating and air-conditioning (HVAC) systems. They can drive a variety of quarter-turn, final control elements requiring spring return fail-safe operation.

SPECIFICATIONS

Actuator Type	Damper; Valve
Rotational Stroke	95 ±3 degrees
Fail Safe Mode	Spring Return
Torque	27 lb-in. (3 Nm)
Spring Return Torque	27 lb-in (3 Nm)
Spring Return Direction.....	By orientation
External Auxiliary Switches Available...	No
Electrical Connections	Enclosed screw terminal strip (22 to 14 AWG)
Ingress Protection Rating	IP54
Environmental Rating	NEMA2
Frequency	50 Hz; 60 Hz
Mounting	Direct Coupled
Maximum Noise Rating, Holding (dBA @ 1m)	20 (no audible noise)
Maximum Noise Rating, Driving (dBA @ 1m)	50
Rotation to Open	By switch
Rotational Stroke Adjustment	Mechanically limited 5 degree increments
Compatible Damper Shafts	3/8 to 5/8 in. round or 1/4 to 1/2 in. square (9 to 16 mm round or 6 to 13 mm square)
Shaft Adapter Type	Self-centering clamping
Materials	Plenum rated plastic housing
Operating Humidity Range (% RH)	5 to 95% RH, non-condensing
Ambient Temperature Range	-40 F to +149F (-40 C to +65 C) -22 F to +149F (-30 C to +65 C) for two-position actuators only
Temperature Ratings (Shipping)	-40 F to +150F (-40 C to +65 C)
Storage Temperature Range	-40 F to +150F (-40 C to +65 C)
Weight	3.5 lb (1.6 kg)
Includes.....	Mounting bracket, self- centering shaft adapter

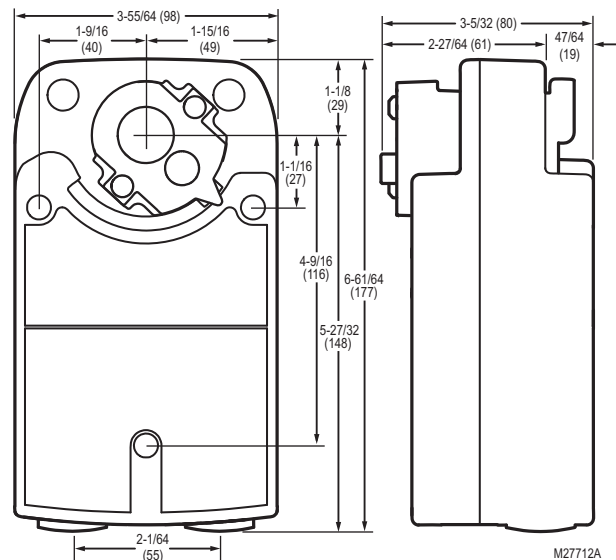
APPROVALS

CE.....	EMC 2004/108/EC; Certification Low Voltage Directive 2006/95/EC; IEC 60730-1 and Part 2-14
C-Tick	N314
Underwriters Laboratories, Inc.....	UL 873
Canadian Underwriters Laboratories, Inc.	cUL C22.2 No. 24-93

FEATURES

- Brushless DC submotor with electronic stall protection on all models
- Self-centering shaft adaptor (shaft coupling) for wide range of shaft sizes
- Models available for use with two-position, SPST, line- (Series 40) or low- (Series 80) voltage controls
- Models available for use with floating or switched SPDT (Series 60) controls
- Models available for use with proportional current or voltage (Series 70) controls
- Models available with combined floating and modulating control in a single device
- Models available with an internal end switch
- Access cover to facilitate connectivity
- Durable plastic housing with built-in mechanical end limits
- Spring return direction field selectable
- Shaft position indicator and scale
- UL (cUL) listed and CE compliant
- All models are plenum rated per UL873

DIMENSIONS DIAGRAM





MS4105, MS7405, MS7505, and MS8105 Spring Return Direct Coupled Actuators (DCA) are used within heating, ventilating and air-conditioning (HVAC) systems. They can drive a variety of quarter-turn, final control elements requiring spring return fail-safe operation.

SPECIFICATIONS

Actuator Type	Damper; Valve
Rotational Stroke	95 ±3 degrees
Fail Safe Mode	Spring Return
Torque	44 lb-in. (5 Nm)
Spring Return Torque	44 lb-in. (5 Nm)
Spring Return Direction	By orientation
External Auxiliary Switches Available	No
Environmental Rating	NEMA2
Ingress Protection Rating	IP54
Frequency	50 Hz; 60 Hz
Mounting	Direct Coupled
Maximum Noise Rating, Holding (dBA @ 1m)	20 (no audible noise)
Maximum Noise Rating, Driving (dBA @ 1m)	50
Rotation to Open	By switch
Rotational Stroke Adjustment	Mechanically limited 5 degree increments
Compatible Damper Shafts	3/8 to 5/8 in. round or 1/4 to 1/2 in. square (9 to 16 mm round or 6 to 13 mm square)
Shaft Adapter Type	Self-centering clamping
Materials	Plenum rated plastic housing
Operating Humidity Range (% RH)	5 to 95% RH, non-condensing
Ambient Temperature Range	-40 F to +149F (-40 C to +65 C) -22 F to +149F (-30 C to +65 C) for two-position actuators only
Temperature Ratings (Shipping)	-40 F to +150F (-40 C to +65 C)
Storage Temperature Range	-40 F to +150F (-40 C to +65 C)
Weight	3.5 lb (1.6 kg)
Includes	Mounting bracket, self-centering shaft adapter

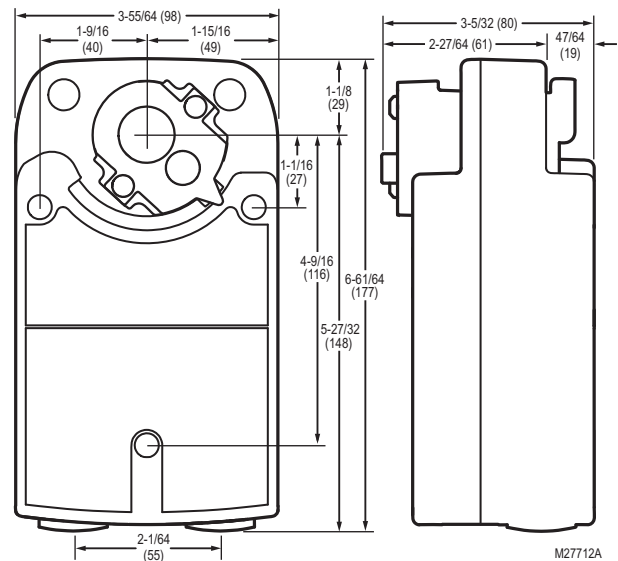
APPROVALS

CE	EMC 2004/108/EC; Certification Low Voltage Directive 2006/95/EC; IEC 60730-1 and Part 2-14
C-Tick	N314
Underwriters Laboratories, Inc.	UL 873
Canadian Underwriters Laboratories, Inc.	cUL C22.2 No. 24-93

FEATURES

- Brushless DC submotor with electronic stall protection on all models
- Self-centering shaft adaptor (shaft coupling) for wide range of shaft sizes
- Models available for use with two-position, SPST, line- (Series 40) or low- (Series 80) voltage controls
- Models available for use with floating or switched SPDT (Series 60) controls
- Models available for use with proportional current or voltage (Series 70) controls
- Models available with combined floating and modulating control in a single device
- Models available with an internal end switch
- Access cover includes enclosed screw terminal strip (22 to 14 AWG) for electrical connections.
- Models available with 3 foot 18 AWG color-coded cable
- Durable plastic housing with built-in mechanical end limits
- Spring return direction field selectable
- Shaft position indicator and scale
- UL (cUL) listed and CE compliant
- All models are plenum rated per UL873

DIMENSIONS DIAGRAM



Submittal Data - Actuators

Spring Return S10 Series



MS4110, MS7510 and MS8110 Spring Return Direct Coupled Actuators (DCA) are used within heating, ventilating and air-conditioning (HVAC) systems. They can drive a variety of quarter-turn, final control elements requiring spring return fail-safe operation.

SPECIFICATIONS

Actuator Type	Damper; Valve
Rotational Stroke	95 ±3 degrees
Fail Safe Mode	Spring Return
Torque	88 lb-in. (10 Nm)
Spring Return Torque	88 lb-in. (10 Nm)
Spring Return Direction	By orientation
External Auxiliary Switches Available	Yes, SW2-US
Environmental Rating	NEMA2
Frequency	50 Hz; 60 Hz
Manual operation	Manual crank
Mounting	Direct Coupled
Maximum Noise Rating, Holding (dBA @ 1m)	20 (no audible noise)
Maximum Noise Rating, Driving (dBA @ 1m)	40
Rotational Stroke Adjustment	Mechanically limited 5 degree increments
Compatible Damper Shafts	3/8 to 1.06 in. round or 3/8 to 1 1/16 in. square (10 to 27 mm round or 10 to 18 mm square)
Shaft Adapter Type	Self-centering clamping
Materials	Aluminum housing, Plenum rated plastic access cover
Operating Humidity Range (% RH)	5 to 95% RH, non-condensing
Ambient Temperature Range	-40 F to +140 F (-40 C to +60 C)
Storage Temperature Range	-40 F to +158 F (-40 C to +70 C)
Weight	6 lb (2.72 kg)
Includes	Mounting bracket, self-centering shaft adapter, 3mm crank
Comments	Integral 1/2 in. NPSM conduit connection.

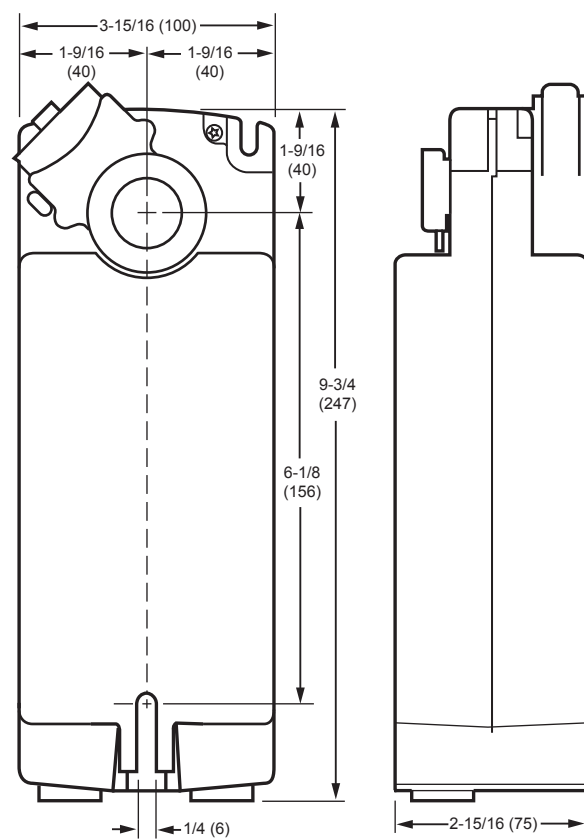
APPROVALS

CE	89/336/ECC, 73/23/EEC
C-Tick	N314
Underwriters Laboratories, Inc.	UL873, Plenum Rated
Canadian Underwriters Laboratories, Inc.	cUL C22.2 No. 24-93

FEATURES

- Brushless DC submotor with electronic stall protection for floating/modulating models.
- Brush DC submotor with electronic stall protection for 2-position models.
- Self-centering shaft adapter (shaft coupling) for wide range of shaft sizes.
- Models available for use with two-position, single pole single throw (spst), line- (Series 40) or low- (Series 80) voltage controls.
- Models available for use with proportional current or voltage (Series 70) controls.
- Models available with combined floating/modulating control in a single device.
- Models available with adjustable zero and span.
- Models available with line-voltage internal end switches.
- Access cover includes enclosed screw terminal strip (22 to 14 AWG) for electrical connections.
- Models available with 3 foot 18 AWG color-coded cable.
- Metal housing with built-in mechanical end limits.
- Spring return direction field-selectable.
- Shaft position indicator and scale.
- Manual winding capability with locking function.
- UL (cUL) listed and CE compliant.
- All Models are plenum-rated per UL873.

DIMENSIONS DIAGRAM



M20952



MS4120, MS7520 and MS8120 Spring Return Direct Coupled Actuators (DCA) are used within heating, ventilating and air-conditioning (HVAC) systems. They can drive a variety of quarter-turn, final control elements requiring spring return fail-safe operation.

SPECIFICATIONS

Actuator Type	Damper; Valve
Rotational Stroke	95 ±3 degrees
Fail Safe Mode.....	Spring Return
Torque.....	175 lb-in. (20 Nm)
Spring Return Torque	175 lb-in. (20 Nm)
Spring Return Direction	By orientation
External Auxiliary Switches Available...	Yes, SW2-US
Environmental Rating	NEMA2
Frequency	50 Hz; 60 Hz
Manual operation.....	Manual crank
Mounting.....	Direct Coupled
Maximum Noise Rating, Holding (dBA @ 1m).....	20 (no audible noise)
Maximum Noise Rating, Driving (dBA @ 1m).....	40
Rotational Stroke Adjustment	Mechanically limited 5 degree increments
Compatible Damper Shafts	3/8 to 1.06 in. round or 3/8 to 1 1/16 in. square (10 to 27 mm round or 10 to 18 mm square)
Shaft Adapter Type.....	Self-centering clamping
Materials.....	Aluminum housing, Plenum rated plastic access cover
Operating Humidity Range (% RH)	5 to 95% RH, non-condensing
Ambient Temperature Range	-40 F to +140 F (-40 C to +60 C)
Storage Temperature Range	-40 F to +158 F (-40 C to +70 C)
Weight	6 lb (2.72 kg)
Includes.....	Mounting bracket, self-centering shaft adapter, 3mm crank
Comments	Integral 1/2 in. NPSM conduit connection.

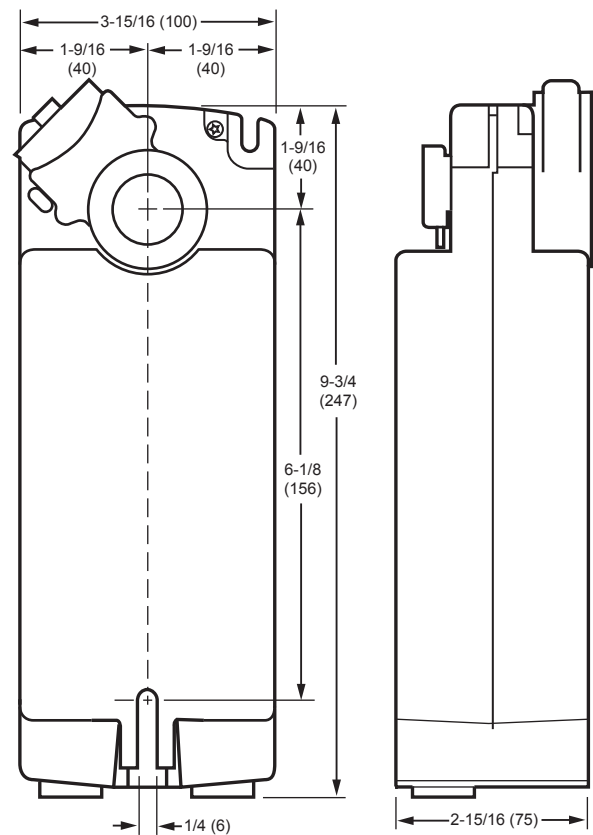
APPROVALS

CE.....	89/336/ECC, 73/23/EEC
C-Tick	N314
Underwriters Laboratories, Inc.	UL873, Plenum Rated
Canadian Underwriters Laboratories, Inc.	cUL C22.2 No. 24-93

FEATURES

- Brushless DC submotor with electronic stall protection for floating/modulating models.
- Brush DC submotor with electronic stall protection for 2-position models.
- Self-centering shaft adapter (shaft coupling) for wide range of shaft sizes.
- Models available for use with two-position, single pole single throw (spst), line- (Series 40) or low- (Series 80) voltage controls.
- Models available for use with proportional current or voltage (Series 70) controls.
- Models available with combined floating/modulating control in a single device.
- Models available with adjustable zero and span.
- Models available with line-voltage internal end switches.
- Access cover includes enclosed screw terminal strip (22 to 14 AWG) for electrical connections.
- Models available with 3 foot 18 AWG color-coded cable.
- Metal housing with built-in mechanical end limits.
- Spring return direction field-selectable.
- Shaft position indicator and scale.
- Manual winding capability with locking function.
- UL (cUL) listed and CE compliant.
- All models are plenum-rated per UL873.

DIMENSIONS DIAGRAM



M20952

Submittal Data - Actuators

Non-spring Return ML6161; ML7161



Used to control dampers in applications such as variable air volume (VAV) terminal units and for mounting on ball valves; suitable for use with SPDT or floating thermostats or building automation controls.

FEATURES

- Control for air damper applications with up to 10 sq.ft. assuming 3.5 in-lb per sq.ft. of damper area, velocity independent.
- Superior A/C synchronous submotor for consistent timing and actuator longevity.
- Eliminate need for limit switches or mechanical stops by providing magnetic coupling.
- All models include manual declutch lever and bag assembly with two minimum position setscrews.
- Mount directly on 3/8 inch or 1/2 inch square or round damper shaft.
- Selectable 45, 60 and 90 stroke in either clockwise or counterclockwise direction.

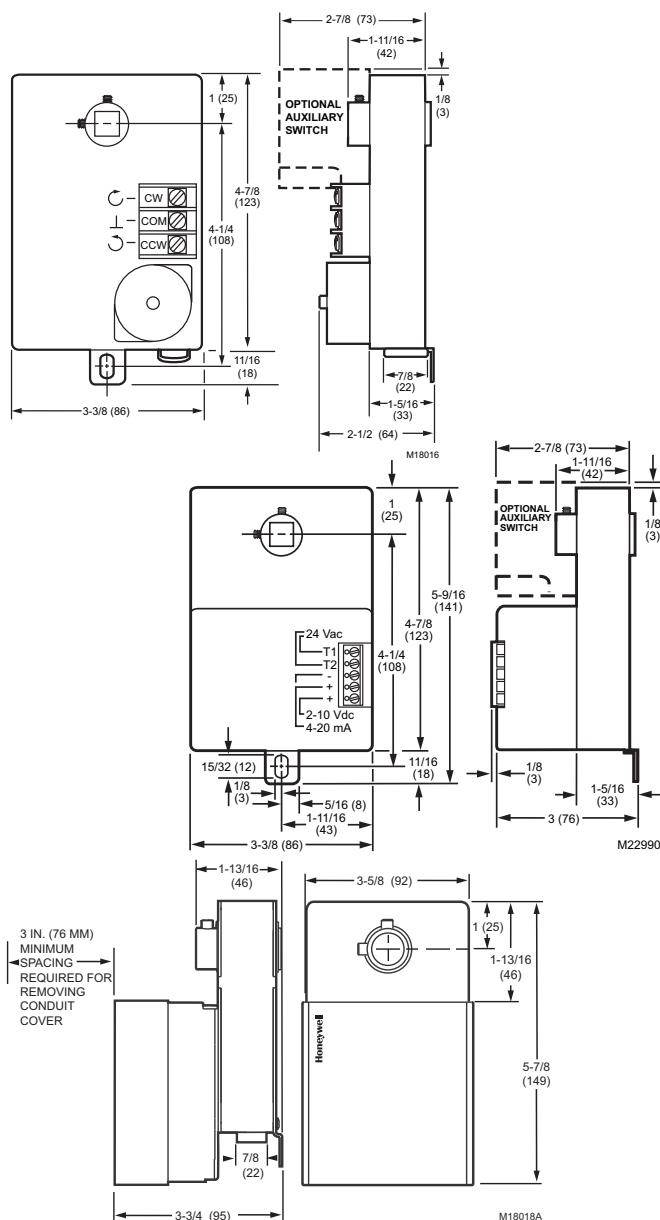
SPECIFICATIONS

Actuator Type	Damper
Rotational Stroke	90 degrees
Fail Safe Mode	Non-Spring Return
Torque	35 lb-in. (4 Nm)
External Auxiliary Switches Available...	Yes, 201052B
Electrical Connections	Screw terminals
Environmental Rating	NEMA1
Feedback	With accessory
Frequency	50 Hz; 60 Hz
Manual operation	Declutch mechanism
Mounting	Direct Coupled
Maximum Noise Rating, Driving (dBA @ 1m).....	45
Rotation to Open	By wiring
Rotational Stroke Adjustment	Mechanically limited at 45 or 60 degrees in cw or ccw directions
Compatible Damper Shafts	3/8 to 1/2 in. square or round (10 to 13 mm square/round)
Shaft Adapter Type	Aluminum Hub, two set screws
Supply Voltage	24 Vac $\pm$ 20%
Materials	Steel plate and Plenum rated plastic
Operating Humidity Range (% RH).....	5 to 95% RH, non-condensing
Ambient Temperature Range	20 F to 125 F (-18 C to +50 C)
Storage Temperature Range	20 F to 130 F (-18 C to +54 C)
Weight	1.5 lb (0.68 kg)
Includes.....	4074ENY Bag Assembly

APPROVALS

CE.....	89/336/ECC, 73/23/EEC
C-Tick	N314
Underwriters Laboratories, Inc.....	UL873, Plenum Rated
Canadian Underwriters Laboratories, Inc.	cUL C22.2 No. 24-93

DIMENSIONS DIAGRAMS



Non-spring Return ML6174; ML7174



Used to control dampers in applications such as variable air volume (VAV) terminal units and for mounting on ball valves; suitable for use with SPDT or floating thermostats or building automation controls.

FEATURES

- Control for air damper applications with up to 20 sq.ft. assuming 3.5 in-lb per sq.ft. of damper area, velocity independent.
- Magnetic coupling eliminates the need for mechanical stops or limit switch adjustments by limiting stall torque to 130 lb-in. maximum.
- Mount directly on 3/8 to 1/2 in. round and square damper shafts. All models include manual declutch lever for ease of mounting and bag assembly with two minimum position setscrews. 90 second timing models are suitable for use with pressure independent VAV systems.
- Selectable 45, 60, and 90 degree stroke in either clockwise or counterclockwise direction.

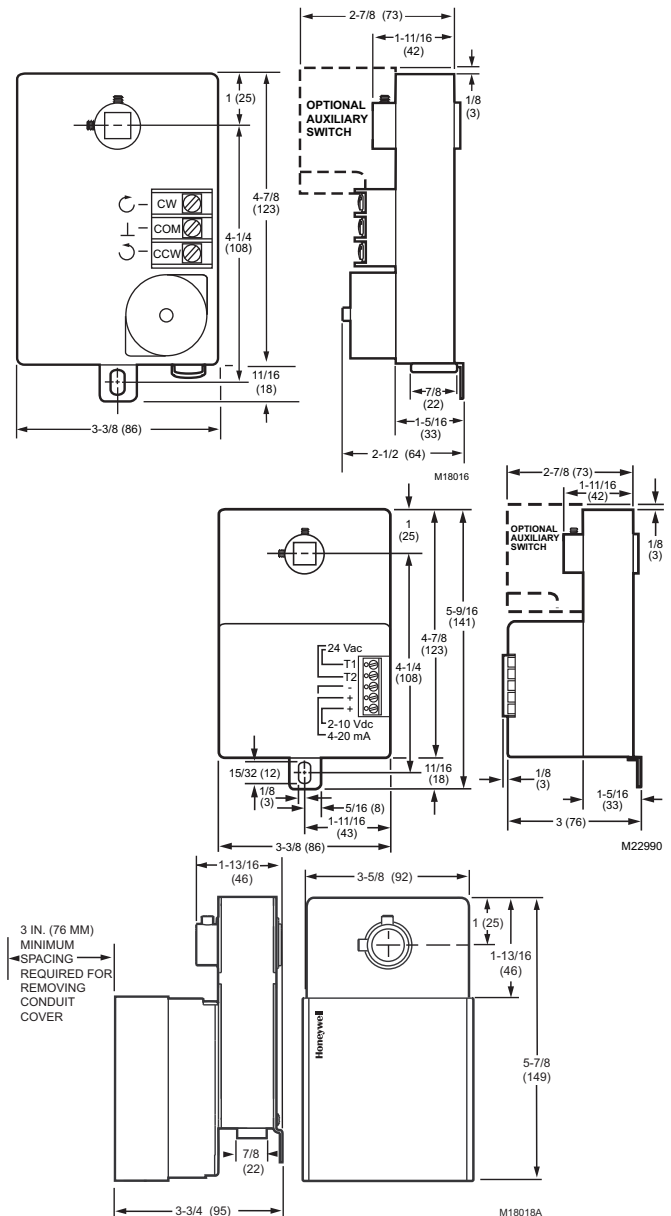
SPECIFICATIONS

Actuator Type	Damper
Rotational Stroke	90 degrees
Fail Safe Mode	Non-Spring Return
Torque	70 lb-in (8 Nm)
External Auxiliary Switches Available	Yes, 201052B
Environmental Rating	NEMA1
Feedback	With accessory
Frequency	50 Hz; 60 Hz
Manual operation	Declutch mechanism
Mounting	Direct Coupled
Maximum Noise Rating, Driving (dBA @ 1m)	45
Rotation to Open	By wiring
Rotational Stroke Adjustment	Mechanically limited at 45 or 60 degrees in cw or ccw directions
Compatible Damper Shafts	3/8 to 1/2 in. square or round (10 to 13 mm square/round)
Shaft Adapter Type	Aluminum Hub, two set screws
Supply Voltage	24 Vac $\pm$ 20%
Materials	Steel plate and Plenum rated plastic
Operating Humidity Range (% RH)	5 to 95% RH, non-condensing
Ambient Temperature Range	20 F to 125 F (-18 C to +50 C)
Storage Temperature Range	20 F to 130 F (-18 C to +54 C)
Weight	1.5 lb (0.68 kg)
Includes	4074ENY Bag Assembly

APPROVALS

Underwriters Laboratories, Inc.UL873, Plenum Rated
Canadian Underwriters Laboratories, Inc.cUL C22.2 No. 24-93

DIMENSIONS DIAGRAMS



Submittal Data - Actuators

Non-spring Return N05 Series



This non-spring return direct-coupled damper actuator provides modulating and floating/2-position control for: air dampers, air handlers, ventilation flaps, louvers and reliable control for air damper applications with up to 10 sq. ft./44lb.-in. (5 Nm) and 20 sq. ft./88 lb.-in. (10 Nm) (seal-less damper blades; air friction-dependent).

FEATURES

- Declutch for manual adjustment
- Adjustable mechanical end limits
- Access cover includes enclosed screw terminal strip (22 to 14 AWG) for electrical connections
- Models available with 3 foot 18 AWG color-coded cable
- Mountable in any orientation
- Function selection switch for selecting modulating or floating/2-position control

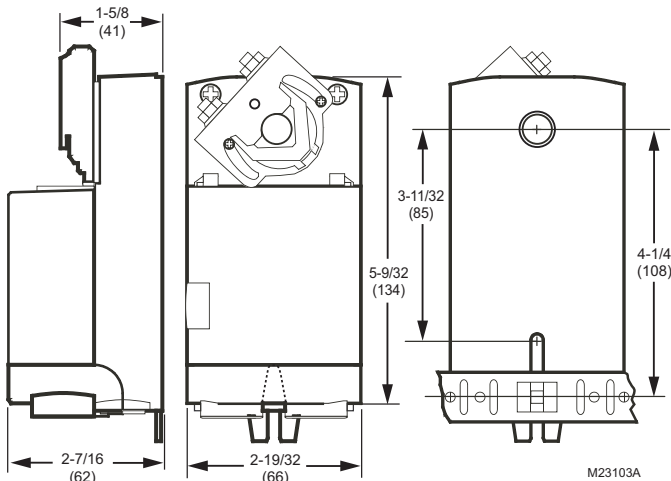
SPECIFICATIONS

Actuator Type	Damper; Valve
Rotational Stroke	95 ±3 degrees
Fail Safe Mode	Non-Spring Return
Torque	44 lb.-in. (5 Nm)
External Auxiliary Switches Available...	Yes, SSW2-1M
Environmental Rating	NEMA2
Frequency	50 Hz; 60 Hz
Manual operation	Declutch mechanism
Mounting	Direct Coupled
Maximum Noise Rating, Driving (dBA @ 1m).....	35
Rotation to Open	By switch
Rotational Stroke Adjustment	Dual Integral Adj. Stops (3 degree increments)
Compatible Damper Shafts.....	1/4 to 1/2 in. square or 3/8 to 5/8 in. round (6 to 13 mm square or 8 to 16 mm round)
Shaft Adapter Type	U-bolt clamp
Supply Voltage	24 Vac +20%, -15%, 24 Vdc
Materials.....	Plenum rated plastic housing
Ingress Protection Rating.....	IP54
Operating Humidity Range (% RH).....	5 to 95% RH, non-condensing
Ambient Temperature Range	-5 F to +140 F (-20 C to +60 C)
Storage Temperature Range	-22 F to +176 F (-30 C to +80 C)
Weight	1 lb (0.45 kg)
Includes.....	Mounting bracket, screws, shaft adapter, water-tight strain-relief cable fittings
Comments	Integral 1/2 in. NPSM conduit connection.

APPROVALS

CE.....	89/336/ECC, 73/23/EEC
C-Tick.....	N314
Underwriters Laboratories, Inc.....	UL873, Plenum Rated
Canadian Underwriters Laboratories, Inc.	cUL C22.2 No. 24-93

DIMENSIONS DIAGRAM





This non-spring return direct-coupled damper actuator provides modulating and floating/2-position control for air dampers, air handlers, ventilation flaps, louvers and reliable control for air damper applications with up to 20 sq ft/88 lb-in. (10 Nm) (seal-less damper blades; air friction-dependent).

FEATURES

- Declutch for manual adjustment
- Adjustable mechanical end limits
- Removable access cover for direct wiring
- Mountable in any orientation
- Function selection switch for selecting modulating or floating/2-position control

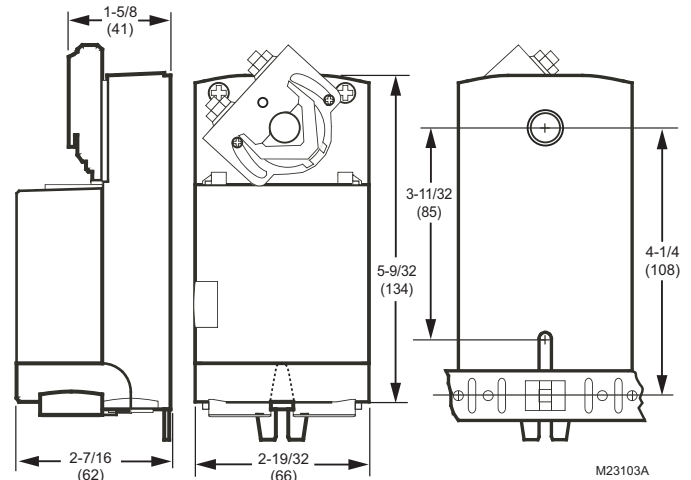
SPECIFICATIONS

Actuator Type	Damper; Valve
Rotational Stroke	95 ±3 degrees
Fail Safe Mode	Non-Spring Return
Torque	88 lb-in. (10 Nm)
External Auxiliary Switches Available	Yes, SSW2-1M
Electrical Connections	Enclosed screw terminal strip (22 to 14 AWG)
Environmental Rating	NEMA2
Frequency	50 Hz; 60 Hz
Manual operation	Declutch mechanism
Mounting	Direct Coupled
Maximum Noise Rating, Driving (dBA @ 1m)	35
Rotation to Open	By switch
Rotational Stroke Adjustment	Dual Integral Adj. Stops (3 degree increments)
Compatible Damper Shafts	1/4 to 1/2 in. square or 3/8 to 5/8 in. round (6 to 13 mm square or 8 to 16 mm round)
Shaft Adapter Type	U-bolt clamp
Supply Voltage	24 Vac +20%, -15%, 24 Vdc
Materials	Plenum rated plastic housing
Ingress Protection Rating	IP54
Operating Humidity Range (% RH)	5 to 95% RH, non-condensing
Ambient Temperature Range	-5 F to +140 F (-20 C to +60 C)
Storage Temperature Range	-22 F to +176 F (-30 C to +80 C)
Weight	1 lb (0.45 kg)
Includes	Mounting bracket, screws, shaft adapter, water-tight strain-relief cable fittings
Comments	Integral 1/2 in. NPSM conduit connection.

APPROVALS

CE	89/336/ECC, 73/23/EEC
C-Tick	N314
Underwriters Laboratories, Inc.	UL873, Plenum Rated
Canadian Underwriters Laboratories, Inc.	cUL C22.2 No. 24-93

DIMENSIONS DIAGRAM



Submittal Data - Actuators

Non-spring Return N20 Series



These direct-coupled damper actuators provide adjustable modulating control for: air dampers, air handling units, ventilation flaps, louvers and reliable control for air damper applications with up to 4.6 m²/50 sq ft (seal-less dampers; air friction-dependent).

FEATURES

- Control for air damper applications with up to 50 sq ft assuming 3.5 in-lb per sq ft of damper area, velocity independent.
- Patented self-centering shaft adapter.
- Access cover to facilitate connectivity.
- Declutch for manual adjustment.
- Mechanical end limits.
- Field-installable auxiliary switches.
- Rotation direction selectable by switch.
- Mountable in any orientation (no IP54 if upside down).
- Mechanical position indicator.
- CE approved. UL approved.

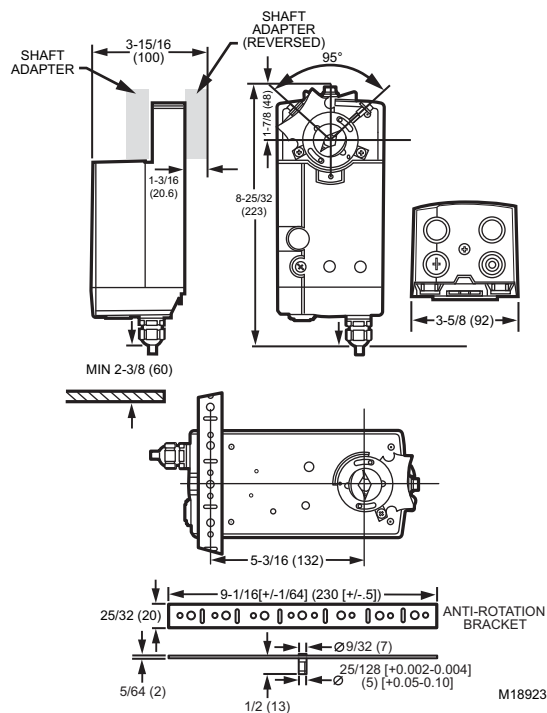
SPECIFICATIONS

Actuator Type	Damper; Valve
Rotational Stroke	95 ±3 degrees
Fail Safe Mode	Non-Spring Return
Torque	175 lb-in. (20 Nm)
External Auxiliary Switches Available...	Yes, SW2-US
Electrical Connections	Enclosed screw terminal strip (22 to 14 AWG)
Environmental Rating	NEMA2; IP54
Frequency	50 Hz; 60 Hz
Manual operation	Declutch mechanism
Mounting	Direct Coupled
Maximum Noise Rating, Driving (dBA @ 1m).....	40
Rotation to Open	By switch
Rotational Stroke Adjustment	Dual Integral Adj. Stops (3 degree increments)
Compatible Damper Shafts	3/8 to 1.06 in. round or 3/8 to 1 1/16 in. square (10 to 27 mm round or 10 to 18 mm square)
Shaft Adapter Type	Self-centering clamping
Materials	Plenum rated plastic housing
Operating Humidity Range (% RH)	5 to 95% RH, non-condensing
Ambient Temperature Range	-5 F to +140 F (-20 C to +60 C)
Storage Temperature Range	-40 F to +175 F (-40 C to +80 C)
Weight	3.2 lb (1.45 kg)
Includes	Mounting bracket, self-centering shaft adapter
Comments	Integral 1/2 in. NPSM conduit connection.

APPROVALS

CE	89/336/ECC, 73/23/EEC
C-Tick	N314
Underwriters Laboratories, Inc.	UL873, Plenum Rated
Canadian Underwriters Laboratories, Inc.	cUL C22.2 No. 24-93

DIMENSIONS DIAGRAM





These direct coupled damper actuators provide adjustable modulating control for air dampers, air handling units, ventilation flaps, louvers and reliable control for air damper applications with up to 7.9 m²/85 sq ft (seal-less dampers; air friction-dependent).

FEATURES

- Control for air damper applications with up to 85 sq ft assuming 3.5 in-lb per sq ft of damper area, velocity independent.
- Patented self-centering shaft adapter.
- Access cover to facilitate connectivity.
- Declutch for manual adjustment.
- Mechanical end limits.
- Field-installable auxiliary switches.
- Rotation direction selectable by switch.
- Mountable in any orientation (no IP54 if upside down).
- Mechanical position indicator.
- CE approved. UL approved.

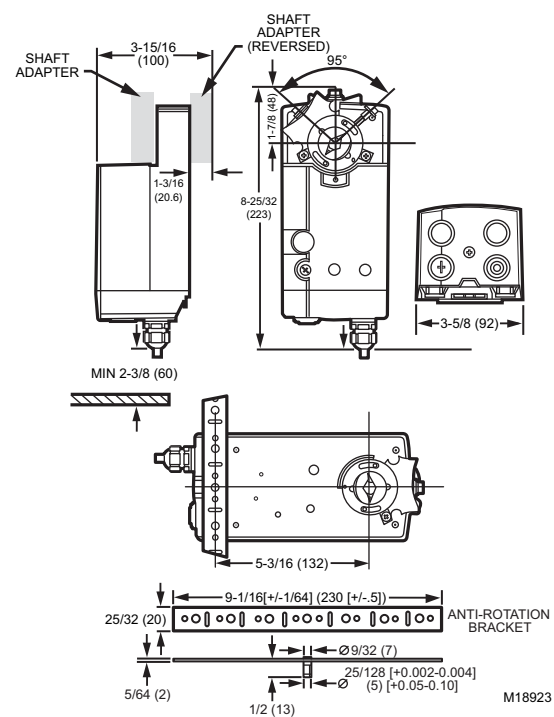
SPECIFICATIONS

Actuator Type	Damper; Valve
Rotational Stroke	95 ±3 degrees
Fail Safe Mode	Non-Spring Return
Torque.....	300 lb-in. (34 Nm)
External Auxiliary Switches Available...	Yes, SW2-US
Electrical Connections.....	Enclosed screw terminal strip (22 to 14 AWG)
Environmental Rating	NEMA2
Frequency	50 Hz; 60 Hz
Manual operation.....	Declutch mechanism
Mounting.....	Direct Coupled
Maximum Noise Rating, Driving (dBA @ 1m)	40
Rotation to Open	By switch
Compatible Damper Shafts	3/8 to 1.06 in. round or 3/8 to 1 1/16 in. square (10 to 27 mm round or 10 to 18 mm square)
Shaft Adapter Type.....	Self-centering clamping
Materials	Plenum rated plastic housing
Operating Humidity Range (% RH)	5 to 95% RH, non-condensing
Ambient Temperature Range	-5 F to +140 F (-20 C to +60 C)
Storage Temperature Range	-40 F to +175 F (-40 C to +80 C)
Weight	3.2 lb (1.45 kg)
Includes.....	Mounting bracket, self-centering shaft adapter
Comments	Integral 1/2 in. NPSM conduit connection.

APPROVALS

CE	89/336/ECC, 73/23/EEC
C-Tick	N314
Underwriters Laboratories, Inc.	UL873, Plenum Rated
Canadian Underwriters Laboratories, Inc.	cUL C22.2 No. 24-93

DIMENSIONS DIAGRAM



Submittal Data - Actuators

Spring Return MS4104F, MS4604F, MS8104F



Fire and Smoke Damper Actuator

Spring return direct coupled actuators (DCA) for on/off damper control. The actuator accepts an on/off signal from a single-pole, singlethrow (SPST) controller. They are designed to operate reliably in smoke control systems requiring Underwriters Laboratories Inc. UL555S ratings up to 350 F.

SPECIFICATIONS

Actuator Type	Damper
Rotational Stroke	95 +/- 3 degrees
Fail Safe Mode	Spring Return
Torque	30 lb-in. (3.4 Nm)
Minimum Driving Torque at 350 F	30 lb-in.
Spring Return Torque	30 lb-in. (3.4 Nm)
Number of Internal Auxiliary Switches:	2
Electrical Connections	Color-coded leads
Electrical Connection Length	32 in. (0.8 m)
Environmental Rating	NEMA 1, IP40
Frequency	60 Hz
Mounting	Direct Coupled
Maximum Noise Rating,Holding (dBA @ 1m) ...	20 (no audible noise)
Maximum Noise Rating,Driving (dBA @ 1m).....	80
Compatible Damper Shafts.....	3/8 to 1/2 in. round (10 to 13 mm square/round)
Shaft Adapter Type	Aluminum Hub, two set screws
Materials	Aluminum housing
Operating Humidity Range (% RH)	5 to 95% RH, non-condensing
Ambient Temperature Range	0 F to +130 F (-18 C to +55 C)
Storage Temperature Range	-40 F to 140 F (-40 C to +60 C)
Weight	5 lb (2.27 kg)
Comments	Two integral 3/8 in. clip-in flexible conduit connections

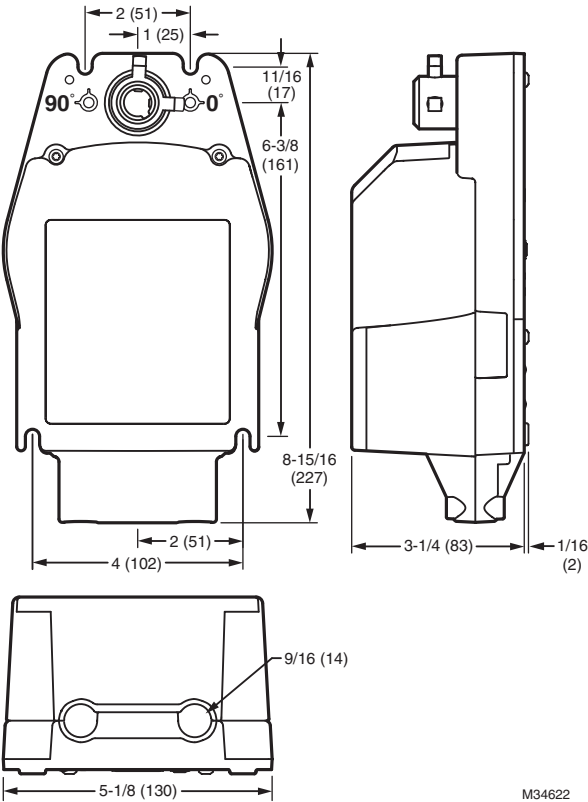
APPROVALS

CE	89/336/ECC, 73/23/EEC
C-Tick	N314
Underwriters Laboratories, Inc	UL873, Plenum Rated
Canadian Underwriters Laboratories, Inc.	cUL C22.2 No. 24-93

FEATURES

- Reversible mounting facilitates use in either clockwise (cw) or counterclockwise (ccw) spring rotation.
- Integral spring return ensures level of return torque.
- Fifteen-second spring return timing.
- No special cycling required during long-term holding. (See Operation section.)
- No audible noise during holding.
- Patent pending design eliminates need for limit switches to reduce power consumption.
- Models available for 24, 120, and 230 Vac.
- Ninety-five degree angle of rotation.
- Actuator holds rated torque at reduced power level.
- Die-cast aluminum housing.
- Housing design allows flush mounting to damper.
- Designed to operate reliably in smoke control systems requiring Underwriters Laboratories Inc. UL555S ratings up to 350°F.
- Models available with SPST position-indicating switches (7°, 85° stroke).

DIMENSIONS DIAGRAM



M34622



Fire and Smoke Damper Actuator

Spring return direct coupled actuators (DCA) for on/off damper control. The actuator accepts an on/off signal from a single-pole, singlethrow (SPST) controller. They are designed to operate reliably in smoke control systems requiring Underwriters Laboratories Inc. UL555S ratings up to 350 F.

SPECIFICATIONS

Actuator Type	Damper
Rotational Stroke	95 +/- 3 degrees
Fail Safe Mode	Spring Return
Torque	80 lb-in. (9 Nm)
Minimum Driving Torque at 350 F	80 lb-in.
Spring Return Torque	80 lb-in. (9 Nm)
Number of Internal Auxiliary Switches:	2
Environmental Rating	NEMA 1, IP40
Frequency	60 Hz
Mounting	Direct Coupled
Maximum Noise Rating, Holding (dBA @ 1m)	20 (no audible noise)
Maximum Noise Rating, Driving (dBA @ 1m)	80
Compatible Damper Shafts	3/8 to 1/2 in. round (10 to 13 mm square/round)
Shaft Adapter Type	Aluminum Hub, four set screws
Supply Voltage	120 Vac +10%, -15%
Materials	Aluminum housing
Operating Humidity Range (% RH)	5 to 95% RH, non-condensing
Ambient Temperature Range	0 F to +130 F (-18 C to +55 C)
Storage Temperature Range	-40 F to 140 F (-40 C to +60 C)
Weight	5 lb (2.27 kg)
Comments	Two integral 3/8 in. clip-in flexible conduit connections

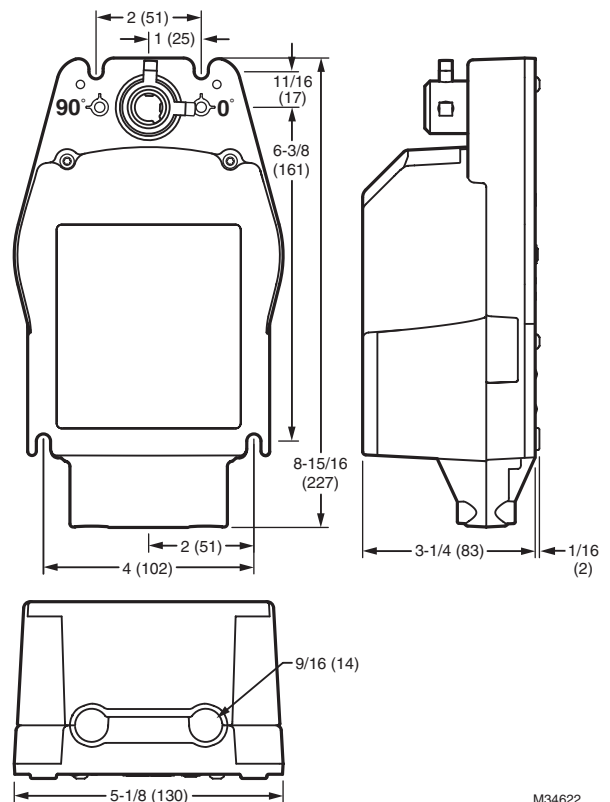
APPROVALS

CE	89/336/ECC, 73/23/EEC
C-Tick	N314
Underwriters Laboratories, Inc	UL873, Plenum Rated
Canadian Underwriters Laboratories, Inc.	cUL C22.2 No. 24-93

FEATURES

- Reversible mounting facilitates use in either clockwise (cw) or counterclockwise (ccw) spring rotation.
- Integral spring return ensures level of return torque.
- Fifteen-second spring return timing.
- No special cycling required during long-term holding. (See Operation section.)
- No audible noise during holding.
- Patent pending design eliminates need for limit switches to reduce power consumption.
- Models available for 24, 120, and 230 Vac.
- Ninety-five degree angle of rotation.
- Actuator holds rated torque at reduced power level.
- Die-cast aluminum housing.
- Housing design allows flush mounting to damper.
- Designed to operate reliably in smoke control systems requiring Underwriters Laboratories Inc. UL555S ratings up to 350°F.
- Models available with SPST position indicating switches (7°, 85° stroke).

DIMENSIONS DIAGRAM



M34622

Submittal Data - Actuators

Spring Return MS4120F; MS4620F; MS8120F



Fire and Smoke Damper Actuator

Spring return direct coupled actuators (DCA) for on/off damper control with an integral junction box. The actuator accepts an on/off signal from a single-pole, single-throw (SPST) controller. They are designed to operate reliably in smoke control systems requiring Underwriters Laboratories Inc. UL555S ratings up to 350 F.

FEATURES

- Brush DC submotor with electronic stall protection for 2-position models
- Self-centering shaft adapter (shaft coupling) for wide range of shaft sizes
- Models available for use with two-position, single pole single throw (spst), line- (Series 40) or low- (Series 80) voltage controls
- Metal housing with built-in mechanical end limits
- Spring return direction field-selectable
- Shaft position indicator and scale
- Manual winding capability with locking function
- UL (cUL) listed and CE compliant
- All models are plenum-rated per UL873

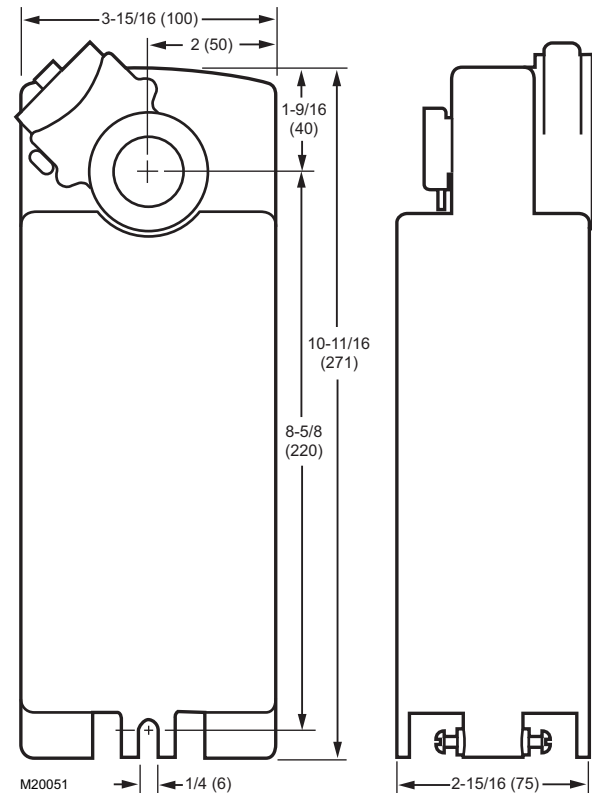
SPECIFICATIONS

Actuator Type	Damper
Rotational Stroke	95 ±3 degrees
Fail Safe Mode	Spring Return
Torque	175 lb-in. (20 Nm)
Minimum Driving Torque at 350 F	175 lb-in.
Spring Return Torque	175 lb-in. (20 Nm)
Spring Return Direction:	By orientation
External Auxiliary Switches Available...	No
Electrical Connections	Teflon-jacketed cable
Electrical Connection Length	40 in. (1 m)
Environmental Rating	NEMA2
Ingress Protection Rating	IP54
Frequency	60 Hz
Manual operation	Manual crank
Mounting	Direct Coupled
Maximum Noise Rating, Holding (dBA @ 1m)	20 (no audible noise)
Maximum Noise Rating, Driving (dBA @ 1m)	70
Compatible Damper Shafts	3/8 to 1.06 in. round or 3/8 to 1 1/16 in. square (10 to 27 mm round or 10 to 18 mm square)
Shaft Adapter Type	Self-centering clamping
Supply Voltage	120 Vac ±10%
Materials	Aluminum housing
Operating Humidity Range (% RH)	5 to 95% RH, non-condensing
Ambient Temperature Range	-40 F to +130 F (-40 C to +55 C)
Storage Temperature Range	-40 F to +140 F (-40 C to +60 C)
Weight	8 lb (3.63 kg)
Includes	Self-centering shaft adapter, 3mm crank
Comments	Two integral 3/8 in. flexible conduit connections

APPROVALS

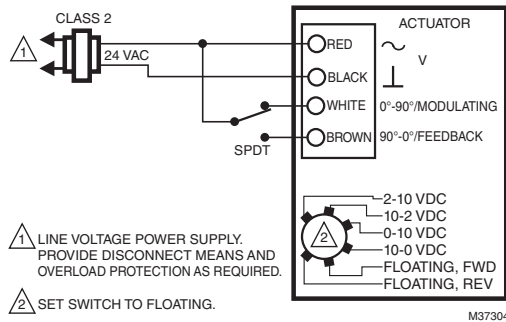
CE	89/336/ECC, 73/23/EEC
C-Tick	N314
Underwriters Laboratories, Inc.	UL873, Plenum Rated
Canadian Underwriters Laboratories, Inc.	cUL C22.2 No. 24-93

DIMENSIONS DIAGRAM

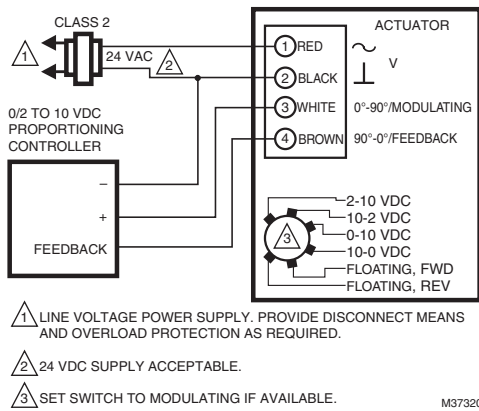


Wiring Diagrams - Actuators

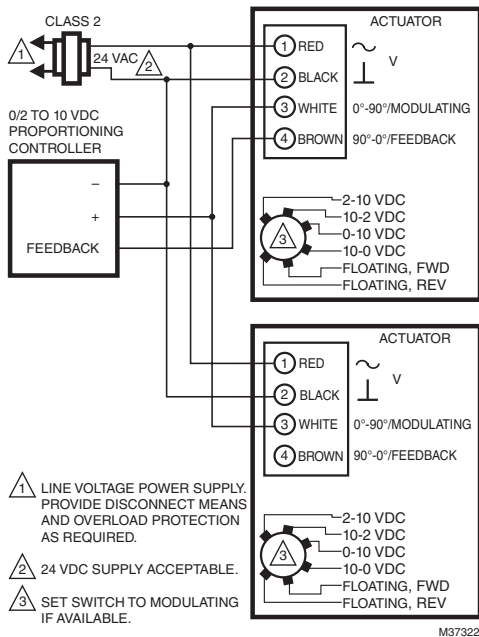
Wiring for SPDT on/off control, MS75.



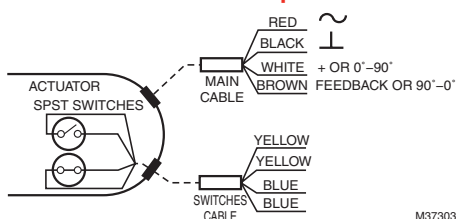
Wiring for modulating (0/2-10 VDC) proportioning control, MS75 (shown) and MS71.



Wiring for modulating (0/2-10 VDC) proportioning control operating multiple actuators, MS75 (shown) and MS71.

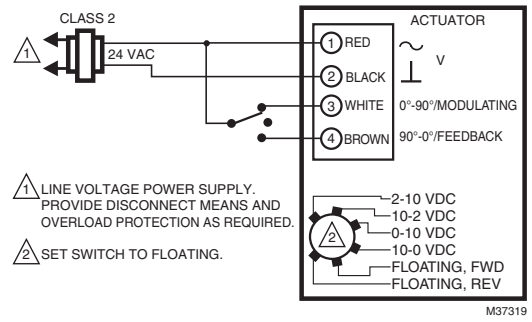


Return to closed position.

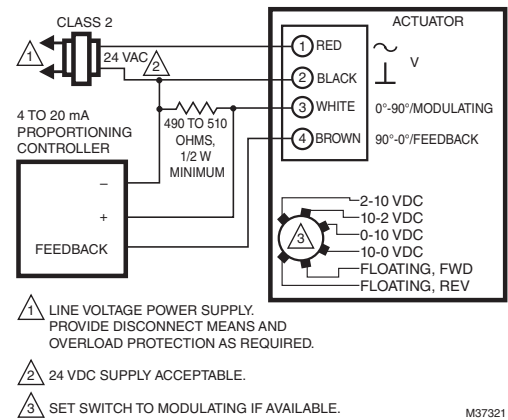


Diamond 3 Nm (MS7103, MS7503)

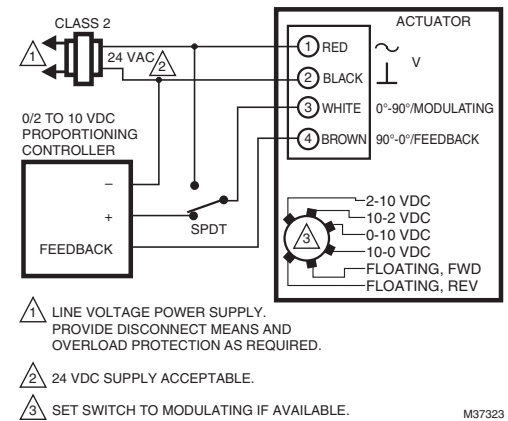
Wiring for floating control, MS75.



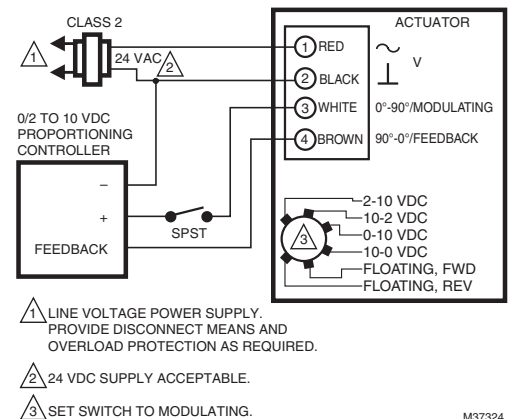
Wiring for 4-20 mA proportioning controllers, MS75 (shown) and MS71.



Override to open position



Cable installation details.

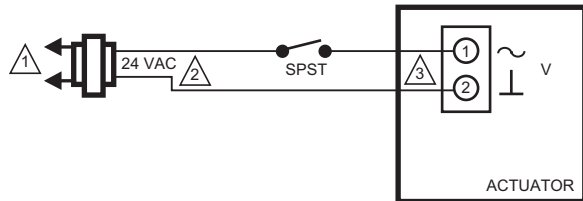


Wiring Diagrams - Actuators

Spring Return S03 and S05 Series

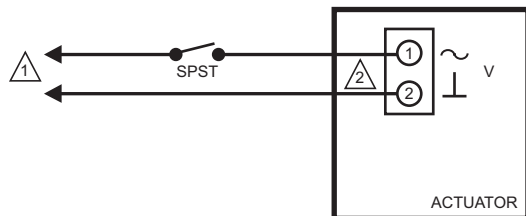
S03 Series (MS4103, MS7403, MS7403, MS7503, MS8103) and
S05 Series (MS4105, MS7105, MS7405, MS7505, MS8105)

Wiring for low-voltage two-position control



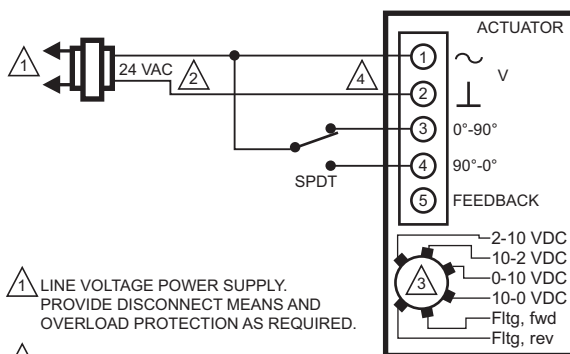
- 1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
 - 2 24 VDC SUPPLY ACCEPTABLE.
 - 3 ENSURE PROPER GROUNDING OF ACTUATOR CASE.
- M19718C

Wiring for line-voltage two-position control



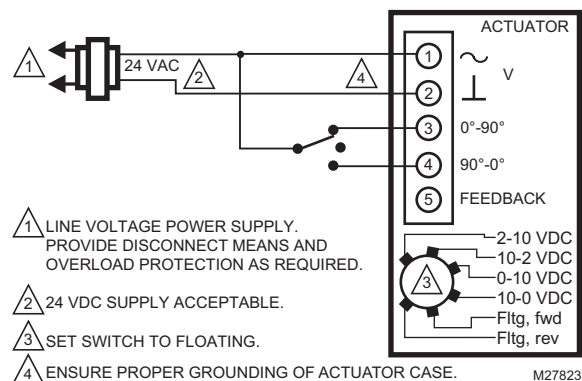
- 1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
 - 2 ENSURE PROPER GROUNDING OF ACTUATOR CASE.
- M22289A

Wiring for SPDT on/off Control



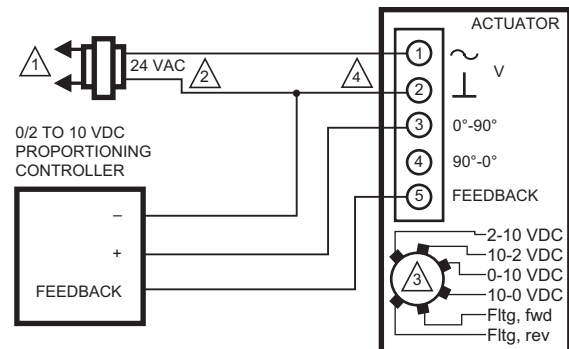
- 1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
 - 2 24 VDC SUPPLY ACCEPTABLE.
 - 3 SET SWITCH TO FLOATING.
 - 4 ENSURE PROPER GROUNDING OF ACTUATOR CASE.
- M27822

Wiring for floating control



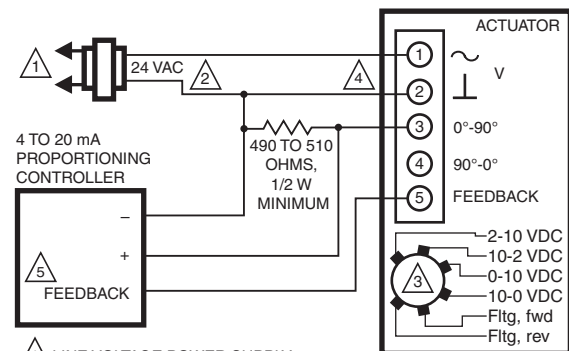
- 1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
 - 2 24 VDC SUPPLY ACCEPTABLE.
 - 3 SET SWITCH TO FLOATING.
 - 4 ENSURE PROPER GROUNDING OF ACTUATOR CASE.
- M27823

Wiring for (0)2-10 VDC proportioning controllers



- 1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
 - 2 24 VDC SUPPLY ACCEPTABLE.
 - 3 SET SWITCH TO MODULATING.
 - 4 ENSURE PROPER GROUNDING OF ACTUATOR CASE.
- M27824

Wiring for 4-20 mA proportioning controllers

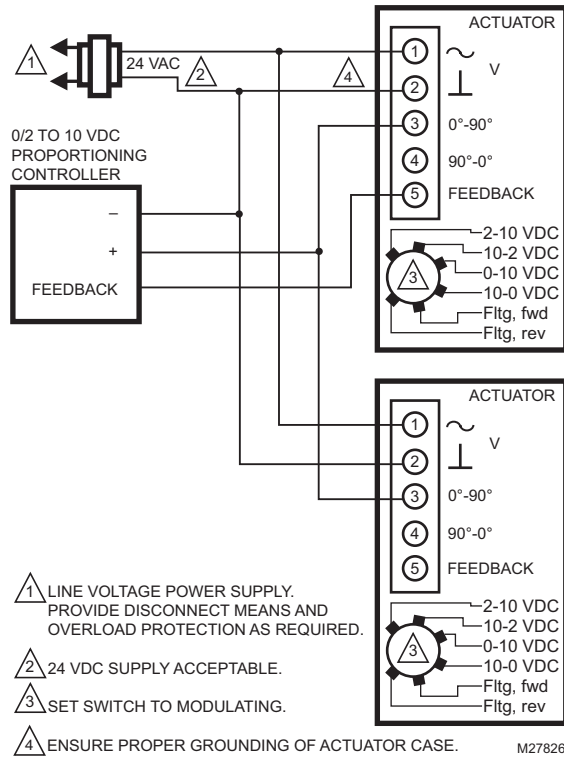


- 1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
 - 2 24 VDC SUPPLY ACCEPTABLE.
 - 3 SET SWITCH TO MODULATING.
 - 4 ENSURE PROPER GROUNDING OF ACTUATOR CASE.
 - 5 FEEDBACK WILL BE A 2-10 VDC.
- M27825A

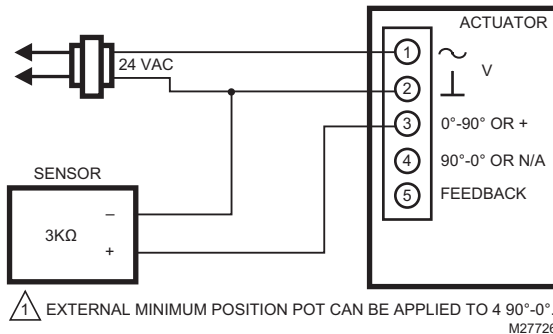
Wiring Diagrams - Actuators

Spring Return S03 and S05 Series

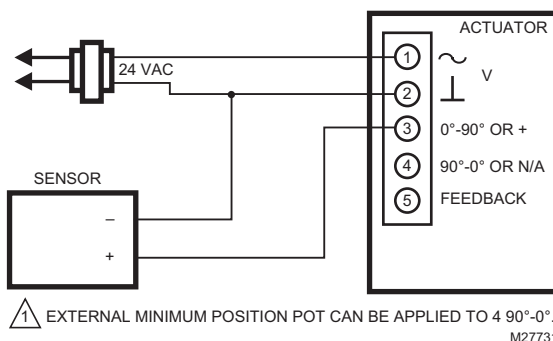
Wiring for (0)2-10 Vdc proportioning controller operating multiple actuators



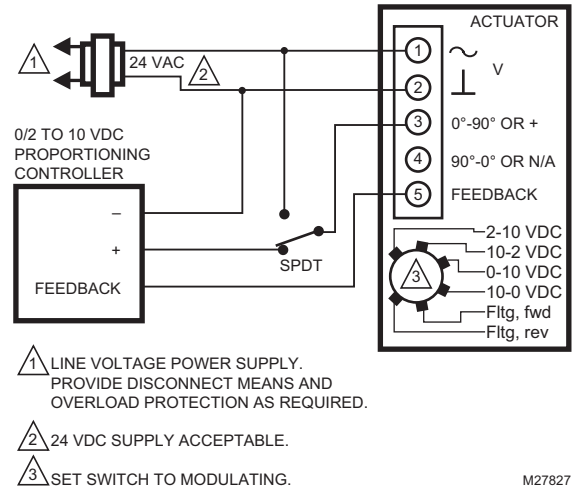
Wiring for 3 kOhm Economizer controllers



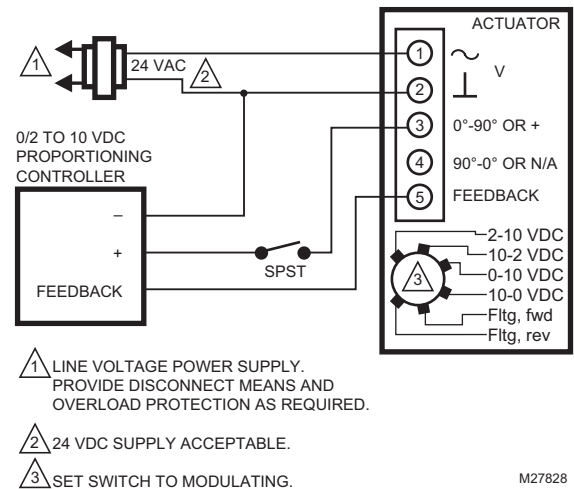
Wiring for 3 position Economizer controllers



Override to full open



Override to full close

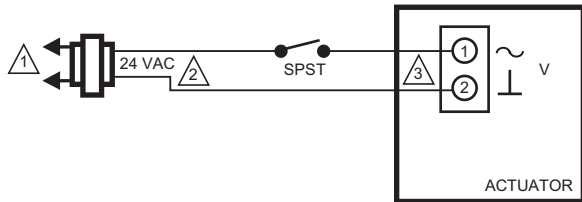


Wiring Diagrams - Actuators

Spring Return S10 and S20 Series

S10 Series (MS4110, MS7510, MS8110) and S20 Series (MS4120, MS7520, MS8120)

Wiring for On/Off Control

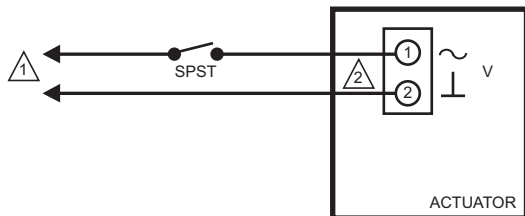


1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 ENSURE PROPER GROUNDING OF ACTUATOR CASE.

M19718C

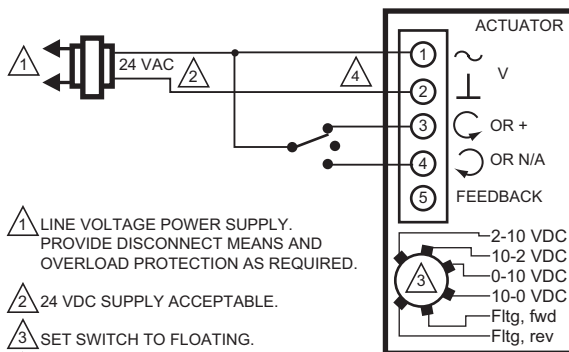


1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 ENSURE PROPER GROUNDING OF ACTUATOR CASE.

M22289A

Wiring for Floating Control (Floating mode setting)



1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

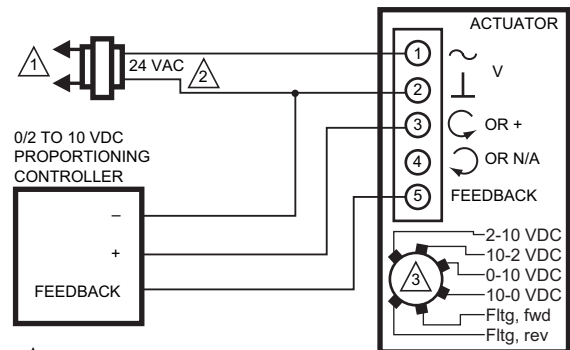
2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO FLOATING.

4 ENSURE PROPER GROUNDING OF ACTUATOR CASE.

M19573B

Wiring for Proportioning controllers (Modulating mode setting)

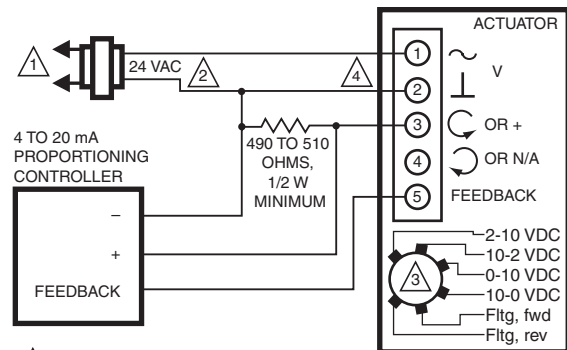


1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

M19574A



1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

4 ENSURE PROPER GROUNDING OF ACTUATOR CASE.

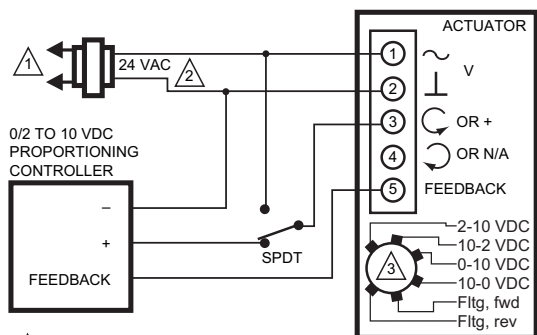
5 FEEDBACK WILL BE A 2-10 VDC.

M22282C

Wiring Diagrams - Actuators

Spring Return S10 and S20 Series

Override to full open (Modulating mode setting)



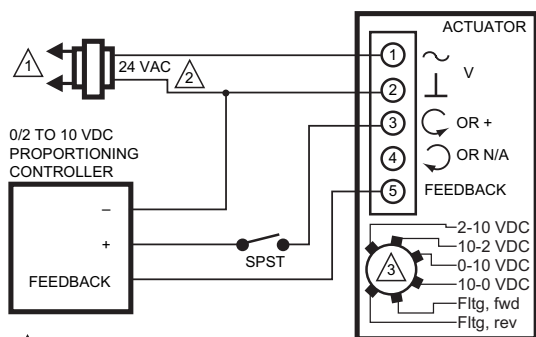
1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

M19576A

Override to full closed (Modulating mode setting)



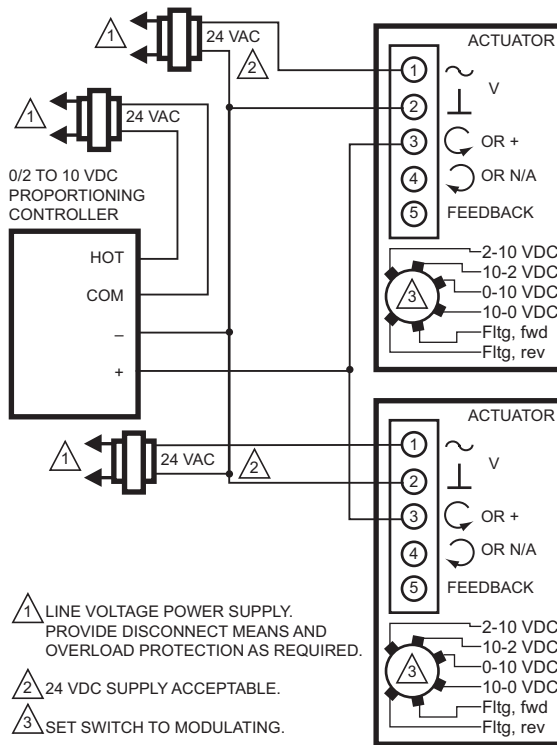
1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

M19577A

Wiring for Proportioning controllers operating multiple actuators (Modulating mode setting)



1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

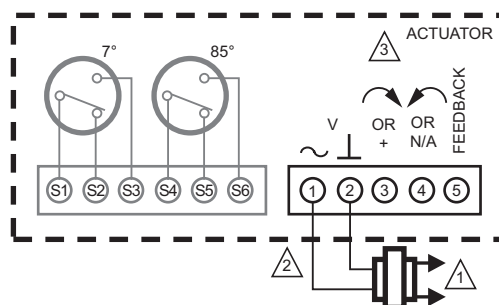
2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

4 ENSURE PROPER GROUNDING OF ACTUATOR CASE.

M22288A

Terminal Block Details



1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 THE INTERNAL AUXILIARY SWITCHES MUST BE CONNECTED TO THE SAME POWER SOURCE; OR THE AUXILIARY SWITCHES SHALL BE CONNECTED TO THE SAME POLE OF THE SAME SUPPLY CIRCUIT, CONNECTED IN A SAME POLARITY MANNER.

3 ENSURE PROPER GROUNDING OF ACTUATOR CASE.

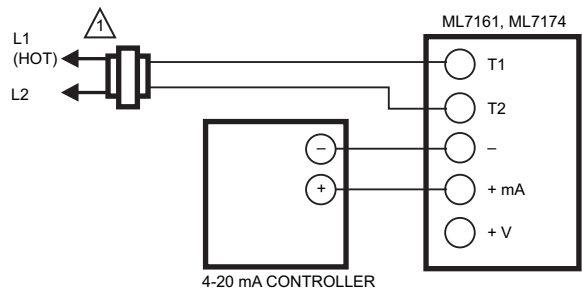
M19571B

Wiring Diagrams - Actuators

Non-spring Return ML6161; ML7161

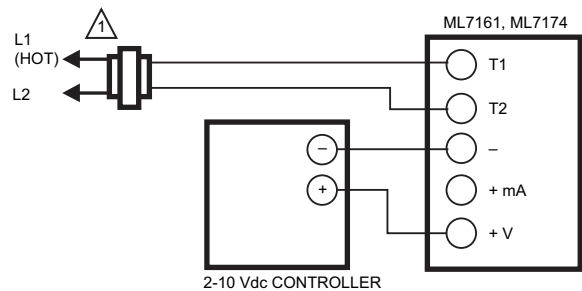
ML6161 and ML7161

ML7161 used with 4-20 mA control



1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED. M18071

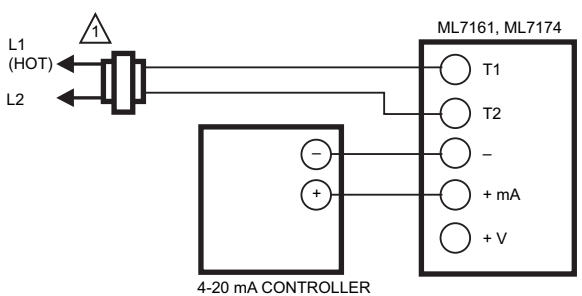
ML7161 used with 2-10 Vdc control



1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED. M18072

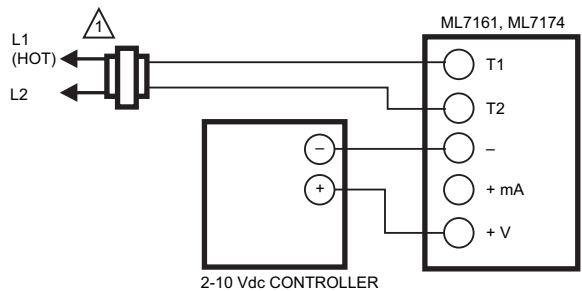
ML6174 and ML7174

ML7174 used with 4-20 mA control



1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED. M18071

ML7174 used with 2-10 Vdc control



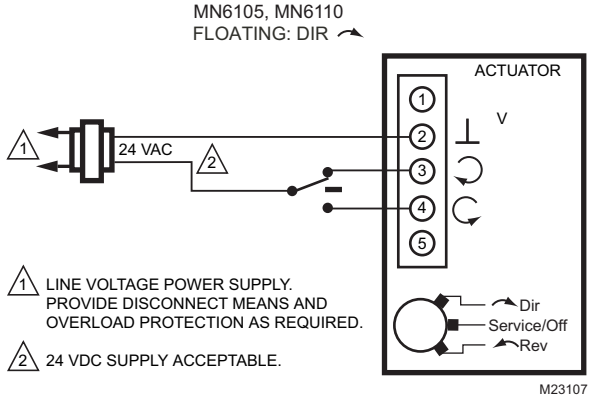
1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED. M18072

Wiring Diagrams - Actuators

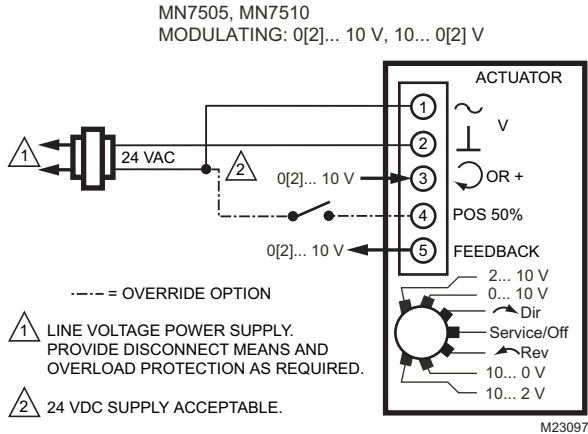
Non-spring Return N05 and N10 Series

N05 Series (MN6105, MN7505) and N10 Series (MN6110, MN7510)

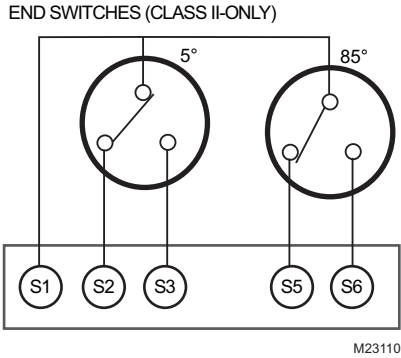
Wiring for Floating Control



Wiring for Voltage Control



Wiring for Auxiliary Switches

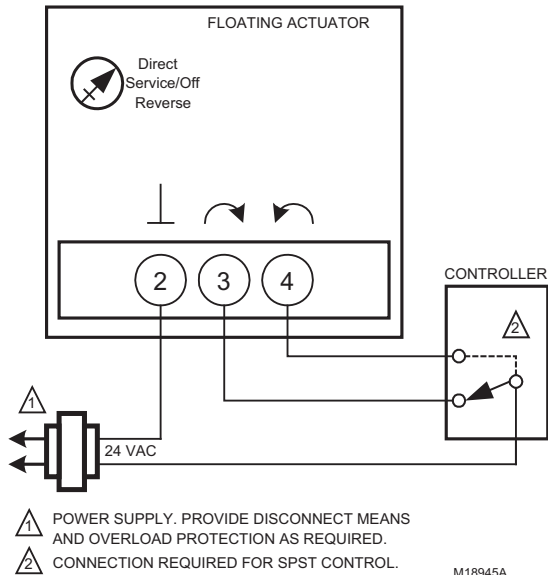


Wiring Diagrams - Actuators

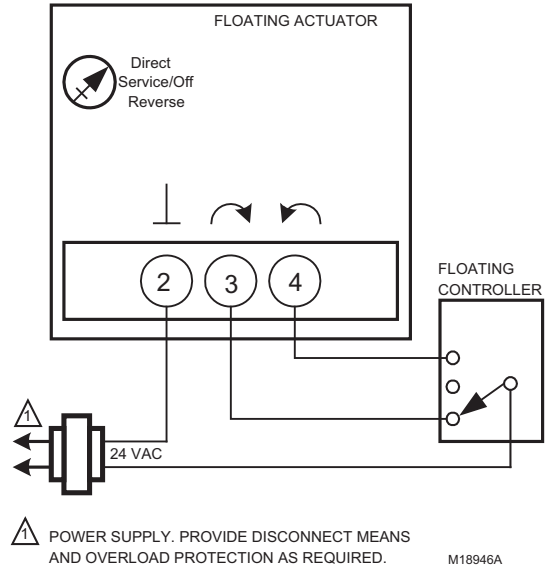
Non-spring Return N20 and N34 Series

N20 Series (MN6120, MN7220) and N34 Series (MN6134, MN7234)

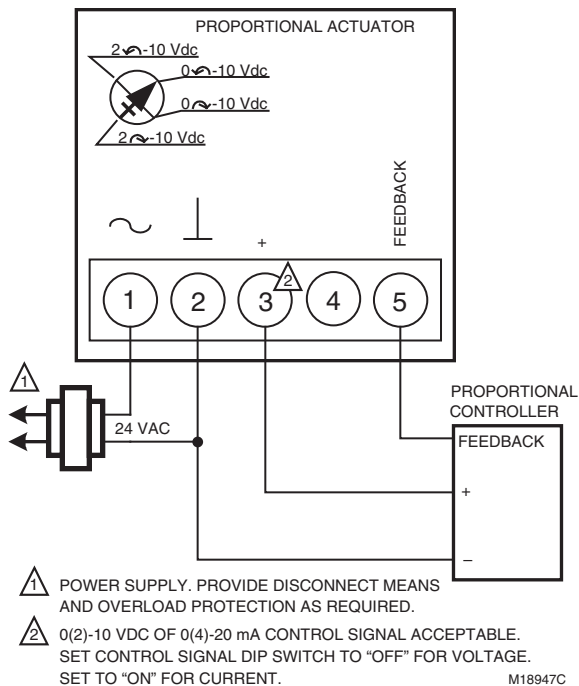
Used for On/Off Control



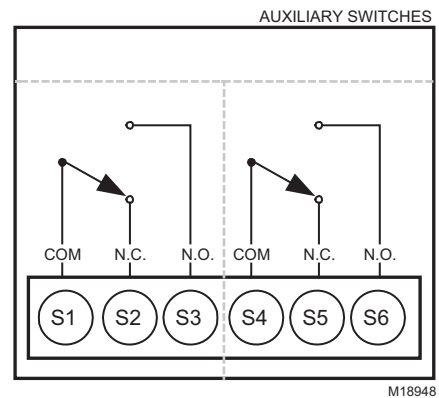
Wiring for Floating Control



Wiring for Modulating Control



Wiring for Auxiliary Switches

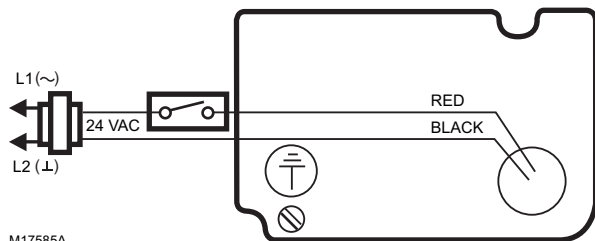


Wiring Diagrams - Actuators

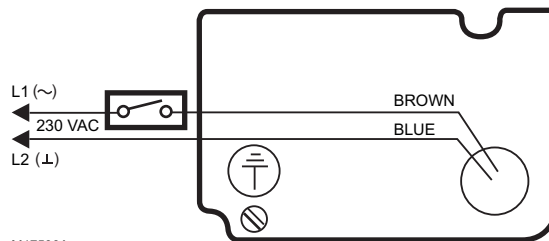
Fire and Smoke Damper Actuators

MS4209F, MS4309F, MS4709F, MS4809F, MS8209F and MS8309F

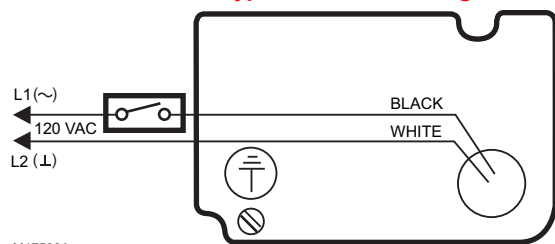
Typical 24 Vac wiring



Typical 230 Vac Wiring

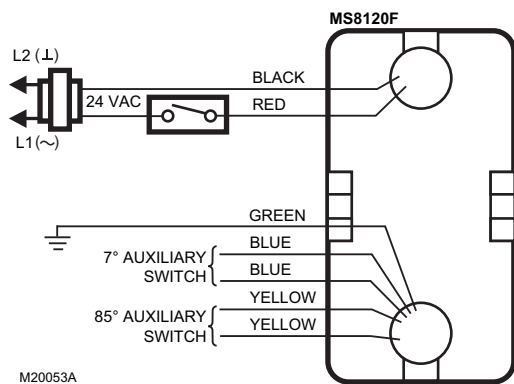


Typical 120 Vac wiring

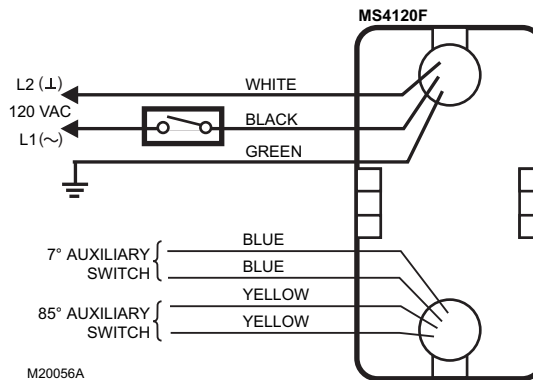


MS4120F, MS4620F, MS8120F, MS4109F, MS4609F and MS8109F

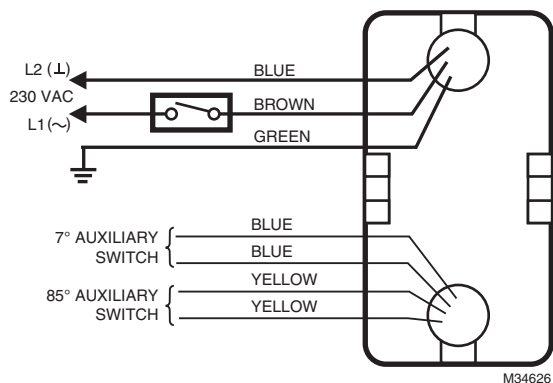
Wiring for 24V Control



Wiring for 120V Control



Wiring for 230V Control



Accessories - Actuators

Ball Joints, Push Rod Accessories

	Product Number	Description	Used With
	27518	Crankarm balljoint with 1/4 - 28 UNF male threads, fits 5-16 inch diameter push rods	All Actuators and Dampers
	27520A	Push Rod (5/16 in. dia., 5 in. length)	All Actuators and Dampers
	27520B	Push Rod (5/16 in. dia., 10 in. length)	All Actuators and Dampers
	27520C	Push Rod (5/16 in. dia., 12 in. length)	All Actuators and Dampers
	27520D	Push Rod (5/16 in. dia., 15 in. length)	All Actuators and Dampers
	27520E	Push Rod (5/16 in. dia., 18 in. length)	All Actuators and Dampers
	27520G	Push Rod (5/16 in. dia., 24 in. length)	All Actuators and Dampers
	27520H	Push Rod (5/16 in. dia., 28 in. length)	All Actuators and Dampers
	27520K	Push Rod (5/16 in. dia., 36 in. length)	All Actuators and Dampers
	27520L	Push Rod (5/16 in. dia., 48 in. length)	All Actuators and Dampers
	27520Q	Push Rod (5/16 in. dia., 8 in. length)	All Actuators and Dampers

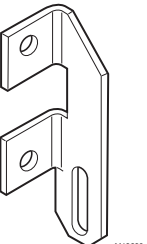
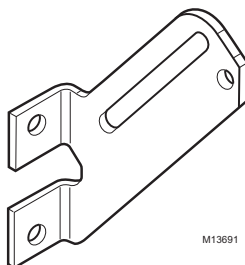
Control, Positioning, Feedback Accessories

	Product Number	Description	Used With
	200976A	Auxiliary Feedback Potentiometer (0 to 500 ohm)	ML6161, ML6174, ML7161, ML7174
	200976C	Auxiliary Feedback Potentiometer (0 to 2000 ohm)	ML6161, ML6174, ML7161, ML7174
	201052A	Auxiliary Switch Package, Single	ML6161, ML6174, ML7161, ML7174
	201052B	Auxiliary Switch Package, Double	ML6161, ML6174, ML7161, ML7174
	205860	Electronic Remote Minimum Position Potentiometer	Proportional Actuators
	32003532-005	High Temperature Dual Switch Assembly	ML4105, ML8105, ML4115, ML8115, ML4125, ML8125, ML4135, ML8135, MS4209, MS4309, MS4709, MS4809, MS8209, MS8309
	32006306-001	Resistor Kit (500 ohm, converts 4-20mA to 2-10Vdc)	Proportional Actuators

Control, Positioning, Feedback Accessories (cont.)

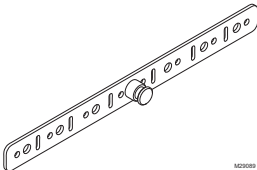
	Product Number	Description	Used With
	SW2-US	Auxiliary Switch Package (2 adjustable SPDT switches)	MS and MN Series High Torque Actuators (MNXX20 and XX34)

Mounting Accessories

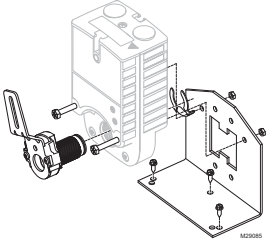
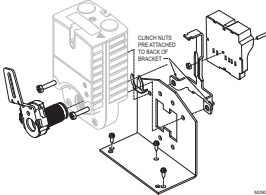
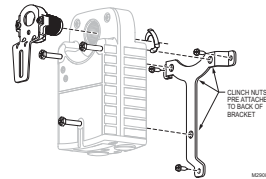
	Product Number	Description	Used With
	205649	Mounting Bracket	150 and 300 lb-in. NSR and SR (except 25, 53 and 142 lb-in) Actuators
	32007205-001	Direct Coupled Actuator Mounting Bracket	Damper with External Actuator Mounting (i.e., 32007205-005 Kit)
	32007205-002	Damper Blade Drive Lever (Small)	All Actuators and Dampers
	32007205-003	Damper Blade Drive Lever (Large)	All Actuators and Dampers
	32007205-004	Retaining Clip, Damper External Drive Pin	Damper with External Actuator Mounting (i.e., 32007205-005 Kit)

Accessories - Actuators

Mounting Accessories (cont.)

	Product Number	Description	Used With
	32007205-005	Damper External Drive Pin Kit	Damper with External Actuator Mounting (i.e., 32007205-005 Kit)
	32007205-006	Damper Axle Coupling	Multi-Section Dampers
	32007205-007	Jumper Bracket	Multi-Section Dampers
	50000407-001	Actuator Tandem Mounting Kit	N20, N34 Actuators; S05, S10, S20 Actuators
	50001194-001	Foot Mounting Kit	MS and MN Series High Torque Actuators (MNXX20 and MNXX34) MSxx10 and MSxx20, but not for MSxx20F
	50006427-001	Flexible Anti-Rotation Bracket	N20, N34 Actuators; S05, S10, S20 Actuators
	STRN-BRKT	Anti-rotation Bracket for S03 and S05 Series Actuators	S03, S05 Actuator

Mounting Accessories (cont.)

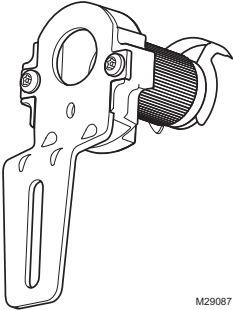
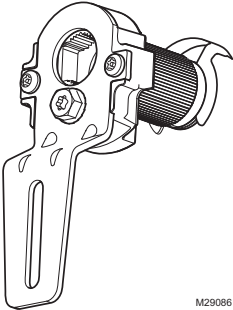
	Product Number	Description	Used With
	STRN-CRK-01	Crank arm kit for S03 and S05 Series Actuators	S03, S05 Actuators
	STRN-ECONO-01	Economizer Retrofit Kit for S03 and S05 Series Actuators	S03, S05 Actuators
	STRN-WMK-01	Wall mount kit for S03 and S05 Series Actuators	S03, S05 Actuators

Rotational Limiters, Position Indicators

	Product Number	Description	Used With
	4074ENJ	Minimum Position Kit	ML6161, ML6174, ML7161, ML7174

Accessories - Actuators

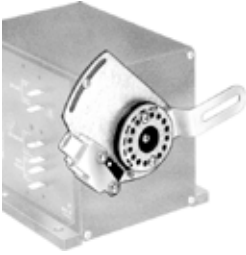
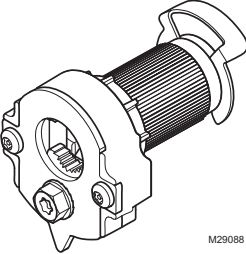
Crankarms

	Product Number	Description	Used With
	205830A	Rotary-to-Linear Kit Used With: 35 and 70 lb-in NSR Actuators	35 and 70 lb-in.NSR
	26026G	Damper Crank Arm, 1/2 in. damper shaft	All Actuators and Damper
 M29087	STRN-CA-01	Non Self-centering Crank Arm for S03 and S05 Series Actuators	S03, S05 Actuators
 M29086	STRN-CA-02	Self-centering Crank Arm for S03 and S05 Series Actuators	S03; S05 Actuators

Shaft Adapter Accessories

	Product Number	Description	Used With
	32003167-001	3/8 in. Shaft Adapter	ML6161; ML6174; ML7161; ML7174; ML7999
	32003168-001	Short Shaft Adapter (3/4 in. to 1/2 in.)	All Actuators and Dampers
	32003168-002	Short Shaft Adapter (5/8 in. to 1/2 in.)	All Actuators and Dampers
	32003168-003	Short Shaft Adapter (9/16 in. to 1/2 in.)	All Actuators and Dampers
	32003168-004	Short Shaft Adapter (1/2 in.)	All Actuators and Dampers

Shaft Adapter Accessories (cont.)

	Product Number	Description	Used With
	32004254-001	Self-Centering Shaft Adapter	N20 Actuators
	32004254-002	Self-Centering Shaft Adapter	S10, S20 Actuators
	172092060	Self-Centering Shaft Adapter	N34 Actuators
	172092062	Self-Centering Shaft Adapter	N20 Actuators
	4074ENY	3/8 in. Shaft Kit	ML6161, ML6174, ML7161, ML7174
	4074EVK	Short Shaft Kit	ML6161, ML6174, ML7161, ML7174
	STRN-SCSA	Self-centering Shaft Adapter	S03, S05 Actuators

Accessories - Actuators

Enclosure Accessories

	Product Number	Description	Used With
	32003036-001	Weather Enclosure	All Actuators
	50005859-001	NEMA 4 Enclosure for Direct Coupled Actuator	ML6161, ML6174, ML7161, ML7174; 150 lb-in. NSR Actuators (ML Series); N20, N34 Actuators; S03, S05, S10, S20 Actuators
	7640QW	Enclosure for Conduit Connection	ML6161, ML6174, ML7161, ML7174

Q7002 Interface Modules

	Product Number	Description	Used With
	Q7002B1009	Transducer, Accepts dc voltage, current or resistive input and provides a voltage or current output	Direct Coupled Proportional Actuators and Modutrol Motors
	Q7002C1007	Transducer, Accepts a pulse-width modulation (PWM) signal and provides a voltage output	Direct Coupled Proportional Actuators and Modutrol Motors

Miscellaneous Accessories

	Product Number	Description	Used With
	32000085-001	Strain Relief Fitting 1/2" x 14 NPT	MS, MN and MVN Series Actuators
	STRN-STRNRLF	Strain Relief Fitting M20 x 1.5	MS and MN Series Actuators

Damper and Linkage Accessories

Product Number	Description	Used With
102546	Ball Joint, 5/16 in.	Damper Linkages
101662A/0021	Motor Mounting Bracket Assembly for Q605	Q605
102931/0021	Adapter arm for less than 90 degree rotation for the Q605	Q605
104643A	Adapter for driving 2 dampers from 1 crank arm	Kit Mounted Motors; Modutrol IV Motors
26025F	Damper Arm, 3/8 in. shaft	—
26026B	Damper Arm, 1/2 in. shaft, 3 in. long	—
7617ACL	Bag Assembly	Q605

Cross Reference - Actuators

Direct Coupled Actuators

Belimo Model	Fail Safe	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)	Honeywell Model	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)
GMB24-SR	NSR	360 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	—	150	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GMX24-SR	NSR	360 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	—	150	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GMB24-MFT	NSR	360 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	150	MN6134A2008	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
GMX24-MFT	NSR	360 lb-in	MFT	24 Vac/Vdc	Variable (0-10 Vdc)	—	150	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GMX120-3	NSR	360 lb-in	On/Off, Floating	100-240 Vac	—	—	150	MN6134A2008	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
TFB24	SR	22 lb-in	On/Off	24 Vac/Vdc	—	—	75	MS8103A1030	27 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
TFB24-S	SR	22 lb-in	On/Off	24 Vac/Vdc	—	1	75	MS8103A1130	27 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	1	45
TFLB24	SR	22 lb-in	On/Off	24 Vac/Vdc	—	—	75	MS8103A1030	27 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
TFB120	SR	22 lb-in	On/Off	100-240 Vac	—	—	75	MS4103A1030	27 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
TFB120-S	SR	22 lb-in	On/Off	100-240 Vac	—	1	75	MS4103A1130	27 lb-in	Two-Position (SPST)	100-250 Vac	—	1	45
TFLB120	SR	22 lb-in	On/Off	100-240 Vac	—	—	75	MS4103A1030	27 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
TFCB120-S	SR	22 lb-in	On/Off	100-240 Vac	—	1	30	MS4103A1130	27 lb-in	Two-Position (SPST)	100-250 Vac	—	1	45
TFB24-SR	SR	22 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	—	95	MS7103A2021	27 lb-in	(0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
TFB24-SR-S	SR	22 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	1	95	MS7103A2221	27 lb-in	(0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
TFB120-SR	SR	22 lb-in	2-10 Vdc (4-20 mA)	100-240 Vac	—	—	95	MS4103A1030	27 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
TFB24-3	SR	22 lb-in	Floating	24 Vac/Vdc	—	—	95	MS7503A2021	27 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
TFB24-3-S	SR	22 lb-in	Floating	24 Vac/Vdc	—	1	95	MS7503A2221	27 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
TFB24-MFT	SR	22 lb-in	MFT	24 Vac/Vdc	Variable (0-10 Vdc)	—	95	MS7503A2021	27 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
TFB24-MFT-S	SR	22 lb-in	MFT	24 Vac/Vdc	Variable (0-10 Vdc)	1	95	MS7503A2221	27 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
TFX24	SR	22 lb-in	On/Off	24 Vac/Vdc	—	—	<75	MS8105W1030	44 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
TFX24-S	SR	22 lb-in	On/Off	24 Vac/Vdc	—	1	<75	MS8105W1130	44 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	1	45
TFX24-SR	SR	22 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	—	95	MS7505W2030	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
TFX24-SR-S	SR	22 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	1	95	MS7505W2130	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	1	90
TFX24-3	SR	22 lb-in	Floating	24 Vac/Vdc	—	—	95	MS7505W2030	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
TFX24-3-S	SR	22 lb-in	Floating	24 Vac/Vdc	—	1	95	MS7505W2130	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	1	90
TFX24-MFT	SR	22 lb-in	MFT	24 Vac/Vdc	Variable (0-10 Vdc)	—	150	MS7505W2030	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
TFX24-MFT-S	SR	22 lb-in	MFT	24 Vac/Vdc	Variable (0-10 Vdc)	1	150	MS7505W2130	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	1	90
LF24-S US	SR	35 lb-in	On/Off	24 Vac/Vdc	—	1	40-75	MS8105A1130	44 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	1	45
LF120 US	SR	35 lb-in	On/Off	120 Vac	—	—	40-75	MS4105A1030	44 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
LF120-S US	SR	35 lb-in	On/Off	120 Vac	—	1	40-75	MS4105A1130	44 lb-in	Two-Position (SPST)	100-250 Vac	—	1	45
LF230 US	SR	35 lb-in	On/Off	230 Vac	—	—	40-75	MS4105A1030	44 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
LF230-S US	SR	35 lb-in	On/Off	230 Vac	—	1	40-75	MS4105A1130	44 lb-in	Two-Position (SPST)	100-250 Vac	—	1	45
LF24-3 US	SR	35 lb-in	Modulating	24 Vac/Vdc	—	—	150	MS7505A2030	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
LF24-3-S US	SR	35 lb-in	Modulating	24 Vac/Vdc	—	1	150	MS7505A2130	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	1	90
LFC24-3-R US	SR	35 lb-in	Floating	24 Vac/Vdc	—	—	90	MS7505A2030	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
LFC24-3-S US	SR	35 lb-in	Floating	24 Vac/Vdc	—	1	90	MS7505A2130	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	1	90
LF24-SR US	SR	35 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	—	150	MS7505A2030	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
LF24-SR-S US	SR	35 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	1	150	MS7505A2130	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	1	90
LF24-SR-E US	SR	35 lb-in	2-10 Vdc, Built-in minimum position	24 Vac/Vdc	2-10 Vdc	—	150	MS7405A2030	44 lb-in	On/Off, Floating, (0) 2-10 Vdc, Economizer (3 kOhm, 3-Position)	24 Vac/Vdc	(0) 2-10 Vdc	—	90
LF24-MFT US	SR	35 lb-in	MFT	24 Vac/Vdc	2-10 Vdc	—	150	MS7505A2030	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
LF24-MFT-S US	SR	35 lb-in	MFT	24 Vac/Vdc	2-10 Vdc	1	150	MS7505A2130	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	1	90
LF24-MFT-20 US	SR	35 lb-in	MFT	24 Vac/Vdc	2-10 Vdc	—	150	MS7505A2030	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
NFB24	SR	90 lb-in	On/Off	24 Vac/Vdc	—	—	<75	MS8110A1008	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45

Cross Reference - Actuators

Direct Coupled Actuators

Belimo Model	Fail Safe	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)	Honeywell Model	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)
NFB24-S	SR	90 lb-in	On/Off	24 Vac/Vdc	—	2	<75	MS8110A1206	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
NFBUP	SR	90 lb-in	On/Off	24-240Vac	—	—	<75	MS41101002	88 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
NFBUP-S	SR	90 lb-in	On/Off	24-240Vac	—	2	<75	MS4110A1200	88 lb-in	Two-Position (SPST)	100-250 Vac	—	2	45
NFB24-SR	SR	90 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	—	95	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
NFB24-SR-S	SR	90 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	2	95	MS7510A2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
NFB24-MFT	SR	90 lb-in	MFT	24 Vac/Vdc	Variable (0-10 Vdc)	—	150	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
NFB24-MFT-S	SR	90 lb-in	0-135 kOhm	24 Vac/Vdc	Variable (0-10 Vdc)	2	150	MS7510A2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
NFX24	SR	90 lb-in	On/Off	24 Vac/Vdc	—	—	<75	MS8110W1008	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
NFX24-S	SR	90 lb-in	On/Off	24 Vac/Vdc	—	2	<75	MS8110W1206	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
NFX24-SR	SR	90 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	—	95	MS7510W2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
NFX24-SR-S	SR	90 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	2	95	MS7510W2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
NFX24-MFT	SR	90 lb-in	MFT	24 Vac/Vdc	Variable (0-10 Vdc)	—	150	MS7510W2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
NFX24-MFT-S	SR	90 lb-in	MFT	24 Vac/Vdc	Variable (0-10 Vdc)	2	150	MS7510W2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
AF24 US	SR	133 lb-in	On/Off	24 Vac/Vdc	—	—	150	MS8120A1007	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
AF24-S US	SR	133 lb-in	On/Off	24 Vac/Vdc	—	2	150	MS8120A1205	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
AF120 US	SR	133 lb-in	On/Off	120 Vac	—	—	150	MS4120A1001	175 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
AF120-S US	SR	133 lb-in	On/Off	120 Vac	—	2	150	MS4120A1209	175 lb-in	Two-Position (SPST)	100-250 Vac	—	2	45
AF230 US	SR	133 lb-in	On/Off	230 Vac	—	—	150	MS4120A1001	175 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
AF230-S US	SR	133 lb-in	On/Off	230 Vac	—	2	150	MS4120A1209	175 lb-in	Two-Position (SPST)	100-250 Vac	—	2	45
AF24-SR US	SR	133 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	—	150	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
AF24-MFT US	SR	133 lb-in	MFT	24 Vac/Vdc	2-10 Vdc	—	150	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
AF24-MFT-S US	SR	133 lb-in	MFT	24 Vac/Vdc	2-10 Vdc	2	150	MS7520A2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
AF24-MFT-S US	SR	133 lb-in	MFT	24 Vac/Vdc	2-10 Vdc	2	150	MS7520H2208	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
AF24-MFT95 US	SR	133 lb-in	0-135 kOhm	24 Vac/Vdc	—	—	150	MS7520A2007 + Q7002B1009	175 lb-in	0-135 kOhm	24 Vac/Vdc	(0) 2-10 Vdc	—	90
AFB24	SR	180 lb-in	On/Off	24 Vac/Vdc	—	—	<75	MS8120A1007	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
AFB24-S	SR	180 lb-in	On/Off	24 Vac/Vdc	—	2	<75	MS8120A1205	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
AFBUP	SR	180 lb-in	On/Off	24-240Vac	—	—	<75	MS4120A1001	175 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
AFBUP-S	SR	180 lb-in	On/Off	24-240Vac	—	2	<75	MS4120A1209	175 lb-in	Two-Position (SPST)	100-250 Vac	—	2	45
AFB24-SR	SR	180 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	—	95	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
AFB24-SR-S	SR	180 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	2	95	MS7520A2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
AFB24-MFT	SR	180 lb-in	MFT	24 Vac/Vdc	Variable (0-10 Vdc)	—	150	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
AFB24-MFT-S	SR	180 lb-in	MFT	24 Vac/Vdc	Variable (0-10 Vdc)	2	150	MS7520A2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
AFB24-MFT95	SR	180 lb-in	0-135 kOhm	24 Vac/Vdc	Variable (0-10 Vdc)	—	150	MS7520A2007 + Q7002B1009	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
AFX24	SR	180 lb-in	On/Off	24 Vac/Vdc	—	—	<75	MS8120W1007	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
AFX24-S	SR	180 lb-in	On/Off	24 Vac/Vdc	—	2	<75	MS8120W1205	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
AFX24-SR	SR	180 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	—	95	MS7520W2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
AFX24-SR-S	SR	180 lb-in	2-10 Vdc (4-20 mA)	24 Vac/Vdc	2-10 Vdc	2	95	MS7520W2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
AFX24MFT	SR	180 lb-in	MFT	24 Vac/Vdc	Variable (0-10 Vdc)	—	150	MS7520W2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
AFX24-MFT-S	SR	180 lb-in	MFT	24 Vac/Vdc	Variable (0-10 Vdc)	2	150	MS7520W2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
AFX24-MFT95	SR	180 lb-in	0-135 kOhm	24 Vac/Vdc	Variable (0-10 Vdc)	—	150	MS7520W2007 + Q7002B1009	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90

Belimo Notes: All models described as (0) 2-10 Vdc can be used with a 4-20 mA control input. Shunt a 500 kOhm, 1/2 W resistor across the input at the actuator.

Cross Reference - Actuators

Direct Coupled Actuators

Johnson Model	Fail Safe	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)	Honeywell Model	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)
M9102-AGA-2S	NSR	18 lb-in	Floating	18 to 30 Vac at 50/60 Hz	—	—	30	ML6161A2009	35 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9102-AGA-3S	NSR	18 lb-in	Floating	18 to 30 Vac at 50/60 Hz	—	—	30	ML6161A2009	35 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9102-IGA-2S	NSR	18 lb-in	On/Off, Floating	18 to 30 Vac at 50/60 Hz	—	—	30	ML6161A2009	35 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9102-IGA-3S	NSR	18 lb-in	On/Off, Floating	18 to 30 Vac at 50/60 Hz	—	—	30	ML6161A2009	35 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9104-AGA-2S	NSR	35 lb-in	Floating	18 to 30 Vac at 50/60 Hz	—	—	60	ML6161A2009	35 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9104-AGA-3S	NSR	35 lb-in	Floating	18 to 30 Vac at 50/60 Hz	—	—	60	ML6161A2009	35 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9104-IGA-2S	NSR	35 lb-in	On/Off, Floating	18 to 30 Vac at 50/60 Hz	—	—	60	ML6161A2009	35 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9104-IGA-3S	NSR	35 lb-in	On/Off, Floating	18 to 30 Vac at 50/60 Hz	—	—	60	ML6161A2009	35 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9104-GGA-2S	NSR	35 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	18 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	—	60	ML7161A2008 + 200976C	35 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	0-2 kOhm	—	90
M9104-GGA-3S	NSR	35 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	18 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	—	60	ML7161A2008 + 200976C	35 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	0-2 kOhm	—	90
M9104-AGA-2N	NSR	35 lb-in	Floating	20 to 30 Vac at 50/60 Hz	—	—	90/108 (at 60/50 Hz)	MN6105A1011	44 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9104-AGS-2N	NSR	35 lb-in	Floating	20 to 30 Vac at 50/60 Hz	—	—	90/108 (at 60/50 Hz)	MN6105A1011	44 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9106-IGA-2	NSR	53 lb-in & 35 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	—	Selectable: 60, 90, 120, 330, or 660 (at 60 Hz). 72, 108, 144, 396, or 792 (at 50 Hz).	MN6105A1011	44 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9106-IGC-2	NSR	53 lb-in & 35 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	2	Selectable: 60, 90, 120, 330, or 660 (at 60 Hz). 72, 108, 144, 396, or 792 (at 50 Hz).	MN6105A1201	44 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90
M9106-AGA-2	NSR	53 lb-in	Floating	20 to 30 Vac at 50/60 Hz	—	—	60/72 (at 60/50 Hz)	MN6110A1003	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9106-AGA2N01	NSR	53 lb-in	Floating	20 to 30 Vac at 50/60 Hz	—	—	60/72 (at 60/50 Hz)	MN6110A1003	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9106-AGA2N02	NSR	53 lb-in	Floating	20 to 30 Vac at 50/60 Hz	—	—	120/144 (at 60/50 Hz)	MN6110A1003	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9106-AGC-2	NSR	53 lb-in	Floating	20 to 30 Vac at 50/60 Hz	—	2	60/72 (at 60/50 Hz)	MN6110A1201	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90
M9106-AGF-2	NSR	53 lb-in	Floating	20 to 30 Vac at 50/60 Hz	0-10 kOhm	—	60/72 (at 60/50 Hz)	ML6174B2019 + 200976C	70 lb-in	On/Off, Floating	24 Vac	0-2 kOhm	—	90
M9106-GGA-2	NSR	53 lb-in	(0) 2-10 Vdc, (0) 4 to 20 mA	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	—	60/72 (at 60/50 Hz)	MN7510A2001	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9106-GGC-2	NSR	53 lb-in	(0) 2-10 Vdc, (0) 4 to 20 mA	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	2	60/72 (at 60/50 Hz)	MN7510A2209	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9108-AGA-2	NSR	70 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	—	25-50 for 0-70 lb-in, 30 at 50% load.	MN6110A1003	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9108-AGC-2	NSR	70 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	2	25-50 for 0-70 lb-in, 30 at 50% load.	MN6110A1201	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90

Cross Reference - Actuators

Direct Coupled Actuators

Johnson Model	Fail Safe	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)	Honeywell Model	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)
M9108-AGD-2	NSR	70 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	0-135 kOhm	—	25-50 for 0-70 lb-in, 30 at 50% load.	ML6174B2019 + 200976A	70 lb-in	On/Off, Floating	24 Vac	0-500 kOhm	—	90
M9108-AGE-2	NSR	70 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	0-1 kOhm	—	25-50 for 0-70 lb-in, 30 at 50% load.	ML6174B2019 + 200976C	70 lb-in	On/Off, Floating	24 Vac	0-2 kOhm	—	90
M9108-GGA-2	NSR	70 lb-in	0-20 Vdc (selectable zero and span), (0) 4 to 20 mA, Reversible.	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	—	25-50 for 0-70 lb-in, 30 at 50% load.	MN7510A2001	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9108-GGC-2	NSR	70 lb-in	0-20 Vdc (selectable zero and span), (0) 4 to 20 mA, Reversible.	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	2	25-50 for 0-70 lb-in, 30 at 50% load.	MN7510A2209	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9108-HGA-2	NSR	70 lb-in	0-20 Vdc (adjustable zero and span), (0) 4 to 20 mA, Reversible.	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	—	25-50 for 0-70 lb-in, 30 at 50% load.	MN7510A2001	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9108-HGC-2	NSR	70 lb-in	0-20 Vdc (adjustable zero and span), (0) 4 to 20 mA, Reversible.	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	2	25-50 for 0-70 lb-in, 30 at 50% load.	MN7510A2209	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9109-AGA-2	NSR	80 lb-in	Floating	20 to 30 Vac at 50/60 Hz	—	—	60/72 (at 60/50 Hz)	MN6110A1003	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9109-AGC-2	NSR	80 lb-in	Floating	20 to 30 Vac at 50/60 Hz	—	2	60/72 (at 60/50 Hz)	MN6110A1201	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90
M9109-GGA-2	NSR	80 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	—	60/72 (at 60/50 Hz)	MN7510A2001	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9109-GGC-2	NSR	80 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	2	60/72 (at 60/50 Hz)	MN7510A2209	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9116-AGA-2	NSR	140 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	—	70-115 for 0-140 lb-in, 80 at 50% load.	MN6120A1002	175 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9116-AGC-2	NSR	140 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	2	70-115 for 0-140 lb-in, 80 at 50% load.	MN6120A1200	175 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90
M9116-AGD-2	NSR	140 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	0-135 kOhm	—	70-115 for 0-140 lb-in, 80 at 50% load.	MN6120A1002	175 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9116-AGE-2	NSR	140 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	0-1 kOhm	—	70-115 for 0-140 lb-in, 80 at 50% load.	MN6120A1002	175 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9116-GGA-2	NSR	140 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	—	70-115 for 0-140 lb-in, 80 at 50% load.	MN7220A2007	175 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9116-GGC-2	NSR	140 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	2	70-115 for 0-140 lb-in, 80 at 50% load.	MN7220A2205	175 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9116-HGA-2	NSR	140 lb-in & 280 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	—	70-115 for 0-140 lb-in, 80 at 50% load.	MN7220A2007	175 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90

Cross Reference - Actuators

Direct Coupled Actuators

Johnson Model	Fail Safe	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)	Honeywell Model	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)
M9116-HGC-2	NSR	140 lb-in & 280 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	2	70-115 for 0-140 lb-in, 80 at 50% load.	MN7220A2205	175 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9124-AGA-2	NSR	210 lb-in & 420 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	—	115-175 for 0-210 lb-in, 130 at 50% load.	MN6134A1003	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9124-AGC-2	NSR	210 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	2	115-175 for 0-210 lb-in, 130 at 50% load.	MN6134A1003 + SW2-US	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90
M9124-AGD-2	NSR	210 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	0-1 35 kOhm	—	115-175 for 0-210 lb-in, 130 at 50% load.	MN6134A1003	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9124-AGE-2	NSR	210 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	0-1 kOhm	—	115-175 for 0-210 lb-in, 130 at 50% load.	MN6134A1003	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9124-GGA-2	NSR	210 lb-in & 420 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	—	115-175 for 0-210 lb-in, 130 at 50% load.	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9124-GGC-2	NSR	210 lb-in & 420 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	2	115-175 for 0-210 lb-in, 130 at 50% load.	MN7234A2008 + SW2-US	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9124-HGA-2	NSR	210 lb-in & 420 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	—	115-175 for 0-210 lb-in, 130 at 50% load.	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9124-HGC-2	NSR	210 lb-in & 420 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span selection.	2	115-175 for 0-210 lb-in, 130 at 50% load.	MN7234A2008 + SW2-US	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9132-AGA-2	NSR	280 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	—	115-205 for 0-280 lb-in, 140 at 50% load.	MN6134A1003	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9132-AGC-2	NSR	280 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	2	115-205 for 0-280 lb-in, 140 at 50% load.	MN6134A1003 + SW2-US	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90
M9132-AGE-2	NSR	280 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	0-1 kOhm	—	115-205 for 0-280 lb-in, 140 at 50% load.	MN6134A1003	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
M9132-GGA-2	NSR	280 lb-in & 560 lb-in	(0) 2-10 Vdc, (0) 4 to 20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span and stroke limits	—	115-205 for 0-280 lb-in, 140 at 50% load.	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9132-GGC-2	NSR	280 lb-in & 560 lb-in	(0) 2-10 Vdc, (0) 4 to 20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc for 90 (1 mA at 10 Vdc). Corresponds to span and stroke limits	2	115-205 for 0-280 lb-in, 140 at 50% load.	MN7234A2008 + SW2-US	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9203-AGA-2	SR	27 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	—	150	MS7503A2021	27 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9203-AGB-2	SR	27 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	1	150	MS7503A2221	27 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9203-AGA-2Z	SR	27 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	—	90	MS7503A2021	27 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9203-AGB-2Z	SR	27 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	1	90	MS7503A2221	27 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9203-BGA-2	SR	27 lb-in	On/Off	20 to 30 Vac at 50/60 Hz	—	—	< 75	MS8103A1030	27 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45

Cross Reference - Actuators

Direct Coupled Actuators

Johnson Model	Fail Safe	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)	Honeywell Model	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)
M9203-BGB-2	SR	27 lb-in	On/Off	20 to 30 Vac at 50/60 Hz	—	1	< 75	MS8103A1130	27 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	1	45
M9203-BUA-2	SR	27 lb-in	On/Off	85 to 264 Vac at 50/60Hz	—	—	< 75	MS4103A1030	27 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
M9203-BUB-2	SR	27 lb-in	On/Off	85 to 264 Vac at 50/60Hz	—	1	< 75	MS4103A1130	27 lb-in	Two-Position (SPST)	100-250 Vac	—	1	45
M9203-GGA-2	SR	27 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	—	150	MS7503A2021	27 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9203-GGB-2	SR	27 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	1	150	MS7503A2221	27 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9203-GGA-2Z	SR	27 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	—	90	MS7503A2021	27 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9203-GGB-2Z	SR	27 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	1	90	MS7503A2221	27 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9208-AGA-2	SR	70 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	—	150	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9208-AGA-3	SR	70 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	—	150	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9208-AGC-3	SR	70 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	2	150	MS7510A2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9208-BGA-3	SR	70 lb-in	On/Off	18 to 30 Vac at 50/60 Hz	—	—	< 75	MS8110A1008	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
M9208-BGC-3	SR	70 lb-in	On/Off	18 to 30 Vac at 50/60 Hz	—	2	< 75	MS8110A1206	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
M9208-BAA-3	SR	70 lb-in	On/Off	102 to 132 Vac at 50/60 Hz	—	—	< 75	MS4110A1002	88 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
M9208-BAC-3	SR	70 lb-in	On/Off	102 to 132 Vac at 50/60 Hz	—	2	< 75	MS4110A1200	88 lb-in	Two-Position (SPST)	100-250 Vac	—	2	45
M9208-BDA-3	SR	70 lb-in	On/Off	198 to 264 Vac at 50/60 Hz	—	—	< 75	MS4110A1002	88 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
M9208-BDC-3	SR	70 lb-in	On/Off	198 to 264 Vac at 50/60 Hz	—	2	< 75	MS4110A1200	88 lb-in	Two-Position (SPST)	100-250 Vac	—	2	45
M9208-GGA-2	SR	70 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	—	150	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9208-GGA-3	SR	70 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	—	150	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9208-GGC-3	SR	70 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	2	150	MS7510A2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9210-AGA-3	SR	89 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	—	150	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9210-AGC-3	SR	89 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	2	150	MS7510A2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9210-BGA-3	SR	89 lb-in	On/Off	20 to 30 Vac at 50/60 Hz	—	—	24 to 57	MS8110A1008	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
M9210-BGC-3	SR	89 lb-in	On/Off	20 to 30 Vac at 50/60 Hz	—	2	24 to 57	MS8110A1206	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
M9210-BAA-3	SR	89 lb-in	On/Off	102 to 132 Vac at 50/60 Hz	—	—	24 to 57	MS4110A1002	88 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
M9210-BAC-3	SR	89 lb-in	On/Off	102 to 132 Vac at 50/60 Hz	—	2	24 to 57	MS4110A1200	88 lb-in	Two-Position (SPST)	100-250 Vac	—	2	45
M9210-BDA-3	SR	89 lb-in	On/Off	198 to 264 Vac at 50/60 Hz	—	—	24 to 57	MS4110A1002	88 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45

Cross Reference - Actuators

Direct Coupled Actuators

Johnson Model	Fail Safe	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)	Honeywell Model	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)
M9210-BDC-3	SR	89 lb-in	On/Off	198 to 264 Vac at 50/60 Hz	—	2	24 to 57	MS4110A1200	88 lb-in	Two-Position (SPST)	100-250 Vac	—	2	45
M9210-GGA-3	SR	89 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	—	150	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9210-GGC-3	SR	89 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	2	150	MS7510A2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9210-HGA-3	SR	89 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	—	150	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9210-HGC-3	SR	89 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	2	150	MS7510A2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9220-AGA-3	SR	177 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	—	150	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9220-AGC-3	SR	177 lb-in	On/Off, Floating	20 to 30 Vac at 50/60 Hz	—	2	150	MS7520A2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9220-BGA-3	SR	177 lb-in	On/Off	20 to 30 Vac at 50/60 Hz	—	—	24 to 57	MS8120A1007	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
M9220-BGC-3	SR	177 lb-in	On/Off	20 to 30 Vac at 50/60 Hz	—	2	24 to 57	MS8120A1205	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
M9220-BAA-3	SR	177 lb-in	On/Off	102 to 132 Vac at 50/60 Hz	—	—	24 to 57	MS4120A1001	175 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
M9220-BAC-3	SR	177 lb-in	On/Off	102 to 132 Vac at 50/60 Hz	—	2	24 to 57	MS4120A1209	175 lb-in	Two-Position (SPST)	100-250 Vac	—	2	45
M9220-BDA-3	SR	177 lb-in	On/Off	198 to 264 Vac at 50/60 Hz	—	—	24 to 57	MS4120A1001	175 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
M9220-BDC-3	SR	177 lb-in	On/Off	198 to 264 Vac at 50/60 Hz	—	2	24 to 57	MS4120A1209	175 lb-in	Two-Position (SPST)	100-250 Vac	—	2	45
M9220-GGA-3	SR	177 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	—	150	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9220-GGC-3	SR	177 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	2	150	MS7520A2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
M9220-HGA-3	SR	177 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	—	150	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
M9220-HGC-3	SR	177 lb-in	(0) 2-10 Vdc, (0) 4-20 mA, Reversible	20 to 30 Vac at 50/60 Hz	(0) 2-10 Vdc	2	150	MS7520A2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90

Johnson Notes: All models described as (0) 2-10 Vdc can be used with a 4-20 mA control input. Shunt a 500 kOhm, 1/2 W resistor across the input at the actuator.

Cross Reference - Actuators

Direct Coupled Actuators

Invensys Model	Fail Safe	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)	Honeywell Model	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)
MF41-6043	NSR	35 lb-in	Floating	24 Vac	—	—	< 90	MN6105A1011	44 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
MF41-6043-502	NSR	35 lb-in	Floating	24 Vac	—	2	< 90	MN6105A1201	44 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90
MF41-6043-510	NSR	35 lb-in	Floating	24 Vac	0-1 kOhm	—	< 90	MN7505A2001	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MF41-6083	NSR	70 lb-in	Floating	24 Vac	—	—	< 125	MN6110A1003	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
MF41-6083-502	NSR	70 lb-in	Floating	24 Vac	—	2	< 125	MN6110A1201	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90
MF41-6083-510	NSR	70 lb-in	Floating	24 Vac	0-1 kOhm	—	< 125	MN7510A2001	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MF41-6153	NSR	133 lb-in	Floating	24 Vac	—	—	< 125	MN6120A1002	175 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
MF41-6343	NSR	300 lb-in	Floating	24 Vac	—	—	< 145	MN6134A1003	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
MF4D-6043-100	NSR	35 lb-in	Floating	24 Vac, 20-30 Vdc	—	—	< 85	MS7505A2030	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MF4D-6083-100	NSR	70 lb-in	Floating	24 Vac, 20-30 Vdc	—	—	< 85	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MF4E-60430-100	NSR	35 lb-in	Floating	24 Vac	—	—	90	MN6105A1011	44 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
MF4E-60830-100	NSR	70 lb-in	Floating	24 Vac	—	—	90	MN6110A1003	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
MS41-6043	NSR	35 lb-in	0-10 Vdc	24 Vac	0-10 Vdc	—	< 90	MN7505A2001	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS41-6043-502	NSR	35 lb-in	0-10 Vdc	24 Vac	0-10 Vdc	2	< 90	MN7505A2209	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
MS41-6043-520	NSR	35 lb-in	0-10 Vdc (adjustable)	24 Vac	0-10 Vdc	—	< 90	MN7505A2001	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS41-6043-522	NSR	35 lb-in	0-10 Vdc (adjustable)	24 Vac	0-10 Vdc	2	< 90	MN7505A2209	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
MS41-6083	NSR	70 lb-in	0-10 Vdc	24 Vac	0-10 Vdc	—	< 125	MN7510A2001	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS41-6083-502	NSR	70 lb-in	0-10 Vdc	24 Vac	0-10 Vdc	2	< 125	MN7510A2209	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
MS41-6083-520	NSR	70 lb-in	0-10 Vdc (adjustable)	24 Vac	0-10 Vdc	—	< 125	MN7510A2001	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS41-6083-522	NSR	70 lb-in	0-10 Vdc (adjustable)	24 Vac	0-10 Vdc	2	< 125	MN7510A2209	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
MS41-6153	NSR	133 lb-in	0-10 Vdc	24 Vac	0-10 Vdc	—	< 125	MN7220A2007	175 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS41-6153-502	NSR	133 lb-in	0-10 Vdc	24 Vac	0-10 Vdc	2	< 125	MN7220A2205	175 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	2	90
MS41-6340	NSR	300 lb-in	2-10 Vdc, 4-20 mA	120 Vac	—	—	< 145	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS41-6341	NSR	300 lb-in	2-10 Vdc, 4-20 mA	240 Vac	—	—	< 145	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS41-6343	NSR	300 lb-in	2-10 Vdc, 4-20 mA	24 Vac	—	—	< 145	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS4D-6043-100	NSR	35 lb-in	2-10 Vdc	24 Vac, 20-30 Vdc	2-10 Vdc	—	< 85	MN7505A2001	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS4D-6043-150	NSR	35 lb-in	0-10 Vdc	24 Vac, 20-30 Vdc	2-10 Vdc	—	< 85	MN7505A2001	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS4D-6043-160	NSR	35 lb-in	4-20 mA	24 Vac, 20-30 Vdc	2-10 Vdc	—	< 85	MN7505A2001	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS4D-6083-100	NSR	70 lb-in	2-10 Vdc	24 Vac, 20-30 Vdc	2-10 Vdc	—	< 85	MN7510A2001	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS4D-6083-150	NSR	70 lb-in	0-10 Vdc	24 Vac, 20-30 Vdc	2-10 Vdc	—	< 85	MN7510A2001	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS4D-6083-160	NSR	70 lb-in	4-20 mA	24 Vac, 20-30 Vdc	2-10 Vdc	—	< 85	MN7510A2001	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS50-H2001	NSR	300 lb-in	1-5 Vdc, 4-20 mA	120 Vac	—	—	145	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS50-H2101	NSR	300 lb-in	1-5 Vdc, 4-20 mA	240 Vac	—	—	145	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS50-H2301	NSR	300 lb-in	1-5 Vdc, 4-20 mA	24 Vac	—	—	145	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MA40-7043	SR	35 lb-in	On/Off	24 Vac, 22-30 Vdc	—	—	< 50	MS8105A1030	44 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
MA40-7043-501	SR	35 lb-in	On/Off	24 Vac, 22-30 Vdc	—	1	< 50	MS8105A1130	44 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	1	45
MA40-7170	SR	150 lb-in	On/Off	120 Vac	—	—	< 145	MS4120A1001	175 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
MA40-7171	SR	150 lb-in	On/Off	240 Vac	—	—	< 145	MS4120A1001	175 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
MA40-7173	SR	150 lb-in	On/Off	24 Vac, $\pm 20\%$	—	—	< 145	MS8120A1007	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
MA41-7073	SR	60 lb-in	On/Off	24 Vac, 22-30 Vdc	—	—	< 80	MS8110A1008	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45

Cross Reference - Actuators

Direct Coupled Actuators

Invensys Model	Fail Safe	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)	Honeywell Model	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)
MA41-7073-502	SR	60 lb-in	On/Off	24 Vac, 22-30 Vdc	—	2	< 80	MS8110A1206	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
MA41-7153	SR	133 lb-in	On/Off	24 Vac, 22-30 Vdc	—	—	< 190	MS8120A1007	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
MA41-7153-502	SR	133 lb-in	On/Off	24 Vac, 22-30 Vdc	—	2	< 190	MS8120A1205	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
MA4D-7030-000	SR	30 lb-in	On/Off	120 Vac	—	—	< 56	MS4105A1030	44 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
MA4D-7031-000	SR	30 lb-in	On/Off	230 Vac	—	—	< 56	MS4105A1030	44 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
MA4D-7033-100	SR	30 lb-in	On/Off	24 Vac, 20-30 Vdc	—	—	< 56	MS8105A1008	44 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
MA4D-8030-000	SR	30 lb-in	On/Off	120 Vac	—	—	< 56	MS4105A1030	44 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
MA4D-8031-000	SR	30 lb-in	On/Off	230 Vac	—	—	< 56	MS4105A1030	44 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
MA4D-8033-100	SR	30 lb-in	On/Off	24 Vac, 20-30 Vdc	—	—	< 56	MS8105A1008	44 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
MF40-7043	SR	35 lb-in	Floating	24 Vac, 22-30 Vdc	—	—	< 130	MS7505A2030	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MF40-7043-501	SR	35 lb-in	Floating	24 Vac, 22-30 Vdc	—	1	< 130	MS7505A2130	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	1	90
MF40-7173	SR	150 lb-in	Floating	24 Vac, ±20%	—	—	< 145	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MF41-7073	SR	60 lb-in	Floating	24 Vac, 22-30 Vdc	—	—	< 195	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MF41-7073-502	SR	60 lb-in	Floating	24 Vac, 22-30 Vdc	—	2	< 195	MS7510A2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
MF41-7153	SR	133 lb-in	Floating	24 Vac, 22-30 Vdc	—	—	< 190	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MF41-7153-502	SR	133 lb-in	Floating	24 Vac, 22-30 Vdc	—	2	< 190	MS7520A2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
MF4D-7033-100	SR	30 lb-in	Floating	24 Vac, 20-30 Vdc	2-10 Vdc	—	< 85	MS7505A2008	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MF4D-8033-100	SR	30 lb-in	Floating	24 Vac, 20-30 Vdc	2-10 Vdc	—	< 85	MS7505A2008	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS40-7043	SR	35 lb-in	2-10 Vdc, 4-20 mA	24 Vac, 22-30 Vdc	2-10 Vdc	—	< 130	MS7505A2030	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS40-7043-501	SR	35 lb-in	2-10 Vdc, 4-20 mA	24 Vac, 22-30 Vdc	2-10 Vdc	1	< 130	MS7505A2130	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	1	90
MS40-7170	SR	150 lb-in	2-10 Vdc, 4-20 mA	120 Vac	—	—	< 145	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS40-7171	SR	150 lb-in	2-10 Vdc, 4-20 mA	240 Vac	—	—	< 145	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS40-7173	SR	150 lb-in	2-10 Vdc, 4-20 mA	24 Vac, ±20%	—	—	< 145	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS41-7073	SR	60 lb-in	2-10 Vdc, 4-20 mA	24 Vac, 22-30 Vdc	2-10 Vdc	—	< 195	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS41-7073-502	SR	60 lb-in	2-10 Vdc, 4-20 mA	24 Vac, 22-30 Vdc	2-10 Vdc	2	< 195	MS7510A2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
MS41-7153	SR	133 lb-in	2-10 Vdc, 4-20 mA	24 Vac, 22-30 Vdc	2-10 Vdc	—	< 190	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS41-7153-502	SR	133 lb-in	2-10 Vdc, 4-20 mA	24 Vac, 22-30 Vdc	2-10 Vdc	2	< 190	MS7520A2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
MS4D-7033-100	SR	30 lb-in	2-10 Vdc, 4-20 mA	24 Vac, 20-30 Vdc	2-10 Vdc	—	< 85	MS7505A2008	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS4D-7033-150	SR	30 lb-in	0-10 Vdc, 4-20 mA	24 Vac, 20-30 Vdc	2-10 Vdc	—	< 85	MS7505A2008	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS4D-7033-160	SR	30 lb-in	4-20 mA	24 Vac, 22-30 Vdc	2-10 Vdc	—	< 85	MS7505A2008	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS4D-8033-100	SR	30 lb-in	2-10 Vdc, 4-20 mA	24 Vac, 22-30 Vdc	2-10 Vdc	—	< 85	MS7505A2008	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS4D-8033-150	SR	30 lb-in	0-10 Vdc, 4-20 mA	24 Vac, 22-30 Vdc	2-10 Vdc	—	< 85	MS7505A2008	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS4D-8033-160	SR	30 lb-in	4-20 mA	24 Vac, 22-30 Vdc	2-10 Vdc	—	< 85	MS7505A2008	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS50-E2001	SR	150 lb-in	1-5 Vdc, 4- 20 mA	120 Vac	—	—	145	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS50-E2101	SR	150 lb-in	1-5 Vdc, 4- 20 mA	240 Vac	—	—	145	MS7520A2007	175 lb-in	On/Off	24 Vac/Vdc	(0) 2-10 Vdc	—	90
MS50-E2301	SR	150 lb-in	1-5 Vdc, 4- 20 mA	24 Vac	—	—	145	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90

Invensys Notes: All models described as (0)2-10 Vdc can be used with a 4-20 mA control input. Shunt a 500 kOhm, 1/2 W resistor across the input at the actuator.

Cross Reference - Actuators

Direct Coupled Actuators

Siemens Model	Fail Safe	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)	Honeywell Model	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)
GDE131.1U	NSR	44 lb-in	Floating	24 Vac	—	—	90	MN6105A1011	44 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
GDE131.1P	NSR	44 lb-in	Floating	24 Vac	—	—	90	MN6105W1011	44 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
GDE161.1P	NSR	44 lb-in	0-10 Vdc	24 Vac	0-1 kOhm	—	90	MN7505A2001	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GDE132.1P	NSR	44 lb-in	Floating	24 Vac	0-1 kOhm	—	90	MN7505A2001	44 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GDE136.1P	NSR	44 lb-in	Floating	24 Vac	—	2	90	MN6105A1201	44 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90
GLB131.1P	NSR	88 lb-in	Floating	24 Vac	—	—	125	MN6110A1003	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
GLB161.1P	NSR	88 lb-in	0-10 Vdc	24 Vac	—	—	125	MN7510A2001	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GLB132.1P	NSR	88 lb-in	Floating	24 Vac	0-1 kOhm	—	125	ML6174A2002 + 200976C	70 lb-in	On/Off, Floating	24 Vac	0-2 kOhm	—	90
GLB136.1P	NSR	88 lb-in	Floating	24 Vac	—	2	125	MN6110A1201	88 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90
GLB163.1P	NSR	88 lb-in	0-10 Vdc	24 Vac	—	—	125	MN7510A2001	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GLB164.1P	NSR	88 lb-in	0-10 Vdc	24 Vac	—	2	125	MN7510A2209	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GLB166.1P	NSR	88 lb-in	0-10 Vdc	24 Vac	—	2	125	MN7510A2209	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GEB131.1U	NSR	132 lb-in	Floating	24 Vac	—	—	125	MN6120A1002	175 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
GEB136.1U	NSR	132 lb-in	Floating	24 Vac	—	2	125	MN6120A1200	175 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90
GEB161.1U	NSR	132 lb-in	0-10 Vdc	24 Vac	—	—	125	MN7220A2007	175 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	—	—	90
GBB171.1P	NSR	221 lb-in	On/Off, Floating	24 Vac	—	—	150	MN6120A1002	175 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
GBB131.1U	NSR	221 lb-in	Floating	24 Vac	—	—	150	MN6120A1002	175 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
GBB136.1U	NSR	221 lb-in	Floating	24 Vac	—	—	150	MN6120A1200	175 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
GBB161.1U	NSR	221 lb-in	0-10 Vdc	24 Vac	—	—	150	MN7220A2007	175 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GBB166.1U	NSR	221 lb-in	0-10 Vdc	24 Vac	—	2	150	MN7220A2205	175 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GBB151.1P	NSR	221 lb-in	4-20 mA	24 Vac	—	—	150	MN7220A2007	175 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GBB166.1P	NSR	221 lb-in	0-10 Vdc	24 Vac	—	2	150	MN7220A2205	175 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GBB156.1P	NSR	221 lb-in	4-20 mA	24 Vac	—	2	150	MN7220A2205	175 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GIB131.1U	NSR	310 lb-in	Floating	24 Vac	—	—	150	MN6134A1003	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
GIB136.1U	NSR	310 lb-in	Floating	24 Vac	—	2	150	MN6134A1003 + SW2-US	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	2	90
GIB171.1U	NSR	310 lb-in	On/Off, Floating	24 Vac	—	—	150	MN6134A1003	300 lb-in	On/Off, Floating	24 Vac/Vdc	—	—	90
GIB161.1U	NSR	310 lb-in	0-10 Vdc	24 Vac	—	—	150	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GIB151.1U	NSR	310 lb-in	4-20 mA	24 Vac	—	—	150	MN7234A2008	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GIB166.1U	NSR	310 lb-in	0-10 Vdc	24 Vac	—	2	150	MN7234A2008 + SW-US2	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GIB156.1U	NSR	310 lb-in	4-20 mA	24 Vac	—	2	150	MN7234A2008 + SW2-US	300 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GQD121.1P	SR	20 lb-in	On/Off	24 Vac/dc	—	—	30	MS8103A1030	27 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
GQD126.1P	SR	20 lb-in	On/Off	24 Vac/dc	—	2	30	MS8103A1130	27 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	1	45
GQD221.1U	SR	20 lb-in	On/Off	120 Vac	—	—	30	MS4103A1030	27 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
GQD226.1U	SR	20 lb-in	On/Off	120 Vac	—	2	30	MS4103A1130	27 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
GQD131.1P	SR	20 lb-in	Floating	24 Vac/dc	—	—	30	MS7503A2021	27 lb-in	Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GQD136.1P	SR	20 lb-in	Floating	24 Vac/dc	—	2	30	MS7503A2221	27 lb-in	Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GQD151.1P	SR	20 lb-in	2-10 Vdc	24 Vac/dc	2-10 Vdc	—	30	MS7503A2021	27 lb-in	Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GQD156.1P	SR	20 lb-in	2-10 Vdc	24 Vac/dc	2-10 Vdc	2	30	MS7503A2221	27 lb-in	Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GMA121.1U	SR	62 lb-in	On/Off	24 Vac/dc	—	—	90	MS8110A1008	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
GMA121.1P	SR	62 lb-in	On/Off	24 Vac/dc	—	—	90	MS8110W1008	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
GMA126.1U	SR	62 lb-in	On/Off	24 Vac/dc	—	2	90	MS8110A1206	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
GMA126.1P	SR	62 lb-in	On/Off	24 Vac/dc	—	2	90	MS8110W1206	88 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
GMA221.1U	SR	62 lb-in	On/Off	120 Vac	—	—	90	MS4110A1002	88 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
GMA226.1U	SR	62 lb-in	On/Off	120 Vac	—	2	90	MS4110A1200	88 lb-in	Two-Position (SPST)	100-250 Vac	—	2	45
GMA131.1U	SR	62 lb-in	Floating	24 Vac/Vdc	—	—	90	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GMA131.1P	SR	62 lb-in	Floating	24 Vac/Vdc	—	—	90	MS7510W2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90

Cross Reference - Actuators

Direct Coupled Actuators

Siemens Model	Fail Safe	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)	Honeywell Model	Torque (lb-in)	Control Signal	Power	Feedback	Switches	Timing (sec)
GMA132.1U	SR	62 lb-in	Floating	24 Vac/Vdc	0-1 kOhm	—	90	MS7510A2008	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GMA136.1U	SR	62 lb-in	Floating	24 Vac/dc	—	2	90	MS7510A2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GMA151.1U	SR	62 lb-in	2-10 Vdc	24 Vac/Vdc	0-1 kOhm	—	90	MS7510A2008	88 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GMA151.1P	SR	62 lb-in	2-10 Vdc	24 Vac/Vdc	0-1 kOhm	—	90	MS7510W2008	88 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GMA156.1U	SR	62 lb-in	2-10 Vdc	24 Vac/Vdc	0-1 kOhm	2	90	MS7510A2206	88 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GMA156.1P	SR	62 lb-in	2-10 Vdc	24 Vac/Vdc	0-1 kOhm	2	90	MS7510W2206	88 lb-in	(0) 2-10 Vdc, (0) 4-20 mA	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GCA121.1U	SR	160 lb-in	On/Off	24 Vac/dc	—	—	90	MS8120A1007	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
GCA121.1P	SR	160 lb-in	On/Off	24 Vac/dc	—	—	90	MS8120W1007	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	—	45
GCA126.1U	SR	160 lb-in	On/Off	24 Vac/dc	—	2	90	MS8120A1205	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
GCA126.1P	SR	160 lb-in	On/Off	24 Vac/dc	—	2	90	MS8120W1205	175 lb-in	Two-Position (SPST)	24 Vac/Vdc	—	2	45
GCA221.1U	SR	160 lb-in	On/Off	120 Vac	—	—	90	MS4120A1001	175 lb-in	Two-Position (SPST)	100-250 Vac	—	—	45
GCA226.1U	SR	160 lb-in	On/Off	120 Vac	—	2	90	MS4120A1209	175 lb-in	Two-Position (SPST)	100-250 Vac	—	2	45
GCA131.1U	SR	160 lb-in	Floating	24 Vac/dc	—	—	90	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GCA131.1P	SR	160 lb-in	Floating	24 Vac/dc	—	—	90	MS7520W2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GCA136.1U	SR	160 lb-in	Floating	24 Vac/dc	—	2	90	MS7520A2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GCA136.1P	SR	160 lb-in	Floating	24 Vac/dc	—	2	90	MS7520W2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GCA132.1U	SR	160 lb-in	Floating	24 Vac/dc	0-1 kOhm	—	90	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GCA132.1P	SR	160 lb-in	Floating	24 Vac/dc	0-1 kOhm	—	90	MS7520W2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GCA151.1U	SR	160 lb-in	4-20 mA	24 Vac/dc	—	—	90	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GCA151.1P	SR	160 lb-in	4-20 mA	24 Vac/dc	—	—	90	MS7520W2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GCA156.1U	SR	160 lb-in	4-20 mA	24 Vac/dc	—	2	90	MS7520A2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GCA156.1P	SR	160 lb-in	4-20 mA	24 Vac/dc	—	2	90	MS7520W2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GCA161.1U	SR	160 lb-in	0-10 Vdc	24 Vac/dc	—	—	90	MS7520A2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GCA161.1P	SR	160 lb-in	0-10 Vdc	24 Vac/dc	—	—	90	MS7520W2007	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	—	90
GCA166.1U	SR	160 lb-in	0-10 Vdc	24 Vac/dc	—	2	90	MS7520A2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GCA166.1P	SR	160 lb-in	0-10 Vdc	24 Vac/dc	—	2	90	MS7520W2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GCA163.1U	SR	160 lb-in	0-10 Vdc	24 Vac/dc	—	—	90	MS7520H2208	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GCA164.1U	SR	160 lb-in	0-10 Vdc	24 Vac/dc	—	2	90	MS7520H2208	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90
GCA166.1P	SR	160 lb-in	0-10 Vdc	24 Vac/dc	—	2	90	MS7520W2205	175 lb-in	On/Off, Floating, (0) 2-10 Vdc	24 Vac/Vdc	(0) 2-10 Vdc	2	90

Siemens Notes: All models described as (0) 2-10 Vdc can be used with a 4-20 mA control input. Shunt a 500 kOhm, 1/2 W resistor across the input at the actuator.

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Control Valve Applications														
Pipe Size, inches (DN)														
		1/2" DN15	3/4" DN20	1" DN25	1-1/4" DN32	1-1/2" DN40	2" DN50	2-1/2" DN65	3" DN80	4" DN100	5" DN125	6" DN150	8-20" >DN200	
Unitary Equipment	Fan Coil Units	Cartridge globe valves												
		Control ball valves												
		Pressure regulated valves												
	Unit Heaters	Cartridge globe valves												
		Control ball valves												
		Pressure regulated valves												
	Convectors	Control ball valves												
		Cartridge globe valves												
		Pressure regulated valves												
	Radiant Panels	Control ball valves												
		Cartridge globe valves												
		Pressure regulated valves												
Unit Ventilator	Cartridge globe valves													
	Control ball valves													
	Pressure regulated valves													
Reheat Coils	Cartridge globe valves													
	Control ball valves													
	Pressure regulated valves													
Water Source Heat Pump	Control ball valves													
	Pressure regulated valves													
Blower Coil	Cartridge globe valves													
	Control ball valves													
	Pressure regulated valves													
Air Handling Units	Heating & Cooling Coils	Threaded globe valve												
		Threaded control ball valves												
								Flanged globe valve						
									Flanged ball valve					
	Pressure regulated valves													
	Chilled Ceiling	Threaded globe valve												
		Threaded control ball valves												
		Pressure regulated valves												
	Humidifiers	Threaded globe valve												
								Flanged globe valve						
Central Plant	Outdoor reset	Threaded globe valve												
		Threaded control ball valves												
								Flanged globe valve						
									Flanged ball valve					
	Boiler Bypass	Threaded globe valve												
		Threaded control ball valves												
								Flanged globe valve						
									Flanged ball valve					
		Resilient seat butterfly valves												
	Heat reclaim	Threaded globe valve												
		Threaded control ball valves												
	Steam Heat Exchangers	Threaded globe valve												
								Flanged globe valve						
	Greenhouse	Threaded globe valve												
		Threaded control ball valves												
								Flanged globe valve						
								Flanged ball valve						
Resilient seat butterfly valves														
Thermal Storage	Threaded globe valve													
	Threaded control ball valves													
							Flanged globe valve							
	Resilient seat butterfly valves													
Chillers	Threaded globe valve													
	Threaded control ball valves													
							Flanged globe valve							
								Flanged ball valve						
	Resilient seat butterfly valves													
Pressure regulated valves														
Cooling Towers	Threaded globe valve													
	Threaded control ball valves													
	Resilient seat butterfly valves													
Isolation valves	Threaded control ball valves													
	Resilient seat butterfly valves													

Product Selection - Valves

2-Way Control Valves

Attribute	Specification	Unitary	Globe					
		Cartridge Globe	Threaded			Flanged	Pressure-Balanced	
		V58x2	V5011N	V5011F	V5011G	VGf2xS	V5862A3	VGf2xP
Pipe Size	1/2" [DN15]	•	•					
	3/4" [DN20]	•	•					
	1" [DN25]		•				•	
	1-1/4" [DN32]		•				•	
	1-1/2" [DN40]		•				•	
	2" [DN50]		•					
	2-1/2" [DN65]			•	•	•		•
	3" [DN80]			•	•	•		•
	4" [DN100]					•		•
	5" [DN125]					•		•
	6" [DN150]					•		•
	Other (maximum size)							
Pipe Fittings	Sweat	•						
	NPT Internal Thread	•	•	•	•		•	
	Inverted Flare							
	ANSI Flange					•		•
Static Pressure	ANSI 125/150		•	•	•	•		•
	ANSI 250/300					•		
	Other	230 psi					230 psi	
Media	Chilled Water	•	•	•	•	•	•	•
	Hot Water	•	•	•	•	•	•	•
	Low Pressure Steam		N1	•	•	•		•
	High Pressure Steam		N2		•	•		•
Flow Capacity, Cv	Multiple ratings per pipe size	•	•	•	•		•	
	One rating/size above 1/2"		•	•	•	•		•
Valve Action	Direct Acting (Stem down to close)		N1, N2	•	•	•	•	•
	Reverse Acting (Stem up to close)	•						
	Rotary N.O.							
	Rotary N.C.							
Flow Characteristic	Equal Percentage	•	•	•		•		•
	Modified Equal Percentage							
	Linear		•		•	•	•	•
	Quick Open							
Close-off pressure***	High** (100 psid minimum)	•					•	•
	Medium (40 psid minimum)	•						
	Varies with actuator		•	•	•	•		
Maximum Seat Leakage	ANSI Class III (0.10% Cv max.)	0.02%	0.05%			•		
	ANSI Class IV (0.01% Cv max.)						•	•
	Bubble-tight design							
	Other (see product data literature)			0.5%	0.5%			
Rangeability	High (50:1 minimum)	•	•	•	•	•	•	•
	Medium* (15~50:1)							
	Low (under 15:1)							
Trim	Brass, plated brass, bronze			•				
	Brass plug /Stainless seat		N1					
	Stainless Steel		N2		•	•	•	•
	Resilient materials	•						
In-line Serviceability	Cartridge	•						
	Packing		•	•	•	•	•	•
	Rebuild		•	•	•			
Actuation Options	Electronic Modulating	•	•	•	•	•	•	•
	Tri-state floating	•	•	•	•	•	•	•
	Pulse Width Modulation							
	2-position low voltage	•	•	•	•	•		•
	2-position line voltage		•	•	•	•		•
	Electric Spring Return	•	•	•	•	•	•	•
	Electronic Fail Safe							
	Pneumatic, low pressure	•	•	•	•	•		•
	Pneumatic bidirectional (Hi-Pr)							
	Pneumatic spring return (Hi-Pr)							

Notes * Best used with supply water reset from outdoor air temperature.
 ** Can dead-head pumps. Use with VFD-controlled pumps with maximum pressure cut-out
 *** Maximum operating differential pressure. Static close-off pressure may be higher. Maximum pressure for quiet service may be less.

Product Selection - Valves

2-Way Control Valves

Attribute	Specification	Control Ball		Pressure-Regulated		Butterfly	
		Threaded	Flanged	Threaded	Wafer Flanged	Resilient Seat	
		VCN2	VCB2	VRN2	VRW2	VFF1	VFF2
Pipe Size	1/2" [DN15]	•		•			
	3/4" [DN20]	•		•			
	1" [DN25]	•		•			
	1-1/4" [DN32]	•		•			
	1-1/2" [DN40]	•		•			
	2" [DN50]	•		•		•	•
	2-1/2" [DN65]	•		•	•	•	•
	3" [DN80]	•		•	•	•	•
	4" [DN100]		•		•	•	•
	5" [DN125]		•		•	•	•
	6" [DN150]		•		•	•	•
	Other (maximum size)					20" [DN500]	
Pipe Fittings	Sweat						
	NPT Internal Thread	•		•			
	Inverted Flare						
Static Pressure	ANSI Flange		•		•	•	•
	ANSI 125/150		•		•		
	ANSI 250/300				•		
Media	Other	360 psi		360 psi		250 psi	
	Chilled Water	•	•	•	•	•	•
	Hot Water	•	•	•	•	•	•
	Low Pressure Steam						
Flow Capacity, Cv	High Pressure Steam						
	Multiple ratings per pipe size	•	•	x (gpm)	x (gpm)		
Valve Action	One rating/size above 1/2"					•	•
	Direct Acting (Stem down to close)						
	Reverse Acting (Stem up to close)						
	Rotary N.O.	•	•	•	•	•	•
Flow Characteristic	Rotary N.C.	•	•	•	•		•
	Equal Percentage			•	•		
	Modified Equal Percentage	•	•			•	•
	Linear			•			
Close-off pressure***	Quick Open						
	High** (100 psid minimum)	•	•	•	•	•	•
	Medium (40 psid minimum)					•	•
Maximum Seat Leakage	Varies with actuator						
	ANSI Class III (0.10% Cv max.)			•			
	ANSI Class IV (0.01% Cv max.)	•	•			•	•
	Bubble-tight design					•	•
Rangeability	Other (see product data literature)				< 0.2%		
	High (50:1 minimum)	•	•	•	•		
	Medium* (15~50:1)	•		< 10 gpm			
Trim	Low (under 15:1)					•	•
	Brass, plated brass, bronze	•		•			
	Brass plug /Stainless seat						
	Stainless Steel	•	•	•	•		
In-line Serviceability	Resilient materials			•	•	•	•
	Cartridge			•	•		
	Packing	•	•	•	•		
Actuation Options	Rebuild		•	Regulator			
	Electronic Modulating	•	•	•	•	•	•
	Tri-state floating	•	•	•	•	•	•
	Pulse Width Modulation						
	2-position low voltage	•	•	•	•	Limited	
	2-position line voltage	•	•	•	•	•	•
	Electric Spring Return	•	•	•		Limited	
	Electronic Fail Safe				•		
	Pneumatic, low pressure					Limited	
	Pneumatic bidirectional (Hi-Pr)					•	•
	Pneumatic spring return (Hi-Pr)					•	•

Notes * Best used with supply water reset from outdoor air temperature.

** Can dead-head pumps. Use with VFD-controlled pumps with maximum pressure cut-out

*** Maximum operating differential pressure. Static close-off pressure may be higher. Maximum pressure for quiet service may be less.

Product Selection - Valves

3-Way Control Valves

Attribute	Specification	Unitary		Globe			Control Ball		Butterfly	
		Cartridge Globe		Threaded	Flanged		Threaded	Flanged	Resilient Seat	
		V58x3	V5863A3	V5013N...	VGf3xLD	VGf3xEM	VBN3	VBF3	VFF3	VFF6
Pipe Size	1/2" [DN15]	•		•			•			
	3/4" [DN20]	•		•			•			
	1" [DN25]		•	•			•			
	1-1/4" [DN32]		•	•			•			
	1-1/2" [DN40]		•	•			•			
	2" [DN50]			•			•		•	•
	2-1/2" [DN65]				•	•	•		•	•
	3" [DN80]				•	•			•	•
	4" [DN100]				•	•		•	•	•
	5" [DN125]				•	•		•	•	•
	6" [DN150]				•	•		•	•	•
	Other (maximum size)								20" [DN500]	
Pipe Fittings	Sweat	•								
	NPT Internal Thread	•	•	•			•			
	Inverted Flare									
	ANSI Flange				•	•		•	•	•
Static Pressure	ANSI 125/150			•	•	•		•		
	ANSI 250/300				•	•				
	Other	230 psi	230 psi				360 psi		250 psi	
Media	Chilled Water	•	•	•	•	•	•	•	•	•
	Hot Water	•	•	•	•	•	•	•	•	•
Flow Capacity, Cv	Multiple ratings per pipe size	•	•	•			•	•		
	One rating/size above 1/2"			•	•	•			•	•
Valve Action	Mixing A-B-AB porting	•	•	•		•	•	•	•	
	Mixing A-AB-B porting									•
	Diverting AB-B-A porting				•		•	•	•	
	Diverting A-AB-B porting									•
A-port Flow Characteristic	Equal Percentage	•		•		•				
	Modified Equal Percentage						•	•	•	•
	Linear		•		•					
	Quick Open									
B-port Flow Characteristic	Modified Equal Percentage								•	•
	Linear			•	•	•				
	Linear, Reduced Cv	•	•				•	•		
	Total Constant Flow	•	•	•	•					
	Quick Open									
Close-off pressure***	High (60 psid minimum)	•	•					•	•	•
	Medium (30 psid minimum)	•					•		•	•
	Varies with actuator			•	•	•				
Maximum Seat Leakage**	ANSI Class III (0.10% Cv max.)	•	•	•	•					
	ANSI Class IV (0.01% Cv max.)						•	A-port	•	•
	Bubble-tight design								•	•
	Other (see product data literature)					A = 0.5%		B-port		
Rangeability	High (50:1 minimum)	•	•	•	•	•	•	•		
	Medium* (15~50:1)						•			
	Low (under 15:1)								•	•
Trim	Brass, plated brass, bronze		•	•			•			
	Stainless Steel			•	•	•		•		
	Resilient materials	•							•	•
In-line Serviceability	Cartridge	•								
	Packing		•	•	•	•	•	•		
	Rebuild			•				•		
Actuation Options	Electronic Modulating	•	•	•	•	•	•	•	•	•
	Tri-state floating	•	•	•	•	•	•	•	•	•
	Pulse Width Modulation									
	2-position low voltage	•	•	•	•	•	•	•	Limited	
	2-position line voltage			•	•	•	•	•	•	•
	Electric Spring Return	•	•	•	•	•	•	•	Limited	
	Electronic Fail Safe									
	Pneumatic, low pressure	•		•	•	•			Limited	
	Pneumatic bidirectional (Hi-Pr)								•	•
	Pneumatic spring return (Hi-Pr)								•	•

Notes * Best used with supply water reset from outdoor air temperature.

** A port specification

*** A-port maximum operating differential pressure. Static close-off pressure may be higher. Maximum pressure for quiet service may be less.

**** Stem down to close

***** Stem up to close

"Limited" = not available in large sizes

Product Selection - Valves

Cartridge Globe Valves

For more than 50 years, Honeywell has manufactured the V58 series of premium Cartridge Globe Valves. The compact size and replacement capabilities make it a great choice for controlling modulating unitary equipment.

Valves 1" and larger feature a pressure balanced design with enhanced close-off (levels).

Common Features

- For closed loop HVAC systems with up to 50% glycol, not for use with steam
- Maximum static pressure 235 psi
- Long stroke allows for a wide range of control
- Leakage rate: 0.02% of Cv
- Insert replacement tool allows for the valve cartridge to be replaced or changed without draining the system (½" and ¾" models only)
- Brass body and stainless steel stem
- Threaded plastic valve cover/manual handle allows for manual operation
- Corrosion resistant



Actuator O.S. Number		Non Fail Safe			
		M6410A1029	M6410A3017	M7410F1000	M7410F3006
Power Supply	Voltage	24 Vac	24 Vac	24 Vac	24 Vac
	Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
	Power	0.7 VA	0.7 VA	1.4 VA	1.4 VA
Control	Stem Force (lb.)	40.5	67.5	40.5	67.5
	2-Position SPDT	•	•		
	Floating	•	•		
	0(2)-10 Vdc			DIP Switch	DIP Switch
	4-20 mA (external 500 Ohm resistor)			•	•
Pneumatic Spring Range					
Fail Safe Action		Stay in Place	Stay in Place	Stay in Place	Stay in Place
Reversible Operation	Wiring Change	•	•		
	DIP Switch			•	•
Stroke Timing	Seconds @ 60 Hz (Drive)	125	125	125	125
	Fail Safe				
Manual Override	(Use valve dust cap)	•	•	•	•
		•	•	•	•
Position Indicator					
Electrical Connection	Cable length, in.	36	36	36	36
	Plenum-rated Cable	•	•	•	•
	Screw terminals				
	1/2 in. flexible conduit hub	•	•	•	•



2-Way



3-Way

Valve Size (inches)	Pipe Connection Type	Flow Capacity (Cv)	Flow Characteristic	Valve Closes	Valve O.S. Number	Close-off Pressure, psid			
1/2"	f NPT	0.19	Equal%	Stem Down	V5862A2005	232		232	
	Sweat	0.19			V5852A2007	232		232	
	f NPT	0.29			V5862A2013	232		232	
	Sweat	0.29			V5852A2015	232		232	
	f NPT	0.47			V5862A2021	232		232	
	Sweat	0.47			V5852A2023	232		232	
	f NPT	0.74			V5862A2039	232		232	
	Sweat	0.74			V5852A2031	232		232	
	f NPT	1.2			V5862A2047	174		174	
	Sweat	1.2			V5852A2049	174		174	
	f NPT	1.9			V5862A2054	174		174	
	Sweat	1.9			V5852A2056	174		174	
	f NPT	2.9			V5862A2062	58		58	
	Sweat	2.9			V5852A2064	58		58	
	f NPT	4.9			V5862A2070	58		58	
	Sweat	4.9			V5852A2072	58		58	
1"	f NPT	5.5	Linear	Stem Up	V5862A3003		232		232
	f NPT	7.8			V5862A3011		232		232
	f NPT	11			V5862A3029		232		232
	1-1/4"	f NPT			V5862A3037		174		174
	1-1/2"	f NPT			V5862A3045		145		145
Valve Size (inches)	Pipe Connection Type	Flow Capacity (Cv) ¹	Flow Characteristic	Valve Closes	Valve O.S. Number	Close-off Pressure, psid			
1/2"	f NPT	0.29	A-AB Equal%, B-AB Linear	Port A to AB Stem up	V5863A2004	116		116	
	Sweat	0.29			V5853A2006	116		116	
	f NPT	0.47			V5863A2012	116		116	
	Sweat	0.47			V5853A2014	116		116	
	f NPT	0.74			V5863A2020	116		36	
	Sweat	0.74			V5853A2022	116		36	
	f NPT	1.2			V5863A2038	36		36	
	Sweat	1.2			V5853A2030	36		36	
	f NPT	1.9			V5863A2046	34		34	
	Sweat	1.9			V5853A2048	34		34	
	f NPT	2.9			V5863A1006	34		34	
	Sweat	2.9			V5853A1008	34		34	
	f NPT	4.9			V5863A1014	34		34	
	Sweat	4.9			V5853A1016	34		34	
	f NPT	2.9			V5863A2053	7.25		7.25	
	Sweat	2.9			V5853A2055	7.25		7.25	
3/4"	f NPT	4.9	Linear	Port A to AB Stem up	V5863A2061	7.25		7.25	
	Sweat	4.9			V5853A2063	7.25		7.25	
	f NPT	5.5			V5863A3002		232		232
	f NPT	7.8			V5863A3010		232		232
	f NPT	11			V5863A3028		232		232
	1-1/4"	f NPT			V5863A3036		174		174
1-1/2"	f NPT	25			V5863A3044		145		145

¹ B port Cv is 20% less

Product Selection - Valves

Cartridge Globe Valves



		Fail Safe			
Actuator O.S. Number		M6435A1004	M6435A3000	M7435F1001	M7435F3007
Power Supply	Voltage	24 Vac	24 Vac	24 Vac	24 Vac
	Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
	Power	10 VA	10 VA	5 VA	5 VA
Control	Stem Force (lb.)	40.5	90	40.5	90
	2-Position SPDT	•	•		
	Floating	•	•		
	0(2)-10 Vdc			DIP Switch	DIP Switch
	4-20 mA (external 500 Ohm resistor)			•	•
Pneumatic Spring Range					
Fail Safe Action		Stem Up	Stem Up	Stem Up	Stem Up
Reversible Operation	Wiring Change	•	•		
	DIP Switch			•	•
Stroke Timing	Seconds @ 60 Hz (Drive)	50	50	50	50
	Fail Safe	10	10	10	10
Manual Override (Use valve dust cap)		•	•	•	•
Position Indicator		•	•	•	•
Electrical Connection	Cable length, in.	—	—	—	—
	Plenum-rated Cable				
	Screw terminals	•	•	•	•
	1/2 in. flexible conduit hub	•	•	•	•

2-Way	Valve Size (inches)	Pipe Connection Type	Flow Capacity (Cv)	Flow Characteristic	Valve Closes	Valve O.S. Number	Close-off Pressure, psid				Replacement Insert
	1/2"	f NPT	0.19	Equal%	Stem Down?	V5862A2005	232		232		0902812
		Sweat	0.19			V5852A2007	232		232		0902812
		f NPT	0.29			V5862A2013	232		232		0902811
		Sweat	0.29			V5852A2015	232		232		0902811
		f NPT	0.47			V5862A2021	232		232		0902810
		Sweat	0.47			V5852A2023	232		232		0902810
		f NPT	0.74			V5862A2039	232		232		0902809
		Sweat	0.74			V5852A2031	232		232		0902809
		f NPT	1.2			V5862A2047	174		174		0902808
		Sweat	1.2			V5852A2049	174		174		0902808
	3/4"	f NPT	1.9	V5862A2054	174		174		0902807		
		Sweat	1.9	V5852A2056	174		174		0902807		
		f NPT	2.9	V5862A2062	58		58		0902814		
		Sweat	2.9	V5852A2064	58		58		0902814		
		f NPT	4.9	V5862A2070	58		58		0902815		
		Sweat	4.9	V5852A2072	58		58		0902815		
	1"	f NPT	5.5	Linear	Stem Up	V5862A3003		232		232	0903827
		f NPT	7.8			V5862A3011		232		232	0903827
		f NPT	11			V5862A3029		232		232	0903827
1-1/4"		f NPT	18			V5862A3037		174		174	0903828
1-1/2"		f NPT	25			V5862A3045		145		145	0903829
Valve Size (inches)	Pipe Connection Type	Flow Capacity (Cv) ¹	Flow Characteristic	Valve Closes	Valve O.S. Number	Close-off Pressure, psid				Replacement Insert	
3-Way	1/2"	f NPT	0.29	A-AB Equal%, B-AB Linear	Port A to AB Stem up	V5863A2004	116		116		0902821
		Sweat	0.29			V5853A2006	116		116		0902821
		f NPT	0.47			V5863A2012	116		116		0902822
		Sweat	0.47			V5853A2014	116		116		0902822
		f NPT	0.74			V5863A2020	36		36		0902823
		Sweat	0.74			V5853A2022	36		36		0902823
		f NPT	1.2			V5863A2038	36		36		0902824
		Sweat	1.2			V5853A2030	36		36		0902824
		f NPT	1.9			V5863A2046	34		34		0902825
		Sweat	1.9			V5853A2048	34		34		0902825
	3/4"	f NPT	2.9			V5863A1006	34		34		0902827
		Sweat	2.9			V5853A1008	34		34		0902827
		f NPT	4.9			V5863A1014	34		34		0902827
		Sweat	4.9			V5853A1016	34		34		0902827
		f NPT	2.9			V5863A2053	7.25		7.25		0902827
		Sweat	2.9			V5853A2055	7.25		7.25		0902827
		f NPT	4.9			V5863A2061	7.25		7.25		0902827
		Sweat	4.9			V5853A2063	7.25		7.25		0902827
	1"	f NPT	5.5	Linear		V5863A3002		232		232	0903827
		f NPT	7.8			V5863A3010		232		232	0903827
		f NPT	11			V5863A3028		232		232	0903827
		1-1/4"	f NPT			18	V5863A3036		174		174
	1-1/2"	f NPT	25	V5863A3044		145		145	0903829		

¹ B port Cv is 20% less

² Fail safe position for 1/2" and 3/4" 2-way is Normally Open with Mx435 spring return actuators. All other valves fail safe closed.

Product Selection - Valves

2-Way Control Ball Valves With Non Sping Return Actuators 1/2"-3"



Example of complete orderable part number: **VBN2A000.38SA+MVN643A0000+C1**

Control Ball Valve, Female NPT Thread, 2-way, 1/2", CV .38, Stainless Steel trim,
Standard Profile with MVN643A0000 Actuator, Fail in place and 1 meter cable.

Standard profile provides clearance between valve and actuator for insulation.
Low profile enables installation of valve and actuator in tight spaces.

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 75 to 96.

**5-YEAR
LIMITED
WARRANTY**

2-Way

Valve Specification		Valve Profile	Standard Profile		Low Profile		Black Bracket	
		Valve Trim	Plated Brass	Stainless Steel	Plated Brass	Stainless Steel	Plated Brass	Stainless Steel
Valve Size (inches)	Close-off (psi)	Cv	Valve Body Model Number					
1/2"	130	0.38	VBN2A000.38PA	VBN2A000.38SA	VBN2A000.38PL	VBN2A000.38SL	VBN2A000.38PX	VBN2A000.38SX
		0.68	VBN2A000.68PA	VBN2A000.68SA	VBN2A000.68PL	VBN2A000.68SL	VBN2A000.68PX	VBN2A000.68SX
		1.3	VBN2A001.30PA	VBN2A001.30SA	VBN2A001.30PL	VBN2A001.30SL	VBN2A001.30PX	VBN2A001.30SX
		2	VBN2A002.00PA	VBN2A002.00SA	VBN2A002.00PL	VBN2A002.00SL	VBN2A002.00PX	VBN2A002.00SX
		2.6	VBN2A002.60PA	VBN2A002.60SA	VBN2A002.60PL	VBN2A002.60SL	VBN2A002.60PX	VBN2A002.60SX
		4.7	VBN2A004.70PA	VBN2A004.70SA	VBN2A004.70PL	VBN2A004.70SL	VBN2A004.70PX	VBN2A004.70SX
		8	VBN2A008.00PA	VBN2A008.00SA	VBN2A008.00PL	VBN2A008.00SL	VBN2A008.00PX	VBN2A008.00SX
		11.7	VBN2A011.70PA	VBN2A011.70SA	VBN2A011.70PL	VBN2A011.70SL	VBN2A011.70PX	VBN2A011.70SX
		0.31	VBN2B000.31PA	VBN2B000.31SA	VBN2B000.31PL	VBN2B000.31SL	VBN2B000.31PX	VBN2B000.31SX
		0.63	VBN2B000.63PA	VBN2B000.63SA	VBN2B000.63PL	VBN2B000.63SL	VBN2B000.63PX	VBN2B000.63SX
3/4"	130	1.2	VBN2B001.20PA	VBN2B001.20SA	VBN2B001.20PL	VBN2B001.20SL	VBN2B001.20PX	VBN2B001.20SX
		2.5	VBN2B002.50PA	VBN2B002.50SA	VBN2B002.50PL	VBN2B002.50SL	VBN2B002.50PX	VBN2B002.50SX
		4.3	VBN2B004.30PA	VBN2B004.30SA	VBN2B004.30PL	VBN2B004.30SL	VBN2B004.30PX	VBN2B004.30SX
		7.4	VBN2B007.40PA	VBN2B007.40SA	VBN2B007.40PL	VBN2B007.40SL	VBN2B007.40PX	VBN2B007.40SX
		10.1	VBN2B010.10PA	VBN2B010.10SA	VBN2B010.10PL	VBN2B010.10SL	VBN2B010.10PX	VBN2B010.10SX
		14.7	VBN2B014.70PA	VBN2B014.70SA	VBN2B014.70PL	VBN2B014.70SL	VBN2B014.70PX	VBN2B014.70SX
		29	VBN2B029.00PA	VBN2B029.00SA	VBN2B029.00PL	VBN2B029.00SL	VBN2B029.00PX	VBN2B029.00SX
		4.4	VBN2C004.40PA	VBN2C004.40SA	VBN2C004.40PL	VBN2C004.40SL	VBN2C004.40PX	VBN2C004.40SX
		9	VBN2C009.00PA	VBN2C009.00SA	VBN2C009.00PL	VBN2C009.00SL	VBN2C009.00PX	VBN2C009.00SX
		15.3	VBN2C015.30PA	VBN2C015.30SA	VBN2C015.30PL	VBN2C015.30SL	VBN2C015.30PX	VBN2C015.30SX
1"	100	26	VBN2C026.00PA	VBN2C026.00SA	VBN2C026.00PL	VBN2C026.00SL	VBN2C026.00PX	VBN2C026.00SX
		44	VBN2C044.00PA	VBN2C044.00SA	VBN2C044.00PL	VBN2C044.00SL	VBN2C044.00PX	VBN2C044.00SX
		54	VBN2C054.00PA	VBN2C054.00SA	VBN2C054.00PL	VBN2C054.00SL	VBN2C054.00PX	VBN2C054.00SX
		4.4	VBN2D004.40PA	VBN2D004.40SA	VBN2D004.40PL	VBN2D004.40SL	VBN2D004.40PX	VBN2D004.40SX
		8.3	VBN2D008.30PA	VBN2D008.30SA	VBN2D008.30PL	VBN2D008.30SL	VBN2D008.30PX	VBN2D008.30SX
		14.9	VBN2D014.90PA	VBN2D014.90SA	VBN2D014.90PL	VBN2D014.90SL	VBN2D014.90PX	VBN2D014.90SX
		25	VBN2D025.00PA	VBN2D025.00SA	VBN2D025.00PL	VBN2D025.00SL	VBN2D025.00PX	VBN2D025.00SX
		37	VBN2D037.00PA	VBN2D037.00SA	VBN2D037.00PL	VBN2D037.00SL	VBN2D037.00PX	VBN2D037.00SX
		41	VBN2D041.00PA	VBN2D041.00SA	VBN2D041.00PL	VBN2D041.00SL	VBN2D041.00PX	VBN2D041.00SX
		102	VBN2D102.00PA	VBN2D102.00SA	VBN2D102.00PL	VBN2D102.00SL	VBN2D102.00PX	VBN2D102.00SX
1-1/4"	100	23					VBN2E023.00PX	VBN2E023.00SX
		30					VBN2E030.00PX	VBN2E030.00SX
		41					VBN2E041.00PX	VBN2E041.00SX
		74					VBN2E074.00PX	VBN2E074.00SX
		172					VBN2E172.00PX	VBN2E172.00SX
1-1/2"	100	42					VBN2F042.00PX	VBN2F042.00SX
		57					VBN2F057.00PX	VBN2F057.00SX
		71					VBN2F071.00PX	VBN2F071.00SX
		100					VBN2F100.00PX	VBN2F100.00SX
		108					VBN2F108.00PX	VBN2F108.00SX
2"	100	210					VBN2F210.00PX	VBN2F210.00SX
		266					VBN2F266.00PX	VBN2F266.00SX
		45					VBN2G045.00PX	VBN2G045.00SX
		55					VBN2G055.00PX	VBN2G055.00SX
		72					VBN2G072.00PX	VBN2G072.00SX
2-1/2"	100	101					VBN2G101.00PX	VBN2G101.00SX
		162					VBN2G162.00PX	VBN2G162.00SX
		202					VBN2G202.00PX	VBN2G202.00SX
		49					VBN2H049.00PX	VBN2H049.00SX
		63					VBN2H063.00PX	VBN2H063.00SX
3"	100	82					VBN2H082.00PX	VBN2H082.00SX
		124					VBN2H124.00PX	VBN2H124.00SX
		145					VBN2H145.00PX	VBN2H145.00SX

N/A

Actuator Features

				MVN Standard Profile	MVN Low Profile	DCA or DCA w/ switches
Control Signal	Timing	Voltage	Enclosure	Actuator Model Number		
Floating	90 sec.	24 VAC/DC*	NEMA 2	+MVN613A0000	+MVN613L0000	+MN6105A1011 or +MN6105A1201
Fast SPDT	30 sec.			+MVN643A0000	+MVN643L0000	
Modulating	90 sec.			+MVN713A0000	+MVN713L0000	+MN7505A2001 or +MN7505A2209
Accessories	1 meter cable			+C1		N/A
	NEMA 3R enclosure			N/A		+3R

*MVN613 24 VAC only

Product Selection - Valves



2-Way Control Ball Valves With Spring Return Actuators 1/2"-3"

Example of complete orderable part number: **VBN2A000.38SX+MS7103A2024+FSC**
Control Ball Valve, Female NPT Thread, 2-way, 1/2", CV .38, Black Bracket, Stainless Steel trim with MS7103A2024 Actuator, Fail closed.

**5-YEAR
LIMITED
WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 75 to 96.

2-Way

Valve Specification		Valve Profile	Black Bracket			
		Valve Trim	Plated Brass	Stainless Steel	Plated Brass	Stainless Steel
Valve Size (inches)	Close-off (psi)	Cv	Valve Body Model Number			
1/2"	130	0.38	VBN2A000.38PX	VBN2A000.38SX	VBN2A000.38PX	VBN2A000.38SX
		0.68	VBN2A000.68PX	VBN2A000.68SX	VBN2A000.68PX	VBN2A000.68SX
		1.3	VBN2A001.30PX	VBN2A001.30SX	VBN2A001.30PX	VBN2A001.30SX
		2	VBN2A002.00PX	VBN2A002.00SX	VBN2A002.00PX	VBN2A002.00SX
		2.6	VBN2A002.60PX	VBN2A002.60SX	VBN2A002.60PX	VBN2A002.60SX
		4.7	VBN2A004.70PX	VBN2A004.70SX	VBN2A004.70PX	VBN2A004.70SX
		8	VBN2A008.00PX	VBN2A008.00SX	VBN2A008.00PX	VBN2A008.00SX
		11.7	VBN2A011.70PX	VBN2A011.70SX	VBN2A011.70PX	VBN2A011.70SX
3/4"	130	0.31	VBN2B000.31PX	VBN2B000.31SX	VBN2B000.31PX	VBN2B000.31SX
		0.63	VBN2B000.63PX	VBN2B000.63SX	VBN2B000.63PX	VBN2B000.63SX
		1.2	VBN2B001.20PX	VBN2B001.20SX	VBN2B001.20PX	VBN2B001.20SX
		2.5	VBN2B002.50PX	VBN2B002.50SX	VBN2B002.50PX	VBN2B002.50SX
		4.3	VBN2B004.30PX	VBN2B004.30SX	VBN2B004.30PX	VBN2B004.30SX
		7.4	VBN2B007.40PX	VBN2B007.40SX	VBN2B007.40PX	VBN2B007.40SX
		10.1	VBN2B010.10PX	VBN2B010.10SX	VBN2B010.10PX	VBN2B010.10SX
		14.7	VBN2B014.70PX	VBN2B014.70SX	VBN2B014.70PX	VBN2B014.70SX
1"	100	29	VBN2B029.00PX	VBN2B029.00SX	VBN2B029.00PX	VBN2B029.00SX
		4.4	VBN2C004.40PX	VBN2C004.40SX	VBN2C004.40PX	VBN2C004.40SX
		9	VBN2C009.00PX	VBN2C009.00SX	VBN2C009.00PX	VBN2C009.00SX
		15.3	VBN2C015.30PX	VBN2C015.30SX	VBN2C015.30PX	VBN2C015.30SX
		26	VBN2C026.00PX	VBN2C026.00SX	VBN2C026.00PX	VBN2C026.00SX
		44	VBN2C044.00PX	VBN2C044.00SX	VBN2C044.00PX	VBN2C044.00SX
		54	VBN2C054.00PX	VBN2C054.00SX	VBN2C054.00PX	VBN2C054.00SX
		4.4	VBN2D004.40PX	VBN2D004.40SX	VBN2D004.40PX	VBN2D004.40SX
1-1/4"	100	8.3	VBN2D008.30PX	VBN2D008.30SX	VBN2D008.30PX	VBN2D008.30SX
		14.9	VBN2D014.90PX	VBN2D014.90SX	VBN2D014.90PX	VBN2D014.90SX
		25	VBN2D025.00PX	VBN2D025.00SX	VBN2D025.00PX	VBN2D025.00SX
		37	VBN2D037.00PX	VBN2D037.00SX	VBN2D037.00PX	VBN2D037.00SX
		41	VBN2D041.00PX	VBN2D041.00SX	VBN2D041.00PX	VBN2D041.00SX
		102	VBN2D102.00PX	VBN2D102.00SX	VBN2D102.00PX	VBN2D102.00SX
		23			VBN2E023.00PX	VBN2E023.00SX
		30			VBN2E030.00PX	VBN2E030.00SX
1-1/2"	100	41			VBN2E041.00PX	VBN2E041.00SX
		74			VBN2E074.00PX	VBN2E074.00SX
		172			VBN2E172.00PX	VBN2E172.00SX
		42			VBN2F042.00PX	VBN2F042.00SX
2"	100	57			VBN2F057.00PX	VBN2F057.00SX
		71			VBN2F071.00PX	VBN2F071.00SX
		100			VBN2F100.00PX	VBN2F100.00SX
		108			VBN2F108.00PX	VBN2F108.00SX
		210			VBN2F210.00PX	VBN2F210.00SX
		266			VBN2F266.00PX	VBN2F266.00SX
		45			VBN2G045.00PX	VBN2G045.00SX
		55			VBN2G055.00PX	VBN2G055.00SX
2-1/2"	100	72			VBN2G072.00PX	VBN2G072.00SX
		101			VBN2G101.00PX	VBN2G101.00SX
		162			VBN2G162.00PX	VBN2G162.00SX
		202			VBN2G202.00PX	VBN2G202.00SX
		49			VBN2H049.00PX	VBN2H049.00SX
		63			VBN2H063.00PX	VBN2H063.00SX
3"	100	82			VBN2H082.00PX	VBN2H082.00SX
		124			VBN2H124.00PX	VBN2H124.00SX
		145			VBN2H145.00PX	VBN2H145.00SX

N/A

Actuator Features

				DCA or DCA w/ switches	DCA or DCA w/ switches
Control Signal	Timing	Voltage	Enclosure	Actuator Model Number	
Modulating	90 sec.	24 VAC/DC	NEMA 2	+MS7103A2024 or +MS7103A2224	+MS7505A2030 or +MS7505A2130
2-position	45 sec.				+MS8105A1030 or +MS8105A1130
2-position	45 sec.			120 VAC	+MS4105A1030 or +MS4105A1130
Fail Safe Position	FSO - Fail Safe Open, FSC - Fail Safe Closed			+FSO or +FSC	+FSO or +FSC
Accessories	NEMA 3R enclosure			N/A	+3R

Note: MS7505A2030 and MS7505A2130 are only available with NEMA 3R enclosure on 1/2" - 1-1/4" valves, for NEMA 2 use MS7103A2024 or MS7103A2224. MS7505A2030 and MS7505A2130 are available with or without NEMA 3R enclosure on 1-1/2" - 3" valves.

Product Selection - Valves

3-Way Control Ball Valves With Non Spring Return Actuators ½"-2½"



Example of complete orderable part number: **VBN3A000.33PA+MVN613A0000+C1**
Control Ball Valve, Female NPT Thread, 3-way, 1-1/2", CV .33, Plated Brass trim, with MVN613A0000
Actuator, Fail in place and 1 meter cable.

**5-YEAR
LIMITED
WARRANTY**

Standard profile provides clearance between valve and actuator for insulation.
Low profile enables installation of valve and actuator in tight spaces.

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 75 to 96.

3-Way

Valve Specification		Valve Profile	Standard Profile	Low Profile	Black Bracket
		Valve Trim	Plated Brass	Stainless Steel	Plated Brass
Valve Size (inches)	Close-off (psi)	Cv	Valve Body Model Number		
1/2"	50	0.33	VBN3A000.33PA	VBN3A000.33PL	VBN3A000.33PX
		0.59	VBN3A000.59PA	VBN3A000.59PL	VBN3A000.59PX
		1.0	VBN3A001.00PA	VBN3A001.00PL	VBN3A001.00PX
		2	VBN3A002.40PA	VBN3A002.40PL	VBN3A002.40PX
		4.3	VBN3A004.30PA	VBN3A004.30PL	VBN3A004.30PX
		8.0	VBN3A008.00PA	VBN3A008.00PL	VBN3A008.00PX
3/4"	50	0	VBN3B000.40PA	VBN3B000.40PL	VBN3B000.40PX
		0.7	VBN3B000.66PA	VBN3B000.66PL	VBN3B000.66PX
		1.30	VBN3B001.30PA	VBN3B001.30PL	VBN3B001.30PX
		2.40	VBN3B002.40PA	VBN3B002.40PL	VBN3B002.40PX
		3.8	VBN3B003.80PA	VBN3B003.80PL	VBN3B003.80PX
		7.0	VBN3B007.00PA	VBN3B007.00PL	VBN3B007.00PX
1"	50	11.0	VBN3B011.00PA	VBN3B011.00PL	VBN3B011.00PX
		0.4	VBN3C000.40PA	VBN3C000.40PL	VBN3C000.40PX
		0.7	VBN3C000.65PA	VBN3C000.65PL	VBN3C000.65PX
		1.3	VBN3C001.30PA	VBN3C001.30PL	VBN3C001.30PX
		2	VBN3C002.30PA	VBN3C002.30PL	VBN3C002.30PX
		3.5	VBN3C003.50PA	VBN3C003.50PL	VBN3C003.50PX
1-1/4"	40	5	VBN3C004.50PA	VBN3C004.50PL	VBN3C004.50PX
		8.6	VBN3C008.60PA	VBN3C008.60PL	VBN3C008.60PX
		15	VBN3C014.90PA	VBN3C014.90PL	VBN3C014.90PX
		22	VBN3C022.00PA	VBN3C022.00PL	VBN3C022.00PX
		31	VBN3C031.00PA	VBN3C031.00PL	VBN3C031.00PX
		4.1	VBN3D004.10PA	VBN3D004.10PL	VBN3D004.10PX
1-1/2"	40	8.7	VBN3D008.70PA	VBN3D008.70PL	VBN3D008.70PX
		12.7	VBN3D012.70PA	VBN3D012.70PL	VBN3D012.70PX
		19.4	VBN3D019.40PA	VBN3D019.40PL	VBN3D019.40PX
		27	VBN3D027.00PA	VBN3D027.00PL	VBN3D027.00PX
		34	VBN3D034.00PA	VBN3D034.00PL	VBN3D034.00PX
		4	N/A		VBN3E004.00PX
2"	40	8.3			VBN3E008.30PX
		13.4			VBN3E013.40PX
		24			VBN3E024.00PX
		32			VBN3E032.00PX
		61			VBN3E061.00PX
2-1/2"	40	24			VBN3F024.00PX
		38			VBN3F038.00PX
		57			VBN3F057.00PX
		83			VBN3F083.00PX
		109			VBN3F109.00PX
		38			VBN3G038.00PX
2-1/2"	40	74			VBN3G074.00PX
		100			VBN3G100.00PX

VALVES

Actuator Features						
				MVN Standard Profile	MVN Low Profile	DCA or DCA w/ switches
Control Signal	Timing	Voltage	Enclosure	Actuator Model Number		
Floating	90 sec.	24 VAC/DC*	NEMA 2	+MVN613A0000	+MVN613L0000	+MN6105A1011 or +MN6105A1201
Fast SPDT	30 sec.			+MVN643A0000	+MVN643L0000	
Modulating	90 sec.			+MVN713A0000	+MVN713L0000	+MN7505A2001 or +MN7505A2209
Accessories	1 meter cable			+C1		N/A
	NEMA 3R enclosure			N/A		+3R

*MVN613 24 VAC only

Product Selection - Valves

3-Way Control Ball Valves With Spring Return Actuators 1/2"-2 1/2"



Example of complete orderable part number: **VBN3E032.00PX+MS8105A1030+FSC**
Control Ball Valve, Female NPT Thread, 3-way, 1-1/2", CV 32, Black Bracket, Plated Brass trim with MS8105A1030 Actuator, Fail closed.

**5-YEAR
LIMITED
WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 75 to 96.

3-Way

Valve Specification		Valve Profile	Black Bracket	
		Valve Trim	Plated Brass	Plated Brass
Valve Size (inches)	Close-off (psi)	Cv	Valve Body Model Number	
1/2"	50	0.33	VBN3A000.33PX	VBN3A000.33PX
		0.59	VBN3A000.59PX	VBN3A000.59PX
		1.0	VBN3A001.00PX	VBN3A001.00PX
		2	VBN3A002.40PX	VBN3A002.40PX
		4.3	VBN3A004.30PX	VBN3A004.30PX
		8.0	VBN3A008.00PX	VBN3A008.00PX
3/4"	50	0	VBN3B000.40PX	VBN3B000.40PX
		0.7	VBN3B000.66PX	VBN3B000.66PX
		1.30	VBN3B001.30PX	VBN3B001.30PX
		2.40	VBN3B002.40PX	VBN3B002.40PX
		3.8	VBN3B003.80PX	VBN3B003.80PX
		7.0	VBN3B007.00PX	VBN3B007.00PX
1"	50	11.0	VBN3B011.00PX	VBN3B011.00PX
		0.4	VBN3C000.40PX	VBN3C000.40PX
		0.7	VBN3C000.65PX	VBN3C000.65PX
		1.3	VBN3C001.30PX	VBN3C001.30PX
		2	VBN3C002.30PX	VBN3C002.30PX
		3.5	VBN3C003.50PX	VBN3C003.50PX
		5	VBN3C004.50PX	VBN3C004.50PX
		8.6	VBN3C008.60PX	VBN3C008.60PX
		15	VBN3C014.90PX	VBN3C014.90PX
		22	VBN3C022.00PX	VBN3C022.00PX
1-1/4"	40	31	VBN3C031.00PX	VBN3C031.00PX
		4.1	VBN3D004.10PX	VBN3D004.10PX
		8.7	VBN3D008.70PX	VBN3D008.70PX
		12.7	VBN3D012.70PX	VBN3D012.70PX
		19.4	VBN3D019.40PX	VBN3D019.40PX
		27	VBN3D027.00PX	VBN3D027.00PX
1-1/2"	40	34	VBN3D034.00PX	VBN3D034.00PX
		4	VBN3E004.00PX	VBN3E004.00PX
		8.3	VBN3E008.30PX	VBN3E008.30PX
		13.4	VBN3E013.40PX	VBN3E013.40PX
		24	VBN3E024.00PX	VBN3E024.00PX
		32	VBN3E032.00PX	VBN3E032.00PX
2"	40	61	VBN3E061.00PX	VBN3E061.00PX
		24	VBN3F024.00PX	VBN3F024.00PX
		38	VBN3F038.00PX	VBN3F038.00PX
		57	VBN3F057.00PX	VBN3F057.00PX
		83	VBN3F083.00PX	VBN3F083.00PX
		109	VBN3F109.00PX	VBN3F109.00PX
2-1/2"	40	38	VBN3G038.00PX	VBN3G038.00PX
		74	VBN3G074.00PX	VBN3G074.00PX
		100	VBN3G100.00PX	VBN3G100.00PX

Actuator Features					
				DCA or DCA w/ switches	DCA or DCA w/ switches
Control Signal	Timing	Voltage	Enclosure	Actuator Model Number	
Modulating	90 sec.	24 VAC/DC	NEMA 2	+MS7103A2024 or +MS7103A2224	
2-position	45 sec.			+MS7505A2030 or +MS7505A2130	
2-position	45 sec.	120 VAC		+MS8105A1030 or +MS8105A1130	
Fail Safe Position	FSA - A-AB Open FSB - B-AB Open			+MS4105A1030 or +MS4105A1130	
Accessories	NEMA 3R enclosure			+FSA or +FSB	+FSA or +FSB
				N/A	+3R

Note: MS7505A2030 and MS7505A2130 are only available with NEMA 3R enclosure on 1/2" - 1-1/4" valves, for NEMA 2 use MS7103A2024 or MS7103A2224. MS7505A2030 and MS7505A2130 are available with or without NEMA 3R enclosure on 1-1/2" - 2-1/2" valves.

Product Selection - Valves

MVN Actuator With Standard Profile, 2-Way NPT Valves ½"-1¼"

5-YEAR
LIMITED
WARRANTY

Common Features

- Max static pressure 360 psi (250°F)
- Medium: Water/glycol solutions up to 50%. Use globe valves for steam control.
- Fluid temperature range: -22 to +250°F
- Spring return actuators field-configurable for A-port normally open or normally closed fail safe.

VBN2 (Two-way)

- Equal % flow insert. Largest Cv rating in each valve size is full port, as noted
- Nickel-chrome plated brass or 316 stainless steel ball and stem
- ANSI class IV leakage (0.01% of Cv)



2-Way

Actuator Features		Non Fail Safe				Valve Only	
Actuator O.S Number/ Short Order Code		MVN613A0000		MVN613A0000+C1		N/A	
Power Supply	Voltage	24 VAC		24 VAC			
	Frequency	50/60 Hz		50/60 Hz			
	Power	1.5 VA		1.5 VA			
Actuator Torque	(lb.-in.)	27		27			
Control	Modulating (0)2-10Vdc						
	Floating	•		•			
	Fast acting SPDT						
Actuator Stroke (degrees)		90° ± 3°		90° ± 3°			
Timing (seconds)		90		90			
Fail Safe Action		Fail in Place		Fail in Place			
Valve Features	Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel

Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes					
			No Cable		1 Meter Cable		Valve Only	
½"	130	0.38	VBN2ABPA1000	VBN2ABSA1000	VBN2ABPA1001	VBN2ABSA1001	VBN2ABPA0000	VBN2ABSA0000
		0.68	VBN2ADPA1000	VBN2ADSA1000	VBN2ADPA1001	VBN2ADSA1001	VBN2ADPA0000	VBN2ADSA0000
		1.3	VBN2AEPa1000	VBN2AESa1000	VBN2AEPa1001	VBN2AESa1001	VBN2AEPa0000	VBN2AESa0000
		2	VBN2AFPA1000	VBN2AFSA1000	VBN2AFPA1001	VBN2AFSA1001	VBN2AFPA0000	VBN2AFSA0000
		2.6	VBN2AGPA1000	VBN2AGSA1000	VBN2AGPA1001	VBN2AGSA1001	VBN2AGPA0000	VBN2AGSA0000
		4.7	VBN2AHPa1000	VBN2AHSa1000	VBN2AHPa1001	VBN2AHSa1001	VBN2AHPa0000	VBN2AHSa0000
		8	VBN2AJPA1000	VBN2AJSA1000	VBN2AJPA1001	VBN2AJSA1001	VBN2AJPA0000	VBN2AJSA0000
		11.7*	VBN2AKPA1000	VBN2AKSA1000	VBN2AKPA1001	VBN2AKSA1001	VBN2AKPA0000	VBN2AKSA0000
¾"	130	0.31	VBN2BBPA1000	VBN2BBSa1000	VBN2BBPA1001	VBN2BBSa1001	VBN2BBPA0000	VBN2BBSa0000
		0.63	VBN2BDPA1000	VBN2BDSa1000	VBN2BDPA1001	VBN2BDSa1001	VBN2BDPA0000	VBN2BDSa0000
		1.2	VBN2BEPa1000	VBN2BESa1000	VBN2BEPa1001	VBN2BESa1001	VBN2BEPa0000	VBN2BESa0000
		2.5	VBN2BGPA1000	VBN2BGSa1000	VBN2BGPA1001	VBN2BGSa1001	VBN2BGPA0000	VBN2BGSa0000
		4.3	VBN2BHPa1000	VBN2BHSa1000	VBN2BHPa1001	VBN2BHSa1001	VBN2BHPa0000	VBN2BHSa0000
		7.4	VBN2BJPA1000	VBN2BJSa1000	VBN2BJPA1001	VBN2BJSa1001	VBN2BJPA0000	VBN2BJSa0000
		10.1	VBN2BKPA1000	VBN2BKSA1000	VBN2BKPA1001	VBN2BKSA1001	VBN2BKPA0000	VBN2BKSA0000
		14.7*	VBN2BLPA1000	VBN2BLSa1000	VBN2BLPA1001	VBN2BLSa1001	VBN2BLPA0000	VBN2BLSa0000
1"	100	29*	VBN2BMPa1000	VBN2BMSa1000	VBN2BMPa1001	VBN2BMSa1001	VBN2BMPa0000	VBN2BMSa0000
		4.4	VBN2CHPA1000	VBN2CHSA1000	VBN2CHPA1001	VBN2CHSA1001	VBN2CHPA0000	VBN2CHSA0000
		9	VBN2CJPA1000	VBN2CJSa1000	VBN2CJPA1001	VBN2CJSa1001	VBN2CJPA0000	VBN2CJSa0000
		15.3	VBN2CLPA1000	VBN2CLSa1000	VBN2CLPA1001	VBN2CLSa1001	VBN2CLPA0000	VBN2CLSa0000
		26	VBN2CMPa1000	VBN2CMSa1000	VBN2CMPa1001	VBN2CMSa1001	VBN2CMPa0000	VBN2CMSa0000
		44*	VBN2CNPA1000	VBN2CNSa1000	VBN2CNPA1001	VBN2CNSa1001	VBN2CNPA0000	VBN2CNSa0000
1-1/4"	100	54*	VBN2CPPA1000	VBN2CPSa1000	VBN2CPPA1001	VBN2CPSa1001	VBN2CPPA0000	VBN2CPSa0000
		4.4	VBN2DHPa1000	VBN2DHSa1000	VBN2DHPa1001	VBN2DHSa1001	VBN2DHPa0000	VBN2DHSa0000
		8.3	VBN2DJPA1000	VBN2DJSa1000	VBN2DJPA1001	VBN2DJSa1001	VBN2DJPA0000	VBN2DJSa0000
		14.9	VBN2DKPA1000	VBN2DKSA1000	VBN2DKPA1001	VBN2DKSA1001	VBN2DKPA0000	VBN2DKSA0000
		25	VBN2DLPA1000	VBN2DLSa1000	VBN2DLPA1001	VBN2DLSa1001	VBN2DLPA0000	VBN2DLSa0000
		37	VBN2DMPa1000	VBN2DMSa1000	VBN2DMPa1001	VBN2DMSa1001	VBN2DMPa0000	VBN2DMSa0000
		41*	VBN2DNPA1000	VBN2DNSa1000	VBN2DNPA1001	VBN2DNSa1001	VBN2DNPA0000	VBN2DNSa0000
		102*	VBN2DSPA1000	VBN2DSSa1000	VBN2DSPA1001	VBN2DSSa1001	VBN2DSPA0000	VBN2DSSa0000

* Full port ball. No flow characterizing insert.

Product Selection - Valves

MVN Actuator With Standard Profile 2-Way NPT Valves ½"-1 ¼"

			Actuator Features		Non Fail Safe									
			Actuator O.S Number/ Short Order Code		MVN643A0000		MVN643A0000+C1		MVN713A0000		MVN713A0000+C1			
			Power Supply		24 VAC/DC		24 VAC/DC		24 VAC/DC		24 VAC/DC			
			Voltage											
			Frequency		50/60 Hz		50/60 Hz		50/60 Hz		50/60 Hz			
			Power		6 VA		6 VA		5 VA		5 VA			
			Actuator Torque (lb. -in.)		27		27		27		27			
			Control Modulating (0)2-10Vdc						•		•			
			Floating											
			Fast acting SPDT		•		•							
			Actuator Stroke (degrees)		90° ± 3°		90° ± 3°		90° ± 3°		90° ± 3°			
			Timing (seconds)		30		30		90		90			
			Fail Safe Action		Fail in Place		Fail in Place		Fail in Place		Fail in Place			
			Valve Features		Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	
Valve Size (inches)			Close-off Pressure (psid)		Cv		Short Order Codes							
							No Cable		1 Meter Cable		No Cable		1 Meter Cable	
1/2"	100	0.38	VBN2ABPA2000	VBN2ABSA2000	VBN2ABPA2001	VBN2ABSA2001	VBN2ABPA3000	VBN2ABSA3000	VBN2ABPA3001	VBN2ABSA3001				
		0.68	VBN2ADPA2000	VBN2ADSA2000	VBN2ADPA2001	VBN2ADSA2001	VBN2ADPA3000	VBN2ADSA3000	VBN2ADPA3001	VBN2ADSA3001				
		1.3	VBN2AEPa2000	VBN2AESA2000	VBN2AEPa2001	VBN2AESA2001	VBN2AEPa3000	VBN2AESA3000	VBN2AEPa3001	VBN2AESA3001				
		2	VBN2AFPA2000	VBN2AFSA2000	VBN2AFPA2001	VBN2AFSA2001	VBN2AFPA3000	VBN2AFSA3000	VBN2AFPA3001	VBN2AFSA3001				
		2.6	VBN2AGPA2000	VBN2AGSA2000	VBN2AGPA2001	VBN2AGSA2001	VBN2AGPA3000	VBN2AGSA3000	VBN2AGPA3001	VBN2AGSA3001				
		4.7	VBN2AHPa2000	VBN2AHTA2000	VBN2AHPa2001	VBN2AHTA2001	VBN2AHPa3000	VBN2AHTA3000	VBN2AHPa3001	VBN2AHTA3001				
		8	VBN2AJPA2000	VBN2AJSA2000	VBN2AJPA2001	VBN2AJSA2001	VBN2AJPA3000	VBN2AJSA3000	VBN2AJPA3001	VBN2AJSA3001				
		11.7*	VBN2AKPA2000	VBN2AKSA2000	VBN2AKPA2001	VBN2AKSA2001	VBN2AKPA3000	VBN2AKSA3000	VBN2AKPA3001	VBN2AKSA3001				
3/4"	100	0.31	VBN2BBPA2000	VBN2BBSA2000	VBN2BBPA2001	VBN2BBSA2001	VBN2BBPA3000	VBN2BBSA3000	VBN2BBPA3001	VBN2BBSA3001				
		0.63	VBN2BDPA2000	VBN2BDSA2000	VBN2BDPA2001	VBN2BDSA2001	VBN2BDPA3000	VBN2BDSA3000	VBN2BDPA3001	VBN2BDSA3001				
		1.2	VBN2BEPa2000	VBN2BESA2000	VBN2BEPa2001	VBN2BESA2001	VBN2BEPa3000	VBN2BESA3000	VBN2BEPa3001	VBN2BESA3001				
		2.5	VBN2BGPA2000	VBN2BGSA2000	VBN2BGPA2001	VBN2BGSA2001	VBN2BGPA3000	VBN2BGSA3000	VBN2BGPA3001	VBN2BGSA3001				
		4.3	VBN2BHPa2000	VBN2BHSA2000	VBN2BHPa2001	VBN2BHSA2001	VBN2BHPa3000	VBN2BHSA3000	VBN2BHPa3001	VBN2BHSA3001				
		7.4	VBN2BJPA2000	VBN2BJSa2000	VBN2BJPA2001	VBN2BJSa2001	VBN2BJPA3000	VBN2BJSa3000	VBN2BJPA3001	VBN2BJSa3001				
		10.1	VBN2BKPA2000	VBN2BKSA2000	VBN2BKPA2001	VBN2BKSA2001	VBN2BKPA3000	VBN2BKSA3000	VBN2BKPA3001	VBN2BKSA3001				
		14.7*	VBN2BLPA2000	VBN2BLSa2000	VBN2BLPA2001	VBN2BLSa2001	VBN2BLPA3000	VBN2BLSa3000	VBN2BLPA3001	VBN2BLSa3001				
1"	100	29*	VBN2BMPa2000	VBN2BMSa2000	VBN2BMPa2001	VBN2BMSa2001	VBN2BMPa3000	VBN2BMSa3000	VBN2BMPa3001	VBN2BMSa3001				
		4.4	VBN2CHPA2000	VBN2CHSA2000	VBN2CHPA2001	VBN2CHSA2001	VBN2CHPA3000	VBN2CHSA3000	VBN2CHPA3001	VBN2CHSA3001				
		9	VBN2CJPA2000	VBN2CJSa2000	VBN2CJPA2001	VBN2CJSa2001	VBN2CJPA3000	VBN2CJSa3000	VBN2CJPA3001	VBN2CJSa3001				
		15.3	VBN2CLPA2000	VBN2CLSA2000	VBN2CLPA2001	VBN2CLSA2001	VBN2CLPA3000	VBN2CLSA3000	VBN2CLPA3001	VBN2CLSA3001				
		26	VBN2CMPa2000	VBN2CMSa2000	VBN2CMPa2001	VBN2CMSa2001	VBN2CMPa3000	VBN2CMSa3000	VBN2CMPa3001	VBN2CMSa3001				
		44*	VBN2CNPA2000	VBN2CNSa2000	VBN2CNPA2001	VBN2CNSa2001	VBN2CNPA3000	VBN2CNSa3000	VBN2CNPA3001	VBN2CNSa3001				
1-1/4"	100	54*	VBN2CPPa2000	VBN2CPSa2000	VBN2CPPa2001	VBN2CPSa2001	VBN2CPPa3000	VBN2CPSa3000	VBN2CPPa3001	VBN2CPSa3001				
		4.4	VBN2DHPa2000	VBN2DHSA2000	VBN2DHPa2001	VBN2DHSA2001	VBN2DHPa3000	VBN2DHSA3000	VBN2DHPa3001	VBN2DHSA3001				
		8.3	VBN2DJPA2000	VBN2DJSa2000	VBN2DJPA2001	VBN2DJSa2001	VBN2DJPA3000	VBN2DJSa3000	VBN2DJPA3001	VBN2DJSa3001				
		14.9	VBN2DKPA2000	VBN2DKSA2000	VBN2DKPA2001	VBN2DKSA2001	VBN2DKPA3000	VBN2DKSA3000	VBN2DKPA3001	VBN2DKSA3001				
		25	VBN2DLPA2000	VBN2DLSa2000	VBN2DLPA2001	VBN2DLSa2001	VBN2DLPA3000	VBN2DLSa3000	VBN2DLPA3001	VBN2DLSa3001				
		37	VBN2DMPa2000	VBN2DMSa2000	VBN2DMPa2001	VBN2DMSa2001	VBN2DMPa3000	VBN2DMSa3000	VBN2DMPa3001	VBN2DMSa3001				
		41*	VBN2DNPA2000	VBN2DNSa2000	VBN2DNPA2001	VBN2DNSa2001	VBN2DNPA3000	VBN2DNSa3000	VBN2DNPA3001	VBN2DNSa3001				
102*	VBN2DSPa2000	VBN2DSSa2000	VBN2DSPa2001	VBN2DSSa2001	VBN2DSPa3000	VBN2DSSa3000	VBN2DSPa3001	VBN2DSSa3001						

* Full port ball. No flow characterizing insert.

Product Selection - Valves

MVN Actuator With Low Profile 2-Way NPT Valves ½"-1¼"

Common Features

- Max static pressure 360 psi (250°F)
- Medium: Water/glycol solutions up to 50%. Use globe valves for steam control.
- Fluid temperature range: -22 to +250°F
- Spring return actuators field-configurable for A-port normally open or normally closed fail safe.

VBN2 (Two-way)

- Equal % flow insert. Largest Cv rating in each valve size is full port, as noted
- Nickel-chrome plated brass or 316 stainless steel ball and stem
- ANSI class IV leakage (0.01% of Cv)

Actuator Features		Non Fail Safe		Valve Only	
Actuator O.S Number/ Short Order Code		MVN613L0000	MVN613L0000	N/A	
Power Supply	Voltage	24 Vac	24 Vac		
	Frequency	50/60 Hz	50/60 Hz		
	Power	1.5 VA	1.5 VA		
Actuator Torque (lb.-in.)		27	27		
Control	Modulating (0)2-10Vdc				
	Floating	•	•		
	Fast acting SPDT				
Actuator Stroke (degrees)		90° ± 3°	90 ± 3		
Timing (seconds)		90	90		
Fail Safe Action		Fail in Place	Fail in Place		
Valve Features		Trim	Nickel-Plated Brass Stainless Steel	Nickel-Plated Brass Stainless Steel	Nickel-Plated Brass Stainless Steel

Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes					
			No Cable		1 Meter Cable		Valve Only	
1/2"	130	0.38	VBN2ABPL1000	VBN2ABSL1000	VBN2ABPL1001	VBN2ABSL1001	VBN2ABPL0000	VBN2ABSL0000
		0.68	VBN2ADPL1000	VBN2ADSL1000	VBN2ADPL1001	VBN2ADSL1001	VBN2ADPL0000	VBN2ADSL0000
		1.3	VBN2AEPL1000	VBN2AESL1000	VBN2AEPL1001	VBN2AESL1001	VBN2AEPL0000	VBN2AESL0000
		2	VBN2AFPL1000	VBN2AFSL1000	VBN2AFPL1001	VBN2AFSL1001	VBN2AFPL0000	VBN2AFSL0000
		2.6	VBN2AGPL1000	VBN2AGSL1000	VBN2AGPL1001	VBN2AGSL1001	VBN2AGPL0000	VBN2AGSL0000
		4.7	VBN2AHPL1000	VBN2AHSL1000	VBN2AHPL1001	VBN2AHSL1001	VBN2AHPL0000	VBN2AHSL0000
		8	VBN2AJPL1000	VBN2AJSL1000	VBN2AJPL1001	VBN2AJSL1001	VBN2AJPL0000	VBN2AJSL0000
		11.7*	VBN2AKPL1000	VBN2AKSL1000	VBN2AKPL1001	VBN2AKSL1001	VBN2AKPL0000	VBN2AKSL0000
3/4"	130	0.31	VBN2BBPL1000	VBN2BBSL1000	VBN2BBPL1001	VBN2BBSL1001	VBN2BBPL0000	VBN2BBSL0000
		0.63	VBN2BDPL1000	VBN2BDSL1000	VBN2BDPL1001	VBN2BDSL1001	VBN2BDPL0000	VBN2BDSL0000
		1.2	VBN2BEPL1000	VBN2BESL1000	VBN2BEPL1001	VBN2BESL1001	VBN2BEPL0000	VBN2BESL0000
		2.5	VBN2BGPL1000	VBN2BGSL1000	VBN2BGPL1001	VBN2BGSL1001	VBN2BGPL0000	VBN2BGSL0000
		4.3	VBN2BHPL1000	VBN2BHSL1000	VBN2BHPL1001	VBN2BHSL1001	VBN2BHPL0000	VBN2BHSL0000
		7.4	VBN2BJPL1000	VBN2BJS�1000	VBN2BJPL1001	VBN2BJS�1001	VBN2BJPL0000	VBN2BJS�0000
		10.1	VBN2BKPL1000	VBN2BKSL1000	VBN2BKPL1001	VBN2BKSL1001	VBN2BKPL0000	VBN2BKSL0000
		14.7*	VBN2BLPL1000	VBN2BLSL1000	VBN2BLPL1001	VBN2BLSL1001	VBN2BLPL0000	VBN2BLSL0000
		29*	VBN2BMPL1000	VBN2BMSL1000	VBN2BMPL1001	VBN2BMSL1001	VBN2BMPL0000	VBN2BMSL0000
1"	100	4.4	VBN2CHPL1000	VBN2CHSL1000	VBN2CHPL1001	VBN2CHSL1001	VBN2CHPL0000	VBN2CHSL0000
		9	VBN2CJPL1000	VBN2CJSL1000	VBN2CJPL1001	VBN2CJSL1001	VBN2CJPL0000	VBN2CJSL0000
		15.3	VBN2CLPL1000	VBN2CLSL1000	VBN2CLPL1001	VBN2CLSL1001	VBN2CLPL0000	VBN2CLSL0000
		26	VBN2CMPL1000	VBN2CMSL1000	VBN2CMPL1001	VBN2CMSL1001	VBN2CMPL0000	VBN2CMSL0000
		44*	VBN2CNPL1000	VBN2CNSL1000	VBN2CNPL1001	VBN2CNSL1001	VBN2CNPL0000	VBN2CNSL0000
		54*	VBN2CPPL1000	VBN2CPSL1000	VBN2CPPL1001	VBN2CPSL1001	VBN2CPPL0000	VBN2CPSL0000
1-1/4"	100	4.4	VBN2DHPL1000	VBN2DHSL1000	VBN2DHPL1001	VBN2DHSL1001	VBN2DHPL0000	VBN2DHSL0000
		8.3	VBN2DJPL1000	VBN2DJSL1000	VBN2DJPL1001	VBN2DJSL1001	VBN2DJPL0000	VBN2DJSL0000
		14.9	VBN2DKPL1000	VBN2DKSL1000	VBN2DKPL1001	VBN2DKSL1001	VBN2DKPL0000	VBN2DKSL0000
		25	VBN2DLPL1000	VBN2DLSL1000	VBN2DLPL1001	VBN2DLSL1001	VBN2DLPL0000	VBN2DLSL0000
		37	VBN2DMPL1000	VBN2DMSL1000	VBN2DMPL1001	VBN2DMSL1001	VBN2DMPL0000	VBN2DMSL0000
		41*	VBN2DNPL1000	VBN2DNSL1000	VBN2DNPL1001	VBN2DNSL1001	VBN2DNPL0000	VBN2DNSL0000
		102*	VBN2DSPL1000	VBN2DSSL1000	VBN2DSPL1001	VBN2DSSL1001	VBN2DSPL0000	VBN2DSSL0000

* Full port ball. No flow characterizing insert.



Product Selection - Valves

MVN Actuator With Low Profile 2-Way NPT Valves ½"-1¼"

Actuator Features		Non Fail Safe								
Actuator O.S Number/ Short Order Code		MVN643A0000		MVN643A0000+C1		MVN713A0000		MVN713A0000+C1		
Power Supply	Voltage	24 VAC/DC		24 VAC/DC		24 VAC/DC		24 VAC/DC		
	Frequency	50/60 Hz		50/60 Hz		50/60 Hz		50/60 Hz		
	Power	6 VA		6 VA		5 VA		5 VA		
Actuator Torque (lb.-in.)		27		27		27		27		
Control	Modulating (0)2-10Vdc					•		•		
	Floating									
	Fast acting SPDT	•		•						
Actuator Stroke (degrees)		90° ± 3°		90° ± 3°		90° ± 3°		90° ± 3°		
Timing (seconds)		30		30		90		90		
Fail Safe Action		Fail in Place		Fail in Place		Fail in Place		Fail in Place		
Valve Features		Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel

Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes							
			No Cable		1 Meter Cable		No Cable		1 Meter Cable	
½"	130	0.38	VBN2ABPL2000	VBN2ABSL2000	VBN2ABPL2001	VBN2ABSL2001	VBN2ABPL3000	VBN2ABSL3000	VBN2ABPL3001	VBN2ABSL3001
		0.68	VBN2ADPL2000	VBN2ADSL2000	VBN2ADPL2001	VBN2ADSL2001	VBN2ADPL3000	VBN2ADSL3000	VBN2ADPL3001	VBN2ADSL3001
		1.3	VBN2AEPL2000	VBN2AESL2000	VBN2AEPL2001	VBN2AESL2001	VBN2AEPL3000	VBN2AESL3000	VBN2AEPL3001	VBN2AESL3001
		2	VBN2AFPL2000	VBN2AFSL2000	VBN2AFPL2001	VBN2AFSL2001	VBN2AFPL3000	VBN2AFSL3000	VBN2AFPL3001	VBN2AFSL3001
		2.6	VBN2AGPL2000	VBN2AGSL2000	VBN2AGPL2001	VBN2AGSL2001	VBN2AGPL3000	VBN2AGSL3000	VBN2AGPL3001	VBN2AGSL3001
		4.7	VBN2AHPL2000	VBN2AHSL2000	VBN2AHPL2001	VBN2AHSL2001	VBN2AHPL3000	VBN2AHSL3000	VBN2AHPL3001	VBN2AHSL3001
		8	VBN2AJPL2000	VBN2AJSL2000	VBN2AJPL2001	VBN2AJSL2001	VBN2AJPL3000	VBN2AJSL3000	VBN2AJPL3001	VBN2AJSL3001
		11.7*	VBN2AKPL2000	VBN2AKSL2000	VBN2AKPL2001	VBN2AKSL2001	VBN2AKPL3000	VBN2AKSL3000	VBN2AKPL3001	VBN2AKSL3001
¾"	130	0.31	VBN2BBPL2000	VBN2BBSL2000	VBN2BBPL2001	VBN2BBSL2001	VBN2BBPL3000	VBN2BBSL3000	VBN2BBPL3001	VBN2BBSL3001
		0.63	VBN2BDPL2000	VBN2BDSL2000	VBN2BDPL2001	VBN2BDSL2001	VBN2BDPL3000	VBN2BDSL3000	VBN2BDPL3001	VBN2BDSL3001
		1.2	VBN2BEPL2000	VBN2BESL2000	VBN2BEPL2001	VBN2BESL2001	VBN2BEPL3000	VBN2BESL3000	VBN2BEPL3001	VBN2BESL3001
		2.5	VBN2BGPL2000	VBN2BGS�2000	VBN2BGPL2001	VBN2BGS�2001	VBN2BGPL3000	VBN2BGS�3000	VBN2BGPL3001	VBN2BGS�3001
		4.3	VBN2BHPL2000	VBN2BHSL2000	VBN2BHPL2001	VBN2BHSL2001	VBN2BHPL3000	VBN2BHSL3000	VBN2BHPL3001	VBN2BHSL3001
		7.4	VBN2BJPL2000	VBN2BJS�2000	VBN2BJPL2001	VBN2BJS�2001	VBN2BJPL3000	VBN2BJS�3000	VBN2BJPL3001	VBN2BJS�3001
		10.1	VBN2BKPL2000	VBN2BKSL2000	VBN2BKPL2001	VBN2BKSL2001	VBN2BKPL3000	VBN2BKSL3000	VBN2BKPL3001	VBN2BKSL3001
		14.7*	VBN2BLPL2000	VBN2BLSL2000	VBN2BLPL2001	VBN2BLSL2001	VBN2BLPL3000	VBN2BLSL3000	VBN2BLPL3001	VBN2BLSL3001
1"	100	29*	VBN2BMPL2000	VBN2BMSL2000	VBN2BMPL2001	VBN2BMSL2001	VBN2BMPL3000	VBN2BMSL3000	VBN2BMPL3001	VBN2BMSL3001
		4.4	VBN2CHPL2000	VBN2CHSL2000	VBN2CHPL2001	VBN2CHSL2001	VBN2CHPL3000	VBN2CHSL3000	VBN2CHPL3001	VBN2CHSL3001
		9	VBN2CJPL2000	VBN2CJS�2000	VBN2CJPL2001	VBN2CJS�2001	VBN2CJPL3000	VBN2CJS�3000	VBN2CJPL3001	VBN2CJS�3001
		15.3	VBN2CLPL2000	VBN2CLS�2000	VBN2CLPL2001	VBN2CLS�2001	VBN2CLPL3000	VBN2CLS�3000	VBN2CLPL3001	VBN2CLS�3001
		26	VBN2CMPL2000	VBN2CMSL2000	VBN2CMPL2001	VBN2CMSL2001	VBN2CMPL3000	VBN2CMSL3000	VBN2CMPL3001	VBN2CMSL3001
		44*	VBN2CNPL2000	VBN2CNSL2000	VBN2CNPL2001	VBN2CNSL2001	VBN2CNPL3000	VBN2CNSL3000	VBN2CNPL3001	VBN2CNSL3001
1-1/4"	100	54*	VBN2CPPL2000	VBN2CPSL2000	VBN2CPPL2001	VBN2CPSL2001	VBN2CPPL3000	VBN2CPSL3000	VBN2CPPL3001	VBN2CPSL3001
		4.4	VBN2DHPL2000	VBN2DHSL2000	VBN2DHPL2001	VBN2DHSL2001	VBN2DHPL3000	VBN2DHSL3000	VBN2DHPL3001	VBN2DHSL3001
		8.3	VBN2DJPL2000	VBN2DJS�2000	VBN2DJPL2001	VBN2DJS�2001	VBN2DJPL3000	VBN2DJS�3000	VBN2DJPL3001	VBN2DJS�3001
		14.9	VBN2DKPL2000	VBN2DKSL2000	VBN2DKPL2001	VBN2DKSL2001	VBN2DKPL3000	VBN2DKSL3000	VBN2DKPL3001	VBN2DKSL3001
		25	VBN2DLPL2000	VBN2DLSL2000	VBN2DLPL2001	VBN2DLSL2001	VBN2DLPL3000	VBN2DLSL3000	VBN2DLPL3001	VBN2DLSL3001
		37	VBN2DMPL2000	VBN2DMSL2000	VBN2DMPL2001	VBN2DMSL2001	VBN2DMPL3000	VBN2DMSL3000	VBN2DMPL3001	VBN2DMSL3001
		41*	VBN2DNPL2000	VBN2DNSL2000	VBN2DNPL2001	VBN2DNSL2001	VBN2DNPL3000	VBN2DNSL3000	VBN2DNPL3001	VBN2DNSL3001
1-1/4"	100	102*	VBN2DSPL2000	VBN2DSSL2000	VBN2DSPL2001	VBN2DSSL2001	VBN2DSPL3000	VBN2DSSL3000	VBN2DSPL3001	VBN2DSSL3001

* Full port ball. No flow characterizing insert.

Product Selection - Valves

MVN Actuator With Standard Profile 3-Way NPT Valves ½"-1¼"

Common Features

- Max static pressure 360 psi (250°F)
- Medium: Water/glycol solutions up to 50%. Use globe valves for steam control.
- Fluid temperature range: -22 to +250°F
- Spring return actuators field-configurable for A-port normally open or normally closed fail safe.

VBN2 (Two-way)

- Equal % flow insert. Largest Cv rating in each valve size is full port, as noted
- Nickel-chrome plated brass or 316 stainless steel ball and stem
- ANSI class IV leakage (0.01% of Cv)



3-Way

Actuator Features		Non Fail Safe						Valve Only
Actuator O.S Number/ Short Order Code		MVN613A0000	MVN613A0000+C1	MVN643A0000	MVN643A0000+C1	MVN713A0000	MVN713A0000+C1	N/A
Power Supply	Voltage	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac	
	Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	
	Power	1.5 VA	1.5 VA	6 VA	6 VA	5 VA	5 VA	
Actuator Torque	(lb.-in.)	27	27	27	27	27	27	
Control	Modulating (0)2-10Vdc					•	•	
	Floating	•	•					
	Fast acting SPDT			•	•			
Actuator Stroke (degrees)		90 ±3	90 ±3	90 ±3	90 ±3	90 ±3	90 ±3	
Timing	(seconds)	90	90	30	30	90	90	
Fail Safe Action		Fail in Place	Fail in Place	Fail in Place	Fail in Place	Fail in Place	Fail in Place	
Valve Features	Trim	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass
Close-off Pressure (psid)	Cv	Short Order Codes						
		No Cable	1 Meter Cable	No Cable	1 Meter Cable	No Cable	1 Meter Cable	Valve Only
50	0.33	VBN3ABPA1000	VBN3ABPA1001	VBN3ABPA2000	VBN3ABPA2001	VBN3ABPA3000	VBN3ABPA3001	VBN3ABPA0000
	0.59	VBN3ACPA1000	VBN3ACPA1001	VBN3ACPA2000	VBN3ACPA2001	VBN3ACPA3000	VBN3ACPA3001	VBN3ACPA0000
	1	VBN3AEPa1000	VBN3AEPa1001	VBN3AEPa2000	VBN3AEPa2001	VBN3AEPa3000	VBN3AEPa3001	VBN3AEPa0000
	2.4	VBN3AFPA1000	VBN3AFPA1001	VBN3AFPA2000	VBN3AFPA2001	VBN3AFPA3000	VBN3AFPA3001	VBN3AFPA0000
	4.3	VBN3AHPA1000	VBN3AHPA1001	VBN3AHPA2000	VBN3AHPA2001	VBN3AHPA3000	VBN3AHPA3001	VBN3AHPA0000
	8*	VBN3AJPA1000	VBN3AJPA1001	VBN3AJPA2000	VBN3AJPA2001	VBN3AJPA3000	VBN3AJPA3001	VBN3AJPA0000
50	0.4	VBN3BCPA1000	VBN3BCPA1001	VBN3BCPA2000	VBN3BCPA2001	VBN3BCPA3000	VBN3BCPA3001	VBN3BCPA0000
	0.66	VBN3BDPA1000	VBN3BDPA1001	VBN3BDPA2000	VBN3BDPA2001	VBN3BDPA3000	VBN3BDPA3001	VBN3BDPA0000
	1.3	VBN3BEPA1000	VBN3BEPA1001	VBN3BEPA2000	VBN3BEPA2001	VBN3BEPA3000	VBN3BEPA3001	VBN3BEPA0000
	2.4	VBN3BFPA1000	VBN3BFPA1001	VBN3BFPA2000	VBN3BFPA2001	VBN3BFPA3000	VBN3BFPA3001	VBN3BFPA0000
	3.8	VBN3BGPA1000	VBN3BGPA1001	VBN3BGPA2000	VBN3BGPA2001	VBN3BGPA3000	VBN3BGPA3001	VBN3BGPA0000
	7	VBN3BJPA1000	VBN3BJPA1001	VBN3BJPA2000	VBN3BJPA2001	VBN3BJPA3000	VBN3BJPA3001	VBN3BJPA0000
	11*	VBN3BKPA1000	VBN3BKPA1001	VBN3BKPA2000	VBN3BKPA2001	VBN3BKPA3000	VBN3BKPA3001	VBN3BKPA0000
50	0.4	VBN3CCPA1000	VBN3CCPA1001	VBN3CCPA2000	VBN3CCPA2001	VBN3CCPA3000	VBN3CCPA3001	VBN3CCPA0000
	0.65	VBN3CDPA1000	VBN3CDPA1001	VBN3CDPA2000	VBN3CDPA2001	VBN3CDPA3000	VBN3CDPA3001	VBN3CDPA0000
	1.3	VBN3CEPA1000	VBN3CEPA1001	VBN3CEPA2000	VBN3CEPA2001	VBN3CEPA3000	VBN3CEPA3001	VBN3CEPA0000
	2.3	VBN3CFPA1000	VBN3CFPA1001	VBN3CFPA2000	VBN3CFPA2001	VBN3CFPA3000	VBN3CFPA3001	VBN3CFPA0000
	3.5	VBN3CGPA1000	VBN3CGPA1001	VBN3CGPA2000	VBN3CGPA2001	VBN3CGPA3000	VBN3CGPA3001	VBN3CGPA0000
	4.5	VBN3CHPA1000	VBN3CHPA1001	VBN3CHPA2000	VBN3CHPA2001	VBN3CHPA3000	VBN3CHPA3001	VBN3CHPA0000
	8.6	VBN3CJPA1000	VBN3CJPA1001	VBN3CJPA2000	VBN3CJPA2001	VBN3CJPA3000	VBN3CJPA3001	VBN3CJPA0000
	14.9	VBN3CKPA1000	VBN3CKPA1001	VBN3CKPA2000	VBN3CKPA2001	VBN3CKPA3000	VBN3CKPA3001	VBN3CKPA0000
	22*	VBN3CLPA1000	VBN3CLPA1001	VBN3CLPA2000	VBN3CLPA2001	VBN3CLPA3000	VBN3CLPA3001	VBN3CLPA0000
	31*	VBN3CMPA1000	VBN3CMPA1001	VBN3CMPA2000	VBN3CMPA2001	VBN3CMPA3000	VBN3CMPA3001	VBN3CMPA0000
40	4.1	VBN3DHPA1000	VBN3DHPA1001	VBN3DHPA2000	VBN3DHPA2001	VBN3DHPA3000	VBN3DHPA3001	VBN3DHPA0000
	8.7	VBN3DJPA1000	VBN3DJPA1001	VBN3DJPA2000	VBN3DJPA2001	VBN3DJPA3000	VBN3DJPA3001	VBN3DJPA0000
	12.7	VBN3DKPA1000	VBN3DKPA1001	VBN3DKPA2000	VBN3DKPA2001	VBN3DKPA3000	VBN3DKPA3001	VBN3DKPA0000
	19.4*	VBN3DLPA1000	VBN3DLPA1001	VBN3DLPA2000	VBN3DLPA2001	VBN3DLPA3000	VBN3DLPA3001	VBN3DLPA0000
	27	VBN3DMPA1000	VBN3DMPA1001	VBN3DMPA2000	VBN3DMPA2001	VBN3DMPA3000	VBN3DMPA3001	VBN3DMPA0000
	34*	VBN3DNPA1000	VBN3DNPA1001	VBN3DNPA2000	VBN3DNPA2001	VBN3DNPA3000	VBN3DNPA3001	VBN3DNPA0000

* Full port ball. No flow characterizing insert.

Product Selection - Valves

MVN Actuator With Low Profile 3-Way NPT Valves ½"-1¼"

Actuator Features		Non Fail Safe						Valve Only
Actuator O.S Number/ Short Order Code		MVN613A0000	MVN613A0000+C1	MVN643A0000	MVN643A0000+C1	MVN713A0000	MVN713A0000+C1	N/A
Power Supply	Voltage	24 VAC	24 VAC	24 VAC/DC	24VAC/DC	24 VAC/DC	24 VAC/DC	
	Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	
	Power	1.5 VA	1.5 VA	6 VA	6 VA	5 VA	5 VA	
Actuator Torque	(lb.-in.)	27	27	27	27	27	27	
Control	Modulating (0)2-10Vdc					•	•	
	Floating	•	•					
	Fast acting SPDT			•	•			
Actuator Stroke (degrees)		90° ± 3°	90° ± 3°	90° ± 3°	90° ± 3°	90° ± 3°	90° ± 3°	
Timing	(seconds)	90	90	30	30	90	90	
Fail Safe Action		Fail in Place	Fail in Place	Fail in Place	Fail in Place	Fail in Place	Fail in Place	
Valve Features	Trim	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass

Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes						
			No Cable	1 Meter Cable	No Cable	1 Meter Cable	No Cable	1 Meter Cable	Valve Only
1/2"	50	0.33	VBN3ABPL1000	VBN3ABPL1001	VBN3ABPL2000	VBN3ABPL2001	VBN3ABPL3000	VBN3ABPL3001	VBN3ABPL0000
		0.59	VBN3ACPL1000	VBN3ACPL1001	VBN3ACPL2000	VBN3ACPL2001	VBN3ACPL3000	VBN3ACPL3001	VBN3ACPL0000
		1	VBN3AEPL1000	VBN3AEPL1001	VBN3AEPL2000	VBN3AEPL2001	VBN3AEPL3000	VBN3AEPL3001	VBN3AEPL0000
		2.4	VBN3AFPL1000	VBN3AFPL1001	VBN3AFPL2000	VBN3AFPL2001	VBN3AFPL3000	VBN3AFPL3001	VBN3AFPL0000
		4.3	VBN3AHPL1000	VBN3AHPL1001	VBN3AHPL2000	VBN3AHPL2001	VBN3AHPL3000	VBN3AHPL3001	VBN3AHPL0000
		8*	VBN3AJPL1000	VBN3AJPL1001	VBN3AJPL2000	VBN3AJPL2001	VBN3AJPL3000	VBN3AJPL3001	VBN3AJPL0000
3/4"	50	0.4	VBN3BCPL1000	VBN3BCPL1001	VBN3BCPL2000	VBN3BCPL2001	VBN3BCPL3000	VBN3BCPL3001	VBN3BCPL0000
		0.66	VBN3BDPL1000	VBN3BDPL1001	VBN3BDPL2000	VBN3BDPL2001	VBN3BDPL3000	VBN3BDPL3001	VBN3BDPL0000
		1.3	VBN3BEPL1000	VBN3BEPL1001	VBN3BEPL2000	VBN3BEPL2001	VBN3BEPL3000	VBN3BEPL3001	VBN3BEPL0000
		2.4	VBN3BFPL1000	VBN3BFPL1001	VBN3BFPL2000	VBN3BFPL2001	VBN3BFPL3000	VBN3BFPL3001	VBN3BFPL0000
		3.8	VBN3BGPL1000	VBN3BGPL1001	VBN3BGPL2000	VBN3BGPL2001	VBN3BGPL3000	VBN3BGPL3001	VBN3BGPL0000
		7	VBN3BJPL1000	VBN3BJPL1001	VBN3BJPL2000	VBN3BJPL2001	VBN3BJPL3000	VBN3BJPL3001	VBN3BJPL0000
		11*	VBN3BKPL1000	VBN3BKPL1001	VBN3BKPL2000	VBN3BKPL2001	VBN3BKPL3000	VBN3BKPL3001	VBN3BKPL0000
1"	50	0.4	VBN3CCPL1000	VBN3CCPL1001	VBN3CCPL2000	VBN3CCPL2001	VBN3CCPL3000	VBN3CCPL3001	VBN3CCPL0000
		0.65	VBN3CDPL1000	VBN3CDPL1001	VBN3CDPL2000	VBN3CDPL2001	VBN3CDPL3000	VBN3CDPL3001	VBN3CDPL0000
		1.3	VBN3CEPL1000	VBN3CEPL1001	VBN3CEPL2000	VBN3CEPL2001	VBN3CEPL3000	VBN3CEPL3001	VBN3CEPL0000
		2.3	VBN3CFPL1000	VBN3CFPL1001	VBN3CFPL2000	VBN3CFPL2001	VBN3CFPL3000	VBN3CFPL3001	VBN3CFPL0000
		3.5	VBN3CGPL1000	VBN3CGPL1001	VBN3CGPL2000	VBN3CGPL2001	VBN3CGPL3000	VBN3CGPL3001	VBN3CGPL0000
		4.5	VBN3CHPL1000	VBN3CHPL1001	VBN3CHPL2000	VBN3CHPL2001	VBN3CHPL3000	VBN3CHPL3001	VBN3CHPL0000
		8.6	VBN3CJPL1000	VBN3CJPL1001	VBN3CJPL2000	VBN3CJPL2001	VBN3CJPL3000	VBN3CJPL3001	VBN3CJPL0000
		14.9	VBN3CKPL1000	VBN3CKPL1001	VBN3CKPL2000	VBN3CKPL2001	VBN3CKPL3000	VBN3CKPL3001	VBN3CKPL0000
		22*	VBN3CLPL1000	VBN3CLPL1001	VBN3CLPL2000	VBN3CLPL2001	VBN3CLPL3000	VBN3CLPL3001	VBN3CLPL0000
		31*	VBN3CMPL1000	VBN3CMPL1001	VBN3CMPL2000	VBN3CMPL2001	VBN3CMPL3000	VBN3CMPL3001	VBN3CMPL0000
1-1/4"	40	4.1	VBN3DHPL1000	VBN3DHPL1001	VBN3DHPL2000	VBN3DHPL2001	VBN3DHPL3000	VBN3DHPL3001	VBN3DHPL0000
		8.7	VBN3DJPL1000	VBN3DJPL1001	VBN3DJPL2000	VBN3DJPL2001	VBN3DJPL3000	VBN3DJPL3001	VBN3DJPL0000
		12.7	VBN3DKPL1000	VBN3DKPL1001	VBN3DKPL2000	VBN3DKPL2001	VBN3DKPL3000	VBN3DKPL3001	VBN3DKPL0000
		19.4*	VBN3DLPL1000	VBN3DLPL1001	VBN3DLPL2000	VBN3DLPL2001	VBN3DLPL3000	VBN3DLPL3001	VBN3DLPL0000
		27	VBN3DMPL1000	VBN3DMPL1001	VBN3DMPL2000	VBN3DMPL2001	VBN3DMPL3000	VBN3DMPL3001	VBN3DMPL0000
		34*	VBN3DNPL1000	VBN3DNPL1001	VBN3DNPL2000	VBN3DNPL2001	VBN3DNPL3000	VBN3DNPL3001	VBN3DNPL0000

* Full port ball. No flow characterizing insert.

Product Selection - Valves

2-Way NPT Valves ½" - 3", NEMA 2

Common Features

- Max static pressure 360 psi (250°F)
- Medium: Water/glycol solutions up to 50%.
Use globe valves for steam control.
- Fluid temperature range: -22 to +250°F
- Spring return actuators field-configurable for
A-port normally open or normally closed fail
safe.

VBN2 (Two-way)

- Equal % flow insert. Largest Cv rating in each
valve size is full port, as noted
- Nickel-chrome plated brass or 316 stainless
steel ball and stem
- ANSI class IV leakage (0.01% of Cv)



2-Way

Actuator Features			Non Fail Safe			
Actuator O.S. Number			MN6105A1011		MN6105A1201	
Power Supply			Voltage		24 VAC/DC	
			Frequency		50 / 60 Hz	
			Power		5 VA	
Actuator Torque			(lb.-in.)		44	
Control			(0)2-10 Vdc			
			4-20 mA (external 500 Ohm Resistor)			
			Floating		•	
			Two-Position SPDT		•	
			Two-Position SPST			
Actuator Stroke			(degrees)		95° ± 3°	
Timing			(drive/spring return, seconds)		90	
Aux Switch					0	
Feedback			2-10 Vdc Built In		-	
Fail Safe Action					Stay in Place	
Normal Position (no signal)					Stay in Place	
Valve Features			Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass
Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes			
				Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass
1/2"	130	0.38	VBN2ABPX4000	VBN2ABPX4000	VBN2ABPX4000	VBN2ABPX4000
		0.68	VBN2ADPX4000	VBN2ADPX4000	VBN2ADPX4000	VBN2ADPX4000
		1.3	VBN2AEPX4000	VBN2AEPX4000	VBN2AEPX4000	VBN2AEPX4000
		2	VBN2AFPX4000	VBN2AFPX4000	VBN2AFPX4000	VBN2AFPX4000
		2.6	VBN2AGPX4000	VBN2AGPX4000	VBN2AGPX4000	VBN2AGPX4000
		4.7	VBN2AHPX4000	VBN2AHPX4000	VBN2AHPX4000	VBN2AHPX4000
		8	VBN2AJPX4000	VBN2AJPX4000	VBN2AJPX4000	VBN2AJPX4000
		11.7*	VBN2AKPX4000	VBN2AKPX4000	VBN2AKPX4000	VBN2AKPX4000
3/4"	130	0.31	VBN2BPPX4000	VBN2BPPX4000	VBN2BPPX4000	VBN2BPPX4000
		0.63	VBN2BDPX4000	VBN2BDPX4000	VBN2BDPX4000	VBN2BDPX4000
		1.2	VBN2BEPX4000	VBN2BEPX4000	VBN2BEPX4000	VBN2BEPX4000
		2.5	VBN2BGPX4000	VBN2BGPX4000	VBN2BGPX4000	VBN2BGPX4000
		4.3	VBN2BHPX4000	VBN2BHPX4000	VBN2BHPX4000	VBN2BHPX4000
		7.4	VBN2BJPX4000	VBN2BJPX4000	VBN2BJPX4000	VBN2BJPX4000
		10.1	VBN2BKPX4000	VBN2BKPX4000	VBN2BKPX4000	VBN2BKPX4000
		14.7*	VBN2BLPX4000	VBN2BLPX4000	VBN2BLPX4000	VBN2BLPX4000
1"	100	29*	VBN2BMPX4000	VBN2BMPX4000	VBN2BMPX4000	VBN2BMPX4000
		4.4	VBN2CHPX4000	VBN2CHPX4000	VBN2CHPX4000	VBN2CHPX4000
		9	VBN2CJPX4000	VBN2CJPX4000	VBN2CJPX4000	VBN2CJPX4000
		15.3	VBN2CLPX4000	VBN2CLPX4000	VBN2CLPX4000	VBN2CLPX4000
		26	VBN2CMPX4000	VBN2CMPX4000	VBN2CMPX4000	VBN2CMPX4000
		44*	VBN2CNPX4000	VBN2CNPX4000	VBN2CNPX4000	VBN2CNPX4000
		54*	VBN2CPPX4000	VBN2CPPX4000	VBN2CPPX4000	VBN2CPPX4000
		4.4	VBN2DHPX4000	VBN2DHPX4000	VBN2DHPX4000	VBN2DHPX4000
1-1/4"	100	8.3	VBN2DJPX4000	VBN2DJPX4000	VBN2DJPX4000	VBN2DJPX4000
		14.9	VBN2DKPX4000	VBN2DKPX4000	VBN2DKPX4000	VBN2DKPX4000
		25	VBN2DLPX4000	VBN2DLPX4000	VBN2DLPX4000	VBN2DLPX4000
		37	VBN2DMPX4000	VBN2DMPX4000	VBN2DMPX4000	VBN2DMPX4000
		41*	VBN2DNPX4000	VBN2DNPX4000	VBN2DNPX4000	VBN2DNPX4000
		102*	VBN2DSPX4000	VBN2DSPX4000	VBN2DSPX4000	VBN2DSPX4000
		23	VBN2ELPX4000	VBN2ELPX4000	VBN2ELPX4000	VBN2ELPX4000
		30	VBN2EMPX4000	VBN2EMPX4000	VBN2EMPX4000	VBN2EMPX4000
1-1/2"	100	41	VBN2ENPX4000	VBN2ENPX4000	VBN2ENPX4000	VBN2ENPX4000
		74*	VBN2ERPX4000	VBN2ERPX4000	VBN2ERPX4000	VBN2ERPX4000
		172*	VBN2E1PX4000	VBN2E1PX4000	VBN2E1PX4000	VBN2E1PX4000
		42	VBN2FNPX4000	VBN2FNPX4000	VBN2FNPX4000	VBN2FNPX4000
		57	VBN2FPPX4000	VBN2FPPX4000	VBN2FPPX4000	VBN2FPPX4000
		71	VBN2FRPX4000	VBN2FRPX4000	VBN2FRPX4000	VBN2FRPX4000
		100	VBN2FSPX4000	VBN2FSPX4000	VBN2FSPX4000	VBN2FSPX4000
		108*	VBN2FTPX4000	VBN2FTPX4000	VBN2FTPX4000	VBN2FTPX4000
2"	100	210	VBN2F1PX4000	VBN2F1PX4000	VBN2F1PX4000	VBN2F1PX4000
		266*	VBN2F2PX4000	VBN2F2PX4000	VBN2F2PX4000	VBN2F2PX4000
		45	VBN2GNPX4000	VBN2GNPX4000	VBN2GNPX4000	VBN2GNPX4000
		55	VBN2GPPX4000	VBN2GPPX4000	VBN2GPPX4000	VBN2GPPX4000
		72	VBN2GRPX4000	VBN2GRPX4000	VBN2GRPX4000	VBN2GRPX4000
		101	VBN2GSPX4000	VBN2GSPX4000	VBN2GSPX4000	VBN2GSPX4000
		162	VBN2GUPX4000	VBN2GUPX4000	VBN2GUPX4000	VBN2GUPX4000
		202*	VBN2G1PX4000	VBN2G1PX4000	VBN2G1PX4000	VBN2G1PX4000
2-1/2"	100	49	VBN2HNPX4000	VBN2HNPX4000	VBN2HNPX4000	VBN2HNPX4000
		63	VBN2HPPX4000	VBN2HPPX4000	VBN2HPPX4000	VBN2HPPX4000
		82	VBN2HRPX4000	VBN2HRPX4000	VBN2HRPX4000	VBN2HRPX4000
		124	VBN2HTPX4000	VBN2HTPX4000	VBN2HTPX4000	VBN2HTPX4000
		145*	VBN2HUPX4000	VBN2HUPX4000	VBN2HUPX4000	VBN2HUPX4000

* Full port ball. No flow characterizing insert.

Product Selection - Valves

2-Way NPT Valves ½" - 3", NEMA 2

Actuator Features			Non Fail Safe				Valve Only			
Actuator O.S. Number			MN7505A2001		MN7505A2209					
Power Supply			Voltage		24 VAC/DC					
			Frequency		50 / 60 Hz					
			Power		5 VA					
Actuator Torque			(lb.-in.)		44					
Control			(0)2-10 Vdc		•					
			4-20 mA (external 500 Ohm Resistor)		•					
			Floating		•					
			Two-Position SPDT		•					
			Two-Position SPST		•					
Actuator Stroke			(degrees)		95° ± 3°					
Timing			(drive/spring return, seconds)		90					
Aux Switch			2 x SPDT Add-on		0					
Feedback			2-10 Vdc Built In		•					
Fail Safe Action			Stay in Place		Stay in Place					
Normal Position (no signal)			Closed		Closed					
Valve Features			Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	
Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes							
1/2"	130	0.38	VBN2ABPX5000	VBN2ABSX5000	VBN2ABPXD000	VBN2ABSXD000	VBN2ABPX0000	VBN2ABSX0000		
		0.68	VBN2ADPX5000	VBN2ADSX5000	VBN2ADPXD000	VBN2ADSXD000	VBN2ADPX0000	VBN2ADSX0000		
		1.3	VBN2AEPX5000	VBN2AESX5000	VBN2AEPXD000	VBN2AESXD000	VBN2AEPX0000	VBN2AESX0000		
		2	VBN2AFPX5000	VBN2AFSX5000	VBN2AFPXD000	VBN2AFSX0000	VBN2AFPX0000	VBN2AFSX0000		
		2.6	VBN2AGPX5000	VBN2AGSX5000	VBN2AGPXD000	VBN2AGSX0000	VBN2AGPX0000	VBN2AGSX0000		
		4.7	VBN2AHPX5000	VBN2AHSX5000	VBN2AHPXD000	VBN2AHSXD000	VBN2AHPX0000	VBN2AHSX0000		
		8	VBN2AJPX5000	VBN2JXSX5000	VBN2AJPXD000	VBN2JXSXD000	VBN2AJPX0000	VBN2JXSX0000		
		11.7*	VBN2AKPX5000	VBN2AKSX5000	VBN2AKPXD000	VBN2AKSX0000	VBN2AKPX0000	VBN2AKSX0000		
3/4"	130	0.31	VBN2BBPX5000	VBN2BBSX5000	VBN2BBPXD000	VBN2BBSXD000	VBN2BBPX0000	VBN2BBSX0000		
		0.63	VBN2BDPX5000	VBN2BDSX5000	VBN2BDPXD000	VBN2BDSXD000	VBN2BDPX0000	VBN2BDSX0000		
		1.2	VBN2BEPX5000	VBN2BESX5000	VBN2BEPXD000	VBN2BESXD000	VBN2BEPX0000	VBN2BESX0000		
		2.5	VBN2BGPX5000	VBN2BGSX5000	VBN2BGPXD000	VBN2BGSXD000	VBN2BGPX0000	VBN2BGSX0000		
		4.3	VBN2BHPX5000	VBN2BHSX5000	VBN2BHPXD000	VBN2BHSXD000	VBN2BHPX0000	VBN2BHSX0000		
		7.4	VBN2BJPX5000	VBN2BJSX5000	VBN2BJPXD000	VBN2BJSXD000	VBN2BJPX0000	VBN2BJSX0000		
		10.1	VBN2BKPX5000	VBN2BKSX5000	VBN2BKPXD000	VBN2BKSX0000	VBN2BKPX0000	VBN2BKSX0000		
		14.7*	VBN2BLPX5000	VBN2BLSX5000	VBN2BLPXD000	VBN2BLSXD000	VBN2BLPX0000	VBN2BLSX0000		
1"	100	29*	VBN2BMPX5000	VBN2BMSX5000	VBN2BMPXD000	VBN2BMSXD000	VBN2BMPX0000	VBN2BMSX0000		
		4.4	VBN2CHPX5000	VBN2CHSX5000	VBN2CHPXD000	VBN2CHSX0000	VBN2CHPX0000	VBN2CHSX0000		
		9	VBN2CJPX5000	VBN2CJSX5000	VBN2CJPXD000	VBN2CJSXD000	VBN2CJPX0000	VBN2CJSX0000		
		15.3	VBN2CLPX5000	VBN2CLSX5000	VBN2CLPXD000	VBN2CLSXD000	VBN2CLPX0000	VBN2CLSX0000		
		26	VBN2CMPX5000	VBN2CMSX5000	VBN2CMPXD000	VBN2CMSXD000	VBN2CMPX0000	VBN2CMSX0000		
		44*	VBN2CNPX5000	VBN2CNSX5000	VBN2CNPXD000	VBN2CNSXD000	VBN2CNPX0000	VBN2CNSX0000		
		54*	VBN2CPPX5000	VBN2CPSX5000	VBN2CPPXD000	VBN2CPSXD000	VBN2CPPX0000	VBN2CPSX0000		
		4.4	VBN2DHPX5000	VBN2DHSX5000	VBN2DHPXD000	VBN2DHSXD000	VBN2DHPX0000	VBN2DHSX0000		
1-1/4"	100	8.3	VBN2DJPX5000	VBN2DJSX5000	VBN2DJPXD000	VBN2DJSXD000	VBN2DJPX0000	VBN2DJSX0000		
		14.9	VBN2DKPX5000	VBN2DKSX5000	VBN2DKPXD000	VBN2DKSX0000	VBN2DKPX0000	VBN2DKSX0000		
		25	VBN2DLPX5000	VBN2DLSX5000	VBN2DLPXD000	VBN2DLSXD000	VBN2DLPX0000	VBN2DLSX0000		
		37	VBN2DMPX5000	VBN2DMSX5000	VBN2DMPXD000	VBN2DMSXD000	VBN2DMPX0000	VBN2DMSX0000		
		41*	VBN2DNPX5000	VBN2DNSX5000	VBN2DNPXD000	VBN2DNSXD000	VBN2DNPX0000	VBN2DNSX0000		
		102*	VBN2DSPX5000	VBN2DSSX5000	VBN2DSPXD000	VBN2DSSXD000	VBN2DSPX0000	VBN2DSSX0000		
		23	VBN2ELPX5000	VBN2ELSX5000	VBN2ELPXD000	VBN2ELSX0000	VBN2ELPX0000	VBN2ELSX0000		
		30	VBN2EMPX5000	VBN2EMSX5000	VBN2EMPXD000	VBN2EMSX0000	VBN2EMPX0000	VBN2EMSX0000		
1-1/2"	100	41	VBN2ENPX5000	VBN2ENSX5000	VBN2ENPXD000	VBN2ENSXD000	VBN2ENPX0000	VBN2ENSX0000		
		74*	VBN2ERPX5000	VBN2ERSX5000	VBN2ERPXD000	VBN2ERSXD000	VBN2ERPX0000	VBN2ERSX0000		
		172*	VBN2E1PX5000	VBN2E1SX5000	VBN2E1PXD000	VBN2E1SX0000	VBN2E1PX0000	VBN2E1SX0000		
		42	VBN2FNPX5000	VBN2FNSX5000	VBN2FNPXD000	VBN2FNSXD000	VBN2FNPX0000	VBN2FNSX0000		
		57	VBN2FPPX5000	VBN2FPSX5000	VBN2FPPXD000	VBN2FPSXD000	VBN2FPPX0000	VBN2FPSX0000		
		71	VBN2FRPX5000	VBN2FRSX5000	VBN2FRPXD000	VBN2FRSX0000	VBN2FRPX0000	VBN2FRSX0000		
		100	VBN2FSPX5000	VBN2FSSX5000	VBN2FSPXD000	VBN2FSSXD000	VBN2FSPX0000	VBN2FSSX0000		
		108*	VBN2FTPX5000	VBN2FTSX5000	VBN2FTPXD000	VBN2FTSX0000	VBN2FTPX0000	VBN2FTSX0000		
2"	100	210	VBN2F1PX5000	VBN2F1SX5000	VBN2F1PXD000	VBN2F1SX0000	VBN2F1PX0000	VBN2F1SX0000		
		266*	VBN2F2PX5000	VBN2F2SX5000	VBN2F2PXD000	VBN2F2SX0000	VBN2F2PX0000	VBN2F2SX0000		
		45	VBN2GNPX5000	VBN2GNSX5000	VBN2GNPXD000	VBN2GNSXD000	VBN2GNPX0000	VBN2GNSX0000		
		55	VBN2GPPX5000	VBN2GPSX5000	VBN2GPPXD000	VBN2GPSXD000	VBN2GPPX0000	VBN2GPSX0000		
		72	VBN2GRPX5000	VBN2GRSX5000	VBN2GRPXD000	VBN2GRSX0000	VBN2GRPX0000	VBN2GRSX0000		
		101	VBN2GSPX5000	VBN2GSSX5000	VBN2GSPXD000	VBN2GSSXD000	VBN2GSPX0000	VBN2GSSX0000		
		162	VBN2GUPX5000	VBN2GUSX5000	VBN2GUPXD000	VBN2GUSXD000	VBN2GUPX0000	VBN2GUSX0000		
		202*	VBN2G1PX5000	VBN2G1SX5000	VBN2G1PXD000	VBN2G1SX0000	VBN2G1PX0000	VBN2G1SX0000		
2-1/2"	100	49	VBN2HNPX5000	VBN2HNSX5000	VBN2HNPXD000	VBN2HNSXD000	VBN2HNPX0000	VBN2HNSX0000		
		63	VBN2HPPX5000	VBN2HPSX5000	VBN2HPPXD000	VBN2HPSXD000	VBN2HPPX0000	VBN2HPSX0000		
		82	VBN2HRPX5000	VBN2HRSX5000	VBN2HRPXD000	VBN2HRSXD000	VBN2HRPX0000	VBN2HRSX0000		
		124	VBN2HTPX5000	VBN2HTSX5000	VBN2HTPXD000	VBN2HTSX0000	VBN2HTPX0000	VBN2HTSX0000		
		145*	VBN2HUPX5000	VBN2HUSX5000	VBN2HUPXD000	VBN2HUSXD000	VBN2HUPX0000	VBN2HUSX0000		
3"	100									

* Full port ball. No flow characterizing insert.

Product Selection - Valves

2-Way NPT Valves ½"- 1¼", NEMA 2

Actuator Features				Fail Safe							
Actuator O.S. Number				MS7103A2024				MS7103A2224			
Power Supply		Voltage		24 VAC/DC				24 VAC/DC			
		Frequency		50 / 60 Hz				50 / 60 Hz			
		Power		4 VA				4 VA			
Actuator Torque		(lb.-in.)		27				27			
Control		(0)2-10 Vdc		•				•			
		4-20 mA (external 500 Ohm Resistor)		•				•			
		Floating									
		Two-Position SPDT									
		Two-Position SPST									
Actuator Stroke		(degrees)		95° ± 3°				95° ± 3°			
Timing		(drive/spring return, seconds)		90 / 25				90 / 25			
Aux Switch				0				2			
Feedback		2-10 Vdc Built In		•				•			
Fail Safe Action				Closed		Open		Closed		Open	
Normal Position (no signal)				Closed		Open		Closed		Open	
Valve Features			Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel
Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes								
1/2"	130	0.38	VBN2ABPXE201	VBN2ABSXE201	VBN2ABPXE101	VBN2ABSXE101	VBN2ABPXF201	VBN2ABSXF201	VBN2ABPXF101	VBN2ABSXF101	
		0.68	VBN2ADPXE201	VBN2ADSXE201	VBN2ADPXE101	VBN2ADSXE101	VBN2ADPXF201	VBN2ADSXF201	VBN2ADPXF101	VBN2ADSXF101	
		1.3	VBN2AEPXE201	VBN2AESXE201	VBN2AEPXE101	VBN2AESXE101	VBN2AEPXF201	VBN2AESXF201	VBN2AEPXF101	VBN2AESXF101	
		2	VBN2AFPXE201	VBN2AFSXE201	VBN2AFPXE101	VBN2AFSXE101	VBN2AFPXF201	VBN2AFSXF201	VBN2AFPXF101	VBN2AFSXF101	
		2.6	VBN2AGPXE201	VBN2AGSXE201	VBN2AGPXE101	VBN2AGSXE101	VBN2AGPXF201	VBN2AGSXF201	VBN2AGPXF101	VBN2AGSXF101	
		4.7	VBN2AHPXE201	VBN2AHSXE201	VBN2AHPXE101	VBN2AHSXE101	VBN2AHPXF201	VBN2AHSXF201	VBN2AHPXF101	VBN2AHSXF101	
		8	VBN2AJPXE201	VBN2AJSXE201	VBN2AJPXE101	VBN2AJSXE101	VBN2AJPF201	VBN2AJSXF201	VBN2AJPF101	VBN2AJSXF101	
		11.7*	VBN2AKPXE201	VBN2AKSXE201	VBN2AKPXE101	VBN2AKSXE101	VBN2AKPXF201	VBN2AKSXF201	VBN2AKPXF101	VBN2AKSXF101	
3/4"	130	0.31	VBN2BBPXE201	VBN2BBSXE201	VBN2BBPXE101	VBN2BBSXE101	VBN2BBPXF201	VBN2BBSXF201	VBN2BBPXF101	VBN2BBSXF101	
		0.63	VBN2BDPXE201	VBN2BDSXE201	VBN2BDPXE101	VBN2BDSXE101	VBN2BDPXF201	VBN2BDSXF201	VBN2BDPXF101	VBN2BDSXF101	
		1.2	VBN2BEPXE201	VBN2BESXE201	VBN2BEPXE101	VBN2BESXE101	VBN2BEPXF201	VBN2BESXF201	VBN2BEPXF101	VBN2BESXF101	
		2.5	VBN2BGPXE201	VBN2BGSXE201	VBN2BGPXE101	VBN2BGSXE101	VBN2BGPXF201	VBN2BGSXF201	VBN2BGPXF101	VBN2BGSXF101	
		4.3	VBN2BHPXE201	VBN2BHSXE201	VBN2BHPXE101	VBN2BHSXE101	VBN2BHPXF201	VBN2BHSXF201	VBN2BHPXF101	VBN2BHSXF101	
		7.4	VBN2BJPXE201	VBN2BJSXE201	VBN2BJPXE101	VBN2BJSXE101	VBN2BJPF201	VBN2BJSXF201	VBN2BJPF101	VBN2BJSXF101	
		10.1	VBN2BKPXE201	VBN2BKSXE201	VBN2BKPXE101	VBN2BKSXE101	VBN2BKPF201	VBN2BKSXF201	VBN2BKPF101	VBN2BKSXF101	
		14.7*	VBN2BLPXE201	VBN2BLSXE201	VBN2BLPXE101	VBN2BLSXE101	VBN2BLPF201	VBN2BLSXF201	VBN2BLPF101	VBN2BLSXF101	
1"	100	29*	VBN2BMPXE201	VBN2BMSXE201	VBN2BMPXE101	VBN2BMSXE101	VBN2BMPXF201	VBN2BMSXF201	VBN2BMPXF101	VBN2BMSXF101	
		4.4	VBN2CHPXE201	VBN2CHSXE201	VBN2CHPXE101	VBN2CHSXE101	VBN2CHPXF201	VBN2CHSXF201	VBN2CHPXF101	VBN2CHSXF101	
		9	VBN2CJPXE201	VBN2CJSXE201	VBN2CJPXE101	VBN2CJSXE101	VBN2CJPF201	VBN2CJSXF201	VBN2CJPF101	VBN2CJSXF101	
		15.3	VBN2CLPXE201	VBN2CLSXE201	VBN2CLPXE101	VBN2CLSXE101	VBN2CLPF201	VBN2CLSXF201	VBN2CLPF101	VBN2CLSXF101	
		26	VBN2CMPXE201	VBN2CMSXE201	VBN2CMPXE101	VBN2CMSXE101	VBN2CMPXF201	VBN2CMSXF201	VBN2CMPXF101	VBN2CMSXF101	
		44*	VBN2CNPXE201	VBN2CNSXE201	VBN2CNPXE101	VBN2CNSXE101	VBN2CNPF201	VBN2CNSXF201	VBN2CNPF101	VBN2CNSXF101	
		54*	VBN2CPPXE201	VBN2CPSXE201	VBN2CPPXE101	VBN2CPSXE101	VBN2CPPXF201	VBN2CPSXF201	VBN2CPPXF101	VBN2CPSXF101	
		1-1/4"	100	4.4	VBN2DHPXE201	VBN2DHSXE201	VBN2DHPXE101	VBN2DHSXE101	VBN2DHPXF201	VBN2DHSXF201	VBN2DHPXF101
8.3	VBN2DJPXE201			VBN2DJSXE201	VBN2DJPXE101	VBN2DJSXE101	VBN2DJPF201	VBN2DJSXF201	VBN2DJPF101	VBN2DJSXF101	
14.9	VBN2DKPXE201			VBN2DKSXE201	VBN2DKPXE101	VBN2DKSXE101	VBN2DKPF201	VBN2DKSXF201	VBN2DKPF101	VBN2DKSXF101	
25	VBN2DLPXE201			VBN2DLSXE201	VBN2DLPXE101	VBN2DLSXE101	VBN2DLPXF201	VBN2DLSXF201	VBN2DLPXF101	VBN2DLSXF101	
37	VBN2DMPXE201			VBN2DMSXE201	VBN2DMPXE101	VBN2DMSXE101	VBN2DMPXF201	VBN2DMSXF201	VBN2DMPXF101	VBN2DMSXF101	
41*	VBN2DNPXE201			VBN2DNSXE201	VBN2DNPXE101	VBN2DNSXE101	VBN2DNPF201	VBN2DNSXF201	VBN2DNPF101	VBN2DNSXF101	
		102*	VBN2DSPXE201	VBN2DSSXE201	VBN2DSPXE101	VBN2DSSXE101	VBN2DSPXF201	VBN2DSSXF201	VBN2DSPXF101	VBN2DSSXF101	

* Full port ball. No flow characterizing insert.

Product Selection - Valves

2-Way NPT Valves 1½"- 3", NEMA 2

2-Way

Actuator Features			Fail Safe								
Actuator O.S. Number			MS7505A2030				MS7505A2130				
Power Supply		Voltage	24 VAC/DC				24 VAC/DC				
		Frequency	50 / 60 Hz				50 / 60 Hz				
		Power	6 VA				6 VA				
Actuator Torque		(lb.-in.)	44				44				
Control		(0)2-10 Vdc	•				•				
		4-20 mA (external 500 Ohm Resistor)	•				•				
		Floating	•				•				
		Two-Position SPDT	•				•				
		Two-Position SPST	•				•				
Actuator Stroke		(degrees)	95° ± 3°				95° ± 3°				
Timing		(drive/spring return, seconds)	90 / 25				90 / 25				
Aux Switch			0				1				
Feedback		2-10 Vdc Built In	•				•				
Fail Safe Action			Closed		Open		Closed		Open		
Normal Position (no signal)			Closed		Open		Closed		Open		
Valve Features			Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel
Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes								
1-1/2"	100	23	VBN2ELPX6200	VBN2ELSX6200	VBN2ELPX6100	VBN2ELSX6100	VBN2ELPX6200	VBN2ELSX6200	VBN2ELPX6100	VBN2ELSX6100	
		30	VBN2EMPX6200	VBN2EMSX6200	VBN2EMPX6100	VBN2EMSX6100	VBN2EMPX6200	VBN2EMSX6200	VBN2EMPX6100	VBN2EMSX6100	
		41	VBN2ENPX6200	VBN2ENSX6200	VBN2ENPX6100	VBN2ENSX6100	VBN2ENPX6200	VBN2ENSX6200	VBN2ENPX6100	VBN2ENSX6100	
		74*	VBN2ERP6200	VBN2ERSX6200	VBN2ERP6100	VBN2ERSX6100	VBN2ERP6200	VBN2ERSX6200	VBN2ERP6100	VBN2ERSX6100	
		172*	VBN2E1PX6200	VBN2E1SX6200	VBN2E1PX6100	VBN2E1SX6100	VBN2E1PX6200	VBN2E1SX6200	VBN2E1PX6100	VBN2E1SX6100	
2"	100	42	VBN2FNP6200	VBN2FNSX6200	VBN2FNP6100	VBN2FNSX6100	VBN2FNP6200	VBN2FNSX6200	VBN2FNP6100	VBN2FNSX6100	
		57	VBN2FPP6200	VBN2FPSX6200	VBN2FPP6100	VBN2FPSX6100	VBN2FPP6200	VBN2FPSX6200	VBN2FPP6100	VBN2FPSX6100	
		71	VBN2FRPX6200	VBN2FRSX6200	VBN2FRPX6100	VBN2FRSX6100	VBN2FRPX6200	VBN2FRSX6200	VBN2FRPX6100	VBN2FRSX6100	
		100	VBN2FSP6200	VBN2FSSX6200	VBN2FSP6100	VBN2FSSX6100	VBN2FSP6200	VBN2FSSX6200	VBN2FSP6100	VBN2FSSX6100	
		108*	VBN2FTP6200	VBN2FTSX6200	VBN2FTP6100	VBN2FTSX6100	VBN2FTP6200	VBN2FTSX6200	VBN2FTP6100	VBN2FTSX6100	
		210	VBN2F1PX6200	VBN2F1SX6200	VBN2F1PX6100	VBN2F1SX6100	VBN2F1PX6200	VBN2F1SX6200	VBN2F1PX6100	VBN2F1SX6100	
		266*	VBN2F2PX6200	VBN2F2SX6200	VBN2F2PX6100	VBN2F2SX6100	VBN2F2PX6200	VBN2F2SX6200	VBN2F2PX6100	VBN2F2SX6100	
2-1/2"	100	45	VBN2GNPX6200	VBN2GNSX6200	VBN2GNPX6100	VBN2GNSX6100	VBN2GNPX6200	VBN2GNSX6200	VBN2GNPX6100	VBN2GNSX6100	
		55	VBN2GPP6200	VBN2GPSX6200	VBN2GPP6100	VBN2GPSX6100	VBN2GPP6200	VBN2GPSX6200	VBN2GPP6100	VBN2GPSX6100	
		72	VBN2GRP6200	VBN2GRSX6200	VBN2GRP6100	VBN2GRSX6100	VBN2GRP6200	VBN2GRSX6200	VBN2GRP6100	VBN2GRSX6100	
		101	VBN2GSP6200	VBN2GSSX6200	VBN2GSP6100	VBN2GSSX6100	VBN2GSP6200	VBN2GSSX6200	VBN2GSP6100	VBN2GSSX6100	
		162	VBN2GUP6200	VBN2GUSX6200	VBN2GUP6100	VBN2GUSX6100	VBN2GUP6200	VBN2GUSX6200	VBN2GUP6100	VBN2GUSX6100	
		202*	VBN2G1PX6200	VBN2G1SX6200	VBN2G1PX6100	VBN2G1SX6100	VBN2G1PX6200	VBN2G1SX6200	VBN2G1PX6100	VBN2G1SX6100	
3	100	49	VBN2HNP6200	VBN2HNSX6200	VBN2HNP6100	VBN2HNSX6100	VBN2HNP6200	VBN2HNSX6200	VBN2HNP6100	VBN2HNSX6100	
		63	VBN2HPP6200	VBN2HPSX6200	VBN2HPP6100	VBN2HPSX6100	VBN2HPP6200	VBN2HPSX6200	VBN2HPP6100	VBN2HPSX6100	
		82	VBN2HRP6200	VBN2HRSX6200	VBN2HRP6100	VBN2HRSX6100	VBN2HRP6200	VBN2HRSX6200	VBN2HRP6100	VBN2HRSX6100	
		124	VBN2HTP6200	VBN2HTSX6200	VBN2HTP6100	VBN2HTSX6100	VBN2HTP6200	VBN2HTSX6200	VBN2HTP6100	VBN2HTSX6100	
		145*	VBN2HUP6200	VBN2HUSX6200	VBN2HUP6100	VBN2HUSX6100	VBN2HUP6200	VBN2HUSX6200	VBN2HUP6100	VBN2HUSX6100	

* Full port ball. No flow characterizing insert.

Product Selection - Valves

3-Way NPT Control Ball Valves ½"-2½", NEMA2

Common Features

VBN3 (Three-way):

- Equal % A to AB, linear B to AB
- B-port Cv reduction of 20% approximates constant total loop flow
- Nickel-chrome plated brass ball and stem
- Convert to 2-way by plugging B port (plug not provided)
- Spring return actuators field-configurable for A-port normally open or normally closed fail safe.
- Mixing or diverting control with the same valve
- ANSI Class IV (0.01%) seat leakage on both A and B ports
- Available with NEMA 3R actuator enclosure



3-Way

Actuator Features			Non Fail Safe				Valve Only
Actuator O.S. Number			MN6105A1011	MN6105A1201	MN7505A2001	MN7505A2209	N/A
Power Supply	Voltage		24 VAC/DC	24 VAC/DC	24 VAC/DC	24 VAC/DC	
	Frequency		50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	
Actuator Torque	Power		5 VA	5 VA	5 VA	5 VA	
	(lb.-in.)		44	44	44	44	
Control	(0)2-10 Vdc						
	4-20 mA (external 500 Ohm Resistor)						
Two-Position SPDT	Floating		•	•	•	•	
	Two-Position SPDT		•	•	•	•	
	Two-Position SPST				•	•	
Actuator Stroke	(degrees)		95° ± 3°	95° ± 3°	95° ± 3°	95° ± 3°	
Timing	(drive/spring return, seconds)		90	90	90	90	
Aux Switch			0	2	0	2	
Feedback	2-10 Vdc Built In				•	•	
Fail Safe Action			Stay in Place	Stay in Place	Stay in Place	Stay in Place	
Normal Position (no signal)			Stay in Place	Stay in Place	A-AB Open	A-AB Open	
Valve Features	Trim		Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass
Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes				
1/2"	50	0.33	VBN3ABPX4000	VBN3ABPXC000	VBN3ABPX5000	VBN3ABPXD000	VBN3ABPX0000
		0.59	VBN3ACPX4000	VBN3ACPXC000	VBN3ACPX5000	VBN3ACPXD000	VBN3ACPX0000
		1	VBN3AEPX4000	VBN3AEPXC000	VBN3AEPX5000	VBN3AEPXD000	VBN3AEPX0000
		2.4	VBN3AFPX4000	VBN3AFPXC000	VBN3AFPX5000	VBN3AFPXD000	VBN3AFPX0000
		4.3	VBN3AHPX4000	VBN3AHPXC000	VBN3AHPX5000	VBN3AHPXD000	VBN3AHPX0000
		8*	VBN3AJPX4000	VBN3AJPXC000	VBN3AJPX5000	VBN3AJPXD000	VBN3AJPX0000
3/4"	50	0.4	VBN3BCPX4000	VBN3BCPXC000	VBN3BCPX5000	VBN3BCPXD000	VBN3BCPX0000
		0.66	VBN3BDPX4000	VBN3BDPXC000	VBN3BDPX5000	VBN3BDPXD000	VBN3BDPX0000
		1.3	VBN3BEPX4000	VBN3BEPXC000	VBN3BEPX5000	VBN3BEPXD000	VBN3BEPX0000
		2.4	VBN3BFPX4000	VBN3BFPC000	VBN3BFPX5000	VBN3BFPXD000	VBN3BFPX0000
		3.8	VBN3BGPX4000	VBN3BGPC000	VBN3BGPX5000	VBN3BGPXD000	VBN3BGPX0000
		7	VBN3BJPX4000	VBN3BJPXC000	VBN3BJPX5000	VBN3BJPXD000	VBN3BJPX0000
1"	50	11*	VBN3BKPX4000	VBN3BKPC000	VBN3BKPX5000	VBN3BKPD000	VBN3BKPX0000
		0.4	VBN3CCPX4000	VBN3CCPXC000	VBN3CCPX5000	VBN3CCPXD000	VBN3CCPX0000
		0.65	VBN3CDPX4000	VBN3CDPXC000	VBN3CDPX5000	VBN3CDPXD000	VBN3CDPX0000
		1.3	VBN3CEPX4000	VBN3CEPXC000	VBN3CEPX5000	VBN3CEPXD000	VBN3CEPX0000
		2.3	VBN3CFPX4000	VBN3CFPC000	VBN3CFPX5000	VBN3CFPD000	VBN3CFPX0000
		3.5	VBN3CGPX4000	VBN3CGPC000	VBN3CGPX5000	VBN3CGPD000	VBN3CGPX0000
		4.5	VBN3CHPX4000	VBN3CHPXC000	VBN3CHPX5000	VBN3CHPD000	VBN3CHPX0000
		8.6	VBN3CJPX4000	VBN3CJPXC000	VBN3CJPX5000	VBN3CJPD000	VBN3CJPX0000
		14.9	VBN3CKPX4000	VBN3CKPXC000	VBN3CKPX5000	VBN3CKPD000	VBN3CKPX0000
		22*	VBN3CLPX4000	VBN3CLPXC000	VBN3CLPX5000	VBN3CLPD000	VBN3CLPX0000
1-1/4"	40	31*	VBN3CMPX4000	VBN3CMPXC000	VBN3CMPX5000	VBN3CMPXD000	VBN3CMPX0000
		4.1	VBN3DHPX4000	VBN3DHPXC000	VBN3DHPX5000	VBN3DHPXD000	VBN3DHPX0000
		8.7	VBN3DJPX4000	VBN3DJPXC000	VBN3DJPX5000	VBN3DJPD000	VBN3DJPX0000
		12.7	VBN3DKPX4000	VBN3DKPXC000	VBN3DKPX5000	VBN3DKPD000	VBN3DKPX0000
		19.4*	VBN3DLPX4000	VBN3DLPXC000	VBN3DLPX5000	VBN3DLPXD000	VBN3DLPX0000
		27	VBN3DMPX4000	VBN3DMPXC000	VBN3DMPX5000	VBN3DMPXD000	VBN3DMPX0000
1-1/2"	40	34*	VBN3DNPX4000	VBN3DNPC000	VBN3DNPX5000	VBN3DNPD000	VBN3DNPX0000
		4	VBN3EHPX4000	VBN3EHPXC000	VBN3EHPX5000	VBN3EHPXD000	VBN3EHPX0000
		8.3	VBN3EJPX4000	VBN3EJPXC000	VBN3EJPX5000	VBN3EJPXD000	VBN3EJPX0000
		13.4	VBN3EKPX4000	VBN3EKPXC000	VBN3EKPX5000	VBN3EKPXD000	VBN3EKPX0000
		24	VBN3ELPX4000	VBN3ELPXC000	VBN3ELPX5000	VBN3ELPD000	VBN3ELPX0000
		32*	VBN3EMPX4000	VBN3EMPXC000	VBN3EMPX5000	VBN3EMPXD000	VBN3EMPX0000
2"	40	61*	VBN3EPPX4000	VBN3EPPXC000	VBN3EPPX5000	VBN3EPPXD000	VBN3EPPX0000
		24	VBN3FLPX4000	VBN3FLPXC000	VBN3FLPX5000	VBN3FLPD000	VBN3FLPX0000
		38	VBN3FNPX4000	VBN3FNPC000	VBN3FNPX5000	VBN3FNPD000	VBN3FNPX0000
		57*	VBN3FPPX4000	VBN3FPPXC000	VBN3FPPX5000	VBN3FPPXD000	VBN3FPPX0000
		83	VBN3FRPX4000	VBN3FRPXC000	VBN3FRPX5000	VBN3FRPD000	VBN3FRPX0000
2-1/2"	40	109*	VBN3FSPX4000	VBN3FSPXC000	VBN3FSPX5000	VBN3FSPXD000	VBN3FSPX0000
		38	VBN3GNPX4000	VBN3GNPC000	VBN3GNPX5000	VBN3GNPD000	VBN3GNPX0000
		74	VBN3GRPX4000	VBN3GRPXC000	VBN3GRPX5000	VBN3GRPD000	VBN3GRPX0000
		100*	VBN3GSPX4000	VBN3GSPXC000	VBN3GSPX5000	VBN3GSPXD000	VBN3GSPX0000

* Full port ball. No flow characterizing insert.

VALVES

Product Selection - Valves

3-Way NPT Control Ball Valves ½"-1¼", NEMA2

Actuator Features			Fail Safe			
Actuator O.S. Number			MS7503A2024		MS7503A2224	
Power Supply		Voltage	24 VAC/DC		24 VAC/DC	
		Frequency	50 / 60 Hz		50 / 60 Hz	
		Power	4 VA		4 VA	
Actuator Torque		(lb.-in.)	27		27	
Control		(0)2-10 Vdc	•		•	
		4-20 mA (external 500 Ohm Resistor)	•		•	
		Floating	•		•	
		Two-Position SPDT	•		•	
		Two-Position SPST				
Actuator Stroke		(degrees)	95° ± 3°		95° ± 3°	
Timing		(drive/spring return, seconds)	90 / 25		90 / 25	
Aux Switch			0		2	
Feedback		2-10 Vdc Built In	•		•	
Fail Safe Action			B-AB Open (FSB)	A-AB Open (FSA)	B-AB Open (FSB)	A-AB Open (FSA)
Normal Position (no signal)			B-AB Open	A-AB Open	B-AB Open	A-AB Open
Valve Features		Trim	Nickel-Plated Brass		Nickel-Plated Brass	
Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes			
1/2"	50	0.33	VBN3ABPXE401	VBN3ABPXE301	VBN3ABPXF401	VBN3ABPXF301
		0.59	VBN3ACPXE401	VBN3ACPXE301	VBN3ACPXF401	VBN3ACPXF301
		1	VBN3AEPXE401	VBN3AEPXE301	VBN3AEPXF401	VBN3AEPXF301
		2.4	VBN3AFPXE401	VBN3AFPXE301	VBN3AFPXF401	VBN3AFPXF301
		4.3	VBN3AHPXE401	VBN3AHPXE301	VBN3AHPXF401	VBN3AHPXF301
3/4"	50	8*	VBN3AJPXE401	VBN3AJPXE301	VBN3AJPXF401	VBN3AJPXF301
		0.4	VBN3BCPXE401	VBN3BCPXE301	VBN3BCPXF401	VBN3BCPXF301
		0.66	VBN3BDPXE401	VBN3BDPXE301	VBN3BDPXF401	VBN3BDPXF301
		1.3	VBN3BEPXE401	VBN3BEPXE301	VBN3BEPXF401	VBN3BEPXF301
		2.4	VBN3BFPXE401	VBN3BFPXE301	VBN3BFPXF401	VBN3BFPXF301
		3.8	VBN3BGPXE401	VBN3BGPXE301	VBN3BGPXF401	VBN3BGPXF301
		7	VBN3BJPXE401	VBN3BJPXE301	VBN3BJJXF401	VBN3BJJXF301
		11*	VBN3BKPXE401	VBN3BKPXE301	VBN3BKPXF401	VBN3BKPXF301
		0.4	VBN3CCPXE401	VBN3CCPXE301	VBN3CCPXF401	VBN3CCPXF301
1"	50	0.65	VBN3CDPXE401	VBN3CDPXE301	VBN3CDPXF401	VBN3CDPXF301
		1.3	VBN3CEPXE401	VBN3CEPXE301	VBN3CEPXF401	VBN3CEPXF301
		2.3	VBN3CFPXE401	VBN3CFPXE301	VBN3CFPXF401	VBN3CFPXF301
		3.5	VBN3CGPXE401	VBN3CGPXE301	VBN3CGPXF401	VBN3CGPXF301
		4.5	VBN3CHPXE401	VBN3CHPXE301	VBN3CHPXF401	VBN3CHPXF301
		8.6	VBN3CJPXE401	VBN3CJPXE301	VBN3CJPXF401	VBN3CJPXF301
		14.9	VBN3CKPXE401	VBN3CKPXE301	VBN3CKPXF401	VBN3CKPXF301
		22*	VBN3CLPXE401	VBN3CLPXE301	VBN3CLPXF401	VBN3CLPXF301
		31*	VBN3CMPXE401	VBN3CMPXE301	VBN3CMPXF401	VBN3CMPXF301
1-1/4"	40	4.1	VBN3DHPXE401	VBN3DHPXE301	VBN3DHPXF401	VBN3DHPXF301
		8.7	VBN3DJPXE401	VBN3DJPXE301	VBN3DJJXF401	VBN3DJJXF301
		12.7	VBN3DKPXE401	VBN3DKPXE301	VBN3DKPXF401	VBN3DKPXF301
		19.4*	VBN3DLPXE401	VBN3DLPXE301	VBN3DLPXF401	VBN3DLPXF301
		27	VBN3DMPXE401	VBN3DMPXE301	VBN3DMPXF401	VBN3DMPXF301
		34*	VBN3DNPXE401	VBN3DNPXE301	VBN3DNPXF401	VBN3DNPXF301

* Full port ball. No flow characterizing insert.

Product Selection - Valves

3-Way NPT Control Ball Valves 1½"-2½", NEMA2

Actuator Features			Fail Safe			
Actuator O.S. Number			MS7505A2030		MS7505A2130	
Power Supply		Voltage	24 VAC/DC		24 VAC/DC	
		Frequency	50 / 60 Hz		50 / 60 Hz	
		Power	6 VA		6 VA	
Actuator Torque		(lb.-in.)	44		44	
Control		(0)2-10 Vdc	•		•	
		4-20 mA (external 500 Ohm Resistor)	•		•	
		Floating	•		•	
		Two-Position SPDT	•		•	
		Two-Position SPST	•		•	
Actuator Stroke		(degrees)	95° ± 3°		95° ± 3°	
Timing		(drive/spring return, seconds)	90 / 25		90 / 25	
Aux Switch			0		1	
Feedback		2-10 Vdc Built In	•		•	
Fail Safe Action			B-AB Open (FSB)	A-AB Open (FSA)	B-AB Open (FSB)	A-AB Open (FSA)
Normal Position (no signal)			B-AB Open	A-AB Open	B-AB Open	A-AB Open
Valve Features			Trim		Nickel-Plated Brass	
			Nickel-Plated Brass		Nickel-Plated Brass	
Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes			
1-1/2"	40	4	VBN3EHPX6400	VBN3EHPX6300	VBN3EHPXB400	VBN3EHPXB300
		8.3	VBN3EJPX6400	VBN3EJPX6300	VBN3EJPXB400	VBN3EJPXB300
		13.4	VBN3EKPX6400	VBN3EKPX6300	VBN3EKPXB400	VBN3EKPXB300
		24	VBN3ELPX6400	VBN3ELPX6300	VBN3ELPB400	VBN3ELPB300
		32*	VBN3EMPX6400	VBN3EMPX6300	VBN3EMPXB400	VBN3EMPXB300
		61*	VBN3EPPX6400	VBN3EPPX6300	VBN3EPPXB400	VBN3EPPXB300
2"	40	24	VBN3FLPX6400	VBN3FLPX6300	VBN3FLPB400	VBN3FLPB300
		38	VBN3FNPX6400	VBN3FNPX6300	VBN3FNPB400	VBN3FNPB300
		57*	VBN3FPPX6400	VBN3FPPX6300	VBN3FPPXB400	VBN3FPPXB300
		83	VBN3FRPX6400	VBN3FRPX6300	VBN3FRPB400	VBN3FRPB300
		109*	VBN3FSPX6400	VBN3FSPX6300	VBN3FSPXB400	VBN3FSPXB300
2-1/2"	40	38	VBN3GNPX6400	VBN3GNPX6300	VBN3GNPB400	VBN3GNPB300
		74	VBN3GRPX6400	VBN3GRPX6300	VBN3GRPB400	VBN3GRPB300
		100*	VBN3GSPX6400	VBN3GSPX6300	VBN3GSPXB400	VBN3GSPXB300

* Full port ball. No flow characterizing insert.

3-Way

Product Selection - Valves

3-Way NPT Control Ball Valves 1/2"-2-1/2", NEMA2

Actuator Features			Fail Safe							
Actuator O.S. Number			MS8105A1030		MS8105A1130		MS4105A1030		MS4105A1130	
Power Supply	Voltage	24 VAC/DC		24 VAC/DC		100-250 VAC		100-250 VAC		
	Frequency	50 / 60 Hz		50 / 60 Hz		50 / 60 Hz		50 / 60 Hz		
	Power	6 VA		6 VA		6 VA		6 VA		
Actuator Torque (lb.-in.)			44		44		44		44	
Control (0)2-10 Vdc										
4-20 mA (external 500 Ohm Resistor)										
Floating										
Two-Position SPDT										
Two-Position SPST			•		•		•		•	
Actuator Stroke (degrees)			95° ± 3°		95° ± 3°		95° ± 3°		95° ± 3°	
Timing (drive/spring return, seconds)			45 / 25		45 / 25		45 / 25		45 / 25	
Aux Switch			0		1		0		1	
Feedback 2-10 Vdc Built In										
Fail Safe Action			B-AB Open (FSB)	A-AB Open (FSA)	B-AB Open (FSB)	A-AB Open (FSA)	B-AB Open (FSB)	A-AB Open (FSA)	B-AB Open (FSB)	A-AB Open (FSA)
Normal Position (no signal)			B-AB Open	A-AB Open	B-AB Open	A-AB Open	B-AB Open	A-AB Open	B-AB Open	A-AB Open
Valve Features Trim			Nickel-Plated Brass		Nickel-Plated Brass		Nickel-Plated Brass		Nickel-Plated Brass	
Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes							
1/2"	50	0.33	VBN3ABPX7400	VBN3ABPX7300	VBN3ABPXA400	VBN3ABPXA300	VBN3ABPX8400	VBN3ABPX8300	VBN3ABPX9400	VBN3ABPX9300
		0.59	VBN3ACPX7400	VBN3ACPX7300	VBN3ACPXA400	VBN3ACPXA300	VBN3ACPX8400	VBN3ACPX8300	VBN3ACPX9400	VBN3ACPX9300
		1	VBN3AEPX7400	VBN3AEPX7300	VBN3AEPXA400	VBN3AEPXA300	VBN3AEPX8400	VBN3AEPX8300	VBN3AEPX9400	VBN3AEPX9300
		2.4	VBN3AFPX7400	VBN3AFPX7300	VBN3AFPXA400	VBN3AFPXA300	VBN3AFPX8400	VBN3AFPX8300	VBN3AFPX9400	VBN3AFPX9300
		4.3	VBN3AHPX7400	VBN3AHPX7300	VBN3AHPXA400	VBN3AHPXA300	VBN3AHPX8400	VBN3AHPX8300	VBN3AHPX9400	VBN3AHPX9300
3/4"	50	8*	VBN3AJPX7400	VBN3AJPX7300	VBN3AJPXA400	VBN3AJPXA300	VBN3AJPX8400	VBN3AJPX8300	VBN3AJPX9400	VBN3AJPX9300
		0.4	VBN3BCPX7400	VBN3BCPX7300	VBN3BCPXA400	VBN3BCPXA300	VBN3BCPX8400	VBN3BCPX8300	VBN3BCPX9400	VBN3BCPX9300
		0.66	VBN3BDPX7400	VBN3BDPX7300	VBN3BDPXA400	VBN3BDPXA300	VBN3BDPX8400	VBN3BDPX8300	VBN3BDPX9400	VBN3BDPX9300
		1.3	VBN3BEPX7400	VBN3BEPX7300	VBN3BEPXA400	VBN3BEPXA300	VBN3BEPX8400	VBN3BEPX8300	VBN3BEPX9400	VBN3BEPX9300
		2.4	VBN3BFPX7400	VBN3BFPX7300	VBN3BFPA400	VBN3BFPXA300	VBN3BFPX8400	VBN3BFPX8300	VBN3BFPX9400	VBN3BFPX9300
		3.8	VBN3BGPX7400	VBN3BGPX7300	VBN3BGPA400	VBN3BGPA300	VBN3BGPX8400	VBN3BGPX8300	VBN3BGPX9400	VBN3BGPX9300
1"	50	7	VBN3BJPX7400	VBN3BJPX7300	VBN3BJPXA400	VBN3BJPXA300	VBN3BJPX8400	VBN3BJPX8300	VBN3BJPX9400	VBN3BJPX9300
		11*	VBN3BKPX7400	VBN3BKPX7300	VBN3BKPA400	VBN3BKPA300	VBN3BKPX8400	VBN3BKPX8300	VBN3BKPX9400	VBN3BKPX9300
		0.4	VBN3CCPX7400	VBN3CCPX7300	VBN3CCPXA400	VBN3CCPXA300	VBN3CCPX8400	VBN3CCPX8300	VBN3CCPX9400	VBN3CCPX9300
		0.65	VBN3CDPX7400	VBN3CDPX7300	VBN3CDPXA400	VBN3CDPXA300	VBN3CDPX8400	VBN3CDPX8300	VBN3CDPX9400	VBN3CDPX9300
		1.3	VBN3CEPX7400	VBN3CEPX7300	VBN3CEPXA400	VBN3CEPXA300	VBN3CEPX8400	VBN3CEPX8300	VBN3CEPX9400	VBN3CEPX9300
		2.3	VBN3CFPX7400	VBN3CFPX7300	VBN3CFPXA400	VBN3CFPXA300	VBN3CFPX8400	VBN3CFPX8300	VBN3CFPX9400	VBN3CFPX9300
		3.5	VBN3CGPX7400	VBN3CGPX7300	VBN3CGPXA400	VBN3CGPXA300	VBN3CGPX8400	VBN3CGPX8300	VBN3CGPX9400	VBN3CGPX9300
		4.5	VBN3CHPX7400	VBN3CHPX7300	VBN3CHPXA400	VBN3CHPXA300	VBN3CHPX8400	VBN3CHPX8300	VBN3CHPX9400	VBN3CHPX9300
		8.6	VBN3CJPX7400	VBN3CJPX7300	VBN3CJPXA400	VBN3CJPXA300	VBN3CJPX8400	VBN3CJPX8300	VBN3CJPX9400	VBN3CJPX9300
		14.9	VBN3CKPX7400	VBN3CKPX7300	VBN3CKPXA400	VBN3CKPXA300	VBN3CKPX8400	VBN3CKPX8300	VBN3CKPX9400	VBN3CKPX9300
1-1/4"	40	22*	VBN3CLPX7400	VBN3CLPX7300	VBN3CLPXA400	VBN3CLPXA300	VBN3CLPX8400	VBN3CLPX8300	VBN3CLPX9400	VBN3CLPX9300
		31*	VBN3CMPX7400	VBN3CMPX7300	VBN3CMPXA400	VBN3CMPXA300	VBN3CMPX8400	VBN3CMPX8300	VBN3CMPX9400	VBN3CMPX9300
		4.1	VBN3DHPX7400	VBN3DHPX7300	VBN3DHPXA400	VBN3DHPXA300	VBN3DHPX8400	VBN3DHPX8300	VBN3DHPX9400	VBN3DHPX9300
		8.7	VBN3DJPX7400	VBN3DJPX7300	VBN3DJPA400	VBN3DJPA300	VBN3DJPX8400	VBN3DJPX8300	VBN3DJPX9400	VBN3DJPX9300
		12.7	VBN3DKPX7400	VBN3DKPX7300	VBN3DKPXA400	VBN3DKPXA300	VBN3DKPX8400	VBN3DKPX8300	VBN3DKPX9400	VBN3DKPX9300
		19.4*	VBN3DLPX7400	VBN3DLPX7300	VBN3DLPXA400	VBN3DLPXA300	VBN3DLPX8400	VBN3DLPX8300	VBN3DLPX9400	VBN3DLPX9300
1-1/2"	40	27	VBN3DMPX7400	VBN3DMPX7300	VBN3DMPXA400	VBN3DMPXA300	VBN3DMPX8400	VBN3DMPX8300	VBN3DMPX9400	VBN3DMPX9300
		34*	VBN3DNPX7400	VBN3DNPX7300	VBN3DNPXA400	VBN3DNPXA300	VBN3DNPX8400	VBN3DNPX8300	VBN3DNPX9400	VBN3DNPX9300
		4	VBN3EHPX7400	VBN3EHPX7300	VBN3EHPXA400	VBN3EHPXA300	VBN3EHPX8400	VBN3EHPX8300	VBN3EHPX9400	VBN3EHPX9300
		8.3	VBN3EJPX7400	VBN3EJPX7300	VBN3EJPA400	VBN3EJPA300	VBN3EJPX8400	VBN3EJPX8300	VBN3EJPX9400	VBN3EJPX9300
		13.4	VBN3EKPX7400	VBN3EKPX7300	VBN3EKPXA400	VBN3EKPXA300	VBN3EKPX8400	VBN3EKPX8300	VBN3EKPX9400	VBN3EKPX9300
		24	VBN3ELPX7400	VBN3ELPX7300	VBN3ELPXA400	VBN3ELPXA300	VBN3ELPX8400	VBN3ELPX8300	VBN3ELPX9400	VBN3ELPX9300
2"	40	32*	VBN3EMPX7400	VBN3EMPX7300	VBN3EMPXA400	VBN3EMPXA300	VBN3EMPX8400	VBN3EMPX8300	VBN3EMPX9400	VBN3EMPX9300
		61*	VBN3EPPX7400	VBN3EPPX7300	VBN3EPPXA400	VBN3EPPXA300	VBN3EPPX8400	VBN3EPPX8300	VBN3EPPX9400	VBN3EPPX9300
		24	VBN3FLPX7400	VBN3FLPX7300	VBN3FLPXA400	VBN3FLPXA300	VBN3FLPX8400	VBN3FLPX8300	VBN3FLPX9400	VBN3FLPX9300
		38	VBN3FNPX7400	VBN3FNPX7300	VBN3FNPA400	VBN3FNPA300	VBN3FNPX8400	VBN3FNPX8300	VBN3FNPX9400	VBN3FNPX9300
		57*	VBN3FPPX7400	VBN3FPPX7300	VBN3FPPXA400	VBN3FPPXA300	VBN3FPPX8400	VBN3FPPX8300	VBN3FPPX9400	VBN3FPPX9300
2-1/2"	40	83	VBN3FRPX7400	VBN3FRPX7300	VBN3FRPXA400	VBN3FRPXA300	VBN3FRPX8400	VBN3FRPX8300	VBN3FRPX9400	VBN3FRPX9300
		109*	VBN3FSPX7400	VBN3FSPX7300	VBN3FSPXA400	VBN3FSPXA300	VBN3FSPX8400	VBN3FSPX8300	VBN3FSPX9400	VBN3FSPX9300
		38	VBN3GNPX7400	VBN3GNPX7300	VBN3GNPXA400	VBN3GNPXA300	VBN3GNPX8400	VBN3GNPX8300	VBN3GNPX9400	VBN3GNPX9300
		74	VBN3GRPX7400	VBN3GRPX7300	VBN3GRPXA400	VBN3GRPXA300	VBN3GRPX8400	VBN3GRPX8300	VBN3GRPX9400	VBN3GRPX9300
			100*	VBN3GSPX7400	VBN3GSPX7300	VBN3GSPXA400	VBN3GSPXA300	VBN3GSPX8400	VBN3GSPX9400	VBN3GSPX9300

* Full port ball. No flow characterizing insert.

Product Selection - Valves

3-Way NPT Control Ball Valves ½"-2½", NEMA 3R

Actuator Features			Non Fail Safe				Fail Safe			
Actuator O.S. Number			MN6105A1011	MN6105A1201	MN7505A2001	MN7505A2209	MS7505A2030		MS7505A2130	
Power Supply	Voltage		24 VAC/DC	24 VAC/DC	24 VAC/DC	24 VAC/DC	24 VAC/DC		24 VAC/DC	
	Frequency		50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz		50 / 60 Hz	
Actuator Torque	Power		5 VA	5 VA	5 VA	5 VA	6 VA		6 VA	
	(lb.-in.)		44	44	44	44	44		44	
Control	(0)2-10 Vdc				•	•	•		•	
	4-20 mA (external 500 Ohm Resistor)				•	•	•		•	
	Floating		•	•	•	•	•		•	
	Two-Position SPDT		•	•	•	•	•		•	
Actuator Stroke	Two-Position SPST				•	•	•		•	
	(degrees)		95° ± 3°	95° ± 3°	95° ± 3°	95° ± 3°	95° ± 3°		95° ± 3°	
Timing	(drive/spring return, seconds)		90	90	90	90	90 / 25		90 / 25	
Aux Switch	2 x SPDT Add-on		0	2	0	2	0		1	
	2-10 Vdc Built In				•	•	•		•	
Fail Safe Action			Stay in Place	Stay in Place	Stay in Place	Stay in Place	B-AB Open (FSB)	A-AB Open (FSA)	B-AB Open (FSB)	A-AB Open (FSA)
Normal Position (no signal)			Stay in Place	Stay in Place	A-AB Open	A-AB Open	B-AB Open	A-AB Open	B-AB Open	A-AB Open
Valve Features			Trim	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass	Nickel-Plated Brass		Nickel-Plated Brass	
Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes							
1/2"	50	0.33	VBN3ABPX4002	VBN3ABPXC002	VBN3ABPX5002	VBN3ABPXD002	VBN3ABPX6402	VBN3ABPX6302	VBN3ABPXB402	VBN3ABPXB302
		0.59	VBN3ACPX4002	VBN3ACPXC002	VBN3ACPX5002	VBN3ACPXD002	VBN3ACPX6402	VBN3ACPX6302	VBN3ACPXB402	VBN3ACPXB302
		1	VBN3AEPX4002	VBN3AEPXC002	VBN3AEPX5002	VBN3AEPXD002	VBN3AEPX6402	VBN3AEPX6302	VBN3AEPXB402	VBN3AEPXB302
		2.4	VBN3AFPX4002	VBN3AFPXC002	VBN3AFPX5002	VBN3AFPXD002	VBN3AFPX6402	VBN3AFPX6302	VBN3AFPXB402	VBN3AFPXB302
		4.3	VBN3AHPX4002	VBN3AHPXC002	VBN3AHPX5002	VBN3AHPXD002	VBN3AHPX6402	VBN3AHPX6302	VBN3AHPXB402	VBN3AHPXB302
		8*	VBN3AJPX4002	VBN3AJPXC002	VBN3AJPX5002	VBN3AJPXD002	VBN3AJPX6402	VBN3AJPX6302	VBN3AJPXB402	VBN3AJPXB302
3/4"	50	0.4	VBN3BCPX4002	VBN3BCPXC002	VBN3BCPX5002	VBN3BCPXD002	VBN3BCPX6402	VBN3BCPX6302	VBN3BCPXB402	VBN3BCPXB302
		0.66	VBN3BDPX4002	VBN3BDPXC002	VBN3BDPX5002	VBN3BDPXD002	VBN3BDPX6402	VBN3BDPX6302	VBN3BDPXB402	VBN3BDPXB302
		1.3	VBN3BEPX4002	VBN3BEPXC002	VBN3BEPX5002	VBN3BEPXD002	VBN3BEPX6402	VBN3BEPX6302	VBN3BEPXB402	VBN3BEPXB302
		2.4	VBN3BFPX4002	VBN3BFPC002	VBN3BFPX5002	VBN3BFPXD002	VBN3BFPX6402	VBN3BFPX6302	VBN3BFPXB402	VBN3BFPXB302
		3.8	VBN3BGPX4002	VBN3BGPC002	VBN3BGPX5002	VBN3BGPXD002	VBN3BGPX6402	VBN3BGPX6302	VBN3BGPXB402	VBN3BGPXB302
		7	VBN3BJPX4002	VBN3BJPXC002	VBN3BJPX5002	VBN3BJPXD002	VBN3BJPX6402	VBN3BJPX6302	VBN3BJPXB402	VBN3BJPXB302
1"	50	11*	VBN3BKPX4002	VBN3BKPC002	VBN3BKPX5002	VBN3BKPD002	VBN3BKPX6402	VBN3BKPX6302	VBN3BKPXB402	VBN3BKPXB302
		0.4	VBN3CCPX4002	VBN3CCPXC002	VBN3CCPX5002	VBN3CCPXD002	VBN3CCPX6402	VBN3CCPX6302	VBN3CCPXB402	VBN3CCPXB302
		0.65	VBN3CDPX4002	VBN3CDPXC002	VBN3CDPX5002	VBN3CDPXD002	VBN3CDPX6402	VBN3CDPX6302	VBN3CDPXB402	VBN3CDPXB302
		1.3	VBN3CEPX4002	VBN3CEPXC002	VBN3CEPX5002	VBN3CEPXD002	VBN3CEPX6402	VBN3CEPX6302	VBN3CEPXB402	VBN3CEPXB302
		2.3	VBN3CFPX4002	VBN3CFPC002	VBN3CFPX5002	VBN3CFPXD002	VBN3CFPX6402	VBN3CFPX6302	VBN3CFPXB402	VBN3CFPXB302
		3.5	VBN3CGPX4002	VBN3CGPC002	VBN3CGPX5002	VBN3CGPXD002	VBN3CGPX6402	VBN3CGPX6302	VBN3CGPXB402	VBN3CGPXB302
		4.5	VBN3CHPX4002	VBN3CHPXC002	VBN3CHPX5002	VBN3CHPXD002	VBN3CHPX6402	VBN3CHPX6302	VBN3CHPXB402	VBN3CHPXB302
		8.6	VBN3CJPX4002	VBN3CJPXC002	VBN3CJPX5002	VBN3CJPXD002	VBN3CJPX6402	VBN3CJPX6302	VBN3CJPXB402	VBN3CJPXB302
		14.9	VBN3CKPX4002	VBN3CKPXC002	VBN3CKPX5002	VBN3CKPXD002	VBN3CKPX6402	VBN3CKPX6302	VBN3CKPXB402	VBN3CKPXB302
		22*	VBN3CLPX4002	VBN3CLPXC002	VBN3CLPX5002	VBN3CLPXD002	VBN3CLPX6402	VBN3CLPX6302	VBN3CLPXB402	VBN3CLPXB302
1-1/4"	40	31*	VBN3CMPX4002	VBN3CMPXC002	VBN3CMPX5002	VBN3CMPXD002	VBN3CMPX6402	VBN3CMPX6302	VBN3CMPXB402	VBN3CMPXB302
		4.1	VBN3DHPX4002	VBN3DHPXC002	VBN3DHPX5002	VBN3DHPXD002	VBN3DHPX6402	VBN3DHPX6302	VBN3DHPXB402	VBN3DHPXB302
		8.7	VBN3DJPX4002	VBN3DJPXC002	VBN3DJPX5002	VBN3DJPXD002	VBN3DJPX6402	VBN3DJPX6302	VBN3DJPXB402	VBN3DJPXB302
		12.7	VBN3DKPX4002	VBN3DKPXC002	VBN3DKPX5002	VBN3DKPXD002	VBN3DKPX6402	VBN3DKPX6302	VBN3DKPXB402	VBN3DKPXB302
		19.4*	VBN3DLPX4002	VBN3DLPXC002	VBN3DLPX5002	VBN3DLPXD002	VBN3DLPX6402	VBN3DLPX6302	VBN3DLPXB402	VBN3DLPXB302
		27	VBN3DMPX4002	VBN3DMPXC002	VBN3DMPX5002	VBN3DMPXD002	VBN3DMPX6402	VBN3DMPX6302	VBN3DMPXB402	VBN3DMPXB302
		34*	VBN3DNPX4002	VBN3DNPC002	VBN3DNPX5002	VBN3DNPD002	VBN3DNPX6402	VBN3DNPX6302	VBN3DNPXB402	VBN3DNPXB302
		4	VBN3EHPX4002	VBN3EHPXC002	VBN3EHPX5002	VBN3EHPXD002	VBN3EHPX6402	VBN3EHPX6302	VBN3EHPXB402	VBN3EHPXB302
1-1/2"	40	8.3	VBN3EJPX4002	VBN3EJPXC002	VBN3EJPX5002	VBN3EJPXD002	VBN3EJPX6402	VBN3EJPX6302	VBN3EJPXB402	VBN3EJPXB302
		13.4	VBN3EKPX4002	VBN3EKPXC002	VBN3EKPX5002	VBN3EKPXD002	VBN3EKPX6402	VBN3EKPX6302	VBN3EKPXB402	VBN3EKPXB302
		24	VBN3ELPX4002	VBN3ELPXC002	VBN3ELPX5002	VBN3ELPXD002	VBN3ELPX6402	VBN3ELPX6302	VBN3ELPXB402	VBN3ELPXB302
		32*	VBN3EMPX4002	VBN3EMPXC002	VBN3EMPX5002	VBN3EMPXD002	VBN3EMPX6402	VBN3EMPX6302	VBN3EMPXB402	VBN3EMPXB302
		61*	VBN3EPPX4002	VBN3EPPXC002	VBN3EPPX5002	VBN3EPPXD002	VBN3EPPX6402	VBN3EPPX6302	VBN3EPPXB402	VBN3EPPXB302
		24	VBN3FLPX4002	VBN3FLPXC002	VBN3FLPX5002	VBN3FLPXD002	VBN3FLPX6402	VBN3FLPX6302	VBN3FLPXB402	VBN3FLPXB302
2"	40	38	VBN3FNPX4002	VBN3FNPC002	VBN3FNPX5002	VBN3FNPD002	VBN3FNPX6402	VBN3FNPX6302	VBN3FNPXB402	VBN3FNPXB302
		57*	VBN3FPPX4002	VBN3FPPXC002	VBN3FPPX5002	VBN3FPPXD002	VBN3FPPX6402	VBN3FPPX6302	VBN3FPPXB402	VBN3FPPXB302
		83	VBN3FRPX4002	VBN3FRPXC002	VBN3FRPX5002	VBN3FRPD002	VBN3FRPX6402	VBN3FRPX6302	VBN3FRPXB402	VBN3FRPXB302
		109*	VBN3FSPX4002	VBN3FSPXC002	VBN3FSPX5002	VBN3FSPXD002	VBN3FSPX6402	VBN3FSPX6302	VBN3FSPXB402	VBN3FSPXB302
2-1/2"	40	38	VBN3GNPX4002	VBN3GNPXC002	VBN3GNPX5002	VBN3GNPD002	VBN3GNPX6402	VBN3GNPX6302	VBN3GNPXB402	VBN3GNPXB302
		74	VBN3GRPX4002	VBN3GRPXC002	VBN3GRPX5002	VBN3GRPD002	VBN3GRPX6402	VBN3GRPX6302	VBN3GRPXB402	VBN3GRPXB302
		100*	VBN3GSPX4002	VBN3GSPXC002	VBN3GSPX5002	VBN3GSPXD002	VBN3GSPX6402	VBN3GSPX6302	VBN3GSPXB402	VBN3GSPXB302

* Full port ball. No flow characterizing insert.

Short Order Codes

Product Selection - Valves

3-Way NPT Control Ball Valves ½"-2½", NEMA 3R

Actuator Features			Fail Safe							
Actuator O.S. Number			MS8105A1030		MS8105A1130		MS4105A1030		MS4105A1130	
Power Supply	Voltage	24 VAC/DC		24 VAC/DC		100-250 VAC		100-250 VAC		
	Frequency	50 / 60 Hz		50 / 60 Hz		50 / 60 Hz		50 / 60 Hz		
Actuator Torque	Power	6 VA		6 VA		6 VA		6 VA		
	(lb.-in.)	44		44		44		44		
Control	(0)2-10 Vdc									
	4-20 mA (external 500 Ohm Resistor)									
Floating										
Two-Position SPDT										
Two-Position SPST			•		•		•		•	
Actuator Stroke	(degrees)	95° ± 3°		95° ± 3°		95° ± 3°		95° ± 3°		
Timing	(drive/spring return, seconds)	45 / 25		45 / 25		45 / 25		45 / 25		
Aux Switch	2 x SPDT Add-on	0		1		0		1		
	2-10 Vdc Built In									
Feedback										
Fail Safe Action			B-AB Open (FSB)		A-AB Open (FSA)		B-AB Open (FSB)		A-AB Open (FSA)	
Normal Position (no signal)			B-AB Open		A-AB Open		B-AB Open		A-AB Open	
Valve Features			Trim		Nickel-Plated Brass		Nickel-Plated Brass		Nickel-Plated Brass	
Valve Size (inches)	Close-off Pressure (psid)	Cv	Short Order Codes							
1/2"	50	0.33	VBN3ABPX7402	VBN3ABPX7302	VBN3ABPXA402	VBN3ABPXA302	VBN3ABPX8402	VBN3ABPX8302	VBN3ABPX9402	VBN3ABPX9302
		0.59	VBN3ACPX7402	VBN3ACPX7302	VBN3ACPXA402	VBN3ACPXA302	VBN3ACPX8402	VBN3ACPX8302	VBN3ACPX9402	VBN3ACPX9302
		1	VBN3AEPX7402	VBN3AEPX7302	VBN3AEPXA402	VBN3AEPXA302	VBN3AEPX8402	VBN3AEPX8302	VBN3AEPX9402	VBN3AEPX9302
		2.4	VBN3AFPX7402	VBN3AFPX7302	VBN3AFPXA402	VBN3AFPXA302	VBN3AFPX8402	VBN3AFPX8302	VBN3AFPX9402	VBN3AFPX9302
		4.3	VBN3AHPX7402	VBN3AHPX7302	VBN3AHPXA402	VBN3AHPXA302	VBN3AHPX8402	VBN3AHPX8302	VBN3AHPX9402	VBN3AHPX9302
		8*	VBN3AJPX7402	VBN3AJPX7302	VBN3AJPXA402	VBN3AJPXA302	VBN3AJPX8402	VBN3AJPX8302	VBN3AJPX9402	VBN3AJPX9302
3/4"	50	0.4	VBN3BCPX7402	VBN3BCPX7302	VBN3BCPXA402	VBN3BCPXA302	VBN3BCPX8402	VBN3BCPX8302	VBN3BCPX9402	VBN3BCPX9302
		0.66	VBN3BDPX7402	VBN3BDPX7302	VBN3BDPXA402	VBN3BDPXA302	VBN3BDPX8402	VBN3BDPX8302	VBN3BDPX9402	VBN3BDPX9302
		1.3	VBN3BEPX7402	VBN3BEPX7302	VBN3BEPXA402	VBN3BEPXA302	VBN3BEPX8402	VBN3BEPX8302	VBN3BEPX9402	VBN3BEPX9302
		2.4	VBN3BFPX7402	VBN3BFPX7302	VBN3BFPA402	VBN3BFPXA302	VBN3BFPX8402	VBN3BFPX8302	VBN3BFPX9402	VBN3BFPX9302
		3.8	VBN3BGPX7402	VBN3BGPX7302	VBN3BGPA402	VBN3BGPXA302	VBN3BGPX8402	VBN3BGPX8302	VBN3BGPX9402	VBN3BGPX9302
		7	VBN3BJPX7402	VBN3BJPX7302	VBN3BJPXA402	VBN3BJPXA302	VBN3BJPX8402	VBN3BJPX8302	VBN3BJPX9402	VBN3BJPX9302
1"	50	11*	VBN3BKPX7402	VBN3BKPX7302	VBN3BKPA402	VBN3BKPXA302	VBN3BKPX8402	VBN3BKPX8302	VBN3BKPX9402	VBN3BKPX9302
		0.4	VBN3CCPX7402	VBN3CCPX7302	VBN3CCPXA402	VBN3CCPXA302	VBN3CCPX8402	VBN3CCPX8302	VBN3CCPX9402	VBN3CCPX9302
		0.65	VBN3CDPX7402	VBN3CDPX7302	VBN3CDPXA402	VBN3CDPXA302	VBN3CDPX8402	VBN3CDPX8302	VBN3CDPX9402	VBN3CDPX9302
		1.3	VBN3CEPX7402	VBN3CEPX7302	VBN3CEPXA402	VBN3CEPXA302	VBN3CEPX8402	VBN3CEPX8302	VBN3CEPX9402	VBN3CEPX9302
		2.3	VBN3CFPX7402	VBN3CFPX7302	VBN3CFPA402	VBN3CFPXA302	VBN3CFPX8402	VBN3CFPX8302	VBN3CFPX9402	VBN3CFPX9302
		3.5	VBN3CGPX7402	VBN3CGPX7302	VBN3CGPA402	VBN3CGPXA302	VBN3CGPX8402	VBN3CGPX8302	VBN3CGPX9402	VBN3CGPX9302
		4.5	VBN3CHPX7402	VBN3CHPX7302	VBN3CHPXA402	VBN3CHPXA302	VBN3CHPX8402	VBN3CHPX8302	VBN3CHPX9402	VBN3CHPX9302
		8.6	VBN3CJPX7402	VBN3CJPX7302	VBN3CJPXA402	VBN3CJPXA302	VBN3CJPX8402	VBN3CJPX8302	VBN3CJPX9402	VBN3CJPX9302
		14.9	VBN3CKPX7402	VBN3CKPX7302	VBN3CKPA402	VBN3CKPXA302	VBN3CKPX8402	VBN3CKPX8302	VBN3CKPX9402	VBN3CKPX9302
		22*	VBN3CLPX7402	VBN3CLPX7302	VBN3CLPA402	VBN3CLPXA302	VBN3CLPX8402	VBN3CLPX8302	VBN3CLPX9402	VBN3CLPX9302
		31*	VBN3CMPX7402	VBN3CMPX7302	VBN3CMPXA402	VBN3CMPXA302	VBN3CMPX8402	VBN3CMPX8302	VBN3CMPX9402	VBN3CMPX9302
1-1/4"	40	4.1	VBN3DHPX7402	VBN3DHPX7302	VBN3DHPXA402	VBN3DHPXA302	VBN3DHPX8402	VBN3DHPX8302	VBN3DHPX9402	VBN3DHPX9302
		8.7	VBN3DJPX7402	VBN3DJPX7302	VBN3DJPA402	VBN3DJPXA302	VBN3DJPX8402	VBN3DJPX8302	VBN3DJPX9402	VBN3DJPX9302
		12.7	VBN3DKPX7402	VBN3DKPX7302	VBN3DKPA402	VBN3DKPXA302	VBN3DKPX8402	VBN3DKPX8302	VBN3DKPX9402	VBN3DKPX9302
		19.4*	VBN3DLPX7402	VBN3DLPX7302	VBN3DLPXA402	VBN3DLPXA302	VBN3DLPX8402	VBN3DLPX8302	VBN3DLPX9402	VBN3DLPX9302
		27	VBN3DMPX7402	VBN3DMPX7302	VBN3DMPXA402	VBN3DMPXA302	VBN3DMPX8402	VBN3DMPX8302	VBN3DMPX9402	VBN3DMPX9302
		34*	VBN3DNPX7402	VBN3DNPX7302	VBN3DNPXA402	VBN3DNPXA302	VBN3DNPX8402	VBN3DNPX8302	VBN3DNPX9402	VBN3DNPX9302
1-1/2"	40	4	VBN3EHPX7402	VBN3EHPX7302	VBN3EHPXA402	VBN3EHPXA302	VBN3EHPX8402	VBN3EHPX8302	VBN3EHPX9402	VBN3EHPX9302
		8.3	VBN3EJPX7402	VBN3EJPX7302	VBN3EJPA402	VBN3EJPA302	VBN3EJPX8402	VBN3EJPX8302	VBN3EJPX9402	VBN3EJPX9302
		13.4	VBN3EKPX7402	VBN3EKPX7302	VBN3EKPXA402	VBN3EKPXA302	VBN3EKPX8402	VBN3EKPX8302	VBN3EKPX9402	VBN3EKPX9302
		24	VBN3ELPX7402	VBN3ELPX7302	VBN3ELPA402	VBN3ELPXA302	VBN3ELPX8402	VBN3ELPX8302	VBN3ELPX9402	VBN3ELPX9302
		32*	VBN3EMPX7402	VBN3EMPX7302	VBN3EMPXA402	VBN3EMPXA302	VBN3EMPX8402	VBN3EMPX8302	VBN3EMPX9402	VBN3EMPX9302
		61*	VBN3EPPX7402	VBN3EPPX7302	VBN3EPPXA402	VBN3EPPXA302	VBN3EPPX8402	VBN3EPPX8302	VBN3EPPX9402	VBN3EPPX9302
2"	40	24	VBN3FLPX7402	VBN3FLPX7302	VBN3FLPA402	VBN3FLPXA302	VBN3FLPX8402	VBN3FLPX8302	VBN3FLPX9402	VBN3FLPX9302
		38	VBN3FNPX7402	VBN3FNPX7302	VBN3FNPA402	VBN3FNPXA302	VBN3FNPX8402	VBN3FNPX8302	VBN3FNPX9402	VBN3FNPX9302
		57*	VBN3FPPX7402	VBN3FPPX7302	VBN3FPPXA402	VBN3FPPXA302	VBN3FPPX8402	VBN3FPPX8302	VBN3FPPX9402	VBN3FPPX9302
		83	VBN3FRPX7402	VBN3FRPX7302	VBN3FRPXA402	VBN3FRPXA302	VBN3FRPX8402	VBN3FRPX8302	VBN3FRPX9402	VBN3FRPX9302
		109*	VBN3FSPX7402	VBN3FSPX7302	VBN3FSPXA402	VBN3FSPXA302	VBN3FSPX8402	VBN3FSPX8302	VBN3FSPX9402	VBN3FSPX9302
2-1/2"	40	38	VBN3GNPX7402	VBN3GNPX7302	VBN3GNPXA402	VBN3GNPXA302	VBN3GNPX8402	VBN3GNPX8302	VBN3GNPX9402	VBN3GNPX9302
		74	VBN3GRPX7402	VBN3GRPX7302	VBN3GRPXA402	VBN3GRPXA302	VBN3GRPX8402	VBN3GRPX8302	VBN3GRPX9402	VBN3GRPX9302
		100*	VBN3GSPX7402	VBN3GSPX7302	VBN3GSPXA402	VBN3GSPXA302	VBN3GSPX8402	VBN3GSPX8302	VBN3GSPX9402	VBN3GSPX9302

* Full port ball. No flow characterizing insert.

2-Way Flanged Control Ball Valves 4"-6", NEMA 2+3R

Common Features

- Maximum static pressure 240 psi (-22°F to 250°F)
- Spring return actuators field-configurable for A-port normally open or normally closed fail safe
- Use globe valves for steam ratings
- Medium: Water/glycol solutions up to 50%, closed loop HVAC systems only, not for use with steam
- ANSI class 125 flanged connections
- ANSI class IV leakage (0.01% of Cv)
- Valve ball and stem 316 stainless steel
- Equal percentage flow (laser-milled stainless steel ball)
- Cast iron body construction -- not for use with open systems such as cooling towers

5-YEAR

LIMITED
WARRANTY



2-Way

Actuator Features		Non Fail Safe		Fail Safe		Valve Only
Actuator O.S. Number		MN6110A1003 4 to 5 in.	MN7510A2001 4 to 5 in.	MS8110A1008 4 to 5 in.	MS7510A2008 4 to 5 in.	N/A
		MN6134A1003 6 in.	MN7234A2008 6 in.	MS8120A1007 6 in.	MS7520A2007 6 in.	
Power Supply	Voltage	24 Vac	24 Vac	24 Vac	24 Vac	
	Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	
Actuator Torque	Power	5 / 9 VA	5 / 9 VA	30 / 40 VA	14 / 16 VA	
	(lb.-in.)	88/300	88/300	88/175	88/175	
Control	(0)2-10 Vdc		•		•	
	4-20 mA (external 500 Ohm Resistor)		•		•	
	Floating	•	•**		•	
	Two-Position SPDT	•	•**		•	
	Two-Position SPST	•	•**	•	•	
	Fail Safe Action (field configurable)	Stay in Place	Stay in Place	Closed	Closed	
	Normal Position (no signal) (field configurable)	Stay in Place	Closed	Closed	Closed	
	Actuator Stroke (degrees)	95°	95°	95°	95°	
	Timing (drive/spring return, seconds)	95	95	45/20	90/20	
	Aux Switch 2 x SPDT Add-on	SW2-US	SW2-US	SW2-US	SW2-US	
	Feedback 2-10 Vdc Built In		•		•	
	Valve Features Trim	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	



Valve Size (inches)	Close-off Pressure (psid)	Cv*	Valve O.S. Number				
			NEMA 2 Actuator				
4"	70	91	VBF2JS1S0A	VBF2JS1S0B	VBF2JS1S0C	VBF2JS1S0D	VBF2JS1S0X
		118	VBF2JT1S0A	VBF2JT1S0B	VBF2JT1S0C	VBF2JT1S0D	VBF2JT1S0X
		152	VBF2JU1S0A	VBF2JU1S0B	VBF2JU1S0C	VBF2JU1S0D	VBF2JU1S0X
		197	VBF2J11S0A	VBF2J11S0B	VBF2J11S0C	VBF2J11S0D	VBF2J11S0X
		254	VBF2J21S0A	VBF2J21S0B	VBF2J21S0C	VBF2J21S0D	VBF2J21S0X
5"	70	144	VBF2KU1S0A	VBF2KU1S0B	VBF2KU1S0C	VBF2KU1S0D	VBF2KU1S0X
		185	VBF2K11S0A	VBF2K11S0B	VBF2K11S0C	VBF2K11S0D	VBF2K11S0X
		240	VBF2K21S0A	VBF2K21S0B	VBF2K21S0C	VBF2K21S0D	VBF2K21S0X
		309	VBF2K31S0A	VBF2K31S0B	VBF2K31S0C	VBF2K31S0D	VBF2K31S0X
		400	VBF2K41S0A	VBF2K41S0B	VBF2K41S0C	—	VBF2K41S0X
6"	70	208	VBF2L11S0A	VBF2L11S0B	VBF2L11S0C	VBF2L11S0D	VBF2L11S0X
		268	VBF2L21S0A	VBF2L21S0B	VBF2L21S0C	VBF2L21S0D	VBF2L21S0X
		346	VBF2L41S0A	VBF2L41S0B	VBF2L41S0C	—	VBF2L41S0X
		441	VBF2L51S0A	VBF2L51S0B	VBF2L51S0C	—	VBF2L51S0X
		577	VBF2L61S0A	VBF2L61S0B	VBF2L61S0C	—	VBF2L61S0X
		650	VBF2L71S0A	VBF2L71S0B	VBF2L71S0C	—	VBF2L71S0X
			NEMA 3R Actuator				
4"	70	91	VBF2JC1SRA	VBF2JC1SRB	VBF2JC1SRC	VBF2JC1SRD	—
		118	VBF2JT1SRA	VBF2JT1SRB	VBF2JT1SRC	VBF2JT1SRD	—
		152	VBF2JU1SRA	VBF2JU1SRB	VBF2JU1SRC	VBF2JU1SRD	—
		197	VBF2J11SRA	VBF2J11SRB	VBF2J11SRC	VBF2J11SRD	—
		254	VBF2J21SRA	VBF2J21SRB	VBF2J21SRC	VBF2J21SRD	—
5"	70	144	VBF2KU1SRA	VBF2KU1SRB	VBF2KU1SRC	VBF2KU1SRD	—
		185	VBF2K11SRA	VBF2K11SRB	VBF2K11SRC	VBF2K11SRD	—
		240	VBF2K21SRA	VBF2K21SRB	VBF2K21SRC	VBF2K21SRD	—
		309	VBF2K31SRA	VBF2K31SRB	VBF2K31SRC	VBF2K31SRD	—
		400	VBF2K41SRA	VBF2K41SRB	VBF2K41SRC	—	—
6"	70	208	VBF2L11SRA	VBF2L11SRB	VBF2L11SRC	VBF2L11SRD	—
		268	VBF2L21SRA	VBF2L21SRB	VBF2L21SRC	VBF2L21SRD	—
		346	VBF2L41SRA	VBF2L41SRB	VBF2L41SRC	—	—
		441	VBF2L51SRA	VBF2L51SRB	VBF2L51SRC	—	—
		577	VBF2L61SRA	VBF2L61SRB	VBF2L61SRC	—	—
		650	VBF2L71SRA	VBF2L71SRB	VBF2L71SRC	—	—

* Maximum flow 700 gpm
**4 and 5 inch valves only.

Product Selection - Valves

3-Way Flanged Control Ball Valves 4"-6", NEMA 2+3R

Common Features

- Spring return actuators field-configurable for A-port normally open or normally closed fail safe
- Globe valve A-B-AB flow pattern (side B port)
- Valve ball and stem 316 stainless steel
- Three-way: A-AB equal percentage, B-AB linear (80% of Cv on B-port) (laser-milled ball)
- Mixing or Diverting control and ANSI Class IV leakage specification (.01% of CV) for all sizes except as noted below.
- VBF3 4 inch with 327 CV, 5 inch with 400 CV, and 6 inch with 650 CV.
 - Mixing control only.
 - Class IV (.01% of CV) leakage A to AB.
 - Class III (.1% of CV) leakage B to AB.
- Cast iron body construction -- not for use with open systems such as cooling towers

**5-YEAR
LIMITED
WARRANTY**



3-Way

Actuator Features			Non Fail Safe		Fail Safe		Valve Only
Actuator O.S. Number			MN6110A1003 4 to 5 in.	MN7510A2001 4 to 5 in.	MS8110A1008 4 to 5 in.	MS7510A2008 4 to 5 in.	N/A
			MN6134A1003 6 in.	MN7234A2008 6 in.	MS8120A1007 6 in.	MS7520A2007 6 in.	
Power Supply	Voltage		24 Vac	24 Vac	24 Vac	24 Vac	
	Frequency		50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	
	Power		5 / 9 VA	5 / 9 VA	30 / 40 VA	14 / 16 VA	
Actuator Torque	(lb.-in.)		88/300	88/300	88/175	88/175	
Control	(0)2-10 Vdc			•		•	
	4-20 mA (external 500 Ohm Resistor)			•		•	
	Floating		•	•**		•	
	Two-Position SPDT		•	•**		•	
	Two-Position SPST		•	•**	•	•	
Fail Safe Action	(field configurable)		Stay in Place	Stay in Place	A-AB Closed	A-AB Closed	
Normal Position (no signal)	(field configurable)		Stay in Place	A-AB Closed	A-AB Closed	A-AB Closed	
Actuator Stroke	(degrees)		95°	95°	95°	95°	
Timing	(drive/spring return, seconds)		95	95	45/20	90/20	
Aux Switch	2 x SPDT Add-on		SW2-US	SW2-US	SW2-US	SW2-US	
Feedback	2-10 Vdc Built In			•		•	
Valve Features		Trim	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Close-off Pressure (psid)	Cv*		Valve O.S. Number				
			NEMA 2 Actuator				
70	91	VBF3JS1S0A	VBF3JS1S0B	VBF3JS1S0C	VBF3JS1S0D	VBF3JS1S0X	
	118	VBF3JT1S0A	VBF3JT1S0B	VBF3JT1S0C	VBF3JT1S0D	VBF3JT1S0X	
	152	VBF3JU1S0A	VBF3JU1S0B	VBF3JU1S0C	VBF3JU1S0D	VBF3JU1S0X	
	197	VBF3J11S0A	VBF3J11S0B	VBF3J11S0C	VBF3J11S0D	VBF3J11S0X	
	254	VBF3J21S0A	VBF3J21S0B	VBF3J21S0C	VBF3J21S0D	VBF3J21S0X	
	327	VBF3J31S0A	VBF3J31S0B	VBF3J31S0C	VBF3J31S0D	VBF3J31S0X	
70	144	VBF3KU1S0A	VBF3KU1S0B	VBF3KU1S0C	VBF3KU1S0D	VBF3KU1S0X	
	185	VBF3K11S0A	VBF3K11S0B	VBF3K11S0C	VBF3K11S0D	VBF3K11S0	
	240	VBF3K21S0A	VBF3K21S0B	VBF3K21S0C	VBF3K21S0D	VBF3K21S0X	
	309	VBF3K31S0A	VBF3K31S0B	VBF3K31S0C	VBF3K31S0D	VBF3K31S0X	
	400	VBF3K41S0A	VBF3K41S0B	VBF3K41S0C	—	VBF3K41S0X	
70	208	VBF3L11S0A	VBF3L11S0B	VBF3L11S0C	VBF3L11S0D	VBF3L11S0X	
	268	VBF3L21S0A	VBF3L21S0B	VBF3L21S0C	VBF3L21S0D	VBF3L21S0X	
	346	VBF3L41S0A	VBF3L41S0B	VBF3L41S0C	—	VBF3L41S0X	
	441	VBF3L51S0A	VBF3L51S0B	VBF3L51S0C	—	VBF3L51S0X	
	577	VBF3L61S0A	VBF3L61S0B	VBF3L61S0C	—	VBF3L61S0X	
	650	VBF3L71S0A	VBF3L71S0B	VBF3L71S0C	—	VBF3L71S0X	
			NEMA 3R Actuator				
70	91	VBF3JS1SRA	VBF3JS1SRB	VBF3JS1SRC	VBF3JS1SRD	—	
	118	VBF3JT1SRA	VBF3JT1SRB	VBF3JT1SRC	VBF3JT1SRD	—	
	152	VBF3JU1SRA	VBF3JU1SRB	VBF3JU1SRC	VBF3JU1SRD	—	
	197	VBF3J11SRA	VBF3J11SRB	VBF3J11SRC	VBF3J11SRD	—	
	254	VBF3J21SRA	VBF3J21SRB	VBF3J21SRC	VBF3J21SRD	—	
	327	VBF3J31SRA	VBF3J31SRB	VBF3J31SRC	VBF3J31SRD	—	
70	144	VBF3KU1SRA	VBF3KU1SRB	VBF3KU1SRC	VBF3KU1SRD	—	
	185	VBF3K11SRA	VBF3K11SRB	VBF3K11SRC	VBF3K11SRD	—	
	240	VBF3K21SRA	VBF3K21SRB	VBF3K21SRC	VBF3K21SRD	—	
	309	VBF3K31SRA	VBF3K31SRB	VBF3K31SRC	VBF3K31SRD	—	
	400	VBF3K41SRA	VBF3K41SRB	VBF3K41SRC	—	—	
70	208	VBF3L11SRA	VBF3L11SRB	VBF3L11SRC	VBF3L11SRD	—	
	268	VBF3L21SRA	VBF3L21SRB	VBF3L21SRC	VBF3L21SRD	—	
	346	VBF3L41SRA	VBF3L41SRB	VBF3L41SRC	—	—	
	441	VBF3L51SRA	VBF3L51SRB	VBF3L51SRC	—	—	
	577	VBF3L61SRA	VBF3L61SRB	VBF3L61SRC	—	—	
	650	VBF3L71SRA	VBF3L71SRB	VBF3L71SRC	—	—	

* Maximum flow 700 gpm
**4 and 5 inch valves only.

Product Selection - Valves

Flanged Control Ball Valves 2½" - 6"

Common Features

- For closed loop HVAC systems with up to 50% glycol, not for use with steam
- Sizes from 2-1/2" to 6" with ANSI Class 125 flanged connections
- Flow characteristics
 - Two-way: equal percentage
 - Three-way: A-AB equal percentage, B-AB linear.
- Choice of four actuator mounting positions on the 4", 5" and 6" valve
- Field configurable for normally open or normally closed fail safe position
- Removable manual operating handle to control valve during installation or in event of power failure (2-1/2" and 3" models)
- ANSI Class leakage specifications:
 - 2-way; ANSI Class IV leakage (0.01% of Cv)
 - 3-way; A to AB; ANSI Class IV leakage (0.01% of Cv)
 - 3-way; B to AB; ANSI Class III leakage (0.1% of Cv)
- Wide range of Cv choices from 63 to 360
- Valve ball and stem 316 stainless steel for all valves except 3-way 2-1/2" valve



**5-YEAR
LIMITED
WARRANTY**

Actuator Features		Non Fail Safe							
Actuator O.S. Number		MN7505A2001 MN7505A2209	MN6105A1011 MN6105A1201	MN7510A2001 MN7510A2209	MN6110A1003 MN6110A1201	MN7220A2007 MN7220A2205	MN6120A1002 MN6120A1200	MN7234A2008	MN6134A1003
Power Supply	Voltage	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac
	Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
	Power	5 VA	5 VA	5 VA	5 VA	6 VA	6 VA	9 VA	9 VA
Actuator Torque	(lb.-in.)	44	44	88	88	175	175	300	300
Control	(0)2-10 Vdc	•		•		•		•	
	4-20 mA (external 500 Ohm Resistor)	•		•		•		•	
	Floating	•	•	•	•		•		•
	Two-Position SPDT	•	•	•	•		•		•
	Two-Position SPST	•	•	•	•		•		•
Fail Safe Action		Stay in place							
Normal Position (no signal) (field configurable)		Open or Closed	Stay in Place	Open or Closed	Stay in Place	Open or Closed	Stay in Place	Open or Closed	Stay in Place
Actuator Stroke	(degrees)	95	95	95	95	95	95	95	95
Timing	(seconds)	95	95	95	95	95	95	95	95
Aux Switch	SPDT Built In	0 / 2	0 / 2	0 / 2	0 / 2	0 / 2	0 / 2		
	2 x SPDT Add-On					SW2-US	SW2-US	SW2-US	SW2-US
Feedback	(0)2-10 Vdc Built In	•		•		•		•	

	Valve Size (inches)	Cv	Valve Type	Max Static Water Pressure	Valve Trim	Valve OS Number	Close-off Pressure, psid							
							100	100						
2-Way	2-1/2"	63	On/Off, Mod	360 psi @ 250°F	Stainless Steel	VBF5011A1734								
	3"	100	On/Off, Mod	360 psi @ 250°F	Stainless Steel	VBF5011A1767								
	4"	160	On/Off, Mod	240 psig @ 250°F	Stainless Steel	VBF5011A1858			70	70	70	70	70	70
	5"	250	On/Off, Mod	240 psig @ 250°F	Stainless Steel	VBF5011A1882			70	70	70	70	70	70
	6"	360	On/Off, Mod	240 psig @ 250°F	Stainless Steel	VBF5011A1916					70*	70	70	70
3-Way	2.5"	63	Mixing, Diverting	360 psi @ 250°F	Brass	VBF5013B1003	40	40						
	3"	100	Mixing, Diverting	360 psi @ 250°F	Stainless Steel	VBF5013B1011			70	70	70	70	70	70
	4"	160	Mixing, Diverting	240 psig @ 250°F	Stainless Steel	VBF5013B1029			70	70	70	70	70	70
	5"	250	Mixing, Diverting	240 psig @ 250°F	Stainless Steel	VBF5013B1037			70	70	70	70	70	70
	6"	360	Mixing, Diverting	240 psig @ 250°F	Stainless Steel	VBF5013B1045					70*	70	70	70

* 2-position only

Product Selection - Valves

Flanged Control Ball Valves 2½"- 6"



**5-YEAR
LIMITED
WARRANTY**

Actuator Features		Fail Safe								
Actuator O.S. Number		MS7505A2030 MS7505A2130	MS8105A1030 MS8105A1130	MS4105A1030 MS4105A1130	MS7510A2008 MS7510A2206 MS7510H2209	MS8110A1008 MS8110A1206	MS4110A1002 MS4110A1200	MS7520A2007 MS7520A2205 MS7520H2208	MS8120A1007 MS8120A1205	MS4120A1001 MS4120A1209
Power Supply	Voltage	24 Vac	24 Vac	100-250 Vac	24 Vac	24 Vac	100-250 Vac	24 Vac	24 Vac	100-250 Vac
	Frequency	50/60 Hz	50/60 Hz	60 Hz	50/60 Hz	50/60 Hz	60 Hz	50/60 Hz	50/60 Hz	60 Hz
	Power	7.5 VA	8 VA	11 VA	14 VA	30 VA	45 VA	16 VA	40 VA	60 VA
Actuator Torque	(lb.-in.)	44	44	44	88	88	88	175	175	175
Control	(0)2-10 Vdc	•			•			•		
	4-20 mA (external 500 Ohm Resistor)	•			•			•		
	Floating	•			•			•		
	Two-Position SPDT	•			•			•		
	Two-Position SPST	•	•	•	•	•	•	•	•	•
Fail Safe Action		Configurable Open/Closed								
Normal Position (no signal) (field configurable)		Open or Closed								
Actuator Stroke	(degrees)	95	95	95	95	95	95	95	95	95
Timing	(seconds)	90	45	45	90	45	45	90	45	45
Aux Switch	SPDT Built In	0 / 1	0 / 1	0 / 1	0 / 2 / 2	0 / 2	0 / 2	0 / 2 / 2	0 / 2	0 / 2
	2 x SPDT Add-On				SW2-US	SW2-US	SW2-US	SW2-US	SW2-US	SW2-US
Feedback	(0)2-10 Vdc Built In	•			•			•		

2-Way	Valve Size (inches)	Cv	Valve Type	Max Static Water Pressure	Valve Trim	Valve OS Number	Close-off Pressure, psid							
	2-1/2"	63	On/Off, Mod	360 psi @ 250°F	Stainless Steel	VBF5011A1734	100	100	100					
	3"	100	On/Off, Mod	360 psi @ 250°F	Stainless Steel	VBF5011A1767	100	100	100					
	4"	160	On/Off, Mod	240 psig @ 250°F	Stainless Steel	VBF5011A1858				70	70	70	70	70
	5"	250	On/Off, Mod	240 psig @ 250°F	Stainless Steel	VBF5011A1882				70	70	70	70	70
	6"	360	On/Off, Mod	240 psig @ 250°F	Stainless Steel	VBF5011A1916						70*	70	70
	2.5"	63	Mixing, Diverting	360 psi @ 250°F	Brass	VBF5013B1003	40	40	40					
3-Way	3"	100	Mixing, Diverting	360 psi @ 250°F	Stainless Steel	VBF5013B1011				70	70	70	70	70
	4"	160	Mixing, Diverting	240 psig @ 250°F	Stainless Steel	VBF5013B1029				70	70	70	70	70
	5"	250	Mixing, Diverting	240 psig @ 250°F	Stainless Steel	VBF5013B1037				70	70	70	70	70
	6"	360	Mixing, Diverting	240 psig @ 250°F	Stainless Steel	VBF5013B1045						70*	70	70

* 2-position only

Product Selection - Valves

Pressure Independent Control Valves with Non Spring Return Actuators ½"-1¼"



Example of complete orderable part number: **VRN2A005.00SA** + **MVN643A0000** + **C1**
 Pressure Independent Control Valve, Female NPT Thread, 2-way, 1/2", 5 GPM, Stainless Steel trim with
 MVN643A0000 Actuator, Fail in place and 1 meter cable.

**5-YEAR
LIMITED
WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 105 to 124.

Valve Specification				Valve Profile	Standard Profile		Black Bracket	
				Valve Trim	Plated Brass	Stainless Steel	Plated Brass	Stainless Steel
Valve Size (inches)	Differential Pressure, psid		Close-off	Max. gpm	Valve Body Model Number			
	Min	Max						
1/2"	3.0	35	100	1.0	VRN2A001.00PA	VRN2A001.00SA	VRN2A001.00PX	VRN2A001.00SX
				2.0	VRN2A002.00PA	VRN2A002.00SA	VRN2A002.00PX	VRN2A002.00SX
				3.0	VRN2A003.00PA	VRN2A003.00SA	VRN2A003.00PX	VRN2A003.00SX
				4.0	VRN2A004.00PA	VRN2A004.00SA	VRN2A004.00PX	VRN2A004.00SX
				5.0	VRN2A005.00PA	VRN2A005.00SA	VRN2A005.00PX	VRN2A005.00SX
				6.0	VRN2A006.00PA	VRN2A006.00SA	VRN2A006.00PX	VRN2A006.00SX
				7.0	VRN2A007.00PA	VRN2A007.00SA	VRN2A007.00PX	VRN2A007.00SX
3/4"	3.0	35	100	1.0	VRN2B001.00PA	VRN2B001.00SA	VRN2B001.00PX	VRN2B001.00SX
				2.0	VRN2B002.00PA	VRN2B002.00SA	VRN2B002.00PX	VRN2B002.00SX
				3.0	VRN2B003.00PA	VRN2B003.00SA	VRN2B003.00PX	VRN2B003.00SX
				4.0	VRN2B004.00PA	VRN2B004.00SA	VRN2B004.00PX	VRN2B004.00SX
				5.0	VRN2B005.00PA	VRN2B005.00SA	VRN2B005.00PX	VRN2B005.00SX
				6.0	VRN2B006.00PA	VRN2B006.00SA	VRN2B006.00PX	VRN2B006.00SX
				7.0	VRN2B007.00PA	VRN2B007.00SA	VRN2B007.00PX	VRN2B007.00SX
	6.0	35	100	8.0	VRN2B008.00PA	VRN2B008.00SA	VRN2B008.00PX	VRN2B008.00SX
				9.0	VRN2B009.00PA	VRN2B009.00SA	VRN2B009.00PX	VRN2B009.00SX
				10.0	VRN2B010.00PA	VRN2B010.00SA	VRN2B010.00PX	VRN2B010.00SX
1"	3.0	35	100	1.0	VRN2C001.00PA	VRN2C001.00SA	VRN2C001.00PX	VRN2C001.00SX
				2.0	VRN2C002.00PA	VRN2C002.00SA	VRN2C002.00PX	VRN2C002.00SX
				3.0	VRN2C003.00PA	VRN2C003.00SA	VRN2C003.00PX	VRN2C003.00SX
				4.0	VRN2C004.00PA	VRN2C004.00SA	VRN2C004.00PX	VRN2C004.00SX
				5.0	VRN2C005.00PA	VRN2C005.00SA	VRN2C005.00PX	VRN2C005.00SX
				6.0	VRN2C006.00PA	VRN2C006.00SA	VRN2C006.00PX	VRN2C006.00SX
				7.0	VRN2C007.00PA	VRN2C007.00SA	VRN2C007.00PX	VRN2C007.00SX
	6.0	35	100	8.0	VRN2C008.00PA	VRN2C008.00SA	VRN2C008.00PX	VRN2C008.00SX
				9.0	VRN2C009.00PA	VRN2C009.00SA	VRN2C009.00PX	VRN2C009.00SX
				10	VRN2C010.00PA	VRN2C010.00SA	VRN2C010.00PX	VRN2C010.00SX
	3.0	50	100	15	VRN2C015.00PA	VRN2C015.00SA	VRN2C015.00PX	VRN2C015.00SX
	4.0			20	VRN2C020.00PA	VRN2C020.00SA	VRN2C020.00PX	VRN2C020.00SX
1-1/4"	3.0	50	100	10	VRN2D010.00PA	VRN2D010.00SA	VRN2D010.00PX	VRN2D010.00SX
	4.0			15	VRN2D015.00PA	VRN2D015.00SA	VRN2D015.00PX	VRN2D015.00SX
	5.0			20	VRN2D020.00PA	VRN2D020.00SA	VRN2D020.00PX	VRN2D020.00SX
	5.0			25	VRN2D025.00PA	VRN2D025.00SA	VRN2D025.00PX	VRN2D025.00SX
	5.0			30	VRN2D030.00PA	VRN2D030.00SA	VRN2D030.00PX	VRN2D030.00SX
	6.5	58		35	VRN2D035.00PA	VRN2D035.00SA	VRN2D035.00PX	VRN2D035.00SX

Actuator Features						
				MVN Standard Profile		DCA or DCA w/ switches
Control Signal	Timing	Voltage	Enclosure	Actuator Model Number		
Floating	90 sec.	24 VAC/DC*	NEMA 2	+MVN613A0000		+MN6105A1011 or +MN6105A1201
Fast SPDT	30 sec.			+MVN643A0000		
Modulating	90 sec.			+MVN713A0000		+MN7505A2001 or +MN7505A2209
Accessories	1 meter cable			+C1		N/A
	NEMA 3R enclosure			N/A		+3R

Product Selection - Valves

Pressure Independent Control Valves with Non Spring Return Actuators 1½"-3"



Example of complete orderable part number: **VRN2E020.00SX + MN6105A1011**
 Pressure Independent Control Valve, Female NPT Thread, 2-way, 1-1/2", 20 GPM, Stainless Steel trim with
 MN6105A1011 Actuator, Fail in place.

**5-YEAR
LIMITED
WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 105 to 124.

Valve Specification				Valve Profile	Black Bracket					
				Valve Trim	Plated Brass	Stainless Steel				
Valve Size (inches)	Differential Pressure, psid		Close-off	Max. gpm	Valve Body Model Number					
	Min	Max								
1-1/2"	3.0	50	100	10	VRN2E010.00PX	VRN2E010.00SX				
				15	VRN2E015.00PX	VRN2E015.00SX				
	4.0			20	VRN2E020.00PX	VRN2E020.00SX				
				25	VRN2E025.00PX	VRN2E025.00SX				
	5.0	58		30	VRN2E030.00PX	VRN2E030.00SX				
				35	VRN2E035.00PX	VRN2E035.00SX				
				40	VRN2E040.00PX	VRN2E040.00SX				
	4.0			45	VRN2E045.00PX	VRN2E045.00SX				
				50	VRN2E050.00PX	VRN2E050.00SX				
	6.0			55	VRN2E055.00PX	VRN2E055.00SX				
				60	VRN2E060.00PX	VRN2E060.00SX				
				65	VRN2E065.00PX	VRN2E065.00SX				
				70	VRN2E070.00PX	VRN2E070.00SX				
				75	VRN2E075.00PX	VRN2E075.00SX				
				80	VRN2E080.00PX	VRN2E080.00SX				
				85	VRN2E085.00PX	VRN2E085.00SX				
	95			VRN2E095.00PX	VRN2E095.00SX					
2"	4.0	58	100	25	VRN2F025.00PX	VRN2F025.00SX				
				30	VRN2F030.00PX	VRN2F030.00SX				
				35	VRN2F035.00PX	VRN2F035.00SX				
	6.0			40	VRN2F040.00PX	VRN2F040.00SX				
				45	VRN2F045.00PX	VRN2F045.00SX				
				50	VRN2F050.00PX	VRN2F050.00SX				
	7.0			55	VRN2F055.00PX	VRN2F055.00SX				
				60	VRN2F060.00PX	VRN2F060.00SX				
				65	VRN2F065.00PX	VRN2F065.00SX				
				70	VRN2F070.00PX	VRN2F070.00SX				
				75	VRN2F075.00PX	VRN2F075.00SX				
				2-1/2"	4.0	58	100	25	VRN2G025.00PX	VRN2G025.00SX
								30	VRN2G030.00PX	VRN2G030.00SX
	6.0			35	VRN2G035.00PX			VRN2G035.00SX		
40		VRN2G040.00PX	VRN2G040.00SX							
	45	VRN2G045.00PX	VRN2G045.00SX							
7.0	50	VRN2G050.00PX	VRN2G050.00SX							
	55	VRN2G055.00PX	VRN2G055.00SX							
	60	VRN2G060.00PX	VRN2G060.00SX							
	65	VRN2G065.00PX	VRN2G065.00SX							
	70	VRN2G070.00PX	VRN2G070.00SX							
	75	VRN2G075.00PX	VRN2G075.00SX							
	80	VRN2G080.00PX	VRN2G080.00SX							
85	VRN2G085.00PX	VRN2G085.00SX								
95	VRN2G095.00PX	VRN2G095.00SX								
3"	4.0	58	100	25	VRN2H025.00PX	VRN2H025.00SX				
				30	VRN2H030.00PX	VRN2H030.00SX				
	6.0			35	VRN2H035.00PX	VRN2H035.00SX				
				40	VRN2H040.00PX	VRN2H040.00SX				
				45	VRN2H045.00PX	VRN2H045.00SX				
	7.0			50	VRN2H050.00PX	VRN2H050.00SX				
				55	VRN2H055.00PX	VRN2H055.00SX				
				60	VRN2H060.00PX	VRN2H060.00SX				
				65	VRN2H065.00PX	VRN2H065.00SX				
				70	VRN2H070.00PX	VRN2H070.00SX				
				75	VRN2H075.00PX	VRN2H075.00SX				
				80	VRN2H080.00PX	VRN2H080.00SX				
	85			VRN2H085.00PX	VRN2H085.00SX					
	95			VRN2H095.00PX	VRN2H095.00SX					

Actuator Features				
				DCA or DCA w/ switches
Control Signal	Timing	Voltage	Enclosure	Actuator Model Number
Floating	90 sec.	24 VAC/DC	NEMA 2	+MN6105A1011 or +MN6105A1201
Modulating	90 sec.			+MN7505A2001 or +MN7505A2209
Accessories	NEMA 3R enclosure			+3R

Product Selection - Valves

Pressure Independent Control Valves With Spring Return Actuators 1/2"-1 1/4"



Example of complete orderable part number: **VRN2A005.00PX + MS7103A2024 + FSC**
 Pressure Independent Control Valve, Female NPT Thread, 2-way, 1/2", 5 GPM, Black Bracket, Plated Brass trim with MS7103A2024 Actuator, Fail closed.

**5-YEAR
LIMITED
WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 105 to 124.

Valve Specification				Valve Profile	Black Bracket		Black Bracket	
				Valve Trim	Plated Brass	Stainless Steel	Plated Brass	Stainless Steel
Valve Size (inches)	Differential Pressure, psid		Close-off	Max. gpm	Valve Body Model Number			
	Min	Max						
1/2"	3.0	35	100	1.0	VRN2A001.00PX	VRN2A001.00SX	VRN2A001.00PX	VRN2A001.00SX
				2.0	VRN2A002.00PX	VRN2A002.00SX	VRN2A002.00PX	VRN2A002.00SX
				3.0	VRN2A003.00PX	VRN2A003.00SX	VRN2A003.00PX	VRN2A003.00SX
				4.0	VRN2A004.00PX	VRN2A004.00SX	VRN2A004.00PX	VRN2A004.00SX
				5.0	VRN2A005.00PX	VRN2A005.00SX	VRN2A005.00PX	VRN2A005.00SX
				6.0	VRN2A006.00PX	VRN2A006.00SX	VRN2A006.00PX	VRN2A006.00SX
				7.0	VRN2A007.00PX	VRN2A007.00SX	VRN2A007.00PX	VRN2A007.00SX
3/4"	3.0	35	100	1.0	VRN2B001.00PX	VRN2B001.00SX	VRN2B001.00PX	VRN2B001.00SX
				2.0	VRN2B002.00PX	VRN2B002.00SX	VRN2B002.00PX	VRN2B002.00SX
				3.0	VRN2B003.00PX	VRN2B003.00SX	VRN2B003.00PX	VRN2B003.00SX
				4.0	VRN2B004.00PX	VRN2B004.00SX	VRN2B004.00PX	VRN2B004.00SX
				5.0	VRN2B005.00PX	VRN2B005.00SX	VRN2B005.00PX	VRN2B005.00SX
				6.0	VRN2B006.00PX	VRN2B006.00SX	VRN2B006.00PX	VRN2B006.00SX
				7.0	VRN2B007.00PX	VRN2B007.00SX	VRN2B007.00PX	VRN2B007.00SX
	6.0	35	100	8.0	VRN2B008.00PX	VRN2B008.00SX	VRN2B008.00PX	VRN2B008.00SX
				9.0	VRN2B009.00PX	VRN2B009.00SX	VRN2B009.00PX	VRN2B009.00SX
				10	VRN2B010.00PX	VRN2B010.00SX	VRN2B010.00PX	VRN2B010.00SX
1"	3.0	35	100	1.0	VRN2C001.00PX	VRN2C001.00SX	VRN2C001.00PX	VRN2C001.00SX
				2.0	VRN2C002.00PX	VRN2C002.00SX	VRN2C002.00PX	VRN2C002.00SX
				3.0	VRN2C003.00PX	VRN2C003.00SX	VRN2C003.00PX	VRN2C003.00SX
				4.0	VRN2C004.00PX	VRN2C004.00SX	VRN2C004.00PX	VRN2C004.00SX
				5.0	VRN2C005.00PX	VRN2C005.00SX	VRN2C005.00PX	VRN2C005.00SX
				6.0	VRN2C006.00PX	VRN2C006.00SX	VRN2C006.00PX	VRN2C006.00SX
				7.0	VRN2C007.00PX	VRN2C007.00SX	VRN2C007.00PX	VRN2C007.00SX
	6.0	35	100	8.0	VRN2C008.00PX	VRN2C008.00SX	VRN2C008.00PX	VRN2C008.00SX
				9.0	VRN2C009.00PX	VRN2C009.00SX	VRN2C009.00PX	VRN2C009.00SX
	3.0	50	100	10	VRN2C010.00PX	VRN2C010.00SX	VRN2C010.00PX	VRN2C010.00SX
				15	VRN2C015.00PX	VRN2C015.00SX	VRN2C015.00PX	VRN2C015.00SX
	4.0	50	100	20	VRN2C020.00PX	VRN2C020.00SX	VRN2C020.00PX	VRN2C020.00SX
				25	VRN2C025.00PX	VRN2C025.00SX	VRN2C025.00PX	VRN2C025.00SX
1-1/4"	3.0	50	100	10	VRN2D010.00PX	VRN2D010.00SX	VRN2D010.00PX	VRN2D010.00SX
				15	VRN2D015.00PX	VRN2D015.00SX	VRN2D015.00PX	VRN2D015.00SX
	4.0	50	100	20	VRN2D020.00PX	VRN2D020.00SX	VRN2D020.00PX	VRN2D020.00SX
				25	VRN2D025.00PX	VRN2D025.00SX	VRN2D025.00PX	VRN2D025.00SX
	5.0	50	100	30	VRN2D030.00PX	VRN2D030.00SX	VRN2D030.00PX	VRN2D030.00SX
				35	VRN2D035.00PX	VRN2D035.00SX	VRN2D035.00PX	VRN2D035.00SX

VALVES

Actuator Features						
				DCA or DCA w/ switches		DCA or DCA w/ switches
Control Signal	Timing	Voltage	Enclosure	Actuator Model Number		
Modulating	90 sec.	24 VAC/DC	NEMA 2	+MS7103A2024 or +MS7103A2224		+MS7505A2030 or +MS7505A2130
2-position	45 sec.					+MS8105A1030 or +MS8105A1130
2-position	45 sec.					+MS4105A1030 or +MS4105A1130
		120 VAC				
Fail Safe Position	FSO - Fail Safe Open, FSC - Fail Safe Closed			+FSO or +FSC		+FSO or +FSC
Accessories	NEMA 3R enclosure			N/A		+3R

Note: MS7505A2030 and MS7505A2130 are only available with NEMA 3R enclosure on 1/2" - 1-1/4" valves, for NEMA 2 use MS7103A2024 or MS7103A2224

Product Selection - Valves

Pressure Independent Control Valves With Spring Return Actuators 1½"-3"



Example of complete orderable part number: **VRN2E020.00SX** + **MS7505A2030** + **FSC**
 Pressure Independent Control Valve, Female NPT Thread, 2-way, 1-1/2", 20 GPM, Stainless Steel trim with
 MS7505A2030 Actuator, Fail closed.

**5-YEAR
 LIMITED
 WARRANTY**

If the complete orderable part number is too long for your ordering system, please refer to the Short Order Codes on pg 105 to 124.

Valve Specification				Valve Profile	Black Bracket	
Valve Size (Inches)	Differential Pressure, psid		Close-off	Valve Trim	Plated Brass	Stainless Steel
	Min	Max		Max. gpm	Valve Body Model Number	
1-1/2"	3.0	50	100	10	VRN2E010.00PX	VRN2E010.00SX
				15	VRN2E015.00PX	VRN2E015.00SX
	4.0			20	VRN2E020.00PX	VRN2E020.00SX
				25	VRN2E025.00PX	VRN2E025.00SX
	5.0	58		30	VRN2E030.00PX	VRN2E030.00SX
				35	VRN2E035.00PX	VRN2E035.00SX
	6.0			40	VRN2E040.00PX	VRN2E040.00SX
				45	VRN2E045.00PX	VRN2E045.00SX
				50	VRN2E050.00PX	VRN2E050.00SX
	7.0			55	VRN2E055.00PX	VRN2E055.00SX
				60	VRN2E060.00PX	VRN2E060.00SX
				65	VRN2E065.00PX	VRN2E065.00SX
				70	VRN2E070.00PX	VRN2E070.00SX
				75	VRN2E075.00PX	VRN2E075.00SX
				80	VRN2E080.00PX	VRN2E080.00SX
				85	VRN2E085.00PX	VRN2E085.00SX
	11.0			95	VRN2E095.00PX	VRN2E095.00SX
2"	4.0	58	100	25	VRN2F025.00PX	VRN2F025.00SX
				30	VRN2F030.00PX	VRN2F030.00SX
	6.0			35	VRN2F035.00PX	VRN2F035.00SX
				40	VRN2F040.00PX	VRN2F040.00SX
	7.0			45	VRN2F045.00PX	VRN2F045.00SX
				50	VRN2F050.00PX	VRN2F050.00SX
				55	VRN2F055.00PX	VRN2F055.00SX
				60	VRN2F060.00PX	VRN2F060.00SX
				65	VRN2F065.00PX	VRN2F065.00SX
				70	VRN2F070.00PX	VRN2F070.00SX
2-1/2"	4.0	58	100		VRN2G025.00PX	VRN2G025.00SX
				30	VRN2G030.00PX	VRN2G030.00SX
	6.0			35	VRN2G035.00PX	VRN2G035.00SX
				40	VRN2G040.00PX	VRN2G040.00SX
	7.0			45	VRN2G045.00PX	VRN2G045.00SX
				50	VRN2G050.00PX	VRN2G050.00SX
				55	VRN2G055.00PX	VRN2G055.00SX
				60	VRN2G060.00PX	VRN2G060.00SX
				65	VRN2G065.00PX	VRN2G065.00SX
				70	VRN2G070.00PX	VRN2G070.00SX
	10			75	VRN2G075.00PX	VRN2G075.00SX
				80	VRN2G080.00PX	VRN2G080.00SX
				85	VRN2G085.00PX	VRN2G085.00SX
				95	VRN2G095.00PX	VRN2G095.00SX
				12		25
4.0		30	VRN2H030.00PX		VRN2H030.00SX	
		35	VRN2H035.00PX		VRN2H035.00SX	
6.0	40	VRN2H040.00PX	VRN2H040.00SX			
	45	VRN2H045.00PX	VRN2H045.00SX			
7.0	50	VRN2H050.00PX	VRN2H050.00SX			
	55	VRN2H055.00PX	VRN2H055.00SX			
	60	VRN2H060.00PX	VRN2H060.00SX			
	65	VRN2H065.00PX	VRN2H065.00SX			
10	70	VRN2H070.00PX	VRN2H070.00SX			
	75	VRN2H075.00PX	VRN2H075.00SX			
	80	VRN2H080.00PX	VRN2H080.00SX			
	85	VRN2H085.00PX	VRN2H085.00SX			
	12	95	VRN2H095.00PX	VRN2H095.00SX		

Actuator Features

				DCA or DCA w/ switches
Control Signal	Timing	Voltage	Enclosure	Actuator Model Number
Floating	90 sec.	24 VAC/DC	NEMA 2	+MS7505A2030 or +MS7505A2130
2-position	45 sec.			+MS8105A1030 or +MS8105A1130
2-position	45 sec.	120 VAC		+MS4105A1030 or +MS4105A1130
Fail Safe Position	FSO - Fail Safe Open, FSC - Fail Safe Closed			+FSO or +FSC
Accessories	NEMA 3R enclosure			+3R

Product Selection - Valves

Pressure Independent Control Valves, NPT ½"-1¼"

Common Features

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of ±5% over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.



Actuator Features		Non Fail Safe							
Actuator O.S Number/ Short Order Code		MVN613A0000		MVN613A0000+C1		MVN643A0000		MVN643A0000+C1	
Power Supply	Voltage	24 VAC		24 VAC		24 VAC/DC		24 VAC/DC	
	Frequency	50/60 Hz		50/60 Hz		50/60 Hz		50/60 Hz	
	Power	1.5 VA		1.5 VA		6 VA		6 VA	
Actuator Torque (lb.-in.)		27		27		27		27	
Control	Modulating (0)2-10Vdc								
	Floating	•		•		•		•	
	Fast acting SPDT								
Actuator Stroke (degrees)		90° ± 3°		90° ± 3°		90° ± 3°		90° ± 3°	
Timing (seconds)		90		90		30		30	
Fail Safe Action		Fail in Place		Fail in Place		Fail in Place		Fail in Place	
Valve Features		Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass

Valve Size (inches)	Differential Pressure** (psid)		Close-off Pressure (psid)	Max. GPM	Short Order Codes							
	Min.	Max.			No Cable		1 Meter Cable		No Cable		1 Meter Cable	
1/2"	3.0	35	100	1	VRN2ABPA1000	VRN2ABSA1000	VRN2ABPA1001	VRN2ABSA1001	VRN2ABPA2000	VRN2ABSA2000	VRN2ABPA2001	VRN2ABSA2001
				2	VRN2ADPA1000	VRN2ADSA1000	VRN2ADPA1001	VRN2ADSA1001	VRN2ADPA2000	VRN2ADSA2000	VRN2ADPA2001	VRN2ADSA2001
				3	VRN2AEP1000	VRN2AESA1000	VRN2AEP1001	VRN2AESA1001	VRN2AEP2000	VRN2AESA2000	VRN2AEP2001	VRN2AESA2001
				4	VRN2AFPA1000	VRN2AFSA1000	VRN2AFPA1001	VRN2AFSA1001	VRN2AFPA2000	VRN2AFSA2000	VRN2AFPA2001	VRN2AFSA2001
				5	VRN2AGPA1000	VRN2AGSA1000	VRN2AGPA1001	VRN2AGSA1001	VRN2AGPA2000	VRN2AGSA2000	VRN2AGPA2001	VRN2AGSA2001
				6	VRN2AHPA1000	VRN2AHPA1000	VRN2AHPA1001	VRN2AHPA1001	VRN2AHPA2000	VRN2AHPA2000	VRN2AHPA2001	VRN2AHPA2001
				7	VRN2AJPA1000	VRN2AJSA1000	VRN2AJPA1001	VRN2AJSA1001	VRN2AJPA2000	VRN2AJSA2000	VRN2AJPA2001	VRN2AJSA2001
3/4"	3.0	35	100	1	VRN2BBPA1000	VRN2BBSA1000	VRN2BBPA1001	VRN2BBSA1001	VRN2BBPA2000	VRN2BBSA2000	VRN2BBPA2001	VRN2BBSA2001
				2	VRN2BDPA1000	VRN2BDSA1000	VRN2BDPA1001	VRN2BDSA1001	VRN2BDPA2000	VRN2BDSA2000	VRN2BDPA2001	VRN2BDSA2001
				3	VRN2BEP1000	VRN2BESA1000	VRN2BEP1001	VRN2BESA1001	VRN2BEP2000	VRN2BESA2000	VRN2BEP2001	VRN2BESA2001
				4	VRN2BFPA1000	VRN2BFSA1000	VRN2BFPA1001	VRN2BFSA1001	VRN2BFPA2000	VRN2BFSA2000	VRN2BFPA2001	VRN2BFSA2001
				5	VRN2BGPA1000	VRN2BGSA1000	VRN2BGPA1001	VRN2BGSA1001	VRN2BGPA2000	VRN2BGSA2000	VRN2BGPA2001	VRN2BGSA2001
				6	VRN2BHPA1000	VRN2BHSA1000	VRN2BHPA1001	VRN2BHSA1001	VRN2BHPA2000	VRN2BHSA2000	VRN2BHPA2001	VRN2BHSA2001
				7	VRN2BJPA1000	VRN2BJS1000	VRN2BJPA1001	VRN2BJS1001	VRN2BJPA2000	VRN2BJS2000	VRN2BJPA2001	VRN2BJS2001
	6.0	35	100	8	VRN2BKPA1000	VRN2BKSA1000	VRN2BKPA1001	VRN2BKSA1001	VRN2BKPA2000	VRN2BKSA2000	VRN2BKPA2001	VRN2BKSA2001
				9	VRN2BLPA1000	VRN2BLSA1000	VRN2BLPA1001	VRN2BLSA1001	VRN2BLPA2000	VRN2BLSA2000	VRN2BLPA2001	VRN2BLSA2001
				10*	VRN2BMPA1000	VRN2BMSA1000	VRN2BMPA1001	VRN2BMSA1001	VRN2BMPA2000	VRN2BMSA2000	VRN2BMPA2001	VRN2BMSA2001
1"	3.0	35	100	1	VRN2CBPA1000	VRN2CBSA1000	VRN2CBPA1001	VRN2CBSA1001	VRN2CBPA2000	VRN2CBSA2000	VRN2CBPA2001	VRN2CBSA2001
				2	VRN2CDPA1000	VRN2CDSA1000	VRN2CDPA1001	VRN2CDSA1001	VRN2CDPA2000	VRN2CDSA2000	VRN2CDPA2001	VRN2CDSA2001
				3	VRN2CEPA1000	VRN2CESA1000	VRN2CEPA1001	VRN2CESA1001	VRN2CEPA2000	VRN2CESA2000	VRN2CEPA2001	VRN2CESA2001
				4	VRN2CFPA1000	VRN2CFSA1000	VRN2CFPA1001	VRN2CFSA1001	VRN2CFPA2000	VRN2CFSA2000	VRN2CFPA2001	VRN2CFSA2001
				5	VRN2CGPA1000	VRN2CGSA1000	VRN2CGPA1001	VRN2CGSA1001	VRN2CGPA2000	VRN2CGSA2000	VRN2CGPA2001	VRN2CGSA2001
				6	VRN2CHPA1000	VRN2CHSA1000	VRN2CHPA1001	VRN2CHSA1001	VRN2CHPA2000	VRN2CHSA2000	VRN2CHPA2001	VRN2CHSA2001
				7	VRN2CJPA1000	VRN2CJSA1000	VRN2CJPA1001	VRN2CJSA1001	VRN2CJPA2000	VRN2CJSA2000	VRN2CJPA2001	VRN2CJSA2001
				8	VRN2CKPA1000	VRN2CKSA1000	VRN2CKPA1001	VRN2CKSA1001	VRN2CKPA2000	VRN2CKSA2000	VRN2CKPA2001	VRN2CKSA2001
	6.0	35	100	9	VRN2CLPA1000	VRN2CLSA1000	VRN2CLPA1001	VRN2CLSA1001	VRN2CLPA2000	VRN2CLSA2000	VRN2CLPA2001	VRN2CLSA2001
				10	VRN2CMPA1000	VRN2CMSA1000	VRN2CMPA1001	VRN2CMSA1001	VRN2CMPA2000	VRN2CMSA2000	VRN2CMPA2001	VRN2CMSA2001
				15	VRN2CNPA1000	VRN2CNSA1000	VRN2CNPA1001	VRN2CNSA1001	VRN2CNPA2000	VRN2CNSA2000	VRN2CNPA2001	VRN2CNSA2001
	4.0	50	100	20	VRN2CPPA1000	VRN2CPSA1000	VRN2CPPA1001	VRN2CPSA1001	VRN2CPPA2000	VRN2CPSA2000	VRN2CPPA2001	VRN2CPSA2001
				25	VRN2DMPA1000	VRN2DMSA1000	VRN2DMPA1001	VRN2DMSA1001	VRN2DMPA2000	VRN2DMSA2000	VRN2DMPA2001	VRN2DMSA2001
1-1/4"	4.0	50	100	15	VRN2DNPA1000	VRN2DNSA1000	VRN2DNPA1001	VRN2DNSA1001	VRN2DNPA2000	VRN2DNSA2000	VRN2DNPA2001	VRN2DNSA2001
				20	VRN2DPPA1000	VRN2DPSA1000	VRN2DPPA1001	VRN2DPSA1001	VRN2DPPA2000	VRN2DPSA2000	VRN2DPPA2001	VRN2DPSA2001
				25	VRN2DQPA1000	VRN2DQSA1000	VRN2DQPA1001	VRN2DQSA1001	VRN2DQPA2000	VRN2DQSA2000	VRN2DQPA2001	VRN2DQSA2001
				30	VRN2DRPA1000	VRN2DRSA1000	VRN2DRPA1001	VRN2DRSA1001	VRN2DRPA2000	VRN2DRSA2000	VRN2DRPA2001	VRN2DRSA2001
	6.5	50	100	35*	VRN2DSPA1000	VRN2DSSA1000	VRN2DSPA1001	VRN2DSSA1001	VRN2DSPA2000	VRN2DSSA2000	VRN2DSPA2001	VRN2DSSA2001

* Full port ball

** Differential pressure regulator operating range, ±5%

Product Selection - Valves

Pressure Independent Control Valves, NPT ½"-1 ¼"

Common Features

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of ±5% over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.



Actuator Features		Non Fail Safe				Valve Only		
Actuator O.S Number/ Short Order Code		MVN713A0000		MVN713A0000+C1		N/A		
Power Supply	Voltage	24 VAC/DC		24 VAC/DC				
	Frequency	50/60 Hz		50/60 Hz				
	Power	5 VA		5 VA				
Actuator Torque (lb.-in.)		27		27				
Control	Modulating (0)2-10Vdc	•		•				
	Floating							
	Fast acting SPDT							
Actuator Stroke (degrees)		90° ± 3°		90° ± 3°				
Timing (seconds)		90		90				
Fail Safe Action		Fail in Place		Fail in Place				
Valve Features		Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel

Valve Size (inches)	Differential Pressure** (psid)		Close-off Pressure (psid)	Max. GPM	Short Order Codes							
	Min.	Max.			No Cable		1 Meter Cable		Valve Only			
1/2"	3.0	35	100	1	VRN2ABPA3000	VRN2ABSA3000	VRN2ABPA3001	VRN2ABSA3001	VRN2ABPA0000	VRN2ABSA0000		
				2	VRN2ADPA3000	VRN2ADSA3000	VRN2ADPA3001	VRN2ADSA3001	VRN2ADPA0000	VRN2ADSA0000		
				3	VRN2AEP3000	VRN2AESA3000	VRN2AEP3001	VRN2AESA3001	VRN2AEP0000	VRN2AESA0000		
				4	VRN2AFPA3000	VRN2AFSA3000	VRN2AFPA3001	VRN2AFSA3001	VRN2AFPA0000	VRN2AFSA0000		
				5	VRN2AGPA3000	VRN2AGSA3000	VRN2AGPA3001	VRN2AGSA3001	VRN2AGPA0000	VRN2AGSA0000		
				6	VRN2AHPA3000	VRN2AHPA3000	VRN2AHPA3001	VRN2AHPA3001	VRN2AHPA0000	VRN2AHPA0000		
				7	VRN2AJPA3000	VRN2AJSA3000	VRN2AJPA3001	VRN2AJSA3001	VRN2AJPA0000	VRN2AJSA0000		
3/4"	3.0	35	100	1	VRN2BBPA3000	VRN2BBSA3000	VRN2BBPA3001	VRN2BBSA3001	VRN2BBPA0000	VRN2BBSA0000		
				2	VRN2BDPA3000	VRN2BDSA3000	VRN2BDPA3001	VRN2BDSA3001	VRN2BDPA0000	VRN2BDSA0000		
				3	VRN2BEP3000	VRN2BESA3000	VRN2BEP3001	VRN2BESA3001	VRN2BEP0000	VRN2BESA0000		
				4	VRN2BFPA3000	VRN2BFSA3000	VRN2BFPA3001	VRN2BFSA3001	VRN2BFPA0000	VRN2BFSA0000		
				5	VRN2BGPA3000	VRN2BGSA3000	VRN2BGPA3001	VRN2BGSA3001	VRN2BGPA0000	VRN2BGSA0000		
				6	VRN2BHPA3000	VRN2BHSA3000	VRN2BHPA3001	VRN2BHSA3001	VRN2BHPA0000	VRN2BHSA0000		
				7	VRN2BJPA3000	VRN2BJSA3000	VRN2BJPA3001	VRN2BJSA3001	VRN2BJPA0000	VRN2BJSA0000		
	6.0	35	100	8	VRN2BKPA3000	VRN2BKSA3000	VRN2BKPA3001	VRN2BKSA3001	VRN2BKPA0000	VRN2BKSA0000		
				9	VRN2BLPA3000	VRN2BLSA3000	VRN2BLPA3001	VRN2BLSA3001	VRN2BLPA0000	VRN2BLSA0000		
				10*	VRN2BMPA3000	VRN2BMSA3000	VRN2BMPA3001	VRN2BMSA3001	VRN2BMPA0000	VRN2BMSA0000		
1"	3.0	35	100	1	VRN2CBPA3000	VRN2CBSA3000	VRN2CBPA3001	VRN2CBSA3001	VRN2CBPA0000	VRN2CBSA0000		
				2	VRN2CDPA3000	VRN2CDSA3000	VRN2CDPA3001	VRN2CDSA3001	VRN2CDPA0000	VRN2CDSA0000		
				3	VRN2CEPA3000	VRN2CESA3000	VRN2CEPA3001	VRN2CESA3001	VRN2CEPA0000	VRN2CESA0000		
				4	VRN2CFPA3000	VRN2CFSA3000	VRN2CFPA3001	VRN2CFSA3001	VRN2CFPA0000	VRN2CFSA0000		
				5	VRN2CGPA3000	VRN2CGSA3000	VRN2CGPA3001	VRN2CGSA3001	VRN2CGPA0000	VRN2CGSA0000		
				6	VRN2CHPA3000	VRN2CHSA3000	VRN2CHPA3001	VRN2CHSA3001	VRN2CHPA0000	VRN2CHSA0000		
				7	VRN2CJPA3000	VRN2CJSA3000	VRN2CJPA3001	VRN2CJSA3001	VRN2CJPA0000	VRN2CJSA0000		
	6.0	35	100	8	VRN2CKPA3000	VRN2CKSA3000	VRN2CKPA3001	VRN2CKSA3001	VRN2CKPA0000	VRN2CKSA0000		
				9	VRN2CLPA3000	VRN2CLSA3000	VRN2CLPA3001	VRN2CLSA3001	VRN2CLPA0000	VRN2CLSA0000		
				10	VRN2CMPA3000	VRN2CMSA3000	VRN2CMPA3001	VRN2CMSA3001	VRN2CMPA0000	VRN2CMSA0000		
	4.0	50	100	15	VRN2CNPA3000	VRN2CNPA3000	VRN2CNPA3001	VRN2CNPA3001	VRN2CNPA0000	VRN2CNPA0000		
				20	VRN2CPPA3000	VRN2CPSA3000	VRN2CPPA3001	VRN2CPSA3001	VRN2CPPA0000	VRN2CPSA0000		
				10	VRN2DMPA3000	VRN2DMSA3000	VRN2DMPA3001	VRN2DMSA3001	VRN2DMPA0000	VRN2DMSA0000		
				15	VRN2DNPA3000	VRN2DNPA3000	VRN2DNPA3001	VRN2DNPA3001	VRN2DNPA0000	VRN2DNPA0000		
1-1/4"	4.0	50	100	20	VRN2DPPA3000	VRN2DPSA3000	VRN2DPPA3001	VRN2DPSA3001	VRN2DPPA0000	VRN2DPSA0000		
				25	VRN2DQPA3000	VRN2DQSA3000	VRN2DQPA3001	VRN2DQSA3001	VRN2DQPA0000	VRN2DQSA0000		
	5.0			50	100	30	VRN2DRPA3000	VRN2DRSA3000	VRN2DRPA3001	VRN2DRSA3001	VRN2DRPA0000	VRN2DRSA0000
						35*	VRN2DSPA3000	VRN2DSPA3000	VRN2DSPA3001	VRN2DSPA3001	VRN2DSPA0000	VRN2DSPA0000
6.5												

* Full port ball

** Differential pressure regulator operating range, ±5%

Product Selection - Valves

Pressure Independent Control Valves, NPT 1/2"-1 1/4" NEMA 2

Common Features

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of $\pm 5\%$ over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.



Actuator Features		Non Fail Safe	
Actuator O.S Number		MN6105A1011	MN6105A1201
Power Supply	Voltage	24 VAC/DC	24 VAC/DC
	Frequency	50 / 60 Hz	50 / 60 Hz
	Power	5 VA	5 VA
Actuator Torque (lb.-in.)		44	44
Control (0)-10Vdc			
4-20 mA (w/ external 500 Ohm Resistor)			
Floating		•	•
Two-Position SPDT		•	•
Two-Position SPST			
Actuator Stroke (degrees)		95° $\pm$ 3°	95° $\pm$ 3°
Timing (drive/spring return, seconds)		90	90
Aux Switch		0	2
Feedback 2-10 Vdc Built In		—	—
Fail Safe Action		Stay in Place	Stay in Place
Normal Position (no signal)		Stay in Place	Stay in Place
Valve Features		Trim	Nickel-Plated Brass Stainless Steel Nickel-Plated Brass Stainless Steel

Valve Size (Inches)	Differential Pressure** (psid)		Close-off Pressure (psid)	Max. GPM	Short Order Codes			
	Min.	Max.						
1/2"	3.0	35	100	1	VRN2ABPX4000	VRN2ABSX4000	VRN2ABPXC000	VRN2ABSXC000
				2	VRN2ADPX4000	VRN2ADSX4000	VRN2ADPXC000	VRN2ADSXC000
				3	VRN2AEPX4000	VRN2AESX4000	VRN2AEPXC000	VRN2AESXC000
				4	VRN2AFPX4000	VRN2AFSX4000	VRN2AFPXC000	VRN2AFSXC000
				5	VRN2AGPX4000	VRN2AGSX4000	VRN2AGPXC000	VRN2AGSXC000
				6	VRN2AHPX4000	VRN2AHSX4000	VRN2AHPXC000	VRN2AHSXC000
				7	VRN2AJPX4000	VRN2AJSX4000	VRN2AJPXC000	VRN2AJSXC000
3/4"	3.0	35	100	1	VRN2BBPX4000	VRN2BSX4000	VRN2BBPXC000	VRN2BSXC000
				2	VRN2BDPX4000	VRN2BDSX4000	VRN2BDPXC000	VRN2BDSXC000
				3	VRN2BEPX4000	VRN2BESX4000	VRN2BEPXC000	VRN2BESXC000
				4	VRN2BFPX4000	VRN2BFSX4000	VRN2BFPXC000	VRN2BFSXC000
				5	VRN2BGPX4000	VRN2BGSX4000	VRN2BGPXC000	VRN2BGSXC000
				6	VRN2BHPX4000	VRN2BHSX4000	VRN2BHPXC000	VRN2BHSXC000
				7	VRN2BJPX4000	VRN2BJSX4000	VRN2BJPXC000	VRN2BJSXC000
	6.0	35	100	8	VRN2BKPX4000	VRN2BKSX4000	VRN2BKPXC000	VRN2BKSXC000
				9	VRN2BLPX4000	VRN2BLSX4000	VRN2BLPXC000	VRN2BLSXC000
				10*	VRN2BMPX4000	VRN2BMSX4000	VRN2BMPXC000	VRN2BMSXC000
1"	3.0	35	100	1	VRN2CBPX4000	VRN2CBSX4000	VRN2CBPXC000	VRN2CBSXC000
				2	VRN2CDPX4000	VRN2CDSX4000	VRN2CDPXC000	VRN2CDSXC000
				3	VRN2CEPX4000	VRN2CESX4000	VRN2CEPXC000	VRN2CESXC000
				4	VRN2CFPX4000	VRN2CFSX4000	VRN2CFPXC000	VRN2CFSXC000
				5	VRN2CGPX4000	VRN2CGSX4000	VRN2CGPXC000	VRN2CGSXC000
				6	VRN2CHPX4000	VRN2CHSX4000	VRN2CHPXC000	VRN2CHSXC000
				7	VRN2CJPX4000	VRN2CJSX4000	VRN2CJPXC000	VRN2CJSXC000
	6.0	35	100	8	VRN2CKPX4000	VRN2CKSX4000	VRN2CKPXC000	VRN2CKSXC000
				9	VRN2CLPX4000	VRN2CLSX4000	VRN2CLPXC000	VRN2CLSXC000
				10	VRN2CMPX4000	VRN2CMSX4000	VRN2CMPXC000	VRN2CMSXC000
	4.0	50	100	15	VRN2CNPX4000	VRN2CNSX4000	VRN2CNPXC000	VRN2CNSXC000
				20	VRN2CPPX4000	VRN2CPSX4000	VRN2CPPXC000	VRN2CPSXC000
				10	VRN2DMPX4000	VRN2DMSX4000	VRN2DMPXC000	VRN2DMSXC000
				15	VRN2DNPX4000	VRN2DNSX4000	VRN2DNPXC000	VRN2DNSXC000
				20	VRN2DPPX4000	VRN2DPSX4000	VRN2DPPXC000	VRN2DPSXC000
1-1/4"	4.0	50	100	25	VRN2DQPX4000	VRN2DQSX4000	VRN2DQPXC000	VRN2DQSXC000
				30	VRN2DRPX4000	VRN2DRSX4000	VRN2DRPXC000	VRN2DRSXC000
				35*	VRN2DSPX4000	VRN2DSSX4000	VRN2DSPXC000	VRN2DSSXC000
	5.0							

* Full port ball

** Differential pressure regulator operating range, $\pm 5\%$

Product Selection - Valves

Pressure Independent Control Valves, NPT ½"-1¼" NEMA 2

Common Features

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of ±5% over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.

Actuator Features		Non Fail Safe		Valve Only	
Actuator O.S Number		MN7505A2001	MN7505A2209	N/A	
Power Supply	Voltage	24 VAC/DC	24 VAC/DC		
	Frequency	50 / 60 Hz	50 / 60 Hz		
	Power	5 VA	5 VA		
Actuator Torque (lb.-in.)		44	44		
Control	(0)2-10Vdc	•	•		
	4-20 mA (w/ external 500 Ohm Resistor)	•	•		
	Floating	•	•		
	Two-Position SPDT	•	•		
	Two-Position SPST	•	•		
Actuator Stroke (degrees)		95° ± 3°	95° ± 3°		
Timing (drive/spring return, seconds)		90	90		
Aux Switch		0	2		
Feedback		2-10 Vdc Built In	•		
Fail Safe Action		Stay in Place	Stay in Place		
Normal Position (no signal)		Closed	Closed		
Valve Features		Trim	Nickel-Plated Brass Stainless Steel	Nickel-Plated Brass Stainless Steel	Nickel-Plated Brass Stainless Steel

Valve Size (inches)	Differential Pressure** (psid)		Close-off Pressure (psid)	Max. GPM	Short Order Codes					
	Min.	Max.								
1/2"	3.0	35	100	1	VRN2ABPX5000	VRN2ABSX5000	VRN2ABPX0000	VRN2ABSX0000	VRN2ABPX0000	VRN2ABSX0000
				2	VRN2ADPX5000	VRN2ADSX5000	VRN2ADPX0000	VRN2ADSX0000	VRN2ADPX0000	VRN2ADSX0000
				3	VRN2AEPX5000	VRN2AESX5000	VRN2AEPX0000	VRN2AESX0000	VRN2AEPX0000	VRN2AESX0000
				4	VRN2AFPX5000	VRN2AFSX5000	VRN2AFPX0000	VRN2AFSX0000	VRN2AFPX0000	VRN2AFSX0000
				5	VRN2AGPX5000	VRN2AGSX5000	VRN2AGPX0000	VRN2AGSX0000	VRN2AGPX0000	VRN2AGSX0000
				6	VRN2AHPX5000	VRN2AHSX5000	VRN2AHPX0000	VRN2AHSX0000	VRN2AHPX0000	VRN2AHSX0000
				7	VRN2AJPX5000	VRN2AJSX5000	VRN2AJPX0000	VRN2AJSX0000	VRN2AJPX0000	VRN2AJSX0000
3/4"	3.0	35	100	1	VRN2BBPX5000	VRN2BBSX5000	VRN2BBPX0000	VRN2BBSX0000	VRN2BBPX0000	VRN2BBSX0000
				2	VRN2BDPX5000	VRN2BDSX5000	VRN2BDPX0000	VRN2BDSX0000	VRN2BDPX0000	VRN2BDSX0000
				3	VRN2BEPX5000	VRN2BESX5000	VRN2BEPX0000	VRN2BESX0000	VRN2BEPX0000	VRN2BESX0000
				4	VRN2BFPX5000	VRN2BFSX5000	VRN2BFPX0000	VRN2BFSX0000	VRN2BFPX0000	VRN2BFSX0000
				5	VRN2BGPX5000	VRN2BG SX5000	VRN2BGPX0000	VRN2BG SX0000	VRN2BGPX0000	VRN2BG SX0000
				6	VRN2BHPX5000	VRN2BHSX5000	VRN2BHPX0000	VRN2BHSX0000	VRN2BHPX0000	VRN2BHSX0000
				7	VRN2BJPX5000	VRN2BJSX5000	VRN2BJPX0000	VRN2BJSX0000	VRN2BJPX0000	VRN2BJSX0000
	6.0	35	100	8	VRN2BKPX5000	VRN2BKSX5000	VRN2BKPX0000	VRN2BKSX0000	VRN2BKPX0000	VRN2BKSX0000
				9	VRN2BLPX5000	VRN2BLSX5000	VRN2BLPX0000	VRN2BLSX0000	VRN2BLPX0000	VRN2BLSX0000
				10*	VRN2BMPX5000	VRN2BMSX5000	VRN2BMPX0000	VRN2BMSX0000	VRN2BMPX0000	VRN2BMSX0000
1"	3.0	35	100	1	VRN2CBPX5000	VRN2CBSX5000	VRN2CBPX0000	VRN2CBSX0000	VRN2CBPX0000	VRN2CBSX0000
				2	VRN2CDPX5000	VRN2CDSX5000	VRN2CDPX0000	VRN2CDSX0000	VRN2CDPX0000	VRN2CDSX0000
				3	VRN2CEPX5000	VRN2CESX5000	VRN2CEPX0000	VRN2CESX0000	VRN2CEPX0000	VRN2CESX0000
				4	VRN2CFPX5000	VRN2CFSX5000	VRN2CFPX0000	VRN2CFSX0000	VRN2CFPX0000	VRN2CFSX0000
				5	VRN2CGPX5000	VRN2CGSX5000	VRN2CGPX0000	VRN2CGSX0000	VRN2CGPX0000	VRN2CGSX0000
				6	VRN2CHPX5000	VRN2CHSX5000	VRN2CHPX0000	VRN2CHSX0000	VRN2CHPX0000	VRN2CHSX0000
				7	VRN2CJPX5000	VRN2CJSX5000	VRN2CJPX0000	VRN2CJSX0000	VRN2CJPX0000	VRN2CJSX0000
	6.0	35	100	8	VRN2CKPX5000	VRN2CKSX5000	VRN2CKPX0000	VRN2CKSX0000	VRN2CKPX0000	VRN2CKSX0000
				9	VRN2CLPX5000	VRN2CLSX5000	VRN2CLPX0000	VRN2CLSX0000	VRN2CLPX0000	VRN2CLSX0000
				10	VRN2CMPX5000	VRN2CMSX5000	VRN2CMPX0000	VRN2CMSX0000	VRN2CMPX0000	VRN2CMSX0000
	4.0	50	100	15	VRN2CNPX5000	VRN2CNSX5000	VRN2CNPX0000	VRN2CNSX0000	VRN2CNPX0000	VRN2CNSX0000
				20	VRN2CPPX5000	VRN2CPSX5000	VRN2CPPX0000	VRN2CPSX0000	VRN2CPPX0000	VRN2CPSX0000
				10	VRN2DMPX5000	VRN2DMSX5000	VRN2DMPX0000	VRN2DMSX0000	VRN2DMPX0000	VRN2DMSX0000
				15	VRN2DNPX5000	VRN2DNSX5000	VRN2DNPX0000	VRN2DNSX0000	VRN2DNPX0000	VRN2DNSX0000
				20	VRN2DPPX5000	VRN2DPSX5000	VRN2DPPX0000	VRN2DPSX0000	VRN2DPPX0000	VRN2DPSX0000
1-1/4"	4.0	50	100	25	VRN2DQPX5000	VRN2DQSX5000	VRN2DQPX0000	VRN2DQSX0000	VRN2DQPX0000	VRN2DQSX0000
				30	VRN2DRPX5000	VRN2DRSX5000	VRN2DRPX0000	VRN2DRSX0000	VRN2DRPX0000	VRN2DRSX0000
				35*	VRN2DSPX5000	VRN2DSSX5000	VRN2DSPX0000	VRN2DSSX0000	VRN2DSPX0000	VRN2DSSX0000

* Full port ball

** Differential pressure regulator operating range, ±5%

Product Selection - Valves

Pressure Independent Control Valves, NPT 1/2"-1 1/4" NEMA 2

Actuator Features		Fail Safe			
Actuator O.S Number		MS7103A2024		MS7103A2224	
Power Supply	Voltage	24 VAC/DC		24 VAC/DC	
	Frequency	50 / 60 Hz		50 / 60 Hz	
	Power	4 VA		4 VA	
Actuator Torque (lb.-in.)		27		27	
Control	(0)2-10Vdc	•		•	
	4-20 mA (w/ external 500 Ohm Resistor)	•		•	
	Floating				
Two-Position SPDT					
Two-Position SPST					
Actuator Stroke (degrees)		95° ± 3°		95° ± 3°	
Timing (drive/spring return, seconds)		90 / 25		90 / 25	
Aux Switch		0		2	
Feedback 2-10 Vdc Built In		•		•	
Fail Safe Action		Closed		Closed	
		Open		Open	
Normal Position (no signal)		Closed		Closed	
		Open		Open	
Valve Features		Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass
					Stainless Steel

Valve Size (inches)	Differential Pressure** (psid)		Close-off Pressure (psid)	Max. GPM	Short Order Codes							
	Min.	Max.										
1/2"	3.0	35	100	1	VRN2ABPXE201	VRN2ABSXE201	VRN2ABPXE101	VRN2ABSXE101	VRN2ABPXF201	VRN2ABSXF201	VRN2ABPXF101	VRN2ABSXF101
				2	VRN2ADPXE201	VRN2ADSXE201	VRN2ADPXE101	VRN2ADSXE101	VRN2ADPXF201	VRN2ADSXF201	VRN2ADPXF101	VRN2ADSXF101
				3	VRN2AEPXE201	VRN2AESXE201	VRN2AEPXE101	VRN2AESXE101	VRN2AEPXF201	VRN2AESXF201	VRN2AEPXF101	VRN2AESXF101
				4	VRN2AFPXE201	VRN2AFSXE201	VRN2AFPXE101	VRN2AFSXE101	VRN2AFPXF201	VRN2AFSXF201	VRN2AFPXF101	VRN2AFSXF101
				5	VRN2AGPXE201	VRN2AGSXE201	VRN2AGPXE101	VRN2AGSXE101	VRN2AGPXF201	VRN2AGSXF201	VRN2AGPXF101	VRN2AGSXF101
				6	VRN2AHPXE201	VRN2AHSXE201	VRN2AHPXE101	VRN2AHSXE101	VRN2AHPXF201	VRN2AHSXF201	VRN2AHPXF101	VRN2AHSXF101
				7	VRN2AJPXE201	VRN2AJSXE201	VRN2AJPXE101	VRN2AJSXE101	VRN2AJPF201	VRN2AJSXF201	VRN2AJPF101	VRN2AJSXF101
3/4"	3.0	35	100	1	VRN2BBPXE201	VRN2BBSXE201	VRN2BBPXE101	VRN2BBSXE101	VRN2BBPXF201	VRN2BBSXF201	VRN2BBPXF101	VRN2BBSXF101
				2	VRN2BDPXE201	VRN2BDSXE201	VRN2BDPXE101	VRN2BDSXE101	VRN2BDPXF201	VRN2BDSXF201	VRN2BDPXF101	VRN2BDSXF101
				3	VRN2BEPXE201	VRN2BESXE201	VRN2BEPXE101	VRN2BESXE101	VRN2BEPXF201	VRN2BESXF201	VRN2BEPXF101	VRN2BESXF101
				4	VRN2BFPXE201	VRN2BFSXE201	VRN2BFPXE101	VRN2BFSXE101	VRN2BFPXF201	VRN2BFSXF201	VRN2BFPXF101	VRN2BFSXF101
				5	VRN2BGPXE201	VRN2BGSXE201	VRN2BGPXE101	VRN2BGSXE101	VRN2BGPXF201	VRN2BGSXF201	VRN2BGPXF101	VRN2BGSXF101
				6	VRN2BHPXE201	VRN2BHSXE201	VRN2BHPXE101	VRN2BHSXE101	VRN2BHPXF201	VRN2BHSXF201	VRN2BHPXF101	VRN2BHSXF101
	6.0	35	100	7	VRN2BJPXE201	VRN2BJSXE201	VRN2BJPXE101	VRN2BJSXE101	VRN2BJPF201	VRN2BJSXF201	VRN2BJPF101	VRN2BJSXF101
				8	VRN2BKPXE201	VRN2BKSXE201	VRN2BKPXE101	VRN2BKSXE101	VRN2BKPF201	VRN2BKSXF201	VRN2BKPF101	VRN2BKSXF101
				9	VRN2BLPXE201	VRN2BLSXE201	VRN2BLPXE101	VRN2BLSXE101	VRN2BLPF201	VRN2BLSXF201	VRN2BLPF101	VRN2BLSXF101
				10*	VRN2BMPXE201	VRN2BMSXE201	VRN2BMPXE101	VRN2BMSXE101	VRN2BMPP201	VRN2BMSXF201	VRN2BMPP101	VRN2BMSXF101
1"	3.0	35	100	1	VRN2CBPXE201	VRN2CBSXE201	VRN2CBPXE101	VRN2CBSXE101	VRN2CBPXF201	VRN2CBSXF201	VRN2CBPXF101	VRN2CBSXF101
				2	VRN2CDPXE201	VRN2CDSXE201	VRN2CDPXE101	VRN2CDSXE101	VRN2CDPXF201	VRN2CDSXF201	VRN2CDPXF101	VRN2CDSXF101
				3	VRN2CEPXE201	VRN2CESXE201	VRN2CEPXE101	VRN2CESXE101	VRN2CEPXF201	VRN2CESXF201	VRN2CEPXF101	VRN2CESXF101
				4	VRN2CFPXE201	VRN2CFSXE201	VRN2CFPXE101	VRN2CFSXE101	VRN2CFPXF201	VRN2CFSXF201	VRN2CFPXF101	VRN2CFSXF101
				5	VRN2CGPXE201	VRN2CGSXE201	VRN2CGPXE101	VRN2CGSXE101	VRN2CGPXF201	VRN2CGSXF201	VRN2CGPXF101	VRN2CGSXF101
				6	VRN2CHPXE201	VRN2CHSXE201	VRN2CHPXE101	VRN2CHSXE101	VRN2CHPXF201	VRN2CHSXF201	VRN2CHPXF101	VRN2CHSXF101
				7	VRN2CJPXE201	VRN2CJSXE201	VRN2CJPXE101	VRN2CJSXE101	VRN2CJPXF201	VRN2CJSXF201	VRN2CJPXF101	VRN2CJSXF101
	6.0	35	100	8	VRN2CKPXE201	VRN2CKSXE201	VRN2CKPXE101	VRN2CKSXE101	VRN2CKPXF201	VRN2CKSXF201	VRN2CKPXF101	VRN2CKSXF101
				9	VRN2CLPXE201	VRN2CLSXE201	VRN2CLPXE101	VRN2CLSXE101	VRN2CLPXF201	VRN2CLSXF201	VRN2CLPXF101	VRN2CLSXF101
	4.0	50	100	10	VRN2CMPXE201	VRN2CMSXE201	VRN2CMPXE101	VRN2CMSXE101	VRN2CMPXF201	VRN2CMSXF201	VRN2CMPXF101	VRN2CMSXF101
				15	VRN2CNPXE201	VRN2CNSXE201	VRN2CNPXE101	VRN2CNSXE101	VRN2CNPF201	VRN2CNSXF201	VRN2CNPF101	VRN2CNSXF101
				20	VRN2CPPXE201	VRN2CPSXE201	VRN2CPPXE101	VRN2CPSXE101	VRN2CPPXF201	VRN2CPSXF201	VRN2CPPXF101	VRN2CPSXF101
				10	VRN2DMPXE201	VRN2DMSXE201	VRN2DMPXE101	VRN2DMSXE101	VRN2DMPXF201	VRN2DMSXF201	VRN2DMPXF101	VRN2DMSXF101
1-1/4"	4.0	50	100	15	VRN2DNPXE201	VRN2DNSXE201	VRN2DNPXE101	VRN2DNSXE101	VRN2DNPF201	VRN2DNSXF201	VRN2DNPF101	VRN2DNSXF101
				20	VRN2DPPXE201	VRN2DPSXE201	VRN2DPPXE101	VRN2DPSXE101	VRN2DPPXF201	VRN2DPSXF201	VRN2DPPXF101	VRN2DPSXF101
				25	VRN2DQPE201	VRN2DQSXE201	VRN2DQPE101	VRN2DQSXE101	VRN2DQPF201	VRN2DQSXF201	VRN2DQPF101	VRN2DQSXF101
				30	VRN2DRPXE201	VRN2DRSXE201	VRN2DRPXE101	VRN2DRSXE101	VRN2DRPF201	VRN2DRSXF201	VRN2DRPF101	VRN2DRSXF101
				35*	VRN2DSPXE201	VRN2DSSXE201	VRN2DSPXE101	VRN2DSSXE101	VRN2DSPXF201	VRN2DSSXF201	VRN2DSPXF101	VRN2DSSXF101

* Full port ball

** Differential pressure regulator operating range, ±5%

Product Selection - Valves

Pressure Independent Control Valves, NPT 1/2"-1 1/4" NEMA 2

Actuator Features		Fail Safe			
Actuator O.S Number		MS8105A1030		MS8105A1130	
Power Supply	Voltage	24 VAC/DC		24 VAC/DC	
	Frequency	50 / 60 Hz		50 / 60 Hz	
	Power	6 VA		6 VA	
Actuator Torque (lb.-in.)		44		44	
Control (0)2-10Vdc					
4-20 mA (w/ external 500 Ohm Resistor)					
Floating					
Two-Position SPDT					
Two-Position SPST		•		•	
Actuator Stroke (degrees)		95° ± 3°		95° ± 3°	
Timing (drive/spring return, seconds)		45 / 25		45 / 25	
Aux Switch		0		1	
Feedback 2-10 Vdc Built In					
Fail Safe Action		Closed	Open	Closed	Open
Normal Position (no signal)		Closed	Open	Closed	Open
Valve Features Trim		Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel

Valve Size (inches)	Differential Pressure** (psid)		Close-off Pressure (psid)	Max. GPM	Short Order Codes							
	Min.	Max.										
1/2"	3.0	35	100	1	VRN2ABPX7200	VRN2ABSX7200	VRN2ABPX7100	VRN2ABSX7100	VRN2ABPX200	VRN2ABSXA200	VRN2ABPX100	VRN2ABSXA100
				2	VRN2ADPX7200	VRN2ADSX7200	VRN2ADPX7100	VRN2ADSX7100	VRN2ADPX200	VRN2ADSXA200	VRN2ADPX100	VRN2ADSXA100
				3	VRN2AEPX7200	VRN2AESX7200	VRN2AEPX7100	VRN2AESX7100	VRN2AEPX200	VRN2AESXA200	VRN2AEPX100	VRN2AESXA100
				4	VRN2AFPX7200	VRN2AFSX7200	VRN2AFPX7100	VRN2AFSX7100	VRN2AFPX200	VRN2AFSXA200	VRN2AFPX100	VRN2AFSXA100
				5	VRN2AGPX7200	VRN2AGSX7200	VRN2AGPX7100	VRN2AGSX7100	VRN2AGPX200	VRN2AGSXA200	VRN2AGPX100	VRN2AGSXA100
				6	VRN2AHPX7200	VRN2AHSX7200	VRN2AHPX7100	VRN2AHSX7100	VRN2AHPX200	VRN2AHSXA200	VRN2AHPX100	VRN2AHSXA100
				7	VRN2AJPX7200	VRN2AJSX7200	VRN2AJPX7100	VRN2AJSX7100	VRN2AJPX200	VRN2AJSXA200	VRN2AJPX100	VRN2AJSXA100
3/4"	3.0	35	100	1	VRN2BBPX7200	VRN2BBSX7200	VRN2BBPX7100	VRN2BBSX7100	VRN2BBPX200	VRN2BBSXA200	VRN2BBPX100	VRN2BBSXA100
				2	VRN2BDPX7200	VRN2BDSX7200	VRN2BDPX7100	VRN2BDSX7100	VRN2BDPX200	VRN2BDSXA200	VRN2BDPX100	VRN2BDSXA100
				3	VRN2BEPX7200	VRN2BESX7200	VRN2BEPX7100	VRN2BESX7100	VRN2BEPX200	VRN2BESXA200	VRN2BEPX100	VRN2BESXA100
				4	VRN2BFPX7200	VRN2BFSX7200	VRN2BFPX7100	VRN2BFSX7100	VRN2BFPX200	VRN2BFSXA200	VRN2BFPX100	VRN2BFSXA100
				5	VRN2BGPX7200	VRN2BGSX7200	VRN2BGPX7100	VRN2BGSX7100	VRN2BGPX200	VRN2BGSXA200	VRN2BGPX100	VRN2BGSXA100
				6	VRN2BHPX7200	VRN2BHSX7200	VRN2BHPX7100	VRN2BHSX7100	VRN2BHPX200	VRN2BHSXA200	VRN2BHPX100	VRN2BHSXA100
	6.0	35	100	7	VRN2BJPX7200	VRN2BJSX7200	VRN2BJPX7100	VRN2BJSX7100	VRN2BJPX200	VRN2BJSXA200	VRN2BJPX100	VRN2BJSXA100
				8	VRN2BKPX7200	VRN2BKSX7200	VRN2BKPX7100	VRN2BKSX7100	VRN2BKPX200	VRN2BKSXA200	VRN2BKPX100	VRN2BKSXA100
				9	VRN2BLPX7200	VRN2BLSX7200	VRN2BLPX7100	VRN2BLSX7100	VRN2BLPX200	VRN2BLSXA200	VRN2BLPX100	VRN2BLSXA100
				10*	VRN2BMPX7200	VRN2BMSX7200	VRN2BMPX7100	VRN2BMSX7100	VRN2BMPX200	VRN2BMSXA200	VRN2BMPX100	VRN2BMSXA100
1"	3.0	35	100	1	VRN2CBPX7200	VRN2CBSX7200	VRN2CBPX7100	VRN2CBSX7100	VRN2CBPX200	VRN2CBSXA200	VRN2CBPX100	VRN2CBSXA100
				2	VRN2CDPX7200	VRN2CDSX7200	VRN2CDPX7100	VRN2CDSX7100	VRN2CDPX200	VRN2CDSXA200	VRN2CDPX100	VRN2CDSXA100
				3	VRN2CEPX7200	VRN2CESX7200	VRN2CEPX7100	VRN2CESX7100	VRN2CEPX200	VRN2CESXA200	VRN2CEPX100	VRN2CESXA100
				4	VRN2CFPX7200	VRN2CFSX7200	VRN2CFPX7100	VRN2CFSX7100	VRN2CFPX200	VRN2CFSXA200	VRN2CFPX100	VRN2CFSXA100
				5	VRN2CGPX7200	VRN2CGSX7200	VRN2CGPX7100	VRN2CGSX7100	VRN2CGPX200	VRN2CGSXA200	VRN2CGPX100	VRN2CGSXA100
				6	VRN2CHPX7200	VRN2CHSX7200	VRN2CHPX7100	VRN2CHSX7100	VRN2CHPX200	VRN2CHSXA200	VRN2CHPX100	VRN2CHSXA100
				7	VRN2CJPX7200	VRN2CJSX7200	VRN2CJPX7100	VRN2CJSX7100	VRN2CJPX200	VRN2CJSXA200	VRN2CJPX100	VRN2CJSXA100
	6.0	35	100	8	VRN2CKPX7200	VRN2CKSX7200	VRN2CKPX7100	VRN2CKSX7100	VRN2CKPX200	VRN2CKSXA200	VRN2CKPX100	VRN2CKSXA100
				9	VRN2CLPX7200	VRN2CLSX7200	VRN2CLPX7100	VRN2CLSX7100	VRN2CLPX200	VRN2CLSXA200	VRN2CLPX100	VRN2CLSXA100
				10	VRN2CMPX7200	VRN2CMSX7200	VRN2CMPX7100	VRN2CMSX7100	VRN2CMPX200	VRN2CMSXA200	VRN2CMPX100	VRN2CMSXA100
	4.0	50	100	15	VRN2CNPX7200	VRN2CNSX7200	VRN2CNPX7100	VRN2CNSX7100	VRN2CNPX200	VRN2CNSXA200	VRN2CNPX100	VRN2CNSXA100
				20	VRN2CPPX7200	VRN2CPSX7200	VRN2CPPX7100	VRN2CPSX7100	VRN2CPPX200	VRN2CPSXA200	VRN2CPPX100	VRN2CPSXA100
				10	VRN2DMPX7200	VRN2DMSX7200	VRN2DMPX7100	VRN2DMSX7100	VRN2DMPX200	VRN2DMSXA200	VRN2DMPX100	VRN2DMSXA100
1-1/4"	4.0	50	100	15	VRN2DNPX7200	VRN2DNSX7200	VRN2DNPX7100	VRN2DNSX7100	VRN2DNPX200	VRN2DNSXA200	VRN2DNPX100	VRN2DNSXA100
				20	VRN2DPPX7200	VRN2DPSX7200	VRN2DPPX7100	VRN2DPSX7100	VRN2DPPX200	VRN2DPSXA200	VRN2DPPX100	VRN2DPSXA100
				25	VRN2DQPX7200	VRN2DQSX7200	VRN2DQPX7100	VRN2DQSX7100	VRN2DQPX200	VRN2DQSXA200	VRN2DQPX100	VRN2DQSXA100
				30	VRN2DRPX7200	VRN2DRSX7200	VRN2DRPX7100	VRN2DRSX7100	VRN2DRPX200	VRN2DRSXA200	VRN2DRPX100	VRN2DRSXA100
				35*	VRN2DSPX7200	VRN2DSSX7200	VRN2DSPX7100	VRN2DSSX7100	VRN2DSPX200	VRN2DSSXA200	VRN2DSPX100	VRN2DSSXA100

* Full port ball

** Differential pressure regulator operating range, ±5%

Product Selection - Valves

Pressure Independent Control Valves, NPT ½"-1¼" NEMA 2

Actuator Features		Fail Safe								
Actuator O.S Number		MS4105A1030				MS4105A1130				
Power Supply	Voltage	100-250 VAC				100-250 VAC				
	Frequency	50 / 60 Hz				50 / 60 Hz				
	Power	6 VA				6 VA				
Actuator Torque (lb.-in.)		44				44				
Control (0)2-10Vdc										
4-20 mA (w/ external 500 Ohm Resistor)										
Floating										
Two-Position SPDT										
Two-Position SPST		•				•				
Actuator Stroke (degrees)		95° ± 3°				95° ± 3°				
Timing (drive/spring return, seconds)		45 / 25				45 / 25				
Aux Switch		0				1				
Feedback 2-10 Vdc Built In										
Fail Safe Action		Closed		Open		Closed		Open		
Normal Position (no signal)		Closed		Open		Closed		Open		
Valve Features		Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel

Valve Size (inches)	Differential Pressure** (psid)		Close-off Pressure (psid)	Max. GPM	Short Order Codes											
	Min.	Max.														
1/2"	3.0	35	100	1	VRN2ABPX8200	VRN2ABSX8200	VRN2ABPX8100	VRN2ABSX8100	VRN2ABPX9200	VRN2ABSX9200	VRN2ABPX9100	VRN2ABSX9100				
				2	VRN2ADPX8200	VRN2ADSX8200	VRN2ADPX8100	VRN2ADSX8100	VRN2ADPX9200	VRN2ADSX9200	VRN2ADPX9100	VRN2ADSX9100				
				3	VRN2AEPX8200	VRN2AESX8200	VRN2AEPX8100	VRN2AESX8100	VRN2AEPX9200	VRN2AESX9200	VRN2AEPX9100	VRN2AESX9100				
				4	VRN2AFPX8200	VRN2AFSX8200	VRN2AFPX8100	VRN2AFSX8100	VRN2AFPX9200	VRN2AFSX9200	VRN2AFPX9100	VRN2AFSX9100				
				5	VRN2AGPX8200	VRN2AGSX8200	VRN2AGPX8100	VRN2AGSX8100	VRN2AGPX9200	VRN2AGSX9200	VRN2AGPX9100	VRN2AGSX9100				
				6	VRN2AHPX8200	VRN2AHSX8200	VRN2AHPX8100	VRN2AHSX8100	VRN2AHPX9200	VRN2AHSX9200	VRN2AHPX9100	VRN2AHSX9100				
				7	VRN2AJPX8200	VRN2AJSX8200	VRN2AJPX8100	VRN2AJSX8100	VRN2AJPX9200	VRN2AJSX9200	VRN2AJPX9100	VRN2AJSX9100				
3/4"	3.0	35	100	1	VRN2BBPX8200	VRN2BBSX8200	VRN2BBPX8100	VRN2BBSX8100	VRN2BBPX9200	VRN2BBSX9200	VRN2BBPX9100	VRN2BBSX9100				
				2	VRN2BDPX8200	VRN2BDSX8200	VRN2BDPX8100	VRN2BDSX8100	VRN2BDPX9200	VRN2BDSX9200	VRN2BDPX9100	VRN2BDSX9100				
				3	VRN2BEPX8200	VRN2BESX8200	VRN2BEPX8100	VRN2BESX8100	VRN2BEPX9200	VRN2BESX9200	VRN2BEPX9100	VRN2BESX9100				
				4	VRN2BFPX8200	VRN2BFSX8200	VRN2BFPX8100	VRN2BFSX8100	VRN2BFPX9200	VRN2BFSX9200	VRN2BFPX9100	VRN2BFSX9100				
				5	VRN2BGPX8200	VRN2BGSX8200	VRN2BGPX8100	VRN2BGSX8100	VRN2BGPX9200	VRN2BGSX9200	VRN2BGPX9100	VRN2BGSX9100				
				6	VRN2BHPX8200	VRN2BHSX8200	VRN2BHPX8100	VRN2BHSX8100	VRN2BHPX9200	VRN2BHSX9200	VRN2BHPX9100	VRN2BHSX9100				
				7	VRN2BJPX8200	VRN2BJSX8200	VRN2BJPX8100	VRN2BJSX8100	VRN2BJPX9200	VRN2BJSX9200	VRN2BJPX9100	VRN2BJSX9100				
	6.0	35	100	8	VRN2BKPX8200	VRN2BKSX8200	VRN2BKPX8100	VRN2BKSX8100	VRN2BKPX9200	VRN2BKSX9200	VRN2BKPX9100	VRN2BKSX9100				
				9	VRN2BLPX8200	VRN2BLSX8200	VRN2BLPX8100	VRN2BLSX8100	VRN2BLPX9200	VRN2BLSX9200	VRN2BLPX9100	VRN2BLSX9100				
				10*	VRN2BMPX8200	VRN2BMSX8200	VRN2BMPX8100	VRN2BMSX8100	VRN2BMPX9200	VRN2BMSX9200	VRN2BMPX9100	VRN2BMSX9100				
1"	3.0	35	100	1	VRN2CBPX8200	VRN2CBSX8200	VRN2CBPX8100	VRN2CBSX8100	VRN2CBPX9200	VRN2CBSX9200	VRN2CBPX9100	VRN2CBSX9100				
				2	VRN2CDPX8200	VRN2CDSX8200	VRN2CDPX8100	VRN2CDSX8100	VRN2CDPX9200	VRN2CDSX9200	VRN2CDPX9100	VRN2CDSX9100				
				3	VRN2CEPX8200	VRN2CESX8200	VRN2CEPX8100	VRN2CESX8100	VRN2CEPX9200	VRN2CESX9200	VRN2CEPX9100	VRN2CESX9100				
				4	VRN2CFPX8200	VRN2CFSX8200	VRN2CFPX8100	VRN2CFSX8100	VRN2CFPX9200	VRN2CFSX9200	VRN2CFPX9100	VRN2CFSX9100				
				5	VRN2CGPX8200	VRN2CGSX8200	VRN2CGPX8100	VRN2CGSX8100	VRN2CGPX9200	VRN2CGSX9200	VRN2CGPX9100	VRN2CGSX9100				
				6	VRN2CHPX8200	VRN2CHSX8200	VRN2CHPX8100	VRN2CHSX8100	VRN2CHPX9200	VRN2CHSX9200	VRN2CHPX9100	VRN2CHSX9100				
				7	VRN2CJPX8200	VRN2CJSX8200	VRN2CJPX8100	VRN2CJSX8100	VRN2CJPX9200	VRN2CJSX9200	VRN2CJPX9100	VRN2CJSX9100				
	6.0	35	100	8	VRN2CKPX8200	VRN2CKSX8200	VRN2CKPX8100	VRN2CKSX8100	VRN2CKPX9200	VRN2CKSX9200	VRN2CKPX9100	VRN2CKSX9100				
				9	VRN2CLPX8200	VRN2CLSX8200	VRN2CLPX8100	VRN2CLSX8100	VRN2CLPX9200	VRN2CLSX9200	VRN2CLPX9100	VRN2CLSX9100				
				10	VRN2CMPX8200	VRN2CMSX8200	VRN2CMPX8100	VRN2CMSX8100	VRN2CMPX9200	VRN2CMSX9200	VRN2CMPX9100	VRN2CMSX9100				
	4.0	50	100	15	VRN2CNPX8200	VRN2CNSX8200	VRN2CNPX8100	VRN2CNSX8100	VRN2CNPX9200	VRN2CNSX9200	VRN2CNPX9100	VRN2CNSX9100				
				20	VRN2CPPX8200	VRN2CPSX8200	VRN2CPPX8100	VRN2CPSX8100	VRN2CPPX9200	VRN2CPSX9200	VRN2CPPX9100	VRN2CPSX9100				
				10	VRN2DMPX8200	VRN2DMSX8200	VRN2DMPX8100	VRN2DMSX8100	VRN2DMPX9200	VRN2DMSX9200	VRN2DMPX9100	VRN2DMSX9100				
				15	VRN2DNPX8200	VRN2DNSX8200	VRN2DNPX8100	VRN2DNSX8100	VRN2DNPX9200	VRN2DNSX9200	VRN2DNPX9100	VRN2DNSX9100				
				20	VRN2DPPX8200	VRN2DPSX8200	VRN2DPPX8100	VRN2DPSX8100	VRN2DPPX9200	VRN2DPSX9200	VRN2DPPX9100	VRN2DPSX9100				
1-1/4"	4.0	50	100	25	VRN2DQPX8200	VRN2DQSX8200	VRN2DQPX8100	VRN2DQSX8100	VRN2DQPX9200	VRN2DQSX9200	VRN2DQPX9100	VRN2DQSX9100				
				30	VRN2DRPX8200	VRN2DRSX8200	VRN2DRPX8100	VRN2DRSX8100	VRN2DRPX9200	VRN2DRSX9200	VRN2DRPX9100	VRN2DRSX9100				
				35*	VRN2DSPX8200	VRN2DSSX8200	VRN2DSPX8100	VRN2DSSX8100	VRN2DSPX9200	VRN2DSSX9200	VRN2DSPX9100	VRN2DSSX9100				

* Full port ball

** Differential pressure regulator operating range, ±5%

Product Selection - Valves

Pressure Independent Control Valves, NPT 1½"-3" NEMA 2

Common Features

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of ±5% over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.



Actuator Features		Non Fail Safe	
Actuator O.S Number		MN6105A1011	MN6105A1201
Power Supply	Voltage	24 VAC/DC	24 VAC/DC
	Frequency	50 / 60 Hz	50 / 60 Hz
	Power	5 VA	5 VA
Actuator Torque	(lb.-in.)	44	44
Control	(0)2-10Vdc		
	4-20 mA (w/ external 500 Ohm Resistor)		
	Floating	•	•
	Two-Position SPDT	•	•
	Two-Position SPST		
Actuator Stroke	(degrees)	95° ± 3°	95° ± 3°
Timing	(drive/spring return, seconds)	90	90
Aux Switch		0	2
Feedback	2-10 Vdc Built In	-	-
Fail Safe Action		Stay in Place	Stay in Place
Normal Position	(no signal)	Stay in Place	Stay in Place
Valve Features	Trim	Nickel-Plated Brass	Stainless Steel
		Nickel-Plated Brass	Stainless Steel

Valve Size (inches)	Differential Pressure** (psid)		Close-off Pressure (psid)	Max. GPM	Short Order Codes			
	Min.	Max.						
1-1/2"	4	50	100	10	VRN2EMPX4000	VRN2EMSX4000	VRN2EMPXC000	VRN2EMSXC000
				15	VRN2ENPX4000	VRN2ENSX4000	VRN2ENPXC000	VRN2ENSXC000
				20	VRN2EPPX4000	VRN2EPSX4000	VRN2EPPXC000	VRN2EPSXC000
				25	VRN2EQPX4000	VRN2EQSX4000	VRN2EQPXC000	VRN2EQSXC000
	5	58		30	VRN2ERPX4000	VRN2ERSX4000	VRN2ERPXC000	VRN2ERSXC000
				35	VRN2ESPX4000	VRN2ESSX4000	VRN2ESPXC000	VRN2ESSXC000
				40	VRN2ETPX4000	VRN2ETSX4000	VRN2ETPXC000	VRN2ETSC000
				45	VRN2EUPX4000	VRN2EUSX4000	VRN2EUPXC000	VRN2EUSXC000
	6	58		50	VRN2E1PX4000	VRN2E1SX4000	VRN2E1PXC000	VRN2E1SXC000
				55	VRN2E2PX4000	VRN2E2SX4000	VRN2E2PXC000	VRN2E2SXC000
				60	VRN2E3PX4000	VRN2E3SX4000	VRN2E3PXC000	VRN2E3SXC000
				65	VRN2E4PX4000	VRN2E4SX4000	VRN2E4PXC000	VRN2E4SXC000
	7	58		70	VRN2E5PX4000	VRN2E5SX4000	VRN2E5PXC000	VRN2E5SXC000
				75	VRN2E6PX4000	VRN2E6SX4000	VRN2E6PXC000	VRN2E6SXC000
80			VRN2E7PX4000	VRN2E7SX4000	VRN2E7PXC000	VRN2E7SXC000		
85			VRN2E8PX4000	VRN2E8SX4000	VRN2E8PXC000	VRN2E8SXC000		
11	95	VRN2E9PX4000	VRN2E9SX4000	VRN2E9PXC000	VRN2E9SXC000			
2"	4	58	100	25	VRN2FQPX4000	VRN2FQSX4000	VRN2FQPC000	VRN2FQSC000
				30	VRN2FRPX4000	VRN2FRSX4000	VRN2FRPXC000	VRN2FRSXC000
				35	VRN2FSPX4000	VRN2FSSX4000	VRN2FSPXC000	VRN2FSSXC000
				40	VRN2FTPX4000	VRN2FTSX4000	VRN2FTPXC000	VRN2FTSXC000
	6			45	VRN2FUPX4000	VRN2FUSX4000	VRN2FUPXC000	VRN2FUSXC000
				50	VRN2F1PX4000	VRN2F1SX4000	VRN2F1PXC000	VRN2F1SXC000
				55	VRN2F2PX4000	VRN2F2SX4000	VRN2F2PXC000	VRN2F2SXC000
				60	VRN2F3PX4000	VRN2F3SX4000	VRN2F3PXC000	VRN2F3SXC000
	7			65	VRN2F4PX4000	VRN2F4SX4000	VRN2F4PXC000	VRN2F4SXC000
				70	VRN2F5PX4000	VRN2F5SX4000	VRN2F5PXC000	VRN2F5SXC000
75	VRN2F6PX4000	VRN2F6SX4000	VRN2F6PXC000	VRN2F6SXC000				
2-1/2"	4	58	100	25	VRN2GQPX4000	VRN2GQSX4000	VRN2GQPC000	VRN2GQSC000
				30	VRN2GRPX4000	VRN2GRSX4000	VRN2GRPXC000	VRN2GRSXC000
				35	VRN2GSPX4000	VRN2GSSX4000	VRN2GSPXC000	VRN2GSSXC000
				40	VRN2GTPX4000	VRN2GTSX4000	VRN2GTPXC000	VRN2GTSXC000
	6			45	VRN2GUPX4000	VRN2GUSX4000	VRN2GUPXC000	VRN2GUSXC000
				50	VRN2G1PX4000	VRN2G1SX4000	VRN2G1PXC000	VRN2G1SXC000
				55	VRN2G2PX4000	VRN2G2SX4000	VRN2G2PXC000	VRN2G2SXC000
				60	VRN2G3PX4000	VRN2G3SX4000	VRN2G3PXC000	VRN2G3SXC000
	7			65	VRN2G4PX4000	VRN2G4SX4000	VRN2G4PXC000	VRN2G4SXC000
				70	VRN2G5PX4000	VRN2G5SX4000	VRN2G5PXC000	VRN2G5SXC000
				75	VRN2G6PX4000	VRN2G6SX4000	VRN2G6PXC000	VRN2G6SXC000
				80	VRN2G7PX4000	VRN2G7SX4000	VRN2G7PXC000	VRN2G7SXC000
85	VRN2G8PX4000	VRN2G8SX4000	VRN2G8PXC000	VRN2G8SXC000				
11	95*	VRN2G9PX4000	VRN2G9SX4000	VRN2G9PXC000	VRN2G9SXC000			
3"	4	58	100	25	VRN2HQPX4000	VRN2HQSX4000	VRN2HQPXC000	VRN2HQSC000
				30	VRN2HRPX4000	VRN2HRSX4000	VRN2HRPXC000	VRN2HRSXC000
				35	VRN2HSPX4000	VRN2HSSX4000	VRN2HSPXC000	VRN2HSSXC000
				40	VRN2HTPX4000	VRN2HTSX4000	VRN2HTPXC000	VRN2HTSXC000
	6			45	VRN2HUPX4000	VRN2HUSX4000	VRN2HUPXC000	VRN2HUSXC000
				50	VRN2H1PX4000	VRN2H1SX4000	VRN2H1PXC000	VRN2H1SXC000
				55	VRN2H2PX4000	VRN2H2SX4000	VRN2H2PXC000	VRN2H2SXC000
				60	VRN2H3PX4000	VRN2H3SX4000	VRN2H3PXC000	VRN2H3SXC000
	7			65	VRN2H4PX4000	VRN2H4SX4000	VRN2H4PXC000	VRN2H4SXC000
				70	VRN2H5PX4000	VRN2H5SX4000	VRN2H5PXC000	VRN2H5SXC000
				75	VRN2H6PX4000	VRN2H6SX4000	VRN2H6PXC000	VRN2H6SXC000
				80	VRN2H7PX4000	VRN2H7SX4000	VRN2H7PXC000	VRN2H7SXC000
	85			VRN2H8PX4000	VRN2H8SX4000	VRN2H8PXC000	VRN2H8SXC000	
	11			95*	VRN2H9PX4000	VRN2H9SX4000	VRN2H9PXC000	VRN2H9SXC000

* Full port ball

** Differential pressure regulator operating range, ±5%

Common Features

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of $\pm 5\%$ over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.



Features to 3 in. with internal (female) SS. chilled water with up to 50% rates available from 1 to 95 sure regulator for constant cross valve seat. ie, rolling diaphragm regulator service life for flow control % over specified control range. ge flow characteristic using control ball insert.	Actuator Features				Non Fail Safe				Valve Only				
	Actuator O.S Number				MN7505A2001				MN7505A2209		N/A		
	Power Supply		Voltage		24 VAC/DC		24 VAC/DC						
			Frequency		50 / 60 Hz		50 / 60 Hz						
			Power		5 VA		5 VA						
			(lb.-in.)		44		44						
	Actuator Torque		(0)2-10Vdc		•		•						
			4-20 mA (w/ external 500 Ohm Resistor)		•		•						
			Floating		•		•						
			Two-Position SPDT		•		•						
			Two-Position SPST		•		•						
	Actuator Stroke		(degrees)		95° ± 3°		95° ± 3°						
Timing		(drive/spring return, seconds)		90		90							
Aux Switch				0		2							
Feedback		2-10 Vdc Built In		•		•							
Fail Safe Action				Stay in Place		Stay in Place							
Normal Position		(no signal)		Closed		Closed							
Valve Features		Trim		Nickel-Plated Brass		Stainless Steel		Nickel-Plated Brass		Stainless Steel			
Valve Size (inches)		Differential Pressure** (psid)		Close-off Pressure (psid)		Max. GPM		Short Order Codes					
		Min.		Max.									
1-1/2"		4		50		10		VRN2EMPX5000	VRN2EMSX5000	VRN2EMPX0000	VRN2EMSX0000	VRN2EMPX0000	VRN2EMSX0000
						15		VRN2ENPX5000	VRN2ENSX5000	VRN2ENPX0000	VRN2ENSX0000	VRN2ENPX0000	VRN2ENSX0000
						20		VRN2EPPX5000	VRN2EPSX5000	VRN2EPPX0000	VRN2EPSX0000	VRN2EPPX0000	VRN2EPSX0000
						25		VRN2EQPX5000	VRN2EQSX5000	VRN2EQPX0000	VRN2EQSX0000	VRN2EQPX0000	VRN2EQSX0000
		6		58		30		VRN2ERPX5000	VRN2ERSX5000	VRN2ERPX0000	VRN2ERSX0000	VRN2ERPX0000	VRN2ERSX0000
						35		VRN2ESPX5000	VRN2ESSX5000	VRN2ESPX0000	VRN2ESSX0000	VRN2ESPX0000	VRN2ESSX0000
						40		VRN2ETPX5000	VRN2ETSX5000	VRN2ETPX0000	VRN2ETSX0000	VRN2ETPX0000	VRN2ETSX0000
						45		VRN2EUPX5000	VRN2EUSX5000	VRN2EUPX0000	VRN2EUSX0000	VRN2EUPX0000	VRN2EUSX0000
		7		58		50		VRN2E1PX5000	VRN2E1SX5000	VRN2E1PX0000	VRN2E1SX0000	VRN2E1PX0000	VRN2E1SX0000
						55		VRN2E2PX5000	VRN2E2SX5000	VRN2E2PX0000	VRN2E2SX0000	VRN2E2PX0000	VRN2E2SX0000
						60		VRN2E3PX5000	VRN2E3SX5000	VRN2E3PX0000	VRN2E3SX0000	VRN2E3PX0000	VRN2E3SX0000
						65		VRN2E4PX5000	VRN2E4SX5000	VRN2E4PX0000	VRN2E4SX0000	VRN2E4PX0000	VRN2E4SX0000
11		58		70		VRN2E5PX5000	VRN2E5SX5000	VRN2E5PX0000	VRN2E5SX0000	VRN2E5PX0000	VRN2E5SX0000		
				75		VRN2E6PX5000	VRN2E6SX5000	VRN2E6PX0000	VRN2E6SX0000	VRN2E6PX0000	VRN2E6SX0000		
				80		VRN2E7PX5000	VRN2E7SX5000	VRN2E7PX0000	VRN2E7SX0000	VRN2E7PX0000	VRN2E7SX0000		
				85		VRN2E8PX5000	VRN2E8SX5000	VRN2E8PX0000	VRN2E8SX0000	VRN2E8PX0000	VRN2E8SX0000		
2"		4		58		95		VRN2E9PX5000	VRN2E9SX5000	VRN2E9PX0000	VRN2E9SX0000	VRN2E9PX0000	VRN2E9SX0000
						25		VRN2FQPX5000	VRN2FQSX5000	VRN2FQPX0000	VRN2FQSX0000	VRN2FQPX0000	VRN2FQSX0000
						30		VRN2FRPX5000	VRN2FRSX5000	VRN2FRPX0000	VRN2FRSX0000	VRN2FRPX0000	VRN2FRSX0000
						35		VRN2FSPX5000	VRN2FSSX5000	VRN2FSPX0000	VRN2FSSX0000	VRN2FSPX0000	VRN2FSSX0000
		6		58		40		VRN2FTPX5000	VRN2FTSX5000	VRN2FTPX0000	VRN2FTSX0000	VRN2FTPX0000	VRN2FTSX0000
						45		VRN2FUPX5000	VRN2FUSX5000	VRN2FUPX0000	VRN2FUSX0000	VRN2FUPX0000	VRN2FUSX0000
						50		VRN2F1PX5000	VRN2F1SX5000	VRN2F1PX0000	VRN2F1SX0000	VRN2F1PX0000	VRN2F1SX0000
						55		VRN2F2PX5000	VRN2F2SX5000	VRN2F2PX0000	VRN2F2SX0000	VRN2F2PX0000	VRN2F2SX0000
		7		58		60		VRN2F3PX5000	VRN2F3SX5000	VRN2F3PX0000	VRN2F3SX0000	VRN2F3PX0000	VRN2F3SX0000

* Full port ball

** Differential pressure regulator operating range, $\pm 5\%$.

Product Selection - Valves

Pressure Independent Control Valves, NPT ½"-1¼" NEMA 3R

Actuator Features	Fail Safe			
Actuator O.S Number	MS8105A1030		MS8105A1130	
Power Supply Voltage	24 VAC/DC		24 VAC/DC	
Frequency	50 / 60 Hz		50 / 60 Hz	
Power	6 VA		6 VA	
Actuator Torque (lb.-in.)	44		44	
Control (0)2-10Vdc				
4-20 mA (w/ external 500 Ohm Resistor)				
Floating				
Two-Position SPDT				
Two-Position SPST	•		•	
Actuator Stroke (degrees)	95° ± 3°		95° ± 3°	
Timing (drive/spring return, seconds)	45 / 25		45 / 25	
Aux Switch	0		1	
Feedback 2-10 Vdc Built In				
Fail Safe Action	Closed		Open	
Normal Position (no signal)	Closed		Open	
Valve Features	Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass
			Stainless Steel	Nickel-Plated Brass
				Stainless Steel

Valve Size (inches)	Differential Pressure** (psid)		Close-off Pressure (psid)	Max. GPM	Short Order Codes									
	Min.	Max.												
1/2"	3.0	35	100	1	VRN2ABPX7202	VRN2ABSX7202	VRN2ABPX7102	VRN2ABSX7102	VRN2ABPX7102	VRN2ABSXA202	VRN2ABPX102	VRN2ABSXA102		
				2	VRN2ADPX7202	VRN2ADSX7202	VRN2ADPX7102	VRN2ADSX7102	VRN2ADPX7102	VRN2ADSXA202	VRN2ADPX102	VRN2ADSXA102		
				3	VRN2AEPX7202	VRN2AESX7202	VRN2AEPX7102	VRN2AESX7102	VRN2AEPX7102	VRN2AESXA202	VRN2AEPX102	VRN2AESXA102		
				4	VRN2AFPX7202	VRN2AFSX7202	VRN2AFPX7102	VRN2AFSX7102	VRN2AFPX7102	VRN2AFSXA202	VRN2AFPX102	VRN2AFSXA102		
				5	VRN2AGPX7202	VRN2AGSX7202	VRN2AGPX7102	VRN2AGSX7102	VRN2AGPX7102	VRN2AGSXA202	VRN2AGPX102	VRN2AGSXA102		
				6	VRN2AHPX7202	VRN2AHSX7202	VRN2AHPX7102	VRN2AHSX7102	VRN2AHPX7102	VRN2AHSXA202	VRN2AHPX102	VRN2AHSXA102		
				7	VRN2AJPX7202	VRN2AJSX7202	VRN2AJPX7102	VRN2AJSX7102	VRN2AJPX7102	VRN2AJSXA202	VRN2AJPX102	VRN2AJSXA102		
3/4"	3.0	35	100	1	VRN2BBPX7202	VRN2BBSX7202	VRN2BBPX7102	VRN2BBSX7102	VRN2BBPX7102	VRN2BBSXA202	VRN2BBPX102	VRN2BBSXA102		
				2	VRN2BDPX7202	VRN2BDSX7202	VRN2BDPX7102	VRN2BDSX7102	VRN2BDPX7102	VRN2BDSXA202	VRN2BDPX102	VRN2BDSXA102		
				3	VRN2BEPX7202	VRN2BESX7202	VRN2BEPX7102	VRN2BESX7102	VRN2BEPX7102	VRN2BESXA202	VRN2BEPX102	VRN2BESXA102		
				4	VRN2BFPX7202	VRN2BFSX7202	VRN2BFPX7102	VRN2BFSX7102	VRN2BFPX7102	VRN2BFSXA202	VRN2BFPX102	VRN2BFSXA102		
				5	VRN2BGPX7202	VRN2BGSX7202	VRN2BGPX7102	VRN2BGSX7102	VRN2BGPX7102	VRN2BGSXA202	VRN2BGPX102	VRN2BGSXA102		
				6	VRN2BHPX7202	VRN2BHSX7202	VRN2BHPX7102	VRN2BHSX7102	VRN2BHPX7102	VRN2BHSXA202	VRN2BHPX102	VRN2BHSXA102		
	6.0	35	100	7	VRN2BJPX7202	VRN2BJSX7202	VRN2BJPX7102	VRN2BJSX7102	VRN2BJPX7102	VRN2BJSXA202	VRN2BJPX102	VRN2BJSXA102		
				8	VRN2BKPX7202	VRN2BKSX7202	VRN2BKPX7102	VRN2BKSX7102	VRN2BKPX7102	VRN2BKSXA202	VRN2BKPX102	VRN2BKSXA102		
				9	VRN2BLPX7202	VRN2BLSX7202	VRN2BLPX7102	VRN2BLSX7102	VRN2BLPX7102	VRN2BLSXA202	VRN2BLPX102	VRN2BLSXA102		
				10*	VRN2BMPX7202	VRN2BMSX7202	VRN2BMPX7102	VRN2BMSX7102	VRN2BMPX7102	VRN2BMSXA202	VRN2BMPX102	VRN2BMSXA102		
1"	3.0	35	100	1	VRN2CBPX7202	VRN2CBSX7202	VRN2CBPX7102	VRN2CBSX7102	VRN2CBPX7102	VRN2CBSXA202	VRN2CBPX102	VRN2CBSXA102		
				2	VRN2CDPX7202	VRN2CDSX7202	VRN2CDPX7102	VRN2CDSX7102	VRN2CDPX7102	VRN2CDSXA202	VRN2CDPX102	VRN2CDSXA102		
				3	VRN2CEPX7202	VRN2CESX7202	VRN2CEPX7102	VRN2CESX7102	VRN2CEPX7102	VRN2CESXA202	VRN2CEPX102	VRN2CESXA102		
				4	VRN2CFPX7202	VRN2CFSX7202	VRN2CFPX7102	VRN2CFSX7102	VRN2CFPX7102	VRN2CFSXA202	VRN2CFPX102	VRN2CFSXA102		
				5	VRN2CGPX7202	VRN2CGSX7202	VRN2CGPX7102	VRN2CGSX7102	VRN2CGPX7102	VRN2CGSXA202	VRN2CGPX102	VRN2CGSXA102		
				6	VRN2CHPX7202	VRN2CHSX7202	VRN2CHPX7102	VRN2CHSX7102	VRN2CHPX7102	VRN2CHSXA202	VRN2CHPX102	VRN2CHSXA102		
	6.0	35	100	7	VRN2CJPX7202	VRN2CJSX7202	VRN2CJPX7102	VRN2CJSX7102	VRN2CJPX7102	VRN2CJSXA202	VRN2CJPX102	VRN2CJSXA102		
				8	VRN2CKPX7202	VRN2CKSX7202	VRN2CKPX7102	VRN2CKSX7102	VRN2CKPX7102	VRN2CKSXA202	VRN2CKPX102	VRN2CKSXA102		
				9	VRN2CLPX7202	VRN2CLSX7202	VRN2CLPX7102	VRN2CLSX7102	VRN2CLPX7102	VRN2CLSXA202	VRN2CLPX102	VRN2CLSXA102		
				10	VRN2CMPX7202	VRN2CMSX7202	VRN2CMPX7102	VRN2CMSX7102	VRN2CMPX7102	VRN2CMSXA202	VRN2CMPX102	VRN2CMSXA102		
1-1/4"	4.0	50	100	15	VRN2CNPX7202	VRN2CNSX7202	VRN2CNPX7102	VRN2CNSX7102	VRN2CNPX7102	VRN2CNSXA202	VRN2CNPX102	VRN2CNSXA102		
				20	VRN2CPPX7202	VRN2CPSX7202	VRN2CPPX7102	VRN2CPSX7102	VRN2CPPX7102	VRN2CPSXA202	VRN2CPPX102	VRN2CPSXA102		
				10	VRN2DMPX7202	VRN2DMSX7202	VRN2DMPX7102	VRN2DMSX7102	VRN2DMPX7102	VRN2DMSXA202	VRN2DMPX102	VRN2DMSXA102		
				15	VRN2DNPX7202	VRN2DNSX7202	VRN2DNPX7102	VRN2DNSX7102	VRN2DNPX7102	VRN2DNSXA202	VRN2DNPX102	VRN2DNSXA102		
				20	VRN2DPPX7202	VRN2DPSX7202	VRN2DPPX7102	VRN2DPSX7102	VRN2DPPX7102	VRN2DPSXA202	VRN2DPPX102	VRN2DPSXA102		
				25	VRN2DQPX7202	VRN2DQSX7202	VRN2DQPX7102	VRN2DQSX7102	VRN2DQPX7102	VRN2DQSXA202	VRN2DQPX102	VRN2DQSXA102		
1-1/4"	5.0	50	100	30	VRN2DRPX7202	VRN2DRSX7202	VRN2DRPX7102	VRN2DRSX7102	VRN2DRPX7102	VRN2DRSXA202	VRN2DRPX102	VRN2DRSXA102		
				35*	VRN2DSPX7202	VRN2DSSX7202	VRN2DSPX7102	VRN2DSSX7102	VRN2DSPX7102	VRN2DSSXA202	VRN2DSPX102	VRN2DSSXA102		

* Full port ball

** Differential pressure regulator operating range, ±5%

Actuator Features		Fail Safe								
Actuator O.S Number		MS4105A1030				MS4105A1130				
Power Supply	Voltage	100-250 VAC				100-250 VAC				
	Frequency	50 / 60 Hz				50 / 60 Hz				
	Power	6 VA				6 VA				
Actuator Torque (lb.-in.)		44				44				
Control (0)2-10Vdc										
4-20 mA (w/ external 500 Ohm Resistor)										
Floating										
Two-Position SPDT										
Two-Position SPST		•				•				
Actuator Stroke (degrees)		95° ± 3°				95° ± 3°				
Timing (drive/spring return, seconds)		45 / 25				45 / 25				
Aux Switch		0				1				
Feedback 2-10 Vdc Built In										
Fail Safe Action		Closed		Open		Closed		Open		
Normal Position (no signal)		Closed		Open		Closed		Open		
Valve Features		Trim	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel	Nickel-Plated Brass	Stainless Steel

* Full port ball
** Differential pressure regulator operating range, $\pm 5\%$

Product Selection - Valves

Pressure Independent Control Valves, Flanged 2½"-6"

Common Features

- Multi-sized bodies from 2-1/2 to 6 inch pipes with wafer flanged connections.
- Combination ANSI/ASME Class 150/300 flange compatibility.
- Controls hot or chilled water with up to 50% glycol, closed loop HVAC systems only, not for use with steam.
- Regulated flow rates available from 40.7 to 468 gpm.
- Stainless steel pressure regulator maintains constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design provides flow control accuracy of $\pm 5\%$ over specified pressure range.
- Equal percentage flow characteristic using multi turn, nonrising, characterized plug.
- High close-off rating.
- 50 discrete, selectable flow rates available per valve size.
- Stainless steel trim.
- Six-turn actuator with floating or modulating inputs available with stay-in-place or electronic fail safe action.
- Fail safe actuators field-configurable for normally open or normally closed power failure return position.
- Two Test Ports for venting or pressure gauge attachment.



Flanged Pressure Independent Control Valves							
Actuator Features					Non Fail Safe		Fail Safe
Power Supply				Voltage	24 Vac/30 Vdc		24 Vac/30 Vdc
				Frequency	50 / 60 Hz		50 / 60 Hz
				Power	20 VA		20 VA
Enclosure				(ingress protection)	IP44		IP44
Control				2-10 Vdc	•		•
				4-20 mA (w/external 500 Ohm Resistor)	•		•
				Pulse-width Modulating	•		•
				Floating	•		•
				Two-Position SPDT	•		•
Fail Safe Action				(field configurable)	Stay in Place		Open/Closed
Normal Position (no signal)				(field configurable)	Open/Closed		Open/Closed
Actuator Stroke				(degrees)	6 x 360°		6 x 360°
Timing				(seconds, 60 Hz)	150 (maximum)		150 (maximum)
Feedback				4-20 mA (2-10 Vdc) Built in	•		•
					Trim		Stainless Steel
					Body		Cast Iron
					Pressure Ratings		ANSI 150/300
Valve Features					Test Ports		Two - 1/4" ISO
Valve Size	Flow, gpm*		Differential Pressure (psid)			Valve O.S. Number	
	Min.	Max.	Min.*	Max.*	Close-off		
2-1/2 and 3 in. [DN65-DN80]	40.7	113	4.5	87	100	VRW2JV4SMB	VRW2JV4SMD
	56.3	157	5.1			VRW2JW4SMB	VRW2JW4SMD
3 and 4 in. [DN80-DN100]	55.4	149	4.5			VRW2KV4SMB	VRW2KV4SMD
	75	225	5.1			VRW2KW4SMB	VRW2KW4SMD
5 and 6 in. [DN125-DN150]	103	369	4.5			VRW2LV4SMB	VRW2LV4SMD
	113	468	5.1			VRW2LW4SMB	VRW2LW4SMD

* Differential pressure regulator operating range, $\pm 5\%$

Product Selection - Valves

NPT Globe Valves ½"- 3", With Dedicated Valve Actuators

For more than 50 years, Honeywell Globe Valves (V5011/13, VGF) have provided precise control for many applications.

Globe valves provide the rangeability and close-off needed to keep tight control of the environment.

Valve and Actuator Assemblies available.

Full part numbers are **valve part number+actuator part number**

Example of complete orderable part number: **V5011N1008+ML7984A4009**



Actuator Features		Non Fail Safe					
Actuator O.S. Number		ML7984A4009	ML6984A4000	ML7420A3055	ML7420A3063	ML6420A3049	ML6420A3056
Power Supply	Voltage	24 Vac / 28 Vdc	24 Vac / 28 Vdc	24 Vac	24 Vac	24 Vac	24 Vac
	Frequency	0 / 50 / 60 Hz	0 / 50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
	Power	12 VA	12 VA	7 VA	7 VA	6 VA	6 VA
Stem Force (lbs.)		160	160	135	135	135	135
Control (0)2-10 Vdc		•		•	•		
4-20 mA (external 500 Ohm Resistor)		Built-in		•	•		
Floating			•			•	•
Two-Position SPDT			•			•	•
135 Ohm		•					
Fail Safe Action		Stay in place	Stay in place	Stay in place	Stay in place	Stay in place	Stay in place
Normal Position (no signal) (field configurable)		Stem Up/Down	Stay in place	Stem Up/Down	Stem Up/Down	Stay in place	Stay in place
Actuator Stroke (inches)		0.5 - 1 self adj	0.5 - 1 self adj	0.75	0.75	0.75	0.75
Timing (seconds at 0.75" stroke)		63	63	60	30	60	30
Aux Switch 1 x SPDT Add-On		272630D	272630D				
2 x SPDT Add-On						43191680-105	43191680-105
Feedback				•	•		
2-10 Vdc Add-On		272630D	272630D	•	•		
Valve Action	Valve OS Number	Close-off Pressure, psid					
Stem down to close	V5011N1008	230	230	230	230	230	230
	V5011N1016	230	230	230	230	230	230
	V5011N1024	230	230	230	230	230	230
	V5011N1032	230	230	230	230	230	230
	V5011N1040	230	230	230	230	230	230
	V5011N1057	230	230	230	230	230	230
	V5011N1065	193	193	163	163	163	163
	V5011N1073	123	123	104	104	104	104
	V5011N1081	79	79	67	67	67	67
	V5011N1099	44	44	37	37	37	37
Stem down to close	V5011F1105	33	33	28	28	28	28
	V5011F1113	19	19	16	16	16	16
	V5011N2006	100	100	100	100	100	100
	V5011N2014	100	100	100	100	100	100
	V5011N2022	100	100	100	100	100	100
	V5011N2030	100	100	100	100	100	100
	V5011N2048	100	100	100	100	100	100
	V5011N2055	100	100	100	100	100	100
	V5011N2063	100	100	100	100	100	100
	V5011N2071	100	100	100	100	100	100
Stem up closes A-AB	V5011N2089	79	79	67	67	67	67
	V5011N2097	44	44	37	37	37	37
	V5011G1111	33	33	28	28	28	28
	V5011G1129	19	19	16	16	16	16
	V5013N1030	230	230	230	230	230	230
	V5013N1048	230	230	230	230	230	230
	V5013N1055	230	230	230	230	230	230
	V5013N1063	193	193	163	163	163	163
Stem up closes A-AB	V5013N1071	123	123	104	104	104	104
	V5013N1089	79	79	67	67	67	67
	V5013N1097	44	44	37	37	37	37

Product Selection - Valves

NPT Globe Valves ½"- 3", With Dedicated Valve Actuators

Common Features

- ANSI body class 150
- Close-off pressure = maximum differential pressure
- Maximum static water pressure (250°F): 240 psi
- Maximum steam pressure
- 2-way steam valves, 337°F: 100 psi
- 2-way water valves: 15 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Leakage < 0.05% of Cv
- Body material: Red brass, stainless steel stem (steam valve has stainless steel trim.)

Valve and Actuator Assemblies available.

Full part numbers are **valve part number+actuator part number**

Example of complete orderable part number: **V5011N1008+ML7421A1032**



Actuator Features		Non Fail Safe		Fail Safe			
Actuator O.S. Number		ML7421A1032	ML6421A1017	ML7425A3013	ML7425B3012	ML6425A3022	ML6425B3013
Power Supply	Voltage	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac	24 Vac
	Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
	Power	12 VA	11 VA	12 VA	12 VA	11 VA	11 VA
Stem Force	(lbs.)	404	404	135	135	135	135
Control	(0)2-10 Vdc	•		•	•		
	4-20 mA (external 500 Ohm Resistor)	•		•	•		
	Floating		•			•	•
	Two-Position SPDT		•			•	•
	Two-Position SPST					•	•
Fail Safe Action		Stay in place	Stay in place	Stem Down	Stem Up	Stem Down	Stem Up
Normal Position (no signal)	(field configurable)	Stem Up/Down	Stay in place	Stem Up/Down	Stem Up/Down	Stay in place	Stay in place
Actuator Stroke	(inches)	0.75	0.75	0.75	0.75	0.75	0.75
Timing	(seconds at 0.75" stroke)	90	90	90	90	90	90
Aux Switch	2 x SPDT Add-On	43191680-102	43191680-102			43191680-105	43191680-105
Feedback	2-10 Vdc Built-in	•		•	•		
	220 Ohm Add-On					43191679-112	43191679-112
	10 kOhm Add-On		43191679-101			43191679-111	43191679-111

	Valve Size (inches)	Cv	Max Static Water Pressure	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid					
2-Way Water Valves Straight Through	1/2"	0.73	217 psi @ 248 F	15 psi (2-position)	Equal %	Stem down to close	V5011N1008			230*	230**	230*	230**
		1.16					V5011N1016			230*	230**	230*	230**
		1.85					V5011N1024			230*	230**	230*	230**
		2.9					V5011N1032			230*	230**	230*	230**
		4.7					V5011N1040			230*	230**	230*	230**
	3/4"	7.3					V5011N1057			230*	230**	230*	230**
	1"	11.7					V5011N1065	230	230	163*	163**	163*	163**
	1-1/4"	18.7					V5011N1073	230	230	104*	104**	104*	104**
	1-1/2"	29.3					V5011N1081	221	221	67*	67**	67*	67**
	2"	46.8					V5011N1099	126	126	37*	37**	37*	37**
	2-1/2"	63	V5011F1105	100	100	28*	28**	28*	28**				
	3"	100	V5011F1113	61	61	16*	16**	16*	16**				
2-Way Steam Valves Straight Through	1/2"	0.73	217 psi @ 248 F	100 psig / 337 F	Linear	Stem down to close	V5011N2006			100*	100**	100*	100**
		1.16					V5011N2014			100*	100**	100*	100**
		1.85					V5011N2022			100*	100**	100*	100**
		2.9					V5011N2030			100*	100**	100*	100**
		4.7					V5011N2048			100*	100**	100*	100**
	3/4"	7.3					V5011N2055			100*	100**	100*	100**
	1"	11.7					V5011N2063	100	100	100*	100**	100*	100**
	1-1/4"	18.7					V5011N2071	100	100	100*	100**	100*	100**
	1-1/2"	29.3					V5011N2089	100	100	67*	67**	67*	67**
	2"	46.8					V5011N2097	100	100	37*	37**	37*	37**
	2-1/2"	63	V5011G1111	100	100	28*	28**	28*	28**				
	3"	100	V5011G1129	61	61	16*	16**	16*	16**				
3-Way Water Valves Mixing	1/2"	2.9	217 psi @ 248 F	N / A	Linear B-AB / Equal % A-AB	Stem up closes A-AB	V5013N1030			230	230	230	230
	1/2"	4.7					V5013N1048			230	230	230	230
	3/4"	7.3					V5013N1055			230	230	230	230
	1"	11.7					V5013N1063	230	230	163	163	163	163
	1-1/4"	18.7					V5013N1071	230	230	104	104	104	104
	1-1/2"	29.3					V5013N1089	221	221	67	67	67	67
	2"	46.8					V5013N1097	126	126	37	37	37	37

* valve is Normally Closed on loss of power
** valve is Normally Open on loss of power.

Product Selection - Valves

NPT Globe Valves ½"- 3", With DCA and Valve Linkage

Common Features

- ANSI body class 150
- Close-Off pressure = maximum differential pressure
- Maximum static water pressure (250°F): 240 psi
- Maximum steam pressure
2-way steam valves, 337°F: 100 psi
2-way water valves: 15 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Leakage < 0.05% of Cv
- Body material: Red brass, stainless steel stem (steam valve has stainless steel trim.)



Q5020A1003 Required



Actuator Features		Non Fail Safe			
Actuator O.S. Number		MN7505A2001 MN7505A2209	MN6105A1011 MN6105A1201	MN7510A2001 MN7510A2209	MN6110A1003 MN6110A1201
Power Supply	Voltage	24 Vac	24 Vac	24 Vac	24 Vac
	Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
	Power	5 VA	5 VA	5 VA	5 VA
Actuator Torque (lb.-in.)		44	44	88	88
Linkage Stem Force (lbs.)		58	58	117	117
Control	(0)2-10 Vdc	•		•	
	4-20 mA (external 500 Ohm Resistor)	•		•	
	Floating	•	•	•	•
	Two-Position SPDT	•	•	•	•
	Two-Position SPST	•	•	•	•
Fail Safe Action		Stay in Place	Stay in Place	Stay in Place	Stay in Place
Normal Position (no signal) (field configurable)		Stem Up/Down	Stay in Place	Stem Up/Down	Stay in Place
Actuator Stroke (inches)		95°	95°	95°	95°
Timing (seconds at 0.75" stroke)		95	95	95	95
Aux Switch 2 x SPDT Built In		0 / 2	0 / 2	0 / 2	0 / 2
Feedback (0)2-10 Vdc Built In		•		•	

	Valve Size (inches)	Cv	Max Static Water Pressure	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid			
2-Way Water Valves Straight Through	1/2"	0.73	217 psi @ 248 F	15 psi (2-position)	Equal %	Stem down to close	V5011N1008	230	230	230	230
		1.16					V5011N1016	230	230	230	230
		1.85					V5011N1024	230	230	230	230
		2.9					V5011N1032	230	230	230	230
		4.7					V5011N1040	188	188	230	230
	3/4"	7.3					V5011N1057	91	91	192	192
	1"	11.7					V5011N1065	63	63	135	135
	1-1/4"	18.7					V5011N1073	39	39	85	85
	1-1/2"	29.3					V5011N1081	24	24	55	55
	2"	46.8					V5011N1099	12	12	30	30
2-Way Steam Valves Straight Through	1/2"	0.73	217 psi @ 248 F	100 psig / 337 F	Linear	Stem down to close	V5011F1105	7	7	19	19
		1.16					V5011F1113	3	3	11	11
		1.85					V5011N2006	100	100	100	100
		2.9					V5011N2014	100	100	100	100
		4.7					V5011N2022	100	100	100	100
	3/4"	7.3					V5011N2030	100	100	100	100
	1"	11.7					V5011N2048	100	100	100	100
	1-1/4"	18.7					V5011N2055	91	91	100	100
	1-1/2"	29.3					V5011N2063	63	63	100	100
	2"	46.8					V5011N2071	39	39	85	85
3-Way Water Valves Mixing	1/2"	0.73	217 psi @ 248 F	N / A	Linear B-AB / Equal % A-AB	Stem up closes A-AB	V5011N2089	24	24	55	55
		1.16					V5011N2097	12	12	30	30
		1.85					V5011G1111	7	7	19	19
		2.9					V5011G1129	3	3	11	11
		4.7					V5013N1030	230	230	230	230
	3/4"	7.3					V5013N1048	188	188	230	230
	1"	11.7					V5013N1055	91	91	192	192
	1-1/4"	18.7					V5013N1063	63	63	135	135
	1-1/2"	29.3					V5013N1071	39	39	85	85
	2"	46.8					V5013N1089	24	24	55	55

Product Selection - Valves

NPT Globe Valves ½"- 3", With DCA and Valve Linkage

**Q5020A1003
Required**



Actuator Features		Non Fail Safe			
Actuator O.S. Number		MN7220A2007 MN7220A2205	MN6120A1002 MN6120A1200	MN7234A2008	MN6134A1003
Power Supply	Voltage	24 Vac	24 Vac	24 Vac	24 Vac
	Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
	Power	6 VA	6 VA	9 VA	9 VA
Actuator Torque (lb.-in.)		175	175	300	300
Linkage Stem Force (lbs.)		234	234	402	402
Control	(0)2-10 Vdc	•		•	
	4-20 mA (external 500 Ohm Resistor)	•		•	
	Floating		•		•
	Two-Position SPDT		•		•
	Two-Position SPST		•		•
Fail Safe Action		Stay in Place	Stay in Place	Stay in Place	Stay in Place
Normal Position (no signal) (field configurable)		Stem Up/Down	Stem Up/Down	Stem Up/Down	Stay in Place
Actuator Stroke (inches)		95°	95°	95°	95°
Timing (seconds at 0.75" stroke)		95	95	95	95
Aux Switch	2 x SPDT Built In	0 / 2	0 / 2		
	2 x SPDT Add-On	SW2-US	SW2-US	SW2-US	SW2-US
Feedback (0)2-10 Vdc Built In		•		•	

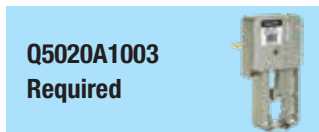
	Valve Size (inches)	Cv	Max Static Water Pressure	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid			
2-Way Water Valves Straight Through	1/2"	0.73	217 psi @ 248 F	15 psi (2-position)	Equal %	Stem down to close	V5011N1008				
		1.16					V5011N1016				
		1.85					V5011N1024				
		2.9					V5011N1032				
		4.7					V5011N1040				
	3/4"	7.3		230	230						
	1"	11.7		230	230						
	1-1/4"	18.7		168	168	230	230				
	1-1/2"	29.3		113	113	180	180				
	2"	46.8		63	63	103	103				
	2-1/2"	63	250 psi @ 100F		42	42	74	74			
	3"	100			26	26	45	45			
2-Way Steam Valves Straight Through	1/2"	0.73	217 psi @ 248 F	100 psig / 337 F	Linear	Stem down to close	V5011N2006				
		1.16					V5011N2014				
		1.85					V5011N2022				
		2.9					V5011N2030				
		4.7					V5011N2048				
	3/4"	7.3									
	1"	11.7		100	100	100	100				
	1-1/4"	18.7		100	100	100	100				
	1-1/2"	29.3		100	100	100	100				
	2"	46.8		58	58	100	100				
	2-1/2"	63	250 psi @ 100F		42	42	74	74			
	3"	100			26	26	45	45			
3-Way Water Valves Mixing	1/2"	2.9	217 psi @ 248 F	N / A	Linear B-AB / Equal % A-AB	Stem up closes A-AB	V5013N1030	230	230	230	230
	1/2"	4.7					V5013N1048	230	230	230	230
	3/4"	7.3					V5013N1055	230	230	230	230
	1"	11.7					V5013N1063	230	230	230	230
	1-1/4"	18.7					V5013N1071	168	168	230	230
	1-1/2"	29.3					V5013N1089	105	105	180	180
	2"	46.8					V5013N1097	103	103	103	103

Product Selection - Valves

NPT Globe Valves ½"- 3", With DCA and Valve Linkage

Common Features

- ANSI body class 150
- Close-Off pressure = maximum differential pressure
- Maximum static water pressure (250°F): 240 psi
- Maximum steam pressure
2-way steam valves, 337°F: 100 psi
2-way water valves: 15 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Leakage < 0.05% of Cv
- Body material: Red brass, stainless steel stem (steam valve has stainless steel trim.)



Actuator Features		Fail Safe				
Actuator O.S. Number		MS7505A2030 MS7505A2130	MS8105A1030 MS8105A1130	MS4105A1030 MS4105A1130	MS7510A2008 MS7510A2206 MS7510H2209	MS8110A1008 MS8110A1206
Power Supply	Voltage	24 Vac	24 Vac	100-250 Vac	24 Vac	24 Vac
	Frequency	50 / 60 Hz	50 / 60 Hz	60 Hz	50 / 60 Hz	50 / 60 Hz
	Power	7.5VA	8 VA	11VA	14 VA	30 VA
Actuator Torque (lb.-in.)		44	44	44	88	88
Linkage Stem Force (lbs.)		58	58	58	117	117
Control	(0)2-10 Vdc	•			•	
	4-20 mA (external 500 Ohm Resistor)	•			•	
	Floating	•			•	
	Two-Position SPDT	•			•	
Two-Position SPST		•	•	•	•	•
	Fail Safe Action	Configurable Open/Closed	Configurable Open/Closed	Configurable Open/Closed	Configurable Open/Closed	Configurable Open/Closed
Normal Position (no signal) (field configurable)		Stem Up/Down	Stem Up/Down	Stem Up/Down	Stem Up/Down	Stem Up/Down
Actuator Stroke (inches)		95°	95°	95°	95°	95°
Timing (seconds at 0.75" stroke)		90	90	90	90	90
Aux Switch	SPDT Built In	0 / 1	0 / 1	0 / 1	0 / 2 / 2	0 / 2
	2 x SPDT Add-On				SW2-US	SW2-US
Feedback 2-10 Vdc Built In		•			•	

	Valve Size (inches)	Cv	Max Static Water Pressure	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid				
2-Way Water Valves Straight Through	1/2"	0.73	217 psi @ 248 F	15 psi (2-position)	Equal %	Stem down to close	V5011N1008	230	230	230	230	230
		1.16					V5011N1016	230	230	230	230	230
		1.85					V5011N1024	230	230	230	230	230
		2.9					V5011N1032	230	230	230	230	230
		4.7					V5011N1040	184	184	184	230	230
	3/4"	7.3	250 psi @ 100F				V5011N1057	79	79	79	150	150
	1"	11.7					V5011N1065	66	66	66	136	136
	1-1/4"	18.7					V5011N1073	40	40	40	84	84
	1-1/2"	29.3					V5011N1081	26	26	26	55	55
	2"	46.8					V5011N1099	13	13	13	30	30
2-Way Steam Valves Straight Through	1/2"	0.73	217 psi @ 248 F	100 psig / 337 F	Linear	Stem down to close	V5011N2006	100	100	100	100	100
		1.16					V5011N2014	100	100	100	100	100
		1.85					V5011N2022	100	100	100	100	100
		2.9					V5011N2030	100	100	100	100	100
		4.7					V5011N2048	100	100	100	100	100
	3/4"	7.3	250 psi @ 100F				V5011N2055	79	79	79	100	100
	1"	11.7					V5011N2063	66	66	66	100	100
	1-1/4"	18.7					V5011N2071	40	40	40	84	84
	1-1/2"	29.3					V5011N2089	26	26	26	55	55
	2"	46.8					V5011N2097	13	13	13	30	30
3-Way Water Valves Mixing	2-1/2"	63	217 psi @ 248 F	N / A	Linear B-AB / Equal % A-AB	Stem up closes A-AB	V5011G1111	9	9	9	21	21
	3"	100					V5011G1129	6	6	6	13	13
	1/2"	2.9					V5013N1030	230	230	230	230	230
	1/2"	4.7					V5013N1048	184	184	184	230	230
	3/4"	7.3					V5013N1055	79	79	79	150	150
	1"	11.7	217 psi @ 248 F				V5013N1063	66	66	66	136	136
	1-1/4"	18.7					V5013N1071	40	40	40	84	84
	1-1/2"	29.3					V5013N1089	26	26	26	55	55
	2"	46.8					V5013N1097	13	13	13	30	30

Product Selection - Valves

NPT Globe Valves ½"- 3", With DCA and Valve Linkage

**Q5020A1003
Required**



Actuator Features		Fail Safe			
Actuator O.S. Number		MS4110A1002 MS4110A1200	MS7520A2007 MS7520A2205 MS7520H2208	MS8120A1007 MS8120A1205	MS4120A1001 MS4120A1209
Power Supply	Voltage	100-250 Vac	24 Vac	24 Vac	100-250 Vac
	Frequency	60 Hz	50 / 60 Hz	50 / 60 Hz	60 Hz
	Power	45 VA	16 VA	40 VA	60 VA
Actuator Torque	(lb.-in.)	88	175	175	175
Linkage Stem Force	(lbs.)	117	234	234	234
Control	(0)2-10 Vdc		•		
	4-20 mA (external 500 Ohm Resistor)		•		
	Floating		•		
	Two-Position SPDT		•		
	Two-Position SPST	•	•	•	•
Fail Safe Action		Configurable Open/Closed	Configurable Open/Closed	Configurable Open/Closed	Configurable Open/Closed
Normal Position (no signal)	(field configurable)	Stem Up/Down	Stem Up/Down	Stem Up/Down	Stem Up/Down
Actuator Stroke	(inches)	95°	95°	95°	95°
Timing	(seconds at 0.75" stroke)	90	90	90	90
Aux Switch	SPDT Built In	0 / 2	0 / 2 / 2	0 / 2	0 / 2
	2 x SPDT Add-On	SW2-US	SW2-US	SW2-US	SW2-US
Feedback	2-10 Vdc Built In		•		

	Valve Size (inches)	Cv	Max Static Water Pressure	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid			
2-Way Water Valves Straight Through	1/2"	0.73	217 psi @ 248 F	15 psi (2-position)	Equal %	Stem down to close	V5011N1008	230			
		1.16					V5011N1016	230			
		1.85					V5011N1024	230			
		2.9					V5011N1032	230			
		4.7					V5011N1040	230			
	3/4"	7.3	250 psi @ 100F				V5011N1057	150	230	230	230
	1"	11.7					V5011N1065	136	230	230	230
	1-1/4"	18.7					V5011N1073	84	171	171	171
	1-1/2"	29.3					V5011N1081	55	113	113	113
	2"	46.8					V5011N1099	30	63	63	63
	2-1/2"	63					V5011F1105	21	45	45	45
	3"	100					V5011F1113	13	27	27	27
2-Way Steam Valves Straight Through	1/2"	0.73	217 psi @ 248 F	100 psig / 337 F	Linear	Stem down to close	V5011N2006	100	100	100	100
		1.16					V5011N2014	100	100	100	100
		1.85					V5011N2022	100	100	100	100
		2.9					V5011N2030	100	100	100	100
		4.7					V5011N2048	100	100	100	100
	3/4"	7.3	250 psi @ 100F				V5011N2055	100	100	100	100
	1"	11.7					V5011N2063	100	100	100	100
	1-1/4"	18.7					V5011N2071	84	100	100	100
	1-1/2"	29.3					V5011N2089	55	100	100	100
	2"	46.8					V5011N2097	30	63	63	63
	2-1/2"	63					V5011G1111	21	45	45	45
	3"	100					V5011G1129	13	27	27	27
3-Way Water Valves Mixing	1/2"	2.9	217 psi @ 248 F	N / A	Linear B-AB / Equal % A-AB	Stem up closes A-AB	V5013N1030	230	230	230	230
	1/2"	4.7					V5013N1048	230	230	230	230
	3/4"	7.3					V5013N1055	150	230	230	230
	1"	11.7					V5013N1063	136	230	230	230
	1-1/4"	18.7					V5013N1071	84	171	171	171
	1-1/2"	29.3					V5013N1089	55	113	113	113
	2"	46.8					V5013N1097	30	63	63	63

VALVES

Product Selection - Valves

NPT Globe Valves ½"- 3", With Pneumatic Actuator

Common Features

- Easy installation and attachment to the valve
- Direct or reverse acting
- No positive positioner

Valve and Actuator Assemblies available.

Full part numbers are **valve part number+actuator part number**



Example of complete orderable part number: **V5011N1081+MP953C1000**



		Valve Size (inches)	Cv	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure - See Charts On Page 134-135										
2-Way Water Valves	Straight Through	1/2"	0.73	Equal %	Stem down to close	V5011N1008	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO	N/A	A-NC	A-NC	A-NC	
			1.16			V5011N1016	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO		A-NC	A-NC	A-NC	
			1.85			V5011N1024	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO		A-NC	A-NC	A-NC	
			2.9			V5011N1032	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO		A-NC	A-NC	A-NC	
			4.7			V5011N1040	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO		A-NC	A-NC	A-NC	
		3/4"	7.3			V5011N1057	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO		A-NC	A-NC	A-NC	
		1"	11.7			V5011N1065	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO		A-NC	A-NC	A-NC	
		1-1/4"	18.7			V5011N1073	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO		A-NC	A-NC	A-NC	
		1-1/2"	29.3			V5011N1081	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO		A-NC	A-NC	A-NC	
		2"	46.8			V5011N1099	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO		A-NC	A-NC	A-NC	
		2-1/2"	63			V5011F1105	N/A			H-NO	H-NO	H-NO	J-NO	J-NO	D-NC	D-NC	D-NC
		3"	100			V5011F1113				H-NO	H-NO	H-NO	J-NO	J-NO	D-NC	D-NC	D-NC
2-Way Steam Valves	Straight Through	1/2"	0.73	Linear	Stem down to close	V5011N2006	C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO	N/A	A*-NC	A*-NC	A*-NC	
			1.16			V5011N2014	C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO		A*-NC	A*-NC	A*-NC	
			1.85			V5011N2022	C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO		A*-NC	A*-NC	A*-NC	
			2.9			V5011N2030	C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO		A*-NC	A*-NC	A*-NC	
			4.7			V5011N2048	C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO		A*-NC	A*-NC	A*-NC	
		3/4"	7.3			V5011N2055	C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO		A*-NC	A*-NC	A*-NC	
		1"	11.7			V5011N2063	C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO		A*-NC	A*-NC	A*-NC	
		1-1/4"	18.7			V5011N2071	C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO		A*-NC	A*-NC	A*-NC	
		1-1/2"	29.3			V5011N2089	C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO		A*-NC	A*-NC	A*-NC	
		2"	46.8			V5011N2097	C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO		A*-NC	A*-NC	A*-NC	
		2-1/2"	63			V5011G1111	N/A			H*-NO	H*-NO	H*-NO	J*-NO	J*-NO	D*-NC	D*-NC	D*-NC
		3"	100			V5011G1129				H*-NO	H*-NO	H*-NO	J*-NO	J*-NO	D*-NC	D*-NC	D*-NC
3-Way Water Valves	Mixing	1/2"	2.9	Linear B-AB / Equal % A-AB	Stem up closes A-AB	V5013N1030	E-NC	E-NC	E-NC	F-NC	F-NC	F-NC	N/A	G-NO	G-NO	G-NO	
			4.7			V5013N1048	E-NC	E-NC	E-NC	F-NC	F-NC	F-NC		G-NO	G-NO	G-NO	
			7.3			V5013N1055	E-NC	E-NC	E-NC	F-NC	F-NC	F-NC		G-NO	G-NO	G-NO	
			1"			11.7	V5013N1063	E-NC	E-NC	E-NC	F-NC	F-NC		F-NC	G-NO	G-NO	G-NO
		1-1/4"	18.7			V5013N1071	E-NC	E-NC	E-NC	F-NC	F-NC	F-NC		G-NO	G-NO	G-NO	
		1-1/2"	29.3			V5013N1089	E-NC	E-NC	E-NC	F-NC	F-NC	F-NC		G-NO	G-NO	G-NO	
		2"	46.8			V5013N1097	E-NC	E-NC	E-NC	F-NC	F-NC	F-NC		G-NO	G-NO	G-NO	

*The close-off pressure not to exceed rated pressure of steam valve
 NC = Normally Closed, A to AB Normally Closed for 3-way valves
 NO = Normally Open, A to AB Normally Open for 3-way valves

Product Selection - Valves

NPT Globe Valves 1/2"-3", With Pneumatic Actuator

Common Features

- Easy installation and attachment to the valve
- Direct or reverse acting
- Integrated positive positioner

Valve and Actuator Assemblies available.

Full part numbers are **valve part number+actuator part number**



Example of complete orderable part number: **V5011N1081+MP953E1301**



Actuator Features	With Positive Positioner										
Actuator O.S. Number	MP953E1301	MP953E1319	MP953E1327	MP953E1368	MP953E1376	MP953E1384	MP953E1435	MP953E1443	MP953F1093	MP953F1101	MP953F1119
Direct Acting / Reverse Acting	Direct Acting								Reverse Acting		
Diaphragm Size	5"			8"			13"		7-1/8"		
Fail Safe Action	Stem Up								Stem Down		
Actuator Force	Low			Medium			High		Medium		
Spring Range	4–11 psi	•	•	•	•	•	•	•			
	8–13 psi								•	•	•
Positioner Span	10 psi		•			•		•			•
	5 psi		•		•		•			•	
	3 psi	•		•					•		

		Valve Size (inches)	Cv	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure - See Charts On Page 134-135										
2-Way Water Valves Straight Through	1/2"	0.73	Equal %	Stem down to close	V5011N1008	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO	N/A		A-NC	A-NC	A-NC	
		1.16			V5011N1016	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO			A-NC	A-NC	A-NC	
		1.85			V5011N1024	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO			A-NC	A-NC	A-NC	
		2.9			V5011N1032	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO			A-NC	A-NC	A-NC	
		4.7			V5011N1040	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO			A-NC	A-NC	A-NC	
	3/4"	7.3			V5011N1057	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO			A-NC	A-NC	A-NC	
	1"	11.7			V5011N1065	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO			A-NC	A-NC	A-NC	
	1-1/4"	18.7			V5011N1073	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO			A-NC	A-NC	A-NC	
	1-1/2"	29.3			V5011N1081	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO			A-NC	A-NC	A-NC	
	2"	46.8			V5011N1099	C-NO	C-NO	C-NO	B-NO	B-NO	B-NO			A-NC	A-NC	A-NC	
	2-1/2"	63	V5011F1105	N/A			H-NO	H-NO	H-NO	J-NO	J-NO	D-NC	D-NC	D-NC			
	3"	100	V5011F1113				H-NO	H-NO	H-NO	J-NO	J-NO	D-NC	D-NC	D-NC			
	2-Way Steam Valves Straight Through	1/2"	0.73	Linear	Stem down to close	V5011N2006	C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO	N/A		A*-NC	A*-NC	A*-NC
			1.16			V5011N2014	C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO			A*-NC	A*-NC	A*-NC
1.85			V5011N2022			C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO	A*-NC			A*-NC	A*-NC	
2.9			V5011N2030			C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO	A*-NC			A*-NC	A*-NC	
4.7			V5011N2048			C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO	A*-NC			A*-NC	A*-NC	
3/4"		7.3	V5011N2055			C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO	A*-NC			A*-NC	A*-NC	
1"		11.7	V5011N2063			C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO	A*-NC			A*-NC	A*-NC	
1-1/4"		18.7	V5011N2071			C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO	A*-NC			A*-NC	A*-NC	
1-1/2"		29.3	V5011N2089			C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO	A*-NC			A*-NC	A*-NC	
2"		46.8	V5011N2097			C*-NO	C*-NO	C*-NO	B*-NO	B*-NO	B*-NO	A*-NC			A*-NC	A*-NC	
2-1/2"		63	V5011G1111	N/A			H*-NO	H*-NO	H*-NO	J*-NO	J*-NO	D*-NC	D*-NC	D*-NC			
3"		100	V5011G1129				H*-NO	H*-NO	H*-NO	J*-NO	J*-NO	D*-NC	D*-NC	D*-NC			
3-Way Water Valves Mixing		1/2"	2.9	Linear B-AB / Equal % A-AB	Stem up closes A-AB	V5013N1030	E-NC	E-NC	E-NC	F-NC	F-NC	F-NC	N/A		G-NO	G-NO	G-NO
		4.7	V5013N1048			E-NC	E-NC	E-NC	F-NC	F-NC	F-NC	G-NO			G-NO	G-NO	
	3/4"	7.3	V5013N1055			E-NC	E-NC	E-NC	F-NC	F-NC	F-NC	G-NO			G-NO	G-NO	
	1"	11.7	V5013N1063			E-NC	E-NC	E-NC	F-NC	F-NC	F-NC	G-NO			G-NO	G-NO	
	1-1/4"	18.7	V5013N1071			E-NC	E-NC	E-NC	F-NC	F-NC	F-NC	G-NO			G-NO	G-NO	
	1-1/2"	29.3	V5013N1089			E-NC	E-NC	E-NC	F-NC	F-NC	F-NC	G-NO			G-NO	G-NO	
	2"	46.8	V5013N1097			E-NC	E-NC	E-NC	F-NC	F-NC	F-NC	G-NO			G-NO	G-NO	

*The close-off pressure not to exceed rated pressure of steam valve.

NC = Normally Closed, A to AB Normally Closed for 3-way valves

NO = Normally Open, A to AB Normally Open for 3-way valves

Close-off Pressure Charts - Valves

NPT Globe Valves 1/2" - 3"

Chart A

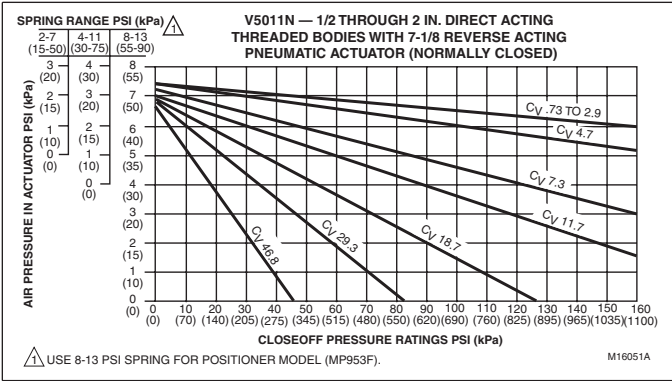


Chart B

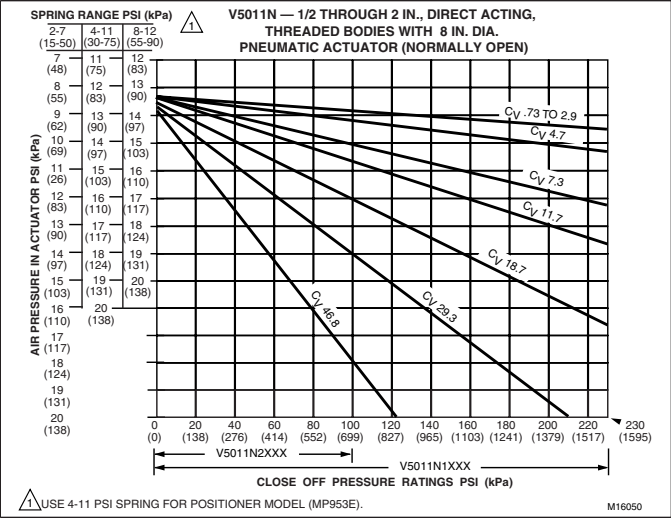


Chart C

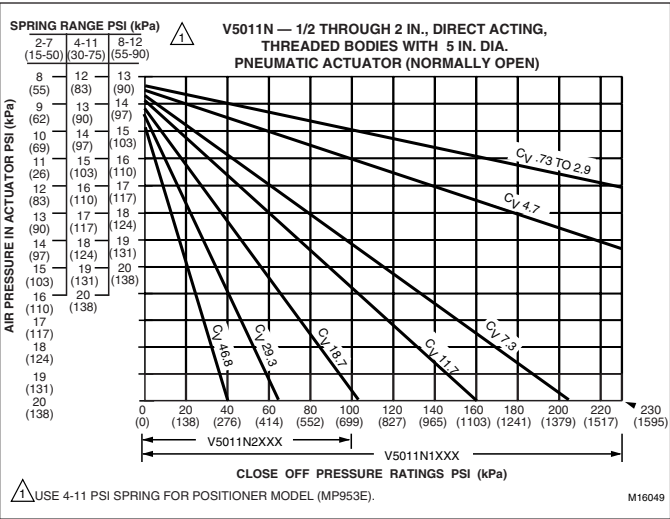


Chart D

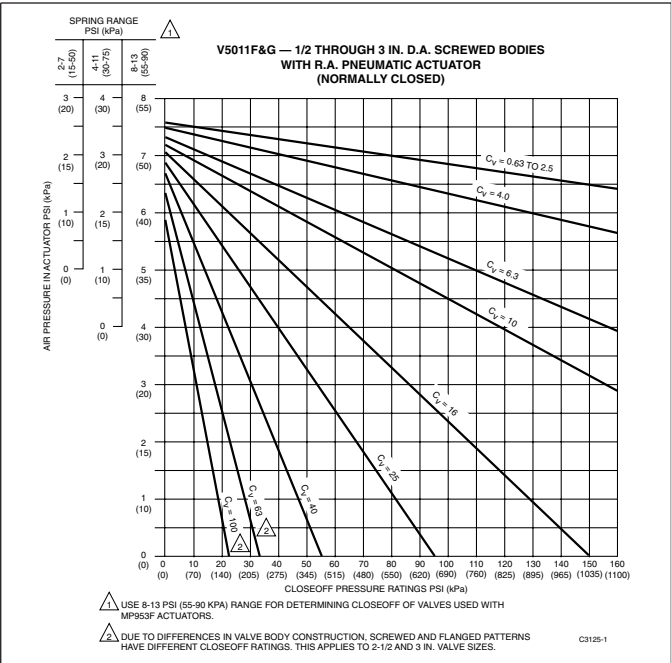
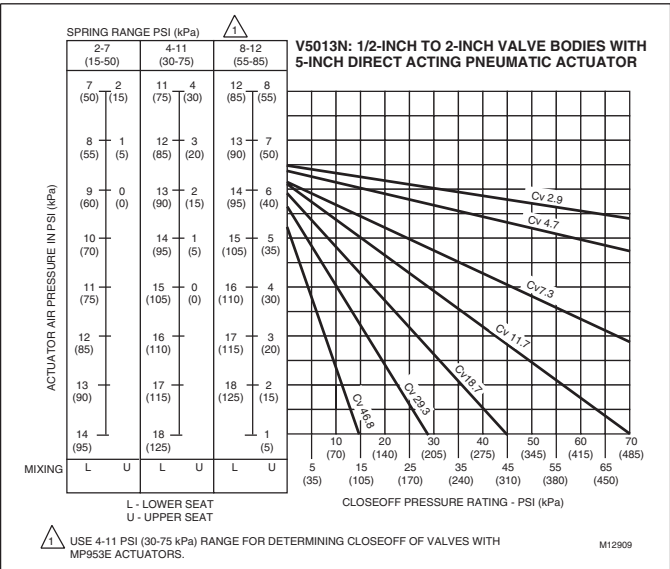


Chart E



Close-off Pressure Charts - Valves

NPT Globe Valves ½" - 3"

Chart F

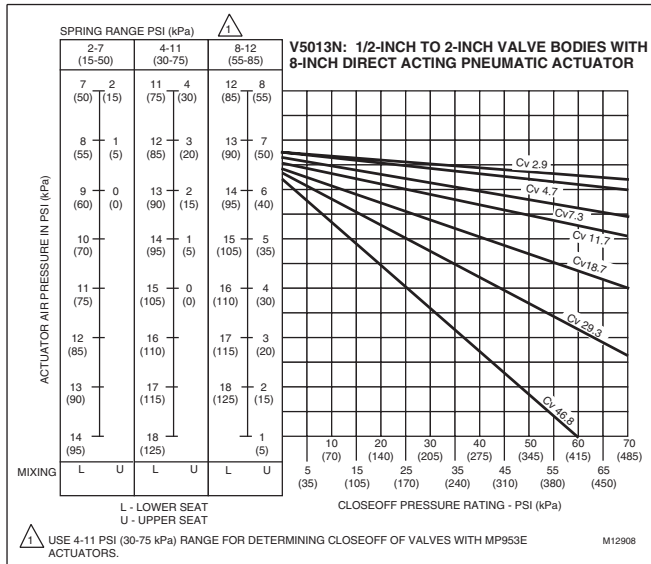


Chart G

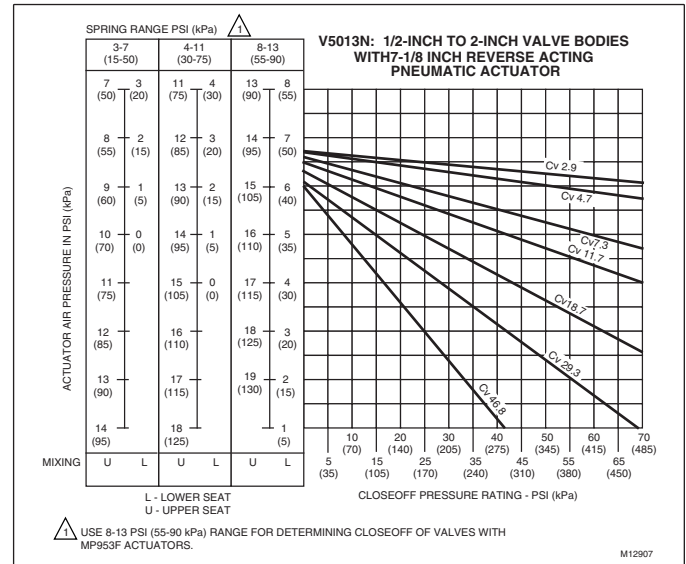


Chart H

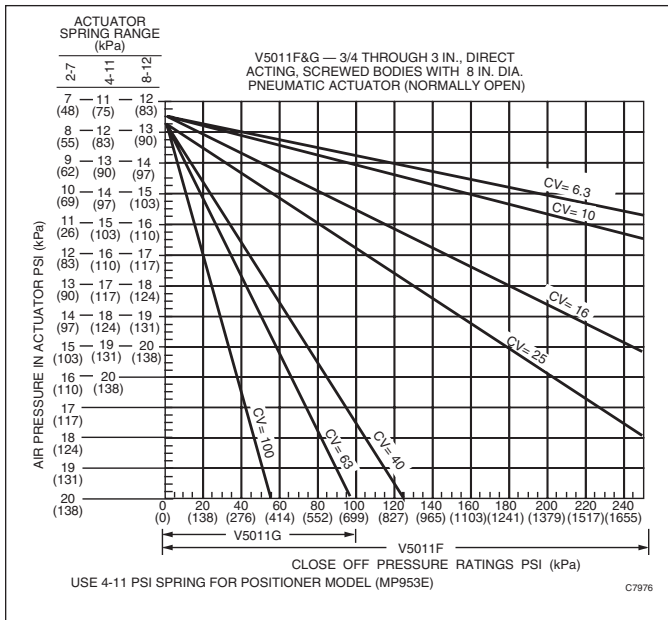
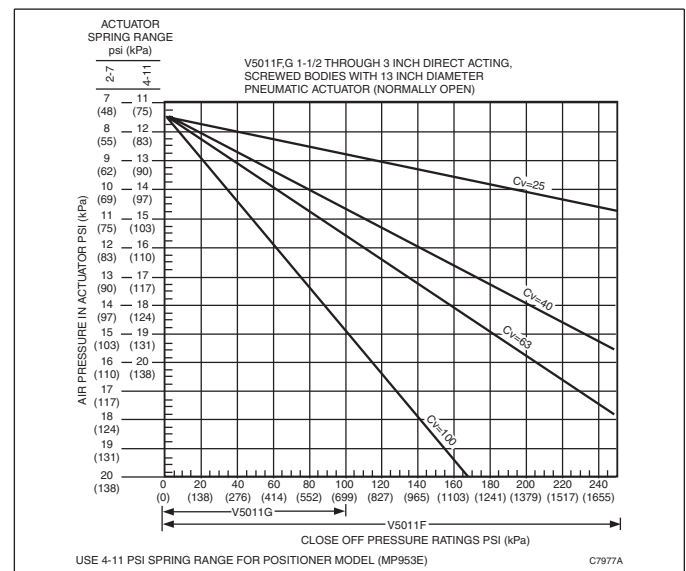


Chart J



Product Selection - Valves

Flanged Globe Valves 2½"- 3", With Non Fail Safe DCA and Valve Linkage

Common Features

- For closed loop HVAC systems with up to 50% glycol
- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves)



Q5020A1003 Required



Actuator Features		Non Fail Safe			
Actuator O.S. Number		MN7220A2007 MN7220A2205	MN6120A1002 MN6120A1200	MN7234A2008	MN6134A1003
Power Supply	Voltage	24 Vac	24 Vac	24 Vac	24 Vac
	Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Actuator Torque	(lb.-in.)	175	175	300	300
	(lbs.)	234	234	402	402
Control	(0)2-10 Vdc	•		•	
	4-20 mA (external 500 Ohm Resistor)	•		•	
Fail Safe Action	Floating		•		•
	Two-Position SPDT		•		•
Normal Position (no signal)	Two-Position SPST		•		•
	(field configurable)	Stem Up/Down	Stay in Place	Stay in Place	Stay in Place
Actuator Stroke	(degrees)	95°	95°	95°	95°
	(seconds)	95	95	95	95
High Temperature Kit	Steam Application	43196000-001	43196000-001	43196000-001	43196000-001
	Aux Switch	SPDT Built In	0 / 2	0 / 2	
Feedback	2 x SPDT Add-On	SW2-US	SW2-US	SW2-US	SW2-US
	(0)2-10 Vdc Built In	•		•	

Valve Size (inches)	Cv	Valve Type	ANSI Class	Max Static Water Pressure	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid			
ANSI Class III (<0.05% Cv) seat leakage												
2-1/2"	70	Standard	125	175 psi @ 130 F	100 psig / 337 F	Equal %	Stem down to close	VGF21ES25	39	39	68	68
			250	400 psi @ 130 F		Linear		VGF21LS25	39	39	68	68
125	175 psi @ 130 F					Equal %		VGF22ES25	39	39	68	68
			250	400 psi @ 130 F		Linear		VGF21ES30	19	19	33	33
120	175 psi @ 130 F	Equal %				VGF21LS30		19	19	33	33	
		250	400 psi @ 130 F	Linear		VGF22ES30		19	19	33	33	
ANSI Class IV (<0.01% Cv) seat leakage												
2-1/2"	70	Pressure Balanced	125	175 psi @ 130 F	100 psig / 337 F	Equal %	Stem down to close	VGF21EP25	175	175	175	175
						Linear		VGF21LP25	175	175	175	175
3"	115					Equal %		VGF21EP30	175	175	175	175
								Linear	VGF21LP30	175	175	175
ANSI Class III (<0.05% Cv) seat leakage (A to AB)												
2-1/2"	70	Mixing	125	175 psi @ 130 F	N / A	Equal % A-AB	Stem up closes A-AB	VGF31EM25	55	55	94	94
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD25	55	55	94	94
		250	400 psi @ 130 F	Equal % A-AB		Stem up closes A-AB	VGF32EM25	55	55	94	94	
				Diverting		Linear, Constant Total	Stem up closes B-AB	VGF32LD25	39	39	68	68
3"	120	Mixing	125	175 psi @ 130 F		Equal % A-AB	Stem up closes A-AB	VGF31EM30	34	34	58	58
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD30	19	19	33	33
		115	250	400 psi @ 130 F		Equal % A-AB	Stem up closes A-AB	VGF32EM30	34	34	58	58
						Diverting	Linear, Constant Total	Stem up closes B-AB	VGF32LD30	19	19	33

Flanged Globe Valves 2½"-3", With Fail Safe DCA and Valve Linkage

Common Features

- For closed loop HVAC systems with up to 50% glycol
- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves)



Q5020A1003 Required



Actuator Features		Fail Safe		
Actuator O.S. Number		MS7520A2007 MS7520A2205 MS7520H2208	MS8120A1007 MS8120A1205	MS4120A1001 MS4120A1209
Power Supply	Voltage	24 Vac	24 Vac	100-250 Vac
	Frequency	50 / 60 Hz	50 / 60 Hz	60 Hz
Actuator Torque	Power	16 VA	40 VA	60 VA
	(lb.-in.)	175	175	175
Linkage Stem Force		(lbs.)	234	234
Control	(0)2-10 Vdc	•		
	4-20 mA (external 500 Ohm Resistor)	•		
	Floating	•		
	Two-Position SPDT	•		
	Two-Position SPST	•	•	•
Fail Safe Action		Configurable Open/Closed	Configurable Open/Closed	Configurable Open/Closed
Normal Position (no signal)		(field configurable) Stem Up/Down	Stem Up/Down	Stem Up/Down
Actuator Stroke		(degrees)	95°	95°
Timing		(seconds)	90	90
High Temperature Kit		Steam Application	43196000-001	43196000-001
Aux Switch	SPDT Built In	0 / 2 / 2	0 / 2	0 / 2
	2 x SPDT Add-On	SW2-US	SW2-US	SW2-US
Feedback		(0)2-10 Vdc Built In	•	

Valve Size (inches)	Cv	Valve Type	ANSI Class	Max Static Water Pressure	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid		
ANSI Class III (<0.05% Cv) seat leakage											
2-1/2"	70	Standard	125	175 psi @ 130 F	100 psig / 337 F	Equal %	Stem down to close	VGF21ES25	39	39	39
			250	400 psi @ 130 F		Linear		VGF21LS25	39	39	39
3"			125	Equal %		VGF22ES25		39	39	39	
				125		175 psi @ 130 F		Equal %	VGF21ES30	19	19
	Linear	VGF21LS30		19		19		19			
120	250	400 psi @ 130 F	Equal %	VGF22ES30		19		19	19		
ANSI Class IV (<0.01% Cv) seat leakage											
2-1/2"	70	Pressure Balanced	125	175 psi @ 130 F	100 psig / 337 F	Equal %	Stem down to close	VGF21EP25	175	175	175
						Linear		VGF21LP25	175	175	175
3"	115					Equal %		VGF21EP30	175	175	175
						Linear		VGF21LP30	175	175	175
ANSI Class III (<0.05% Cv) seat leakage (A to AB)											
2-1/2"	70	Mixing	125	175 psi @ 130 F	N / A	Equal % A-AB	Stem up closes A-AB	VGF31EM25	55	55	55
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD25	39	39	39
		Mixing	250	400 psi @ 130 F		Equal % A-AB	Stem up closes A-AB	VGF32EM25	55	55	55
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD25	39	39	39
	3"	Mixing	125	175 psi @ 130 F		Equal % A-AB	Stem up closes A-AB	VGF31EM30	34	34	34
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD30	19	19	19
		Mixing	250	400 psi @ 130 F		Equal % A-AB	Stem up closes A-AB	VGF32EM30	34	34	34
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD30	19	19	19

Product Selection - Valves

Threaded/Flanged Globe Valves 2"-3", With Tandem Non Fail Safe DCA and Valve Linkage

Common Features

- For closed loop HVAC systems with up to 50% glycol
- ANSI Class 125 and 250 flanged cast iron bodies (VGF), brass body (V5011/13)
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim
VGF: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves
V5011F/G/N1 & V5013: Stainless steel stem and brass seat
V5011N2: Stainless steel stem and seat
- Use Q5020 linkage on VGF_LP and VGF_EP pressure balanced valves



**Q5024B2230 and
HU5024-001
Required**



Actuator Features		Non Fail Safe			
Actuator O.S. Number (Two required per linkage/valve)		MN7220A2007 MN7220A2205	MN6120A1002 MN6120A1200	MN7234A2008	MN6134A1003
Power Supply	Voltage	24 Vac	24 Vac	24 Vac	24 Vac
	Frequency	60 Hz	60 Hz	60 Hz	60 Hz
	Power	6 VA	6 VA	9 VA	9 VA
Actuator Torque (lb.-in.)		175	175	300	300
Linkage Stem Force, Two Actuators (lbs.)		360	360	667	667
Stem & Bonnet Adapter Kit		HU5024-001			
Control	(0)2-10 Vdc	•		•	
	4-20 mA (external 500 Ohm Resistor)	•		•	
	Floating		•		•
	Two-Position SPDT		•		•
Fail Safe Action	Two-Position SPST		•		
	Stay in Place	Stay in Place	Stay in Place	Stay in Place	Stay in Place
	Normal Position (no signal) (field configurable)	Stem Up/ Down	Stem Up/ Down	Stem Up/ Down	Stem Up/ Down
	Actuator Stroke (inches)	0.75	0.75	0.75	0.75
Timing (seconds)		95	95	95	95
Aux Switch	2 x SPDT Add-On	SW2-US	SW2-US	SW2-US	SW2-US
	SPDT Built In	0/2	0/2		
Feedback (0)2-10 Vdc Built In		•		•	

Valve Size (inches)	Pipe Fitting	Cv	Valve Type	ANSI Class	Max Static Water Pressure	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid					
ANSI Class III (<0.05% Cv) seat leakage															
2"	f NPT	47	Standard	N/A	217 psi @ 248 F	15 psi (2-position)	Equal %	Stem down to close	V5011N1099	162	162	240	240		
2-1/2"		63			250 psi @ 100F	100 psig / 337 F	Linear		V5011N2097	100	100	100	100		
	125						175 psi @ 130 F		100 psig / 337 F	Linear	V5011F1105	130	130	225	225
										250	400 psi @ 130 F	Linear	V5011G1111	100	100
f NPT	100	N/A		250 psi @ 100F	15 psi (2-position)	Linear	VGF21ES25		61			61	105	105	
						125	175 psi @ 130 F		100 psig / 337 F	Linear	VGF21LS25	61	61	105	105
Flanged	125	250 psi @ 100F		15 psi (2-position)	Linear					VGF22ES25	61	61	105	105	
					250	400 psi @ 130 F	Linear		V5011F1113	65	65	115	115		
125	175 psi @ 130 F	100 psig / 337 F	Linear	V5011G1129			65		65	100	100				
			Flanged	120	250 psi @ 100F	15 psi (2-position)	Linear		VGF21ES30	30	30	52	52		
250	400 psi @ 130 F	Linear					VGF21LS30		30	30	52	52			
		250	400 psi @ 130 F	Linear	VGF22ES30	30	30		52	52					
ANSI Class IV (<0.01% Cv) seat leakage															
2-1/2"	Flanged	70	Pressure Balanced	125	175 psi @ 130 F	125 psig / 353 F	Equal %	Stem down to close	VGF21EP25	See previous page for Q5020 linkages					
3"		115					Linear		VGF21LP25						
	Equal %		VGF21EP30												
	Linear		VGF21LP30												
ANSI Class III (<0.05% Cv) seat leakage (A to AB)															
2"	f NPT	47	Mixing	N/A	217 psi @ 248 F	N / A	Linear B-AB / Equal % A-AB	Stem up closes A-AB	V5013N1097	162	162	240	240		
2-1/2"	70	Mixing	125	175 psi @ 130 F	Linear B-AB / Equal % A-AB		Stem up closes A-AB	VGF31EM25	77	77	133	133			
		Diverting	250	400 psi @ 130 F	Linear, Constant Total		Stem up closes B-AB	VGF31LD25	61	61	105	105			
		Mixing			Linear B-AB / Equal % A-AB		Stem up closes A-AB	VGF32EM25	77	77	133	133			
		Diverting	Linear, Constant Total	Stem up closes B-AB	VGF32LD25		61	61	105	105					
3"	120	Mixing	125	175 psi @ 130 F	Linear B-AB / Equal % A-AB		Stem up closes A-AB	VGF31EM30	52	52	89	89			
		Diverting	Linear, Constant Total	Stem up closes B-AB	VGF31LD30		30	30	52	52					
		115	Mixing	250	400 psi @ 130 F		Linear B-AB / Equal % A-AB	Stem up closes A-AB	VGF32EM30	52	52	89	89		
		120	Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD30	30	30	52	52		

Product Selection - Valves

Threaded/Flanged Globe Valves 2"- 3", With Tandem Fail Safe DCA and Valve Linkage

Common Features

- For closed loop HVAC systems with up to 50% glycol
- ANSI Class 125 and 250 flanged cast iron bodies (VGF), brass body (V5011/13)
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim
 - VGF: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves
 - V5011F/G/N1 & V5013: Stainless steel stem and brass seat
 - V5011N2: Stainless steel stem and seat
- Use Q5020 linkage on VGF_LP and VGF_EP pressure balanced valves



Q5024B2230 and HU5024-001 Required



Actuator Features		Fail Safe		
Actuator O.S. Number (Two required per linkage/valve)		MS7520A2007 MS7520A2205 MS7520H2208	MS8120A1007 MS8120A1205	MS4120A1001 MS4120A1209
Power Supply	Voltage	24 Vac	24 Vac	100-250 Vac
	Frequency	60 Hz	60 Hz	60 Hz
	Power	16 VA	40 VA	60 VA
Actuator Torque (lb.-in.)		175	175	175
Linkage Stem Force, Two Actuators (lbs.)		360	360	360
Stem & Bonnet Adapter Kit		HU5024-001		
Control (0)-10 Vdc		•		
4-20 mA (external 500 Ohm Resistor)		•		
Floating		•		
Two-Position SPDT		•		
Two-Position SPST		•	•	•
Fail Safe Action		Configurable Open/Closed	Configurable Open/Closed	Configurable Open/Closed
Normal Position (no signal) (field configurable)		Stem Up/Down	Stem Up/Down	Stem Up/Down
Actuator Stroke (inches)		0.75	0.75	0.75
Timing (seconds)		90	90	90
Aux Switch	2 x SPDT Add-On	SW2-US	SW2-US	SW2-US
	SPDT Built In	0 / 2 / 2	0 / 2	0 / 2
Feedback (0)-10 Vdc Built In		•		

Valve Size (inches)	Pipe Fitting	Cv	Valve Type	ANSI Class	Max Static Water Pressure	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid						
ANSI Class III (<0.05% Cv) seat leakage																
2"	f NPT	47	Standard	N/A	217 psi @ 248 F	15 psi (2-position) 100 psig / 337 F	Equal % Linear	Stem down to close	V5011N1099	162	162	162				
2-1/2"		63			250 psi @ 100F	15 psi (2-position) 100 psig / 337 F	Equal % Linear		V5011N2097	100	100	20				
	Flanged	70			125	175 psi @ 130 F	100 psig / 337 F		Equal % Linear	V5011F1105	130	130	130			
				250		400 psi @ 130 F	Equal % Linear		V5011G1111	100	100	100				
	3"	f NPT		100	N/A	250 psi @ 100F	15 psi (2-position) 100 psig / 337 F		Equal % Linear	V5011F1113	61	61	61			
125				175 psi @ 130 F		100 psig / 337 F	Equal % Linear		V5011G1129	61	61	61				
Flanged		120		125	175 psi @ 130 F	100 psig / 337 F	Equal % Linear		VGF21ES25	61	61	61				
									VGF22ES25	61	61	61				
3"		Flanged		120	250	400 psi @ 130 F	100 psig / 337 F		Equal % Linear	V5011F1113	65	65	65			
	V5011G1129									65	65	65				
	VGF21ES30									30	30	30				
	VGF21LS30									30	30	30				
ANSI Class IV (<0.01% Cv) seat leakage																
2-1/2"	Flanged	70	Pressure Balanced	125	175 psi @ 130 F	125 psig / 353 F	Equal % Linear	Stem down to close	VGF21EP25	See previous page for Q5020 linkages						
3"		115					Equal % Linear		VGF21LP25							
							Equal % Linear		VGF21EP30							
ANSI Class III (<0.05% Cv) seat leakage (A to AB)																
2"	f NPT	47	Mixing	N/A	217 psi @ 248 F	N / A	Linear B-AB / Equal % A-AB	Stem up closes A-AB	V5013N1097	162	162	162				
2-1/2"							70	Diverting	125	175 psi @ 130 F	Linear, Constant Total	Stem up closes A-AB	VGF31EM25	77	77	77
									Mixing	250	400 psi @ 130 F	Linear B-AB / Equal % A-AB	Stem up closes B-AB	VGF31LD25	61	61
			Diverting	Linear B-AB / Equal % A-AB	Stem up closes A-AB			VGF32EM25			77	77	77			
			Diverting	Linear, Constant Total	Stem up closes B-AB			VGF32LD25			61	61	61			
			3"	120	Mixing			125	175 psi @ 130 F	Linear B-AB / Equal % A-AB	Stem up closes A-AB	VGF31EM30	52	52	52	
Diverting		Linear, Constant Total					Stem up closes B-AB			VGF31LD30	30	30	30			
115		250			400 psi @ 130 F		Linear B-AB / Equal % A-AB	Stem up closes A-AB	VGF32EM30	52	52	52				
							Diverting	Linear, Constant Total	Stem up closes B-AB	VGF32LD30	30	30	30			

VALVES

Product Selection - Valves

Flanged Globe Valves 2½"- 3", With Dedicated Valve Actuators



Common Features

- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves



Actuator Features		Non Fail Safe			
Actuator O.S. Number		ML6420A3049	ML6420A3056	ML7420A3055	ML7420A3063
Power Supply	Voltage	24 Vac	24 Vac	24 Vac	24 Vac
	Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
	Power	6 VA	6 VA	7 VA	7 VA
Stem Force (lbs.)		135	135	135	135
Control (0)2-10 Vdc				•	•
4-20 mA (external 500 Ohm Resistor)				•	•
Floating		•	•		
Two-Position SPDT		•	•		
Two-Position SPST					
135 Ohm					
Fail Safe Action		Stay in place	Stay in place	Stay in place	Stay in place
Normal Position (no signal) (field configurable)		Stay in place	Stay in place	Stem Up	Stem Up
Actuator Stroke (inches)		0.75	0.75	0.75	0.75
Timing (seconds at 0.75" stroke)		60	30	60	30
High Temperature Kit Steam Application		43196000-001	43196000-001	43196000-001	43196000-001
Aux Switch	1 x SPDT Add-On				
	2 x SPDT Add-On	43191680-105	43191680-105	43191680-105	43191680-105
Feedback	2-10 Vdc Built In			•	•
	2-10 Vdc Add-On				
	220 Ohm Add-On	43191679-112	43191679-112		
10 kOhm Add-On		43191679-111	43191679-111		

2-Way Water & Steam Valves

Valve Size (inches)	Cv	Valve Type	ANSI Class	Max Static Water Pressure	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid			
ANSI Class III (<0.05% Cv) seat leakage												
2-1/2"	70	Standard	125	175 psi @ 130 F	100 psig / 337 F	Equal %	Stem down to close	VGF21ES25	17	17	17	17
			250	400 psi @ 130 F		Linear		VGF21LS25	17	17	17	17
3"	125		125	175 psi @ 130 F		Equal %		VGF22ES25	17	17	17	17
			125	175 psi @ 130 F		Equal %		VGF21ES30	7	7	7	7
		250	400 psi @ 130 F	Linear		VGF21LS30		7	7	7	7	
	120	250	400 psi @ 130 F	Equal %		VGF22ES30		7	7	7	7	
ANSI Class IV (<0.01% Cv) seat leakage												
2-1/2"	70	Pressure Balanced	125	175 psi @ 130 F	100 psig / 337 F	Equal %	Stem down to close	VGF21EP25	175	175	175	175
						Linear		VGF21LP25	175	175	175	175
3"	115					Equal %		VGF21EP30	175	175	175	175
						Linear		VGF21LP30	175	175	175	175
ANSI Class III (<0.05% Cv) seat leakage (A to AB)												
2-1/2"	70	Mixing	125	175 psi @ 130 F	N/A	Equal % A-AB	Stem up closes A-AB	VGF31EM25	23	23	23	23
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD25	17	17	17	17
		Mixing	250	400 psi @ 130 F		Equal % A-AB	Stem up closes A-AB	VGF32EM25	23	23	23	23
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD25	17	17	17	17
3"	120	Mixing	125	175 psi @ 130 F		Equal % A-AB	Stem up closes A-AB	VGF31EM30	15	15	15	15
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD30	7	7	7	7
		115	250	400 psi @ 130 F		Equal % A-AB	Stem up closes A-AB	VGF32EM30	19	19	15	15
						Diverting	Linear, Constant Total	Stem up closes B-AB	VGF32LD30	7	7	7

3-Way Water Valves

Flanged Globe Valves 2½"- 3", With Dedicated Valve Actuators



Common Features

- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Maximum steam pressure (V5011, 2-pos): 15 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves

Actuator Features		Non Fail Safe	
Actuator O.S. Number		ML7421A1032	ML6421A1017
Power Supply	Voltage	24 Vac	24 Vac
	Frequency	50 / 60 Hz	50 / 60 Hz
	Power	12 VA	11 VA
Stem Force	(lbs.)	404	404
Control	(0)2-10 Vdc	•	
	4-20 mA (external 500 Ohm Resistor)	•	
	Floating		•
Two-Position SPDT			•
Fail Safe Action		Stay in place	Stay in place
Normal Position (no signal)	(field configurable)	Stem Up	Stay in place
Actuator Stroke	(inches)	0.75	0.75
Timing	(seconds at 0.75" stroke)	90	90
High Temperature Kit		43196000-001	43196000-001
Aux Switch	2 x SPDT Add-On	43191680-102	43191680-102
Feedback	2-10 Vdc Built In	•	
	220 Ohm Add-On		43191679-101
	10 kOhm Add-On		

Valve Size (inches)	Cv	Valve Type	ANSI Class	Max Static Water Pressure	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid			
ANSI Class III (<0.05% Cv) seat leakage												
2-1/2"	70	Standard	125	175 psi @ 130 F	100 psig / 337 F	Equal %	Stem down to close	VGF21ES25	68	68		
			250	400 psi @ 130 F		Linear		VGF21LS25	68	68		
125	175 psi @ 130 F					Equal %		VGF22ES25	68	68		
			250	400 psi @ 130 F		Linear		VGF21ES30	33	33		
3"	125	175 psi @ 130 F				Equal %		VGF21LS30	33	33		
			250	400 psi @ 130 F		Linear		VGF22ES30	33	33		
120												
ANSI Class IV (<0.01% Cv) seat leakage												
2-1/2"	70	Pressure Balanced	125	175 psi @ 130 F	100 psig / 337 F	Equal %	Stem down to close	VGF21EP25	175	175		
						Linear		VGF21LP25	175	175		
3"	115					175 psi @ 130 F		Equal %	VGF21EP30	175	175	
								Linear	VGF21LP30	175	175	
ANSI Class III (<0.05% Cv) seat leakage (A to AB)												
3-Way Water Valves	2-1/2"	70	Mixing	125	175 psi @ 130 F	N / A	Equal % A-AB	Stem up closes A-AB	VGF31EM25	94	94	
			Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD25	68	68	
		Mixing	250	400 psi @ 130 F	Equal % A-AB		Stem up closes A-AB	VGF32EM25	94	94		
					Diverting		Linear, Constant Total	Stem up closes B-AB	VGF32LD25	68	68	
	3"	120	Mixing	125	175 psi @ 130 F		Equal % A-AB	Stem up closes A-AB	VGF31EM30	58	58	
			Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD30	33	33	
		115	Mixing	250	400 psi @ 130 F		Equal % A-AB	Stem up closes A-AB	VGF32EM30	58	58	
			Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD30	33	33	
		120										

2-Way Water & Steam Valves

3-Way Water Valves

Product Selection - Valves

Flanged Globe Valves 2½"- 3", With Dedicated Fail Safe Valve Actuators



Common Features

- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 0.75"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves



Actuator Features	Fail Safe			
Actuator O.S. Number	ML7425A3013	ML7425B3012	ML6425A3022	ML6425B3013
Power Supply Voltage	24 Vac	24 Vac	24 Vac	24 Vac
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Power	12 VA	12 VA	11 VA	11 VA
Stem Force (lbs.)	135	135	135	135
Control (0)2-10 Vdc	•	•		
4-20 mA (external 500 Ohm Resistor)	•	•		
Floating			•	•
Two-Position SPDT			•	•
Fail Safe Action	Stem Down (2-way N.C.)	Stem Up (2-way N.O.)	Stem Down (2-way N.C.)	Stem Up (2-way N.O.)
Normal Position (no signal) (field configurable)	Stem Up	Stem Up	Stay in Place	Stay in Place
Actuator Stroke (inches)	0.75	0.75	0.75	0.75
Timing (seconds at 0.75" stroke)	90	90	90	90
High Temperature Kit Steam Application	43196000-001	43196000-001	43196000-001	43196000-001
Aux Switch 2 x SPDT Add-On	43191680-105	43191680-105	43191680-105	43191680-105
Feedback 2-10 Vdc Built In	•	•		
220 Ohm Add-On	43191679-112	43191679-112	43191679-112	43191679-112
10 kOhm Add-On	43191679-111	43191679-111	43191679-111	43191679-111

Valve Size (inches)	Cv	Valve Type	ANSI Class	Max Static Water Pressure	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid									
ANSI Class III (<0.05% Cv) seat leakage																		
2-1/2"	70	Standard	125	175 psi @ 130 F	100 psig / 337 F	Equal %	Stem down to close	VGF21ES25	17	17	17	17						
			250	400 psi @ 130 F		Linear		VGF21LS25	17	17	17	17						
						Equal %		VGF22ES25	17	17	17	17						
3"	125		125	175 psi @ 130 F		Equal %		VGF21ES30	7	7	7	7						
			250	400 psi @ 130 F		Linear		VGF21LS30	7	7	7	7						
						Equal %		VGF22ES30	7	7	7	7						
ANSI Class IV (<0.01% Cv) seat leakage																		
2-1/2"	70	Pressure Balanced	125	175 psi @ 130 F	100 psig / 337 F	Equal %	Stem down to close	VGF21EP25	175	175	175	175						
						Linear		VGF21LP25	175	175	175	175						
						3"		115	Equal %	VGF21EP30	175	175	175	175				
Linear	VGF21LP30								175	175	175	175						
ANSI Class III (<0.05% Cv) seat leakage (A to AB)																		
2-1/2"	70					Mixing		125	175 psi @ 130 F	N / A	Equal % A-AB	Stem up closes A-AB	VGF31EM25	23	23	23	23	
		Diverting	Linear, Constant Total	Stem up closes B-AB	VGF31LD25	23	23				23	23						
		Mixing	250	400 psi @ 130 F	Equal % A-AB	Stem up closes A-AB	VGF32EM25	23	23		23	23						
		Diverting			Linear, Constant Total	Stem up closes B-AB	VGF32LD25	17	17		17	17						
3"	120	Mixing	125	175 psi @ 130 F	Equal % A-AB	Stem up closes A-AB	VGF31EM30	15	15		15	15						
		Diverting			Linear, Constant Total	Stem up closes B-AB	VGF31LD30	7	7		7	7						
		115	250	400 psi @ 130 F	Equal % A-AB	Stem up closes A-AB	VGF32EM30	15	15		15	15						
					Diverting	Linear, Constant Total	Stem up closes B-AB	VGF32LD30	7		7	7	7					

Product Selection - Valves

Flanged Globe Valves 4"- 6", With Tandem DCA and Valve Linkage

Common Features

- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 1.5"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves



**Q5024B2240 and
HU5024-002
Required**



Actuator Features		Non Fail Safe			
Actuator O.S. Number (Two Actuators per valve/linkage)		MM7220A2007 MM7220A2205	MM6120A1002 MM6120A1200	MM7234A2008	MM6134A1003
Power Supply	Voltage	24 Vac	24 Vac	24 Vac	24 Vac
	Frequency	60 Hz	60 Hz	60 Hz	60 Hz
	Power	6 VA	6 VA	9 VA	9 VA
Actuator Torque	(lb.-in.)	175	175	300	300
Linkage Stem Force, Two Actuators	(lbs.)	272	272	467	467
Stem & Bonnet Adapter Kit		HU5024-002			
Control	(0)2-10 Vdc	•		•	
	4-20 mA (external 500 Ohm Resistor)	•		•	
	Floating		•		•
	Two-Position SPDT		•		•
	Two-Position SPST		•		
Fail Safe Action		Stay in Place	Stay in Place	Stay in Place	Stay in Place
Normal Position (no signal)	(field configurable)	Stem Up/Down	Stem Up/Down	Stem Up/Down	Stem Up/Down
Actuator Stroke	(inches)	1.5	1.5	1.5	1.5
Timing	(seconds)	95	95	95	95
Aux Switch	2 x SPDT Add-On	SW2-US	SW2-US	SW2-US	SW2-US
	SPDT Built In	0 / 2	0 / 2		
Feedback	(0)2-10 Vdc Built In	•		•	

2-Way Water & Steam Valves												
Valve Size (inches)	Cv	Valve Type	Max Static Water Pressure	ANSI Class	Max Steam Pressure	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid			
ANSI Class III (<0.05% Cv) Seat Leakage												
4"	155	Standard	175 psi @ 130 F	125	100 psig / 337 F	Equal %	Stem down to close	VGF21ES40	22	22	39	39
	150		400 psi @ 130 F	250		Equal %		VGF21LS40	22	22	39	39
5"								320	175 psi @ 130 F	125	Equal %	VGF22ES40
	400 psi @ 130 F		250	Linear		VGF21ES50						9
6"		370				175 psi @ 130 F		125	Equal %	VGF21LS50	9	9
	400 psi @ 130 F		250	Linear						VGF22ES50	9	9
175 psi @ 130 F		125				Equal %		VGF21ES60	9	9	15	15
	400 psi @ 130 F		250	Linear				VGF21LS60	9	9	15	15
175 psi @ 130 F		125			Equal %	VGF22ES60	9	9	15	15		
	400 psi @ 130 F		250	Linear								
ANSI Class IV (<0.01% Cv) Seat Leakage												
4"	150	Pressure Balanced	175 psi @ 130 F	125	100 psig / 337 F	Equal %	Stem down to close	VGF21EP40	175	175	Use Tandem 175 in lb actuator	
						Linear		VGF21LP40	175	175		
5"	285					Equal %		VGF21EP50	175	175		
								Linear	VGF21LP50	175		
6"	370	Equal %	VGF21EP60	175	175							
			Linear	VGF21LP60	175	175						
ANSI Class III (<0.05% Cv) Seat Leakage												
4"	150	Mixing	175 psi @ 130 F	125	N / A	Equal % A-AB	Stem up closes A-AB	VGF31EM40	22	22	39	39
	160	Diverting	175 psi @ 130 F	250		Linear, Constant Total	Stem up closes B-AB	VGF31LD40	22	22	39	39
	170	Mixing	400 psi @ 130 F			Equal % A-AB	Stem up closes A-AB	VGF32EM40	22	22	39	39
	160	Diverting	175 psi @ 130 F	Linear, Constant Total		Stem up closes B-AB	VGF32LD40	22	22	39	39	
5"	320	Mixing	175 psi @ 130 F	125		Equal % A-AB	Stem up closes A-AB	VGF31EM50	9	9	15	15
	285	Diverting	175 psi @ 130 F	Linear, Constant Total		Stem up closes B-AB	VGF31LD50	9	9	15	15	
	320	Mixing	400 psi @ 130 F	250		Equal % A-AB	Stem up closes A-AB	VGF32EM50	9	9	15	15
	285	Diverting	175 psi @ 130 F			Linear, Constant Total	Stem up closes B-AB	VGF32LD50	9	9	15	15
6"	370	Mixing	175 psi @ 130 F	125		Equal % A-AB	Stem up closes A-AB	VGF31EM60	9	9	15	15
	380	Diverting	175 psi @ 130 F	Linear, Constant Total		Stem up closes B-AB	VGF31LD60	9	9	15	15	
	370	Mixing	400 psi @ 130 F	250		Equal % A-AB	Stem up closes A-AB	VGF32EM60	9	9	15	15
	380	Diverting	175 psi @ 130 F			Linear, Constant Total	Stem up closes B-AB	VGF32LD60	9	9	15	15

VALVES

Product Selection - Valves

Flanged Globe Valves 4"- 6", With Tandem DCA and Valve Linkage

Common Features

- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 1.5"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves

**Q5024B2240 and
HU5024-002
Required**



Actuator Features		Fail Safe		
Actuator O.S. Number (Two Actuators per valve/linkage)		MS7520A2007 MS7520A2205 MS7520H2208	MS8120A1007 MS8120A1205	MS4120A1001 MS4120A1209
Power Supply	Voltage	24 Vac	24 Vac	100-250 Vac
	Frequency	60 Hz	60 Hz	60 Hz
	Power	16 VA	40 VA	60 VA
Actuator Torque (lb.-in.)		175	175	175
Linkage Stem Force, Two Actuators (lbs.)		325	325	272
Stem & Bonnet Adapter Kit		HU5024-002		
Control	(0)2-10 Vdc	•		
	4-20 mA (external 500 Ohm Resistor)	•		
	Floating	•		
	Two-Position SPDT	•		
	Two-Position SPST	•	•	•
Fail Safe Action		Configurable Open/Closed	Configurable Open/Closed	Configurable Open/Closed
Normal Position (no signal) (field configurable)		Stem Up/Down	Stem Up/Down	Stem Up/Down
Actuator Stroke (inches)		1.5	1.5	1.5
Timing (seconds)		90	90	90
Aux Switch	2 x SPDT Add-On	SW2-US	SW2-US	SW2-US
	SPDT Built In	0 / 2 / 2	0 / 2	0 / 2
Feedback (0)2-10 Vdc Built In		•		

Valve Size (inches)	Cv	Valve Type	Max Static Water Pressure	ANSI Class	Max Steam Pressure	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid					
2-Way Water & Steam Valves	ANSI Class III (<0.05% Cv) Seat Leakage													
	4"	155	Standard	175 psi @ 130 F	125	100 psig / 337 F	Equal %	Stem down to close	VGF21ES40	22	22	22		
		150		400 psi @ 130 F	250		Linear		VGF21LS40	22	22	22		
	5"	175 psi @ 130 F		125	Equal %		VGF22ES40		22	22	22			
		400 psi @ 130 F		250	Linear		VGF21ES50		9	9	9			
	6"	175 psi @ 130 F		125	Equal %		VGF21LS50		9	9	9			
		400 psi @ 130 F		250	Linear		VGF22ES50		9	9	9			
	6"	175 psi @ 130 F		125	Equal %		VGF21ES60		9	9	9			
		400 psi @ 130 F		250	Linear		VGF21LS60		9	9	9			
	ANSI Class IV (<0.01% Cv) Seat Leakage													
	4"	150	Pressure Balanced	175 psi @ 130 F	125	100 psig / 337 F	Equal %	Stem down to close	VGF21EP40	175	175	175		
	5"	285					Linear		VGF21LP40	175	175	175		
Equal %							VGF21EP50		175	175	175			
Linear							VGF21LP50		175	175	175			
Equal %							VGF21EP60		175	175	175			
6"	370	Linear					VGF21LP60		175	175	175			
3-Way Water Valves	ANSI Class III (<0.05% Cv) Seat Leakage													
	4"	150	Mixing	175 psi @ 130 F	125	N / A	Equal % A-AB	Stem up closes A-AB	VGF31EM40	22	22	22		
		160	Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD40	22	22	22		
		170	Mixing				Equal % A-AB	Stem up closes A-AB	VGF32EM40	22	22	22		
		160	Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD40	22	22	22		
	5"	320	Mixing	175 psi @ 130 F	125		Equal % A-AB	Stem up closes A-AB	VGF31EM50	9	9	9		
		285	Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD50	9	9	9		
		320	Mixing				Equal % A-AB	Stem up closes A-AB	VGF32EM50	9	9	9		
		285	Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD50	9	9	9		
	6"	370	Mixing	175 psi @ 130 F	125		Equal % A-AB	Stem up closes A-AB	VGF31EM60	9	9	9		
		380	Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD60	9	9	9		
		370	Mixing				400 psi @ 130 F	250	Equal % A-AB	Stem up closes A-AB	VGF32EM60	9	9	9
		380	Diverting						Linear, Constant Total	Stem up closes B-AB	VGF32LD60	9	9	9

Flanged Globe Valves 4"- 6", With Dedicated Valve Actuators

Common Features

- ANSI Class 125 and 250 flanged cast iron bodies
- Close-off pressure = Maximum differential pressure
- Maximum static water pressure: Up to 400 psi
- Stem travel: 1.5"
- Rangeability: 50:1
- Valve trim: Stainless steel stem and plug. Integrated (cast iron) seat on VGF mixing valves, stainless steel seat on all other VGF valves



Actuator Features		Non Fail Safe	
Actuator O.S. Number		ML7421B1023	ML6421B1040
Power Supply	Voltage	24 Vac	24 Vac
	Frequency	50 / 60 Hz	50 / 60 Hz
	Power	12 VA	11 VA
Stem Force (lbs.)		404	404
Control	(0)2-10 Vdc	•	
	4-20 mA (external 500 Ohm Resistor)	•	
	Floating		•
Fail Safe Action	Two-Position SPDT		•
	Stay in Place	Stay in Place	Stay in Place
	Normal Position (no signal) (field configurable)	Stem up/down	Stay in Place
Actuator Stroke (inches)		1.5	1.5
Stroke Timing (seconds)		175	175
High Temperature Kit Steam Application		43196000-038	43196000-038
Aux Switch 2 x SPDT (24 Vac) (add-on)		43191680-102	43191680-102
Feedback 1 x 220 Ohm Potentiometer (add-on)		43191679-102	
2-10 Vdc (built in)		•	

2-Way Water & Steam Valves	Valve Size (inches)	Cv	Valve Type	Max Static Water Pressure	ANSI Class	Max Steam Pressure / Temperature	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure, psid	
	ANSI Class III (<0.05% Cv) Seat Leakage										
	4"	155	Standard	175 psi @ 130 F	125	100 psig / 337 F	Equal %	Stem down to close	VGF21ES40	22	22
		150		400 psi @ 130 F	250		Linear		VGF21LS40	22	22
	5"	320		175 psi @ 130 F	125		Equal %		VGF22ES40	22	22
		400 psi @ 130 F		250	Linear		VGF21ES50		9	9	
	6"	370		175 psi @ 130 F	125		Equal %		VGF21LS50	9	9
				400 psi @ 130 F	250		Linear		VGF22ES50	9	9
				175 psi @ 130 F	125		Equal %		VGF21ES60	9	9
			400 psi @ 130 F	250	Linear	VGF21LS60	9	9			
						Equal %		VGF22ES60	9	9	
ANSI Class IV (<0.01% Cv) Seat Leakage											
4"	150	Pressure Balanced	175 psi @ 130 F	125	100 psig / 337 F	Equal %	Stem down to close	VGF21EP40	175	175	
	Linear					VGF21LP40		175	175		
5"	285					Equal %		VGF21EP50	175	175	
	Linear					VGF21LP50		175	175		
6"	370	Equal %	VGF21EP60	175	175						
		Linear	VGF21LP60	175	175						
ANSI Class III (<0.05% Cv) Seat Leakage											
3-Way Water Valves	4"	150	Mixing	175 psi @ 130 F	125	N/A	Equal % A-AB	Stem up closes A-AB	VGF31EM40	34	34
		160	Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD40	34	34
		170	Mixing	400 psi @ 130 F	250		Equal % A-AB	Stem up closes A-AB	VGF32EM40	34	34
		160	Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD40	34	34
	5"	320	Mixing	175 psi @ 130 F	125		Equal % A-AB	Stem up closes A-AB	VGF31EM50	9	9
		285	Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD50	9	9
		320	Mixing	400 psi @ 130 F	250		Equal % A-AB	Stem up closes A-AB	VGF32EM50	9	9
		285	Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD50	9	9
	6"	370	Mixing	175 psi @ 130 F	125		Equal % A-AB	Stem up closes A-AB	VGF31EM60	9	9
		380	Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD60	9	9
		370	Mixing	400 psi @ 130 F	250		Equal % A-AB	Stem up closes A-AB	VGF32EM60	9	9
		380	Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD60	9	9

Product Selection - Valves

Flanged Globe Valves 2½"- 3", With Pneumatic Actuators

Common Features

- Easy installation and attachment to the valve
- Direct or reverse acting
- No positive positioner



Actuator Features		Without Positive Positioner							
Actuator O.S. Number		MP953C1067	MP953C1075	MP953C1083	MP953C1554	MP953C1562	MP953D1107	MP953D1131	MP953D1172
Direct Acting/ Reverse Acting		Direct Acting					Reverse Acting		
Diaphragm Size		8"			13"		7-1/8"		
Fail Safe Action		Stem Up					Stem Down		
Actuator Force		Medium			High		Medium		
Spring Range		2-7 psi	•			•			
		3-7 psi							•
		8-12 psi		•					
		8-13 psi					•		
		4-11 psi			•			•	

Valve Size (inches)		Cv	Valve Type	Max Static Water Pressure	ANSI Class	Max Steam Pressure	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure - See Charts On Page 149									
ANSI Class III (<0.05% Cv) Seat Leakage																			
2-1/2" Water & Steam Valves	2-1/2"	70	Standard	175 psi @ 130 F	125	100 psig / 337 F	Equal %	Stem down to close	VGF21ES25	K*-NO	K*-NO	K*-NO	K*-NO	L*-NO	L*-NO	M*-NC	M*-NC	M*-NC	
				400 psi @ 130 F	250		Linear		VGF21LS25	K*-NO	K*-NO	K*-NO	K*-NO	L*-NO	L*-NO	M*-NC	M*-NC	M*-NC	
	3"	125		175 psi @ 130 F	125		Equal %		VGF22ES25	K*-NO	K*-NO	K*-NO	K*-NO	L*-NO	L*-NO	M*-NC	M*-NC	M*-NC	
				400 psi @ 130 F	250		Linear		VGF21ES30	K*-NO	K*-NO	K*-NO	K*-NO	L*-NO	L*-NO	M*-NC	M*-NC	M*-NC	
				120	400 psi @ 130 F		250		Equal %	VGF21LS30	K*-NO	K*-NO	K*-NO	K*-NO	L*-NO	L*-NO	M*-NC	M*-NC	M*-NC
									Linear	VGF22ES30	K*-NO	K*-NO	K*-NO	K*-NO	L*-NO	L*-NO	M*-NC	M*-NC	M*-NC
	ANSI Class IV (<0.01% Cv) Seat Leakage																		
	2-1/2"	70	Pressure Balanced	175 psi @ 130 F	125	100 psig / 337 F	Equal %	Stem down to close	VGF21EP25	L*-NO	L*-NO	L*-NO	L*-NO	L*-NO	N/A				
							Linear		VGF21LP25	L*-NO	L*-NO	L*-NO	L*-NO	L*-NO					
		3"					115		Equal %	VGF21EP30	L*-NO	L*-NO	L*-NO	L*-NO					
Linear									VGF21LP30	L*-NO	L*-NO	L*-NO	L*-NO	L*-NO					
ANSI Class III (<0.05% Cv) Seat Leakage																			
3-Way Water Valves	2-1/2"	70	Mixing	175 psi @ 130 F	125	N/A	Equal % A-AB	Stem up closes A-AB	VGF31EM25	K-NC	K-NC	K-NC	L-NC	L-NC	M-NO	M-NO	M-NO		
			Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD25	K-NO	K-NO	K-NO	L-NO	L-NO	M-NC	M-NC	M-NC		
			Mixing	400 psi @ 130 F	250		Equal % A-AB	Stem up closes A-AB	VGF32EM25	K-NC	K-NC	K-NC	L-NC	L-NC	M-NO	M-NO	M-NO		
			Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD25	K-NO	K-NO	K-NO	L-NO	L-NO	M-NC	M-NC	M-NC		
	3"	120	Mixing	175 psi @ 130 F	125		Equal % A-AB	Stem up closes A-AB	VGF31EM30	K-NC	K-NC	K-NC	L-NC	L-NC	M-NO	M-NO	M-NO		
			Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD30	K-NO	K-NO	K-NO	L-NO	L-NO	M-NC	M-NC	M-NC		
			115	Mixing	400 psi @ 130 F		250	Equal % A-AB	Stem up closes A-AB	VGF32EM30	K-NC	K-NC	K-NC	L-NC	L-NC	M-NO	M-NO	M-NO	
								Diverting	Linear, Constant Total	Stem up closes B-AB	VGF32LD30	K-NO	K-NO	K-NO	L-NO	L-NO	M-NC	M-NC	M-NC

*The close-off pressure not to exceed rated pressure of steam valve
 †175 psi close-off, see chart for pneumatic air pressure required for operation.
 NC = Normally Closed, A to AB Normally Closed for 3-way valves
 NO = Normally Open, A to AB Normally Open for 3-way valves

Flanged Globe Valves 2½" - 3", With Positive Positioning Pneumatic Actuators

Common Features

- Easy installation and attachment to the valve
- Direct or reverse acting
- Integrated positive positioner



Actuator Features		With Positive Positioner							
Actuator O.S. Number		MP953E1368	MP953E1376	MP953E1384	MP953E1435	MP953E1443	MP953F1093	MP953F1101	MP953F1119
Direct Acting/ Reverse Acting		Direct Acting					Reverse Acting		
Diaphragm Size		8"			13"		7-1/8"		
Fail Safe Action		Stem Up					Stem Down		
Actuator Force		Medium			High		Medium		
Spring Range		4-11 psi	•	•	•	•	•	•	•
		8-13 psi					•	•	•
Positioner Span		10 psi		•		•			•
		5 psi	•		•			•	
		3 psi	•				•		

Valve Size (Inches)	Cv	Valve Type	Max Static Water Pressure	ANSI Class	Max Steam Pressure	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure - See Charts On Page 149							
ANSI Class III (<0.05% Cv) Seat Leakage																
2-1/2"	70	Standard	175 psi @ 130 F	125	100 psig / 337 F	Equal %	Stem down to close	VGF21ES25	K*-NO	K*-NO	K*-NO	L*-NO	L*-NO	M*-NC	M*-NC	M*-NC
			400 psi @ 130 F	250		Linear		VGF21LS25	K*-NO	K*-NO	K*-NO	L*-NO	L*-NO	M*-NC	M*-NC	M*-NC
3"	125		175 psi @ 130 F	125		Equal %		VGF22ES25	K*-NO	K*-NO	K*-NO	L*-NO	L*-NO	M*-NC	M*-NC	M*-NC
			400 psi @ 130 F	250		Linear		VGF21ES30	K*-NO	K*-NO	K*-NO	L*-NO	L*-NO	M*-NC	M*-NC	M*-NC
120	400 psi @ 130 F	250	Equal %	VGF21LS30		K*-NO		K*-NO	K*-NO	L*-NO	L*-NO	M*-NC	M*-NC	M*-NC		
			Equal %	VGF22ES30		K*-NO		K*-NO	K*-NO	L*-NO	L*-NO	M*-NC	M*-NC	M*-NC		
ANSI Class IV (<0.01% Cv) Seat Leakage																
2-1/2"	70	Pressure Balanced	175 psi @ 130 F	125	100 psig / 337 F	Equal %	Stem down to close	VGF21EP25	L*-NO	L*-NO	L*-NO	L*-NO	L*-NO	N/A		
						Linear		VGF21LP25	L*-NO	L*-NO	L*-NO	L*-NO				
3"	115					Equal %		VGF21EP30	L*-NO	L*-NO	L*-NO	L*-NO	L*-NO			
						Linear		VGF21LP30	L*-NO	L*-NO	L*-NO	L*-NO	L*-NO			
ANSI Class III (<0.05% Cv) Seat Leakage																
2-1/2"	70	Mixing	175 psi @ 130 F	125	N/A	Equal % A-AB	Stem up closes A-AB	VGF31EM25	K-NC	K-NC	K-NC	L-NC	L-NC	M-NO	M-NO	M-NO
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD25	K-NO	K-NO	K-NO	L-NO	L-NO	M-NC	M-NC	M-NC
		Mixing	400 psi @ 130 F	250		Equal % A-AB	Stem up closes A-AB	VGF32EM25	K-NC	K-NC	K-NC	L-NC	L-NC	M-NO	M-NO	M-NO
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD25	K-NO	K-NO	K-NO	L-NO	L-NO	M-NC	M-NC	M-NC
3"	120	Mixing	175 psi @ 130 F	125		Equal % A-AB	Stem up closes A-AB	VGF31EM30	K-NC	K-NC	K-NC	L-NC	L-NC	M-NO	M-NO	M-NO
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF31LD30	K-NO	K-NO	K-NO	L-NO	L-NO	M-NC	M-NC	M-NC
	115	Mixing	400 psi @ 130 F	250		Equal % A-AB	Stem up closes A-AB	VGF32EM30	K-NC	K-NC	K-NC	L-NC	L-NC	M-NO	M-NO	M-NO
		Diverting				Linear, Constant Total	Stem up closes B-AB	VGF32LD30	K-NO	K-NO	K-NO	L-NO	L-NO	M-NC	M-NC	M-NC

*The close-off pressure not to exceed rated pressure of steam valve

†175 psi close-off, see chart for pneumatic air pressure required for operation.

NC = Normally Closed, A to AB Normally Closed for 3-way valves

NO = Normally Open, A to AB Normally Open for 3-way valves

Product Selection - Valves

Flanged Globe Valves 4"- 6", With Pneumatic Actuators

Common Features

- Easy installation and attachment to the valve
- Direct acting
- Large 13 inch diaphragm for high stem force



Actuator Features	Without Positive Positioner		With Positive Positioner	
Actuator O.S. Number	MP953C1471	MP953C1489	MP953E1400	MP953E1418
Direct Acting / Reverse Acting	Direct Acting			
Diaphragm Size	13"			
Fail Safe Action	Stem Up			
Actuator Force	High			
Stroke	1-1/2"			
Spring Range	2-7 psi	•		
	4-11 psi		•	•
Positioner Span	10 psi	N/A		•
	5 psi			•

Valve Size (inches)	Cv	Valve Type	Max Static Water Pressure	ANSI Class	Max Steam Pressure	Flow Characteristic	Valve Action	Valve OS Number	Close-off Pressure - See Charts On Page 149									
ANSI Class III (<0.05% Cv) Seat Leakage																		
4"	155	Standard	175 psi @ 130 F	125	100 psig / 337 F	Equal %	Stem down to close	VGf21ES40	L*-NO	L*-NO	L*-NO	L*-NO						
	150		400 psi @ 130 F	250		Linear		VGf21LS40	L*-NO	L*-NO	L*-NO	L*-NO						
5"	320		175 psi @ 130 F	125		Equal %		VGf22ES40	L*-NO	L*-NO	L*-NO	L*-NO						
	400 psi @ 130 F		250	Linear		VGf21ES50		L*-NO	L*-NO	L*-NO	L*-NO							
6"			370	175 psi @ 130 F		125		Equal %	VGf21LS50	L*-NO	L*-NO	L*-NO	L*-NO					
	400 psi @ 130 F		250	Linear		VGf22ES50		L*-NO	L*-NO	L*-NO	L*-NO							
6"			370	175 psi @ 130 F		125		Equal %	VGf21ES60	L*-NO	L*-NO	L*-NO	L*-NO					
	400 psi @ 130 F		250	Linear		VGf21LS60		L*-NO	L*-NO	L*-NO	L*-NO							
						Equal %	VGf22ES60	L*-NO	L*-NO	L*-NO	L*-NO							
	ANSI Class IV (<0.01% Cv) Seat Leakage																	
4"	150	Pressure Balanced	175 psi @ 130 F	125	100 psig / 337 F	Equal %	Stem down to close	VGf21EP40	L*-NO	L*-NO	L*-NO	L*-NO						
						Linear		VGf21LP40	L*-NO	L*-NO	L*-NO	L*-NO						
5"	285					Equal %		VGf21EP50	L*-NO	L*-NO	L*-NO	L*-NO						
						Linear		VGf21LP50	L*-NO	L*-NO	L*-NO	L*-NO						
6"	370					Equal %		VGf21EP60	L*-NO	L*-NO	L*-NO	L*-NO						
						Linear		VGf21LP60	L*-NO	L*-NO	L*-NO	L*-NO						
ANSI Class III (<0.05% Cv) Seat Leakage																		
4"	150					Mixing		175 psi @ 130 F	125	N/A	Equal % A-AB	Stem up closes A-AB	VGf31EM40	L-NC	L-NC	L-NC	L-NC	
	160	Diverting	Linear, Constant Total	Stem up closes B-AB	VGf31LD40	L-NC	L-NC				L-NC	L-NC						
	170	Mixing	400 psi @ 130 F	250	Equal % A-AB	Stem up closes A-AB	VGf32EM40	L-NC	L-NC		L-NC	L-NC						
	160	Diverting	Linear, Constant Total	Stem up closes B-AB	VGf32LD40	L-NC	L-NC	L-NC	L-NC									
5"	320	Mixing	175 psi @ 130 F	125	Equal % A-AB	Stem up closes A-AB	VGf31EM50	L-NC	L-NC		L-NC	L-NC						
	285	Diverting	Linear, Constant Total	Stem up closes B-AB	VGf31LD50	L-NC	L-NC	L-NC	L-NC									
	320	Mixing	400 psi @ 130 F	250	Equal % A-AB	Stem up closes A-AB	VGf32EM50	L-NC	L-NC		L-NC	L-NC						
	285	Diverting	Linear, Constant Total	Stem up closes B-AB	VGf32LD50	L-NC	L-NC	L-NC	L-NC									
6"	370	Mixing	175 psi @ 130 F	125	Equal % A-AB	Stem up closes A-AB	VGf31EM60	L-NC	L-NC		L-NC	L-NC						
	380	Diverting	Linear, Constant Total	Stem up closes B-AB	VGf31LD60	L-NC	L-NC	L-NC	L-NC									
	370	Mixing	400 psi @ 130 F	250	Equal % A-AB	Stem up closes A-AB	VGf32EM60	L-NC	L-NC		L-NC	L-NC						
	380	Diverting	Linear, Constant Total	Stem up closes B-AB	VGf32LD60	L-NC	L-NC	L-NC	L-NC									

*The close-off pressure not to exceed rated pressure of steam valve
 †175 psi close-off, see chart for pneumatic air pressure required for operation.
 NC = Normally Closed, A to AB Normally Closed for 3-way valves
 NO = Normally Open, A to AB Normally Open for 3-way valves

Close-off Pressure Charts - Valves

Flanged Globe Valves 2½" - 6", With Pneumatic Actuators

Chart K

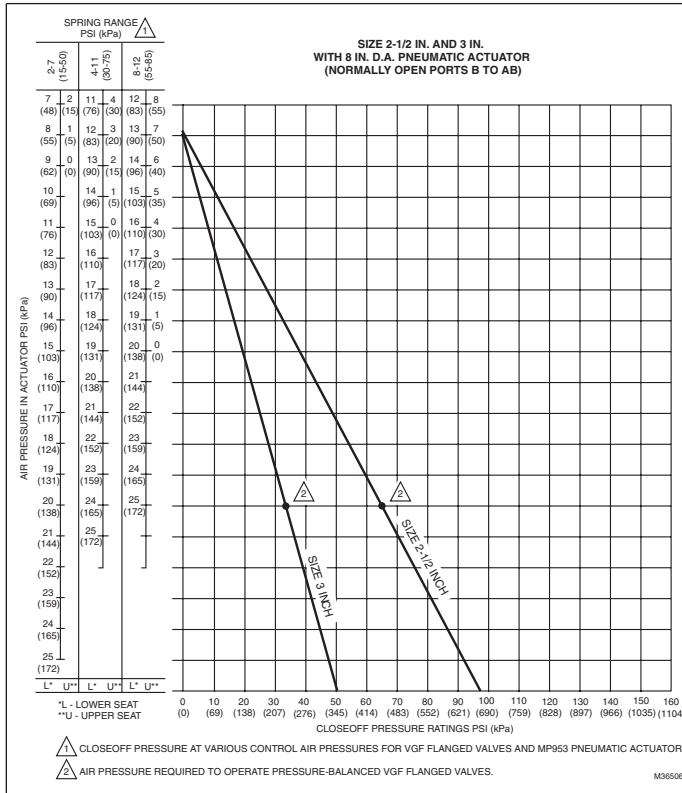


Chart L

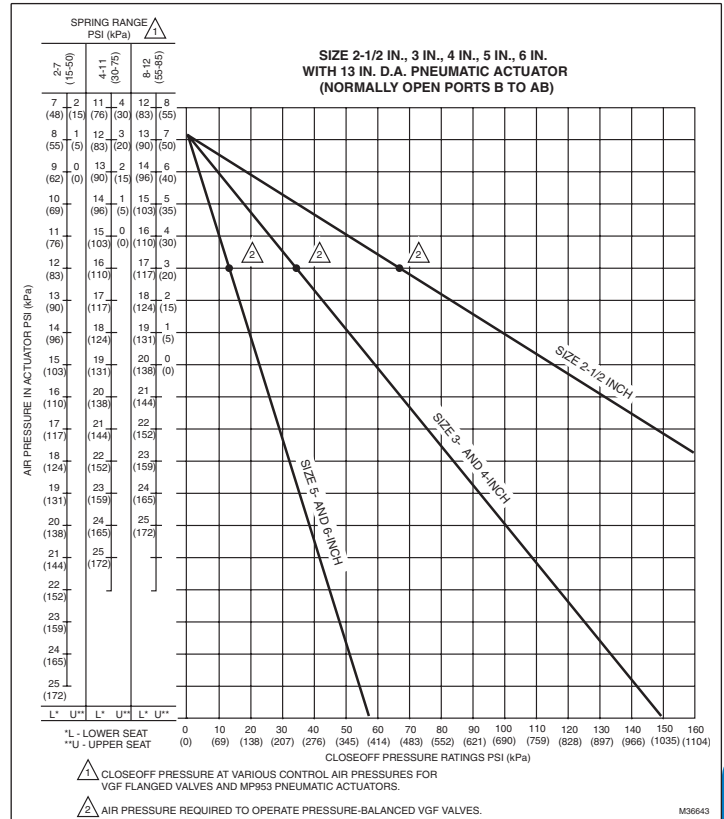
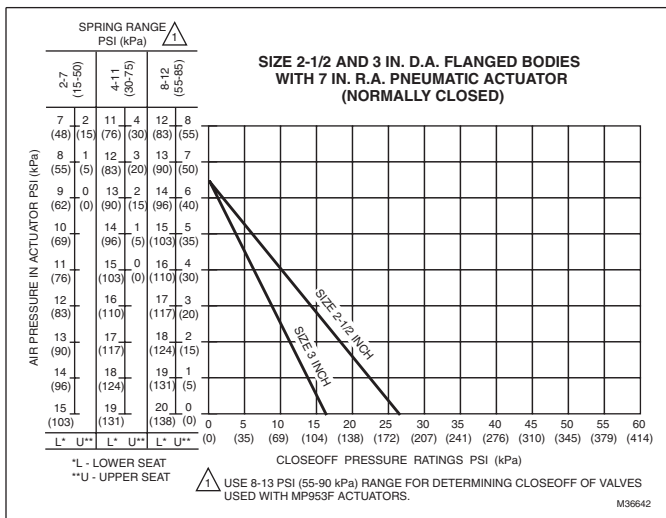


Chart M



Product Selection - Valves

Resilient Seat Butterfly Valves, 2-Way Electric Actuation

Honeywell Resilient Seat Butterfly Valves family (VFF) offers options in sizes 2" to 20", highlighted with an industry unique tandem mount using Honeywell direct coupled actuators on valves up to 8" size.

Common Features

- Honeywell direct coupled actuators up to 8" size
- Maximum static pressure 175 psi at 250°F
- Body style: lugged butterfly valve, full-cut (150-175 psid close-off) or under-cut disc (50 psid close-off)
- ANSI 125/150 flange compatibility
- Bubble-tight leakage at rated close-off
- Heaters built into NEMA 4X actuators
- Controlled media: Open or closed loop water or glycol solutions up to 50% concentration
- Flow characteristics: Equal percentage from 20°-60° stem rotation, modified linear over full stroke
- Normally closed configuration (field configurable)
- Resilient Seat Butterfly Valves come with factory-fitted actuators



2-Way Normally Closed (Field-Configurable Normally Open)

Actuator Features		Non Fail Safe			
		Floating	2-Position	Modulating	
Actuator O.S. Number		MN6134A1003	Industrial Actuator	MN7234A2008	Industrial Actuator
		NEMA 2	NEMA 4X	NEMA 2	NEMA 4X
Power Supply	Voltage	24 Vac	120 Vac	24 Vac	120 Vac
	Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
		Power	9 / 18 [†] VA	1.0 - 3.1 ALR	9 / 18 [†] VA
Actuator Torque		lb.-in.	300 / 600 [†]	600 - 18,000	300 / 600 [†]
Control		(0)2-10 Vdc		•	•
		4-20 mA (external 500 ohm resistor)		•	Built In
		Floating	24 Vac		
		2-Position	•	•	
Fail Safe Action		Stay in Place	Stay in Place	Stay in Place	Stay in Place
Normal Position		Configurable Open / Closed	Configurable Open / Closed	Configurable Open / Closed	Configurable Open / Closed
Aux Switch		Built in	2 x SPDT		2 x SPDT
		Add-On	SW2-US	SW2-US	
Feedback		Built in		2-10 Vdc	4-20mA / 2-10Vdc
Manual Override			•		•
Conduit Connection			•	•	•
Waterproof			•		•
Corrosion-resistant			•		•
Anti-condensate heater			•		•

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number			
2"	61	144	175	VFF2FW1Y2A	VFF2FW1YXA	VFF2FW1Y2B	VFF2FW1YXB
			250				
2-1/2"	107	282	175	VFF2GW1Y2A	VFF2GW1YXA	VFF2GW1Y2B	VFF2GW1YXB
			250				
3"	154	461	175	VFF2HW1Y2A	VFF2HW1YXA	VFF2HW1Y2B	VFF2HW1YXB
			250				
4"	274	841	50	VFF2JV1Y2A	VFF2JV1YXA	VFF2JV1Y2B	VFF2JV1YXB
			175	VFF2JW1Y2A [†]	VFF2JW1YXA	VFF2JW1Y2B [†]	VFF2JW1YXB
			250				
5"	428	1376	50	VFF2KV1Y2A*	VFF2KV1YXA	VFF2KV1Y2B*	VFF2KV1YXB
			175	VFF2KW1Y2A [†]	VFF2KW1YXA	VFF2KW1Y2B [†]	VFF2KW1YXB
			250				
6"	567	1850	50	N/A**	VFF2LV1YXA	N/A**	VFF2LV1YXB
			175	VFF2LW1Y2A [†]	VFF2LW1YXA	VFF2LW1Y2B [†]	VFF2LW1YXB
			250				
8"	1081	3316	50	VFF2MV1Y2A [†]	VFF2MV1YXA	VFF2MV1Y2B [†]	VFF2MV1YXB
			175		VFF2MW1YXA		VFF2MW1YXB
			250				
10"	1710	5430	50		VFF2NV1YXA		VFF2NV1YXB
			175		VFF2NW1YXA		VFF2NW1YXB
			250				
12"	2563	8077	50		VFF2PV1YXA		VFF2PV1YXB
			175		VFF2PW1YXA		VFF2PW1YXB
			250				
14"	3384	10538	50		VFF2RV1YXA		VFF2RV1YXB
			150		VFF2RW1YXA		VFF2RW1YXB
			250				
16"	4483	13966	50		VFF2SV1YXA		VFF2SV1YXB
			150		VFF2SW1Y4A		VFF2SW1Y4B
			250				
18"	5736	17214	50		VFF2TV1YXA		VFF2TV1YXB
			150		VFF2TW1Y4A		VFF2TW1Y4B
			250				
20"	7144	22339	50		VFF2UV1Y4A		VFF2UV1Y4B
			150		VFF2UW1Y4A		VFF2UW1Y4B
			250				

[†] Tandem mount

*Chilled water service only

**Use full cut, 175psid close-off valves - No under-cut, 50 psid close-off valve available

Product Selection - Valves

Resilient Seat Butterfly Valves, 2-Way Electric Actuation

Actuator Features		Fail Safe			Valve Only Manual operation for end-of-line service			
		2-Position	Modulating					
Actuator O.S. Number		MS8120A1007	MS4120A1001	MS7520A2007				
		NEMA 2	NEMA 2	NEMA 2				
Power Supply	Voltage	24 Vac	100-250 Vac	24 Vac				
	Frequency	60 Hz	60 Hz	50 / 60 Hz				
	Power	40 / 80† VA	60 / 120† VA	16 / 32† VA				
Actuator Torque	lb.-in.	175 / 350†	175 / 350†	175 / 350†				
Control	(0)2-10 Vdc			•				
	4-20 mA (external 500 ohm resistor)			•				
	Floating			24 Vac				
	2-Position	•	•	•				
Fail Safe Action		Configurable Open / Closed	Configurable Open / Closed	Configurable Open / Closed				
Normal Position		Configurable Open / Closed	Configurable Open / Closed	Configurable Open / Closed				
Aux Switch	Built in							
	Add-On	SW2-US	SW2-US	SW2-US				
Feedback	Built in			2-10 Vdc				
Manual Override							Lever	Gear Wheel
Conduit Connection		•	•	•				
Waterproof								
Corrosion-resistant								
Anti-condensate heater								

2-Way Normally Closed (Field-Configurable Normally Open)

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number				
2"	61	144	175	VFF2FW1Y2C	VFF2FW1Y2E	VFF2FW1Y2D	VFF2FW2YLX	VFF2FW2YGX
			250					
2-1/2"	107	282	175	VFF2GW1Y2C	VFF2GW1Y2E	VFF2GW1Y2D	VFF2GW2YLX	VFF2GW2YGX
			250					
3"	154	461	175	VFF2HW1Y2C [†]	VFF2HW1Y2E [†]	VFF2HW1Y2D [†]	VFF2HW2YLX	VFF2HW2YGX
			250					
4"	274	841	50	VFF2JV1Y2C	VFF2JV1Y2E	VFF2JV1Y2D		
			175					
5"	428	1376	250				VFF2JW2YLX	VFF2JW2YGX
			50	VFF2KV1Y2C ^{†*}	VFF2KV1Y2E ^{†*}	VFF2KV1Y2D ^{†*}		
6"	567	1850	175					
			250				VFF2KW2YLX	VFF2KW2YGX
8"	1081	3316	50					
			175					
10"	1710	5430	250				VFF2LW2YLX	VFF2LW2YGX
			50					
12"	2563	8077	175					
			250				VFF2MW2YLX	VFF2MW2YGX
14"	3384	10538	50					
			150					
16"	4483	13966	250				VFF2NW2YLX	VFF2NW2YGX
			50					
18"	5736	17214	150					
			250				VFF2PW2YLX	VFF2PW2YGX
20"	7144	22339	50					
			150					
			250				VFF2RW2YLX	VFF2RW2YGX
							VFF2SW2YLX	VFF2SW2YGX
							VFF2TW2YLX	VFF2TW2YGX
							VFF2UW2YLX	VFF2UW2YGX

[†] Tandem mount
*Chilled water service only

Product Selection - Valves

Resilient Seat Butterfly Valves, 3-Way Electric Actuation

Common Features

- VFF3 – A-B-AB porting, full-cut (150-175 psid close-off) or under-cut disc (50 psid close-off)
- VFF6 – A-AB-B porting, full-cut (150-175 psid close-off) or under-cut disc (50 psid close-off)
- Honeywell direct coupled actuators up to 6" size
- Mixing or diverting control
- Standard right-angle cast-iron T-pipe
- A-port configured to closed position at factory
- Porting pattern field-configurable with valve linkage adjustment
- Resilient Seat Butterfly Valves come with factory-fitted actuators



3-Way Mixing / Diverting Valve Porting

3-Way Mixing / Diverting Center Common Port

Actuator Features		Non Fail Safe			
		Floating	2-Position	Modulating	
Actuator O.S. Number		MN6134A1003	Industrial Actuator	MN7234A2008	Industrial Actuator
Power Supply	Voltage	NEMA 2	NEMA 4X	NEMA 2	NEMA 4X
	Frequency	24 Vac	120 Vac	24 Vac	120 Vac
Actuator Torque	Power	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
	lb.-in.	9 / 18 ¹ VA	1.0 - 14.0 ALR	9 / 18 ¹ VA	1.0 - 14.0 ALR
Control	(0)2-10 Vdc	300 / 600 [†]	600 - 21,300	300 / 600 [†]	600 - 21,300
4-20 mA (external 500 ohm resistor)				•	•
				•	Built In
Floating		24 Vac			
		•	•		
Fail Safe Action		Stay in Place	Stay in Place	Stay in Place	Stay in Place
Normal Position		Configurable Open / Closed	Configurable Open / Closed	Configurable Open / Closed	Configurable Open / Closed
Aux Switch	Built in	2 x SPDT			
Add-On		SW2-US		SW2-US	
				2-10 Vdc	4-20mA / 2-10Vdc
Feedback	Built in				
Manual Override			•		•
Conduit Connection		•	•	•	•
Waterproof			•		•
Corrosion-resistant			•		•
Anti-condensate heater			•		•

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number			
2"	61	144	175	VFF3FW1Y2A	VFF3FW1YXA	VFF3FW1Y2B	VFF3FW1YXB
2-1/2"	107	282	175	VFF3GW1Y2A	VFF3GW1YXA	VFF3GW1Y2B	VFF3GW1YXB
3"	154	461	175	VFF3HW1Y2A	VFF3HW1YXA	VFF3HW1Y2B	VFF3HW1YXB
4"	274	841	50	VFF3JV1Y2A	VFF3JV1YXA	VFF3JV1Y2B	VFF3JV1YXB
			175	VFF3JW1Y2A [†]	VFF3JW1YXA	VFF3JW1Y2B [†]	VFF3JW1YXB
5"	428	1376	50	VFF3KV1Y2A [*]	VFF3KV1YXA	VFF3KV1Y2B [*]	VFF3KV1YXB
			175	VFF3KW1Y2A [†]	VFF3KW1YXA	VFF3KW1Y2B [†]	VFF3KW1YXB
6"	567	1850	50	VFF3LV1Y2A [†]	VFF3LV1YXA	VFF3LV1Y2B [†]	VFF3LV1YXB
			175		VFF3LW1YXA		VFF3LW1YXB
8"	1081	3316	50		VFF3MV1YXA		VFF3MV1YXB
			175		VFF3MW1YXA		VFF3MW1YXB
10"	1710	5430	50		VFF3NV1YXA		VFF3NV1YXB
			175		VFF3NW1YXA		VFF3NW1YXB
12"	2563	8077	50		VFF3PV1YXA		VFF3PV1YXB
			175		VFF3PW1YXA		VFF3PW1YXB
14"	3384	10538	50		VFF3RV1YXA		VFF3RV1YXB
			150		VFF3RW1Y4A		VFF3RW1Y4B
16"	4483	13966	50		VFF3SV1YXA		VFF3SV1YXB
			150		VFF3SW1Y4A		VFF3SW1Y4B
18"	5736	17214	50		VFF3TV1Y4A		VFF3TV1Y4B
			150		VFF3TW1Y4A		VFF3TW1Y4B
20"	7144	22339	50		VFF3UV1Y4A		VFF3UV1Y4B
			150		VFF3UW1Y4A		VFF3UW1Y4B

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number			
2"	61	144	175	VFF6FW1Y2A	VFF6FW1YXA	VFF6FW1Y2B	VFF6FW1YXB
2-1/2"	107	282	175	VFF6GW1Y2A	VFF6GW1YXA	VFF6GW1Y2B	VFF6GW1YXB
3"	154	461	175	VFF6HW1Y2A	VFF6HW1YXA	VFF6HW1Y2B	VFF6HW1YXB
4"	274	841	50	VFF6JV1Y2A	VFF6JV1YXA	VFF6JV1Y2B	VFF6JV1YXB
			175	VFF6JW1Y2A [†]	VFF6JW1YXA	VFF6JW1Y2B [†]	VFF6JW1YXB
5"	428	1376	50	VFF6KV1Y2A [*]	VFF6KV1YXA	VFF6KV1Y2B [*]	VFF6KV1YXB
			175	VFF6KW1Y2A [†]	VFF6KW1YXA	VFF6KW1Y2B [†]	VFF6KW1YXB
6"	567	1850	50	VFF6LV1Y2A [†]	VFF6LV1YXA	VFF6LV1Y2B [†]	VFF6LV1YXB
			175		VFF6LW1YXA		VFF6LW1YXB
8"	1081	3316	50		VFF6MV1YXA		VFF6MV1YXB
			175		VFF6MW1YXA		VFF6MW1YXB
10"	1710	5430	50		VFF6NV1YXA		VFF6NV1YXB
			175		VFF6NW1YXA		VFF6NW1YXB
12"	2563	8077	50		VFF6PV1YXA		VFF6PV1YXB
			175		VFF6PW1YXA		VFF6PW1YXB
14"	3384	10538	50		VFF6RV1YXA		VFF6RV1YXB
			150		VFF6RW1Y4A		VFF6RW1Y4B
16"	4483	13966	50		VFF6SV1YXA		VFF6SV1YXB
			150		VFF6SW1Y4A		VFF6SW1Y4B
18"	5736	17214	50		VFF6TV1Y4A		VFF6TV1Y4B
			150		VFF6TW1Y4A		VFF6TW1Y4B
20"	7144	22339	50		VFF6UV1Y4A		VFF6UV1Y4B
			150		VFF6UW1Y4A		VFF6UW1Y4B

[†] Tandem mount

^{*} Chilled water service only

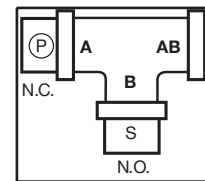
Resilient Seat Butterfly Valves, 3-Way Electric Actuation

Actuator Features		Fail Safe			Valve Only End-of-line Service
		2-Position	Modulating		
Actuator O.S. Number		MS8120A1007	MS4120A1001	MS7520A2007	
		NEMA 2	NEMA 2	NEMA 2	
Power Supply	Voltage	24 Vac	100-250 Vac	24 Vac	
	Frequency	60 Hz	60 Hz	50 / 60 Hz	
Actuator Torque	Power	40 / 80 [†] VA	60 / 120 [†] VA	16 / 32 [†] VA	
	lb.-in.	175 / 350 [†]	175 / 350 [†]	175 / 350 [†]	
Control	(0)2-10 Vdc			•	
	4-20 mA (external 500 ohm resistor)			•	
	Floating			24 Vac	
	2-Position	•	•	•	
Fail Safe Action		Configurable Open / Closed	Configurable Open / Closed	Configurable Open / Closed	
Normal Position		Configurable Open / Closed	Configurable Open / Closed	Configurable Open / Closed	
Aux Switch	Built in				
	Add-On	SW2-US	SW2-US	SW2-US	
Feedback	Built in			2-10 Vdc	
Manual Override					
Conduit Connection		•	•	•	
Waterproof					
Corrosion-resistant					
Anti-condensate heater					

3-Way Mixing / Diverting Valve Porting

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number		
2"	61	144	175	VFF3FW1Y2C	VFF3FW1Y2E	VFF3FW1Y2D
2-1/2"	107	282	175	VFF3GW1Y2C	VFF3GW1Y2E	VFF3GW1Y2D
3"	154	461	175	VFF3HW1Y2C [†]	VFF3HW1Y2E [†]	VFF3HW1Y2D [†]
4"	274	841	50	VFF3JV1Y2C	VFF3JV1Y2E	VFF3JV1Y2D
			175			
5"	428	1376	50	VFF3KV1Y2C ^{†*}	VFF3KV1Y2E ^{†*}	VFF3KV1Y2D ^{†*}
			175			
6"	567	1850	50			
			175			
8"	1081	3316	50			
			175			
10"	1710	5430	50			
			175			
12"	2563	8077	50			
			175			
14"	3384	10538	50			
			150			
16"	4483	13966	50			
			150			
18"	5736	17214	50			
			150			
20"	7144	22339	50			
			150			

Use a pair of
2-way valves
with standard
flanged Tee



VFF3 Default Configuration

Notes:

Viewed from above

P = Actuator and Primary Valve

S = Slave Valve

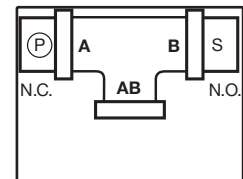
VFF3 valve action is mixing for fluid flow from left to right.

VFF3 valve action is diverting for fluid flow from right to left

3-Way Mixing / Diverting Center Common Port

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number		
2"	61	144	175	VFF6FW1Y2C	VFF6FW1Y2E	VFF6FW1Y2D
2-1/2"	107	282	175	VFF6GW1Y2C	VFF6GW1Y2E	VFF6GW1Y2D
3"	154	461	175	VFF6HW1Y2C [†]	VFF6HW1Y2E [†]	VFF6HW1Y2D [†]
4"	274	841	50	VFF6JV1Y2C	VFF6JV1Y2E	VFF6JV1Y2D
			175			
5"	428	1376	50	VFF6KV1Y2C ^{†*}	VFF6KV1Y2E ^{†*}	VFF6KV1Y2D ^{†*}
			175			
6"	567	1850	50			
			175			
8"	1081	3316	50			
			175			
10"	1710	5430	50			
			175			
12"	2563	8077	50			
			175			
14"	3384	10538	50			
			150			
16"	4483	13966	50			
			150			
18"	5736	17214	50			
			150			
20"	7144	22339	50			
			150			

Use a pair of
2-way valves
with standard
flanged Tee



VFF6 Default Configuration

Notes:

Viewed from above

P = Actuator and Primary Valve

S = Slave Valve

VFF6 may be piped for mixing control with water exiting port AB, or for diverting control with water entering port AB

[†] Tandem mount

^{*} Chilled water service only

Product Selection - Valves

Resilient Seat Butterfly Valves, 2-Way Pneumatic Actuation

Common Features

Honeywell offers a wide selection of pneumatic actuators:

- 20 psi spring return (up to 10" size)
- 80 psi spring return
- 80 psi double acting bi-directional

Configurable with accessories:

- Positioner
- Electro-pneumatic positioner (80 psi only)
- Electro-pneumatic solenoid (80 psi only)
- VFF1 configured normally open and VFF2 normally closed at factory for spring return actuators
- Body style: lugged butterfly valve with full-cut (150-175 psid close-off) or under-cut disc (50 psid close-off)
- Bi-directional actuator 175 psid close-off on all sizes with full cut disc (2-way only)
- Normally-open configuration (VFF1 spring return)
- Normally-closed configuration (VFF2 spring return)



2-Way Normally Open

2-Way Normally Closed

Actuator Features		Non Fail Safe (Bidirectional)				
Actuator		80 psi Actuator				
		Standard	E-P Solenoid	E-P Solenoid	Positioner	E-P Positioner
Power Supply	Voltage		24 Vac	120 VAc		24 Vac
	Frequency		50 / 60 Hz	50 / 60 Hz		50 / 60 Hz
	Power		6 W	6 W		
Control	Modulating Pneumatic	•			•	
	2-Position		•	•		
	4-20 mA					•
Auxiliary Switch	Add-On	VFF50-0400	VFF50-0400	VFF50-0400		
Manual Override		•				
Conduit Connection			•	•		•
Waterproof						•
Fail Safe						

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number				
2"	61	144	175	Use VFF2 models for Bi-directional pneumatic operation				
2-1/2"	107	282	175					
3"	154	461	175					
4"	274	841	50					
			175					
5"	428	1376	50					
			175					
6"	567	1850	50					
			175					
8"	1081	3316	50					
			175					
10"	1710	5430	50					
			175					
12"	2563	8077	50					
			175					
14"	3384	10538	50					
			150					
16"	4483	13966	50					
			150					
18"	5736	17214	50					
			150					
20"	7144	22339	50					
			150					
Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number				
2"	61	144	175	VFF2FW1YXR	VFF2FW1YCR	VFF2FW1YER	VFF2FW1YPR	VFF2FW1YDR
2-1/2"	107	282	175	VFF2GW1YXR	VFF2GW1YCR	VFF2GW1YER	VFF2GW1YPR	VFF2GW1YDR
3"	154	461	175	VFF2HW1YXR	VFF2HW1YCR	VFF2HW1YER	VFF2HW1YPR	VFF2HW1YDR
4"	274	841	50	VFF2JV1YXR	VFF2JV1YCR	VFF2JV1YER	VFF2JV1YPR	VFF2JV1YDR
			175	VFF2JW1YXR	VFF2JW1YCR	VFF2JW1YER	VFF2JW1YPR	VFF2JW1YDR
5"	428	1376	50	VFF2KV1YXR	VFF2KV1YCR	VFF2KV1YER	VFF2KV1YPR	VFF2KV1YDR
			175	VFF2KW1YXR	VFF2KW1YCR	VFF2KW1YER	VFF2KW1YPR	VFF2KW1YDR
6"	567	1850	50	VFF2LV1YXR	VFF2LV1YCR	VFF2LV1YER	VFF2LV1YPR	VFF2LV1YDR
			175	VFF2LW1YXR	VFF2LW1YCR	VFF2LW1YER	VFF2LW1YPR	VFF2LW1YDR
8"	1081	3316	50	VFF2MV1YXR	VFF2MV1YCR	VFF2MV1YER	VFF2MV1YPR	VFF2MV1YDR
			175	VFF2MW1YXR	VFF2MW1YCR	VFF2MW1YER	VFF2MW1YPR	VFF2MW1YDR
10"	1710	5430	50	VFF2NV1YXR	VFF2NV1YCR	VFF2NV1YER	VFF2NV1YPR	VFF2NV1YDR
			175	VFF2NW1YXR	VFF2NW1YCR	VFF2NW1YER	VFF2NW1YPR	VFF2NW1YDR
12"	2563	8077	50	VFF2PV1YXR	VFF2PV1YCR	VFF2PV1YER	VFF2PV1YPR	VFF2PV1YDR
			175	VFF2PW1YXR	VFF2PW1YCR	VFF2PW1YER	VFF2PW1YPR	VFF2PW1YDR
14"	3384	10538	50	VFF2RV1YXR	VFF2RV1YCR	VFF2RV1YER	VFF2RV1YPR	VFF2RV1YDR
			150	VFF2RW1YXR	VFF2RW1YCR	VFF2RW1YER	VFF2RW1YPR	VFF2RW1YDR
16"	4483	13966	50	VFF2SV1YXR	VFF2SV1YCR	VFF2SV1YER	VFF2SV1YPR	VFF2SV1YDR
			150	VFF2SW1YXR	VFF2SW1YCR	VFF2SW1YER	VFF2SW1YPR	VFF2SW1YDR
18"	5736	17214	50	VFF2TV1YXR	VFF2TV1YCR	VFF2TV1YER	VFF2TV1YPR	VFF2TV1YDR
			150	VFF2TW1YXR	VFF2TW1YCR	VFF2TW1YER	VFF2TW1YPR	VFF2TW1YDR
20"	7144	22339	50	VFF2UV1YXR	VFF2UV1YCR	VFF2UV1YER	VFF2UV1YPR	VFF2UV1YDR
			150	VFF2UW1YXR	VFF2UW1YCR	VFF2UW1YER	VFF2UW1YPR	VFF2UW1YDR

Product Selection - Valves

Resilient Seat Butterfly Valves, 2-Way Pneumatic Actuation

Actuator Features				Fail Safe							
Actuator				20 psi Actuator		80 psi Actuator					
				8-13 spring	Positioner	Standard	E-P Solenoid	E-P Solenoid	Positioner	E-P Positioner	
Power Supply	Voltage						24 Vac	120 Vac		24 Vac	
	Frequency						50 / 60 Hz	50 / 60 Hz		50 / 60 Hz	
	Power						6 W	6 W			
Control	Modulating Pneumatic			•	•	•			•		
	2-Position						•	•			
	4-20 mA									•	
Auxiliary Switch	Add-On					VFF50-0400	VFF50-0400	VFF50-0400			
Manual Override						•					
Conduit Connection							•	•		•	
Waterproof										•	
Fail Safe				•	•	•	•	•	•	•	

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number							
				VFF1FW1Y8P	VFF1FW1YPP	VFF1FW1YXS	VFF1FW1YCS	VFF1FW1YES	VFF1FW1YPS	VFF1FW1YDS	
2"	61	144	175	VFF1GW1Y8P	VFF1GW1YPP	VFF1GW1YXS	VFF1GW1YCS	VFF1GW1YES	VFF1GW1YPS	VFF1GW1YDS	
2-1/2"	107	282	175	VFF1HW1Y8P	VFF1HW1YPP	VFF1HW1YXS	VFF1HW1YCS	VFF1HW1YES	VFF1HW1YPS	VFF1HW1YDS	
3"	154	461	175	VFF1JV1Y8P	VFF1JV1YPP	VFF1JV1YXS	VFF1JV1YCS	VFF1JV1YES	VFF1JV1YPS	VFF1JV1YDS	
4"	274	841	50	VFF1JW1Y8P	VFF1JW1YPP	VFF1JW1YXS	VFF1JW1YCS	VFF1JW1YES	VFF1JW1YPS	VFF1JW1YDS	
			175	VFF1KV1Y8P	VFF1KV1YPP	VFF1KV1YXS	VFF1KV1YCS	VFF1KV1YES	VFF1KV1YPS	VFF1KV1YDS	
5"	428	1376	50	VFF1KW1Y8P	VFF1KW1YPP	VFF1KW1YXS	VFF1KW1YCS	VFF1KW1YES	VFF1KW1YPS	VFF1KW1YDS	
			175	VFF1LW1Y8P	VFF1LW1YPP	VFF1LW1YXS	VFF1LW1YCS	VFF1LW1YES	VFF1LW1YPS	VFF1LW1YDS	
6"	567	1850	50	N/A*	N/A*	VFF1LV1YXS	VFF1LV1YCS	VFF1LV1YES	VFF1LV1YPS	VFF1LV1YDS	
			175	VFF1MW1Y8P	VFF1MW1YPP	VFF1MW1YXS	VFF1MW1YCS	VFF1MW1YES	VFF1MW1YPS	VFF1MW1YDS	
8"	1081	3316	50	VFF1NV1Y8P†	VFF1NV1YPP†	VFF1NV1YXS	VFF1NV1YCS	VFF1NV1YES	VFF1NV1YPS	VFF1NV1YDS	
			175	VFF1PW1Y8P	VFF1PW1YPP	VFF1PW1YXS	VFF1PW1YCS	VFF1PW1YES	VFF1PW1YPS	VFF1PW1YDS	
10"	1710	5430	50	VFF1RV1Y8P	VFF1RV1YPP	VFF1RV1YXS	VFF1RV1YCS	VFF1RV1YES	VFF1RV1YPS	VFF1RV1YDS	
			175	VFF1SW1Y8P	VFF1SW1YPP	VFF1SW1YXS	VFF1SW1YCS	VFF1SW1YES	VFF1SW1YPS	VFF1SW1YDS	
12"	2563	8077	50	VFF1TW1Y8P	VFF1TW1YPP	VFF1TW1YXS	VFF1TW1YCS	VFF1TW1YES	VFF1TW1YPS	VFF1TW1YDS	
			175	VFF1UV1Y8P	VFF1UV1YPP	VFF1UV1YXS	VFF1UV1YCS	VFF1UV1YES	VFF1UV1YPS	VFF1UV1YDS	
14"	3384	10538	50	VFF1UW1Y8P	VFF1UW1YPP	VFF1UW1YXS	VFF1UW1YCS	VFF1UW1YES	VFF1UW1YPS	VFF1UW1YDS	
			150	VFF1VW1Y8P	VFF1VW1YPP	VFF1VW1YXS	VFF1VW1YCS	VFF1VW1YES	VFF1VW1YPS	VFF1VW1YDS	
16"	4483	13966	50	VFF1XW1Y8P	VFF1XW1YPP	VFF1XW1YXS	VFF1XW1YCS	VFF1XW1YES	VFF1XW1YPS	VFF1XW1YDS	
			150	VFF1YV1Y8P	VFF1YV1YPP	VFF1YV1YXS	VFF1YV1YCS	VFF1YV1YES	VFF1YV1YPS	VFF1YV1YDS	
18"	5736	17214	50	VFF1ZV1Y8P	VFF1ZV1YPP	VFF1ZV1YXS	VFF1ZV1YCS	VFF1ZV1YES	VFF1ZV1YPS	VFF1ZV1YDS	
			150	VFF1ZV1Y8P	VFF1ZV1YPP	VFF1ZV1YXS	VFF1ZV1YCS	VFF1ZV1YES	VFF1ZV1YPS	VFF1ZV1YDS	
20"	7144	22339	50	VFF1ZV1Y8P	VFF1ZV1YPP	VFF1ZV1YXS	VFF1ZV1YCS	VFF1ZV1YES	VFF1ZV1YPS	VFF1ZV1YDS	
			150	VFF1ZV1Y8P	VFF1ZV1YPP	VFF1ZV1YXS	VFF1ZV1YCS	VFF1ZV1YES	VFF1ZV1YPS	VFF1ZV1YDS	

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number							
				VFF2FW1Y8P	VFF2FW1YPP	VFF2FW1YXS	VFF2FW1YCS	VFF2FW1YES	VFF2FW1YPS	VFF2FW1YDS	
2"	61	144	175	VFF2GW1Y8P	VFF2GW1YPP	VFF2GW1YXS	VFF2GW1YCS	VFF2GW1YES	VFF2GW1YPS	VFF2GW1YDS	
2-1/2"	107	282	175	VFF2HW1Y8P	VFF2HW1YPP	VFF2HW1YXS	VFF2HW1YCS	VFF2HW1YES	VFF2HW1YPS	VFF2HW1YDS	
3"	154	461	175	VFF2JV1Y8P	VFF2JV1YPP	VFF2JV1YXS	VFF2JV1YCS	VFF2JV1YES	VFF2JV1YPS	VFF2JV1YDS	
4"	274	841	50	VFF2JW1Y8P	VFF2JW1YPP	VFF2JW1YXS	VFF2JW1YCS	VFF2JW1YES	VFF2JW1YPS	VFF2JW1YDS	
			175	VFF2KV1Y8P	VFF2KV1YPP	VFF2KV1YXS	VFF2KV1YCS	VFF2KV1YES	VFF2KV1YPS	VFF2KV1YDS	
5"	428	1376	50	VFF2KW1Y8P	VFF2KW1YPP	VFF2KW1YXS	VFF2KW1YCS	VFF2KW1YES	VFF2KW1YPS	VFF2KW1YDS	
			175	VFF2LW1Y8P	VFF2LW1YPP	VFF2LW1YXS	VFF2LW1YCS	VFF2LW1YES	VFF2LW1YPS	VFF2LW1YDS	
6"	567	1850	50	N/A*	N/A*	VFF2LV1YXS	VFF2LV1YCS	VFF2LV1YES	VFF2LV1YPS	VFF2LV1YDS	
			175	VFF2MW1Y8P	VFF2MW1YPP	VFF2MW1YXS	VFF2MW1YCS	VFF2MW1YES	VFF2MW1YPS	VFF2MW1YDS	
8"	1081	3316	50	VFF2NV1Y8P†	VFF2NV1YPP†	VFF2NV1YXS	VFF2NV1YCS	VFF2NV1YES	VFF2NV1YPS	VFF2NV1YDS	
			175	VFF2PW1Y8P	VFF2PW1YPP	VFF2PW1YXS	VFF2PW1YCS	VFF2PW1YES	VFF2PW1YPS	VFF2PW1YDS	
10"	1710	5430	50	VFF2RV1Y8P	VFF2RV1YPP	VFF2RV1YXS	VFF2RV1YCS	VFF2RV1YES	VFF2RV1YPS	VFF2RV1YDS	
			175	VFF2SW1Y8P	VFF2SW1YPP	VFF2SW1YXS	VFF2SW1YCS	VFF2SW1YES	VFF2SW1YPS	VFF2SW1YDS	
12"	2563	8077	50	VFF2TV1Y8P	VFF2TV1YPP	VFF2TV1YXS	VFF2TV1YCS	VFF2TV1YES	VFF2TV1YPS	VFF2TV1YDS	
			175	VFF2UW1Y8P	VFF2UW1YPP	VFF2UW1YXS	VFF2UW1YCS	VFF2UW1YES	VFF2UW1YPS	VFF2UW1YDS	
14"	3384	10538	50	VFF2VW1Y8P	VFF2VW1YPP	VFF2VW1YXS	VFF2VW1YCS	VFF2VW1YES	VFF2VW1YPS	VFF2VW1YDS	
			150	VFF2XW1Y8P	VFF2XW1YPP	VFF2XW1YXS	VFF2XW1YCS	VFF2XW1YES	VFF2XW1YPS	VFF2XW1YDS	
16"	4483	13966	50	VFF2YV1Y8P	VFF2YV1YPP	VFF2YV1YXS	VFF2YV1YCS	VFF2YV1YES	VFF2YV1YPS	VFF2YV1YDS	
			150	VFF2ZV1Y8P	VFF2ZV1YPP	VFF2ZV1YXS	VFF2ZV1YCS	VFF2ZV1YES	VFF2ZV1YPS	VFF2ZV1YDS	
18"	5736	17214	50	VFF2ZV1Y8P	VFF2ZV1YPP	VFF2ZV1YXS	VFF2ZV1YCS	VFF2ZV1YES	VFF2ZV1YPS	VFF2ZV1YDS	
			150	VFF2ZV1Y8P	VFF2ZV1YPP	VFF2ZV1YXS	VFF2ZV1YCS	VFF2ZV1YES	VFF2ZV1YPS	VFF2ZV1YDS	
20"	7144	22339	50	VFF2ZV1Y8P	VFF2ZV1YPP	VFF2ZV1YXS	VFF2ZV1YCS	VFF2ZV1YES	VFF2ZV1YPS	VFF2ZV1YDS	
			150	VFF2ZV1Y8P	VFF2ZV1YPP	VFF2ZV1YXS	VFF2ZV1YCS	VFF2ZV1YES	VFF2ZV1YPS	VFF2ZV1YDS	

2-Way Normally Open

2-Way Normally Closed

† Tandem mount
* Use full cut, 175psid close-off valves - No under-cut, 50psid close-off valve available

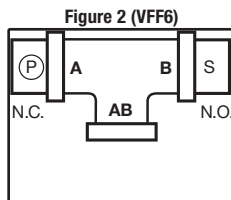
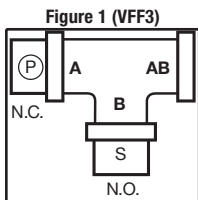
Product Selection - Valves

Resilient Seat Butterfly Valves, 3-Way Pneumatic Actuation

Common Features

Honeywell offers a wide selection of pneumatic actuators:

- FF3 – A-B-AB porting, full-cut (150-175 psid close-off) or under-cut disc (50 psid close-off) (Figure 1 - from 63-2661-03 fig. 12)
- VFF6 – A-AB-B porting, full-cut (150-175 psid close-off) or under-cut disc (50 psid close-off) (Figure 2 - from 63-2661-03 fig. 12)
- 20 psi spring return (up to 8" size)
- 80 psi spring return
- 80 psi double acting bi-directional
- Mixing or diverting control
- Standard right-angle cast-iron T-pipe
- A-port configured to closed position at factory
- Porting pattern field-configurable with valve linkage adjustment



Notes:

Viewed from above

P = Actuator and Primary Valve

S = Slave Valve

VFF3 valve action is mixing for fluid flow from left to right.

VFF3 valve action is diverting for fluid flow from right to left

VFF6 may be piped for mixing control with water exiting port AB, or for diverting control with water entering port AB

Actuator Features		Non Fail Safe (Bidirectional)				
Actuator		80 psi Actuator				
		Standard	E-P Solenoid	E-P Solenoid	Positioner	E-P Positioner
Power Supply	Voltage		24 Vac	120 Vac		24 Vac
	Frequency		50 / 60 Hz	50 / 60 Hz		50 / 60 Hz
Control	Power		6 W	6 W		
	Modulating Pneumatic	•			•	
	2-Position		•	•		
	4-20 mA					•
Auxiliary Switch	Add-On	VFF50-0400	VFF50-0400	VFF50-0400		
Manual Override		•				
Conduit Connection			•	•		•
Waterproof						•
Fail Safe						

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number				
2"	61	144	175	VFF3FW1YXR	VFF3FW1YCR	VFF3FW1YER	VFF3FW1YPR	VFF3FW1YDR
2-1/2"	107	282	175	VFF3GW1YXR	VFF3GW1YCR	VFF3GW1YER	VFF3GW1YPR	VFF3GW1YDR
3"	154	461	175	VFF3HW1YXR	VFF3HW1YCR	VFF3HW1YER	VFF3HW1YPR	VFF3HW1YDR
4"	274	841	50	VFF3JV1YXR	VFF3JV1YCR	VFF3JV1YER	VFF3JV1YPR	VFF3JV1YDR
			175	VFF3JW1YXR	VFF3JW1YCR	VFF3JW1YER	VFF3JW1YPR	VFF3JW1YDR
5"	428	1376	50	VFF3KV1YXR	VFF3KV1YCR	VFF3KV1YER	VFF3KV1YPR	VFF3KV1YDR
			175	VFF3KW1YXR	VFF3KW1YCR	VFF3KW1YER	VFF3KW1YPR	VFF3KW1YDR
6"	567	1850	50	VFF3LV1YXR	VFF3LV1YCR	VFF3LV1YER	VFF3LV1YPR	VFF3LV1YDR
			175	VFF3LW1YXR	VFF3LW1YCR	VFF3LW1YER	VFF3LW1YPR	VFF3LW1YDR
8"	1081	3316	50	VFF3MV1YXR	VFF3MV1YCR	VFF3MV1YER	VFF3MV1YPR	VFF3MV1YDR
			175	VFF3MW1YXR	VFF3MW1YCR	VFF3MW1YER	VFF3MW1YPR	VFF3MW1YDR
10"	1710	5430	50	VFF3NV1YXR	VFF3NV1YCR	VFF3NV1YER	VFF3NV1YPR	VFF3NV1YDR
			175	VFF3NW1YXR	VFF3NW1YCR	VFF3NW1YER	VFF3NW1YPR	VFF3NW1YDR
12"	2563	8077	50	VFF3PV1YXR	VFF3PV1YCR	VFF3PV1YER	VFF3PV1YPR	VFF3PV1YDR
			175	VFF3PW1YXR	VFF3PW1YCR	VFF3PW1YER	VFF3PW1YPR	VFF3PW1YDR
14"	3384	10538	50	VFF3RV1YXR	VFF3RV1YCR	VFF3RV1YER	VFF3RV1YPR	VFF3RV1YDR
			150	VFF3RW1YXR	VFF3RW1YCR	VFF3RW1YER	VFF3RW1YPR	VFF3RW1YDR
16"	4483	13966	50	VFF3SV1YXR	VFF3SV1YCR	VFF3SV1YER	VFF3SV1YPR	VFF3SV1YDR
			150	VFF3SW1YXR	VFF3SW1YCR	VFF3SW1YER	VFF3SW1YPR	VFF3SW1YDR
18"	5736	17214	50	VFF3TV1YXR	VFF3TV1YCR	VFF3TV1YER	VFF3TV1YPR	VFF3TV1YDR
			150	VFF3TW1YXR	VFF3TW1YCR	VFF3TW1YER	VFF3TW1YPR	VFF3TW1YDR
20"	7144	22339	50	VFF3UV1YXR	VFF3UV1YCR	VFF3UV1YER	VFF3UV1YPR	VFF3UV1YDR
			150	VFF3UW1YXR	VFF3UW1YCR	VFF3UW1YER	VFF3UW1YPR	VFF3UW1YDR

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number				
2"	61	144	175	VFF6FW1YXR	VFF6FW1YCR	VFF6FW1YER	VFF6FW1YPR	VFF6FW1YDR
2-1/2"	107	282	175	VFF6GW1YXR	VFF6GW1YCR	VFF6GW1YER	VFF6GW1YPR	VFF6GW1YDR
3"	154	461	175	VFF6HW1YXR	VFF6HW1YCR	VFF6HW1YER	VFF6HW1YPR	VFF6HW1YDR
4"	274	841	50	VFF6JV1YXR	VFF6JV1YCR	VFF6JV1YER	VFF6JV1YPR	VFF6JV1YDR
			175	VFF6JW1YXR	VFF6JW1YCR	VFF6JW1YER	VFF6JW1YPR	VFF6JW1YDR
5"	428	1376	50	VFF6KV1YXR	VFF6KV1YCR	VFF6KV1YER	VFF6KV1YPR	VFF6KV1YDR
			175	VFF6KW1YXR	VFF6KW1YCR	VFF6KW1YER	VFF6KW1YPR	VFF6KW1YDR
6"	567	1850	50	VFF6LV1YXR	VFF6LV1YCR	VFF6LV1YER	VFF6LV1YPR	VFF6LV1YDR
			175	VFF6LW1YXR	VFF6LW1YCR	VFF6LW1YER	VFF6LW1YPR	VFF6LW1YDR
8"	1081	3316	50	VFF6MV1YXR	VFF6MV1YCR	VFF6MV1YER	VFF6MV1YPR	VFF6MV1YDR
			175	VFF6MW1YXR	VFF6MW1YCR	VFF6MW1YER	VFF6MW1YPR	VFF6MW1YDR
10"	1710	5430	50	VFF6NV1YXR	VFF6NV1YCR	VFF6NV1YER	VFF6NV1YPR	VFF6NV1YDR
			175	VFF6NW1YXR	VFF6NW1YCR	VFF6NW1YER	VFF6NW1YPR	VFF6NW1YDR
12"	2563	8077	50	VFF6PV1YXR	VFF6PV1YCR	VFF6PV1YER	VFF6PV1YPR	VFF6PV1YDR
			175	VFF6PW1YXR	VFF6PW1YCR	VFF6PW1YER	VFF6PW1YPR	VFF6PW1YDR
14"	3384	10538	50	VFF6RV1YXR	VFF6RV1YCR	VFF6RV1YER	VFF6RV1YPR	VFF6RV1YDR
			150	VFF6RW1YXR	VFF6RW1YCR	VFF6RW1YER	VFF6RW1YPR	VFF6RW1YDR
16"	4483	13966	50	VFF6SV1YXR	VFF6SV1YCR	VFF6SV1YER	VFF6SV1YPR	VFF6SV1YDR
			150	VFF6SW1YXR	VFF6SW1YCR	VFF6SW1YER	VFF6SW1YPR	VFF6SW1YDR
18"	5736	17214	50	VFF6TV1YXR	VFF6TV1YCR	VFF6TV1YER	VFF6TV1YPR	VFF6TV1YDR
			150	VFF6TW1YXR	VFF6TW1YCR	VFF6TW1YER	VFF6TW1YPR	VFF6TW1YDR
20"	7144	22339	50	VFF6UV1YXR	VFF6UV1YCR	VFF6UV1YER	VFF6UV1YPR	VFF6UV1YDR
			150	VFF6UW1YXR	VFF6UW1YCR	VFF6UW1YER	VFF6UW1YPR	VFF6UW1YDR

3-Way Mixing / Diverting Valve Porting

3-Way Mixing / Diverting Center Common Port

Product Selection - Valves

Resilient Seat Butterfly Valves, 3-Way Pneumatic Actuation

Actuator Features				Fail Safe							
Actuator				20 psi Actuator		80 psi Actuator					
Power Supply				8-13 spring	Positioner	Standard	E-P Solenoid	E-P Solenoid	Positioner	E-P Positioner	
Voltage							24 Vac	120 Vac			24 Vac
Frequency							50 / 60 Hz	50 / 60 Hz			50 / 60 Hz
Power							6 W	6 W			
Control											
Modulating Pneumatic				•	•	•			•		
2-Position							•	•			•
4-20 mA											•
Auxiliary Switch						VFF50-0400	VFF50-0400	VFF50-0400			
Manual Override						•					
Conduit Connection							•	•			•
Waterproof											•
Fail Safe				•	•	•	•	•	•	•	•

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number							
2"	61	144	175	VFF3FW1Y8P	VFF3FW1YPP	VFF3FW1YXS	VFF3FW1YCS		VFF3FW1YPS	VFF3FW1YDS	
2-1/2"	107	282	175	VFF3GW1Y8P	VFF3GW1YPP	VFF3GW1YXS	VFF3GW1YCS	VFF3GW1YES	VFF3GW1YPS	VFF3GW1YDS	
3"	154	461	175	VFF3HW1Y8P	VFF3HW1YPP	VFF3HW1YXS	VFF3HW1YCS	VFF3HW1YES	VFF3HW1YPS	VFF3HW1YDS	
4"	274	841	50	VFF3JV1Y8P	VFF3JV1YPP	VFF3JV1YXS	VFF3JV1YCS	VFF3JV1YES	VFF3JV1YPS	VFF3JV1YDS	
			175	VFF3JW1Y8P	VFF3JW1YPP	VFF3JW1YXS	VFF3JW1YCS	VFF3JW1YES	VFF3JW1YPS	VFF3JW1YDS	
5"	428	1376	50	N/A*	N/A*	VFF3KV1YXS	VFF3KV1YCS	VFF3KV1YES	VFF3KV1YPS	VFF3KV1YDS	
			175	VFF3KW1Y8P	VFF3KW1YPP	VFF3KW1YXS	VFF3KW1YCS	VFF3KW1YES	VFF3KW1YPS	VFF3KW1YDS	
6"	567	1850	50	VFF3LV1Y8P	VFF3LV1YPP	VFF3LV1YXS	VFF3LV1YCS	VFF3LV1YES	VFF3LV1YPS	VFF3LV1YDS	
			175	VFF3LW1Y8P†	VFF3LW1YPP†	VFF3LW1YXS	VFF3LW1YCS	VFF3LW1YES	VFF3LW1YPS	VFF3LW1YDS	
8"	1081	3316	50	VFF3MV1Y8P†	VFF3MV1YPP†	VFF3MV1YXS	VFF3MV1YCS	VFF3MV1YES	VFF3MV1YPS	VFF3MV1YDS	
			175			VFF3MW1YXS	VFF3MW1YCS	VFF3MW1YES	VFF3MW1YPS	VFF3MW1YDS	
10"	1710	5430	50			VFF3NV1YXS	VFF3NV1YCS	VFF3NV1YES	VFF3NV1YPS	VFF3NV1YDS	
			175			VFF3NW1YXS	VFF3NW1YCS	VFF3NW1YES	VFF3NW1YPS	VFF3NW1YDS	
12"	2563	8077	50			VFF3PV1YXS	VFF3PV1YCS	VFF3PV1YES	VFF3PV1YPS	VFF3PV1YDS	
			175			VFF3PW1YXS	VFF3PW1YCS	VFF3PW1YES	VFF3PW1YPS	VFF3PW1YDS	
14"	3384	10538	50			VFF3RV1YXS	VFF3RV1YCS	VFF3RV1YES	VFF3RV1YPS	VFF3RV1YDS	
			150			VFF3RW1YXS	VFF3RW1YCS	VFF3RW1YES	VFF3RW1YPS	VFF3RW1YDS	
16"	4483	13966	50			VFF3SV1YXS	VFF3SV1YCS	VFF3SV1YES	VFF3SV1YPS	VFF3SV1YDS	
			150								
18"	5736	17214	50			VFF3TV1YXS	VFF3TV1YCS	VFF3TV1YES	VFF3TV1YPS	VFF3TV1YDS	
			150								
20"	7144	22339	50			VFF3UV1YXS	VFF3UV1YCS	VFF3UV1YES	VFF3UV1YPS	VFF3UV1YDS	
			150								

Valve Size (inches)	Cv @ 60°	Cv @ 90°	Close-off (psid)	Valve O.S. Number							
2"	61	144	175			VFF6FW1YXS	VFF6FW1YCS		VFF6FW1YPS	VFF6FW1YDS	
2-1/2"	107	282	175			VFF6GW1YXS	VFF6GW1YCS	VFF6GW1YES	VFF6GW1YPS	VFF6GW1YDS	
3"	154	461	175			VFF6HW1YXS	VFF6HW1YCS	VFF6HW1YES	VFF6HW1YPS	VFF6HW1YDS	
4"	274	841	50			VFF6JV1YXS	VFF6JV1YCS	VFF6JV1YES	VFF6JV1YPS	VFF6JV1YDS	
			175			VFF6JW1YXS	VFF6JW1YCS	VFF6JW1YES	VFF6JW1YPS	VFF6JW1YDS	
5"	428	1376	50			VFF6KV1YXS	VFF6KV1YCS	VFF6KV1YES	VFF6KV1YPS	VFF6KV1YDS	
			175			VFF6KW1YXS	VFF6KW1YCS	VFF6KW1YES	VFF6KW1YPS	VFF6KW1YDS	
6"	567	1850	50			VFF6LV1YXS	VFF6LV1YCS	VFF6LV1YES	VFF6LV1YPS	VFF6LV1YDS	
			175			VFF6LW1YXS	VFF6LW1YCS	VFF6LW1YES	VFF6LW1YPS	VFF6LW1YDS	
8"	1081	3316	50			VFF6MV1YXS	VFF6MV1YCS	VFF6MV1YES	VFF6MV1YPS	VFF6MV1YDS	
			175			VFF6MW1YXS	VFF6MW1YCS	VFF6MW1YES	VFF6MW1YPS	VFF6MW1YDS	
10"	1710	5430	50			VFF6NV1YXS	VFF6NV1YCS	VFF6NV1YES	VFF6NV1YPS	VFF6NV1YDS	
			175			VFF6NW1YXS	VFF6NW1YCS	VFF6NW1YES	VFF6NW1YPS	VFF6NW1YDS	
12"	2563	8077	50			VFF6PV1YXS	VFF6PV1YCS	VFF6PV1YES	VFF6PV1YPS	VFF6PV1YDS	
			175			VFF6PW1YXS	VFF6PW1YCS	VFF6PW1YES	VFF6PW1YPS	VFF6PW1YDS	
14"	3384	10538	50			VFF6RV1YXS	VFF6RV1YCS	VFF6RV1YES	VFF6RV1YPS	VFF6RV1YDS	
			150			VFF6RW1YXS	VFF6RW1YCS	VFF6RW1YES	VFF6RW1YPS	VFF6RW1YDS	
16"	4483	13966	50			VFF6SV1YXS	VFF6SV1YCS	VFF6SV1YES	VFF6SV1YPS	VFF6SV1YDS	
			150								
18"	5736	17214	50			VFF6TV1YXS	VFF6TV1YCS	VFF6TV1YES	VFF6TV1YPS	VFF6TV1YDS	
			150								
20"	7144	22339	50			VFF6UV1YXS	VFF6UV1YCS	VFF6UV1YES	VFF6UV1YPS	VFF6UV1YDS	
			150								

† Tandem mount

* Use full cut, 175psid close-off valves - No under-cut, 50psid close-off valve available

Submittal Data - Valves

Pneumatic Valve Actuators



Pneumatic actuators provide proportional control of steam or hot or cold liquids in HVAC systems by operating V5011, V5013 and VGF valve assemblies. Replacement devices are available for older Honeywell actuators.

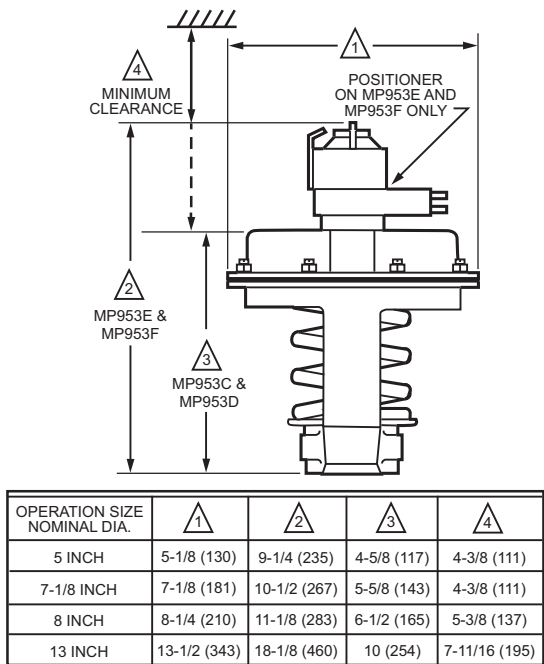
FEATURES

- Rolling diaphragm for long life and low hysteresis.
- Easily attached to valve.
- Can be installed after piping valve.
- Slide lock feature permits simple engagement to valve stem.
- Direct- or reverse-action control.
- Does not include positive positioner.

SPECIFICATIONS

Actuator Type	Valve
Fail Safe Mode	Spring Return
Air Connections	Dual barbed fitting for 5/32 in. O.D. and 1/4 in. O.D. plastic tubing
Temperature Range	0 F to 140 F (-18 C to +60 C)
Maximum Operating Pressure	(172 kPa) 25 psi
Humidity Range	5 to 95% RH

DIMENSIONS DIAGRAM



M13903



Pneumatic actuators provide proportional control of steam or hot or cold liquids in HVAC systems by operating V5011, V5013 and VGF valve assemblies. Replacement devices are available for older Honeywell actuators.

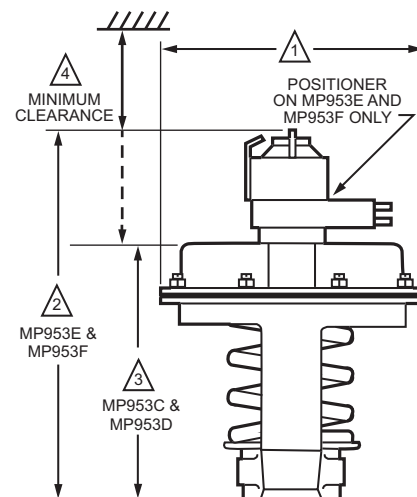
FEATURES

- Rolling diaphragm for long life and low hysteresis.
- Easily attached to valve.
- Can be installed after piping valve.
- Slide lock feature permits simple engagement to valve stem.
- Direct- or reverse-action control.
- Integral positive positioner relay provides positive positioning under varying load conditions.

SPECIFICATIONS

Actuator Type	Valve
Action	Direct Acting
Fail Safe Mode	Spring Return
Air Connections	Pilot: Barbed fitting for 5/32 in. O.D. plastic tubing Main: Barbed fitting for 1/4 in. O.D. plastic tubing
Temperature Range	0 F to 140 F (-18 C to +60 C)
Maximum Operating Pressure	(172 kPa) 25 psi
Humidity Range	5 to 95% RH

DIMENSIONS DIAGRAM



OPERATION SIZE NOMINAL DIA.	1	2	3	4
5 INCH	5-1/8 (130)	9-1/4 (235)	4-5/8 (117)	4-3/8 (111)
7-1/8 INCH	7-1/8 (181)	10-1/2 (267)	5-5/8 (143)	4-3/8 (111)
8 INCH	8-1/4 (210)	11-1/8 (283)	6-1/2 (165)	5-3/8 (137)
13 INCH	13-1/2 (343)	18-1/8 (460)	10 (254)	7-11/16 (195)

M13903

Submittal Data - Valves

Unitary Valve Actuators M6410; M7410



Cartridge Globe Valve Actuators are small electric actuators for individual room control that provide floating or modulating control of V5852, V5862 two-way or V5853, V5863 three-way valves.

FEATURES

- Suitable for Excel/IRC system or other controllers providing specified signals.
- Magnetic coupling for torque limitation independent of voltage supply and self-adjustment of the close-off port.
- No mounting tools required.
- Small size allows installation in limited space of fan coil units, induction units, and small reheaters or recoolers.
- Visual position indication (red pin).

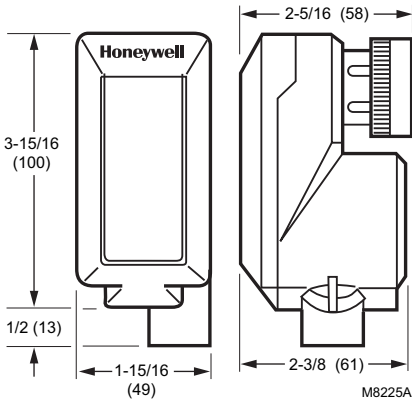
SPECIFICATIONS

Actuator Type	Valve
Fail Safe Mode	Stays in place
Cable Entry	Threaded conduit connector
Electrical Protection	Class I Insulation (24 Vac)
Electrical Connections	Plenum-rated cable
Ingress Protection Rating	IP42
Feedback	No
Frequency	50 Hz; 60 Hz
Manual operation	None (use valve dust cap)
Mounting	Threads onto V58XX valve bonnet
Number of Internal Auxiliary Switch	0
Stroke	1/4 in. (6 mm)
Supply Voltage	24 Vac +10/-30%
Timing; Nominal Driving @ 60 Hz (sec)	125 sec
Materials	Low Maintenance Plastic Housing
Operating Humidity Range (% RH)	5 to 95% RH
Medium Temperature	266 F Maximum (130 C Maximum)
Ambient Temperature Range	32 F to 122 F (0 C to 50 C)
Storage Temperature Range	-40 F to +158 F (-40 C to +70 C)
Weight	0.3125 lb (0.15 kg)
Includes	1/2 in. conduit hub

APPROVALS

Underwriters Laboratories, Inc..... UL94-5V

DIMENSIONS DIAGRAM



Unitary Valve Actuators M6435; M7435



Cartridge Globe Valve Spring Return Actuators are small electric actuators for individual room control that provide floating or modulating control of V5852, V5862 two-way or V5853, V5863 three-way valves.

FEATURES

- Stem actuator retracts up on power failure. Fail safe mode depends on valve seat rest position.
- Suitable for Excel/IRC system or other controllers providing specified signals.
- Magnetic coupling for torque limitation independent of voltage supply and self-adjustment of the close-off port.
- No mounting tools required.
- Compact size allows installation in limited space of fan coil units, induction units, and small reheaters or coolers.
- Visual position indication (red disk).

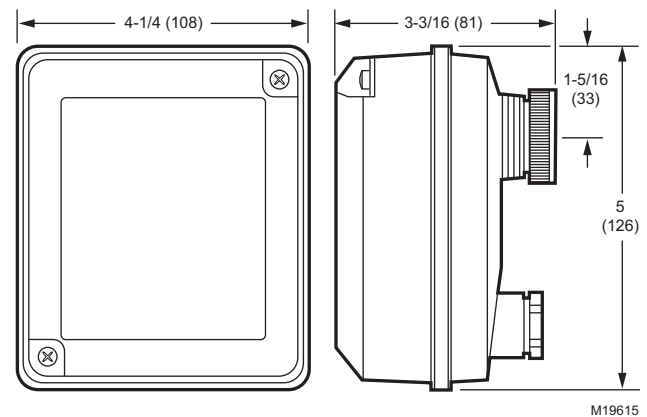
SPECIFICATIONS

Actuator Type	Valve
Fail Safe Mode	Spring Return, operator retracts up (Normally open for 1/2 in. and 3/4 in. V5852 and V5862. Normally closed for all other V58XX valves.)
Spring Return Direction	Stem up
Cable Entry	Threaded conduit connector
Electrical Protection	Class I Insulation (24 Vac)
Electrical Connections	Screw terminals
Ingress Protection Rating	IP54
Feedback	No
Frequency	50 Hz; 60 Hz
Manual operation	None (use valve dust cap)
Mounting	Threads onto V58XX valve bonnet
Number of Internal Auxiliary Switch	0
Stroke	1/4 in. (6 mm)
Supply Voltage	24 Vac +20%, -15%
Timing; Nominal Driving @ 60 Hz (sec)	50 sec
Spring Return Timing (Nominal (sec))	10 sec
Materials	Low Maintenance Plastic Housing
Operating Humidity Range (% RH)	5 to 95% RH
Medium Temperature	266 F Maximum (130 C Maximum)
Ambient Temperature Range	32 F to 122 F (0 C to 50 C)
Storage Temperature Range	-40 F to +158 F (-40 C to +70 C)
Weight	1.1 lb (0.5 kg)
Includes	1/2 in. conduit hub

APPROVALS

Underwriters Laboratories, Inc.UL94-5V

DIMENSIONS DIAGRAM



Submittal Data - Valves

Direct Coupled Valve Actuators, MVN



MVN 3Nm (27 lb-in.) Control Valve Actuator is used with the VBN2 2-way and the VBN3 3-way Control Ball Valves to control hot and chilled water with glycol solutions up to 50% in heating, ventilating and air conditioning (HVAC) systems to provide two position or modulating functions.

FEATURES

- Non-spring Return
- Floating and modulating
- Space saving, click-on installation – no tool required
- Extendable position indicator for easy commissioning
- Available with or without cable
- Compatible with control ball valves from 1/2 to 1-1/4 inches.
- Actuator can be mounted on the valve in any of four positions.

SPECIFICATIONS

Actuator TypeValve
Rotational Stroke.....90° ±3°
Fail Safe Mode.....Non-spring return, Fail in place
Torque27 lb-in. (3 Nm)
External Auxiliary Switches Available..No
Supply Voltage24 Vac +20%, -15%, 24 Vdc
Power Consumption.....5 VA- Modulating; 1.5 VA - Floating;
6 VA - Fast Acting SPDT
Environmental Rating.....NEMA2
Frequency50 Hz; 60 Hz
MountingClick-on installation – no tool required
Noise Rating at 1m (Maximum)35 dB(A) max at 1 m [50 dB (A) for MVN643]
Materials.....Plenum rated plastic housing
Operating Humidity Range (% RH).....5 to 95% RH, noncondensing
Ambient Temperature Range-4 °F to 131 °F (-20 °C to 55 °C)
Storage Temperature Range.....-40 °F to 176 °F (-40 °C to 80 °C)
Dimensions.....See page 171
Timing90 sec. for MVN613 and MVN713;
30 sec. for MVN643
Electrical ConnectionsField wiring 18 to 20 AWG to screw terminals, located under the removable access cover.
Humidity Ratings5% to 95% RH noncondensing
Design Life (at Rated Voltage)60,000 cycles;
1 cycle = 0°...90°...0°
Cable Specification.....18 AWG, Plenum Rated, 300 V, 10 A, 3 ft. length from end of access cover.
Environmental Protection RatingsIP40
ApprovalsUL/cUL; UL60730

DIMENSIONS DIAGRAM

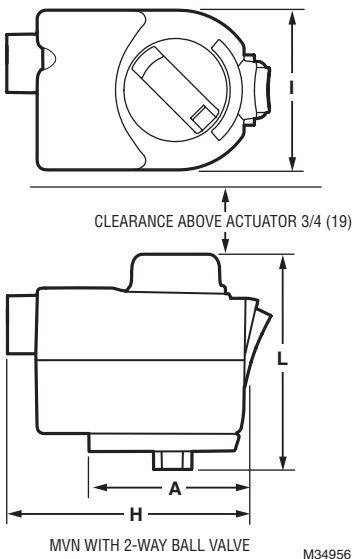


Table 1. Actuators and Accessories

Actuator	Description	Accessory
MVN613A0000	Floating control ball valve actuator	C1- 1 meter cable
MVN613L0000	Floating control ball valve actuator	
MVN643A0000	Fast acting SPDT control ball valve actuator	
MVN643L0000	Fast acting SPDT control ball valve actuator	
MVN713A0000	Modulating control ball valve actuator	
MVN713L0000	Modulating control ball valve actuator	

To order actuator with accessories order actuator part number + accessory. For example: MVN613A0000 + C1

Direct Coupled Valve Actuators, ML6420; ML7420



Direct Coupled Globe Valve Actuators provide floating or modulating control of chilled water, hot water or steam, and mount directly on VGF series, V5011 and V5013 globe valves from 1/2 to 3 inches.

FEATURES

- Easy and quick installation on valves with 1 3/8 in. bonnet and 3/4 in. stroke.
- No separate linkage required.
- Conduit connector standard.
- No adjustments required on linkage.
- Accurate valve positioning.
- Low power consumption.
- High close-off ratings.
- Force limiting end switches.
- Manual operator.
- Synchronous motor.
- Maintenance free.
- ML7420 has an internal selector plug that can be used to reverse the direction of action.

SPECIFICATIONS

Actuator Type	Valve
Fail Safe Mode	Stays in place
Cable Entry	Conduit connector and one knockout on actuator case
Electrical Protection	Class I Insulation (24 Vac)
Electrical Connections	Screw terminals
Ingress Protection Rating	IP54
Frequency	50 Hz; 60 Hz
Manual operation	Knob
Mounting	Directly on V5011/V5013 Globe Valves and VGF Flanged Globe Valves (3/4 in. or 20mm stroke)
Number of Internal Auxiliary Switch	0
Stroke	3/4 in. (20 mm)
Supply Voltage	24 Vac $\pm$ 15%
Materials	ABS-FR Plastic, aluminum yoke
Operating Humidity Range (% RH)	5 to 95% RH
Medium Temperature	300 F Maximum (150 C Maximum)
Ambient Temperature Range	14 F to 122 F (-10 C to +50 C)
Storage Temperature Range	-40 F to +158 F (-40 C to +70 C)
Weight	2.9 lb (1.3 kg)
Includes	1/2 in. conduit hub; 1/2 in. flexible conduit adapter

APPROVALS

Canadian Standards Association	Certified
CE	Listed
Underwriters Laboratories, Inc.	UL94-5V

ACCESSORIES

312495—Large stem button provides anti-spin for globe valves up to 3 in. (1/4-28UNF stem) with ML6420, ML7420, ML6421A, ML7421A, ML6425, and ML7425 actuators. Not required with ML6984/7984 actuators or Q5024 linkage; not compatible with Q5020 linkage.

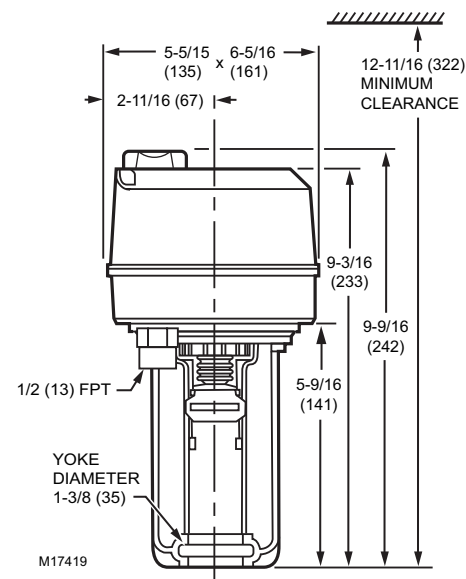
43196000-001—High Temperature Kit for actuators with 3/4 inch (20 mm) stroke, stem button attachment

43191679-111—Potentiometer, 10k ohm, for ML6425, ML7425

43191679-112—Potentiometer, 220 ohm for ML6425, ML7425

43191680-105—Dual Auxiliary Switch for CREVAL actuators

DIMENSIONS DIAGRAM



Submittal Data - Valves

Direct Coupled Valve Actuators, ML6421; ML7421



Direct Coupled Globe Valve Actuators provide floating or modulating control of chilled water, hot water or steam, and mount directly on VGF series, V5011 and V5013 valves. These Non-Spring Return High Force Actuators will operate 1-1/2 to 6 inch valves.

FEATURES

- Easy and quick installation on valves with 1 3/8 in. bonnet and 3/4 in. stroke, or with 1 7/8 in. bonnet and 1 1/2 in. stroke.
- High force for VGF Pressure-balanced valves.
- No separate linkage required.
- Conduit connector standard.
- No adjustments required on linkage.
- Accurate valve positioning.
- Low power consumption.
- High close-off ratings.
- Force limiting end switches.
- Manual operator.
- Synchronous motor.
- Maintenance free.

SPECIFICATIONS

Actuator Type	Valve
Fail Safe Mode.....	Stays in place
Cable Entry	Two knockout holes for 1/2 in. conduit standard on actuator case
Electrical Protection.....	Class I Insulation (24 Vac)
Electrical Connections.....	Screw terminals
Ingress Protection Rating	IP54
Frequency	50 Hz; 60 Hz
Manual operation.....	Knob
Mounting.....	Directly on V5011/V5013 Globe Valves and VGF Flanged Globe Valves
Number of Internal Auxiliary Switch	0
Materials	ABS Plastic
Operating Humidity Range (% RH)	5 to 95% RH
Medium Temperature	300 F Maximum (150 C Maximum)
Ambient Temperature Range	14 F to 122 F (-10 C to +50 C)
Storage Temperature Range	-40 F to +158 F (-40 C to +70 C)
Weight	5.1 lb (2.3 kg)
Includes.....	1/2 in. conduit hub; 1/2 in. flexible conduit adapter

APPROVALS

Canadian Standards Association	Certified
CE	Recognized
Underwriters Laboratories, Inc.	UL94-5V

ACCESSORIES

312495—Large stem button provides anti-spin for globe valves up to 3 in. (1/4-28UNF stem) with ML6420, ML7420, ML6421A, ML7421A, ML6425, and ML7425 actuators. Not required with ML6984/7984 actuators or Q5024 linkage; not compatible with Q5020 linkage.

43191679-101—Auxiliary Potentiometer for ML6421A

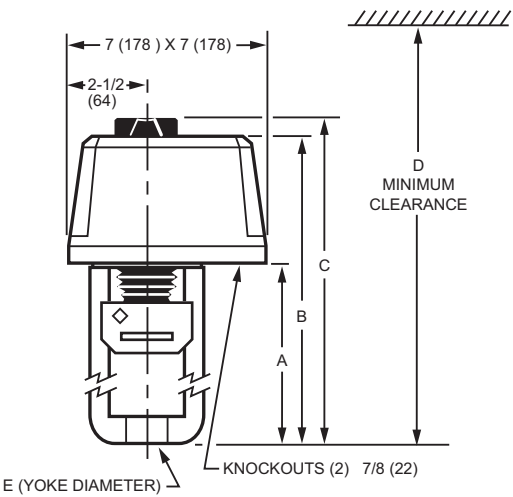
43191679-102—220 ohm Auxiliary Potentiometer for ML6421B

43191680-102—Dual Auxiliary Switch for CREVAL actuators

43196000-001—High Temperature Kit for actuators with 3/4 inch (20 mm) stroke, stem button attachment

43196000-038—High Temperature Kit for actuators with 1-1/2 inch (38 mm) stroke, stem button attachment

DIMENSIONS DIAGRAM



	ML6421A, ML7421A	ML6421B, ML7421B
A	5-5/8 (142)	8 (204)
B	9-3/8 (239)	11-7/8 (301)
C	10-3/8 (264)	12-3/4 (326)
D	14-1/4 (360)	16-7/8 (430)
E	1-3/8 (35)	1-7/8 (48)

M16827

Direct Coupled Valve Actuators, ML6425; ML7425



Direct Coupled Globe Valve Actuators provide floating and modulating control of chilled water, hot water and steam, and mount directly on VGF series, V5011 and V5013 globe valves. These Spring Return Actuators will operate 1/2 to 3 inch valves.

FEATURES

- Easy and quick installation on valves with 1 3/8 in. bonnet and 3/4 in. stroke.
- No separate linkage required.
- Conduit connector standard.
- No adjustments required on linkage.
- Accurate valve positioning.
- Low power consumption.
- High close-off ratings.
- Force limiting end switches.
- Internal manual operator.
- Synchronous motor.
- Maintenance free.

SPECIFICATIONS

Actuator Type	Valve
Fail Safe Mode	Stem down on power failure
Cable Entry	Conduit connector and one knockout on actuator case
Electrical Protection	Class I Insulation (24 Vac)
Electrical Connections	Screw terminals
Ingress Protection Rating	IP54
Frequency	50 Hz; 60 Hz
Manual operation	Manual override winding
Mounting	Directly on V5011/V5013 Globe Valves and VGF Flanged Globe Valves (3/4 in. or 20mm stroke)
Number of Internal Auxiliary Switch	0
Stroke	3/4 in. (20 mm)
Materials	ABS-FR Plastic, aluminum yoke
Operating Humidity Range (% RH)	5 to 95% RH
Medium Temperature	300 F Maximum (150 C Maximum)
Ambient Temperature Range	14 F to 122 F (-10 C to +50 C)
Storage Temperature Range	-40 F to +158 F (-40 C to +70 C)
Weight	5.1 lb (2.3 kg)
Includes	1/2 in. conduit hub; 1/2 in. flexible conduit adapter

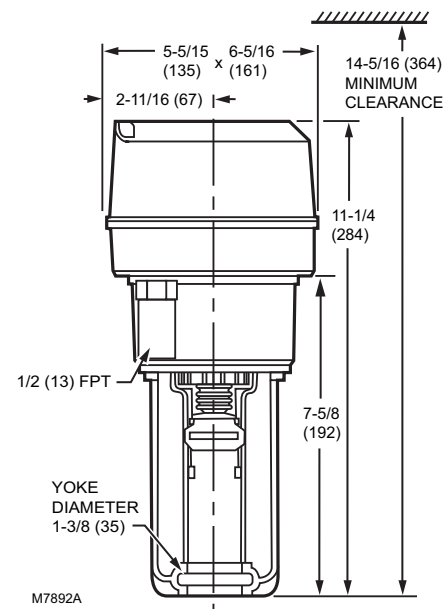
APPROVALS

CE	Recognized
Underwriters Laboratories, Inc.	UL94-5V

ACCESSORIES

312495—Large stem button provides anti-spin for globe valves up to 3 in. (1/4-28UNF stem) with ML6420, ML7420, ML6421A, ML7421A, ML6425, and ML7425 actuators. Not required with ML6984/7984 actuators or Q5024 linkage; not compatible with Q5020 linkage.
 43191679-111—Potentiometer, 10k ohm, for ML6425, ML7425
 43191679-112—Potentiometer, 220 ohm for ML6425, ML7425
 43191680-105—Dual Auxiliary Switch for CREVAL actuators
 43196000-001—High Temperature Kit for actuators with 3/4 inch (20 mm) stroke, stem button attachment

DIMENSIONS DIAGRAM



Submittal Data - Valves

Direct Coupled Valve Actuators, ML6984



The ML6984 is a self-contained, self-adjusting, motorized linkage that mounts directly onto V5011 two-way or V5013 three-way valves and provides up to 25 mm (1") of linear travel (stem lift). For use with low voltage 3-wire SPDT Series 20 (on-off); Series 60 (floating) electromechanical (dry) contacts; or electronic (triac output) controllers (3-wire installation).

FEATURES

- Allows the use of one common transformer power supply for multiple actuators and controllers.
- Self-contained, motorized valve linkage.
- Linkage self-adjusts to valve stroke of 12 to 25 mm (1/2 to 1 in.).
- Multi-pose mounting.
- Strong valve seat closing force 160 lbf (710 N).
- Compact size for easy installation in confined area.
- One device for either 24 Vac or 28 Vdc power supply application.
- Electronic current sensing provides internal protection and positive full closing force.
- Field-addable position feedback/auxiliary switch module available (5-wire control wiring only).
- Compatible with 3-wire control systems.

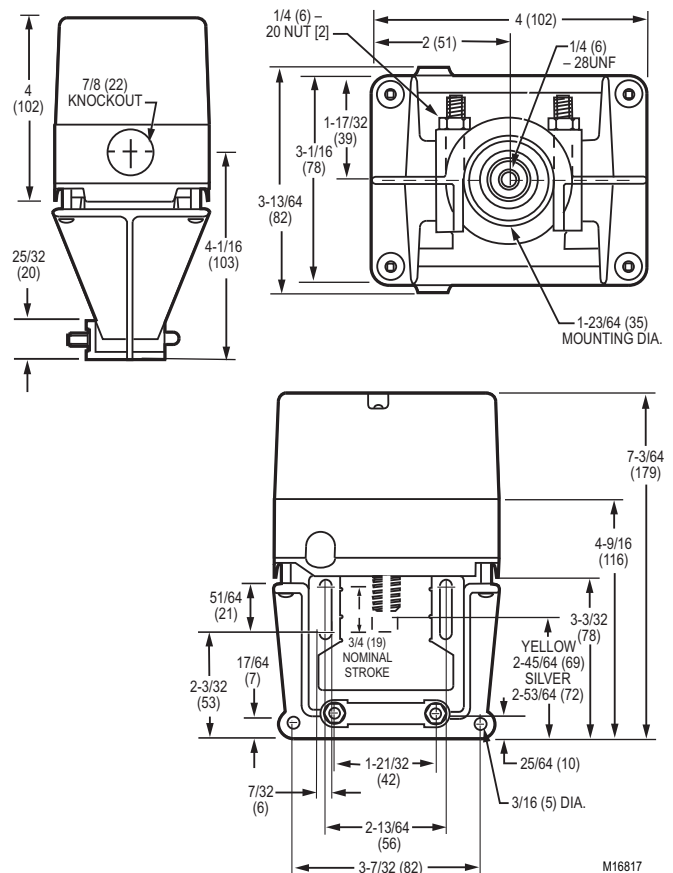
SPECIFICATIONS

Actuator Type	Valve
Fail Safe Mode	Stays in place
(Rated) Stem Force	160 lbf (710 N)
Cable Entry	7/8 in. hole for 1/2 in. conduit
External Auxiliary Switches Available	272630D
Electrical Protection	NEMA 3R
Electrical Connections	Screw terminals
Ingress Protection Rating	NEMA 3R, IP54 (mounted in vertical position)
Feedback	Position feedback available w/ 272630D; 2-10 Vdc
Frequency	50 Hz; 60 Hz
Manual operation	None
Mounting	Screws onto 1/4-28 UNF threaded valve stem
Number of Internal Auxiliary Switch	0
Stroke	1/2 to 1 in. (13 to 25 mm)
Supply Voltage	24 Vac; 28 Vdc
Materials	UV-stabilized plastic cover, aluminum base & yoke
Operating Humidity Range (% RH)	15 to 95% RH at 104 F (40 C)
Medium Temperature	300 F Maximum (150 C Maximum)
Ambient Temperature Range	32 F to 130 F (0 C to 50 C)
Temperature Ratings (Shipping)	-40 F to +150 F (-40 C to +65 C)
Storage Temperature Range	-40 F to +150 F (-40 C to +65 C)
Weight	2.2 lb (1 kg)
Includes	Screw terminals
Comments	3 or 5-wire operation. (3-wire required for XL10 controllers)

ACCESSORIES

272629A—Adapter Kit for mounting ML6984/ML7984 to V5045 and VGF non-pressure balanced 2-way valves
 272630D—Position feedback and SPDT pilot duty auxiliary switch

DIMENSIONS DIAGRAM



Direct Coupled Valve Actuators, ML7984



The ML7984 is a self-contained, self-adjusting, motorized linkage that mounts directly onto V5011 two-way or V5013 three-way valves and provides up to 25 mm (1") of linear stem travel. For use with Series 70 2-10Vdc, 4-20mA; Series 90 135 ohm; and Electronic (Super Mod) modulating signals controllers.

FEATURES

- Allows the use of one common transformer power supply for multiple actuators and controllers.
- Self-contained, motorized valve linkage.
- Linkage self-adjusts to valve stroke from 12 to 25 mm (1/2 - 1 in.).
- Multi-pose mounting.
- Strong valve seat closing force 160 lbf (710 N).
- Compact size for easy installation in confined area.
- One device for either Vac or Vdc power supply application.
- Electronic current sensing provides internal protection and positive full closing force.
- Field-addable position feedback/auxiliary switch module available.

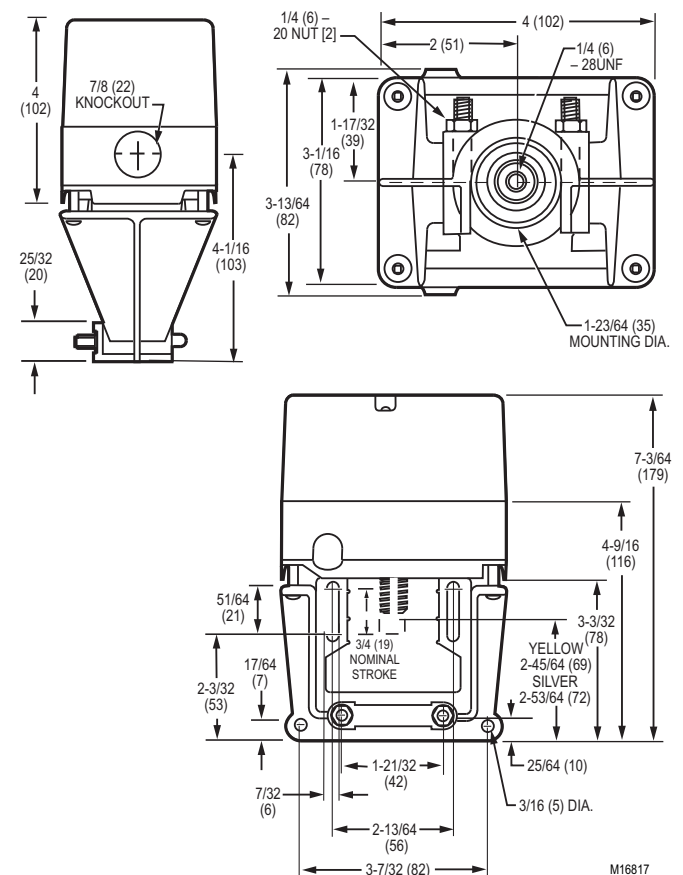
SPECIFICATIONS

Actuator Type	Valve
Fail Safe Mode	Stays in place
Cable Entry	7/8 in. hole for 1/2 in. conduit
External Auxiliary Switches Available.....	272630D
Electrical Protection	NEMA 3R
Electrical Connections	Screw terminals
Ingress Protection Rating.....	NEMA 3R, IP54 (mounted in vertical position)
Feedback	Position feedback available w/ 272630D; 2-10 Vdc
Frequency	50 Hz; 60 Hz
Manual operation	None
Mounting	Screws onto 1/4-28 UNF threaded valve stem
Number of Internal Auxiliary Switch	0
Stroke	1/2 to 1 in. (13 to 25 mm)
Supply Voltage	24 Vac; 28 Vdc
Materials.....	UV-stabilized plastic cover, aluminum base & yoke
Operating Humidity Range (% RH).....	15 to 95% RH at 104 F (40 C)
Ambient Temperature Range	32 F to 130 F (0 C to 55 C)
Temperature Ratings (Shipping)	-40 F to +150 F (-40 C to +65 C)
Storage Temperature Range	-40 F to +150 F (-40 C to +65 C)
Weight	2.2 lb (1 kg)
Includes.....	Screw terminals
Comments	Direct/Reverse Acting Switch

ACCESSORIES:

272629A—Adapter Kit for mounting ML6984/ML7984 to V5045 and VGF non-pressure balanced 2-way valves
272630D—Position feedback and SPDT pilot duty auxiliary switch

DIMENSIONS DIAGRAM



Submittal Data - Valves

Unitary Valve, V5852; V5862



Two-way Cartridge Globe Valves control hot and/or chilled water for VAV terminal units, fan coil units, small reheaters and recoolers in electric/electronic temperature control systems. Used with the M6410 3-position floating Non-Spring Return Valve Actuator and the M7410 selectable 0 to 10 Vdc or 2 to 10 Vdc Non-Spring Return Actuator. The 1/2 in. and 3/4 in. valves are compatible with the

M6435 floating Spring Return Actuator, and the M7435 selectable 0 to 10 Vdc or 2 to 10 Vdc Spring Return Actuator. Larger valves (1 in. through 1-1/2 in.) are pressure balanced, which results in higher close-off pressures.

SPECIFICATIONS

Valve Type	Cartridge Globe Valve
Body Pattern	Two-way
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Leakage Rating	1/2 in. and 3/4 in. valves: ANSI Class IV (0.01% of Cv maximum) 1 in., 1-1/4 in., 1-1/2 in. valves: ANSI Class III (less than 0.02% of Cv)
Maximum Safe Operating Pressure.....	235 psi (1620 kPa)
Fluid Temperature Range	36 F to 230 F (2 C to 110 C)
Stem Travel	1/4 in. (6.4 mm)
Actuation:	Must be purchased separately
Materials	
(Body)	Brass
(Stem)	Stainless Steel
(Seat)	Brass
(Cartridge)	Brass
(Plug/Ball/Disc)	Brass

ACCESSORIES

0902807—Replacement Insert for 1/2 in. V5852/V5862, 1.9Cv
Interchangeable with 0902808
0902808—Replacement Insert for 1/2 in. V5852/V5862, 1.2 Cv
Interchangeable with 0902807
0902809—Replacement Insert for 1/2 in. V5852/V5862, 0.74 Cv
Interchangeable with 0902810 or 090212
0902810—Replacement Insert for 1/2 in. V5852/V5862, 0.47 Cv
Interchangeable with 0902809 or 090212

REPLACEMENT PARTS

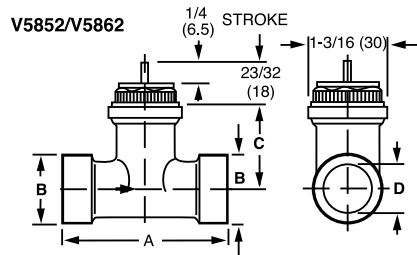
0902812—Replacement Insert for 1/2 in. V5852/V5862, 0.19 Cv
Interchangeable with 0902809 or 090210
0902814—Replacement Insert for 3/4 in. V5852/V5862, 2.9 Cv
Interchangeable with 0902815
0902815—Replacement Insert for 3/4 in. V5852/V5862, 4.9 Cv
Interchangeable with 0902814
0903827—Replacement Packing for 1 in. V5862/63
0903828—Replacement Packing for 1-1/4 in. V5862/63
0903829—Replacement Packing for 1-1/2 in. V5862/63

FEATURES

Long stroke allows wider range of control.

- Soft valve seat provides low leakage rate.
- Inserts for 1/2 in. and 3/4 in. valves are changeable without draining valve when used with an insert replacement tool.
- Brass body and Stainless Steel stem.
- Threaded plastic cover/manual handle allows manual operation.
- Easily installed in areas where space is limited.

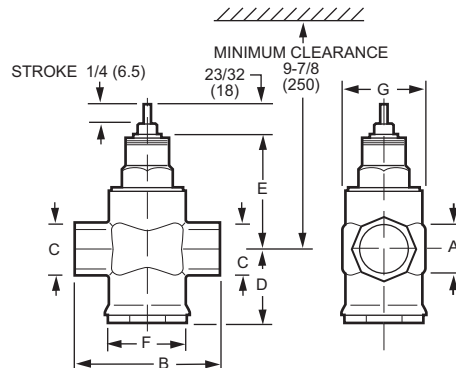
DIMENSIONS DIAGRAM



VALVE SIZE	A	B	C	D (NPT)	D (SWEAT)
1/2 (13)	3 (77)	3/4 (19)	1-5/16 (34)	1/2 (13)	5/8 (16)
3/4 (19)	3-1/2 (88)	1 (25)	1-1/4 (32)	3/4 (19)	7/8 (22)

NOTE: SOLDER ENDS CONFORM TO ANSI B16-18.

M18917



VALVE SIZE A (NPT)	B	C	D	E	F	G
1 (25)	4-1/8 (105)	1-5/8 (41)	2-1/16 (53)	3-5/8 (92)	2 (50)	1-3/4 (44)
1-1/4 (32)	4-15/16 (125)	2 (50)	2-7/16 (62)	3-5/8 (92)	2-3/16 (55)	2-1/4 (57)
1-1/2 (38)	5-1/8 (130)	2-3/16 (55)	2-9/16 (65)	3-7/8 (98)	2-3/8 (60)	2-5/8 (67)



Three-way Cartridge Globe Valves control hot and/or chilled water for VAV terminal units, fan coil units, small reheaters and recoolers in electric/ electronic temperature control systems. Used with the M6410 3-position floating Non-Spring Return Valve Actuator and the M7410 selectable 0 to 10 Vdc or 2 to 10 Vdc Non-Spring Return Actuator. The 1/2 in. and 3/4 in. valves are also compatible with the M6435 floating Spring Return

Actuator, and the M7435 selectable 0 to 10 Vdc or 2 to 10 Vdc Spring Return Actuator.

SPECIFICATIONS

Valve Type	Cartridge Globe Valve
Body Pattern	Three-way
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Leakage Rating	1/2 in. and 3/4 in. valves: ANSI Class IV (0.01% of Cv maximum) 1 in., 1-1/4 in., 1-1/2 in. valves: ANSI Class III (less than 0.02% of Cv)
Maximum Safe Operating Pressure	235 psi (1620 kPa)
Maximum Differential Pressure Ratings (Close-off)	34 psi (234 kPa)
Fluid Temperature Range	36 F to 230 F (2 C to 110 C)
Stem Travel	1/4 in. (6.4 mm)
Actuation:	Must be purchased separately

Materials

(Body)	Brass
(Stem)	Stainless Steel
(Seat)	Brass
(Cartridge)	Brass
(Plug/Ball/Disc)	Brass

ACCESSORIES

0903827—Replacement Packing for 1 in. V5862/63

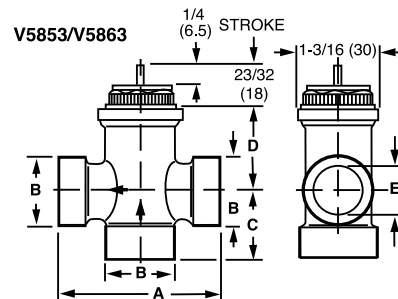
REPLACEMENT PARTS

0902821—Replacement Insert for 1/2 in. V5853/V5863, 0.29 Cv
Interchangeable with 0902822 or 0902823 or 0902824
0902822—Replacement Insert for 1/2 in. V5853/V5863, 0.47 Cv
Interchangeable with 0902821 or 0902823 or 0902824
0902823—Replacement Insert for 1/2 in. V5853/V5863, 0.74 Cv
Interchangeable with 0902821 or 0902822 or 0902824
0902824—Replacement Insert for 1/2 in. V5853/V5863, 1.2 Cv
Interchangeable with 0902821 or 0902822 or 0902823
0902825—Replacement Insert for 1/2 in. V5853/V5863, 1.9 Cv
Interchangeable with 0902827
0902827—Replacement Insert for 3/4 in. V5853/V5863, 4.9 Cv
Interchangeable with 0902825
0903827—Replacement Packing for 1 in. V5862/63
0903828—Replacement Packing for 1-1/4 in. V5862/63
0903829—Replacement Packing for 1-1/2 in. V5862/63

FEATURES

- Long stroke allows wider range of control.
- Soft valve seat provides low leakage rate.
- Inserts for 1/2 in. and 3/4 in. valves are changeable without draining valve when used with an insert replacement tool.
- Brass body and stainless steel stem.
- Threaded plastic cover/manual handle allows manual operation.
- Easily installed in areas where space is limited.

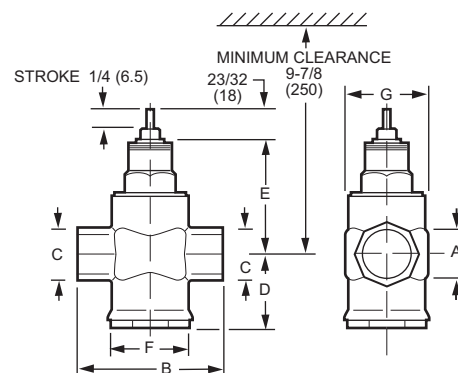
DIMENSIONS DIAGRAM



VALVE SIZE	A	B	C	D	E (NPT)	E (SWEAT)
1/2 (13)	3 (77)	3/4 (19)	1-5/16 (34)	1-5/16 (34)	1/2 (13)	5/8 (16)
3/4 (19)	3-1/2 (88)	1 (25)	1-1/2 (38)	1-1/4 (32)	3/4 (19)	7/8 (22)

NOTE: SOLDER ENDS CONFORM TO ANSI B16-18.

M18919



VALVE SIZE A (NPT)	B	C	D	E	F	G
1 (25)	4-1/8 (105)	1-5/8 (41)	2-1/16 (53)	3-5/8 (92)	2 (50)	1-3/4 (44)
1-1/4 (32)	4-15/16 (125)	2 (50)	2-7/16 (62)	3-5/8 (92)	2-3/16 (55)	2-1/4 (57)
1-1/2 (38)	5-1/8 (130)	2-3/16 (55)	2-9/16 (65)	3-7/8 (98)	2-3/8 (60)	2-5/8 (67)

Submittal Data - Valves

NPT Control Ball Valve, VBN2



The VBN2 Two-Way Control Ball Valves control hot and chilled water with glycol solutions up to 50% in heating, ventilating and air conditioning (HVAC) systems to provide two-position or modulating functions. These valve assemblies can be ordered with or without factory-mounted non-spring return or spring return actuators.

FEATURES

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Equal percentage flow characteristic.
- Reduced B port CV for constant loop flow.
- Choice of factory-installed actuation: floating, modulating (2-10 V), spring return or non-spring return
- 2-Position, Spring Return Modulating/Floating.
- Field configurable for normally open or normally closed fail-safe position.
- Removable manual operating handle to control valve during installation or in an event of power failure.
- Actuator can be mounted on the valve in any of four orientations.
- Field-serviceable stem assembly.
- Wide range of CV choices from 0.33 to 266.
- Nickel-chrome plated brass or 316 stainless steel ball and stem.
- Valve installs in a globe valve “T” pattern, no extra elbows or piping required.
- Mixing or Diverting control for 3-way valves.
- ANSI Class IV seat leakage specification (0.01% of CV) for 3-way A port and ANSI Class III seat leakage specification (0.1% of CV) for 3-way B port.

SPECIFICATIONS

Valve Type	Control Ball Valve
Body Pattern	Two-way
Connection Type	Female NPT
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Leakage Rating	ANSI Class IV (0.01% of Cv maximum)
Maximum Safe Operating Pressure	360 psi (2482 kPa)
Fluid Temperature Range	-22 F to +250 F (-30 C to +121 F)
Materials	
(Body)	Brass
(Seat)	Teflon® seals with EPDM O-rings
(Flow Control Insert)	Noryl®

Dimensional Diagrams - Valves

NPT Control Ball Valve, VBN2

DIMENSIONS DIAGRAM

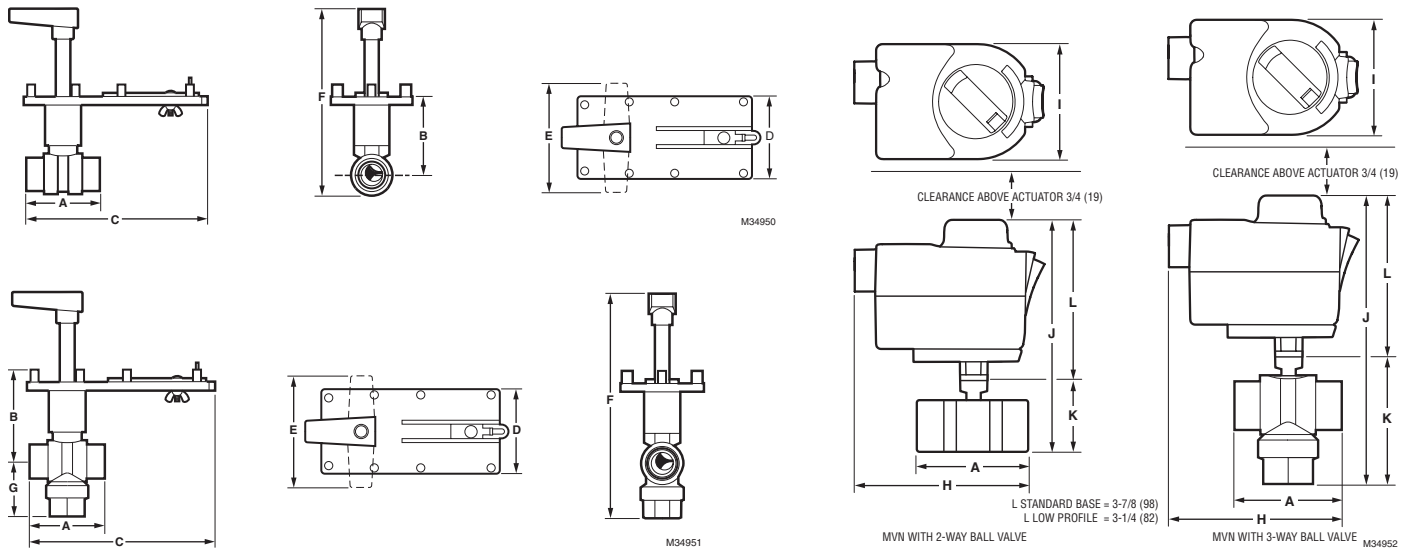


Table 7. VBN2 dimensions in inches (millimeters).

Pipe Size			C _V Designators	MVN, MN, AND MS ACTUATORS WITH 2-WAY BALL VALVE Dimensions in in. (mm)												Weight (valve only) lbs.	Replacement Stem Assembly "		
In.	(DN)	Code		A	B	C	D	E	Fms ^a	Fmn ^b	H	I	J (w/std)	J (w/low)	K				
1/2	15	VBN2A	0.38, 0.68, 1.30, 2.00, 2.60, 4.70, 8.00, 11.70*	2-3/8 (60)	3-7/16 (87)	6-5/8 (168)	3 (76)	4 (102)	8-1/8 (206)	6-7/8 (175)	4-9/16 (116)	2-3/16 (71)	5-7/16 (139)	4-13/16 (123)	1-5/8 (41)	1	5112-19 5112-22 (SS)		
3/4	20	VBN2B	0.31, 0.63, 1.20, 2.50, 4.30, 7.40, 14.70*	2-3/8 (60)	3-7/16 (87)	6-7/16 (164)	3 (76)	4 (102)	8-1/8 (206)	6-7/8 (175)			5-7/16 (139)	4-13/16 (123)	1-5/8 (41)	1			
			10.10, 29.00*	2-5/8 (67)	3-11/16 (94)	6-1/2 (165)	3 (76)	4 (102)	8-5/16 (211)	7-1/16 (180)			5-5/8 (143)	5 (127)	1-13/16 (45)	1			
1	25	VBN2C	9.00	3-3/4 (95)	3-11/16 (94)	7-1/16 (179)	3 (76)	4 (102)	8-5/16 (211)	7-1/16 (180)			5-5/8 (143)	5 (127)	1-13/16 (45)	1		5112-20 5112-23 (SS)	
			4.40, 15.30, 26.00, 44.00, 54.00*	3-1/16 (77)	3-15/16 (100)	6-3/4 (171)	3 (76)	4 (102)	8-11/16 (221)	7-7/16 (189)	6 (152)	5-3/8 (137)	2-3/16 (55)	1.4					
1-1/4	32	VBN2D	4.40, 8.30, 14.90, 25.00, 41.00*	3 (76)	3-15/16 (100)	6-11/16 (170)	3 (76)	4 (102)	8-11/16 (221)	7-7/16 (189)	6 (152)	5-3/8 (137)	2-1/8 (54)	1.4					
			37.00, 102.00*	3-5/8 (92)	4-7/16 (113)	7 (178)	3 (76)	4 (102)	9-1/16 (231)	7-13/16 (198)	6-3/8 (162)	5-3/4 (146)	2-9/16 (64)	2.4					
1-1/2	40	VBN2E	23.00, 30.00, 74.00*	3-7/16 (87)	3-15/16 (100)	6-15/16 (176)	3 (76)	4 (102)	9-1/16 (231)	7-13/16 (198)					2.4	5112-21 5112-24 (SS)			
			41.00, 172.00*	4-1/16 (103)	5-3/16 (132)	7-1/16 (179)	3 (76)	4 (102)	8-7/8 (225)	7-5/8 (194)					3.2				
2	50	VBN2F	42.00, 108.00*	4 (101)	3-3/4 (95)	7-3/16 (183)	3 (76)	4 (102)	8-7/8 (225)	7-5/8 (194)									3.2
			57.00, 71.00, 100.00, 210.00, 266.00*	4-15/16 (125)	4-1/16 (103)	7-7/16 (188)	3 (76)	4 (102)	10-1/2 (267)	9-1/4 (235)									5
2-1/2	65	VBN2G	45.00, 55.00, 72.00, 101.00, 162.00, 202.00*	5-5/16 (135)	4-1/16 (103)	7-9/16 (192)	3 (76)	4 (102)	10-1/2 (267)	9-1/4 (235)					5.5	5112-21 5112-24 (SS)			
3	80	VBN2H	49.00, 63.00, 82.00, 124.00, 145.00*	5 (127)	5-7/8 (149)	7-11/16 (196)	3 (76)	4 (102)	10-11/16 (271)	9-7/16 (240)					5.9				

^a For models using the MS direct coupled actuator.

^b For models using the MN direct coupled actuator.

* Indicates full port valve: no flow characterizing insert.

** Replacement stems available in brass or stainless steel--use accordingly to valve part number.

Submittal Data - Valves

NPT Control Ball Valve, VBN3



The VBN3 Three-Way Control Ball Valves control hot and chilled water with glycol solutions up to 50% in heating, ventilating and air conditioning (HVAC) systems to provide two-position or modulating functions. These valve assemblies can be ordered with or without factory-mounted non-spring return or spring return actuators.

FEATURES

- Sizes from 1/2 to 2-1/2 inches with internal (female) NPT connections.
- Equal percentage or linear flow characteristics.
- Reduced B-port Cv for constant loop flow.
- Choice of four, factory-installed actuation control schemes: Floating, Modulating (2-10 V), Spring Return 2-Position, Spring Return Modulating/Floating.
- Field configurable for normally open or normally closed fail safe position.
- Removable manual operating handle to control valve during installation or in an event of power failure.
- ANSI Class IV seat leakage specification (0.01% of Cv).
- Optional NEMA 3R (IP54) rated enclosure for outdoor applications.
- Actuator can be mounted on the valve in any of four orientations.
- Wide Cv choices from 0.33 to 109.
- Valve installs in a globe valve "T" pattern, no extra elbows or piping required.
- Field-serviceable stem assembly.
- Nickel-chrome plated brass ball and stem.
- Mixing or Diverting control.

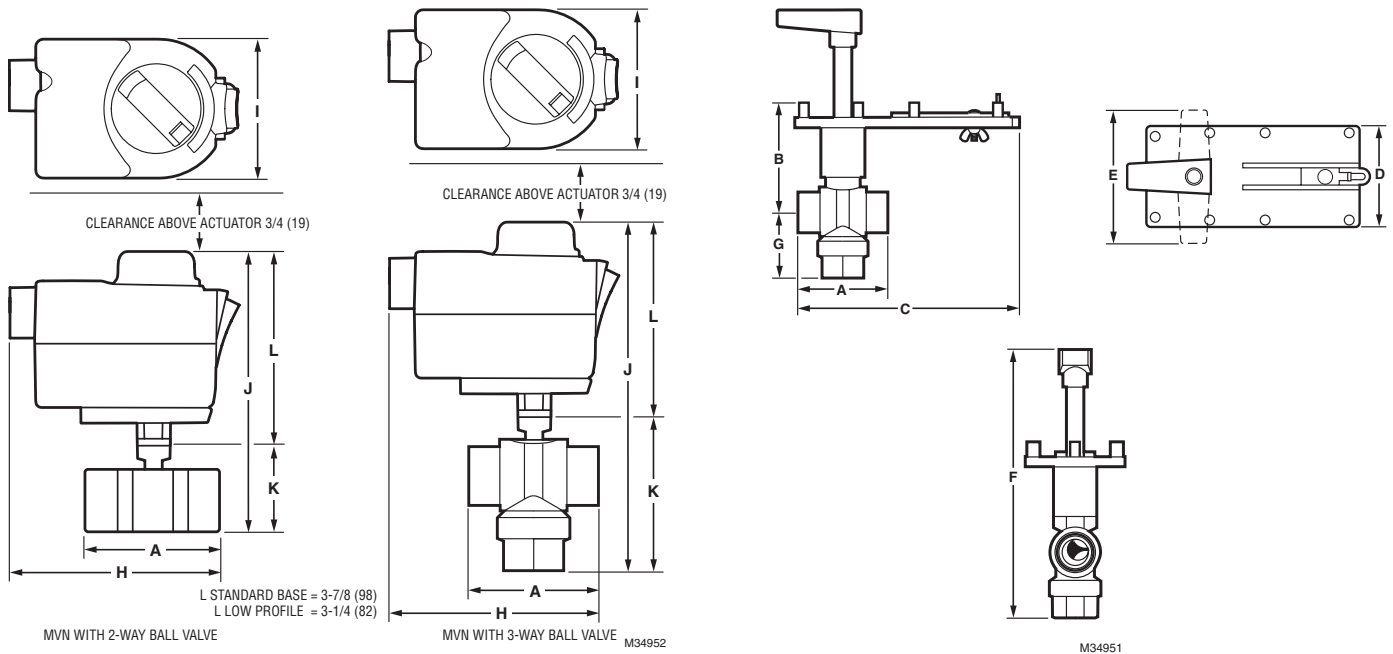
SPECIFICATIONS

Valve Type	Control Ball Valve
Body Pattern	Three-way
Flow Characteristic:	Linear (B-AB); Equal Percentage (A-AB)
Connection Type	Female NPT
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Leakage Rating	ANSI Class IV (0.01% of Cv maximum)
Maximum Safe Operating Pressure	360 psi (2482 kPa)
Fluid Temperature Range	-22 F to +250 F (-30 C to +121 F)
Materials	
(Body)	Brass
(Stem):	Brass
(Seat)	Teflon® seals with EPDM O- rings
(Plug/Ball/Disc):	Nickel-plated brass ball
(Flow Control Insert)	Noryl®

Dimensional Diagrams - Valves

NPT Control Ball Valve, VBN3

DIMENSIONS DIAGRAM



Pipe Size			C _v Designators	MVN WITH 3-WAY BALL VALVE												Weight (valve only) lbs.	Replacement Stem Assembly
In.	(DN)	Code		Dimensions in in. (mm)													
				A	B	C	D	E	F	G	H	I	J (w/ std)	J (w/ low)	K		
1/2	15	VBN3A	0.33, 0.59, 1.00, 2.40, 4.30, 8.00	3-1/2 (89)	3-5/16 (84)	7 (178)	3 (76)	4 (102)	9-3/8 (238)	2-3/8 (60)			6-11/16 (170)	6-1/16 (154)	2-7/8 (72)	2.4	5112-19
3/4	20	VBN3B	0.40, 0.66, 1.30, 2.40, 3.80, 11.00*	2-13/16 (71)	3-5/16 (84)	6-1/2 (165)	3 (76)	4 (102)	8-13/16 (224)	2(51)			6-1/8 (156)	5-1/2 (140)	2-5/16 (58)	2	
1	25	VBN3C	0.40, 0.65, 1.30, 2.30, 3.50	3-13/16 (97)	3-5/16 (84)	7-5/16 (185)	3 (76)	4 (102)	9-1/2 (241)	2-3/4 (70)	4-9/16 (116)	2-13/16 (71)	6-13/16 (173)	6-3/16 (157)	3 (75)	2.8	
			8.60, 22.00	3 (76)	3-13/16 (97)	6-13/16 (173)	3 (76)	4 (102)	9-13/16 (249)	2-5/8 (67)			7-1/8 (181)	6-1/2 (165)	3-5/16 (83)	2.6	
			4.50, 14.90, 31.00	4-5/16 (114)	4 (102)	7-13/16 (198)	3 (76)	4 (102)	10-13/16 (275)	3-1/4 (83)			8-1/8 (207)	7-1/2 (191)	4-5/16 (109)	3.3	
1-1/4	32	VBN3D	4.10, 8.70, 19.00*	3 (76)	3-13/16 (97)	6-13/16 (173)	3 (76)	4 (102)	9-13/16 (249)	2-1/2 (64)			7-1/8 (181)	6-1/2 (165)	3-5/16 (83)	2.5	5112-20
			12.70, 27.00, 34.00*	3-5/8 (91)	4 (102)	7-5/16 (185)	3 (76)	4 (102)	10-5/16 (262)	2-3/4 (70)	7-5/8 (194)	7 (178)	3-13/16 (96)	2.8			
1-1/2	40	VBN3E	4.00, 8.30, 13.40, 32.00*	4-5/16 (114)	4 (102)	7-13/16 (198)	3 (76)	4 (102)	10-13/16 (275)	3-1/4 (83)						3.3	
			24.00, 61.00	4 (102)	4-1/2 (114)	7-5/16 (185)	3 (76)	4 (102)	11 (279)	3-1/4 (83)					3.3		
2	50	VBN3F	24.00, 38.00, 57.00	4 (102)	4-1/2 (114)	7-5/16 (185)	3 (76)	4 (102)	11 (279)	3-1/4 (83)						3.3	5112-21
			83.00, 109.00	5 (127)	5-13/16 (147)	7-13/16 (198)	3 (76)	4 (102)	12-5/16 (313)	3-3/4 (95)					3.8		
2-1/2	65	VBN3G	38.00, 74.00, 100.00	5 (127)	5-13/16 (147)	7-13/16 (198)	3 (76)	4 (102)	12-5/16 (313)	3-3/4 (95)						3.8	

*Indicates full A-port: no flow characterizing insert.

Submittal Data - Valves

Flanged Control Ball Valve, VBF2



The VBF2 Two-Way Ball Valve Assemblies, with and without actuators, control hot and chilled water with glycol solutions up to 50% in closed loop heating, ventilating and air conditioning (HVAC) systems to provide two-position or modulating functions. These valve assemblies can be ordered with or without factory-mounted non-spring return or spring return direct-coupled actuators (DCA).

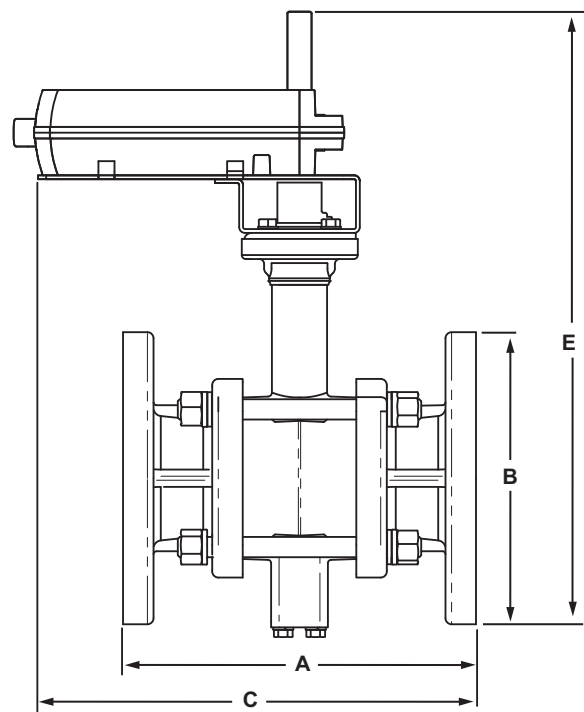
FEATURES

- Sizes from 4 to 6 inch with ANSI Class 125 flanged connections.
- Equal percentage or linear flow characteristics.
- Choice of four, factory-installed actuation control schemes: Floating, Modulating (2-10 V), Spring Return 24V 2-Position, Spring Return Modulating/Floating.
- Field configurable for normally open or normally closed fail safe position.
- Removable manual operating handle to control valve during installation or in an event of power failure.
- ANSI Class IV leakage specification (0.01% of Cv).
- Optional NEMA 3R (IP54) rated enclosure for outdoor applications.
- Option of four actuator mounting positions on the valve.
- Wide range of Cv choices from 91 to 650.
- Valve ball and stem 316 stainless steel.

SPECIFICATIONS

Valve Type	Control Ball Valve
Body Pattern	Two-way
Connection Type	Flanged
Flow Characteristic:.....	Equal Percentage
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Leakage Rating	ANSI Class IV (0.01% of Cv maximum)
Maximum Safe Operating Pressure	240 psi (1655 kPa)
Maximum Differential Pressure Ratings (Close-off)	70 psi (483 kPa)
Fluid Temperature Range.....	-22 F to +250 F (-30 C to +121 F)
Materials	
(Body).....	Cast Iron
(Stem).....	316 Stainless Steel
(Seat).....	Teflon®
(Plug/Ball/Disc).....	316 stainless steel

DIMENSIONS DIAGRAM



Size (in.)	Model Number	A in. (mm)	B in. (mm)	C in. (mm)	D (depth) (not shown) in. (mm)	E in. (mm)	Wt. lb (kg)
4	VBF2J	11 (278)	9 (229)	13-1/4 (337)	9 (229)	18-3/4 (476)	65 (31)
5	VBF2K	12-3/8 (352)	10 (254)	14-1/4 (362)	10 (254)	19 (483)	75 (34)
6	VBF2L	13-7/8 (352)	11 (278)	15-1/8 (384)	11 (278)	19-7/8 (505)	90 (41)

M13732

Flanged Control Ball Valve, VBF3



The VBF3 Three-Way Ball Valve Assemblies, with and without actuators, control hot and chilled water with glycol solutions up to 50% in closed loop heating, ventilating and air conditioning (HVAC) systems to provide two-position or modulating functions. These valve assemblies can be ordered with or without factory-mounted non-spring return or spring return direct-coupled actuators (DCA).

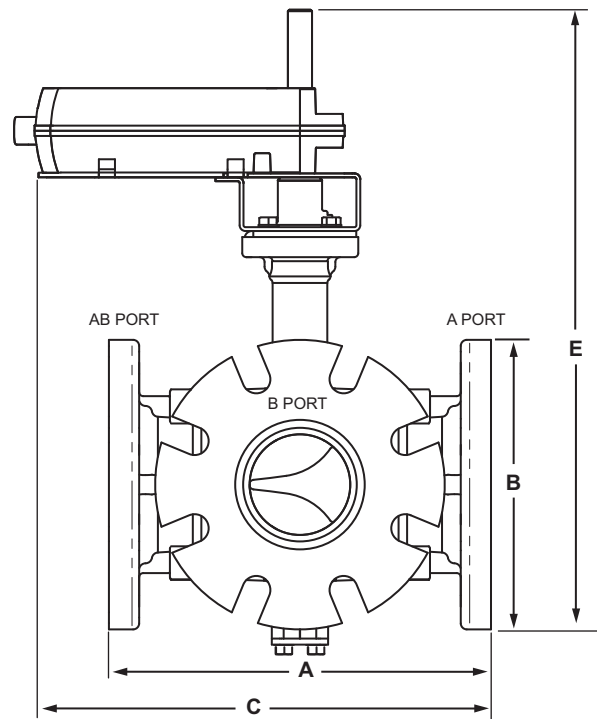
FEATURES

- Sizes from 4 to 6 inch with ANSI Class 125 flanged connections.
- Equal percentage or linear flow characteristics.
- Choice of four, factory-installed actuation control schemes: Floating, Modulating (2-10 V), Spring Return 24V 2-Position, Spring Return Modulating/Floating.
- Field configurable for normally open or normally closed fail safe position.
- Removable manual operating handle to control valve during installation or in an event of power failure.
- ANSI Class IV A-port seat leakage (0.01% of Cv).
- Optional NEMA 3R (IP54) rated enclosure for outdoor applications.
- Option of four actuator mounting positions on the valve.
- Wide range of Cv choices from 91 to 650.
- Valve ball and stem 316 stainless steel.
- Non-isolating mixing or diverting control.

SPECIFICATIONS

Valve Type	Control Ball Valve
Body Pattern	Three-way
Connection Type	Flanged
Flow Characteristic:	Linear (B-AB); Equal Percentage (A-AB)
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Leakage Rating	ANSI Class IV (A port only) B port ~2% leakage
Maximum Safe Operating Pressure	240 psi (1655 kPa)
Maximum Differential Pressure	
Ratings (Close-off)	70 psi (483 kPa)
Fluid Temperature Range	-22 F to +250 F (-30 C to +121 F)
Materials	
(Body)	Cast Iron
(Stem)	316 Stainless Steel
(Seat)	Teflon®
(Plug/Ball/Disc)	316 stainless steel

DIMENSIONS DIAGRAM



Size (in.)	Model Number	A in. (mm)	B in. (mm)	C in. (mm)	D (depth) (not shown) in. (mm)	E in. (mm)	Wt. lb (kg)
4	VBF3J	11-7/8 (278)	9 (229)	14-1/8 (337)	10-3/8 (229)	18-1/2 (470)	75 (34)
5	VBF3K	13-7/8 (352)	10 (254)	15-1/8 (362)	12 (254)	19-3/8 (483)	90 (41)
6	VBF3L	15-7/8 (403)	11 (278)	16-1/8 (410)	13-3/8 (521)	20-1/2 (521)	105 (48)

M13733A

Submittal Data - Valves

NPT Globe Valve, V5011F; V5011G



Used for two-position or modulating control of steam and water and glycol solutions (to 50 percent concentration) in heating or cooling systems.

FEATURES

- Sizes range from 2-1/2 to 3 inches.
- Direct acting
- High pressure steam models with stainless steel trim.
- Spring-loaded, self-adjusting packing.
- Stainless steel stem prevents corrosion.
- Valve designs provide equal percentage characteristics of flow for close control of water, and linear characteristic of flow for close control of steam or chilled water.
- Valves utilize direct mounting, electric or pneumatic linear valve actuators; Q5001 linkage with Modutrol Motor; or Q5020/Q5024 linkages with Direct Coupled Actuators to operate the valve.

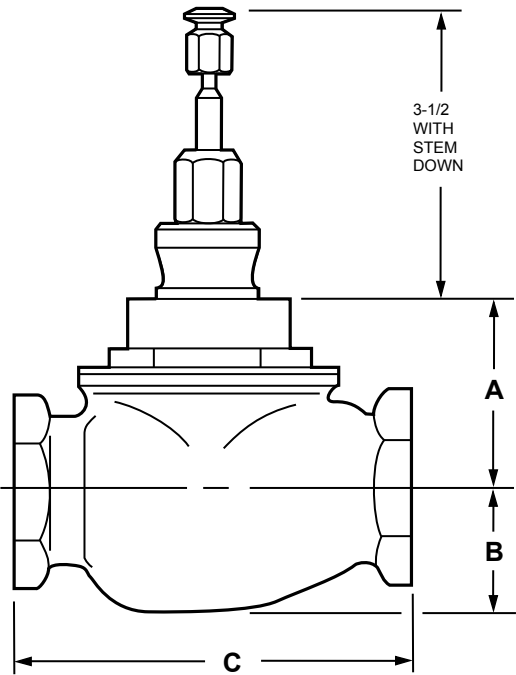
SPECIFICATIONS

Valve Type	Globe Valve
Body Pattern	Two-way, Straight-through
Connection Type	Female NPT
Leakage Rating	0.5% of Cv
Maximum Differential for Quiet Water Service	20 psid (138 kPa)
Fluid Temperature Range	40 F to 337 F (4 C to 169 C)
Stem Travel	3/4 in. (20 mm)
Bonnet Size	1-3/8 in. (35 mm)
Valve Action	Stem down to close
ANSI/ASME Rating	150
Actuation	Must be purchased separately
Materials	
(Body)	Red Brass
(Stem)	Stainless Steel
(Seat)	V5011F: Brass; V5011G: Stainless Steel
(Plug/Ball/Disc)	V5011F: Teflon disc; V5011G: Stainless steel plug with carbon-loaded Teflon disc
(Packing)	V5011F: Teflon and Nitrile; V5011G: Teflon Cone

APPROVALS

CRN Number	0C0861.9087YTN
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DIMENSIONS DIAGRAM



V5011F,G

BODY STYLE	PIPE SIZE (in.)	DIMENSIONS					
		A		B		C	
		in	mm	in	mm	in	mm
V5011F,G THREADED DIRECT BODY	1/2	2	51	1-3/4	45	3-3/8	86
	3/4	1-3/4	45	1-3/4	45	3-3/8	86
	1	1-7/8	48	1-3/4	45	4-1/4	108
	1-1/4	2	51	1-5/8	42	4-7/8	124
	1-1/2	2-7/8	73	1-5/8	42	5-5/8	143
	2	3-1/8	80	2	51	5-5/8	143
	2-1/2	2-3/4	70	2-3/8	61	7-1/2	191
	3	3-1/8	80	2-5/8	67	8-7/8	226

M2804A

NPT Globe Valve, V5011N



Used for two-position or modulating control of steam and water and glycol solutions (to 50 percent concentration) in heating or cooling systems.

FEATURES

- Sizes range from 1/2 to 2 inches.
- Direct and reverse acting
- High pressure steam models with stainless steel trim
- Spring-loaded, self-adjusting packing.
- Stainless steel stem prevents corrosion.
- Valve designs provide equal percentage characteristics of flow for close control of water, and linear characteristic of flow for close control of steam or chilled water.
- Valves utilize direct mounting, electric or pneumatic linear valve actuators; Q5001 linkage with Modutrol Motor; or Q5020/Q5024 linkages with direct coupled rotary actuators to operate the valve.
- Not suitable for combustible gases.

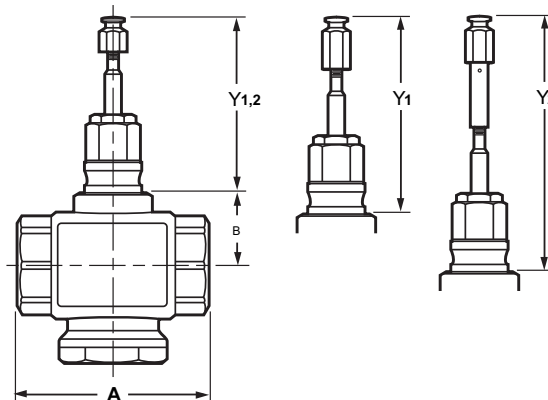
SPECIFICATIONS

Valve Type	Globe Valve
Body Pattern	Two-way
Connection Type	Female NPT
Leakage Rating	Seat: 0.05% of Cv
Maximum Differential f or Quiet Water Service	20 psid (138 kPa)
Maximum Differential Pressure	
Ratings (Close-off)	240 psi (1655 kPa)
Ambient Temperature Range	36 F to 248 F water (2 C to 120 C water)
Stem Travel	3/4 in. (20 mm)
Bonnet Size:	1-3/8 in. (35 mm)
ANSI/ASME Rating:	150
Actuation:	Must be purchased separately
Materials	
(Body)	Red Brass
(Stem)	Stainless Steel
(Packing)	Teflon

APPROVALS

CRN Number0C0861.9087YTN/0C0861.99

DIMENSIONS DIAGRAM



VALVE SIZE (IN)	A in. (mm)	B in. (mm)
1/2	3-1/4 (83)	1-9/16 (40)
3/4		
1	4-1/16 (103)	
1-1/4	4-3/16 (106)	
1-1/2	4-3/4 (120)	1-13/16 (47)
2	5-1/4 (134)	

VALVE	Y1 in. (mm)	Y2 ^a in. (mm)
V5011N1XXX OR V5011N2XXX	3-1/2 (89)	5-1/4 (133)
V5011N3XXX	4-3/16 (107)	5-15/16 (151)
	STEM FULLY UP	

^aY2 WITH STEM EXTENSION FOR MP953C,E (8 IN. ONLY)

M17378A

Submittal Data - Valves

NPT Globe Valve, V5013N



The V5013N is a three-way threaded globe valve that controls hot water, cold water and glycol solutions (up to 50 percent concentration) in heating or cooling HVAC applications. The valves are used for mixing service to direct flow from one or two inlets to a common outlet in two-position or modulating control systems.

FEATURES

- Red brass body with NPT-threaded connections.
- Stainless steel stem and brass plug.
- Low seat leakage rating, < 0.05%.
- Spring-loaded, self adjusting packing.
- 50:1 rangeability per VDI/VDE 2173.
- Constant total flow throughout full stem travel.
- Accurate positioning to ensure state-of-the-art temperature control.
- Sizes range from 1/2 inch to 2 inches.
- Valves utilize direct mounting, electric or pneumatic valve actuators; Q5001 linkage with Modutrol Motor; or Q5020/ Q5024 linkages with Direct Coupled Actuators to operate the valve.
- Repack and rebuild kits available for field servicing.
- Not suitable for combustible gases.

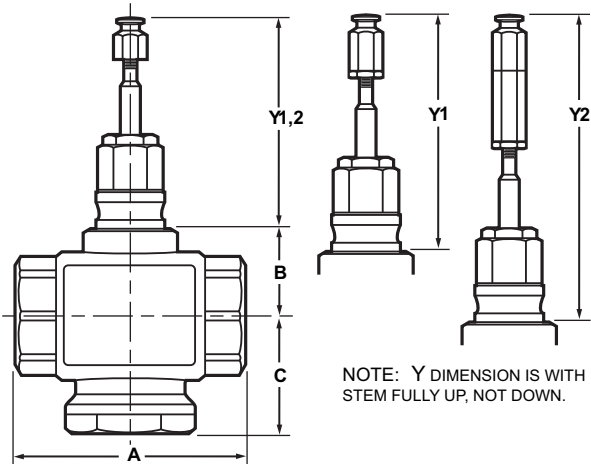
SPECIFICATIONS

Valve Type	Globe Valve
Body Pattern	Three-way mixing, A-B-AB porting
Flow Characteristic:.....	Linear (B-AB), Equal Percentage (A-AB)
Connection Type	Female NPT
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Leakage Rating	0.05% of Cv
Maximum Safe Operating Pressure	217 psi at 248 F (1500 kPa at 120 C)
Maximum Differential for Quiet Water Service	20 psid (138 kPa)
Maximum Differential Pressure Ratings (Close-off)	240 psi (1655 kPa)
Ambient Temperature Range	36 F to 248 F water (2 C to 120 C water)
Stem Travel.....	3/4 in. (20 mm)
Bonnet Size:	1-3/8 in. (35 mm)
Valve Action:.....	Mixing
ANSI/ASME Rating:	150
Actuation:	Must be purchased separately
Materials	
(Body).....	Red Brass
(Stem).....	Stainless Steel
(Plug/Ball/Disc).....	Brass
(Packing)	Teflon/EPDM

APPROVALS

CRN NumberOC0861.9087YTN/OC0861.123

DIMENSIONS DIAGRAM



VALVE SIZE	A	B	C	Y 1 Y 2 ^a	
				STEM UP	
1/2 (15)	3-1/4 (83)	1-9/16 (39.7)	2-9/16 (65)	4-3/16 (106)	5-15/16 (151)
3/4 (20)	3-1/4 (83)	1-9/16 (39.7)	2-9/16 (65)		
1 (25)	4-1/16 (103)	1-9/16 (39.7)	2-5/8 (66.5)		
1-1/4 (32)	4-3/16 (106)	1-9/16 (39.7)	2-7/8 (72.5)		
1-1/2 (40)	4-3/4 (120)	1-13/16 (46.5)	3 (77)		
2 (50)	5-1/4 (134)	1-13/16 (46.5)	3-5/16 (83.5)		

^a Y2 WITH STEM EXTENSION FOR MP953C,E (8 IN. ONLY)

Flanged Globe Valve, VGF2



VGF Flanged Globe Valves are used for 2-position or modulating control of steam, hot water or chilled water-glycol solutions up to 50 percent concentration in closed loop heating, ventilation and air conditioning (HVAC) systems. They can be operated by ML6420/6425, ML6421/7421 Electric Linear Actuators, MP953 Pneumatic Actuators, Modutrol™ Motors with Q5001 valve linkage or MN/MS Series

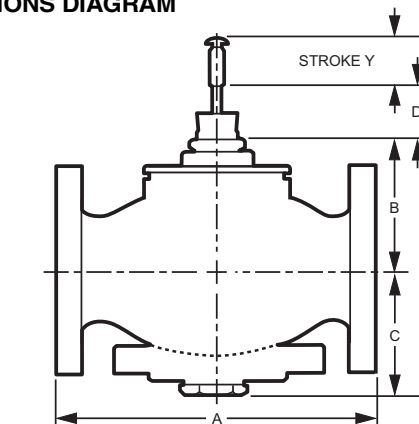
FEATURES

- ANSI Class 125 and Class 250 cast iron bodies with flanged end connections
- Equal percentage and linear flow characteristics
- Face-to-face flange dimensions per ANSI/ISA S75.03 standard
- Sizes from 2-1/2 to 6 in.
- Stainless steel trim standard for long life span
- ANSI Class III or IV seat leakage
- Steam inlet pressure up to 100 psig and 337 F maximum temperature
- Self-adjusting packing
- Accurate positioning with equal percentage and linear flow characteristics to ensure precise temperature control
- Universal bonnet for direct-coupled electric and pneumatic actuators for easy mounting, or linkage coupled Modutrol™ Motors and MN/MS Series direct coupled actuators.
- Not suitable for combustible gasses.
- Valves utilize direct mounting valve actuators, Q5020/ Q5024 linkages with Direct Coupled Actuators or Pneumatic Valve Actuators to operate the valve.

SPECIFICATIONS

Valve Type	Globe Valve
Valve Action	Stem down to close
Body Pattern	Two-way
Connection Type	Flanged
Controlled Fluid	Steam; Chilled or hot water with up to 50% Glycol. Not for use with fuels
Fluid Temperature Range	20 F to 250 F, steam 337 F (-7 C to +120 C, steam 180 C)
Actuation:	Must be purchased separately
Stem Travel	
2-1/2 and 3 inch valves	3/4 in. (20 mm)
4 to 6 inch valves:	1-1/2 in. (39 mm)
Bonnet Size	
2-1/2 and 3 inch valves	1-3/8 in. (35 mm)
4 to 6 inch valves:	1-7/8 in. (47.6 mm)
Materials	
(Body)	Cast Iron ASTM A126 Class B
(Stem)	Stainless Steel
(Seat)	Stainless Steel
(Cartridge)	Stainless Steel
(Plug/Ball/Disc)	Stainless Steel
(Packing)	Spring-loaded PTFE cone rings

DIMENSIONS DIAGRAM



1 DOTTED LINE REPRESENTS ANSI 125 VALVE BONNET.

MODEL NUMBER	DIMENSIONS, IN. (MM)				
	A	B	C	E	Y
2-WAY VALVES, ANSI CLASS 125. STEM DOWN TO CLOSE. EQUAL PERCENTAGE OR LINEAR FLOW CHARACTERISTIC					
VGF21_S25	10-7/8 (276)	4-3/8 (112)	7 (178)	3-1/2 (89)	13/16 (20)
VGF21_S30	11-3/4 (298)	6-3/8 (161)	7-1/2 (191)		
VGF21_S40	13-7/8 (352)	5-7/8 (150)	9 (229)	5-1/4 (133)	1-1/2 (38)
VGF21_S50	15-3/4 (400)	6-3/16 (157)	10 (254)		
VGF21_S60	17-3/4 (451)	6-3/16 (157)	11 (279)		
2-WAY VALVES, ANSI CLASS 250. STEM DOWN TO CLOSE. EQUAL PERCENTAGE FLOW CHARACTERISTIC					
VGF22ES25	11-1/2 (292)	4-3/8 (112)	7-1/2 (191)	3-1/2 (89)	13/16 (20)
VGF22ES30	12-1/2 (318)	6-3/8 (161)	8-1/4 (210)		
VGF22ES40	14-1/2 (368)	5-7/8 (150)	10 (254)	5-1/4 (133)	1-1/2 (38)
VGF22ES50	16-5/8 (422)	6-3/16 (157)	11 (279)		
VGF22ES60	18-5/8 (473)	6-3/16 (157)	12-1/2 (318)		
2-WAY VALVES, PRESSURE-BALANCED, ANSI CLASS 125. STEM DOWN TO CLOSE. EQUAL PERCENTAGE OR LINEAR FLOW CHARACTERISTIC					
VGF21_P25	10-7/8 (276)	4-3/16 (107)	7 (178)	3-1/2 (89)	13/16 (20)
VGF21_P30	11-3/4 (298)	5-7/8 (150)	7-1/2 (191)		
VGF21_P40	13-7/8 (352)	5-7/8 (150)	9 (229)	5-1/4 (133)	1-1/2 (38)
VGF21_P50	15-3/4 (400)	6-1/8 (156)	10 (254)		
VGF21_P60	17-3/4 (451)	6-1/8 (156)	11 (279)		

M27603

Submittal Data - Valves

Flanged Globe Valve, VGF3



VGF Flanged Globe Valves are used for 2-position or modulating control of hot water or chilled water-glycol solutions up to 50% concentration in closed loop heating, ventilation and air conditioning (HVAC) systems. They can be operated by ML6984/7984, ML6420/6425, ML6421/7421 Electric Linear Actuators, MP953 Pneumatic Actuators, Modutrol™ Motors with Q5001 valve linkage or MN/MS Series Direct Coupled Actuators with Q5020 or Q5024 valve linkages. Three-way bodies are available in mixing or diverting style with equal percentage and

linear flow characteristics, respectively. For boiler/chiller bypass applications requiring tight close-off, use VGF31/32LD diverting valves. For outdoor temperature compensation of building supply water or modulating control of heat exchangers, use VGF31/32EM mixing valves.

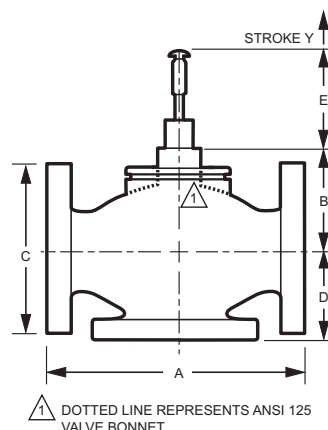
SPECIFICATIONS

Valve Type	Globe Valve
Body Pattern	Three-way
Connection Type	Flanged
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Leakage Rating	Port A seat leakage: 0.5%; Port B seat leakage 1.0%.
Maximum Safe Operating Pressure	175 psig at 130 F (66 C) (1206 kPa at 66 C (130 F))
Maximum Differential Pressure Ratings (Close-off)	.87 psi (599 kPa)
Fluid Temperature Range	20 F to 250 F (-7 C to +120 C)
Actuation:	Must be purchased separately
Stem Travel	
2-1/2 and 3 inch valves	3/4 in. (20 mm)
4 to 6 inch valves:	1-1/2 in. (39 mm)
Bonnet Size	
2-1/2 and 3 inch valves	1-3/8 in. (35 mm)
4 to 6 inch valves:	1-7/8 in. (47.6 mm)
Materials	
(Body)	Cast Iron ASTM A126 Class B
(Stem)	Stainless Steel
(Seat)	Stainless Steel
(Cartridge)	Stainless Steel
(Plug/Ball/Disc)	Stainless Steel
(Packing)	Spring-loaded PTFE cone rings

FEATURES

- ANSI Class 125 and Class 250 cast iron bodies with flanged end connections.
- Face-to-face flange dimensions per ANSI/ISA S75.03 standard.
- Sizes from 2-1/2 to 6 inches.
- Stainless steel trim standard for long life span.
- Self-adjusting packing.
- Accurate positioning with equal percentage and linear flow characteristics to ensure precise temperature control.
- Universal bonnet for direct-coupled electric and pneumatic actuators for easy mounting, or linkage coupled Modutrol™ Motors and MN/MS Series direct coupled actuators.
- Constant total flow throughout full plug travel (3-way diverting models).
- Not suitable for combustible gasses.
- Valves utilize direct mounting valve actuators, Q5020/ Q5024 linkages with Direct Coupled Actuators or Pneumatic Valve Actuators.

DIMENSIONS DIAGRAM



▲ DOTTED LINE REPRESENTS ANSI 125 VALVE BONNET.

MODEL NUMBER	DIMENSIONS, IN. (MM)					
	A	B	C	D	E	Y
3-WAY MIXING VALVES, ANSI CLASS 125. STEM UP TO CLOSE A-AB						
VGF31EM25	10-7/8 (276)	3 (76)	7 (178)	3-3/4 (95)	4-3/16 (107)	13/16 (20)
VGF31EM30	11-3/4 (298)	4-3/16 (107)	7-1/2 (191)	4-3/8 (111)		
VGF31EM40	13-7/8 (352)	5-8/16 (140)	9 (229)	5-1/8 (130)	6-11/16 (170)	1-1/2 (38)
VGF31EM50	15-3/4 (400)	5-3/8 (137)	10 (254)	5-3/4 (146)		
VGF31EM60	17-3/4 (451)	5-11/16 (145)	11 (279)	6-5/8 (168)		
3-WAY MIXING VALVES, ANSI CLASS 250. STEM UP TO CLOSE A-AB						
VGF32EM25	11-1/2 (292)	4-3/8 (112)	7-1/2 (191)	3-3/4 (95)	4-3/16 (107)	13/16 (20)
VGF32EM30	12-1/2 (318)	6-3/8 (161)	8-1/4 (210)	4-3/8 (111)		
VGF32EM40	14-1/2 (368)	5-7/8 (150)	10 (254)	5-1/8 (130)	6-11/16 (170)	1-1/2 (38)
VGF32EM50	16-5/8 (422)	6-3/16 (157)	11 (279)	5-3/4 (146)		
VGF32EM60	18-5/8 (473)	6-3/16 (157)	12-1/2 (318)	6-5/8 (168)		
3-WAY DIVERTING VALVES, ANSI CLASS 125. STEM DOWN TO CLOSE AB-A						
VGF31LD25	10-7/8 (276)	3 (76)	7 (178)	3-3/4 (95)	4-3/16 (107)	13/16 (20)
VGF31LD30	11-3/4 (298)	4-3/16 (107)	7-1/2 (191)	4-3/8 (111)		
VGF31LD40	13-7/8 (352)	5-8/16 (140)	9 (229)	5-1/8 (130)	6-11/16 (170)	1-1/2 (38)
VGF31LD50	15-3/4 (400)	5-3/8 (137)	10 (254)	5-3/4 (146)		
VGF31LD60	17-3/4 (451)	5-11/16 (145)	11 (279)	6-5/8 (168)		
3-WAY DIVERTING VALVES, ANSI CLASS 250. STEM DOWN TO CLOSE AB-A						
VGF32LD25	11-1/2 (292)	4-3/8 (112)	7-1/2 (191)	3-3/4 (95)	4-3/16 (107)	13/16 (20)
VGF32LD30	12-1/2 (318)	6-3/8 (161)	8-1/4 (210)	4-3/8 (111)		
VGF32LD40	14-1/2 (368)	5-7/8 (150)	10 (254)	5-1/8 (130)	6-11/16 (170)	1-1/2 (38)
VGF32LD50	16-5/8 (422)	6-3/16 (157)	11 (279)	5-3/4 (146)		
VGF32LD60	18-5/8 (473)	6-3/16 (157)	12-1/2 (318)	6-5/8 (168)		

M27604

Pressure Independent Control Valves, VRN



The VRN2 two-way pressure independent control ball valves maintain constant flow of hot or chilled water in closed loop heating, ventilating and air conditioning (HVAC) systems regardless of head pressure fluctuations above the minimum specified pressure drop. These valve assemblies can be used with Honeywell non-spring return or spring return direct coupled actuators (DCA) with minimum torque of 35 lb-in (4 Nm) on valve sizes up to 3 inches (DN80). The built-in differential pressure regulator makes fluid flow through the valve independent of changes in supply pressure, eliminating "hunting" by the control system, even at low coil flow. The pressure regulator virtually eliminates cavitation in the valve, and decouples the control valve from the effects of piping components such as reducers and elbows.

Pressure independent control valves are sized to match design coil flow regardless of coil size. VRN2 valves eliminate the need to balance the system for proper flow, and allow chillers to be operated at design temperature differential for maximum efficiency at every load condition. When used in a system with variable speed pump drives, 3-way valves and coil bypass lines are not required. In new construction, VRN2 valves perform better than reverse return piping designs without the extra materials these systems need.

Systems that utilize the capabilities of properly installed and monitored pressure independent control valves may qualify for LEED points. Pressure independent control requires less flow, enabling use of smaller piping, pumps and chillers.

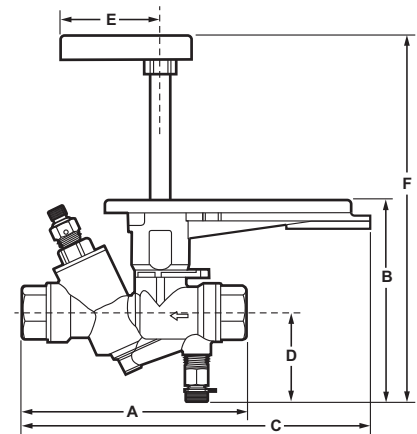
SPECIFICATIONS

Valve Type	Dynamic pressure independent control valve
Body Pattern	2-way, straight-through
Pipe Connection Type	Female-NPT
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Valve Action.....	Quarter-turn rotary
Maximum Safe Operating Pressure	360 psi (2500 kPa)
Maximum Safe Operating Temperature.....	248 F (120 C)
Maximum Close-off Pressure	100 psid (690 kPa)
Fluid Temperature Range.....	-22 F to 250 F (-30 C to 121 C)
Ambient Temperature Range	14 F to 131 F (-10 C to 55 C)
Accuracy	±5% over specified pressure range
Stem Travel.....	90 deg. rotation
Materials	
(Body).....	Forged Brass ASTM B584
(Seat).....	Teflon seals/EPDM O-rings
(Regulator)	Stainless Steel
(Packing).....	Teflon seals/EPDM O-rings
(Diaphragm)	Hydrogenated Acrylonitrile Butadiene Rubber
Comments	No feedback signal Full port ball; No feedback

FEATURES

- Sizes from 1/2 to 3 in. with internal (female) NPT connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 1 to 95 gpm.
- Differential pressure regulator for constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design for long service life for flow control accuracy of ±5% over specified control range.
- Equal percentage flow characteristic using patented flow control ball insert.
- Multiple regulated flow rates available per valve size.
- Patented ball seals require low operating torque.
- Nickel-chrome plated brass or stainless steel trim.
- Choice of factory-installed actuation using Honeywell N05/S05-series direct-coupled actuators: Floating, Modulating (2-10 V), Spring Return Modulating/Floating.
- Spring return actuators field-configurable for normally open or normally closed fail safe position.
- Actuators available with optional auxiliary switches.
- Removable, manual operating handle to control valve during installation or in an event of power failure.
- Upstream Test Port for venting or pressure gauge attachment.
- Three actuator orientations on the valve for cramped spaces.

DIMENSIONS DIAGRAM



VALVE SIZE (IN.)	DIMENSIONS IN INCHES (MM)						
	A	B	C	D	E	F _z ^a	F _s ^a
1/2	5-11/16 (145)	4-5/16 (109)	8-19/32 (218)	1 (26)	2-1/2 (64)	8-13/32 (213)	7-3/16 (182)
3/4	5-29/32 (150)		8-45/64 (221)				
1	9 (229)	4-19/32 (117)	10-57/64 (277)	1-5/8 (41)		9-13/32 (239)	8-3/16 (207)
1-1/4	8-3/32 (213)		10-19/32 (269)				
1-1/2	8-3/16 (208)		10-1/2 (267)				
	10 (254)	5-3/16 (132)	12-3/32 (307)	2-3/32 (53)		10-13/32 (264)	9-3/16 (232)
2	9-29/32 (251)		12 (305)				
2-1/2	10-9/32 (263)		12-3/16 (310)				
3	10-13/16 (274)		12-13/32 (314)				

^a LONG SHAFT SUPPLIED WITH "ZELIX" (Z) DIRECT COUPLED ACTUATORS; SHORT SHAFT SUPPLIED WITH "SALT" (S) NON-SPRING RETURN DCAS.

M31310A

Submittal Data - Valves

Pressure Independent Control Valves, VRW



The VRW2 two-way pressure independent control valves maintain constant flow of hot and chilled water in closed-loop heating, ventilating and air conditioning (HVAC) systems regardless of head pressure fluctuations above minimum specified pressure drop. These valves come complete with proportional, stay-in-place or electronic fail safe actuators.

The built-in differential pressure regulator makes fluid flow through the valve independent of changes

in supply pressure, eliminating “hunting” by the control system, even at low coil flow. The pressure regulator virtually eliminates cavitation in the valve, and decouples the control valve from the effects of piping components such as reducers and elbows.

Pressure independent control valves are sized to match design coil flow regardless of coil size. VRW2 valves eliminate the need to balance the system for proper flow, and allow chillers to be operated at design temperature differential for maximum efficiency at every load condition. When used in a system with variable speed pump drives, 3-way valves and coil bypass lines are not required.

Systems that utilize the capabilities of properly installed, adjusted, and monitored pressure independent control valves may qualify for LEED points.

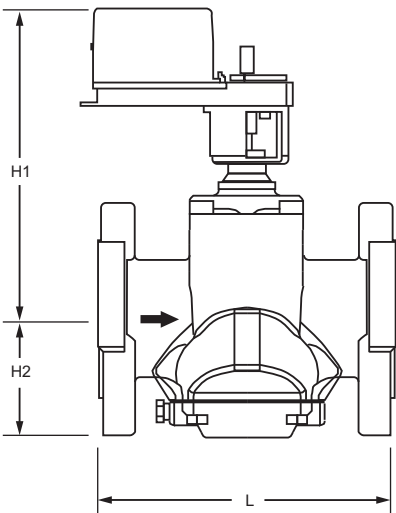
FEATURES

- Multi-sized bodies from 2-1/2 to 6 inch pipes with wafer flanged connections.
- Combination ANSI/ASME Class 150/300 flange connections.
- Controls hot or chilled water with up to 50% glycol.
- Regulated flow rates available from 40.7 to 468 gpm.
- Stainless steel pressure regulator maintains constant pressure drop across valve seat.
- Positive pressure, rolling diaphragm regulator design provides flow control accuracy of ±5% over specified pressure range.
- Equal percentage flow characteristic using multi turn, non-rising, characterized plug.
- High close-off rating.
- 50 discrete, selectable flow rates available per valve size.
- Stainless steel trim.
- Six-turn actuator with floating or modulating inputs available with stay-in-place or electronic fail safe action.
- Fail safe actuators field-configurable for normally open or normally closed power failure return position.
- Two Test Ports for venting or pressure gauge attachment.

SPECIFICATIONS

Valve Type	Wafer flanged dynamic pressure independent control valve
Body Pattern	2-way, straight-through
Flow Characteristic	Equal Percentage
Pipe Connection Type	Wafer flange
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Valve Action	Multi-turn linear
Leakage Rating	0.2% max.
Maximum Safe Operating Pressure	580 psig (4000 kPa)
Maximum Safe Operating Temperature	248 F (120 C)
Maximum Close-off Pressure	100 psid (700 kPa)
Fluid Temperature Range	-4 F to 248 F (-20 C to 120 C)
Ambient Temperature Range	14 F to 131 F (-10 C to 55 C)
Accuracy	±5% over specified pressure range
Stem Travel	1 to 6 Rotations in 51 equal, field-selectable increments
ANSI/ ASME Class	150/300
Comments	2 - 10V position feedback signal
Materials	
(Body)	Ductile Iron, ASTM A536-65T, Class 60-45-18
(Stem)	Stainless Steel
(Seat)	316 Stainless steel
(Regulator)	316 Stainless steel
(Plug/Ball/Disc)	316 stainless steel
(Packing)	EPDM and Nitrile O-rings
(Diaphragm)	EPDM

DIMENSIONS DIAGRAM



L		H ₁		H ₂	
in.	mm	in.	mm	in.	mm
8 3/4	224	9 3/4	246	3 3/4	95
12 5/8	320	11 3/8	290	5 1/4	135
16 5/8	422	13 1/4	338	7 1/8	180

M31311

Submittal Data - Valves

Resilient Seat Butterfly Valves, VFF1

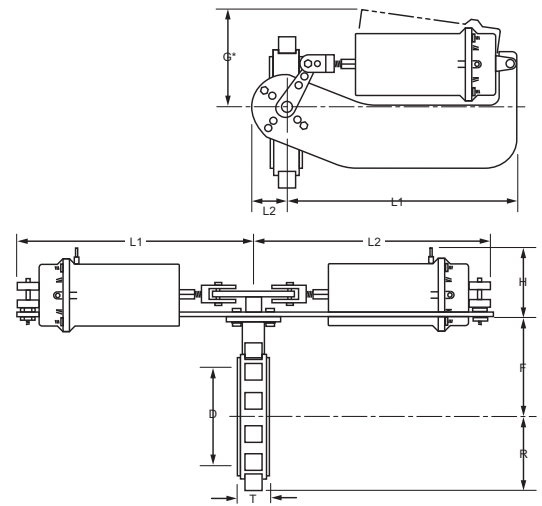


Resilient seat in two-way valves, provide control for HVAC system applications including chilled water, hot water, cooling tower water and thermal storage systems.

SPECIFICATIONS

Body Pattern	2 way (S/R NO)
Valve Action	Normally Open
Connection Type	Lugged
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Actuator Control Type	Pneumatic
Type of Enclosure	Pneumatic
Flow Characteristic	Modified Equal Percent
Mounting	ANSI Flanged
Static Pressure Rating (max)	250 psi (1724 kPa)
Actuator Temperature Ratings	-20 F to 150 F (-29 C to 66 C)
Fluid Temperature Range	-40 F to 250 F (-40 C to 121 C)
Number of Flange Bolts	
For 2 in., 2-1/2 in., 3 in. valves:	4
For 4 in., 5 in., 6 in., 8 in., valves:	8
For 10 in., 12 in., 14 in. valves:	12
For 16 in., 18 in. valves:	16
For 20 in. valves:	20
Flange Bolt Thread	
For 2 in., 2-1/2 in., 3 in. valves:	5/8 in.-11 pitch
For 4 in., 5 in., 6 in., 8 in., valves:	3/4 in.-10 pitch
For 10 in., 12 in., 14 in. valves:	7/8 in.-9 pitch
For 16 in., 18 in., 20 in. valves:	1-1/8 in.-7 pitch
Materials	
(Body)	Polyester-coated cast iron
	ASTM A126 Class B
(Stem)	416 Stainless Steel
(Seat)	Peroxide-cured EPDM resilient seat
(Plug/Ball/Disc)	Nylon 11-coated ductile iron

DIMENSIONS DIAGRAM



PIPE SIZE IN. [mm]	FULL CUT DISK, 175 PSI CLOSE-OFF (VFF1/2, W1Y8P/PP)					THICKNESS T	UNDER CUT DISK, 50 PSI CLOSE-OFF** (VFF1/2, V1Y8P/PP)				
	G	H	HP	L1	L2		G	H	HP	L1	L2*
2 [DN50]						1-5/8 [41]					
2-1/2 [DN65]	5-5/8 [144]	3-1/8 [79]	6-1/4 [160]	16 [406]		1-3/4 [44]					
3 [DN80]					3 [76]						
4 [DN100]	7-1/4 [186]		10 [254]	20 [506]		2 [51]	5-5/8 [144]	3-1/8 [79]	6-1/4 [160]	16 [406]	
5 [DN125]						2-1/8 [54]	7-1/4 [186]		10 [254]	20 [506]	3 [76]
6 [DN150]	9 [227]	6-7/8 [175]	10-1/8 [257]	22-3/4 [578]							
8 [DN200]					22-3/4 [578]	2-1/2 [64]	9 [227]	6-7/8 [175]	10-1/8 [257]	22-3/4 [578]	
10 [DN250]											22-3/4 [578]
12 [DN300]											

**NOTE: VALVE SIZES 2 TO 3 INCHES ARE AVAILABLE ONLY WITH FULL CUT DISKS.
VALVE STROKE IS LIMITED TO 70 DEGREES.

VALVES

M16908

Submittal Data - Valves

Resilient Seat Butterfly Valves, VFF2



Resilient seat two-way valves provide control for HVAC system applications including chilled water, hot water, cooling tower water and thermal storage systems.

SPECIFICATIONS

Body Pattern.....	2 way (NC, NC/NO; NSR)
Valve Action.....	Normally Closed, convertible to Normally Open with Spring Return DCA
Connection Type.....	Lugged
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Flow Characteristic.....	Modified Equal Percent
Mounting.....	ANSI Flanged
Static Pressure Rating (max).....	250 psi (1724 kPa)
Actuator Temperature Ratings.....	-5 F to 140 F (-20 C to 60 C)
Fluid Temperature Range	-40 F to 250 F (-40 C to 121 C)
Number of Flange Bolts	
For 2 in., 2-1/2 in., 3 in. valves:.....	4
For 4 in., 5 in., 6 in., 8 in., valves:	8
For 10 in., 12 in., 14 in. valves:.....	12
For 16 in., 18 in. valves:.....	16
For 20 in. valves:.....	20
Flange Bolt Thread	
For 2 in., 2-1/2 in., 3 in. valves:.....	5/8 in.-11 pitch
For 4 in., 5 in., 6 in., 8 in., valves:	3/4 in.-10 pitch
For 10 in., 12 in., 14 in. valves:.....	7/8 in.-9 pitch
For 16 in., 18 in., 20 in. valves:.....	1-1/8 in.-7 pitch
Materials	
(Body).....	Polyester-coated cast iron
(Stem)	ASTM A126 Class B
(Seat).....	416 Stainless Steel
(Seat).....	Peroxide-cured EPDM resilient seat
(Plug/Ball/Disc).....	Nylon 11-coated ductile iron

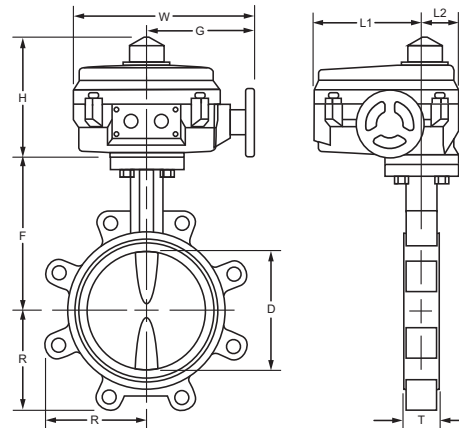
APPROVALS

CE.....	Compliant
Underwriters Laboratories, Inc.	C/US UL873, Plenum Rated

ACCESSORIES

VFF50-0400—Position status monitor for VFF butterfly valves with high pressure pneumatic actuators

DIMENSIONS DIAGRAM



PIPE SIZE IN. [mm]	FULL CUT DISK, HIGH CLOSE-OFF* NEMA 4X (VFF2 W1YXA/B)					THICK- NESS T	UNDER CUT DISK, 50 PSI CLOSE-OFF** NEMA 4X (VFF2 V1YXA/B)				
	W	H1	L1	L2	G		W	H1	L1	L2	G
2 [DN50]						1-5/8 [41]					
2-1/2 [DN65]	7-1/2 [191]	6-3/4 [170]	5-1/2 [141]	2 [51]	5-3/4 [147]	1-3/4 [44]					
3 [DN80]						2 [51]					
4 [DN100]						2-1/8 [54]	7-1/2 [191]	6-3/4 [170]	5-1/2 [141]	2 [51]	5-3/4 [147]
5 [DN125]	10-1/8 [257]	8-1/8 [206]	7-3/8 [188]	2-3/4 [68]	7-3/4 [198]	2-1/2 [64]	10-1/8 [257]	8-1/8 [206]	7-3/8 [188]	2-3/4 [68]	7-3/4 [198]
6 [DN150]						3 [76]					
8 [DN200]	12-1/8 [307]	8-3/4 [224]	8-7/8 [226]	3-1/4 [81]	9-1/2 [241]		12-1/8 [307]	8-3/4 [224]	8-7/8 [226]	3-1/4 [81]	9-1/2 [241]
10 [DN250]						4 [102]					
12 [DN300]						4-1/4 [108]					
14 [DN350]						5 [127]					
16 [DN400]	NEMA 4 (VFF2_W1Y4A/4B)					4 [102]	NEMA 4 (VFF2_V1Y4A/4B)				
18 [DN450]	8-1/2 [217]	16 [406]	8-3/4 [221]	4-1/2 [115]	12-1/2 [320]		8-1/2 [217]	16 [406]	8-3/4 [221]	4-1/2 [115]	12-1/2 [320]
20 [DN500]											

* 175 PSI [1206 KPA] CLOSE-OFF UP TO 12 INCHES [DN 300], 150 PSI [1034 KPA] OTHERWISE

**NOTE: VALVE SIZES 2 TO 3 INCHES HAVE 175 PSI [1206 KPA] CLOSE-OFF AND ARE AVAILABLE ONLY WITH FULL CUT DISKS.

△ NEMA 4X ACTUATORS ARE WATERPROOF AND CORROSION-RESISTANT.

M16907

Submittal Data - Valves

Resilient Seat Butterfly Valves, VFF3



Resilient seat three-way valves provide control for HVAC system applications including chilled water, hot water, cooling tower water and thermal storage systems.

SPECIFICATIONS

Body Pattern	3 way (A-B-AB porting)
Valve Action	Normally Closed
Connection Type	Lugged
Controlled Fluid	Chilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Actuator Control Type	Electric floating
Flow Characteristic	Modified Equal Percent
Mounting	ANSI Flanged
Static Pressure Rating (max)	250 psi (1724 kPa)
Actuator Temperature Ratings	-5 F to 140 F (-20 C to 60 C)
Fluid Temperature Range	-40 F to 250 F (-40 C to 121 C)
Number of Flange Bolts	
For 2 in., 2-1/2 in., 3 in. valves:	4
For 4 in., 5 in., 6 in., 8 in., valves:	8
For 10 in., 12 in., 14 in. valves:	12
For 16 in., 18 in. valves:	16
For 20 in. valves:	20
Flange Bolt Thread	
For 2 in., 2-1/2 in., 3 in. valves:	5/8 in.-11 pitch
For 4 in., 5 in., 6 in., 8 in., valves:	3/4 in.-10 pitch
For 10 in., 12 in., 14 in. valves:	7/8 in.-9 pitch
For 16 in., 18 in., 20 in. valves:	1-1/8 in.-7 pitch
Materials	
(Body)	Polyester-coated cast iron
	ASTM A126 Class B
(Stem)	416 Stainless Steel
(Seat)	Peroxide-cured EPDM resilient seat
(Plug/Ball/Disc)	Nylon 11-coated ductile iron

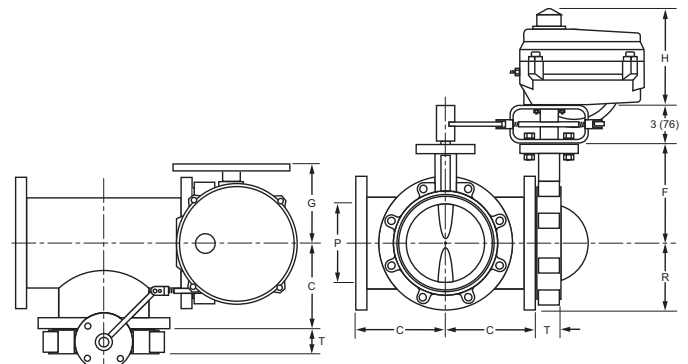
APPROVALS

CE	Compliant
Underwriters Laboratories, Inc.	C/US UL873, Plenum Rated

ACCESSORIES

VFF50-0400—Position status monitor for VFF butterfly valves with high pressure pneumatic actuators

DIMENSIONS DIAGRAM



PIPE SIZE IN. [mm]	FULL CUT DISK, 175 PSI CLOSE-OFF NEMA 4X (VFF3/6, W1YXA/B)					THICKNESS T	UNDER CUT DISK, 50 PSI CLOSE-OFF** NEMA 4X (VFF3/6, V1YXA/B)				
	W	H	L1	L2	G		W	H	L1	L2	G
2 [DN50]						1-5/8 [41]					
2-1/2 [DN65]	7-1/2 [191]	6-3/4 [170]	5-1/2 [141]	2 [49]	5-3/4 [147]	1-3/4 [44]					
3 [DN80]											
4 [DN100]						2 [51]	7-1/2 [191]	6-3/4 [170]	5-1/2 [141]	2 [49]	5-3/4 [147]
5 [DN125]						2-1/8 [54]					
6 [DN150]	10-1/8 [257]	8-1/8 [206]	7-3/8 [188]	2-3/4 [68]	7-3/4 [198]						
8 [DN200]						2-1/2 [64]	10-1/8 [257]	8-1/8 [206]	7-3/8 [188]	2-3/4 [68]	7-3/4 [198]
10 [DN250]											
12 [DN300]	12-1/8 [307]	8-3/4 [224]	8-7/8 [226]	3-1/4 [81]	9-1/2 [241]	3 [76]	12-1/8 [307]	8-3/4 [224]	8-7/8 [226]	3-1/4 [81]	9-1/2 [241]
14 [DN350]											
16 [DN400]						4 [102]					
18 [DN450]	8-1/2 [217]	16 [406]	8-3/4 [221]	4-1/2 [115]	12-1/2 [320]	4-1/4 [108]					
20 [DN500]						5 [127]	8-1/2 [217]	16 [406]	8-3/4 [221]	4-1/2 [115]	12-1/2 [320]

* 175 PSI [1206 KPA] CLOSE-OFF UP TO 12 INCHES [DN 300], 150 PSI [1034 KPA] OTHERWISE

**NOTE: VALVE SIZES 2 TO 3 INCHES HAVE 175 PSI [1206 KPA] CLOSE-OFF AND ARE AVAILABLE ONLY WITH FULL CUT DISKS.

M16906

Submittal Data - Valves

Resilient Seat Butterfly Valves, VFF6



Resilient seat three-way valves provide control for HVAC system applications including chilled water, hot water, cooling tower water and thermal storage systems.

SPECIFICATIONS

- Body Pattern.....3 way (A-AB-B porting)
Valve Action.....Normally Closed
Connection Type.....Lugged
Controlled FluidChilled or hot water with up to 50% Glycol. Not for use with steam or fuels.
Actuator Control Type.....Electric floating
Type of EnclosureNEMA 2 housing
Flow Characteristic.....Modified Equal Percent
Mounting.....ANSI Flanged
Static Pressure Rating (max).....250 psi (1724 kPa)
Actuator Temperature Ratings.....-5 F to 140 F (-20 C to 60 C)
Fluid Temperature Range-40 F to 250 F (-40 C to 121 C)
Number of Flange Bolts
For 2 in., 2-1/2 in., 3 in. valves:.....4
For 4 in., 5 in., 6 in., 8 in., valves:8
For 10 in., 12 in., 14 in. valves:.....12
For 16 in., 18 in. valves:.....20
For 20 in. valves:20
Flange Bolt Thread
For 2 in., 2-1/2 in., 3 in. valves:.....5/8 in.-11 pitch
For 4 in., 5 in., 6 in., 8 in., valves:3/4 in.-10 pitch
For 10 in., 12 in., 14 in. valves:.....7/8 in.-9 pitch
For 16 in., 18 in., 20 in. valves:.....1-1/8 in.-7 pitch
Materials
(Body).....Polyester-coated cast iron
ASTM A126 Class B
(Stem)416 Stainless Steel
(Seat)Peroxide-cured EPDM resilient seat
(Plug/Ball/Disc).....Nylon 11-coated ductile iron

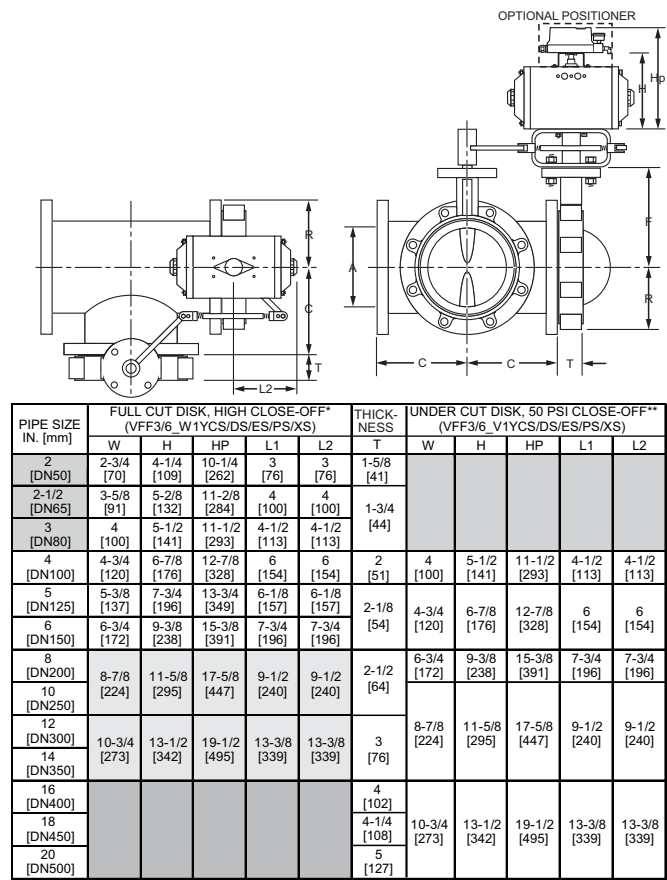
APPROVALS

- CE.....Compliant
Underwriters Laboratories, Inc.C/US UL873, Plenum Rated

ACCESSORIES

- VFF50-0400—Position status monitor for VFF butterfly valves with high pressure pneumatic actuators

DIMENSIONS DIAGRAM



* 175 PSI [1206 KPA] CLOSE-OFF UP TO 12 INCHES [DN 300], 150 PSI [1034 KPA] AT 14 INCHES AND NO PRODUCT AVAILABLE GREATER THAN 14 INCHES.
**NOTE: VALVE SIZES 2 TO 3 INCHES ARE AVAILABLE ONLY WITH FULL CUT DISKS.



The Q5001 Valve Linkage connects a Modutrol® Motor to a 2- or 3-way valve. It is used primarily on V5011 or V5013 steam and water valves.

SPECIFICATIONS

Linkage Type	Valve
Mounting	Linkage mounts directly to the valve bonnet; motor mounts on linkage bracket.
Used with Actuator	Modutrol Motor
Stem Force Rating	80 or 160 lbf (356 N or 712 N)
Ambient Temperature Range	-40 F to +150 F (-40 C to +66 C)

ACCESSORIES

220829BCQ1—Barber-Colman Valve Adapter Kit
220829LGQ3—Landis and Gyr Powers Valve Adapter Kit

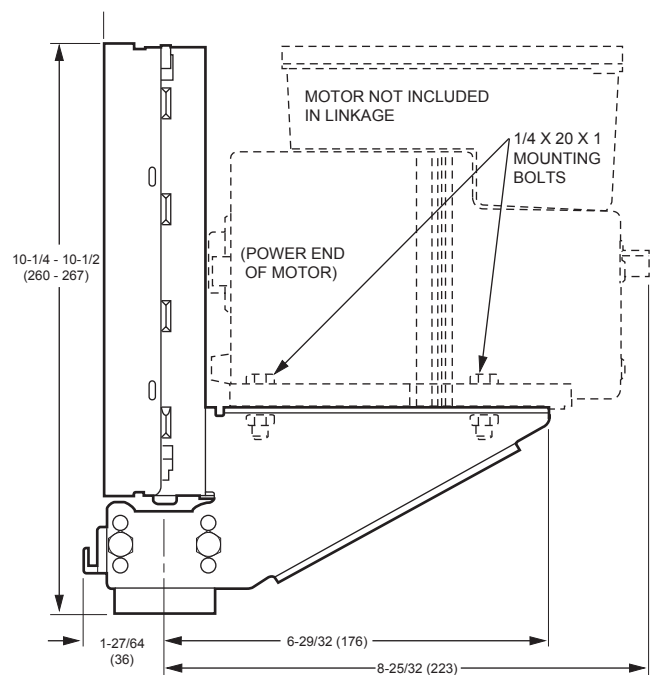
REPLACEMENT PARTS

220845/0767—Retainer button for Q5001

FEATURES

- Q5001 Valve Linkage is applicable to 2-Way or 3-Way valves in modulating or two-position service.
- Linkage requires no adjustment when used with Honeywell valves and Modutrol IV™ Motors.
- Q5001 Valve Linkage replaces Q601 and Q618 Valve Linkages.
- Linkage mounts directly to the valve bonnet; motor mounts to linkage bracket.
- Easy-to-read position indicator.
- Valve stem lift height cam selectable.
- Overtravel permits tight close-off without excessive motor strain.
- Available brackets make linkages adaptable to many valve bodies.
- Models available with 80 lb, 160 lb, and 320 lb stem force.
- Reversible cams on the Q5001 allow field selection of normally open or normally closed valve operation.
- All models have anti-spin clips.

DIMENSIONS DIAGRAM



M13993

Submittal Data - Valves

Globe Valve Linkage, Q5020



The Q5020 Globe Valve Linkages connect a Honeywell direct coupled actuator (DCA) to a steam or water globe valve. The Q5020 Linkages are compatible with two-way and three-way globe valves up to 3 inch (DN80).

FEATURES

- Used with two-way and three-way globe valves in modulating or two-position service.
- Used with 25, 50, and 142 lb-in. spring return and 35, 70, 150, and 300 lb-in. non-spring return DCA.
- Quick and simple installation with no disassembly required.
- Heavy-duty steel rack and pinion construction and aluminum die-cast housing.
- Maintenance-free construction.
- Precision roller-bearing rack construction prevents premature valve packing wear and leakage.
- Flexible actuator mounting orientation.
- Adjustable manual override lever and valve position indicator.
- Can be mounted on specific non-Honeywell valves using a 32004629 Bonnet Adapter Kit.

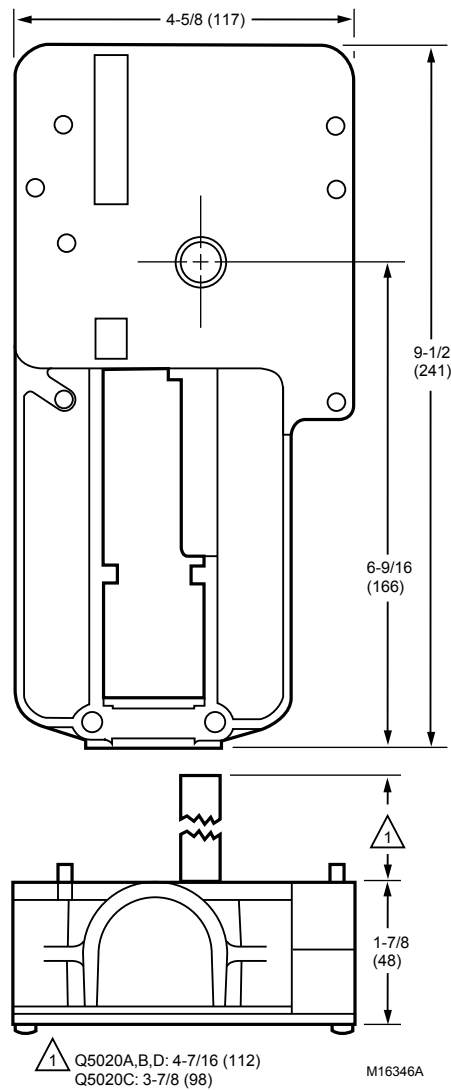
SPECIFICATIONS

Linkage Type..... Valve
Mounting Linkage mounts directly to the valve bonnet; actuator mounts on linkage
Used with Actuator Direct Coupled Actuator

ACCESSORIES

- 32004629-001—Bonnet adapter kit to adapt Siemens (Landis/Power) Flowrite 599 1/2 inch to 3 inch globe valves with Q5020A or Q5009B
- 32004629-002—Bonnet adapter kit to adapt Johnson VG7000 1/2 inch to 3/4 inch globe valves with Q5020D
- 32004629-003—Bonnet adapter kit to adapt Johnson VG7000 1 inch to 2 inch globe valves with Q5020A, Q5020B or Q5020D
- 32004629-004—Bonnet adapter kit to adapt Siebe VB7000 1/2 inch to 2 inch globe valves with Q5020D

DIMENSIONS DIAGRAM



Globe Valve Linkage, Q5024



These easy to install linkage and bonnet/stem adapter combinations fit easily into most globe valve installations. Save time and money by replacing outdated electrical or pneumatic actuators with Honeywell MS and MN spring and non-spring return DCAs. When an expensive valve changeout isn't necessary, these retrofit linkages are used to modernize existing HVAC installations with high preforming DCAs. This enables integration of these components with a Building Management System.

FEATURES

- For use with 2-way and 3-way globe valves in modulating or two-position service.
- Models for single or dual actuators for higher close-off pressures.
- Heavy-duty steel rack and pinion construction and aluminum die-cast housing.
- Maintenance-free construction.
- Available for 1/2" through 6" globe valves made by most manufacturers.
- Used with Honeywell MS and MN Spring and Non-Spring Actuators.

SPECIFICATIONS

Linkage Type Valve
 Mounting..... Linkage mounts on the valve bonnet; actuator(s) mount on linkage
 Used with Actuator Direct Coupled Actuator
 Includes..... Anti-rotation pins
 Comments This linkage is not compatible with the 43196000 high temperature kits

ACCESSORIES

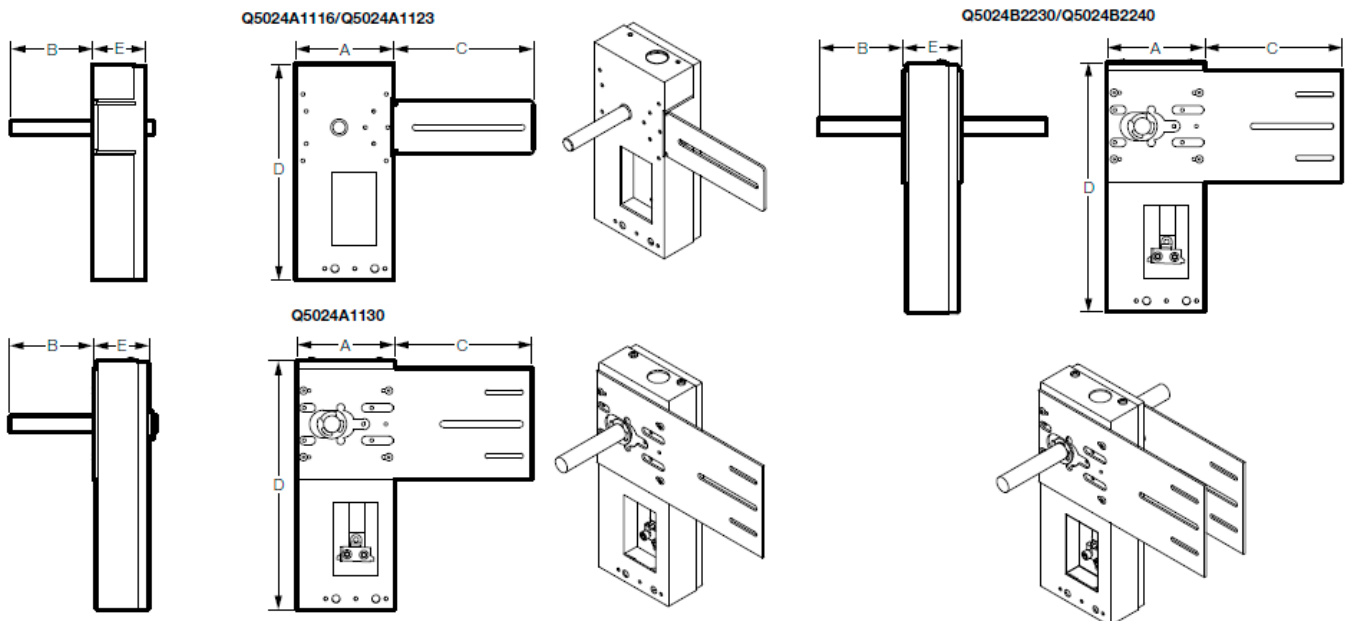
Stem and bonnet adapter needed for most valves, see form 38-00020

Models

Linkage	Actuator Qty	Valve Stroke
Q5024A1116	1	0.63" / 16 mm
Q5024A1123	1	0.91" / 23 mm
Q5024A1130	1	1.18" / 30 mm
Q5024B2230	2	1.18" / 30 mm
Q5024B2240	2	1.57" / 40 mm

Note: If the exact stroke is not available than round up to the next higher stroke.

DIMENSIONS DIAGRAM



Dimensions in Inches.

Linkage	A	B	C	D	D	Shaft Dia.
Q5024A1116 Q5024A1123	4-3/8"	3-1/2"	6-1/4"	9-1/2"	2-1/2"	16mm
Q5024A1130 Q5024B2230 Q5024B2240	4-3/8"	4"	6"	11"	2-3/8"	19mm

Submittal Data - Valves

Globe Valve Linkage, Q5024

LINKAGE SELECTION INSTRUCTION

When selecting your linkage look at the table below for the valve model list. Select the correct valve size to see the recommended linkage and bonnet adapter. Choose the correct actuator torque based on necessary close-off pressure. If model you are looking for is not listed fill out the Special Order Form located on page 199.

If you do not have the exact part number or valve size, measure the valve stroke and select the corresponding linkage from the table on the previous page. Next, select the appropriate bonnet adapter kit from the list on page 210. This kit includes variety of bonnet adapters for you to choose from at the job site.

Linkage and Actuator Selection.

Manufacturer	Valve Model	Single Actuator Linkage			
Honeywell	V5011 V5013	Valve Connection Size (inch)	Linkage		
		0.5	Use Q5020A1003 for single actuator applications on Honeywell valves 1/2" to 3".		
		0.75			
		1			
		1.25			
		1.5			
		2			
		2.5			
		3			
		Dual Actuator Linkage			
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)	
				350 (2 x 175)	600 (2 x 300)
		Close-Off (psi)			
	2	Q5024B2230 and HU5024-001	118		
	2.5		75	123	
	3		50	80	
	4	Q5024B2240 and HU5024-002	18	38	
	5		12	21	
	6		10	16	
	VGF	Single Actuator Linkage			
Valve Connection Size (inch)		Linkage			
2.5		Use Q5020A1003 for single actuator applications on Honeywell valves 1/2" to 3".			
3					
Dual Actuator Linkage					
Valve Connection Size (inch)		Linkage and Bonnet Adapter	Actuator Torque (lb-in)		
			350 (2 x 175)	600 (2 x 300)	
Close-Off (psi)					
2.5		Q5024B2230 and HU5024-001	61	105	
3			30	52	
4		Q5024B2240 and HU5024-002	22	39	
5			9	15	
6			9	15	

Linkage and Actuator Selection. (Continued)

Manufacturer	Valve Model	Dual Actuator Linkage						
Honeywell (continued)	VGF Pressure Balanced	Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)				
				350 (2 x 175)		600 (2 x 300)		
				Close-Off (psi)				
		2.5	Q5024B2230 and HU5024-001	175		175		
		3		175		175		
		4	Q5024B2240 and HU5024-002	175		175		
		5		175		175		
		6		175		175		
Johnson Control	V90AD-1C thru 7C V90DD-1C thru 7C	Single Actuator Linkage						
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)				
				44	88	175	300	
				Close-Off (psi)				
		0.5	Q5024A1116 and JU5024-005	230	230			
		0.75		165	230			
		1	Q5024A1123 and JU5024-005	80	140			
		1.5			65	140		
		V90CA-1 thru 8	0.5	Q5024A1123 and JU5024-005	230	230		
			0.75		130	230		
	1		80		140	230		
	1.25		50		90	200		
	1.5				65	140		
	2				35	80	140	
	2.5		Q5024A1123 and JU5024-002			55	90	
	Dual Actuator Linkage							
	Valve Connection Size (inch)		Linkage and Bonnet Adapter	Actuator Torque (lb-in)				
				350 (2 x 175)		600 (2 x 300)		
				Close-Off (psi)				
	3		Q5024B2230 and JU5024-002	50		80		

Submittal Data - Valves

Globe Valve Linkage, Q5024

Linkage and Actuator Selection. (Continued)

Manufacturer	Valve Model	Single Actuator Linkage						
Johnson Control (continued)	VG7000/2000 Series	Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)				
				44	88	175	300	
				Close-Off (psi)				
		0.5	Q5024A1116 and JU5024-001	230	230			
		0.75		165	230			
		1	Q5024A1116 and JU5024-003	100	190			
		1.25		65	120			
		1.5	Q5024A1123 and JU5024-003		65	140		
		2			35	80	140	
		2.5	Q5024A1123 and JU5024-004			55	90	
		Dual Actuator Linkage						
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)				
				350 (2 x 175)		600 (2 x 300)		
				Close-Off (psi)				
		3	Q5024B2230 and JU5024-004	50		80		
		4		18		48		
		5	Q5024B2240and JU5024-004	12		21		
		6		10		16		
	VTM Series VB-3752		Single Actuator Linkage					
			Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
					44	88	175	300
					Close-Off (psi)			
			0.5	Q5024A1116 and JU5024-005	230	230		
			0.75		165	230		
			1		100	190		
			1.25	Q5024A1123 and JU5024-005	50	90		
1.5					65	140		
2					35	80	140	
2.5			Q5024A1123 and JU5024-002				55	90
Dual Actuator Linkage								
Valve Connection Size (inch)			Linkage and Bonnet Adapter	Actuator Torque (lb-in)				
				350 (2 x 175)		600 (2 x 300)		
				Close-Off (psi)				
3			Q5024B2230 and JU5024-002	50		80		
4				18		48		
5			Q5024B2240 and JU5024-006	12		21		
6			Q5024B2240 and JU5024-004	10		16		

Linkage and Actuator Selection. (Continued)

Manufacturer	Valve Model	Single Actuator Linkage						
Johnson Control (continued)	VB-3754-1 thru 8 VB-3970	Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)				
				44	88	175	300	
				Close-Off (psi)				
		0.5	Q5024A1116 and JU5024-005	230	230			
		0.75		165	230			
		1	Q5024A1123 and JU5024-005	80	140			
		1.25		50	90	200		
		1.5			65	140		
		2			35	80	140	
		2.5	Q5024A1123 and JU5024-002			55	90	
		Dual Actuator Linkage						
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)				
				350 (2 x 175)		600 (2 x 300)		
				Close-Off (psi)				
	3	Q5024B2230 and JU5024-002	50		80			
	4		18		48			
	5	Q5024B2240 and JU5024-006	12		21			
	6		10		16			
	VB-3954-1 thru 7 VB-4324-1 thru 7 VB-4322	VB-3954-1 thru 7 VB-4324-1 thru 7 VB-4322	Single Actuator Linkage					
			Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
					44	88	175	300
Close-Off (psi)								
0.5			Q5024A1116 and JU5024-005	230	230			
0.75				165	230			
1			Q5024A1123 and JU5024-005	80	140			
1.25				50	90	200		
1.5					65	140		
2					35	80	140	
2.5			Q5024A1123 and JU5024-002			55	90	
Dual Actuator Linkage								
Valve Connection Size (inch)			Linkage and Bonnet Adapter	Actuator Torque (lb-in)				
				350 (2 x 175)		600 (2 x 300)		
				Close-Off (psi)				
3			Q5024B2230 and JU5024-002	50		80		
4				18		48		
5			Q5024B2240 and JU5024-006	12		21		
6				10		16		

Submittal Data - Valves

Globe Valve Linkage, Q5024

Linkage and Actuator Selection. (Continued)

Manufacturer	Valve Model	Single Actuator Linkage					
Johnson Control (continued)	V-5462	Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				44	88	175	300
				Close-Off (psi)			
		2.5	Q5024A1123 and JU5024-006			55	90
		Dual Actuator Linkage					
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				350 (2 x 175)		600 (2 x 300)	
				Close-Off (psi)			
		3	Q5024B2230	50		80	
		4	and JU5024-006	18		48	
5	Q5024B2240	12		21			
6	and JU5024-006	10		16			
Siemens Landis Powers	591 (3 way)	Single Actuator Linkage					
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				44	88	175	300
				Close-Off (psi)			
		1.5	Q5024A1116		85		
		2	and GU5024-002		45		
		2.5	Q5024A1123			55	90
		3	and GU5024-003			35	65
		Dual Actuator Linkage					
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				350 (2 x 175)		600 (2 x 300)	
				Close-Off (psi)			
		4	Q5024B2230 and GU5024-003	18		48	
		5	Q5024B2240	12		21	
		6	and GU5024-003	10		16	

Linkage and Actuator Selection. (Continued)

Manufacturer	Valve Model	Single Actuator Linkage							
Siemens Landis Powers (continued)	591 (2 way)	Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)					
				44	88	175	300		
				Close-Off (psi)					
		1.5	Q5024A1130 and GU5024-002		50	105			
		2			30	60	105		
		2.5	Q5024A1123 and GU5024-003			55	90		
		3				35	65		
		Dual Actuator Linkage							
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)					
				350 (2 x 175)		600 (2 x 300)			
				Close-Off (psi)					
		4	Q5024B2230 and GU5024-003	18		48			
		5	Q5024B2240 and GU5024-003	12		21			
		6		10		16			
	(Linkage Only: No Bonnet Adapter Necessary)	599	Single Actuator Linkage						
			Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)				
					44	88	175	300	
					Close-Off (psi)				
			0.5	Q5024A1123	230	230			
			0.75		130	230			
			1		80	140	230		
			1.25		50	90	200		
			1.5			65	140		
			2			35	80	140	
			2.5				55	90	
			3				35	65	
			Dual Actuator Linkage						
			Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)				
					350 (2 x 175)		600 (2 x 300)		
					Close-Off (psi)				
4			Q5024B2240	18		38			
5				12		21			
6				10		16			
658				Single Actuator Linkage					
				Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
						44	88	175	300
	Close-Off (psi)								
	0.5	Q5024A1116 and GU5024-001		230	230				
	0.75			165	230				
	1			100	190				
1.25	65		120						

Submittal Data - Valves

Globe Valve Linkage, Q5024

Linkage and Actuator Selection. (Continued)

Manufacturer	Valve Model	Single Actuator Linkage					
Siebe Barber Colman Invensys	VB-111 Series	Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				44	88	175	300
				Close-Off (psi)			
		0.5	Q5024A1116 and BU5024-001	230	230		
		0.75		165	230		
		1		100	190		
		1.25		65	120		
	VB-921 Series	Single Actuator Linkage					
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				44	88	175	300
				Close-Off (psi)			
		0.5	Q5024A1116 and BU5024-001	230	230		
		0.75		165	230		
		1		100	190		
		1.25		65	120		
		1.5	Q5024A1130 and BU5024-002		50	105	
		2			30	60	105
		Dual Actuator Linkage					
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				350 (2 x 175)		600 (2 x 300)	
				Close-Off (psi)			
		2.5	Q5024B2230 and BU5024-003	75		123	
		3	Q5024B2240 and BU5024-003	37		60	
	VB-922 Series VB-925 Series VB-926 Series	Single Actuator Linkage					
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				44	88	175	300
				Close-Off (psi)			
		0.5	Q5024A1116 and BU5024-001	230	230		
		0.75		165	230		
		1		100	190		
		1.25		65	120		
		1.5	Q5024A1130 and BU5024-002		50	105	
		2			30	60	105
		Dual Actuator Linkage					
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				350 (2 x 175)		600 (2 x 300)	
				Close-Off (psi)			
		2.5	Q5024B2230 and BU5024-003	75		123	
		3		50		80	

Linkage and Actuator Selection. (Continued)

Manufacturer	Valve Model	Single Actuator Linkage					
Siebe Barber Colman Invensys (continued)	VB-927 Series VB-928 Series	Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				44	88	175	300
				Close-Off (psi)			
		0.5	Q5024A1116 and BU5024-001	230	230		
		0.75		165	230		
		1		100	190		
		1.25		65	120		
		1.5	Q5024A1130 and BU5024-002		50	105	
	2			30	60	105	
	VB-931 Series	Single Actuator Linkage					
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				44	88	175	300
				Close-Off (psi)			
		0.5	Q5024A1116 and BU5024-001	230	230		
		0.75		165	230		
		1		100	190		
1.25		65		120			
1.5		Q5024A1130 and BU5024-002		50	105		
2				30	60	105	
Dual Actuator Linkage							
Valve Connection Size (inch)		Linkage and Bonnet Adapter	Actuator Torque (lb-in)				
			350 (2 x 175)		600 (2 x 300)		
			Close-Off (psi)				
2.5		Q5024B2230 and BU5024-003	75		123		
3			50		80		
4		Q5024B2240 and BU5024-003	18		38		

Submittal Data - Valves

Globe Valve Linkage, Q5024

Linkage and Actuator Selection. (Continued)

Manufacturer	Valve Model	Single Actuator Linkage					
Siebe Barber Colman Invensys (continued)	VB-932 Series	Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				44	88	175	300
				Close-Off (psi)			
		0.5	Q5024A1116 and BU5024-001	230	230		
		0.75		165	230		
		1		100	190		
		1.25		65	120		
		1.5	Q5024A1130 and BU5024-002		50	105	
		2			30	60	105
		2.5	Q5024A1123 and WU5024-001			55	90
		3				35	65
		Dual Actuator Linkage					
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				350 (2 x 175)		600 (2 x 300)	
				Close-Off (psi)			
		4	Q5024B2230 and WU5024-001	25		48	
		5		18		27	
		6	Q5024B2240 and WU5024-001	11		16	
	VB-7213 VB-7313	Single Actuator Linkage					
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				44	88	175	300
				Close-Off (psi)			
		0.5	Q5024A1116 and BU5024-001	230	230		
		0.75		165	230		
		1		100	190		
		1.25		65	120		
		1.5			85		
		2			45		
Belimo	G- series	Single Actuator Linkage					
		Valve Connection Size (inch)	Linkage and Bonnet Adapter	Actuator Torque (lb-in)			
				44	88	175	300
				Close-Off (psi)			
		0.5	Q5024A1116 and BU5024-001	230	230		
		0.75		165	230		
		1		100	190		
		1.25		65	120		
		1.5			85		
		2			45		

NOTE: If your valve is not listed above fill out Special Order Form located below.

NOTE: The listed close-off pressures are estimated numbers only.

NOTE: The information in this table is based on publicly available information as of the date of this publication. Honeywell is not liable if information is found to be incorrect

Submittal Data - Valves

SPECIAL ORDER FORM

This form is to be used if your existing valve is not listed in the selection chart located in the Globe Valve Linkage literature. Make photocopies of this form as needed and e-mail completed forms to Honeywell's Take off Service at takeoff.service@honeywell.com to ensure proper linkage compatibility. A separate form should be used for each valve when information is different for valve size or manufacturer. Please fill out form completely. Draw your own diagram using the space provided below if necessary.

Quantity: _____
 Valve Body Information: _____
 Figure No. (choose 1, 2, or 3 below): _____
 Manufacturer (if known): _____
 Model No. (if known): _____
 Valve Size: _____
 _____ 2 Way _____ 3 Way

Actuator (Mark all that apply):
 _____ On/Off _____ Tri-State _____ Modulating
 _____ Spring Return
 _____ 24 V _____ 120 V
 _____ Weather Proof Enclosure
 Approximate Close-Off Required: _____ (PSI)

Valve Body Dimensions (see below for letter designations):

A = _____
 B = _____
 C = _____, _____ th/in
 D = _____, _____ th/in
 E = _____
 F = _____
 G = _____
 H = _____
 I = _____
 J = _____

Letter Designations (for above):

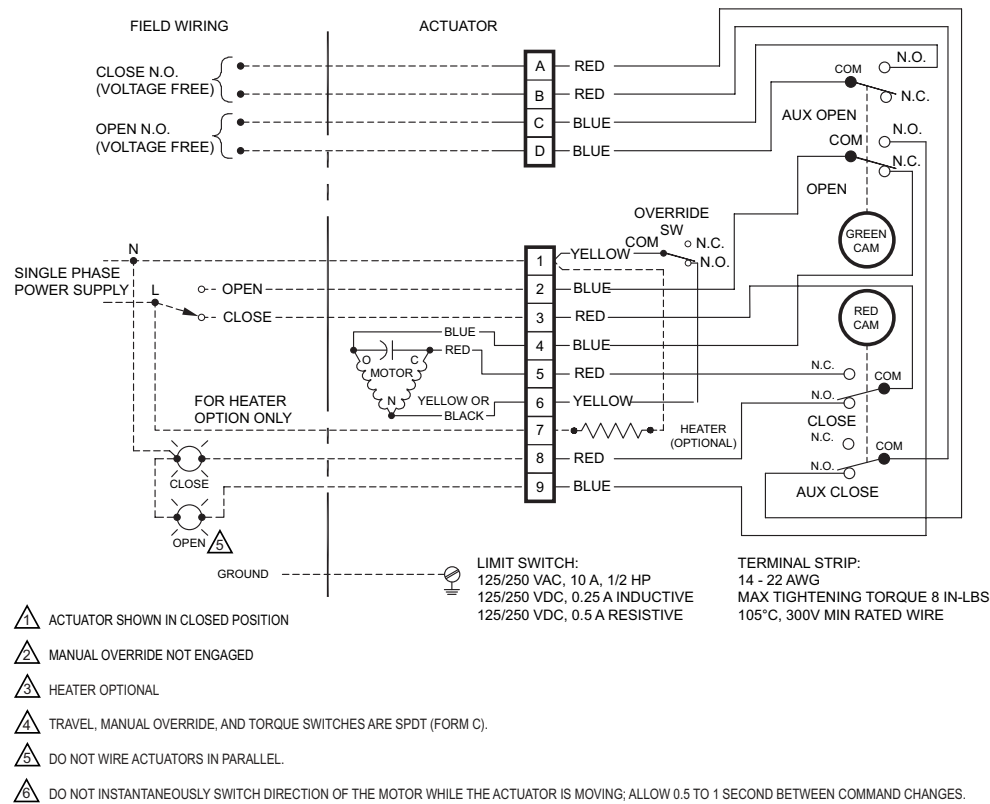
A = Height with stem down
 B = Length of neck
 C = Stem diameter and threads/inch
 D = Major diameter and threads/inch
 E = Lift (Stroke Length)
 F, G, H, I = Neck dimensions

Comments:

FIGURE 1	FIGURE 2
FIGURE 3	Draw your own

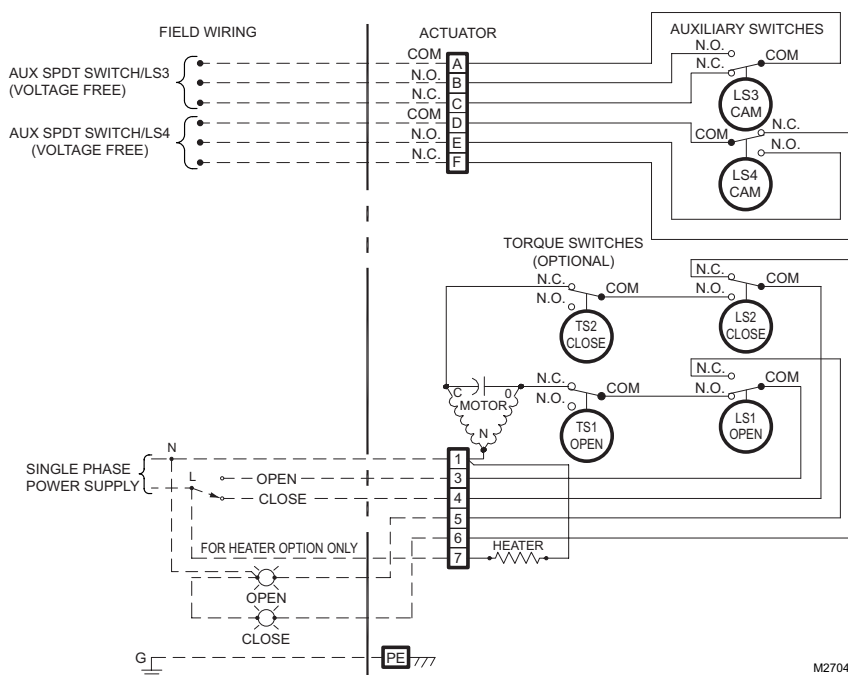
Butterfly Valve Actuators, VFF1; VFF2; VFF3; VFF6

NEMA 4X floating/2-position industrial-grade actuator for valves up to 18"



M27038

NEMA 4 floating/2-position industrial-grade actuator for valves 14" to 20"

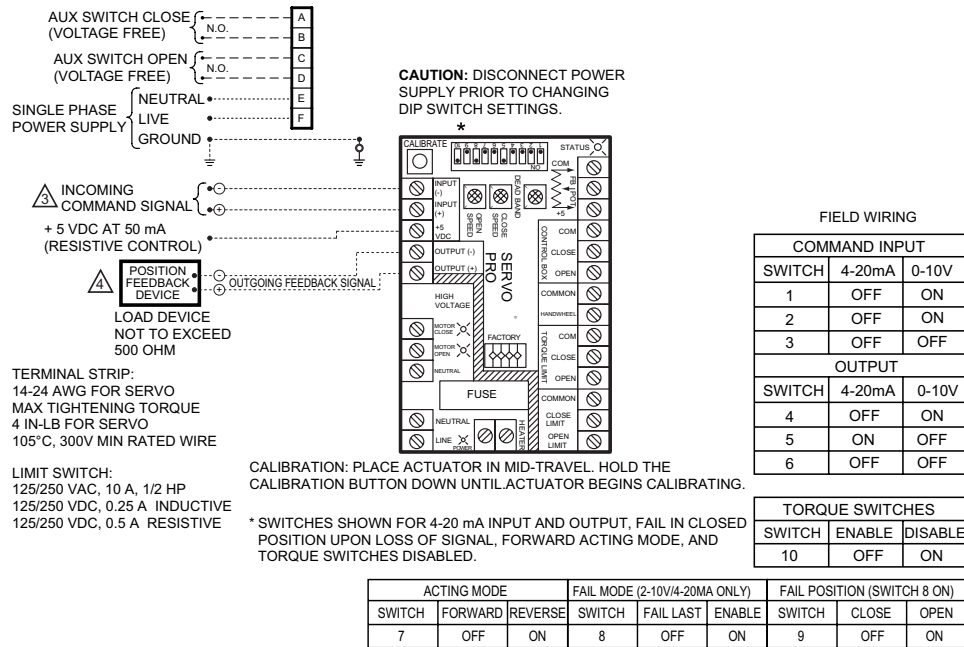


M27040

Wiring Diagrams - Valves

Butterfly Valve Actuators, VFF1; VFF2; VFF3; VFF6

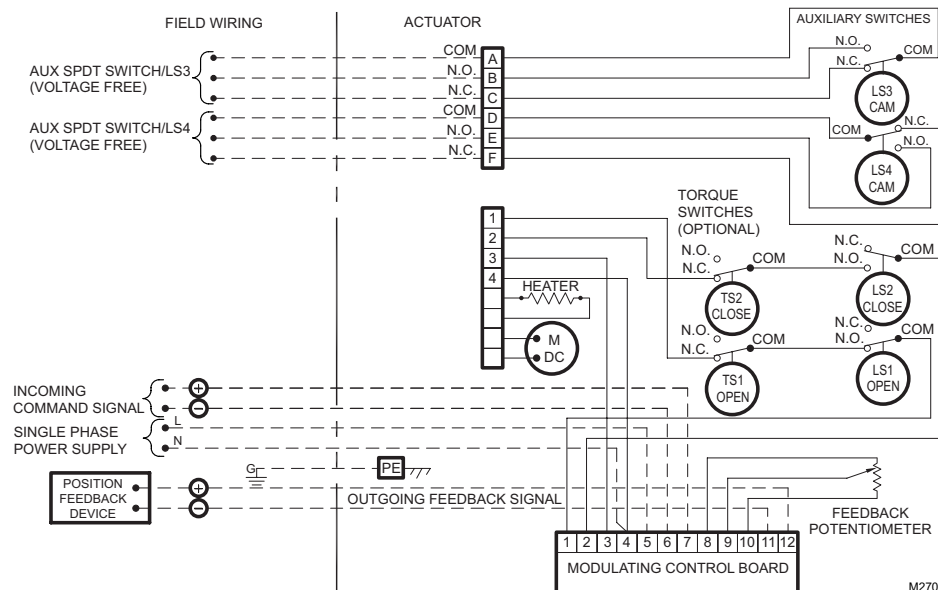
NEMA 4X floating/2-position industrial-grade actuator for valves up to 18"



- ⚠ ACTUATOR SHOWN IN CLOSED POSITION.
- ⚠ MANUAL OVERRIDE NOT ENGAGED.
- ⚠ COMMAND SIGNAL AND FEEDBACK SIGNAL MUST BE ISOLATED FROM EACH OTHER AND ANY OTHER CIRCUIT.
- ⚠ FEEDBACK LOOP IS POWERED BY THE SERVO, DO NOT SUPPLY EXTERNAL POWER.
- ⚠ SEE MANUAL FOR DETAILS.
- ⚠ HEATER OPTIONAL.
- ⚠ TRAVEL LIMIT AND MANUAL OVERRIDE SWITCHES ARE SPDT (FORM C).
- ⚠ SEE NAME TAG FOR POWER RATING.

M27039

NEMA 4 modulating industrial-grade actuator for valves 14" to 20"

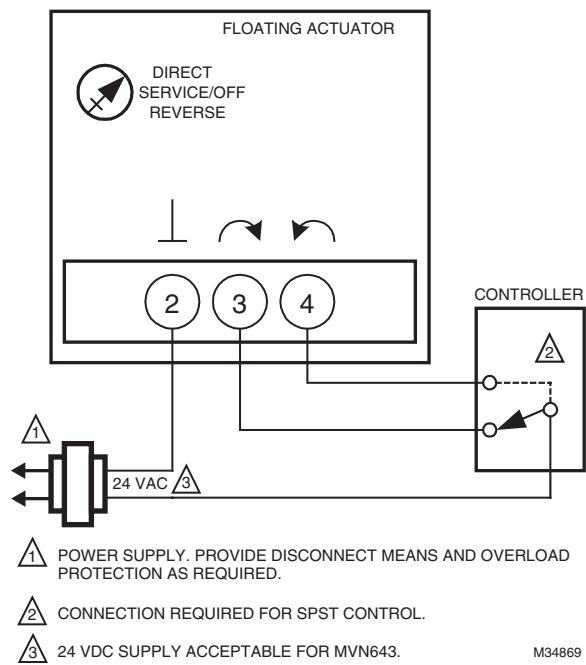


M27041

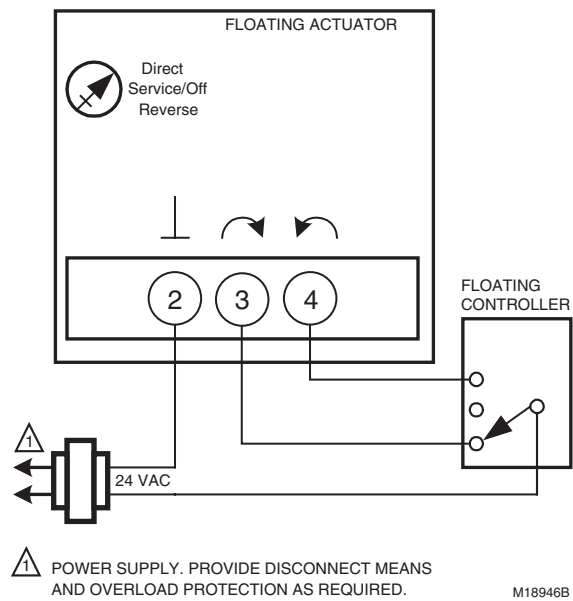
Wiring Diagrams - Valves

Ball Valve Actuators

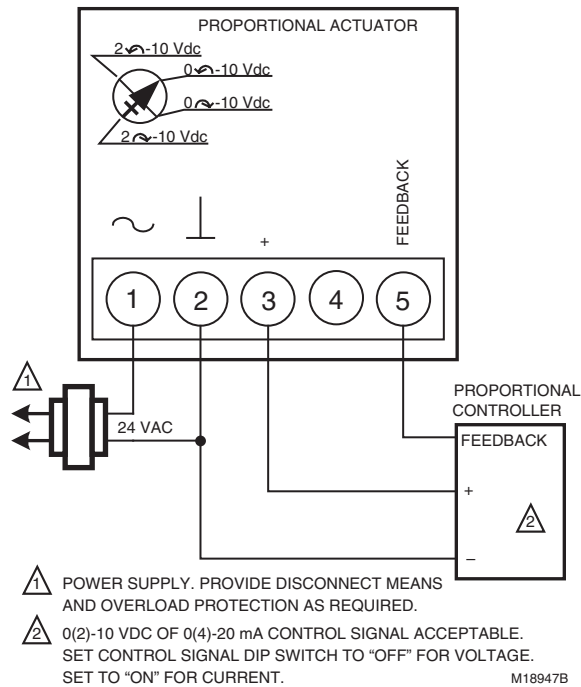
MN6105 with On/Off Control.



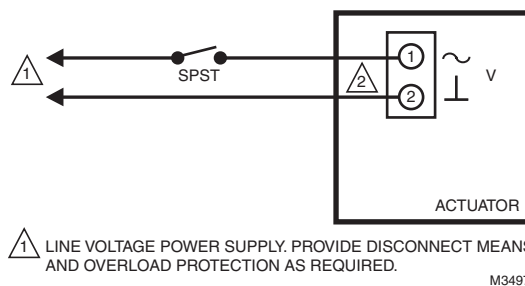
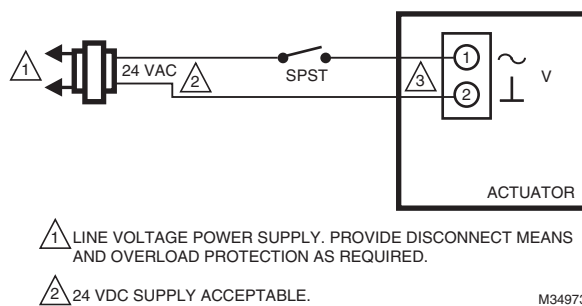
MN6105 with Floating Control.



MN7505 with Modulating Control.



MS8105 with On/Off Control.



Ball Valve Actuators

ACTUATOR

1 2 3 4 5

~ V

OR +

OR N/A

FEEDBACK

2-10 VDC

10-2 VDC

0-10 VDC

10-0 VDC

Fltg, fwd

Fltg, rev

1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO FLOATING.

M3497

0/2 TO 10 VDC PROPORTIONING CONTROLLER

FEEDBACK

SPDT

ACTUATOR

- 1 ~ V
- 2
- 3 OR +
- 4 OR N/A
- 5 FEEDBACK

Set Switch Options:

- 2-10 VDC
- 10-2 VDC
- 0-10 VDC
- Fltg. fwd
- Fltg. rev

- ① LINE VOLTAGE POWER SUPPLY.
PROVIDE DISCONNECT MEANS AND
OVERLOAD PROTECTION AS REQUIRED.
- ② 24 VDC SUPPLY ACCEPTABLE.
- ③ SET SWITCH TO MODULATING.

M19576B

0/2 TO 10 VDC PROPORTIONING CONTROLLER

FEEDBACK

SPST

ACTUATOR

V

OR +

OR N/A

FEEDBACK

2-10 VDC

10-2 VDC

0-10 VDC

Fltg, fwd

Fltg, rev

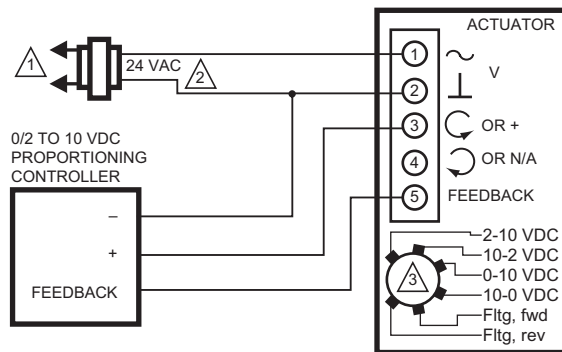
1 LINE VOLTAGE POWER SUPPLY.
PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

M19577B

MS7505 with Proportioning Controllers (Modulating mode setting).

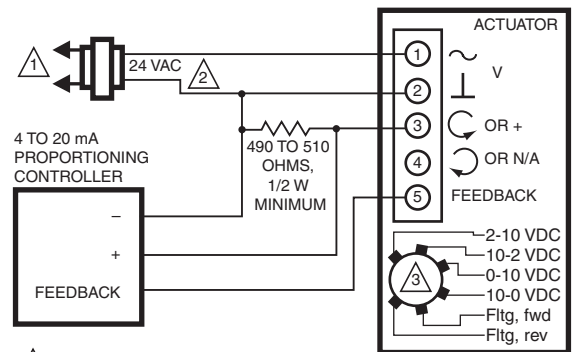


1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

M34976



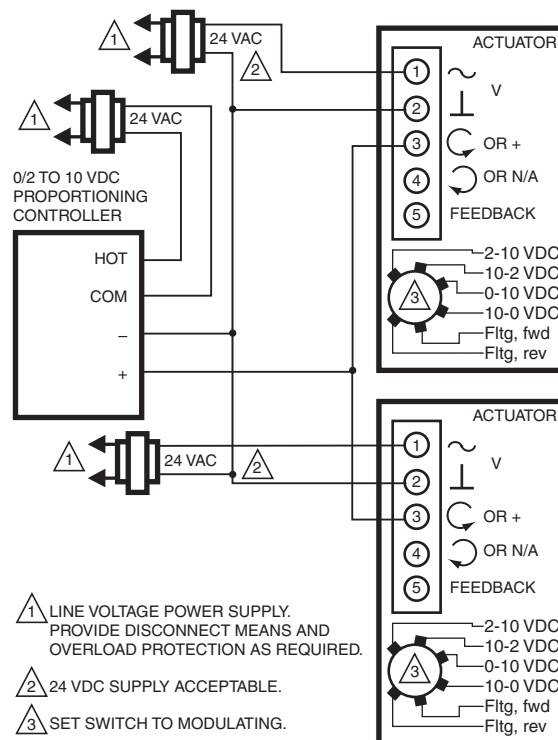
1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

3 SET SWITCH TO MODULATING.

M34977

MS7505 with Proportioning controllers operating multiple actuators (Modulating mode setting).



1 LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

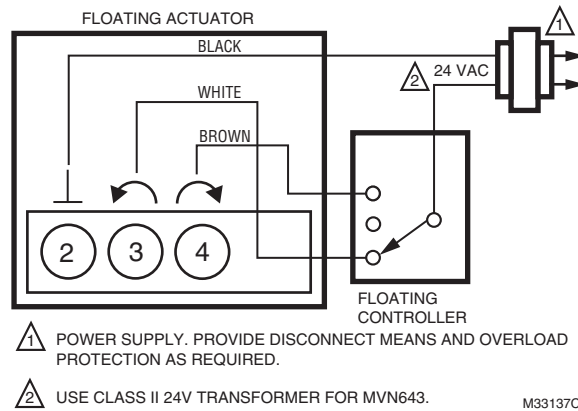
3 SET SWITCH TO MODULATING.

M34978

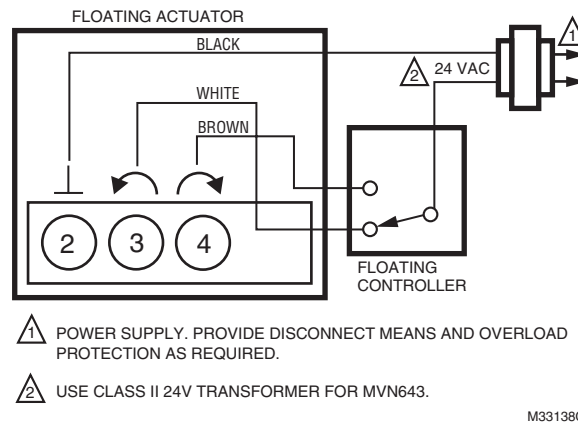
Wiring Diagrams - Valves

MVN Actuator

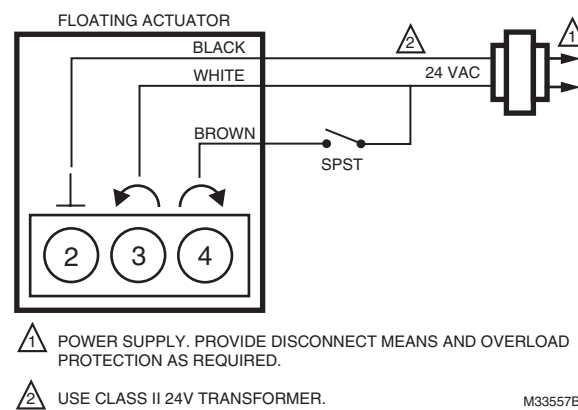
MVN613 or MVN643 with Floating Control.



MVN613 or MVN643 with 2 position or Floating Control.

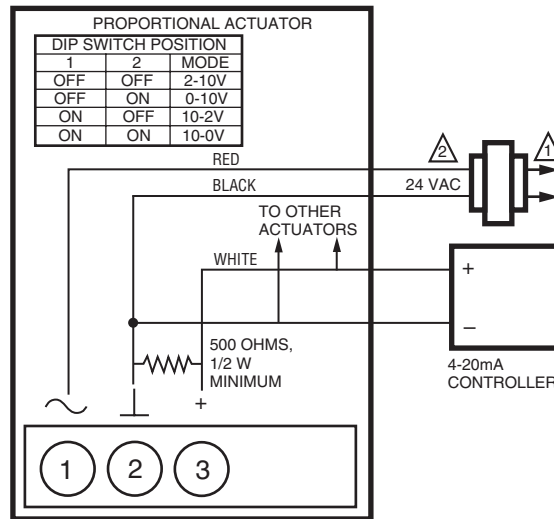


MVN643 with Two Position SPST Control.



MVN713 with 4-20mA Control.

PROPORTIONAL/MODULATING: 4-20mA CONTROLLER OUTPUT WITH 500Ω SERIES RESISTOR



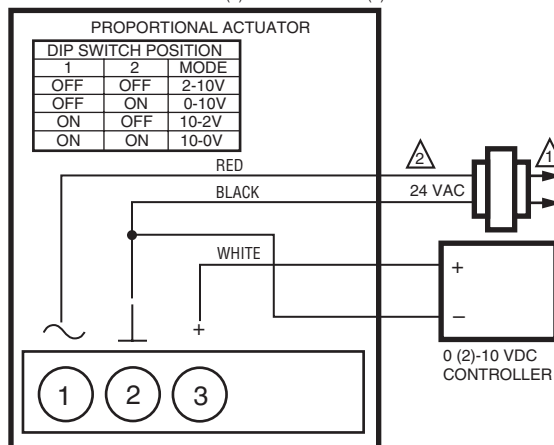
1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 USE CLASS II 24V TRANSFORMER.

M33141B

MVN713 with 0 (2)-10 VDC Control.

PROPORTIONAL/MODULATING: 0(2)...10 VDC OR 10...0(2) VDC CONTROLLER OUTPUT



1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 24 VDC SUPPLY ACCEPTABLE.

M33140A

Accessories - Valves

Valve Actuator Accessories

Product Number	Description	Used With
127834A	Switch Assembly for Q607	Q607
272629A	Adapter Kit for mounting ML6984/ML7984 to V5045 and VGF non-pressure balanced 2-way valves	ML6984 or ML7984, V5045; VGF21ES; VGF21LS, VGF22ES; VGF22LS
272630D	Position feedback and SPDT pilot duty auxiliary switch	ML6984/ML7984 Series 4000 and higher (ML6984 in 5-wire mode only)
312495	Large stem button provides anti-spin for CREVAL actuators with globe valves up to 3 in.	ML6420, ML6421, ML6425, ML7420, ML7421, or ML7425; Not required with ML6984/M7984 Actuators or Q5024 linkage; Not compatible with Q5020 linkage
40003793-005	U-bolt bag assembly for ML6984 & ML7984.	ML6984 or ML7984
43191679-101	Auxiliary Potentiometer for ML6421A	ML6421A
43191679-102	220 ohm Auxiliary Potentiometer for ML6421B	ML6421B
43191679-111	Potentiometer, 10k ohm, for ML6425 only	ML6425
43191679-112	Potentiometer, 220 ohm for ML6425 only	ML6425
43191680-102	Dual Auxiliary Switch for ML6421, ML7421	ML6421, ML7421
43191680-105	Dual Auxiliary Switch for ML6425 Only	ML6425
43196000-001	High Temperature Kit for actuators with 3/4 inch (20 mm) stroke, stem button attachment	ML6420, ML6421, ML6425, ML7420, ML7421, or ML7425; Not compatible with Q5024
43196000-038	High Temperature Kit for actuators with 1-1/2 inch (38 mm) stroke, stem button attachment	ML6421, ML7421; Not compatible with Q5024

Accessories - Valves

Valve Actuator Accessories

Product Number	Description	Used With
5112-3R	Weather Enclosure Assembly	MN6105A1011, MN7505A2001, MS7505A2030, MS8105A1030
5112-24	Replacement SS Stem Kit	For VBN & VRN Valves. Refer to Table 7 on page 157 for specific models
5112-23	Replacement SS Stem Kit	For VBN & VRN Valves. Refer to Table 7 on page 157 for specific models
5112-22	Replacement Stem Kit	For VBN & VRN Valves. Refer to Table 7 on page 157 for specific models
5112-21	Replacement Stem Kit	For VBN & VRN Valves. Refer to Table 7 on page 157 for specific models
5112-20	Replacement Stem Kit	For VBN & VRN Valves. Refer to Table 7 on page 157 for specific models
5112-19	Replacement Stem Kit	For VBN & VRN Valves. Refer to Table 7 on page 157 for specific models
MVNAAA	Replacement Valve Adaptor	MVN613A0000, MVN643A0000, MVN713A0000
MVNAAL	Replacement Valve Adaptor, Low Profile	MVN613L0000, MVN643L0000, MVN713L0000
MVNAC7131	Replacement Cable with Terminal 1m, Modulation (RED, BLACK, WHITE)	MVN713A0000, MVN713L0000
MVNAC6131	Replacement Cable with Terminal 1m, Floating (RED, BLACK, WHITE)	MVN613A0000, MVN613L0000, MVN643A0000, MVN643L0000
MVNAT3	Replacement Screw type Terminal Block, Pluggable	MVN613A0000, MVN613L0000, MVN643A0000, MVN643L0000, MVN713A0000, MVN713L0000
5112-11	Replacement DCA Mounting Bracket for VBN2/3 Ball Valves	MN6105A1011, MN7505A2001, MS7505A2030, MS8105A1030
205860	Minimum position Potentiometer	MN6105A1011, MN7505A2001, MS7505A2030, MS8105A1030
32006306-001	Resistor Kit (500 ohm); converts 4-20 mA signal to 2-10 Vdc	MS7505A2030, MS8105A1030
Q7002B1009	Universal Interface Module	MN6105A1011, MN7505A2001, MS7505A2030, MS8105A1030
STRN-SCSA	Self-centering Shaft Adapter	MS7505A2030, MS8105A1030
32000085-001	Strain Relief Fitting (10 pack)	MN6105A1011, MN7505A2001, MS7505A2030, MS8105A1030
AT120A1004	120 to 24 Vac Transformer (20 VA)	MVN613A0000, MVN613L0000, MVN643A0000, MVN643L0000, MVN713A0000, MN6105A1011, MN7505A2001, MS7505A2030, MS8105A1030
AT140A1000	120 to 24 Vac Transformer (40 VA)	MVN613A0000, MVN613L0000, MVN643A0000, MVN643L0000, MVN713A0000, MN6105A1011, MN7505A2001, MS7505A2030, MS8105A1030
STRN-STRNRLF	Strain Relief Fitting (10 pack)	MS7505A2030, MS8105A1030

Accessories - Valves

Valve Linkage Accessories

Product Number	Description	Used With
220845/0767	Retainer button for Q5001	Q5001
220848A	Q5001 Cam	Q5001
220852A	Stroke Indicator, Q5001	Q5001
220861A	3/4 inch lift Q5001 linkage cam assembly	Q5001
220863A	1 inch lift Q5001 linkage cam assembly	Q5001
220864A	1 1/8 inch lift Q5001 linkage cam assembly	Q5001
220865A	1 1/4 inch lift Q5001 linkage cam assembly	Q5001
220867A	1 1/2 inch lift Q5001 linkage cam assembly	Q5001
32004629-001	Bonnet adapter kit to adapt Seimens (Landis/Power) Flowrite 599 1/2 inch to 3 inch globe valves with Q5020A or Q5009B	Siemens valves
32004629-002	Bonnet Adapter Kit, Johnson Controls 1/2 to 3/4 in., Q5020	Johnson valves; Q5020
32004629-003	Bonnet Adapter Kit, Johnson Controls 1 to 2 in., Q5020	Johnson valves; Q5020
32004629-004	Bonnet Adapter Kit, Siebe 1/2 to 2 in., Q5020	Siebe valves; Q5020
4074ETB	Antispin Kit, Q5001	Q5001
BU5024-001	Bonnet adapter 1-1/4" diameter-16 TPI with 1/4"-28 TPI stem adapter	Q5024 on Siebe, Barber Colman, Invensys Valves
BU5024-002	Bonnet adapter 1" diameter - 16 TPI with 1/4"-28 TPI and 5/16"-24 TPI stem adapters	Q5024 on Siebe, Barber Colman, Invensys Valves
BU5024-003	Bonnet adapter 1-1/4" diameter - 16 TPI with 1/2"-20 TPI stem adapter	Q5024 on Siebe, Barber Colman, Invensys Valves
WU5024-001	Bonnet adapter 1-3/8" diameter -18 TPI with 3/8"-24 TPI stem adapter	Q5024 on Siebe, Barber Colman, Invensys Valves
BU5024-NPTKIT	Globe Valve Adapter kit for Siebe, Barber Coleman, Invensys NPT Valves (1/2" - 2") Includes: BU5024-001, BU5024-002 bonnet adapters only and 1 of each 1/4"-28 TPI and 5/16"-24 TPI stem adapters	Q5024 on Siebe, Barber Colman, Invensys Valves
BU5024-FLGKIT	Globe Valve Adapter kit for Siebe, Barber Coleman, Invensys Flange Valves (2.5" - 6") Includes BU5024-003, WU5024-001 bonnet adapters only and 1 of each 3/8"-24 TPI and 1/2"-20 TPI stem adapters	Q5024 on Siebe, Barber Colman, Invensys Valves
GU5024-001	Bonnet adapter 1-5/16" diameter with 1/4"-28 TPI stem adapter	Q5024 on Siemens, Landis Powers Valves
GU5024-002	Bonnet adapter 1-3/32" diameter-14 with 3/8"-24 TPI and 1/4"-28 TPI stem adapters	Q5024 on Siemens, Landis Powers Valves
GU5024-003	Bonnet adapter 1-3/8" diameter - 20 TPI with 3/8"-24 and 1/4"-28 TPI stem adapters	Q5024 on Siemens, Landis Powers Valves
GU5024-KIT	Globe Valve Adapter kit for Siemens, Landis Powers (1/2" - 6") Includes GU5024-001, GU5024-002, GU5024-003 bonnet adapters only and 1 of each 1/4"-28 TPI and 3/8"-24 TPI stem adapters	Q5024 on Siemens, Landis Powers Valves
HU5024-001	Bonnet adapter 1-3/8" diameter with 1/4"-28 TPI stem adapter	Q5024 on Honeywell Valves
HU5024-002	Bonnet adapter 1-7/8" diameter with 7/16"-20 TPI stem adapter	Q5024 on Honeywell Valves
JU5024-001	Bonnet adapter 20mm diameter -1.5mm thread pitch with 1/4"-28 TPI stem adapter	Q5024 on Johnson Controls Valves
JU5024-002	Bonnet adapter 1-1/16" diameter-16 TPI with 3/8"-24 TPI stem adapter	Q5024 on Johnson Controls Valves
JU5024-003	Bonnet adapter 28mm diameter-1.5mm thread pitch with 1/4"-28 TPI stem adapter	Q5024 on Johnson Controls Valves
JU5024-004	Bonnet adapter 3/4" diameter-16 TPI with 3/8"-24 TPI stem adapter	Q5024 on Johnson Controls Valves
JU5024-005	Bonnet adapter 3/4" diameter- 18 TPI with 1/4"-28 TPI stem adapter	Q5024 on Johnson Controls Valves
JU5024-006	Bonnet adapter 1.59" diameter-14 TPI with 1/2"-20 TPI and 3/8"-24 TPI stem adapter	Q5024 on Johnson Controls Valves
JU5024-NPTKIT	Globe Valve Adapter kit for JCI NPT Valves (1/2" - 2") Includes: JU5024-001, JU5024-003, JU5024-005 bonnet adapters only and 1 of 1/4"-28 TPI stem adapter	Q5024 on Johnson Controls Valves
JU5024-FLGKIT	Globe Valve Adapter kit for JCI Flange Valves (2.5" - 6") Includes JU5024-002, JU5024-004 bonnet adapters only and 1 of each 3/8"-24 TPI and 1/2"-20 TPI stem adapters	Q5024 on Johnson Controls Valves

Accessories - Valves

Pneumatic Valve Actuator Accessories

Product Number	Description	Used With
14002039-001	MP953D Diaphragm Sleeve	MP953B,D,F
14002040-002	MP953D Diaphragm	MP953B,D,F
14003124-002	MP953B,D,F Diaphragm Repair Kit (includes 14002039-001 and 14002040-002)	MP953B,D,F
14004138-001	MP953B,F (Reverse Acting) Positive Positioner Retrofit Kit	MP953B,F
14004139-001	MP953A,E (Direct Acting, 8 in. and 13 in. diameter, 3/4 in. stroke) Positive Positioner Retrofit Kit	MP953A,E
14004140-001	MP953A,E (Direct Acting, 8 in. and 13 in. diameter, 1-1/2 in. stroke) Positive Positioner Retrofit Kit	MP953A,E
14004211-001	MP953E (8 in. and 13 in. diameter, 3/4 in. stroke) Feedback Spring Kit	MP953E
14004212-001	MP953E (8 in. and 13 in. diameter, 1-1/2 in. stroke) Feedback Spring Kit	MP953E
14004213-001	MP953F (Reverse Acting) Feedback Spring Kit	MP953F
14004214-001	MP953A,E (5 in. diameter) 3/4 inch stroke Positive Positioner Retrofit Kit	MP953A,E
14004298-001	Thread forming Screw, Size 4-40	MP953D,F
14004298-003	MP953C,E (5 in. dia.) and MP953B,D,F (7-1/8 in. dia.) Actuator Base Screw, size 1/4-20	MP953B,D,F; MP953C,E (5 in.)
14004577-001	MP953 A, C, and E (Direct Acting, 5 in. diameter) Yoke/Base Assembly	MP953A,C,E
14004578-001	MP953 B, D, and F (Reverse Acting, 7-1/8 in. diameter) Yoke/Base Assembly	MP953B,D,F
14004667-001	Offset Crank arm assembly with 2 screws (304725-062), nuts (14004102-001), crank arm (14004655-001) for 1/2 in. Drive Axle	Pneumatic Actuators
14004697-001	Stem extension for 13 in. MP953C,E with 3/4 in. Stroke	MP953C,E
310664	MP953A, C and E (5 in. and 8 in. models only) Tension Spring	MP953A,C,E
310665/0062	Spring Support for MP 953	MP953A,C,E (5 in.)
310668	MP953A, C and E (5 in. diameter) High Temperature Silicone Diaphragm - Old Style	MP953A,C,E
311393	White Spring, 4- 11 psi	MP953C,E
311616	MP953A, C and E (5 in. diameter) Main Spring (2-7 psi sp ring range - Brown)	MP953A,C,E (5 in.)
311618	MP953A, C and E (5 in. diameter) Main Spring (8-12 psi sp ring range - Gray)	MP953A,C,E (5 in.)
311749/0605	Cup diaphragm, 8 in. for MP95 3A, C, E	MP953A,C,E (8 in.)
311750	MP953A, C and E (8 in. diameter) Regular Temperature Neoprene Diaphragm - New Style	MP953A,C,E
311851/0062	Stem extension for 8 in. dia. 3/4 in. stroke MP953A,C,E	MP953A,C,E (8 in.)

Accessories - Valves

Pneumatic Valve Actuator Accessories

Product Number	Description	Used With
311852	Brown Spring for MP953A,C 3/4 inch stroke (8 inch diameter), 2-7 psi range	MP953A,C (8 in., 2-7 psi)
311855	Gray spring for MP953C (8 inch diameter), 8-12 psi range	MP953C
311863	Stem Retainer for the MP953C,E (8 in. diameter)	MP953C,E
312099	1-1/2 in. stroke Spider for 13 in. MP953C and E	MP953C,E
312203	Black Spring for MP953D,F for 8-13 psi range	MP953D,F
312466/0605	Stem Extension for MP953C1489, MP953C1471, MP953E1392, MP953E1400, and MP953E1418	MP953C,E
312471	White Spring for MP953C,E (13 in. dia. 1/2 in. stroke)	MP953C,E (13 in.)
312505	MP953A,C,E (13 in. diameter) regular temperature Neoprene diaphragm - New style	MP953A,C,E
312760	MP953A,C,E (5 in. diameter) regular temperature Neoprene diaphragm - New style	MP953A,C,E
312817	MP953 (5 in. diameter) Cover	MP953A,C,E
313745	MP953A,C,E (5 in. diameter) High Temperature Silicone Diaphragm - New style	MP953C (5 in.)
314153	MP953A, C and E (8 in. diameter) High Temperature Silicone Diaphragm - New Style	MP953A,C,E
314646A/0062	Plate, Spring for 13 in. diameter MP953A,C,E	MP953A,C,E
314650A	MP953B, D and F (Reverse Acting) Support Assembly (for Series-2 actuators only, use this Support Assembly and 316059A Yoke Assembly to Convert Series-1 MO/MP953)	MP953B,D,F
314651A	MP953B,D,F (Reverse Acting) yoke assembly for support assembly- with nylon insert for use with old style actuators not made with a Helicoil insert in yoke	MP953B,D,F
314683/0062	Stem Retainer for 13 in. diameter MP953A,C,E (Latches on Stem Button)	MP953A,C,E (13 in.)
315020	Cup for MP953C,E (13 inch diameter)	MP953C,E (13 in.)
316059A	MP953B, D and F (Reverse Acting) Yoke Assembly for Support Assembly- with helicoil insert	MP953B,D,F

Economizer Selection

The JADE™ economizer doesn't heat or cool anything. It simply brings in outdoor air to naturally lower a building's interior temperature. You don't need a certified programmer or installer to set up and operate the JADE economizer. JADE is designed to work seamlessly with existing and future roof top systems. The LCD screen delivers continuous messages, important diagnostics and system status.

Section 4: Economizers

JADE™ Economizer Controller W7220

Product Selection	214
Submittal Data	215
Wiring Diagrams	216

Product Selection - JADE™ Economizer

W7220



JADE economizers make energy saving easier for your customers. For buildings with less than 100,000 sq ft and stand-alone rooftop unit applications JADE delivers fresh air ventilation and energy savings. It is packed with features you'd expect in more expensive units, but it can be installed and configured by technicians without significant training.

- LCD screen delivers continuous messages, diagnostics and system status
- Color-coded wiring terminals make wiring easy
- Built-in freeze protection closes outdoor dampers to protect coils when outdoor temperatures drop
- Two-wire Sylk® bus communications enable simple wiring and enhanced diagnostics
- Demand control ventilation (DCV) saves energy with clean outside air without over ventilating and conditioning excess air
- UL Listed
- Title 24 and IECC2015 compliant

Y-Pack

Control Type	Kit Part Number	Kit Includes			
		Actuator	OA Sensor	MAT Sensor	CO2 Sensor
Dry Bulb with Black Motor	Y7220A7215	M7215A1008	C7250A1001	C7250A1001	
Dry Bulb with Non Communicating DCA	YL7220A7503	MS7503A2030	C7250A1001	C7250A1001	
Dry Bulb with Communicating 27 lb-in DCA	YL7220AJ3103	MS3103J1030	C7250A1001	C7250A1001	
Dry Bulb with Communicating 44 lb-in DCA	YL7220AJ3105	MS3105J3030	C7250A1001	C7250A1001	
Dry Bulb with Communicating 27 lb-in DCA and CO2 Wall Sensor without Display	YL7220ACW3103	MS3103J1030	C7250A1001	C7250A1001	C7632A1004
Enthalpy with Black Motor	Y7220S7215	M7215A1008	C7400S1000	C7250A1001	
Enthalpy with Black Motor and CO2 Wall Sensor with a Display	Y7220SCW7215	M7215A1008	C7400S1000	C7250A1001	C7232A1016
Enthalpy with Black Motor and CO2 Duct Sensor with a Display	Y7220SCD7215	M7215A1008	C7400S1000	C7250A1001	C7232B1014
Enthalpy with Non-Communicating DCA	YL7220S7503	MS7503A2030	C7400S1000	C7250A1001	
Enthalpy with Communicating 27 lb-in DCA	YL7220SJ3103	MS3103J1030	C7400S1000	C7250A1001	
Enthalpy with Communicating 44 lb-in DCA	YL7220SJ3105	MS3105J3030	C7400S1000	C7250A1001	
Enthalpy with Communicating 27 lb-in DCA and CO2 Wall Sensor with a Display	YL7220SCW3103	MS3103J1030	C7400S1000	C7250A1001	C7232A1016
Enthalpy with Communicating 27 lb-in DCA and CO2 Duct Sensor with a Display	YL7220SCD3103	MS3103J1030	C7400S1000	C7250A1001	C7232B1014

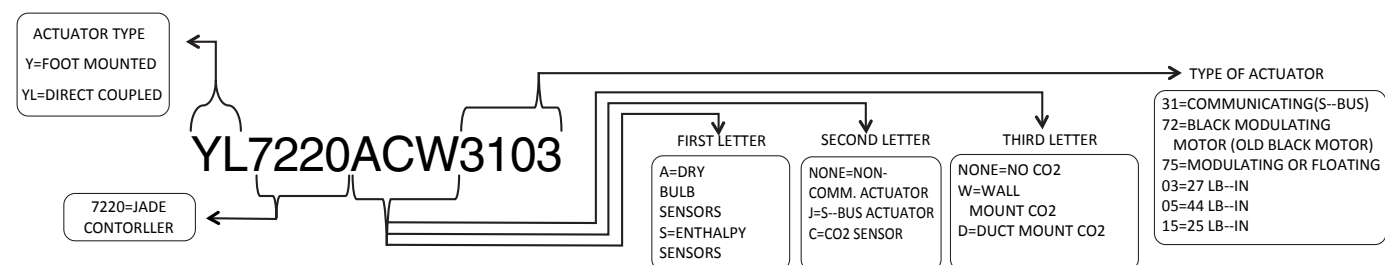
Sensors

	Function	OS Number
Mixed Air Temperature or Outdoor Air Temperature Sensor	MAT or OAT	C7250A1001
Outdoor Air or Return Air Enthalpy Sensor	OAE	C7400S1000
Wall Mount CO2 Sensor with Fixed Settings	CO2	C7632A1004
Wall Mount CO2 Sensor with Selectable Settings	CO2	C7232A1016
Duct Mount CO2 Sensor with Selectable Settings	CO2	C7232B1014

NOTE:
See pages 318-322 for sensor submittal data.

Accessories

Used With	Function	OS Number
C7400S1000, C7250A1001	2-pin edge connector	50048926-001
W7220A1000	6-pin edge connector	50048926-002
C7250A and C7400S Sensors	Duct mount kit	50053060-001
W7220A1000	PCMOD - Connects with PC to communicate with JADE	W7220-PCMOD



The JADE™ Economizer System is an expandable economizer control system, which includes a W7220 Economizer controller with an LCD and keypad. The W7220 can be configured with optional sensors. The W7220 controller is used as a standalone economizer wired directly to a commercial set back thermostat and sensors to provide Outdoor Air dry-bulb economizer control. Optional Sylk bus sensors can be connected to the controller for single or differential enthalpy control. An additional Return Air Sylk bus sensor can be added for differential dry bulb control.

SPECIFICATIONS

Electrical

Rated Voltage.....	20 to 30 Vac; 50/60 Hz Transformer: 100 VA maximum
Nominal Power Consumption (at 24 Vac, 60 Hz)	11.5 VA without sensors or actuators
Relay Digital Output Rating at 30 Vac (maximum power from Class 2 input only).....	1.5A run; 3.5A inrush @ 0.45PF (200,000 cycles) or 7.5A inrush @ 0.45PF (100,000 cycles)
External Sensors Power Output.....	21 Vdc +/- 5% @ 48mA

IMPORTANT

All inputs and outputs must be Class 2 wiring.

Inputs: sensors

Dry Bulb Temperature (optional) and Mixed Air (required), C7250A.....	2-wire (18 to 22 AWG); Temperature range -40 to 150 °F (-40 to 65 °C). Temperature accuracy -0°F/+2°F
Temperature and Humidity, C7400S1000 (optional).....	Temperature: range -40 to 150 °F (-40 to 65 °C) Temperature accuracy -0°F/+2°F Humidity: range 0 to 100% RH with 5% accuracy.

NOTE: Up to three (3) SYLK Bus sensors may be connected to the JADE™ Economizer controller: outdoor air (OA), return air (RA) and discharge (supply) air (DA).

DCV (CO ₂) Sensor (C7232 or C7632)	2-10 Vdc control signal;
4 Binary Inputs	1-wire 24 Vac + common GND 24 Vac power supply: 50/60Hz;

Outputs

Actuator signal	2-10 Vdc; Sylkbus output for Honeywell Sylkbus communicating actuators.
Exhaust fan, Y1, Y2 and AUX1 O	All Relay Outputs (at 30 Vac): Running: 1.5A maximum Inrush: 7.5A maximum

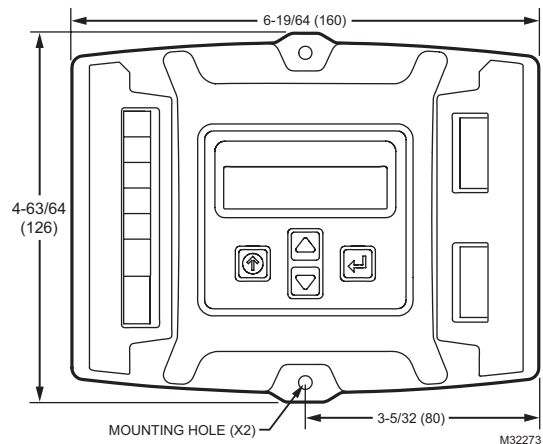
Environmental

Operating Temperature	-40 to 150 °F (-40 to 65 °C).
Storage Temperature	-40 to 150 °F (-40 to 65 °C)
Shipping Temperature.....	-40 to 150 °F (-40 to 65 °C)
Relative Humidity.....	5% to 95% RH non-condensing
Dimensions.....	Height: 4.98 inches (126.4 mm) Width: 6.3 inches (160 mm) Depth: 1.34 inches (34 mm)
Weight.....	0.58 lb. (0.265 kg)
Approvals	UL listed (XAPX) for USA and Canada.

FEATURES

- LCD Screen delivers continuous messages, important diagnostics feedback and system status.
- Color-coded wiring terminals help with easy installation.
- Built-in freeze protection closes the outdoor dampers to protect coils when temperatures drop.
- Two-wire Sylk™ bus communications enable simple integration and future expansion.
- On-board fault detection and diagnostics quickly identify sensor failures or loss of communication, saving time on service and commissioning.

DIMENSIONS DIAGRAM



Wiring Diagrams - JADE Economizer

W7220

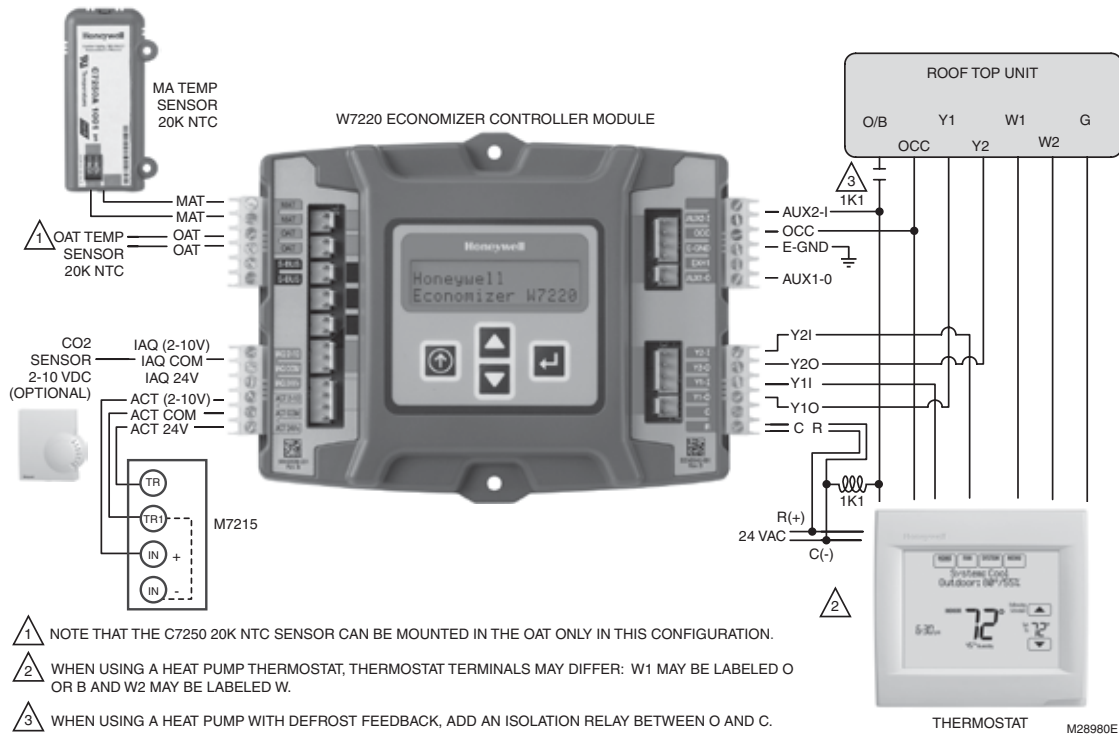


Fig 1. Standalone dry bulb Economizer configuration with black motor M7215.

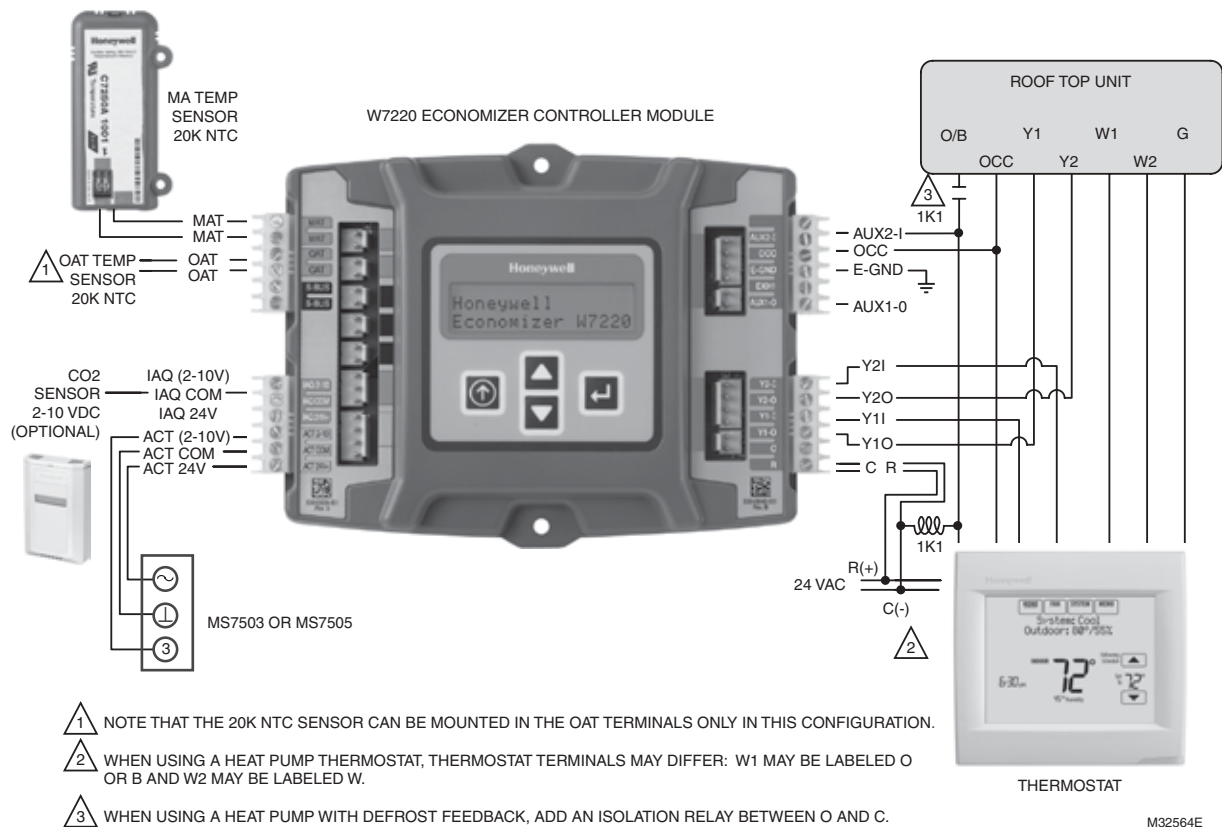
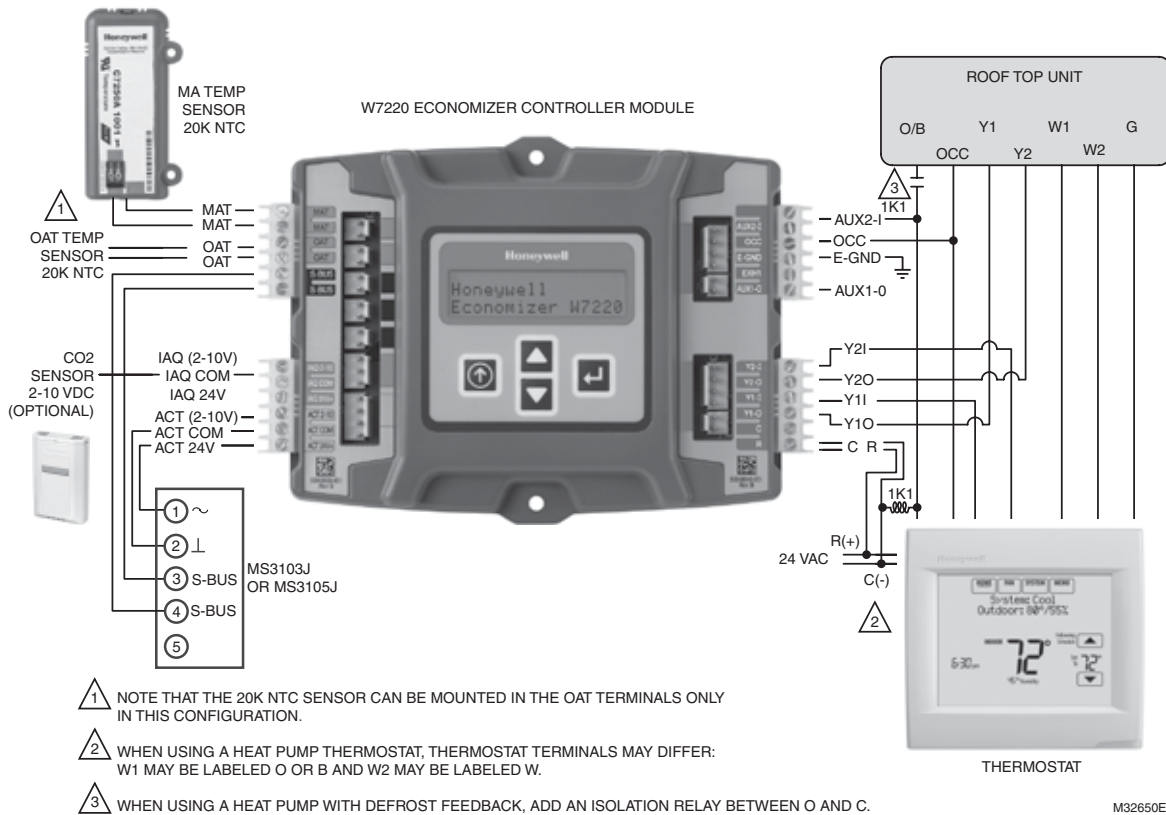
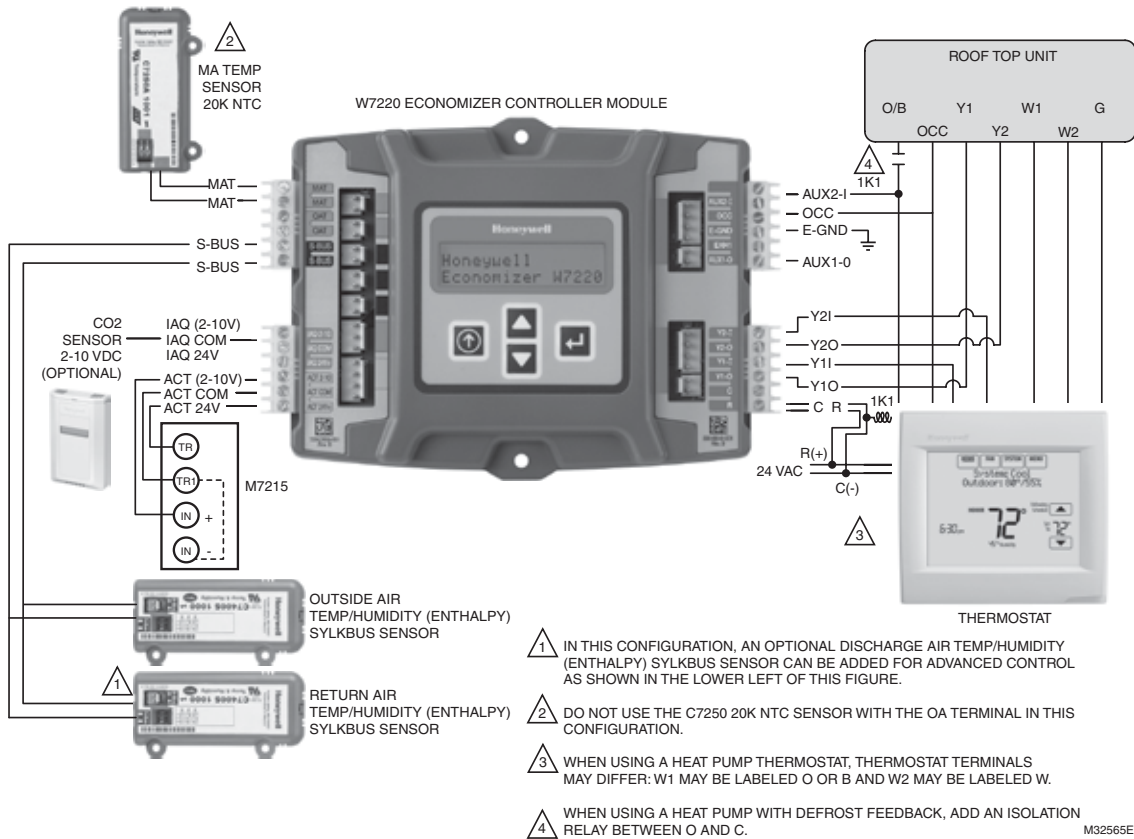


Fig 2. Standalone dry bulb Economizer configuration with Honeywell MS7503 or MS7505 Direct Coupled Actuator.



Wiring Diagrams - JADE Economizer

W7220

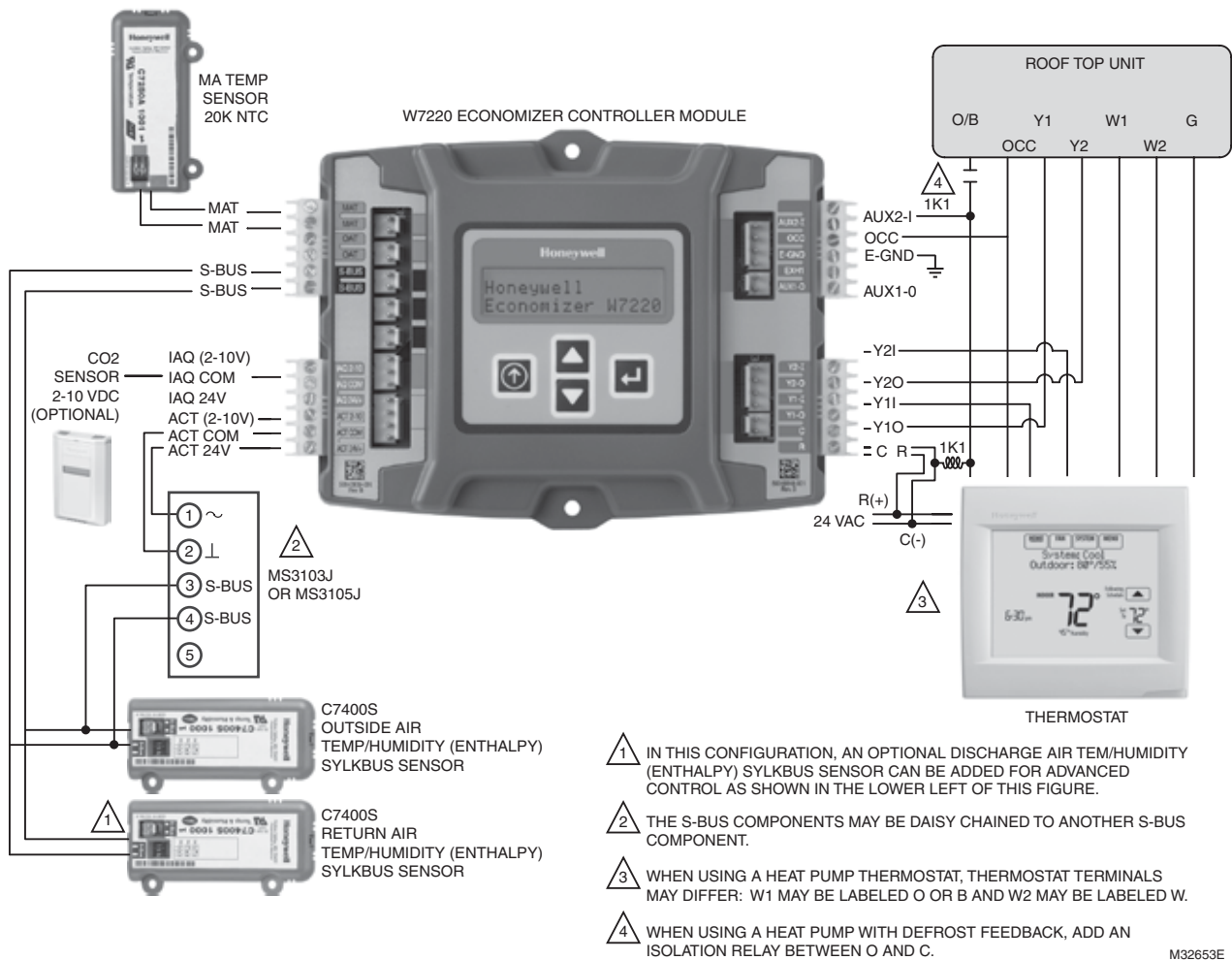


Fig 6. Economizer with Sylk bus sensor for enthalpy configuration with Honeywell MS3103 or MS3105 communicating actuators.



Wiring Diagrams - JADE Economizer

W7220

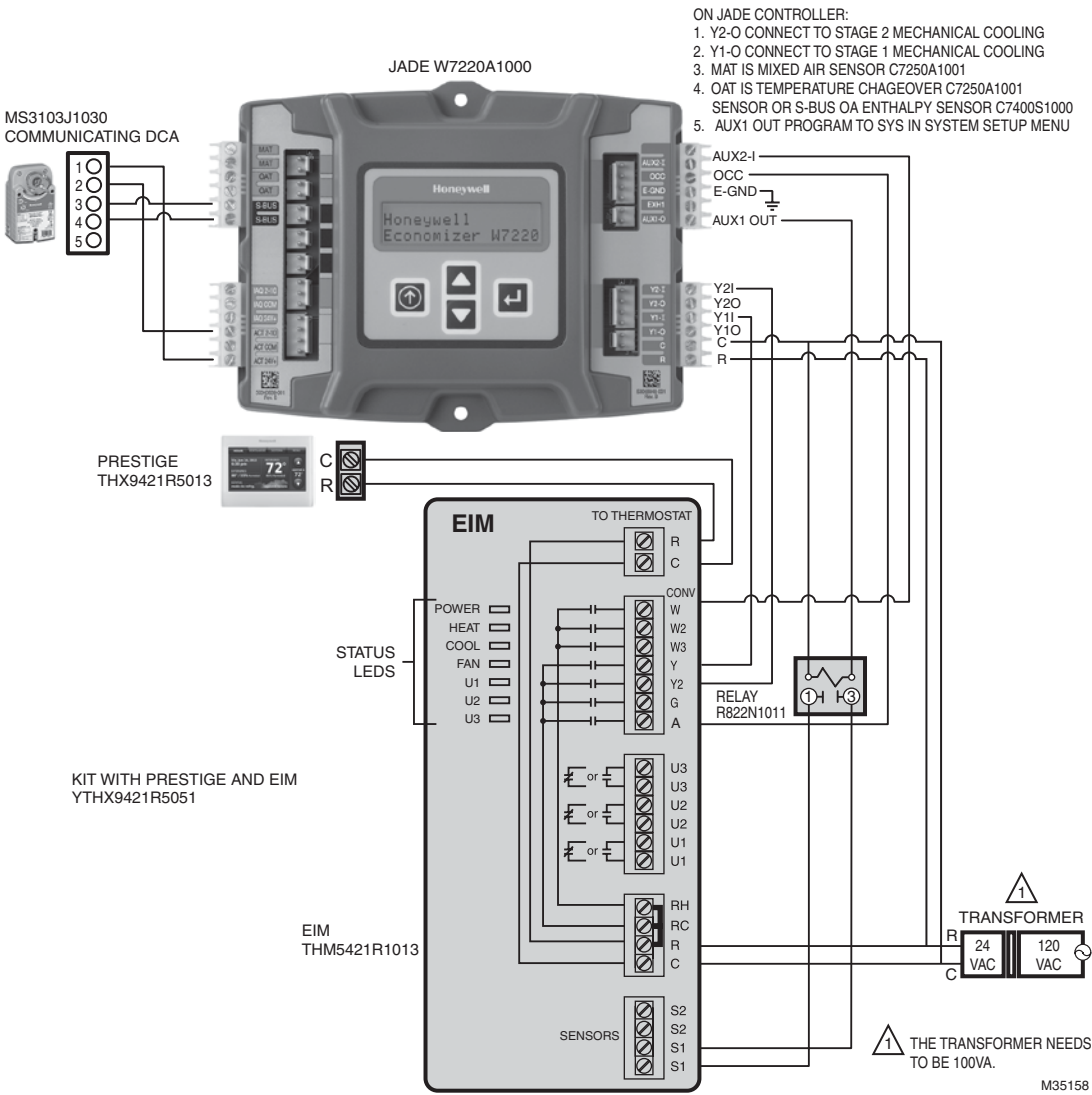


Fig 8. W7220 JADE™ Wired to a Prestige with EIM and MS3103 Communicating DCA.

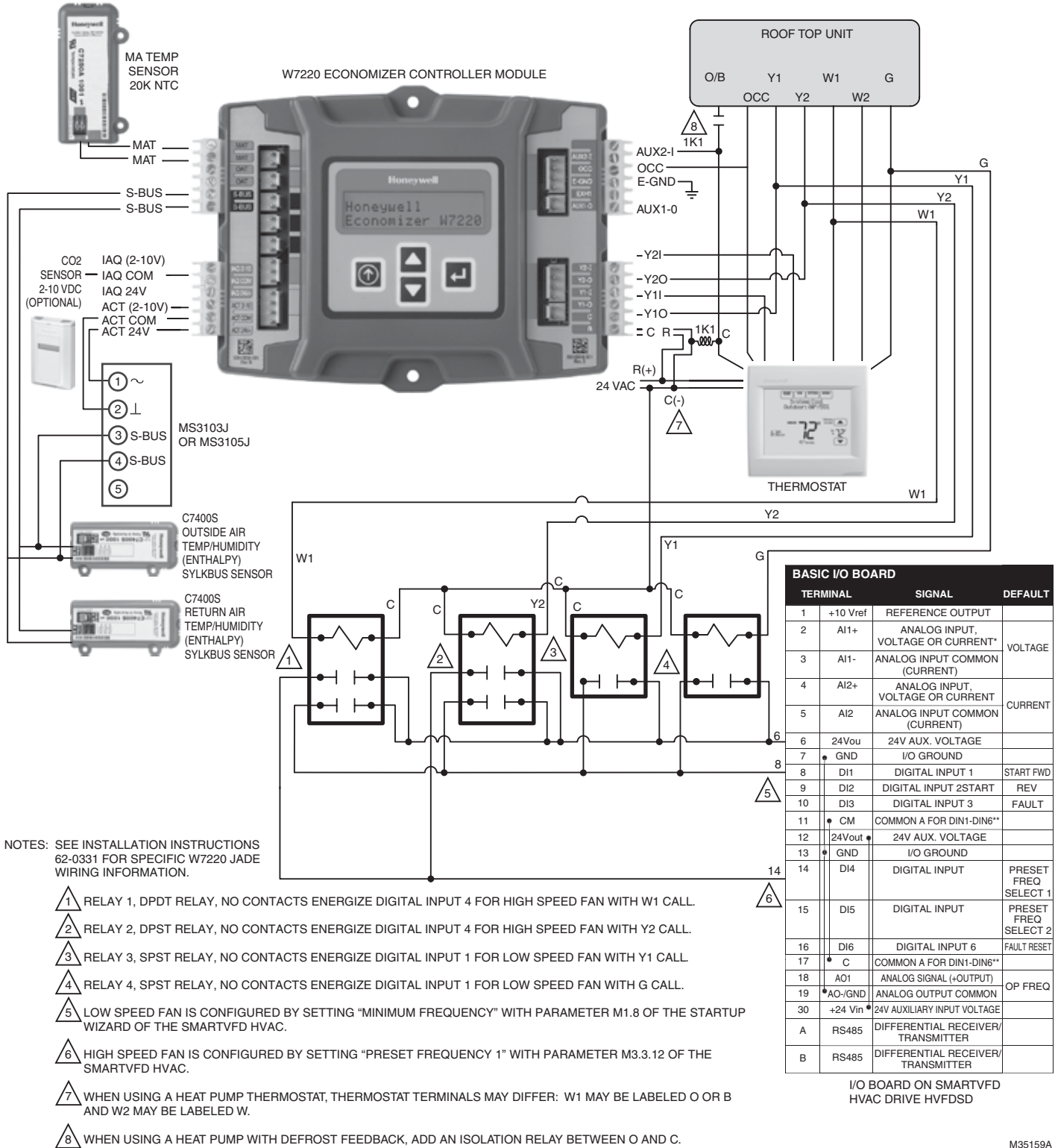


Fig 9. W7220 JADE with the SmartVFD HVAC for Two Speed Fan Operation.

Variable Frequency Drives Selection

To pick the right drive for your motor application, first make sure that the motor is capable of handling the additional heat that is created when varying the speed of the drive with a frequency drive. Check the motor nameplate to make sure that the insulation class is F, H or higher. Older motors with class A or B insulation should not be used with a VFD.

From the motor nameplate you will need the following information: Hertz (50 or 60), Volts, Full Load Amps, Phases of power (single or 3-phase), and RPM.

Pick the Right VFD for the Application

- Drives are typically sized to match the horsepower rating of the motor, which will be accurate 95 percent of the time. But for greatest accuracy, drives should be sized based on the Full Load Amps or current draw of the motor. The VFD must have a slightly larger output current rating.
- The environment the drive will operate in is critical for selection. Honeywell offers NEMA 1, NEMA 12 (for dusty, dirtier environments) and NEMA 3R enclosures (for falling water or rain situations).
- Because of the complexity of VFDs, a clean, conditioned space with temperatures between 14° F and 104° F provides an environment for ideal operation. Some drives are rated as standard for a slightly larger temperature range as noted herein.
 - o VFDs can be de-rated for operation at higher temperatures and/or high altitudes within limits. See specific drive family for de-rating calculations. De-rating for altitude and ambient temperature is cumulative.
 - o Heaters are an option in order to keep your VFD at its recommended temperature when mounted outdoors or in an unconditioned space. Quoted as special.

Determine specific building requirements in regards to harmonics, RFI filtration, etc. Local codes and or jobsite requirements will vary driven by building electrical requirements and requirements by the utility for the condition of power at the point of common coupling to the building.

Section 5: Variable Frequency Drives

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Product Selection - VFDs

SmartVFD HVAC2 Standalone Drives



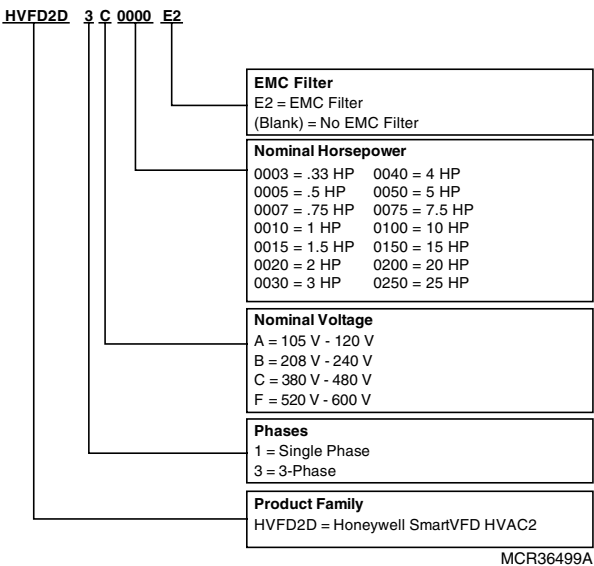
The SmartVFD HVAC2 is a micro drive that lets you make the most of the available space in your control cabinet or it can be converted to a NEMA 1 enclosure. In addition, you choose only the features you require.

- 1 x 115 Vac input, 3 x 208/230 Vac output: 0.33 to 1.5 Nominal HP
- 1 x 208/230 Vac input, 3 x 208/230 Vac output: 0.33 to 3 Nominal HP
- 3 x 208/230 Vac: 0.33 to 3 Nominal HP
- 3 x 460 Vac: 0.5 to 7.5 Nominal HP
- 3 x 600 Vac: 1 to 7.5 Nominal HP
- NEMA 1 enclosure option

SmartVFD HVAC2 drives are designed to operate between 14 °F to 122 °F and 0-95% relative humidity, non-condensing.

Model Nomenclature

Select the voltage, amps, control input/output, and filters you require.



Product Selection and Accessories - VFDs

SmartVFD HVAC2 Standalone Drives

SmartVFD HVAC2 Standalone Drives

Part Number	Nominal Voltage	Nom. HP (Nom. Current)	EMC Filter	Frame Size
HVFD2D1A0003 HVFD2D1A0005 HVFD2D1A0007 HVFD2D1A0010 HVFD2D1A0015	105-120V 1-phase in 230V 3-phase out	0.33 HP (1.7 A) 0.50 HP (2.4 A) 0.75 HP (2.8 A) 1 HP (3.7 A) 1.5 HP (4.8 A)	No Filter	MI2 MI2 MI2 MI2 MI3
HVFD2D1B0003E2 HVFD2D1B0005E2 HVFD2D1B0007E2 HVFD2D1B0010E2 HVFD2D1B0015E2 HVFD2D1B0020E2 HVFD2D1B0030E2	208-240V 1-phase in 3-phase out	0.33 HP (1.7 A) 0.50 HP (2.4 A) 0.75 HP (2.8 A) 1 HP (3.7 A) 1.5 HP (4.8 A) 2 HP (7 A) 3 HP (9.6A)	EMC2	MI1 MI1 MI1 MI2 MI2 MI2 MI3
HVFD2D3B0003 HVFD2D3B0005 HVFD2D3B0007 HVFD2D3B0010 HVFD2D3B0015 HVFD2D3B0020 HVFD2D3B0030 HVFD2D3B0040 HVFD2D3B0050 HVFD2D3B0075 HVFD2D3B0100 HVFD2D3B0150	208-240V 3-phase in 3-phase out	0.33 HP (1.7 A) 0.50 HP (2.4 A) 0.75 HP (2.8 A) 1 HP (3.7 A) 1.5 HP (4.8 A) 2 HP (7 A) 3 HP (11 A) 4 HP (12.5 A) 5 HP (17.5 A) 7.5 HP (25 A) 10 HP (31 A) 15 HP (38A)	No Filter	MI1 MI1 MI1 MI2 MI2 MI2 MI3 MI4 MI4 MI4 MI5 MI5
HVFD2D3C0005 HVFD2D3C0007 HVFD2D3C0010 HVFD2D3C0015 HVFD2D3C0020 HVFD2D3C0030 HVFD2D3C0040 HVFD2D3C0050 HVFD2D3C0075 HVFD2D3C0100 HVFD2D3C0150 HVFD2D3C0200 HVFD2D3C0250	380-480V 3-phase in 3-phase out	0.50 HP (1.3 A) 0.75 HP (1.9 A) 1 HP (2.4A) 1.5 HP (3.3 A) 2 HP (4.3 A) 3 HP (5.6 A) 4 HP (7.6 A) 5 HP (9 A) 7.5 HP (12 A) 10 HP (16 A) 15 HP (23 A) 20 HP (31 A) 25 HP (38 A)	No Filter	MI1 MI1 MI1 MI2 MI2 MI2 MI3 MI3 MI3 MI4 MI4 MI5 MI5
HVFD2D3C0005E2 HVFD2D3C0007E2 HVFD2D3C0010E2 HVFD2D3C0015E2 HVFD2D3C0020E2 HVFD2D3C0030E2 HVFD2D3C0040E2 HVFD2D3C0050E2 HVFD2D3C0075E2 HVFD2D3C0100E2 HVFD2D3C0150E2 HVFD2D3C0200E2 HVFD2D3C0250E2	380-480V 3-phase in 3-phase out	0.50 HP (1.3 A) 0.75 HP (1.9 A) 1 HP (2.4A) 1.5 HP (3.3 A) 2 HP (4.3 A) 3 HP (5.6 A) 4 HP (7.6 A) 5 HP (9 A) 7.5 HP (12 A) 10 HP (16 A) 15 HP (23 A) 20 HP (31 A) 25 HP (38 A)	EMC2	MI1 MI1 MI1 MI2 MI2 MI2 MI3 MI3 MI3 MI4 MI4 MI5 MI5
HVFD2D3F0010 HVFD2D3F0020 HVFD2D3F0030 HVFD2D3F0050 HVFD2D3F0075	520-600V 3-phase in 3-phase out	1 HP (1.7A) 2 HP (2.7A) 3 HP (3.9A) 5 HP (6.1A) 7.5 HP (9A)	No Filter	MI3 MI3 MI3 MI3 MI3

SmartVFD HVAC2

Accessories	Description
HVFD2DOPTFR123	Option board mounting kit HVAC2 MI1-MI3
HVFD2DOPTFR45	Option board mounting kit HVAC2 MI4-MI5
HVFDSDOPT6DI/U	Option board 6 x DI/DO, each I/O can be individually configured
HVFDSDOPT2RO1T/U	Option board 2 x Relay output + Thermistor
HVFDSDOPT1AI2AO/U	Option board 1 x AI, 2 x AO (isolated)
HVFDSDOPT3RO/U	Option board 3 x Relay output
HVFDSDOPT1RO5DI/U	Option board 1 x RO, 5 x DI (42-240 VAC)
HVFDOPPTMP	Option board Temperature measurement (PT100, PT1000, NI1000, KTY84-130, KTY84-150, KTY84-131)
50021579-001/U	PT1000 Sensor probe (or T775-SENS-WR water resistant or T775-SENS-WT water tight)
HVFDCCNEMA1FR1	Nema 1 Kit MI1
HVFDCCNEMA1FR2	Nema 1 Kit MI2
HVFDCCNEMA1FR3	Nema 1 Kit MI3
HVFDCCNEMA1FR4	Nema 1 Kit MI4
HVFDCCNEMA1FR5	Nema 1 Kit MI5
HVFD2DMOUNTKIT	SmartVFD HVAC2 Door Mounting Kit
HVFDCCABLE/U	SmartVFD Commissioning Cable and USB Adaptor
HVFDCCMCA/U	Compact Commissioning Device
HVFDCCMCAKIT/U	Compact Commissioning Kit (Cable, USB Adaptor, and Device combined)
HVFD2DINSTALLMI4	HVAC2 Replacement Install Kit frame 4
HVFD2DINSTALLMI5	HVAC2 Replacement Install Kit frame 5
HVFD2DFANMI4	HVAC2 Replacement Fan HVFD2D frame 4
HVFD2DFANMI5	HVAC2 Replacement Fan HVFD2D frame 5

SmartVFD HVAC2 Frame Size

Frame Type	Dimensions, Approximate		Weight	
	(inch)	(mm)	(lb)	(kg)
MI1	6.2 x 2.6 x 3.9	157 x 66 x 99	1.2 lb	0.54 kg
MI2	7.7 x 3.5 x 4	196 x 90 x 102	1.2 lb	0.54 kg
MI3	10.2 x 3.9 x 4.3	251 x 100 x 109	2.2 lb	1 kg

Submittal Data - VFDs

SmartVFD HVAC2 Standalone Drives



The SmartVFD HVAC2 drive is a micro drive designed to fit in your enclosure or become a NEMA 1 enclosure whichever is required for your smaller frequency drive applications.

FEATURES

Modular Design

- NEMA 1 kit available
- Optional EMC filter
- Accessory PC interface

Easy to Install

- DIN-rail or screw mounting
- Zero clearance side-by-side mounting

Easy Communication

- Intuitive user interface
- Accessory PC interface
- Free PC Tool with optional adaptor turn your computer into a programming window to setup, control, monitor and diagnose in real time or for off-line editing and backup
- PI control
- Modbus RTU

Rugged, High Performance

- Plenum rated
- Optional EMC Filter on many models

Warranty

- 3 years

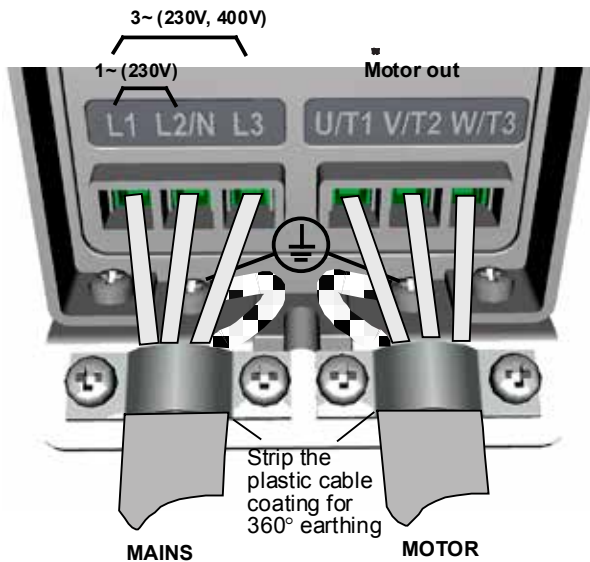
SmartVFD HVAC2 Technical Data

Mains connection	Input voltage U_m	115V, -15%...+10% 1~ 208...240V, -15%...+10% 1~ 208...240V, -15%...+10% 3~ 380 - 480V, -15%...+10% 3~ 600V, -15%...+10% 3~
	Input frequency	45...66 Hz
	Connection to mains	Once per minute or less (normal case)
Supply network	Networks	SmartVFD HVAC2 (400V) cannot be used with corner grounded networks
	Short circuit current	Maximum short circuit current has to be < 50kA
Motor connection	Output voltage	0 - U_m
	Output current	Continuous rated I_n at ambient temperature max. +122 °F (50 °C) (depends on the unit size) overload 1.5 x I_n max. 1 min/10 min
	Starting current/torque	Current 2 x I_n for 2 secs in every 20 sec period. Torque depends on motor
	Output frequency	0...320 Hz
Control connection	Frequency resolution	0.01 Hz
	Digital input	Positive, Logic1: 18...+30V, Logic0: 0...5V; Negative, Logic1: 0...10V, Logic0: 18...30V; Ri = 10KΩ (floating)
	Analogue input voltage	0...+10V, Ri = 250KΩ
	Analogue input current	0(4)...20mA, Ri ≤ 250Ω
	Analogue output	0...10V, RL ≥ 1KΩ; 0(4)...20mA, RL ≤ 500Ω, Selectable through microswitch
	Digital output	Open collector, max. load 35V/50mA (floating)
Control characteristics	Relay output	Switching load: 250Vac/3A, 24V DC 3A
	Auxiliary voltage	±20%, max. load 50mA
	Control method	Frequency Control U/f Open Loop Sensorless Vector Control
	Switching frequency	1...16 kHz; Factory default 4 kHz
	Frequency reference	Resolution 0.01 Hz
	Field weakening point	30...320 Hz
	Acceleration time	0.1...3000 sec
	Deceleration time	0.1...3000 sec
Ambient conditions	Braking torque	100%* T_n with brake option (only in 3~ drives sizes MI2-5) 30%* T_n without brake option
	Ambient operating temperature	14 °F (-10 °C) (no frost)...+104/122 °F (+40/50 °C) (depends on the unit size); rated loadability I_n Side by side installation for MI1-3 it is always 104 °F (40 °C); For IP21/Nema1 option in MI1-3 the maximum temperature is also 104 °F (40 °C)
	Storage temperature	-40 °F (-40 °C)...+158 °F (+70 °C)
	Relative humidity	0...95% RH, non-condensing, non-corrosive, no dripping water
	Air quality: chemical vapors mech. particles	IEC 721-3-3, unit in operation, class 3C2 IEC 721-3-3, unit in operation, class 3S2
	Altitude	100% load capacity (no derating) up to 3281 ft. (1000 m). 1% derating for each 328 ft. (100 m) above 3281 ft. (1000 m); max. 6562 ft. (2000 m)
	Vibration: EN60068-2-6	3...150 Hz Displacement amplitude 1(peak) mm at 3...15.8 Hz Max acceleration amplitude 1 G at 15.8...150 Hz
	Shock IEC 68-2-27	UPS Drop Test (for applicable UPS weights) Storage and shipping: max 15 G, 11 ms (in package)
	Enclosure class	IP20 for MI1-3, IP21 for MI4-5. With HVFDCDNEMA1xxx kit, IP21/NEMA1 for MI1-5.
EMC	Pollution degree	PD2
	Immunity	Complies with EN50082-1, -2, EN61800-3
	Emissions	230V: Complies with EMC category C2; With an internal RFI filter MI4&5 complies C2 with an optional DC choke and CM choke 400V: Complies with EMC category C2; With an internal RFI filter MI4&5 complies C2 with an optional DC choke and CM choke Both: No EMC emission protection (Honeywell level N); Without RFI filter
Standards	Emissions	For EMC: EN61800-3, For safety: UL508C, EN61800-5
Certificates and manufacturer's declarations of conformity	Emissions	For safety: CE, UL, cUL, KC For EMC: CE, KC (see unit nameplate for more detailed approvals)

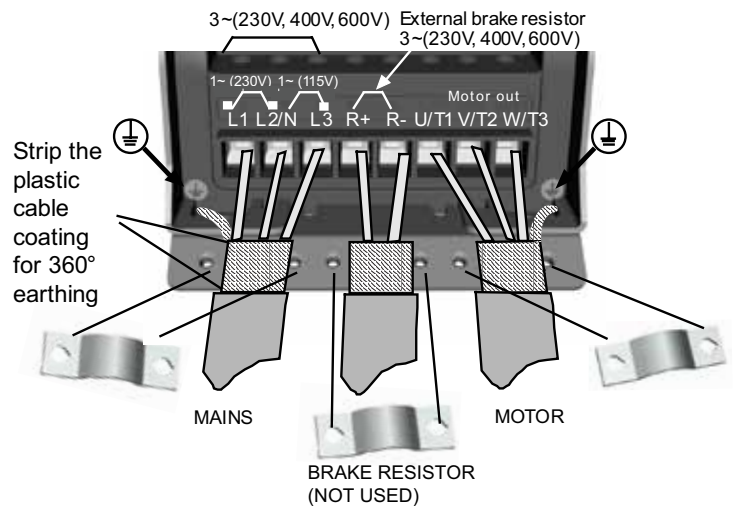
SmartVFD HVAC2 drives can be mounted side by side. Each drive requires 3.0 inches above and 2.0 inches below of free space, for cooling airflow circulation.

Power Wiring

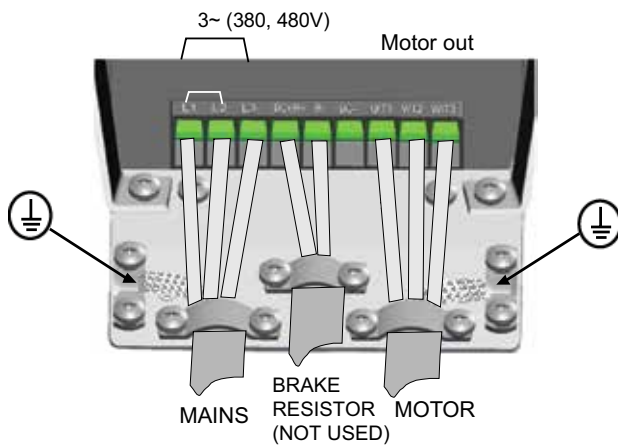
SmartVFD HVAC2 power connections, MI1



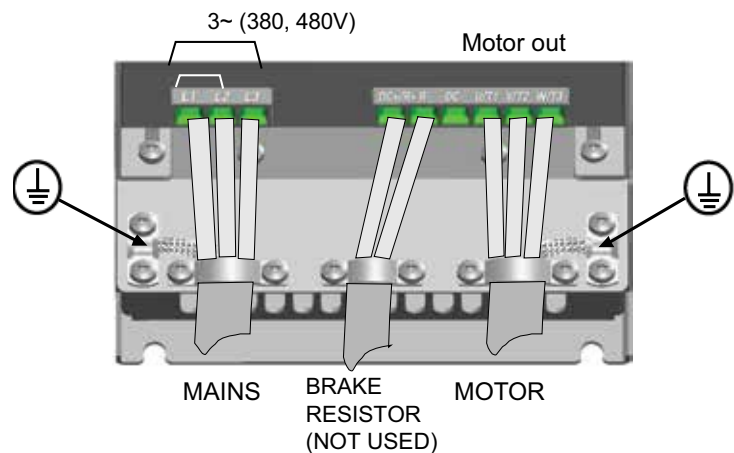
SmartVFD HVAC2 power connections, MI2 - MI3



SmartVFD HVAC2 power connections, MI4



SmartVFD HVAC2 power connections, MI4



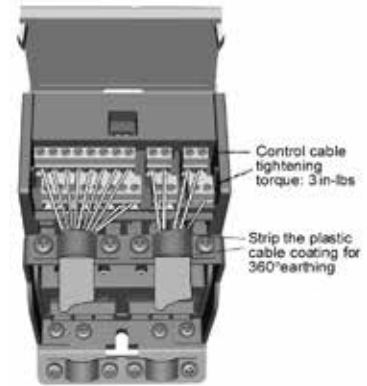
Wiring Diagrams - VFDs

SmartVFD HVAC2 Standalone Drives

Control Inputs and Outputs

1-10 kΩ	Terminal	Signal	Factory preset	Description
	1	+10 Vref		Ref. voltage out
	2	AI1	Freq. reference ^{P)}	Maximum load 10 mA
	3	GND		0 - 10 V, Ri = 250 kΩ
	6	24 Vout		±20%, max. load 50 mA
	7	DI1		Digital Input Common for DI1-DI6, refer to Table 22 on page 54 for DI sink type
	8	DI2	Start forward ^{P)}	
	9	DI3	Start reverse ^{P)}	Positive, Logic1: 18...30V, Logic0: 0...5V;
	10	DI4	Fault reset ^{P)}	Negative, Logic1: 0...10V, Logic0: 18...30V; Ri = 10kΩ (floating)
	A	RS485 signal A	FB Communication	Negative
	B	RS485 signal B	FB Communication	Positive
	4	AI2	PID actual value and Freq. reference ^{P)}	Default: 0(4) - 20 mA, Ri ≤ 250 Ω Other: 0 - + 10 V, Ri = 250 kΩ Selectable through microswitch
	5	GND		I/O signal ground
	13	DO-		Digital Output Common
	14	DI4		As DI1
	15	DI5		As DI1, Selectable through microswitch
	16	DI6		As DI1
	18	AO	Output frequency ^{P)}	0(4) - 20 mA, RL ≤ 500Ω 0 - 10 V, RL ≥ 1 kΩ Selectable through microswitch
	20	DO	Active = READY ^{P)}	Open collector, max. load 35 V / 50 mA
	22	RO1 NO	Active = RUN ^{P)}	Switching load: 250 Vac / 3 A, 24V DC 3A
	23	RO1 CM		
	24	RO2 NC	Active = FAULT ^{P)}	Switching load: 250 Vac / 3 A, 24V DC 3A
	25	RO2 CM		
	26	RO2 NO		

Control Wiring



SmartVFD HVAC2 General purpose application default I / O configuration
and connections for control board P) = Programmable function



SmartVFD HVAC drives are designed to meet all your specification and communication requirements for variable torque HVAC applications.

- 3 x 208/230 Vac: 0.75 to 125 Nominal HP
- 3 x 480 Vac: 1.5 to 250 Nominal HP
- NEMA 1, NEMA 12, and NEMA 3R enclosure options
- Disconnect option
- Bypass options: 2 contactor, 3 contactor, or 3 contactor auto-bypass

Smart VFD drives may operate above 104+ °F or above 1000 meters above sea level if the current draw is de-rated. De-rating for temperature and altitude is cumulative.

De-rating for Temperature

For installations where the ambient temperature will be above 104 °F, (40 °C):

- De-rate the drive output current rating by 1.5% for every 1.8 °F, (1 °C)
- The maximum operating temperature is 122 °F, (50 °C)

Example:

Desire 9.0 Amps at 122 °F. De-rate = 15%

Calculate Amps needed: $X - (X \times .15) = 9$

10.6 Amps are required to provide 9 Amps at 122 °F.

De-rating for Altitude

For installations where ambient temperature will be above 1000 meters (3281 feet) above sea level:

- De-rate the drive output current rating by 1% for every 100 m (328 feet) over 1000 m (3281 feet)
- Maximum altitude is 4500 m (14764 feet) above sea level

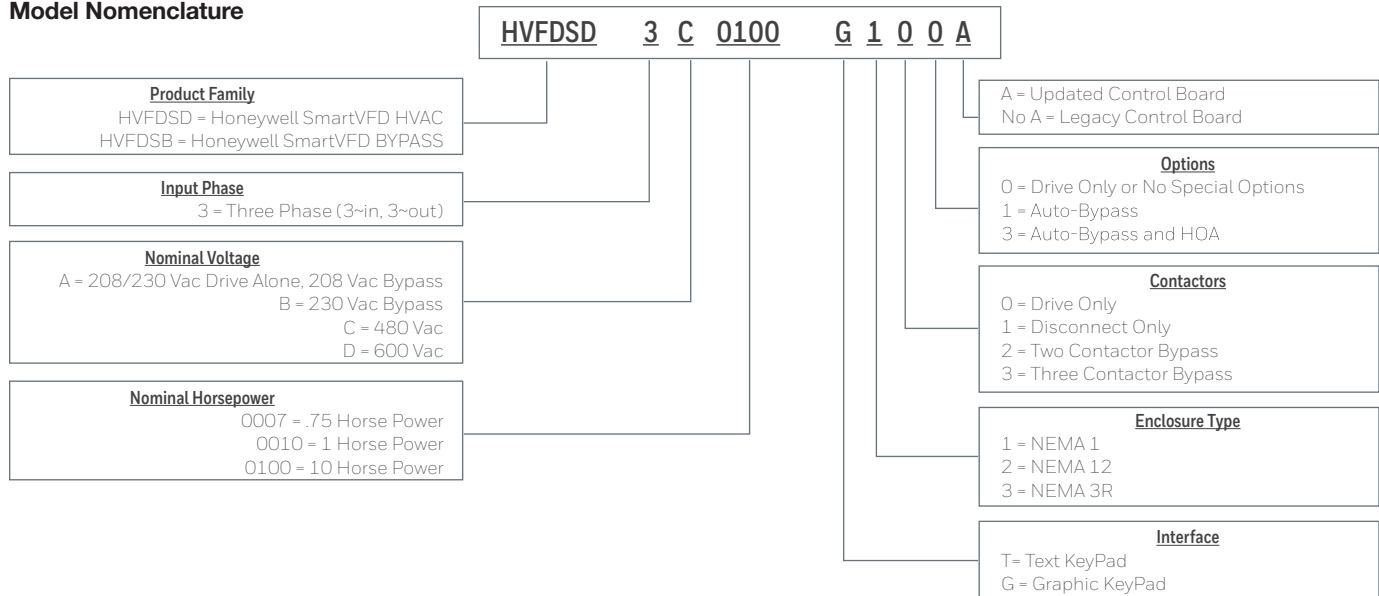
If the drive will be mounted where both temperature and altitude de-rating apply, perform one calculation and use the result as the starting Amps for the second.

Note: I/O signals over 2000 meters must be 120 V or 24 V signals

Product Selection - VFDs

SmartVFD HVAC Standalone Drives

Model Nomenclature



Product Number	Voltage	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Dimensions, Approximate		Weight	
						(inch)	(mm)	(lb)	(kg)
HVFDSD3A0007G100A	208 Vac/230 Vac	0.75 HP	4	NEMA 1	3.7A	5 x 12.9 x 7.5	127 x 327.66 x190.5	13.2 lb	5.98 kg
HVFDSD3A0007G200A	208 Vac/230 Vac	0.75 HP	4	NEMA 12	3.7A	5 x 12.9 x 7.5	127 x 327.66 x190.5	13.2 lb	5.98 kg
HVFDSD3A0007G300/U	208 Vac/230 Vac	0.75 HP	4	NEMA 3R	3.7A	20.5 x 20 x 10	520.7 x 508 x 254	39 lb	17.7 kg
HVFDSD3A0010G100A	208 Vac/230 Vac	1 HP	4	NEMA 1	4.8A	5 x 12.9 x 7.5	127 x 327.66 x190.5	13.2 lb	5.98 kg
HVFDSD3A0010G200A	208 Vac/230 Vac	1 HP	4	NEMA 12	4.8A	5 x 12.9 x 7.5	127 x 327.66 x190.5	13.2 lb	5.98 kg
HVFDSD3A0010G300/U	208 Vac/230 Vac	1 HP	4	NEMA 3R	4.8A	20.5 x 20 x 10	520.7 x 508 x 254	39 lb	17.7 kg
HVFDSD3A0015G100A	208 Vac/230 Vac	1.5 HP	4	NEMA 1	6.6A	5 x 12.9 x 7.5	127 x 327.66 x190.5	13.2 lb	5.98 kg
HVFDSD3A0015G200A	208 Vac/230 Vac	1.5 HP	4	NEMA 12	6.6A	5 x 12.9 x 7.5	127 x 327.66 x190.5	13.2 lb	5.98 kg
HVFDSD3A0015G300/U	208 Vac/230 Vac	1.5 HP	4	NEMA 3R	6.6A	20.5 x 20 x 10	520.7 x 508 x 254	39 lb	17.7 kg
HVFDSD3A0020G100A	208 Vac/230 Vac	2 HP	4	NEMA 1	8A	5 x 12.9 x 7.5	127 x 327.66 x190.5	13.2 lb	5.98 kg
HVFDSD3A0020G200A	208 Vac/230 Vac	2 HP	4	NEMA 12	8A	5 x 12.9 x 7.5	127 x 327.66 x190.5	13.2 lb	5.98 kg
HVFDSD3A0020G300/U	208 Vac/230 Vac	2 HP	4	NEMA 3R	8A	20.5 x 20 x 10	520.7 x 508 x 254	39 lb	17.7 kg
HVFDSD3A0030G100A	208 Vac/230 Vac	3 HP	4	NEMA 1	11A	5 x 12.9 x 7.5	127 x 327.66 x190.5	13.2 lb	5.98 kg
HVFDSD3A0030G200A	208 Vac/230 Vac	3 HP	4	NEMA 12	11A	5 x 12.9 x 7.5	127 x 327.66 x190.5	13.2 lb	5.98 kg
HVFDSD3A0030G300/U	208 Vac/230 Vac	3 HP	4	NEMA 3R	11A	20.5 x 20 x 10	520.7 x 508 x 254	39 lb	17.7 kg
HVFDSD3A0050G100A	208 Vac/230 Vac	5 HP	5	NEMA 1	18A	5.7 x 16.5 x 8.4	144.78 x 419.1 x213.36	22 lb	9.97 kg
HVFDSD3A0050G200A	208 Vac/230 Vac	5 HP	5	NEMA 12	18A	5.7 x 16.5 x 8.4	144.78 x 419.1 x213.36	22 lb	9.97 kg
HVFDSD3A0050G300/U	208 Vac/230 Vac	5 HP	5	NEMA 3R	18A	20.5 x 24 x 10	520.7 x 609.6 x 254	58 lb	26.3 kg
HVFDSD3A0075G100A	208 Vac/230 Vac	7.5 HP	5	NEMA 1	24A	5.7 x 16.5 x 8.4	144.78 x 419.1 x213.36	22 lb	9.97 kg
HVFDSD3A0075G200A	208 Vac/230 Vac	7.5 HP	5	NEMA 12	24A	5.7 x 16.5 x 8.4	144.78 x 419.1 x213.36	22 lb	9.97 kg
HVFDSD3A0075G300/U	208 Vac/230 Vac	7.5 HP	5	NEMA 3R	24A	20.5 x 24 x 10	520.7 x 609.6 x 254	58 lb	26.3 KG
HVFDSD3A0100G100A	208 Vac/230 Vac	10 HP	5	NEMA 1	31A	5.7 x 16.5 x 8.4	144.78 x 419.1 x213.36	22 lb	9.97 kg
HVFDSD3A0100G200A	208 Vac/230 Vac	10 HP	5	NEMA 12	31A	5.7 x 16.5 x 8.4	144.78 x 419.1 x213.36	22 lb	9.97 kg
HVFDSD3A0100G300/U	208 Vac/230 Vac	10 HP	5	NEMA 3R	31A	20.5 x 24 x 10	520.7 x 609.6 x 254	58 lb	26.3 kg
HVFDSD3A0150G100A	208 Vac/230 Vac	15 HP	6	NEMA 1	48A	7.7 x 21.9 x 9	196 x 556 x 229	44.1 lb	20 kg
HVFDSD3A0150G200A	208 Vac/230 Vac	15 HP	6	NEMA 12	48A	7.7 x 21.9 x 9	196 x 556 x 229	44.1 lb	20 kg
HVFDSD3A0150G300/U	208 Vac/230 Vac	15 HP	6	NEMA 3R	48A	28.5 x 36 x 10	723.9 x 914.4 x 254	80 lb	36.3 kg
HVFDSD3A0200G100A	208 Vac/230 Vac	20 HP	6	NEMA 1	62A	7.7 x 21.9 x 9	196 x 556 x 229	44.1 lb	20 kg
HVFDSD3A0200G200A	208 Vac/230 Vac	20 HP	6	NEMA 12	62A	7.7 x 21.9 x 9	196 x 556 x 229	44.1 lb	20 kg
HVFDSD3A0200G300/U	208 Vac/230 Vac	20 HP	6	NEMA 3R	62A	28.5 x 36 x 10	723.9 x 914.4 x 254	80 lb	36.3 kg
HVFDSD3A0250G100A	208 Vac/230 Vac	25 HP	7	NEMA 1	75A	9.3 x 26 x 10.2	236 x 660 x259	82.7 lb	37.5 kg
HVFDSD3A0250G200A	208 Vac/230 Vac	25 HP	7	NEMA 12	75A	9.3 x 26 x 10.2	236 x 660 x259	82.7 lb	37.5 kg
HVFDSD3A0250G300/U	208 Vac/230 Vac	25 HP	7	NEMA 3R	75A	28.5 x 48 x 12	723.9 x 1219.2x 304.8	130 lb	59 kg
HVFDSD3A0300G100A	208 Vac/230 Vac	30 HP	7	NEMA 1	88A	9.3 x 26 x 10.2	236 x 660 x259	82.7 lb	37.5 kg
HVFDSD3A0300G200A	208 Vac/230 Vac	30 HP	7	NEMA 12	88A	9.3 x 26 x 10.2	236 x 660 x259	82.7 lb	37.5 kg
HVFDSD3A0300G300/U	208 Vac/230 Vac	30 HP	7	NEMA 3R	88A	28.5 x 48 x 12	723.9 x 1219.2x 304.8	130 lb	59 kg
HVFDSD3A0400G100A	208 Vac/230 Vac	40 HP	7	NEMA 1	105A	9.3 x 26 x 10.2	236 x 660 x259	82.7 lb	37.5 kg
HVFDSD3A0400G200A	208 Vac/230 Vac	40 HP	7	NEMA 12	105A	9.3 x 26 x 10.2	236 x 660 x259	82.7 lb	37.5 kg
HVFDSD3A0400G300/U	208 Vac/230 Vac	40 HP	7	NEMA 3R	105A	28.5 x 48 x 12	723.9 x 1219.2x 304.8	130 lb	59 kg
HVFDSD3A0500G100A	208 Vac/230 Vac	50 HP	8	NEMA 1	140A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3A0500G200A	208 Vac/230 Vac	50 HP	8	NEMA 12	140A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3A0500G300/U	208 Vac/230 Vac	50 HP	8	NEMA 3R	140A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3A0600G100A	208 Vac/230 Vac	60 HP	8	NEMA 1	170A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg

Product Number	Voltage	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Dimensions, Approximate		Weight	
						(inch)	(mm)	(lb)	(kg)
HVFDSD3A0600G200A	208 Vac/230 Vac	60 HP	8	NEMA 12	170A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3A0600G300/U	208 Vac/230 Vac	60 HP	8	NEMA 3R	170A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3A0750G100A	208 Vac/230 Vac	75 HP	8	NEMA 1	205A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3A0750G200A	208 Vac/230 Vac	75 HP	8	NEMA 12	205A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3A0750G300/U	208 Vac/230 Vac	75 HP	8	NEMA 3R	205A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3A1000G100A	208 Vac/230 Vac	100 HP	9	NEMA 1	261A	18.9 x 45.3 x 14.4	480 x 1150 x 366	238.1 lb	108 kg
HVFDSD3A1000G200A	208 Vac/230 Vac	100 HP	9	NEMA 12	261A	18.9 x 45.3 x 14.4	480 x 1150 x 366	238.1 lb	108 kg
HVFDSD3A1250G100A	208 Vac/230 Vac	125 HP	9	NEMA 1	310A	18.9 x 45.3 x 14.4	480 x 1150 x 366	238.1 lb	108 kg
HVFDSD3A1250G200A	208 Vac/230 Vac	125 HP	9	NEMA 12	310A	18.9 x 45.3 x 14.4	480 x 1150 x 366	238.1 lb	108 kg
HVFDSD3C0015G100A	460 Vac	1.5 HP	4	NEMA 1	3.4A	5 x 12.9 x 7.5	127 x 327.66 x 190.5	13.2 lb	5.98 kg
HVFDSD3C0015G200A	460 Vac	1.5 HP	4	NEMA 12	3.4A	5 x 12.9 x 7.5	127 x 327.66 x 190.5	13.2 lb	5.98 kg
HVFDSD3C0015G300/U	460 Vac	1.5 HP	4	NEMA 3R	3.4A	20.5 x 20 x 10	520.7 x 508 x 254	39 lb	17.7 kg
HVFDSD3C0020G100A	460 Vac	2 HP	4	NEMA 1	4.8A	5 x 12.9 x 7.5	127 x 327.66 x 190.5	13.2 lb	5.98 kg
HVFDSD3C0020G200A	460 Vac	2 HP	4	NEMA 12	4.8A	5 x 12.9 x 7.5	127 x 327.66 x 190.5	13.2 lb	5.98 kg
HVFDSD3C0020G300/U	460 Vac	2 HP	4	NEMA 3R	4.8A	20.5 x 20 x 10	520.7 x 508 x 254	39 lb	17.7 kg
HVFDSD3C0030G100A	460 Vac	3 HP	4	NEMA 1	5.6A	5 x 12.9 x 7.5	127 x 327.66 x 190.5	13.2 lb	5.98 kg
HVFDSD3C0030G200A	460 Vac	3 HP	4	NEMA 12	5.6A	5 x 12.9 x 7.5	127 x 327.66 x 190.5	13.2 lb	5.98 kg
HVFDSD3C0030G300/U	460 Vac	3 HP	4	NEMA 3R	5.6A	20.5 x 20 x 10	520.7 x 508 x 254	39 lb	17.7 kg
HVFDSD3C0040G100A	460 Vac	4 HP	4	NEMA 1	8A	5 x 12.9 x 7.5	127 x 327.66 x 190.5	13.2 lb	5.98 kg
HVFDSD3C0040G200A	460 Vac	4 HP	4	NEMA 12	8A	5 x 12.9 x 7.5	127 x 327.66 x 190.5	13.2 lb	5.98 kg
HVFDSD3C0040G300/U	460 Vac	4 HP	4	NEMA 3R	8A	20.5 x 20 x 10	520.7 x 508 x 254	39 lb	17.7 kg
HVFDSD3C0050G100A	460 Vac	5 HP	4	NEMA 1	9.6A	5 x 12.9 x 7.5	127 x 327.66 x 190.5	13.2 lb	5.98 kg
HVFDSD3C0050G200A	460 Vac	5 HP	4	NEMA 12	9.6A	5 x 12.9 x 7.5	127 x 327.66 x 190.5	13.2 lb	5.98 kg
HVFDSD3C0050G300/U	460 Vac	5 HP	4	NEMA 3R	9.6A	20.5 x 20 x 10	520.7 x 508 x 254	39 lb	17.7 kg
HVFDSD3C0075G100A	460 Vac	7.5 HP	4	NEMA 1	12A	5 x 12.9 x 7.5	127 x 327.66 x 190.5	13.2 lb	5.98 kg
HVFDSD3C0075G200A	460 Vac	7.5 HP	4	NEMA 12	12A	5 x 12.9 x 7.5	127 x 327.66 x 190.5	13.2 lb	5.98 kg
HVFDSD3C0075G300/U	460 Vac	7.5 HP	4	NEMA 3R	12A	20.5 x 20 x 10	520.7 x 508 x 254	39 lb	17.7 kg
HVFDSD3C0100G100A	460 Vac	10 HP	5	NEMA 1	16A	5.7 x 16.5 x 8.4	144.78 x 419.1 x 213.36	22 lb	9.97 kg
HVFDSD3C0100G200A	460 Vac	10 HP	5	NEMA 12	16A	5.7 x 16.5 x 8.4	144.78 x 419.1 x 213.36	22 lb	9.97 kg
HVFDSD3C0100G300/U	460 Vac	10 HP	5	NEMA 3R	16A	20.5 x 24 x 10	520.7 x 609.6 x 254	58 lb	26.3 kg
HVFDSD3C0150G100A	460 Vac	15 HP	5	NEMA 1	23A	5.7 x 16.5 x 8.4	144.78 x 419.1 x 213.36	22 lb	9.97 kg
HVFDSD3C0150G200A	460 Vac	15 HP	5	NEMA 12	23A	5.7 x 16.5 x 8.4	144.78 x 419.1 x 213.36	22 lb	9.97 kg
HVFDSD3C0150G300/U	460 Vac	15 HP	5	NEMA 3R	23A	20.5 x 24 x 10	520.7 x 609.6 x 254	58 lb	26.3 kg
HVFDSD3C0200G100A	460 Vac	20 HP	5	NEMA 1	31A	5.7 x 16.5 x 8.4	144.78 x 419.1 x 213.36	22 lb	9.97 kg
HVFDSD3C0200G200A	460 Vac	20 HP	5	NEMA 12	31A	5.7 x 16.5 x 8.4	144.78 x 419.1 x 213.36	22 lb	9.97 kg
HVFDSD3C0200G300/U	460 Vac	20 HP	5	NEMA 3R	31A	20.5 x 24 x 10.5	520.7 x 609.6 x 254	58 lb	26.3 kg
HVFDSD3C0250G100A	460 Vac	25 HP	6	NEMA 1	38A	7.7 x 21.9 x 9	196 x 556 x 229	44.1 lb	20 kg
HVFDSD3C0250G200A	460 Vac	25 HP	6	NEMA 12	38A	7.7 x 21.9 x 9	196 x 556 x 229	44.1 lb	20 kg
HVFDSD3C0250G300/U	460 Vac	25 HP	6	NEMA 3R	38A	28.5 x 36 x 10.5	723.9 x 914.4 x 254	80 lb	36.3 kg
HVFDSD3C0300G100A	460 Vac	30 HP	6	NEMA 1	46A	7.7 x 21.9 x 9	196 x 556 x 229	44.1 lb	20 kg
HVFDSD3C0300G200A	460 Vac	30 HP	6	NEMA 12	46A	7.7 x 21.9 x 9	196 x 556 x 229	44 lb	20 kg
HVFDSD3C0300G300/U	460 Vac	30 HP	6	NEMA 3R	46A	28.5 x 36 x 10.5	723.9 x 914.4 x 254	80 lb	36.3 kg
HVFDSD3C0400G100A	460 Vac	40 HP	6	NEMA 1	61A	7.7 x 21.9 x 9	196 x 556 x 229	44.1 lb	20 kg
HVFDSD3C0400G200A	460 Vac	40 HP	6	NEMA 12	61A	7.7 x 21.9 x 9	196 x 556 x 229	44.1 lb	20 kg
HVFDSD3C0400G300/U	460 Vac	40 HP	6	NEMA 3R	61A	28.5 x 36 x 10.5	723.9 x 914.4 x 254	80 lb	36.3 kg
HVFDSD3C0500G100A	460 Vac	50 HP	7	NEMA 1	72A	9.3 x 26 x 10.2	236 x 660 x 259	82.7 lb	37.5 kg
HVFDSD3C0500G200A	460 Vac	50 HP	7	NEMA 12	72A	9.3 x 26 x 10.2	236 x 660 x 259	82.7 lb	37.5 kg
HVFDSD3C0500G300/U	460 Vac	50 HP	7	NEMA 3R	72A	28.5 x 48 x 12.5	723.9 x 1219.2x 304.8	130 lb	59 kg
HVFDSD3C0600G100A	460 Vac	60 HP	7	NEMA 1	87A	9.3 x 26 x 10.2	236 x 660 x 259	82.7 lb	37.5 kg
HVFDSD3C0600G200A	460 Vac	60 HP	7	NEMA 12	87A	9.3 x 26 x 10.2	236 x 660 x 259	82.7 lb	37.5 kg
HVFDSD3C0600G300/U	460 Vac	60 HP	7	NEMA 3R	87A	28.5 x 48 x 12.5	723.9 x 1219.2x 304.8	130 lb	59 kg
HVFDSD3C0750G100A	460 Vac	75 HP	7	NEMA 1	105A	9.3 x 26 x 10.2	236 x 660 x 259	82.7 lb	37.5 kg
HVFDSD3C0750G200A	460 Vac	75 HP	7	NEMA 12	105A	9.3 x 26 x 10.2	236 x 660 x 259	82.7 lb	37.5 kg
HVFDSD3C0750G300/U	460 Vac	75 HP	7	NEMA 3R	105A	28.5 x 48 x 12.5	723.9 x 1219.2x 304.8	130 lb	59 kg
HVFDSD3C1000G100A	460 Vac	100 HP	8	NEMA 1	140A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3C1000G200A	460 Vac	100 HP	8	NEMA 12	140A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3C1250G100A	460 Vac	125 HP	8	NEMA 1	170A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3C1250G200A	460 Vac	125 HP	8	NEMA 12	170A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3C1500G100A	460 Vac	150 HP	8	NEMA 1	205A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3C1500G200A	460 Vac	150 HP	8	NEMA 12	205A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3C2000G100A	460 Vac	200 HP	9	NEMA 1	261A	18.9 x 45.3 x 14.4	480 x 1150 x 366	238.1 lb	108 kg
HVFDSD3C2000G200A	460 Vac	200 HP	9	NEMA 12	261A	18.9 x 45.3 x 14.4	480 x 1150 x 366	238.1 lb	108 kg
HVFDSD3C2500G100A	460 Vac	250 HP	9	NEMA 1	310A	18.9 x 45.3 x 14.4	480 x 1150 x 366	238.1 lb	108 kg
HVFDSD3C2500G200A	460 Vac	250 HP	9	NEMA 12	310A	18.9 x 45.3 x 14.4	480 x 1150 x 366	238.1 lb	108 kg
HVFDSD3D0030G100A	600 Vac	3 HP	5	NEMA 1	3.9 A	5.7 x 16.5 x 8.4	144.78 x 419.1 x 213.36	22 lb	9.97 kg
HVFDSD3D0050G100A	600 Vac	5 HP	5	NEMA 1	6.1 A	5.7 x 16.5 x 8.4	144.78 x 419.1 x 213.36	22 lb	9.97 kg
HVFDSD3D0075G100A	600 Vac	7.5 HP	5	NEMA 1	9 A	5.7 x 16.5 x 8.4	144.78 x 419.1 x 213.36	22 lb	9.97 kg

Product Selection - VFDs

SmartVFD HVAC Standalone Drives

Product Number	Voltage	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Dimensions, Approximate		Weight	
						(inch)	(mm)	(lb)	(kg)
HVFDSD3D0100G100A	600 Vac	10 HP	5	NEMA 1	11 A	5.7 x 16.5 x 8.4	144.78 x 419.1 x213.36	22 lb	9.97 kg
HVFDSD3D0150G100A	600 Vac	15 HP	6	NEMA 1	18 A	7.7 x 21.9 x 9	196 x 556 x229	44.1 lb	20 kg
HVFDSD3D0200G100A	600 Vac	20 HP	6	NEMA 1	22 A	7.7 x 21.9 x 9	196 x 556 x229	44.1 lb	20 kg
HVFDSD3D0250G100A	600 Vac	25 HP	6	NEMA 1	27 A	7.7 x 21.9 x 9	196 x 556 x229	44.1 lb	20 kg
HVFDSD3D0300G100A	600 Vac	30 HP	6	NEMA 1	34 A	7.7 x 21.9 x 9	196 x 556 x229	44.1 lb	20 kg
HVFDSD3D0400G100A	600 Vac	40 HP	7	NEMA 1	41 A	9.3 x 26 x 10.2	236 x 660 x259	82.7 lb	37.5 kg
HVFDSD3D0500G100A	600 Vac	50 HP	7	NEMA 1	52 A	9.3 x 26 x 10.2	236 x 660 x259	82.7 lb	37.5 kg
HVFDSD3D0600G100A	600 Vac	60 HP	7	NEMA 1	62 A	9.3 x 26 x 10.2	236 x 660 x259	82.7 lb	37.5 kg
HVFDSD3D0750G100A	600 Vac	75 HP	8	NEMA 1	80 A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3D1000G100A	600 Vac	100 HP	8	NEMA 1	100 A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3D1250G100A	600 Vac	125 HP	8	NEMA 1	125 A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3D1500G100A	600 Vac	150 HP	9	NEMA 1	144 A	18.9 x 45.3 x 14.4	480 x 1150 x 366	238.1 lb	108 Kg
HVFDSD3D2000G100A	600 Vac	200 HP	9	NEMA 12	208 A	18.9 x 45.3 x 14.4	480 x 1150 x 366	238.1 lb	108 Kg
HVFDSD3D0030G200A	600 Vac	3 HP	5	NEMA 12	3.9 A	5.7 x 16.5 x 8.4	144.78 x 419.1 x213.36	22 lb	9.97 kg
HVFDSD3D0050G200A	600 Vac	5 HP	5	NEMA 12	6.1 A	5.7 x 16.5 x 8.4	144.78 x 419.1 x213.36	22 lb	9.97 kg
HVFDSD3D0075G200A	600 Vac	7.5 HP	5	NEMA 12	9 A	5.7 x 16.5 x 8.4	144.78 x 419.1 x213.36	22 lb	9.97 kg
HVFDSD3D0100G200A	600 Vac	10 HP	5	NEMA 12	11 A	5.7 x 16.5 x 8.4	144.78 x 419.1 x213.36	22 lb	9.97 kg
HVFDSD3D0150G200A	600 Vac	15 HP	6	NEMA 12	18 A	7.7 x 21.9 x 9	196 x 556 x229	44.1 lb	20 kg
HVFDSD3D0200G200A	600 Vac	20 HP	6	NEMA 12	22 A	7.7 x 21.9 x 9	196 x 556 x229	44.1 lb	20 kg
HVFDSD3D0250G200A	600 Vac	25 HP	6	NEMA 12	27 A	7.7 x 21.9 x 9	196 x 556 x229	44.1 lb	20 kg
HVFDSD3D0300G200A	600 Vac	30 HP	6	NEMA 12	34 A	7.7 x 21.9 x 9	196 x 556 x229	44.1 lb	20 kg
HVFDSD3D0400G200A	600 Vac	40 HP	7	NEMA 12	41 A	9.3 x 26 x 10.2	236 x 660 x259	82.7 lb	37.5 kg
HVFDSD3D0500G200A	600 Vac	50 HP	7	NEMA 12	52 A	9.3 x 26 x 10.2	236 x 660 x259	82.7 lb	37.5 kg
HVFDSD3D0600G200A	600 Vac	60 HP	7	NEMA 12	62 A	9.3 x 26 x 10.2	236 x 660 x259	82.7 lb	37.5 kg
HVFDSD3D0750G200A	600 Vac	75 HP	8	NEMA 12	80 A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3D1000G200A	600 Vac	100 HP	8	NEMA 12	100 A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3D1250G200A	600 Vac	125 HP	8	NEMA 12	125 A	11.4 x 38 x 13.5	290 x 965 x 343	154.3 lb	70 kg
HVFDSD3D1500G200A	600 Vac	150 HP	9	NEMA 12	144 A	18.9 x 45.3 x 14.4	480 x 1150 x 366	238.1 lb	108 Kg
HVFDSD3D2000G200A	600 Vac	200 HP	9	NEMA 12	208 A	18.9 x 45.3 x 14.4	480 x 1150 x 366	238.1 lb	108 Kg

Accessory	Description	Drive Used with
32006630-001/U	LON Communication Card (NXOPTC4)	SMART
HVFDSDOPT1A2A0/U	1 x AI, 2 x AO (isolated, D- and E-slot compatible)	HVAC2 and SMART
HVFDSDOPT1R05DI/U	1 x RO, 5 x DI (42-240 VAC, D- and E-slot compatible)	HVAC2 and SMART
HVFDSDOPT2R01T/U	2 x RO + Thermistor (D- and E-slot compatible)	HVAC2 and SMART
HVFDSDOPT3R0/U	3 x RO (D- and E-slot compatible)	HVAC2 and SMART
HVFDSDOPT6DI/U	6 x DI / DO Programmable (D- and E-slot compatible)	HVAC2 and SMART
HVFDOPTEMP	Temperature Measurement Board	HVAC2 and SMART
HVFDSDBATTERY/U	Battery Package, 5 pcs, for Real Time Clock (only for old control board)	SMART
HVFDSDTRAINER/U	SmartVFD HVAC Training Demonstration Kit	SMART
HVFDSDGRAPHICKP/U	SmartVFD HVAC Replacement Graphical Keypad	SMART
HVFDSDMOUNTKIT/U	SmartVFD HVAC Panel Mount Kit for NEMA 12 Install 3 Meter Cable	SMART
HVFDSDNEMA12FR4/U	SmartVFD HVAC NEMA 12 Kit Frame 4	SMART
HVFDSDNEMA12FR5/U	SmartVFD HVAC NEMA 12 Kit Frame 5	SMART
HVFDSDNEMA12FR6/U	SmartVFD HVAC NEMA 12 Kit Frame 6	SMART
HVFDSDFLANGEFR4/U	SmartVFD HVAC Flange Mounting Kit for Frame 4	SMART
HVFDSDFLANGEFR5/U	SmartVFD HVAC Flange Mounting Kit for Frame 5	SMART
HVFDSDFLANGEFR6/U	SmartVFD HVAC Flange Mounting Kit for Frame 6	SMART
HVFDSDFLANGEFR7/U	SmartVFD HVAC Flange Mounting Kit for Frame 7	SMART
HVFDSDFANFR4/U	SmartVFD HVAC Frame 4 Replacement Fan	SMART
HVFDSDFANFR5/U	SmartVFD HVAC Frame 5 Replacement Fan	SMART
HVFDSDFANFR6/U	SmartVFD HVAC Frame 6 Replacement Fan	SMART
HVFDSDFANFR7/U	SmartVFD HVAC Frame 7 Replacement Fan	SMART
HVFDSDINSTALLFR4/U	SmartVFD HVAC Replacement Installation Accessories Frame 4	SMART
HVFDSDINSTALLFR5/U	SmartVFD HVAC Replacement Installation Accessories Frame 5	SMART
HVFDSDINSTALLFR6/U	SmartVFD HVAC Replacement Installation Accessories Frame 6	SMART
HVFDCCABLE/U	SmartVFD Compact Commissioning Cable and USB Adaptor	HVAC2 and SMART
HVFDSDEXTENSION	Control Board Wire Extension	SMART



Submittal Data - VFDs

SmartVFD HVAC Standalone Drives



The SmartVFD HVAC is a variable frequency drive designed for use in HVAC applications to control the speed of HVAC pumps and fans in order to maximize energy efficiency. Smart VFD is also designed to run 3 phase standard and high efficiency induction motors by varying the output voltage and frequency.

The SmartVFD is easy to install, communicates effectively with building control systems to minimize energy consumption. The SmartVFD BYPASS is easy to specify, select, install and commission. It is the perfect complement to the advanced capabilities of the SmartVFD HVAC.

The SmartVFD BYPASS configurations make it easy for you to select the right bypass to complete your drive package. All configurations are available in NEMA 1, NEMA 12 and ventilated NEMA 3R.

FEATURES

Easy Communication

- Start-up Wizards—All you have to do is tell the VFD whether you have a pump or a fan, enter nominal motor information, and you are up and running
- Graphic Interface—The easy-to-use keypad and interface deliver menu-driven programming and monitoring for fast, uniform commissioning. It's also easy for the building owner or manager to learn and use, helping to reduce service calls. Plus, a manual is built into the keypad for easy access when needed.
- Built-In Communications—With BACnet®, N2 and Modbus built in, your customers will enjoy a lower total installed cost and reliable communications with the building management system.
- PC Software Wizards—Commissioning, programming and troubleshooting are all a snap thanks to these guided Startup and PID wizards.
- Built-In configurable inputs and outputs enable the flexibility to adapt to your application without additional external logic.

Built-in Protection

- 5% DC Choke for harmonic protection.
- Standard RFI Filter—Ensures that EMC/RFI requirements are met.
- Fire Mode for safe operation.
- Enclosure classes NEMA 1, NEMA 12 or NEMA 3R
- Bypass Options—Meet specifications and system critical applications with a comprehensive bypass offering.
- Motor Switch Ride-Through—Easy, fault-free maintenance.
- Overvoltage trip and undervoltage trip protection
- Ground fault protection
- Mains and motor phase supervisions
- Overcurrent and unit overtemperature protection
- Motor overload, motor stall and motor underload protection
- Short-circuit protection of +24V and +10V reference voltage

Smart Technology

- 6-pulse IGBT, PWM technology
- Intelligent cooling arrangement. Control and power airflow separated.
- Real-Time Clock—Battery included
- 98% Displacement Power Factor Rating
- 98.5% Efficiency at full load
- 0-320Hz output frequency capabilities

Compliance

- 100KA SCCR (Short Circuit Current Requirement) compliant
- EMC harmonics: EN 61000-3-12 compliant.
- EMC radio frequencies: EN 61800-3 Category C2 built in. Complies with radiated and conducted emissions.
- RoHS compliant, no electrolytic capacitors, no lead in the circuit boards.
- American Recovery and Reinvestment Act (ARRA)

Warranty

- 3 years
- Repair available

Table 1. General.

Communication	RS485	Standard: Modbus™ RTU, BACnet, N2
	Ethernet	Standard: Modbus/TCP, BACnet/IP
Software features	Energy-saving functions	- Real-time clock for timed functions - Energy monitor for kWh monitoring - Sleep function to minimize downtime energy
	Protections	- Overload and underload protections (e.g. broken fan and dry pump) - Motor thermal protection - Missing phase detection - Automatic reset to avoid interruption of the process
Process control	2 * PID	For process control
	Multipump	For replacing the pump controller
	Flying start	For tripless catching of spinning fan
Human interfaces	Keypad	Graphical display with built-in manual and wizards.
	PC Tools	- PC Commissioning Tool for easy commissioning, monitoring, and troubleshooting. - Energy Savings calculator to estimate cost avoidance. - Product selection tool for selecting VFD and bypass, and creating submittal documents.

Table 2. I/O Connections. (Continued)

Basic I/O Board		
Terminal		Signal
1	+10	Reference output
2	AI1+	Analogue input, voltage or current
3	AI1-	Analogue input common (current)
4	AI2+	Analogue input, voltage or current
5	AI2-	Analogue input common (current)
6	24	24 V aux. voltage
7	GND	I/O ground
8	DI1	Digital input 1
9	DI2	Digital input 2
10	DI3	Digital input 3
11	CM	Common A for DI1-DI6
12	24	24 V aux. voltage
13	GND	I/O ground
14	DI4	Digital input 4
15	DI5	Digital input 5
16	DI6	Digital input 6
17	CM	Common A for DI1-DI6

Basic I/O Board		
Terminal		Signal
18	AO1+	Analogue signal (+output)
19	AO-/GND	Analogue output common
30	+24	24 V auxiliary input voltage
A	RS485	Differential receiver/transmitter
B	RS485	Differential receiver/transmitter

Table 3. I/O Connections, Relay Board 2.

Relay Board 2		
Terminal		Signal
21	Relay output 1*	Switching capacity24VDC/8A
22		250VAC/8A
23		125VDC/0.4A
24	Relay output 2*	Min.switching load5V/10mA
25		Switching capacity24VDC/8A
26		250VAC/8A
28	Thermistor input	125VDC/0.4A
29		Min.switching load5V/10mA
		Rtrip = 4.7 kΩ (PTC); Measuring voltage 3.5V

Submittal Data - VFDs

SmartVFD HVAC Standalone Drives

Table 4. SmartVFD HVAC Technical Specifications.

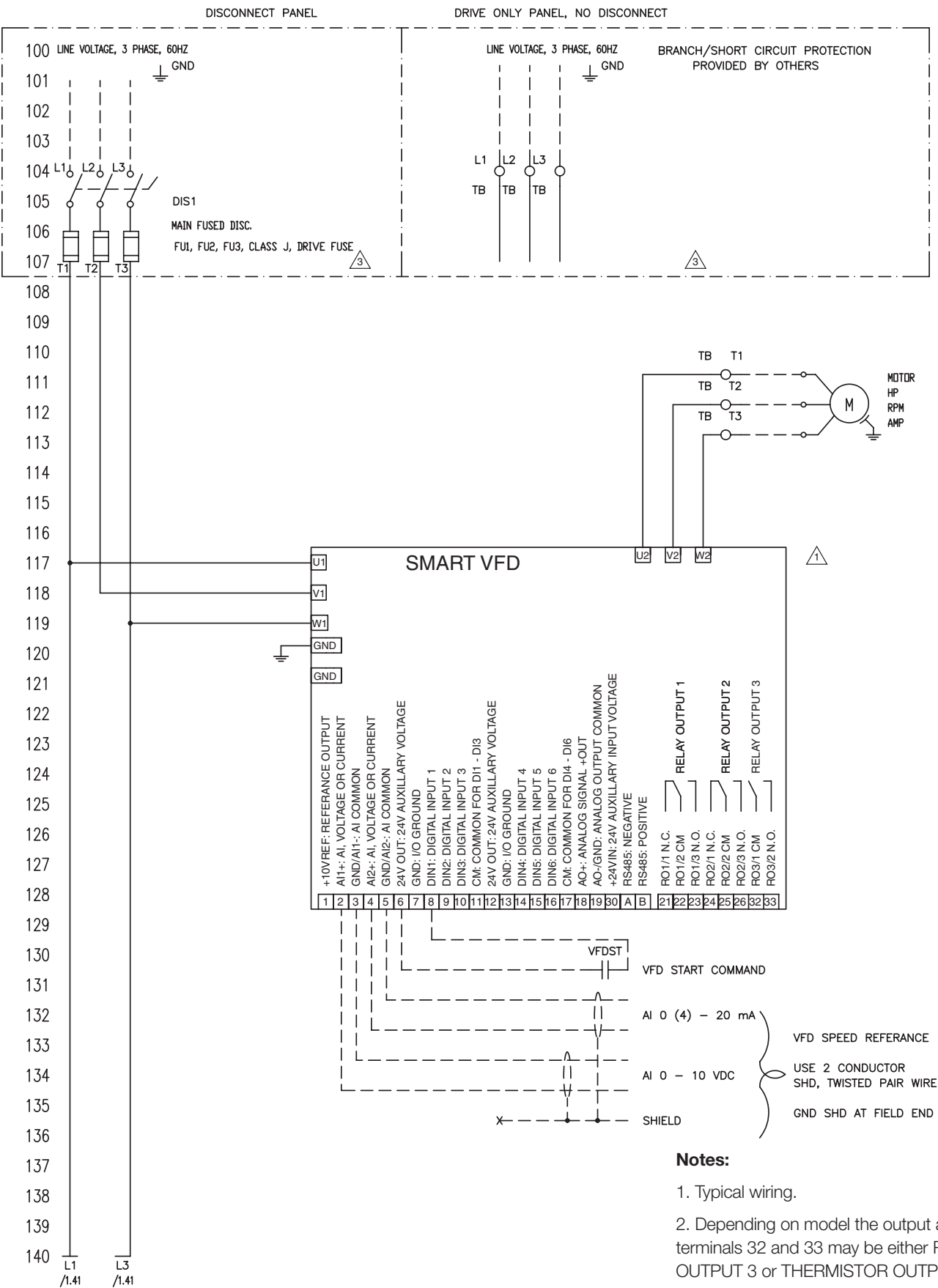
Mains connection	Input voltage U_{in}	208...240V; 380...480V; -10%...+10%
	Input frequency	47...66 Hz
	Connection to mains	Once per minute or less
	Starting delay	4 s (Frame4 to Frame6); 6 s (Frame7 to Frame9)
Motor connection	Output voltage	0- U_{in}
	Continuous output current	I_L : Ambient temperature max. +104°F, overload 1.1 x I_L (1 min./10 min.)
	Starting current	I_S for 2 s every 20 s
	Output frequency	0...320 Hz (standard)
	Frequency resolution	0.01 Hz
Control characteristics	Switching frequency (see parameter M3.1.2.1)	1.5...10 kHz; Defaults: 6 kHz (Frame4-6), 4 kHz (Frame7), 3 kHz (Frame8-9) Automatic switching frequency derating in case of overheating.
	<u>Frequency reference</u>	
	Analogue input	Resolution 0.1% (10-bit), accuracy $\pm 1\%$
	Panel reference	Resolution 0.01 Hz
	Field weakening point	8...320 Hz
	Acceleration time	0.1...3000 sec
Ambient conditions	Deceleration time	0.1...3000 sec
	Ambient operating temperature	Frame4-Frame9: I_L : 14°F (no frost)...+104°F
	Storage temperature	-40°F...+158°F
	Relative humidity	0 to 95% R_H , non-condensing, non-corrosive
	Air quality: chemical vapors mechanical particles	IEC 60721-3-3, unit in operation, class 3C2 IEC 60721-3-3, unit in operation, class 3S2
	Altitude	100% load capacity (no derating) up to 3,280 ft. (1,000 m) 1-% derating for each 328 ft. (100 m) above 3,280 ft. (1,000 m) Max. altitudes: 208...240V : 14,764 ft. (4,500 m) (TN and IT systems) 380...480V : 9,842 ft. (TN and IT systems)
	Vibration EN61800-5-1/ EN60068-2-6	5...150 Hz Displacement amplitude 1 mm (peak) at 5...15.8 Hz (Frame4...Frame9) Max acceleration amplitude 1 G at 15.8...150 Hz (Frame4...Frame9)
	Shock EN61800-5-1 EN60068-2-27	UPS Drop Test (for applicable UPS weights) Storage and shipping: max 15 G, 11 ms (in package)
	Enclosure class	IP21/NEMA 1 standard in entire kW/HP range IP54/NEMA 12 option Note: Keypad required for IP54/NEMA 12
EMC (at default settings)	Immunity	Fulfills EN61800-3 (2004), first and second environment
	Emissions	Depend on EMC level. +EMC2: EN61800-3 (2004), Category C2 Honeywell Smart VFD HVAC will be delivered with class C2 EMC filtering, if not otherwise specified. Honeywell Smart VFD HVAC can be modified for IT-networks.
Emissions	Average noise level (cooling fan) sound power level in dB(A)	Frame4: 65 Frame7: 77 Frame5: 70 Frame8: 86 Frame6: 77 Frame9: 87
Safety		EN 61800-5-1 (2007), CE, cUL; (see unit nameplate for more detailed approvals)

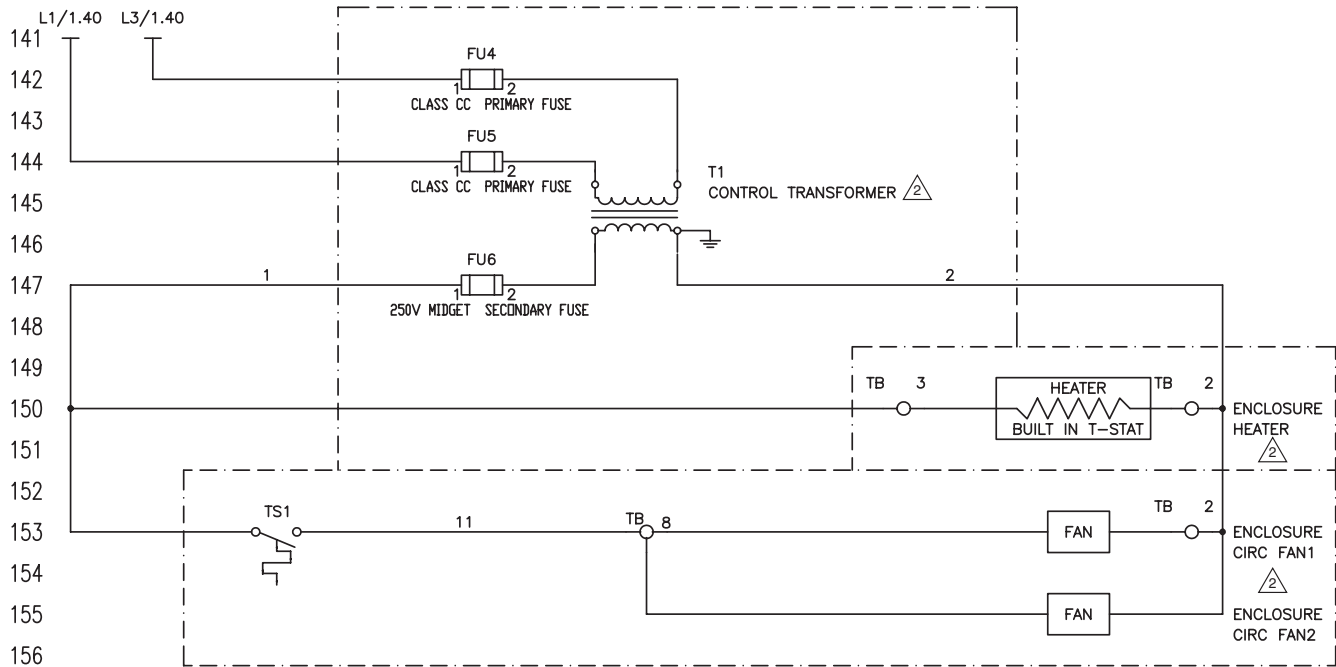
Table 4. SmartVFD HVAC Technical Specifications. (Continued)

Protections	Overvoltage trip limit	Yes
	Undervoltage trip limit	Yes
	Ground fault protection	In case of ground fault in motor or motor cable, only the drive is protected.
	Mains supervision	Yes
	Motor phase supervision	Trips if any of the output phases is missing.
	Overcurrent protection	Yes
	Unit overtemperature protection	Yes
	Motor overload protection	Yes
	Motor stall protection	Yes
	Motor underload protection	Yes
	Short-circuit protection of +24V and +10V reference voltages	Yes

Wiring Diagrams - VFDs

SmartVFD HVAC Standalone Drives





NOTES:

1. ALL PANELS SHIPPED WITH VFD DEFAULT PROGRAMMING PARAMETERS. SET DIP SWITCHES AS NEEDED.
2. TS1, ENCLOSURE FAN1 STANDARD ON ALL NEMA 3R PANELS. ENCLOSURE FAN2 ON 30HP, 40HP, AND 100HP AT 480V. HEATER IS OPTIONAL ON ALL NEMA 3R PANELS. TRANSFORMER ONLY REQUIRED ON 3R MODELS.
3. DISCONNECT PANEL HAS FUSED MAIN DISCONNECT. DRIVE ONLY PANEL HAS WIRE TERMINALS. ON DRIVE ONLY PANEL, CUSTOMER IS RESPONSIBLE FOR BRANCH CIRCUIT AND SHORT CIRCUIT PROTECTION.

ALL WIRING: USE COPPER WIRE ONLY SUITABLE FOR MIN. 75 DEG. C. FIELD WIRING, NEC CLASS 1.

MOTOR AND FEEDER WIRE SIZE MUST BE IN ACCORDANCE WITH NEC.

----- FIELD WIRE

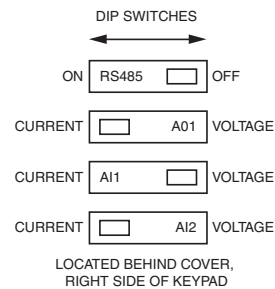
----- WIRE INSIDE C/PNL

----- OPTION

TYPICAL WIRING.

DEPENDING ON MODEL, THE OUTPUT ACROSS TERMINALS 32 AND 33 MAY BE EITHER RELAY OUTPUT 3 OR THERMISTOR INPUT.

M35145



Notes (continued from previous page):

1. Typical wiring.
2. NEMA 3R enclosures include a circulation fan(s). Integral enclosure heaters and/or cooling are available as special options.

Product Selection - VFDs

SmartVFD HVAC Drives with Bypass and/or Disconnect



The SmartVFD BYPASS is easy to specify, select, install and commission and is the perfect complement to the advanced capabilities of the SmartVFD family. For the drive features, model number nomenclature and model accessories refer to the SmartVFD HVAC drive section immediately preceding this section.

Disconnect and/or Bypass Features

Our five configurations make it easy to select the right bypass to complete your drive package. All bundles are available in NEMA 1, NEMA 12 and ventilated NEMA 3R.

SmartVFD Disconnect Option

- Adds a fused disconnect to the VFD.

SmartVFD 2-Contactor Bypass Option

Provides an economical means of bypassing the VFD.

- No Main Disconnect
- Freeze/Fire/Smoke Interlock

SmartVFD 3-Contactor Bypass Option

During commissioning, the TEST position enables power-up of the VFD without sending power to the motor.

- In Bypass mode, the VFD is isolated from the power supply
- Fused Disconnect
- Freeze/Fire/Smoke Interlock

SmartVFD 3-Contactor Auto-Bypass Option

All the features of the 3-Contactor bypass plus:

- Any VFD fault will automatically send the bypass to bypass mode
- A contact closure sends the bypass to bypass mode
- Dry contacts indicate when the bypass is in bypass mode, alerting the building management system

SmartVFD HVAC Drives with Bypass and/or Disconnect

Voltage: 208 Vac; **Configuration:** Drive with Fused Disconnect; **Auto Bypass:** No; **Disconnect Type:** Fused; **Pilot Lights:** None

Product Number	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Drive Input Disconnect	Drive Input Fuses	Dimensions, Approximate		Weight	
							(inch)	(mm)	(lb)	(kg)
HVFD3A0007G110/U	0.75 HP	4	NEMA 1	3.7A	Yes	Yes	8.6 x 31.9 x 9.6	227 x 811 x 245	33 lb	15 kg
HVFD3A0007G210/U	0.75 HP	4	NEMA 12	3.7A	No	—	12 x 36 x 8.8	305 x 914 x 224	40 lb	18.1 kg
HVFD3A0007G310/U	0.75 HP	4	NEMA 3R	3.7A	No	—	20.5 x 20 x 10	520.7 x 508 x 254	43 lb	19.5 kg
HVFD3A0010G110/U	1 HP	4	NEMA 1	4.8A	Yes	Yes	8.6 x 31.9 x 9.6	227 x 811 x 245	33 lb	15 kg
HVFD3A0010G210/U	1 HP	4	NEMA 12	4.8A	No	—	12 x 36 x 8.8	305 x 914 x 224	40 lb	18.1 kg
HVFD3A0010G310/U	1 HP	4	NEMA 3R	4.8A	No	—	20.5 x 20 x 10	520.7 x 508 x 254	43 lb	19.5 kg
HVFD3A0015G110/U	1.5 HP	4	NEMA 1	6.6A	Yes	Yes	8.6 x 31.9 x 9.6	227 x 811 x 245	33 lb	15 kg
HVFD3A0015G210/U	1.5 HP	4	NEMA 12	6.6A	No	—	12 x 37.5 x 11	304.8 x 952.5 x 279.4	40 lb	18.1 kg
HVFD3A0015G310/U	1.5 HP	4	NEMA 3R	6.6A	No	—	20.5 x 20 x 12	520.7 x 508 x 304.8	43 lb	19.5 kg
HVFD3A0020G110/U	2 HP	4	NEMA 1	8A	Yes	Yes	8.6 x 31.9 x 9.6	227 x 811 x 245	33 lb	15 kg
HVFD3A0020G210/U	2 HP	4	NEMA 12	8A	No	—	12 x 37.5 x 11	304.8 x 952.5 x 279.4	40 lb	18.1 kg
HVFD3A0020G310/U	2 HP	4	NEMA 3R	8A	No	—	20.5 x 20 x 12	520.7 x 508 x 304.8	43 lb	19.5 kg
HVFD3A0030G110/U	3 HP	4	NEMA 1	11A	Yes	Yes	8.6 x 31.9 x 9.6	227 x 811 x 245	33 lb	15 kg
HVFD3A0030G210/U	3 HP	4	NEMA 12	11A	No	—	12 x 37.5 x 11	304.8 x 952.5 x 279.4	40 lb	18.1 kg
HVFD3A0030G310/U	3 HP	4	NEMA 3R	11A	No	—	20.5 x 20 x 12	520.7 x 508 x 304.8	43 lb	19.5 kg
HVFD3A0050G110/U	5 HP	5	NEMA 1	18A	Yes	Yes	8.9 x 34.7 x 19.6	226.06 x 881.38 x 261.62	43 lb	19.5 kg
HVFD3A0050G210/U	5 HP	5	NEMA 12	18A	No	—	12 x 41 x 11	304.8 x 1041.4 x 279.4	72 lb	32.7 kg
HVFD3A0050G310/U	5 HP	5	NEMA 3R	18A	No	—	20.5 x 24 x 12	520.7 x 609.6 x 304.8	61 lb	27.7 kg
HVFD3A0075G110/U	7.5 HP	5	NEMA 1	24A	Yes	Yes	8.9 x 34.7 x 9.6	226.06 x 881.38 x 261.62	43 lb	19.5 kg
HVFD3A0075G210/U	7.5 HP	5	NEMA 12	24A	No	—	12 x 41 x 11	304.8 x 1041.4 x 279.4	72 lb	32.7 kg
HVFD3A0075G310/U	7.5 HP	5	NEMA 3R	24A	No	—	20.5 x 24 x 12	520.7 x 609.6 x 304.8	61 lb	27.7 kg
HVFD3A0100G110/U	10 HP	5	NEMA 1	31A	Yes	Yes	8.9 x 34.7 x 10.3	226.06 x 881.38 x 261.62	43 lb	19.5 kg
HVFD3A0100G210/U	10 HP	5	NEMA 12	31A	No	—	12 x 41 x 11	304.8 x 1041.4 x 279.4	72 lb	32.7 kg
HVFD3A0100G310/U	10 HP	5	NEMA 3R	31A	No	—	20.5 x 24 x 12	520.7 x 609.6 x 304.8	61 lb	27.7 kg
HVFD3A0150G110/U	15 HP	6	NEMA 1	48A	Yes	Yes	12.4 x 45 x 10.1	315 x 1143 x 257	60 lb	27.68 kg
HVFD3A0150G210/U	15 HP	6	NEMA 12	48A	No	—	12 x 46.5 x 13	04.8 x 1181.1 x 330.2	120 lb	54.43 kg
HVFD3A0150G310/U	15 HP	6	NEMA 3R	48A	No	—	28.5 x 36 x 12	723.9 x 914.4 x 304.8	188 lb	39.92 kg
HVFD3A0200G110/U	20 HP	6	NEMA 1	62A	Yes	Yes	12.4 x 45 x 10.1	315 x 1143 x 257	60 lb	27.68 kg
HVFD3A0200G210/U	20 HP	6	NEMA 12	62A	No	—	12 x 46.5 x 13	304.8 x 1181.1 x 330.2	120 lb	54.43 kg
HVFD3A0200G310/U	20 HP	6	NEMA 3R	62A	No	—	28.5 x 36 x 12	723.9 x 914.4 x 304.8	88 lb	39.92 kg
HVFD3A0250G110/U	25 HP	7	NEMA 1	75A	Yes	Yes	20.8 x 51.7 x 13.3	529 x 1313 x 292	140 lb	63.5 kg
HVFD3A0250G210/U	25 HP	7	NEMA 12	75A	No	—	16 x 50.5 x 13.5	406.4 x 1282.7 x 342.9	149 lb	67.59 kg
HVFD3A0250G310/U	25 HP	7	NEMA 3R	75A	No	—	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	242 lb	109.8 kg
HVFD3A0300G110/U	30 HP	7	NEMA 1	88A	Yes	Yes	20.8 x 51.7 x 13.3	529 x 1313 x 292	140 lb	63.5 kg
HVFD3A0300G210/U	30 HP	7	NEMA 12	88A	No	—	16 x 50.5 x 13.5	406.4 x 1282.7 x 342.9	160 lb	72.57 kg
HVFD3A0300G310/U	30 HP	7	NEMA 3R	88A	No	—	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	149 lb	67.59 kg
HVFD3A0400G110/U	40 HP	7	NEMA 1	105A	Yes	Yes	20.8 x 51.7 x 13.3	529 x 1313 x 292	140 lb	63.5 kg
HVFD3A0400G210/U	40 HP	7	NEMA 12	105A	No	—	16 x 50.5 x 13.5	406.4 x 1282.7 x 342.9	175 lb	79.38 kg
HVFD3A0400G310/U	40 HP	7	NEMA 3R	105A	No	—	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	149 lb	67.59 kg
HVFD3A0500G110/U	50 HP	8	NEMA 1	140A	Yes	Yes	25 x 60 x 15.3	635 x 1524 x 388	250 lb	113.4 kg
HVFD3A0500G210/U	50 HP	8	NEMA 12	140A	Yes	Yes	40.5 x 60 x 14	1028.7 x 1524 x 355.6	280 lb	127.01 kg
HVFD3A0500G310/U	50 HP	8	NEMA 3R	140A	Yes	Yes	48 x 36 x 16	1219 x 914 x 406	149 lb	67.59 Kg
HVFD3A0600G110/U	60 HP	8	NEMA 1	170A	Yes	Yes	25 x 60 x 15.3	635 x 1524 x 388	250 lb	113.4 kg
HVFD3A0600G210/U	60 HP	8	NEMA 12	170A	Yes	Yes	40.5 x 60 x 14	1028.7 x 1524 x 355.6	280 lb	127.01 kg
HVFD3A0600G310/U	60 HP	8	NEMA 3R	170A	Yes	Yes	48 x 36 x 16	1219 x 914 x 406	149 lb	67.59 Kg
HVFD3A0750G110/U	75 HP	8	NEMA 1	205A	Yes	Yes	25 x 60 x 15.3	635 x 1524 x 388	250 lb	113.4 kg
HVFD3A0750G210/U	75 HP	8	NEMA 12	205A	Yes	Yes	40.5 x 60 x 14	1028.7 x 1524 x 355.6	280 lb	127.01 kg
HVFD3A0750G310/U	75 HP	8	NEMA 3R	205A	Yes	Yes	48 x 36 x 16	1219 x 914 x 406	149 lb	67.59 Kg

Product Selection - VFDs

SmartVFD HVAC Drives with Bypass and/or Disconnect

Voltage: 208 Vac; **Configuration:** Drive with 2 Contactor Bypass; **Auto Bypass:** No; **Disconnect Type:** None; **Pilot Lights:** None

Product Number	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Drive Input Disconnect	Drive Input Fuses	Dimensions, Approximate		Weight	
							(inch)	(mm)	(lb)	(kg)
HVFD SB3A0007G120/U	0.75 HP	4	NEMA 1	3.7A	No	—	8.9 x 31.9 x 10.4	226 x 811 x 263	38 lb	17.2 kg
HVFD SB3A0007G220/U	0.75 HP	4	NEMA 12	3.7A	Yes	Yes	16 x 36 x 8.8	406.4 x 914.4 x 223.52	64 lb	29 kg
HVFD SB3A0007G320/U	0.75 HP	4	NEMA 3R	3.7A	Yes	Yes	24.5 x 24 x 10	623 x 610 x 254	83 lb	37.7 kg
HVFD SB3A0010G120/U	1 HP	4	NEMA 1	4.8A	No	—	8.9 x 31.9 x 10.4	226 x 811 x 263	38 lb	17.2 kg
HVFD SB3A0010G220/U	1 HP	4	NEMA 12	4.8A	Yes	Yes	16 x 36 x 8.8	406.4 x 914.4 x 223.52	64 lb	29 kg
HVFD SB3A0010G320/U	1 HP	4	NEMA 3R	4.8A	Yes	Yes	24.5 x 24 x 10	623 x 610 x 254	83 lb	37.7 kg
HVFD SB3A0015G120/U	1.5 HP	4	NEMA 1	6.6A	No	—	8.9 x 31.7 x 10.7	226 x 805 x 272	38 lb	17.2 kg
HVFD SB3A0015G220/U	1.5 HP	4	NEMA 12	6.6A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	25 kg
HVFD SB3A0015G320/U	1.5 HP	4	NEMA 3R	6.6A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.2 kg
HVFD SB3A0020G120/U	2 HP	4	NEMA 1	8A	No	—	8.9 x 31.7 x 10.7	226.06 x 810.26 x 243.84	38 lb	17.2 kg
HVFD SB3A0020G220/U	2 HP	4	NEMA 12	8A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	25 kg
HVFD SB3A0020G320/U	2 HP	4	NEMA 3R	8A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.2 kg
HVFD SB3A0030G120/U	3 HP	4	NEMA 1	11A	No	—	8.9 x 31.9 x 9.6	226.06 x 810.26 x 243.84	38 lb	17.2 kg
HVFD SB3A0030G220/U	3 HP	4	NEMA 12	11A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	25 kg
HVFD SB3A0030G320/U	3 HP	4	NEMA 3R	11A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.2 kg
HVFD SB3A0050G120/U	5 HP	5	NEMA 1	18A	No	—	8.9 x 34.7 x 10.4	226 x 881 x 263	50 lb	21.8 kg
HVFD SB3A0050G220/U	5 HP	5	NEMA 12	18A	Yes	Yes	16 x 41 x 11	406 x 1041.4 x 279.4	70 lb	31.6 kg
HVFD SB3A0050G320/U	5 HP	5	NEMA 3R	18A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	72 lb	32.7 kg
HVFD SB3A0075G120/U	7.5 HP	5	NEMA 1	24A	No	—	8.9 x 34.7 x 10.4	226 x 881 x 263	50 lb	22.7 kg
HVFD SB3A0075G220/U	7.5 HP	5	NEMA 12	24A	Yes	Yes	16 x 41 x 11	406 x 1041.4 x 279.4	70 lb	31.8 kg
HVFD SB3A0075G320/U	7.5 HP	5	NEMA 3R	24A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	72 lb	32.7 kg
HVFD SB3A0100G120/U	10 HP	5	NEMA 1	31A	No	—	8.9 x 34.7 x 10.5	226.06 x 881.38 x 266.7	50 lb	22.7 kg
HVFD SB3A0100G220/U	10 HP	5	NEMA 12	31A	Yes	Yes	16 x 45 x 11	406 x 1143 x 279.4	84 lb	38.1 kg
HVFD SB3A0100G320/U	10 HP	5	NEMA 3R	31A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	72 lb	32.7 kg
HVFD SB3A0150G120/U	15 HP	6	NEMA 1	48A	No	—	12.4 x 45 x 11.3	314 x 1143 x 287	59 lb	27 kg
HVFD SB3A0150G220/U	15 HP	6	NEMA 12	48A	Yes	Yes	16 x 50.5 x 13	406.4 x 1282.7 x 256.54	125 lb	56.7 kg
HVFD SB3A0150G320/U	15 HP	6	NEMA 3R	48A	Yes	Yes	28.5 x 36 x 10.5	723.9 x 914.4 x 266.7	118 lb	53.52 kg
HVFD SB3A0200G120/U	20 HP	6	NEMA 1	62A	No	—	12.4 x 45 x 11.3	314 x 1143 x 287	59 lb	27 kg
HVFD SB3A0200G220/U	20 HP	6	NEMA 12	62A	Yes	Yes	20 x 54.5 x 13	508 x 1384.3 x 330.2	140 lb	63.5 kg
HVFD SB3A0200G320/U	20 HP	6	NEMA 3R	62A	Yes	Yes	28.5 x 36 x 10.5	723.9 x 914.4 x 266.7	118 lb	53.52 kg
HVFD SB3A0250G120/U	25 HP	7	NEMA 1	75A	No	—	20.9 x 51.7 x 13.3	530.86 x 1313.18 x 337	149 lb	68 kg
HVFD SB3A0250G220/U	25 HP	7	NEMA 12	75A	Yes	Yes	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	160 lb	72.57 kg
HVFD SB3A0250G320/U	25 HP	7	NEMA 3R	75A	Yes	Yes	28.5 x 48 x 12.5	711.2 x 1219.2 x 317.5	185 lb	83.91 kg
HVFD SB3A0300G120/U	30 HP	7	NEMA 1	88A	No	—	20.9 x 51.7 x 13.3	530.86 x 1313.18 x 337	149 lb	68 kg
HVFD SB3A0300G220/U	30 HP	7	NEMA 12	88A	Yes	Yes	24 x 65.5 x 13.5	609 x 1663.7 x 342.9	175 lb	79.38 kg
HVFD SB3A0300G320/U	30 HP	7	NEMA 3R	88A	Yes	Yes	28.5 x 48 x 12.5	711.2 x 1219.2 x 317.5	185 lb	83.91 kg
HVFD SB3A0400G120/U	40 HP	7	NEMA 1	105A	No	—	20.9 x 51.7 x 13.3	530.86 x 1313.18 x 337	149 lb	68 kg
HVFD SB3A0400G220/U	40 HP	7	NEMA 12	105A	Yes	Yes	30 x 70.5 x 13.5	762 x 1790.7 x 342.9	200 lb	90.72 kg
HVFD SB3A0400G320/U	40 HP	7	NEMA 3R	105A	Yes	Yes	28.5 x 48 x 12.5	711.2 x 1219.2 x 317.5	185 lb	83.91 kg
HVFD SB3A0500G120/U	50 HP	8	NEMA 1	140A	No	—	25 x 60 x 15.2	635 x 1524 x 386.08	250 lb	113.4 kg
HVFD SB3A0500G220/U	50 HP	8	NEMA 12	140A	No	—	40.5 x 60 x 12.5	1028.7 x 1524 x 317.5	350 lb	158.75 kg
HVFD SB3A0500G320/U	50 HP	8	NEMA 3R	140A	No	—	60 x 41 x 14	1524 x 1041 x 356	185 lb	83.91 kg
HVFD SB3A0600G120/U	60 HP	8	NEMA 1	170A	No	—	25 x 60 x 16.2	635 x 1524 x 386.08	265 lb	120.2 kg
HVFD SB3A0600G220/U	60 HP	8	NEMA 12	170A	No	—	40.5 x 60 x 12.5	1028.7 x 1524 x 317.5	350 lb	158.75 kg
HVFD SB3A0600G320/U	60 HP	8	NEMA 3R	170A	No	—	60 x 41 x 14	1524 x 1041 x 356	185 lb	83.91 kg
HVFD SB3A0750G120/U	75 HP	8	NEMA 1	205A	No	—	25 x 60 x 15.2	635 x 1524 x 386.08	280 lb	127.01 kg
HVFD SB3A0750G220/U	75 HP	8	NEMA 12	205A	No	—	40.5 x 60 x 12.5	1028.7 x 1524 x 317.5	350 lb	158.75 kg
HVFD SB3A0750G320/U	75 HP	8	NEMA 3R	205A	No	—	60 x 41 x 14	1524 x 1041 x 356	185 lb	83.91 kg

SmartVFD HVAC Drives with Bypass and/or Disconnect

Voltage: 208 Vac; **Configuration:** Drive with 3 Contactor Bypass; **Auto Bypass:** No; **Disconnect Type:** Fused; **Drive Input Fuses:** Yes; **Pilot Lights:** None

Product Number	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Dimensions, Approximate		Weight	
					(inch)	(mm)	(lb)	(kg)
HVFSB3A0007G130/U	0.75 HP	4	NEMA 1	3.7A	8.9 x 38.7 x 10.4	226 x 988 x 264	46 lb	21 kg
HVFSB3A0007G230/U	0.75 HP	4	NEMA 12	3.7A	16 x 36 x 8.8	406.4 x 914.4 x 223.52	66 lb	29.9 kg
HVFSB3A0007G330/U	0.75 HP	4	NEMA 3R	3.7A	24.5 x 24 x 10	623 x 610 x 254	85 lb	38.6 kg
HVFSB3A0010G130/U	1 HP	4	NEMA 1	4.8A	8.9 x 38.7 x 10.7	226 x 983 x 272	44 lb	20 kg
HVFSB3A0010G230/U	1 HP	4	NEMA 12	4.8A	16 x 36 x 8.8	406.4 x 914.4 x 223.52	66 lb	29.9 kg
HVFSB3A0010G330/U	1 HP	4	NEMA 3R	4.8A	24.5 x 24 x 10	623 x 610 x 254	85 lb	38.6 kg
HVFSB3A0015G130/U	1.5 HP	4	NEMA 1	6.6A	8.9 x 38.7 x 10.4	226 x 988 x 264	46 lb	21 kg
HVFSB3A0015G230/U	1.5 HP	4	NEMA 12	6.6A	16 x 37.5 x 11in.	406.4 x 952.5 x 279.4	55 lb	25 kg
HVFSB3A0015G330/U	1.5 HP	4	NEMA 3R	6.6A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.5 kg
HVFSB3A0020G130/U	2 HP	4	NEMA 1	8A	8.9 x 38.7 x 10.4	226 x 988 x 264	46 lb	21 kg
HVFSB3A0020G230/U	2 HP	4	NEMA 12	8A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	25 kg
HVFSB3A0020G330/U	2 HP	4	NEMA 3R	8A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.5 kg
HVFSB3A0030G130/U	3 HP	4	NEMA 1	11A	8.9 x 38.7 x 10.4	226 x 988 x 264	46 lb	21 kg
HVFSB3A0030G230/U	3 HP	4	NEMA 12	11A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	25 kg
HVFSB3A0030G330/U	3 HP	4	NEMA 3R	11A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.5 kg
HVFSB3A0050G130/U	5 HP	5	NEMA 1	18A	8.9 x 41.7 x 10.4	226 x 1059 x 264	56 lb	25 kg
HVFSB3A0050G230/U	5 HP	5	NEMA 12	18A	16 x 41 x 11	406 x 1041.4 x 279.4	70 lb	31.8 kg
HVFSB3A0050G330/U	5 HP	5	NEMA 3R	18A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.4 kg
HVFSB3A0075G130/U	7.5 HP	5	NEMA 1	24A	8.9 x 41.7 x 10.4	226 x 1059 x 264	57 lb	26 kg
HVFSB3A0075G230/U	7.5 HP	5	NEMA 12	24A	16 x 41 x 11	406 x 1041.4 x 279.4	70 lb	31.8 kg
HVFSB3A0075G330/U	7.5 HP	5	NEMA 3R	24A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.4 kg
HVFSB3A0100G130/U	10 HP	5	NEMA 1	31A	8.9 x 41.7 x 10.4	226 x 1059 x 264	60 lb	27 kg
HVFSB3A0100G230/U	10 HP	5	NEMA 12	31A	16 x 45 x 11	406 x 1143 x 279.4	84 lb	38.1 kg
HVFSB3A0100G330/U	10 HP	5	NEMA 3R	31A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.4 kg
HVFSB3A0150G130/U	15 HP	6	NEMA 1	48A	12.4 x 55 x 11.3	315 x 1397 x 287	95 lb	43 kg
HVFSB3A0150G230/U	15 HP	6	NEMA 12	48A	20 x 54 x 10.8	406.4 x 1282.7 x 256.54	125 lb	56.7 kg
HVFSB3A0150G330/U	15 HP	6	NEMA 3R	48A	34.5 x 36 x 12	867.3 x 914.4 x 304.8	124 lb	56.25 kg
HVFSB3A0200G130/U	20 HP	6	NEMA 1	62A	12.4 x 55 x 11.3	315 x 1397 x 287	99 lb	45 kg
HVFSB3A0200G230/U	20 HP	6	NEMA 12	62A	20 x 54.5 x 13	508 x 1384.3 x 330.2	140 lb	63.5 kg
HVFSB3A0200G330/U	20 HP	6	NEMA 3R	62A	34.5 x 36 x 12	867.3 x 914.4 x 304.8	124 lb	56.25 kg
HVFSB3A0250G130/U	25 HP	7	NEMA 1	75A	20.8 x 59.2 x 13.3	530 x 1499 x 337	135 lb	61.3 kg
HVFSB3A0250G230/U	25 HP	7	NEMA 12	75A	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	160 lb	72.57 kg
HVFSB3A0250G330/U	25 HP	7	NEMA 3R	75A	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	193 lb	87.54 kg
HVFSB3A0300G130/U	30 HP	7	NEMA 1	88A	20.8 x 59.2 x 13.3	530 x 1499 x 337	150 lb	68.2 kg
HVFSB3A0300G230/U	30 HP	7	NEMA 12	88A	24 x 65.5 x 13.5	609 x 1663.7 x 342.9	175 lb	79.38 kg
HVFSB3A0300G330/U	30 HP	7	NEMA 3R	88A	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	193 lb	87.54 kg
HVFSB3A0400G130/U	40 HP	7	NEMA 1	105A	20.8 x 59.2 x 13.3	530 x 1499 x 337	170 lb	77.1 kg
HVFSB3A0400G230/U	40 HP	7	NEMA 12	105A	30 x 70.5 x 13.5	762 x 1790.7 x 342.9	200 lb	90.72 kg
HVFSB3A0400G330/U	40 HP	7	NEMA 3R	105A	40.4 x 48 x 12	711.2 x 1219.2 x 355.6	193 lb	87.54 kg
HVFSB3A0500G130/U	50 HP	8	NEMA 1	140A	25 x 70.01 x 16.2	635 x 1780 x 411	286 lb	130 kg
HVFSB3A0500G230/U	50 HP	8	NEMA 12	140A	40.5 x 60 x 14	1028.7 x 1524 x 355.6	369 lb	167.38 kg
HVFSB3A0500G330/U	50 HP	8	NEMA 3R	140A	60 x 41 x 14	1524 x 1041 x 356	193 lb	87.54 kg
HVFSB3A0600G130/U	60 HP	8	NEMA 1	170A	25 x 70.01 x 16.2	635 x 1780 x 411	295 lb	134 kg
HVFSB3A0600G230/U	60 HP	8	NEMA 12	170A	40.5 x 60 x 14	1028.7 x 1524 x 355.6	369 lb	167.38 kg
HVFSB3A0600G330/U	60 HP	8	NEMA 3R	170A	60 x 41 x 14	1524 x 1041 x 356	193 lb	87.54 kg
HVFSB3A0750G130/U	75 HP	8	NEMA 1	205A	25 x 70.01 x 16.2	635 x 1780 x 411	331 lb	150 kg
HVFSB3A0750G230/U	75 HP	8	NEMA 12	205A	40.5 x 60 x 14	1028.7 x 1524 x 355.6	369 lb	167.38 kg
HVFSB3A0750G330/U	75 HP	8	NEMA 3R	205A	60 x 41 x 14	1524 x 1041 x 356	193 lb	87.54 kg

Product Selection - VFDs

SmartVFD HVAC Drives with Bypass and/or Disconnect

Voltage: 208 Vac; **Configuration:** Drive with 3 Contactor Bypass and Auto Bypass; **Auto Bypass:** Yes; **Disconnect Type:** Fused;
Drive Input Fuses: Yes; **Pilot Lights:** Yes

Product Number	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Dimensions, Approximate		Weight	
					(inch)	(mm)	(lb)	(kg)
HVFDSB3A0007G131/U	0.75 HP	4	NEMA 1	3.7A	8.9 x 38.9 x 10.4	226 x 988 x 264	46 lb	20.9 kg
HVFDSB3A0007G231/U	0.75 HP	4	NEMA 12	3.7A	16 x 36 x 8.8	406.4 x 914.4 x 223.52	66 lb	29.9 kg
HVFDSB3A0007G331/U	0.75 HP	4	NEMA 3R	3.7A	24.5 x 24 x 10	623 x 610 x 254	85 lb	38.6 kg
HVFDSB3A0010G131/U	1 HP	4	NEMA 1	4.8A	8.9 x 38.9 x 10.4	226 x 988 x 254	46 lb	20.9 kg
HVFDSB3A0010G231/U	1 HP	4	NEMA 12	4.8A	16 x 36 x 8.8	406.4 x 914.4 x 223.52	66 lb	29.9 kg
HVFDSB3A0010G331/U	1 HP	4	NEMA 3R	4.8A	24.5 x 24 x 10	623 x 610 x 254	85 lb	38.6 kg
HVFDSB3A0015G131/U	1.5 HP	4	NEMA 1	6.6A	8.9 x 38.9 x 10.4	226 x 988 x 264	46 lb	20.9 kg
HVFDSB3A0015G231/U	1.5 HP	4	NEMA 12	6.6A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	25 kg
HVFDSB3A0015G331/U	1.5 HP	4	NEMA 3R	6.6A	24.5 x 24 x 12i	622.3 x 609.6 x 304.8	54 lb	24.5 kg
HVFDSB3A0020G131/U	2 HP	4	NEMA 1	8A	8.9 x 38.9 x 10.4	226 x 988 x 264	46 lb	20.9 kg
HVFDSB3A0020G231/U	2 HP	4	NEMA 12	8A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	25 kg
HVFDSB3A0020G331/U	2 HP	4	NEMA 3R	8A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.5 kg
HVFDSB3A0030G131/U	3 HP	4	NEMA 1	11A	8.9 x 38.9 x 10.4	226 x 988 x 264	46 lb	20.9 kg
HVFDSB3A0030G231/U	3 HP	4	NEMA 12	11A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	25 kg
HVFDSB3A0030G331/U	3 HP	4	NEMA 3R	11A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.5 kg
HVFDSB3A0050G131/U	5 HP	5	NEMA 1	18A	8.9 x 41.7 x 10.4	226 x 1059 x 264	56 lb	25.4 kg
HVFDSB3A0050G231/U	5 HP	5	NEMA 12	18A	16 x 41 x 11	406 x 1041.4 x 279.4	70 lb	31.8 kg
HVFDSB3A0050G331/U	5 HP	5	NEMA 3R	18A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.4 kg
HVFDSB3A0075G131/U	7.5 HP	5	NEMA 1	24A	8.9 x 38.9 x 10.4	226 x 988 x 264	58 lb	26 kg
HVFDSB3A0075G231/U	7.5 HP	5	NEMA 12	24A	16 x 41 x 11	406 x 1041.4 x 279.4	70 lb	31.8 kg
HVFDSB3A0075G331/U	7.5 HP	5	NEMA 3R	24A	28.5 x 24 x 10	724 x 610 x 254	125 lb	56.7 kg
HVFDSB3A0100G131/U	10 HP	5	NEMA 1	31A	8.9 x 38.9 x 10.4	226 x 988 x 264	60 lb	27.2 kg
HVFDSB3A0100G231/U	10 HP	5	NEMA 12	31A	16 x 45 x 11	406 x 1143 x 279.4	84 lb	38.1 kg
HVFDSB3A0100G331/U	10 HP	5	NEMA 3R	31A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.4 kg
HVFDSB3A0150G131/U	15 HP	6	NEMA 1	48A	12.4 x 55 x 11.3	315 x 1397 x 287	95 lb	43 kg
HVFDSB3A0150G231/U	15 HP	6	NEMA 12	48A	16 x 50.5 x 13	406.4 x 1282.7 x 256.54	125 lb	56.7 kg
HVFDSB3A0150G331/U	15 HP	6	NEMA 3R	48A	34.5 x 36 x 12	867.3 x 914.4 x 304.8	124 lb	56.25 kg
HVFDSB3A0200G131/U	20 HP	6	NEMA 1	62A	12.4 x 55 x 11.3	315 x 1397 x 287	99 lb	45 kg
HVFDSB3A0200G231/U	20 HP	6	NEMA 12	62A	20 x 54.5 x 13	508 x 1384.3 x 330.2	140 lb	63.5 kg
HVFDSB3A0200G331/U	20 HP	6	NEMA 3R	62A	34.5 x 36 x 12	867.3 x 914.4 x 304.8	124 lb	56.25 kg
HVFDSB3A0250G131/U	25 HP	7	NEMA 1	75A	20.8 x 59 x 13.3	529 x 1499 x 337	135 lb	61 kg
HVFDSB3A0250G231/U	25 HP	7	NEMA 12	75A	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	160 lb	72.57 kg
HVFDSB3A0250G331/U	25 HP	7	NEMA 3R	75A	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	193 lb	87.54 kg
HVFDSB3A0300G131/U	30 HP	7	NEMA 1	88A	20.8 x 59 x 13.3	529 x 1499 x 337	150 lb	68.2 kg
HVFDSB3A0300G231/U	30 HP	7	NEMA 12	88A	24 x 65.5 x 13.5	609 x 1663.7 x 342.9	175 lb	79.38 kg
HVFDSB3A0300G331/U	30 HP	7	NEMA 3R	88A	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	193 lb	87.54 kg
HVFDSB3A0400G131/U	40 HP	7	NEMA 1	105A	20.8 x 59 x 13.3	529 x 1499 x 337	170 lb	77.1 kg
HVFDSB3A0400G231/U	40 HP	7	NEMA 12	105A	30 x 70.5 x 13.5	762 x 1790.7 x 342.9	200 lb	90.72 kg
HVFDSB3A0400G331/U	40 HP	7	NEMA 3R	105A	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	326 lb	87.54 kg
HVFDSB3A0500G131/U	50 HP	8	NEMA 1	140A	25 x 70 x 16.2	635 x 1778 x 411	286 lb	130 kg
HVFDSB3A0500G231/U	50 HP	8	NEMA 12	140A	40.5 x 60 x 14	1028.7 x 1524 x 355.6	369 lb	167.38 kg
HVFDSB3A0500G331/U	50 HP	8	NEMA 3R	140A	60 x 41 x 14	1524 x 1041 x 356	193 lb	87.54 kg
HVFDSB3A0600G131/U	60 HP	8	NEMA 1	170A	25 x 70 x 16.2	635 x 1778 x 411	295 lb	134 kg
HVFDSB3A0600G231/U	60 HP	8	NEMA 12	170A	40.5 x 60 x 14	1028.7 x 1524 x 355.6	369 lb	167.38 kg
HVFDSB3A0600G331/U	60 HP	8	NEMA 3R	170A	60 x 41 x 14	1524 x 1041 x 356	193 lb	87.54 kg
HVFDSB3A0750G131/U	75 HP	8	NEMA 1	205A	25 x 70 x 16.2	635 x 1778 x 411	331 lb	150 kg
HVFDSB3A0750G231/U	75 HP	8	NEMA 12	205A	40.5 x 60 x 14	1028.7 x 1524 x 355.6	369 lb	167.38 kg
HVFDSB3A0750G331/U	75 HP	8	NEMA 3R	205A	60 x 41 x 14	1524 x 1041 x 356	193 lb	87.54 kg

SmartVFD HVAC Drives with Bypass and/or Disconnect

Voltage: 230 Vac; **Configuration:** Drive with Fused Disconnect; **Auto Bypass:** No; **Disconnect Type:** Fused; **Pilot Lights:** None

Product Number	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Drive Input Disconnect	Drive Input Fuses	Dimensions, Approximate		Weight	
							(inch)	(mm)	(lb)	(kg)
HVFD3B0007G110/U	0.75 HP	4	NEMA 1	3.7A	Yes	Yes	8.9 x 31.9 x 9.6	226 x 811 x 245	33 lb	15 kg
HVFD3B0007G210/U	0.75 HP	4	NEMA 12	3.7A	No	—	12 x 37.5 x 11	305 x 914 x 224	51 lb	23.1 kg
HVFD3B0007G310/U	0.75 HP	4	NEMA 3R	3.7A	No	—	20.5 x 20 x 12	520.7 x 508 x 304.8	43 lb	19.5 kg
HVFD3B0010G110/U	1 HP	4	NEMA 1	4.8A	Yes	Yes	8.9 x 31.9 x 9.6	226 x 811 x 245	33 lb	15 kg
HVFD3B0010G210/U	1 HP	4	NEMA 12	4.8A	No	—	12 x 37.5 x 11	304.8 x 952.5 x 279.4	40 lb	18.14 kg
HVFD3B0010G310/U	1 HP	4	NEMA 3R	4.8A	No	—	20.5 x 20 x 12	520.7 x 508 x 304.8	43 lb	19.5 kg
HVFD3B0015G110/U	1.5 HP	4	NEMA 1	6.6A	Yes	Yes	8.9 x 31.9 x 9.6	226 x 811 x 245	33 lb	15 kg
HVFD3B0015G210/U	1.5 HP	4	NEMA 12	6.6A	No	—	12 x 37.5 x 11	304.8 x 952.5 x 279.4	40 lb	18.14 kg
HVFD3B0015G310/U	1.5 HP	4	NEMA 3R	6.6A	No	—	20.5 x 20 x 12	520.7 x 508 x 304.8	43 lb	19.5 kg
HVFD3B0020G110/U	2 HP	4	NEMA 1	8A	Yes	Yes	8.9 x 31.9 x 9.6	226 x 811 x 245	33 lb	15 kg
HVFD3B0020G210/U	2 HP	4	NEMA 12	8A	No	—	12 x 37.5 x 11	304.8 x 952.5 x 279.4	40 lb	18.14 kg
HVFD3B0020G310/U	2 HP	4	NEMA 3R	8A	No	—	20.5 x 20 x 12	520.7 x 508 x 304.8	43 lb	19.5 kg
HVFD3B0030G110/U	3 HP	4	NEMA 1	11A	Yes	Yes	8.9 x 31.9 x 9.6	226 x 811 x 245	33 lb	15 kg
HVFD3B0030G210/U	3 HP	4	NEMA 12	11A	No	—	12 x 37.5 x 11	304.8 x 952.5 x 279.4	40 lb	18.14 kg
HVFD3B0030G310/U	3 HP	4	NEMA 3R	11A	No	—	20.5 x 20 x 12	520.7 x 508 x 304.8	43 lb	19.5 kg
HVFD3B0050G110/U	5 HP	5	NEMA 1	18A	Yes	Yes	8.9 x 34.5 x 9.6	226 x 876 x 245	43 lb	19.5 kg
HVFD3B0050G210/U	5 HP	5	NEMA 12	18A	No	—	12 x 41 x 11	304.8 x 1041.4 x 279.4	72 lb	32.66 kg
HVFD3B0050G310/U	5 HP	5	NEMA 3R	18A	No	—	20.5 x 24 x 12	520.7 x 609.6 x 304.8	61 lb	27.67 kg
HVFD3B0075G110/U	7.5 HP	5	NEMA 1	24A	Yes	Yes	8.9 x 34.5 x 9.6	226 x 876 x 245	50 lb	23 kg
HVFD3B0075G210/U	7.5 HP	5	NEMA 12	24A	No	—	12 x 41 x 11	304.8 x 1041.4 x 279.4	72 lb	32.66 kg
HVFD3B0075G310/U	7.5 HP	5	NEMA 3R	24A	No	—	20.5 x 24 x 12	520.7 x 609.6 x 304.8	61 lb	27.67 kg
HVFD3B0100G110/U	10 HP	5	NEMA 1	31A	Yes	Yes	8.9 x 34.5 x 9.6	226 x 876 x 245	50 lb	23 kg
HVFD3B0100G210/U	10 HP	5	NEMA 12	31A	No	—	12 x 41 x 11	304.8 x 1041.4 x 279.4	72 lb	32.66 kg
HVFD3B0100G310/U	10 HP	5	NEMA 3R	31A	No	—	20.5 x 24 x 12	520.7 x 609.6 x 304.8	61 lb	27.67 kg
HVFD3B0150G110/U	15 HP	6	NEMA 1	48A	Yes	Yes	12.4 x 45 x 10.1	315 x 1143 x 257	55 lb	25 kg
HVFD3B0150G210/U	15 HP	6	NEMA 12	48A	No	—	12 x 46.5 x 13	304.8 x 1181.1 x 330.2	120 lb	54.43 kg
HVFD3B0150G310/U	15 HP	6	NEMA 3R	48A	No	—	28.5 x 36 x 12	723.9 x 914.4 x 304.8	88 lb	39.92 kg
HVFD3B0200G110/U	20 HP	6	NEMA 1	62A	Yes	Yes	12.4 x 45 x 10.1	315 x 1143 x 257	59 lb	27 kg
HVFD3B0200G210/U	20 HP	6	NEMA 12	62A	No	—	12 x 46.5 x 13	304.8 x 1181.1 x 330.2	120 lb	54.43 kg
HVFD3B0200G310/U	20 HP	6	NEMA 3R	62A	No	—	28.5 x 36 x 12	723.9 x 914.4 x 304.8	88 lb	39.92 kg
HVFD3B0250G110/U	25 HP	6	NEMA 1	75A	Yes	Yes	20.8 x 51.7 x 13.3	530 x 1313 x 326	140 lb	63.5 kg
HVFD3B0250G210/U	25 HP	6	NEMA 12	75A	No	—	16 x 50.5 x 13.5	406.4 x 1282.7 x 342.9	145 lb	65.77 kg
HVFD3B0250G310/U	25 HP	6	NEMA 3R	75A	No	—	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	149 lb	67.59 kg
HVFD3B0300G110/U	30 HP	7	NEMA 1	88A	Yes	Yes	20.8 x 51.7 x 13.3	530 x 1313 x 326	140 lb	63.5 kg
HVFD3B0300G210/U	30 HP	7	NEMA 12	88A	No	—	16 x 50.5 x 13.5	406.4 x 1282.7 x 342.9	160 lb	72.57 kg
HVFD3B0300G310/U	30 HP	7	NEMA 3R	88A	No	—	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	149 lb	67.59 kg
HVFD3B0400G110/U	40 HP	7	NEMA 1	105A	Yes	Yes	20.8 x 51.7 x 13.3	530 x 1313 x 326	140 lb	63.5 kg
HVFD3B0400G210/U	40 HP	7	NEMA 12	105A	No	—	16 x 50.5 x 13.5	406.4 x 1282.7 x 342.9	175 lb	79.38 kg
HVFD3B0400G310/U	40 HP	7	NEMA 3R	105A	No	—	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	149 lb	67.59 kg
HVFD3B0500G110/U	50 HP	8	NEMA 1	140A	Yes	Yes	25 x 60 x 15.3	635 x 1524 x 388	250 lb	113.4 kg
HVFD3B0500G210/U	50 HP	8	NEMA 12	140A	Yes	Yes	40.5 x 60 x 14	1028.7 x 1524 x 355.6	280 lb	127.00 kg
HVFD3B0500G310/U	50 HP	8	NEMA 3R	140A	Yes	Yes	48 x 36 x 16	1219 x 914 x 406	149 lb	67.59 kg
HVFD3B0600G110/U	60 HP	8	NEMA 1	170A	Yes	Yes	25 x 60 x 15.3	635 x 1524 x 388	265 lb	120 kg
HVFD3B0600G210/U	60 HP	8	NEMA 12	170A	Yes	Yes	40.5 x 60 x 14	1028.7 x 1524 x 355.6	280 lb	127.00 kg
HVFD3B0600G310/U	60 HP	8	NEMA 3R	170A	Yes	Yes	48 x 36 x 16	1219 x 914 x 406	149 lb	67.59 kg
HVFD3B0750G110/U	75 HP	8	NEMA 1	205A	Yes	Yes	25 x 60 x 15.3	635 x 1524 x 388	280 lb	127 kg
HVFD3B0750G210/U	75 HP	8	NEMA 12	205A	Yes	Yes	40.5 x 60 x 14	1028.7 x 1524 x 355.6	280 lb	127.00 kg
HVFD3B0750G310/U	75 HP	8	NEMA 3R	205A	Yes	Yes	48 x 36 x 16	1219 x 914 x 406	149 lb	67.59 kg

Product Selection - VFDs

SmartVFD HVAC Drives with Bypass and/or Disconnect

Voltage: 230 Vac; **Configuration:** Drive with 2 Contactor Bypass; **Auto Bypass:** No; **Disconnect Type:** None; **Pilot Lights:** None

Product Number	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Drive Input Disconnect	Drive Input Fuses	Dimensions, Approximate		Weight	
							(inch)	(mm)	(lb)	(kg)
HVFD3B3B0007G120/U	0.75 HP	4	NEMA 1	3.7A	No	—	8.9 x 31.9 x 10.4	226 x 811 x 264	38 lb	17.2 kg
HVFD3B3B0007G220/U	0.75 HP	4	NEMA 12	3.7A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFD3B3B0007G320/U	0.75 HP	4	NEMA 3R	3.7A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.23 kg
HVFD3B3B0010G120/U	1 HP	4	NEMA 1	4.8A	No	—	8.9 x 31.9 x 10.4	226 x 811 x 264	38 lb	17.24 kg
HVFD3B3B0010G220/U	1 HP	4	NEMA 12	4.8A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFD3B3B0010G320/U	1 HP	4	NEMA 3R	4.8A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.23 kg
HVFD3B3B0015G120/U	1.5 HP	4	NEMA 1	6.6A	No	—	8.9 x 31.9 x 10.4	226 x 811 x 264	38 lb	17.2 kg
HVFD3B3B0015G220/U	1.5 HP	4	NEMA 12	6.6A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFD3B3B0015G320/U	1.5 HP	4	NEMA 3R	6.6A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.23 kg
HVFD3B3B0020G120/U	2 HP	4	NEMA 1	8A	No	—	8.9 x 31.9 x 10.4	226 x 811 x 264	38 lb	17.2 kg
HVFD3B3B0020G220/U	2 HP	4	NEMA 12	8A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFD3B3B0020G320/U	2 HP	4	NEMA 3R	8A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.23 kg
HVFD3B3B0030G120/U	3 HP	4	NEMA 1	11A	No	—	8.9 x 31.9 x 10.4	226 x 811 x 264	38 lb	17.2 kg
HVFD3B3B0030G220/U	3 HP	4	NEMA 12	11A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFD3B3B0030G320/U	3 HP	4	NEMA 3R	11A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.23 kg
HVFD3B3B0050G120/U	5 HP	5	NEMA 1	18A	No	—	8.9 x 34.5 x 10.4	226 x 876 x 264	48 lb	21.7 kg
HVFD3B3B0050G220/U	5 HP	5	NEMA 12	18A	Yes	Yes	16 x 41 x 11	406 x 1041.4 x 279.4	70 lb	31.75 kg
HVFD3B3B0050G320/U	5 HP	5	NEMA 3R	18A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	72 lb	32.66 kg
HVFD3B3B0075G120/U	7.5 HP	5	NEMA 1	24A	No	—	8.9 x 34.5 x 10.4	226 x 876 x 264	50 lb	23 kg
HVFD3B3B0075G220/U	7.5 HP	5	NEMA 12	24A	Yes	Yes	16 x 41 x 11	406 x 1041.4 x 279.4	70 lb	31.75 kg
HVFD3B3B0075G320/U	7.5 HP	5	NEMA 3R	24A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	72 lb	32.66 kg
HVFD3B3B0100G120/U	10 HP	5	NEMA 1	31A	No	—	8.9 x 34.5 x 10.4	226 x 876 x 264	50 lb	23 kg
HVFD3B3B0100G220/U	10 HP	5	NEMA 12	31A	Yes	Yes	16 x 45 x 11	406 x 1143 x 279.4	84 lb	38.1 kg
HVFD3B3B0100G320/U	10 HP	5	NEMA 3R	31A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	72 lb	32.66 kg
HVFD3B3B0150G120/U	15 HP	6	NEMA 1	48A	No	—	12.4 x 45 x 11.3	315 x 1143 x 287	60 lb	27.2 kg
HVFD3B3B0150G220/U	15 HP	6	NEMA 12	48A	Yes	Yes	16 x 50.5 x 13	406.4 x 1282.7 x 256.54	125 lb	56.7 kg
HVFD3B3B0150G320/U	15 HP	6	NEMA 3R	48A	Yes	Yes	28.5 x 36 x 10.5	723.9 x 914.4 x 266.7	118 lb	53.52 kg
HVFD3B3B0200G120/U	20 HP	6	NEMA 1	62A	No	—	12.4 x 45 x 11.3	315 x 1143 x 287	60 lb	27.2 kg
HVFD3B3B0200G220/U	20 HP	6	NEMA 12	62A	Yes	Yes	20 x 54.5 x 13	508 x 1384.3 x 330.2	140 lb	63.5 kg
HVFD3B3B0200G320/U	20 HP	6	NEMA 3R	62A	Yes	Yes	28.5 x 36 x 10.5	723.9 x 914.4 x 266.7	118 lb	53.52 kg
HVFD3B3B0250G120/U	25 HP	7	NEMA 1	75A	No	—	20.9 x 51.7 x 13.3	530.86 x 1313 x 338	149 lb	68 kg
HVFD3B3B0250G220/U	25 HP	7	NEMA 12	75A	Yes	Yes	24 x 64 x 13.3	508 x 1485.9 x 342.9	160 lb	73 kg
HVFD3B3B0250G320/U	25 HP	7	NEMA 3R	75A	Yes	Yes	28.5 x 48 x 12.5	711.2 x 1219.2 x 317.5	185 lb	83.91 kg
HVFD3B3B0300G120/U	30 HP	7	NEMA 1	88A	No	—	20.9 x 51.7 x 13.3	530.86 x 1313 x 338	149 lb	68 kg
HVFD3B3B0300G220/U	30 HP	7	NEMA 12	88A	Yes	Yes	24 x 65.5 x 13.5	609 x 1663.7 x 342.9	175 lb	79.38 kg
HVFD3B3B0300G320/U	30 HP	7	NEMA 3R	88A	Yes	Yes	28.5 x 48 x 12.5	711.2 x 1219.2 x 317.5	185 lb	83.91 kg
HVFD3B3B0400G120/U	40 HP	7	NEMA 1	105A	No	—	20.9 x 51.7 x 13.3	530.86 x 1313 x 338	149 lb	68 kg
HVFD3B3B0400G220/U	40 HP	7	NEMA 12	105A	Yes	Yes	30 x 70.5 x 13.5	762 x 1790.7 x 342.9	200 lb	90.72 kg
HVFD3B3B0400G320/U	40 HP	7	NEMA 3R	105A	Yes	Yes	28.5 x 48 x 12.5	711.2 x 1219.2 x 317.5	185 lb	83.91 kg
HVFD3B3B0500G120/U	50 HP	8	NEMA 1	140A	No	—	25 x 60 x 15.2	635 x 1524 x 386.08	250 lb	113.4 kg
HVFD3B3B0500G220/U	50 HP	8	NEMA 12	140A	No	—	40.5 x 60 x 12.5	1028.7 x 1524 x 317.5	350 lb	158.76 kg
HVFD3B3B0500G320/U	50 HP	8	NEMA 3R	140A	No	—	60 x 41 x 14	1524 x 1041 x 356	185 lb	83.91 kg
HVFD3B3B0600G120/U	60 HP	8	NEMA 1	170A	No	—	25 x 60 x 15.2	635 x 1524 x 386.08	265 lb	120.2 kg
HVFD3B3B0600G220/U	60 HP	8	NEMA 12	170A	No	—	40.5 x 60 x 12.5	1028.7 x 1524 x 317.5	350 lb	158.76 kg
HVFD3B3B0600G320/U	60 HP	8	NEMA 3R	170A	No	—	60 x 41 x 14	1524 x 1041 x 356	185 lb	83.91 kg
HVFD3B3B0750G120/U	75 HP	8	NEMA 1	205A	No	—	25 x 60 x 15.2	635 x 1524 x 386.08	280 lb	127.01 kg
HVFD3B3B0750G220/U	75 HP	8	NEMA 12	205A	No	—	40.5 x 60 x 12.5	1028.7 x 1524 x 317.5	350 lb	158.76 kg
HVFD3B3B0750G320/U	75 HP	8	NEMA 3R	205A	No	—	60 x 41 x 14	1524 x 1041 x 356	185 lb	83.91 kg

SmartVFD HVAC Drives with Bypass and/or Disconnect

Voltage: 230 Vac; **Configuration:** Drive with 3 Contactor Bypass; **Auto Bypass:** No; **Disconnect Type:** Fused; **Drive Input Fuses:** Yes; **Pilot Lights:** Yes

Product Number	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Dimensions, Approximate		Weight	
					(inch)	(mm)	(lb)	(kg)
HVFDSB3B0007G130/U	0.75 HP	4	NEMA 1	3.7A	8.9 x 38.9 x 10.3	226.06 x 988.06 x 261.62	44 lb	19.96 kg
HVFDSB3B0007G230/U	0.75 HP	4	NEMA 12	3.7A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFDSB3B0007G330/U	0.75 HP	4	NEMA 3R	3.7A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFDSB3B0010G130/U	1 HP	4	NEMA 1	4.8A	8.9 x 38.9 x 10.3	226.06 x 988.06 x 261.62	44 lb	19.96 kg
HVFDSB3B0010G230/U	1 HP	4	NEMA 12	4.8A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFDSB3B0010G330/U	1 HP	4	NEMA 3R	4.8A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFDSB3B0015G130/U	1.5 HP	4	NEMA 1	6.6A	8.9 x 38.9 x 10.3	226.06 x 988.06 x 261.62	44 lb	19.96 kg
HVFDSB3B0015G230/U	1.5 HP	4	NEMA 12	6.6A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFDSB3B0015G330/U	1.5 HP	4	NEMA 3R	6.6A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFDSB3B0020G130/U	2 HP	4	NEMA 1	8A	8.9 x 38.9 x 10.3	226.06 x 988.06 x 261.62	44 lb	19.96 kg
HVFDSB3B0020G230/U	2 HP	4	NEMA 12	8A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFDSB3B0020G330/U	2 HP	4	NEMA 3R	8A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFDSB3B0030G130/U	3 HP	4	NEMA 1	11A	8.9 x 38.9 x 10.3	226.06 x 988.06 x 261.62	44 lb	19.96 kg
HVFDSB3B0030G230/U	3 HP	4	NEMA 12	11A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFDSB3B0030G330/U	3 HP	4	NEMA 3R	11A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFDSB3B0050G130/U	5 HP	5	NEMA 1	18A	8.9 x 41.7 x 10.3	226.06 x 1059.1 x 261.62	55 lb	24.95 kg
HVFDSB3B0050G230/U	5 HP	5	NEMA 12	18A	16 x 41 x 11	406 x 1041.4 x 279.4	70 lb	31.75 kg
HVFDSB3B0050G330/U	5 HP	5	NEMA 3R	18A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.38 kg
HVFDSB3B0075G130/U	7.5 HP	5	NEMA 1	24A	8.9 x 41.7 x 10.3	226.06 x 1059.1 x 261.62	57 lb	25.85 kg
HVFDSB3B0075G230/U	7.5 HP	5	NEMA 12	24A	16 x 41 x 11	406 x 1041.4 x 279.4	70 lb	31.75 kg
HVFDSB3B0075G330/U	7.5 HP	5	NEMA 3R	24A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.38 kg
HVFDSB3B0100G130/U	10 HP	5	NEMA 1	31A	8.9 x 41.7 x 10.8	226.06 x 1059.1 x 274.32	59.5 lb	26.99 kg
HVFDSB3B0100G230/U	10 HP	5	NEMA 12	31A	16 x 45 x 11	406 x 1143 x 279.4	84 lb	38.1 kg
HVFDSB3B0100G330/U	10 HP	5	NEMA 3R	31A	28.5 x 24 x 10	723.9 x 762 x 304.8	78 lb	35.38 kg
HVFDSB3B0150G130/U	15 HP	6	NEMA 1	48A	12.4 x 55 x 11.3	315 x 1397 x 287	98 lb	44.5 kg
HVFDSB3B0150G230/U	15 HP	6	NEMA 12	48A	16 x 50.5 x 13	406.4 x 1282.7 x 256.54	125 lb	56.7 kg
HVFDSB3B0150G330/U	15 HP	6	NEMA 3R	48A	34.5 x 36 x 12	867.3 x 914.4 x 304.8	124 lb	56.25 kg
HVFDSB3B0200G130/U	20 HP	6	NEMA 1	62A	12.4 x 55 x 11.3	315 x 1397 x 287	98 lb	44.5 kg
HVFDSB3B0200G230/U	20 HP	6	NEMA 12	62A	20 x 54.5 x 13	508 x 1384.3 x 330.2	140 lb	63.5 kg
HVFDSB3B0200G330/U	20 HP	6	NEMA 3R	62A	34.5 x 36 x 12	867.3 x 914.4 x 304.8	124 lb	56.25 kg
HVFDSB3B0250G130/U	25 HP	7	NEMA 1	75A	20.9 x 59.2 x 13.3	530 x 1503 x 338	135 lb	61.3 kg
HVFDSB3B0250G230/U	25 HP	7	NEMA 12	75A	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	160 lb	72.57 kg
HVFDSB3B0250G330/U	25 HP	7	NEMA 3R	75A	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	193 lb	87.54 kg
HVFDSB3B0300G130/U	30 HP	7	NEMA 1	88A	20.9 x 59.2 x 13.3	530 x 1503 x 338	150 lb	68.2 kg
HVFDSB3B0300G230/U	30 HP	7	NEMA 12	88A	24 x 65.5 x 13.5	609 x 1663.7 x 342.9	175 lb	79.38 kg
HVFDSB3B0300G330/U	30 HP	7	NEMA 3R	88A	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	193 lb	87.54 kg
HVFDSB3B0400G130/U	40 HP	7	NEMA 1	105A	20.9 x 59.2 x 13.3	530.86 x 1503 x 338	170 lb	77.1 kg
HVFDSB3B0400G230/U	40 HP	7	NEMA 12	105A	30 x 70.5 x 13.5	762 x 1790.7 x 342.9	200 lb	90.72 kg
HVFDSB3B0400G330/U	40 HP	7	NEMA 3R	105A	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	193 lb	87.54 kg
HVFDSB3B0500G130/U	50 HP	8	NEMA 1	140A	25 x 70 x 16.2	635 x 1778 x 411	286 lb	130 kg
HVFDSB3B0500G230/U	50 HP	8	NEMA 12	140A	40.5 x 60 x 14	1028.7 x 1524 x 355.6	369 lb	167.38 kg
HVFDSB3B0500G330/U	50 HP	8	NEMA 3R	140A	60 x 41 x 14	1524 x 1041 x 356	193 lb	87.54 kg
HVFDSB3B0600G130/U	60 HP	8	NEMA 1	170A	25 x 70 x 16.2	635 x 1778 x 411	295 lb	134 kg
HVFDSB3B0600G230/U	60 HP	8	NEMA 12	170A	40.5 x 60 x 14	1028.7 x 1524 x 355.6	369 lb	167.38 kg
HVFDSB3B0600G330/U	60 HP	8	NEMA 3R	170A	60 x 41 x 14	1524 x 1041 x 356	193 lb	87.54 kg
HVFDSB3B0750G130/U	75 HP	8	NEMA 1	205A	25 x 70 x 16.2	635 x 1778 x 411	331 lb	150 kg
HVFDSB3B0750G230/U	75 HP	8	NEMA 12	205A	40.5 x 60 x 14	1028.7 x 1524 x 355.6	369 lb	167.38 kg
HVFDSB3B0750G330/U	75 HP	8	NEMA 3R	205A	60 x 41 x 14	1524 x 1041 x 356	193 lb	87.54 kg

Product Selection - VFDs

SmartVFD HVAC Drives with Bypass and/or Disconnect

Voltage: 230 Vac; **Configuration:** Drive with 3 Contactor Bypass and Auto Bypass; **Auto Bypass:** Yes; **Disconnect Type:** Fused; **Drive Input Fuses:** Yes; **Pilot Lights:** Yes

Product Number	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Dimensions, Approximate		Weight	
					(inch)	(mm)	(lb)	(kg)
HVFSB3B0007G131/U	0.75 HP	4	NEMA 1	3.7A	8.9 x 38.7 x 10.4	226 x 983 x 264	44 lb	20 kg
HVFSB3B0007G231/U	0.75 HP	4	NEMA 12	3.7A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFSB3B0007G331/U	0.75 HP	4	NEMA 3R	3.7A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFSB3B0010G131/U	1 HP	4	NEMA 1	4.8A	8.9 x 38.7 x 10.4	226 x 983 x 264	44 lb	20kg
HVFSB3B0010G231/U	1 HP	4	NEMA 12	4.8A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFSB3B0010G331/U	1 HP	4	NEMA 3R	4.8A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFSB3B0015G131/U	1.5 HP	4	NEMA 1	6.6A	8.9 x 38.7 x 10.4	226 x 983 x 264	46 lb	20 kg
HVFSB3B0015G231/U	1.5 HP	4	NEMA 12	6.6A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFSB3B0015G331/U	1.5 HP	4	NEMA 3R	6.6A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFSB3B0020G131/U	2 HP	4	NEMA 1	8A	8.9 x 38.7 x 10.4	226 x 983 x 264	44 lb	20 kg
HVFSB3B0020G231/U	2 HP	4	NEMA 12	8A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFSB3B0020G331/U	2 HP	4	NEMA 3R	8A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFSB3B0030G131/U	3 HP	4	NEMA 1	11A	8.9 x 38.7 x 10.4	226 x 983 x 264	44 lb	20 kg
HVFSB3B0030G231/U	3 HP	4	NEMA 12	11A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	55 lb	24.95 kg
HVFSB3B0030G331/U	3 HP	4	NEMA 3R	11A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFSB3B0050G131/U	5 HP	5	NEMA 1	18A	8.9 x 41.5 x 10.4	226 x 1054 x 264	55 lb	24.9 kg
HVFSB3B0050G231/U	5 HP	5	NEMA 12	18A	16 x 44 x 8.8	406 x 1041.4 x 279.4	70 lb	31.75 kg
HVFSB3B0050G331/U	5 HP	5	NEMA 3R	18A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.38 kg
HVFSB3B0075G131/U	7.5 HP	5	NEMA 1	24A	8.9 x 41.5 x 10.4	226 x 1054 x 264	58 lb	26 kg
HVFSB3B0075G231/U	7.5 HP	5	NEMA 12	24A	16 x 41 x 11	406 x 1041.4 x 279.4	70 lb	31.75 kg
HVFSB3B0075G331/U	7.5 HP	5	NEMA 3R	24A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.38 kg
HVFSB3B0100G131/U	10 HP	5	NEMA 1	31A	8.9 x 41.5 x 10.4	226 x 1054 x 264	60 lb	27.2 kg
HVFSB3B0100G231/U	10 HP	5	NEMA 12	31A	16 x 45 x 11	406 x 1143 x 279.4	84 lb	38.1 kg
HVFSB3B0100G331/U	10 HP	5	NEMA 3R	31A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.38 kg
HVFSB3B0150G131/U	15 HP	6	NEMA 1	48A	12.4 x 55 x 11.3	315 x 1397 x 287	98 lb	44.5 kg
HVFSB3B0150G231/U	15 HP	6	NEMA 12	48A	16 x 50.5 x 13	406.4 x 1282.7 x 256.54	125 lb	56.7 kg
HVFSB3B0150G331/U	15 HP	6	NEMA 3R	48A	34.5 x 36 x 12	867.3 x 914.4 x 304.8	124 lb	56.25 kg
HVFSB3B0200G131/U	20 HP	6	NEMA 1	62A	12.4 x 55 x 11.3	315 x 1397 x 287	105 lb	47.6 kg
HVFSB3B0200G231/U	20 HP	6	NEMA 12	62A	20 x 54.5 x 13	508 x 1384.3 x 330.2	140 lb	63.5 kg
HVFSB3B0200G331/U	20 HP	6	NEMA 3R	62A	34.5 x 36 x 12	867.3 x 914.4 x 304.8	124 lb	56.25 kg
HVFSB3B0250G131/U	25 HP	7	NEMA 1	75A	20.9 x 59.2 x 13.3	530 x 1503 x 338	135 lb	61.3 kg
HVFSB3B0250G231/U	25 HP	7	NEMA 12	75A	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	160 lb	72.57 kg
HVFSB3B0250G331/U	25 HP	7	NEMA 3R	75A	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	193 lb	87.54 kg
HVFSB3B0300G131/U	30 HP	7	NEMA 1	88A	20.9 x 59.2 x 13.3	530 x 1503 x 338	150 lb	68.2 kg
HVFSB3B0300G231/U	30 HP	7	NEMA 12	88A	24 x 65.5 x 13.5	609 x 1663.7 x 342.9	175 lb	79.38 kg
HVFSB3B0300G331/U	30 HP	7	NEMA 3R	88A	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	193 lb	87.54 kg
HVFSB3B0400G131/U	40 HP	7	NEMA 1	105A	20.9 x 59.2 x 13.3	530.86 x 14503 x 338	170 lb	77.1 kg
HVFSB3B0400G231/U	40 HP	7	NEMA 12	105A	30 x 70.5 x 13.5	762 x 1790.7 x 342.9	200 lb	90.72 kg
HVFSB3B0400G331/U	40 HP	7	NEMA 3R	105A	28.5 x 48 x 14	711.2 x 1219.2 x 355.6	193 lb	87.54 kg
HVFSB3B0500G131/U	50 HP	8	NEMA 1	140A	25 x 70 x 16.2	635 x 1778 x 411	286 lb	130 kg
HVFSB3B0500G231/U	50 HP	8	NEMA 12	140A	40.5 x 60 x 14	1028.7 x 1524 x 355.6	369 lb	167.38 kg
HVFSB3B0500G331/U	50 HP	8	NEMA 3R	140A	60 x 41 x 14.	1524 x 1041 x 356	193 lb	87.54 kg
HVFSB3B0600G131/U	60 HP	8	NEMA 1	170A	25 x 70 x 16.2	635 x 1778 x 411	295 lb	134 kg
HVFSB3B0600G231/U	60 HP	8	NEMA 12	170A	40.5 x 60 x 14	1028.7 x 1524 x 355.6	369 lb	167.38 kg
HVFSB3B0600G331/U	60 HP	8	NEMA 3R	170A	60 x 41 x 14	1524 x 1041 x 356	193 lb	87.54 kg
HVFSB3B0750G131/U	75 HP	8	NEMA 1	205A	25 x 70 x 16.2	635 x 1778 x 411	331 lb	150 kg
HVFSB3B0750G231/U	75 HP	8	NEMA 12	205A	40.5 x 60 x 14	1028.7 x 1524 x 355.6	369 lb	167.38 kg
HVFSB3B0750G331/U	75 HP	8	NEMA 3R	205A	60 x 41 x 14	1524 x 1041 x 356	193 lb	87.54 kg

SmartVFD HVAC Drives with Bypass and/or Disconnect

Voltage: 460 Vac; **Configuration:** Drive with Fused Disconnect; **Auto Bypass:** No; **Disconnect Type:** Fused; **Pilot Lights:** None

Product Number	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Drive Input Disconnect	Drive Input Fuses	Dimensions, Approximate		Weight	
							(inch)	(mm)	(lb)	(kg)
HVFD3B3C0015G110/U	1.5 HP	4	NEMA 1	3.4A	Yes	Yes	8.9 x 31.7 x 9.6	226 x 805 x 244	33 lb	15 kg
HVFD3B3C0015G210/U	1.5 HP	4	NEMA 12	3.4A	No	—	12 x 37.5 x 11	304.8 x 952.5 x 279.4	40 lb	18.14 kg
HVFD3B3C0015G310/U	1.5 HP	4	NEMA 3R	3.4A	No	—	20.5 x 20 x 12	520.7 x 208 x 304.8	43 lb	19.5 kg
HVFD3B3C0020G110/U	2 HP	4	NEMA 1	4.8A	Yes	Yes	8.9 x 31.9 x 10.3	226.06 x 810.26 x 261.62	33 lb	14.97 kg
HVFD3B3C0020G210/U	2 HP	4	NEMA 12	4.8A	No	—	8.9 x 38.9 x 10.3	226.06 x 810.26 x 261.62	40 lb	18.14 kg
HVFD3B3C0020G310/U	2 HP	4	NEMA 3R	4.8A	No	—	16 x 37.5 x 11	304.8 x 952.5 x 279.4	43 lb	19.5 kg
HVFD3B3C0030G110/U	3 HP	4	NEMA 1	5.6A	Yes	Yes	8.9 x 31.9 x 10.3	226.06 x 810.26 x 261.62	33 lb	14.97 kg
HVFD3B3C0030G210/U	3 HP	4	NEMA 12	5.6A	No	—	12 x 37.5 x 11	304.8 x 952.5 x 279.4	40 lb	18.14 kg
HVFD3B3C0030G310/U	3 HP	4	NEMA 3R	5.6A	No	—	20.5 x 20 x 12	520.7 x 208 x 304.8	43 lb	19.5 kg
HVFD3B3C0040G110/U	4 HP	4	NEMA 1	8A	Yes	Yes	8.9 x 31.9 x 10.3	226.06 x 810.26 x 261.62	33 lb	14.97 kg
HVFD3B3C0040G210/U	4 HP	4	NEMA 12	8A	No	—	12 x 37.5 x 11	304.8 x 952.5 x 279.4	40 lb	18.14 kg
HVFD3B3C0040G310/U	4 HP	4	NEMA 3R	8A	No	—	20.5 x 20 x 12	520.7 x 208 x 304.8	43 lb	19.5 kg
HVFD3B3C0050G110/U	5 HP	4	NEMA 1	9.6A	Yes	Yes	8.9 x 31.9 x 10.3	226.06 x 810.26 x 261.62	33 lb	14.97 kg
HVFD3B3C0050G210/U	5 HP	4	NEMA 12	9.6A	No	—	12 x 37.5 x 11	304.8 x 952.5 x 279.4	40 lb	18.14 kg
HVFD3B3C0050G310/U	5 HP	4	NEMA 3R	9.6A	No	—	20.5 x 20 x 12	520.7 x 208 x 304.8	43 lb	19.5 kg
HVFD3B3C0075G110/U	7.5 HP	4	NEMA 1	12A	Yes	Yes	8.9 x 31.9 x 10.3	226.06 x 810.26 x 261.62	33 lb	14.97 kg
HVFD3B3C0075G210/U	7.5 HP	4	NEMA 12	12A	No	—	12 x 37.5 x 11	304.8 x 952.5 x 279.4	40 lb	18.14 kg
HVFD3B3C0075G310/U	7.5 HP	4	NEMA 3R	12A	No	—	20.5 x 20 x 12	520.7 x 208 x 304.8	43 lb	19.5 kg
HVFD3B3C0100G110/U	10 HP	5	NEMA 1	16A	Yes	Yes	8.9 x 34.7 x 10.3	226.06 x 881.38 x 261.62	43 lb	19.5 kg
HVFD3B3C0100G210/U	10 HP	5	NEMA 12	16A	No	—	12 x 41 x 11	304.8 x 1041.4 x 279.4	72 lb	32.66 kg
HVFD3B3C0100G310/U	10 HP	5	NEMA 3R	16A	No	—	20.5 x 24 x 12	520.7 x 609.6 x 304.8	61 lb	27.67 kg
HVFD3B3C0150G110/U	15 HP	5	NEMA 1	23A	Yes	Yes	8.9 x 34.7 x 10.3	6.06 x 881.38 x 261.62	43 lb	19.5 kg
HVFD3B3C0150G210/U	15 HP	5	NEMA 12	23A	No	—	12 x 41 x 11	304.8 x 1041.4 x 279.4	72 lb	32.66 kg
HVFD3B3C0150G310/U	15 HP	5	NEMA 3R	23A	No	—	20.5 x 24 x 12	520.7 x 609.6 x 304.8	61 lb	27.67 kg
HVFD3B3C0200G110/U	20 HP	5	NEMA 1	31A	Yes	Yes	8.9 x 34.7 x 10.3	226.06 x 881.38 x 261.62	43 lb	19.5 kg
HVFD3B3C0200G210/U	20 HP	5	NEMA 12	31A	No	—	12 x 41 x 11	304.8 x 1041.4 x 279.4	72 lb	32.66 kg
HVFD3B3C0200G310/U	20 HP	5	NEMA 3R	31A	No	—	20.5 x 24 x 12	520.7 x 609.6 x 304.8	61 lb	27.67 kg
HVFD3B3C0250G110/U	25 HP	6	NEMA 1	38A	Yes	Yes	12.4 x 45.1 x 11.3	314.96 x 1145.5 x 287.02	50 lb	22.68 kg
HVFD3B3C0250G210/U	25 HP	6	NEMA 12	38A	No	—	12 x 46.5 x 13	304.8 x 1181.1 x 330.2	120 lb	54.43 kg
HVFD3B3C0250G310/U	25 HP	6	NEMA 3R	38A	No	—	28.5 x 36 x 10.5	723.9 x 914.4 x 266.7	118 lb	53.52 kg
HVFD3B3C0300G110/U	30 HP	6	NEMA 1	46A	Yes	Yes	12.4 x 45.1 x 11.3	314.96 x 1145.5 x 287.02	50 lb	22.68 kg
HVFD3B3C0300G210/U	30 HP	6	NEMA 12	46A	No	—	12 x 46.5 x 13	304.8 x 1181.1 x 330.2	120 lb	54.43 kg
HVFD3B3C0300G310/U	30 HP	6	NEMA 3R	46A	No	—	28.5 x 36 x 12	723.9 x 914.4 x 304.8	88 lb	39.92 kg
HVFD3B3C0400G110/U	40 HP	6	NEMA 1	61A	Yes	Yes	12.4 x 45.1 x 11.3	314.96 x 1145.5 x 287.02	50 lb	22.68 kg
HVFD3B3C0400G210/U	40 HP	6	NEMA 12	61A	No	—	12 x 46.5 x 13	304.8 x 1181.1 x 330.2	136 lb	61.69 kg
HVFD3B3C0400G310/U	40 HP	6	NEMA 3R	61A	No	—	28.5 x 36 x 12	723.9 x 914.4 x 304.8	88 lb	39.92 kg
HVFD3B3C0500G110/U	50 HP	7	NEMA 1	72A	Yes	Yes	20.8 x 51.5 x 13.2	528.32 x 1308.1 x 335.28	100 lb	45.36 kg
HVFD3B3C0500G210/U	50 HP	7	NEMA 12	72A	No	—	16 x 50.5 x 13.5	406.4 x 1282.7 x 342.9	145 lb	65.77 kg
HVFD3B3C0500G310/U	50 HP	7	NEMA 3R	72A	No	—	28.5 x 48 x 14	723.9 x 1219.2 x 355.6	149 lb	67.59 kg
HVFD3B3C0600G110/U	60 HP	7	NEMA 1	87A	Yes	Yes	20.8 x 51.5 x 13.2	528.32 x 1308.1 x 335.28	100 lb	45.36 kg
HVFD3B3C0600G210/U	60 HP	7	NEMA 12	87A	No	—	16 x 50.5 x 13.5	406.4 x 1282.7 x 342.9	160 lb	72.57 kg
HVFD3B3C0600G310/U	60 HP	7	NEMA 3R	87A	No	—	28.5 x 48 x 14	723.9 x 1219.2 x 355.6	149 lb	67.59 kg
HVFD3B3C0750G110/U	75 HP	7	NEMA 1	105A	Yes	Yes	20.8 x 51.5 x 13.2	528.32 x 1308.1 x 335.28	100 lb	45.36 kg
HVFD3B3C0750G210/U	75 HP	7	NEMA 12	105A	No	—	16 x 50.5 x 13.5	406.4 x 1282.7 x 342.9	193 lb	87.54 kg
HVFD3B3C0750G310/U	75 HP	7	NEMA 3R	105A	No	—	28.5 x 48 x 14	723.9 x 1219.2 x 355.6	149 lb	67.59 kg
HVFD3B3C1000G110/U	100 HP	8	NEMA 1	140A	Yes	Yes	25 x 60 x 16.2	635 x 1524 x 411.48	200 lb	90.72 kg
HVFD3B3C1000G210/U	100 HP	8	NEMA 12	140A	Yes	Yes	20 x 64 x 15.1	508 x 1625.6 x 383.5	280 lb	127.00 kg
HVFD3B3C1000G310/U	100 HP	8	NEMA 3R	140A	Yes	Yes	40.5 x 60 x 14	1028.7 x 1524 x 355.6	340 lb	154.22 kg
HVFD3B3C1250G110/U	120 HP	8	NEMA 1	170A	Yes	Yes	25 x 60 x 16.2	635 x 1524 x 411.5	265 lb	120.2 kg
HVFD3B3C1250G210/U	120 HP	8	NEMA 12	170A	Yes	Yes	20 x 64 x 15.1	508 x 1625.6 x 383.5	280 lb	127.00 kg
HVFD3B3C1250G310/U	120 HP	8	NEMA 3R	170A	Yes	Yes	48 x 36 x 16	1219 x 914 x 406	375 lb	170.1 kg
HVFD3B3C1500G110/U	150 HP	8	NEMA 1	205A	Yes	Yes	25 x 60 x 16.2	635 x 1524 x 411.5	280 lb	127 kg
HVFD3B3C1500G210/U	150 HP	8	NEMA 12	205A	Yes	Yes	20 x 64 x 15.1	508 x 1625.6 x 383.5	280 lb	127.00 kg
HVFD3B3C1500G310/U	150 HP	8	NEMA 3R	205A	Yes	Yes	48 x 36 x 16	1219 x 914 x 406	375 lb	170.1 kg

Product Selection - VFDs

SmartVFD HVAC Drives with Bypass and/or Disconnect

Voltage: 460 Vac; **Configuration:** Drive with 2 Contactor Bypass; **Auto Bypass:** No; **Disconnect Type:** Fused; **Pilot Lights:** None

Product Number	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Drive Input Disconnect	Drive Input Fuses	Dimensions, Approximate		Weight	
							(inch)	(mm)	(lb)	(kg)
HVFD3B3C0015G120/U	1.5 HP	4	NEMA 1	3.4A	No	—	8.9 x 319. x 9.6	226.06 x 805.18 x 243.84	38 lb	17.24 kg
HVFD3B3C0015G220/U	1.5 HP	4	NEMA 12	3.4A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	53 lb	24.04 kg
HVFD3B3C0015G320/U	1.5 HP	4	NEMA 3R	3.4A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.23 kg
HVFD3B3C0020G120/U	2 HP	4	NEMA 1	4.8A	No	—	8.9 x 319. x 9.6	226.06 x 805.18 x 243.84	38 lb	17.24 kg
HVFD3B3C0020G220/U	2 HP	4	NEMA 12	4.8A	Yes	Yes	12 x 37.5 x 11	304.8 x 952.5 x 279.4	53 lb	24.04 kg
HVFD3B3C0020G320/U	2 HP	4	NEMA 3R	4.8A	Yes	Yes	20.5 x 20 x 12	520.7 x 208 x 304.8	49 lb	22.23 kg
HVFD3B3C0030G120/U	3 HP	4	NEMA 1	5.6A	No	—	8.9 x 319. x 9.6	226.06 x 805.18 x 243.84	38 lb	17.24 kg
HVFD3B3C0030G220/U	3 HP	4	NEMA 12	5.6A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	53 lb	24.04 kg
HVFD3B3C0030G320/U	3 HP	4	NEMA 3R	5.6A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.23 kg
HVFD3B3C0040G120/U	4 HP	4	NEMA 1	8A	No	—	8.9 x 319. x 9.6	226.06 x 805.18 x 243.84	38 lb	17.24 kg
HVFD3B3C0040G220/U	4 HP	4	NEMA 12	8A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	53 lb	24.04 kg
HVFD3B3C0040G320/U	4 HP	4	NEMA 3R	8A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.23 kg
HVFD3B3C0050G120/U	5 HP	4	NEMA 1	9.6A	No	—	8.9 x 319. x 9.6	226.06 x 805.18 x 243.84	38 lb	17.24 kg
HVFD3B3C0050G220/U	5 HP	4	NEMA 12	9.6A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	53 lb	24.04 kg
HVFD3B3C0050G320/U	5 HP	4	NEMA 3R	9.6A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.23 kg
HVFD3B3C0075G120/U	7.5 HP	4	NEMA 1	12A	No	—	8.9 x 319. x 9.6	226.06 x 805.18 x 243.84	38 lb	17.24 kg
HVFD3B3C0075G220/U	7.5 HP	4	NEMA 12	12A	Yes	Yes	16 x 37.5 x 11	406.4 x 952.5 x 279.4	53 lb	24.04 kg
HVFD3B3C0075G320/U	7.5 HP	4	NEMA 3R	12A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	49 lb	22.23 kg
HVFD3B3C0100G120/U	10 HP	4	NEMA 1	16A	No	—	8.9 x 34.7 x 9.6	226.06 x 876.3 x 243.84	48 lb	21.77 kg
HVFD3B3C0100G220/U	10 HP	5	NEMA 12	16A	Yes	Yes	16 x 44 x 8.8	406.4 x 1041.4 x 279.4	64 lb	29.03 kg
HVFD3B3C0100G320/U	10 HP	5	NEMA 3R	16A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	72 lb	32.66 kg
HVFD3B3C0150G120/U	15 HP	5	NEMA 1	23A	No	—	8.9 x 34.7 x 9.6	226.06 x 876.3 x 243.84	50 lb	22.68 kg
HVFD3B3C0150G220/U	15 HP	5	NEMA 12	23A	Yes	Yes	16 x 41 x 11	406.4 x 1041.4 x 279.4	64 lb	29.03 kg
HVFD3B3C0150G320/U	15 HP	5	NEMA 3R	23A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	72 lb	32.66 kg
HVFD3B3C0200G120/U	20 HP	5	NEMA 1	31A	No	—	8.9 x 34.7 x 9.6	226.06 x 876.3 x 243.84	50 lb	22.68 kg
HVFD3B3C0200G220/U	20 HP	5	NEMA 12	31A	Yes	Yes	16 x 45 x 11	406.4 x 1143 x 279.4	76 lb	34.47 kg
HVFD3B3C0200G320/U	20 HP	5	NEMA 3R	31A	Yes	Yes	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	72 lb	32.66 kg
HVFD3B3C0250G120/U	25 HP	6	NEMA 1	38A	No	—	12.4 x 45.1 x 10.1	314.96 x 1143 x 256.54	55 lb	24.95 kg
HVFD3B3C0250G220/U	25 HP	6	NEMA 12	38A	Yes	Yes	16 x 50.5 x 13	406.4 x 1282.7 x 330.2	120 lb	54.43 kg
HVFD3B3C0250G320/U	25 HP	6	NEMA 3R	38A	Yes	Yes	34.5 x 36 x 10	876.3 x 914.4 x 254	194 lb	88.2 kg
HVFD3B3C0300G120/U	30 HP	6	NEMA 1	46A	No	—	12.4 x 45.1 x 10.1	314.96 x 1143 x 256.54	59 lb	26.76 kg
HVFD3B3C0300G220/U	30 HP	6	NEMA 12	46A	Yes	Yes	16 x 50.5 x 13	406.4 x 1282.7 x 330.2	120 lb	54.43 kg
HVFD3B3C0300G320/U	30 HP	6	NEMA 3R	46A	Yes	Yes	28.5 x 36 x 10.5	723.9 x 914.4 x 266.7	118 lb	53.52 kg
HVFD3B3C0400G120/U	40 HP	6	NEMA 1	61A	No	—	12.4 x 45.1 x 10.1	314.96 x 1143 x 256.54	59 lb	26.76 kg
HVFD3B3C0400G220/U	40 HP	6	NEMA 12	61A	Yes	Yes	16 x 50.5 x 13	406.4 x 1282.7 x 330.2	136 lb	61.69 kg
HVFD3B3C0400G320/U	40 HP	6	NEMA 3R	61A	Yes	Yes	28.5 x 36 x 10.5	723.9 x 914.4 x 266.7	118 lb	53.52 kg
HVFD3B3C0500G120/U	50 HP	7	NEMA 1	72A	No	—	20.8 x 51.5 x 12.2	530.86 x 1313.18 x 309.88	169 lb	76.66 kg
HVFD3B3C0500G220/U	50 HP	7	NEMA 12	72A	Yes	Yes	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	150 lb	68.04 kg
HVFD3B3C0500G320/U	50 HP	7	NEMA 3R	72A	Yes	Yes	28.5 x 48 x 12.5	723.9 x 1219.2 x 317.5	185 lb	83.91 kg
HVFD3B3C0600G120/U	60 HP	7	NEMA 1	87A	No	—	20.8 x 51.5 x 12.2	530.86 x 1313.18 x 309.88	179 lb	81.19 kg
HVFD3B3C0600G220/U	60 HP	7	NEMA 12	87A	Yes	Yes	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	165 lb	74.84 kg
HVFD3B3C0600G320/U	60 HP	7	NEMA 3R	87A	Yes	Yes	28.5 x 48 x 12.5	723.9 x 1219.2 x 317.5	185 lb	83.91 kg
HVFD3B3C0750G120/U	75 HP	7	NEMA 1	105A	No	—	20.8 x 51.5 x 12.2	530.86 x 1313.18 x 309.88	189 lb	85.73 kg
HVFD3B3C0750G220/U	75 HP	7	NEMA 12	105A	Yes	Yes	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	193 lb	87.54 kg
HVFD3B3C0750G320/U	75 HP	7	NEMA 3R	105A	Yes	Yes	28.5 x 48 x 12.5	723.9 x 1219.2 x 317.5	185 lb	83.91 kg
HVFD3B3C1000G120/U	100 HP	8	NEMA 1	140A	No	—	25 x 60 x 15.2	635 x 1524 x 386.08	250 lb	113.4 kg
HVFD3B3C1000G220/U	100 HP	8	NEMA 12	140A	No	—	56 x 48 x 15.1	1422 x 1219 x 384	350 lb	158.76 kg
HVFD3B3C1000G320/U	100 HP	8	NEMA 3R	140A	No	—	40.5 x 60 x 12.5	1028.7 x 1524 x 317.5	430 lb	195.04 kg
HVFD3B3C1250G120/U	120 HP	8	NEMA 1	170A	No	—	25 x 60 x 16.2	635 x 1524 x 411.5	265 lb	120.2 kg
HVFD3B3C1250G220/U	120 HP	8	NEMA 12	170A	No	—	56 x 48 x 15.1	1422 x 1219 x 384	350 lb	158.76 kg
HVFD3B3C1250G320/U	120 HP	8	NEMA 3R	170A	No	—	60 x 41 x 14	1524 x 1041 x 356	451 lb	204.6 kg
HVFD3B3C1500G120/U	150 HP	8	NEMA 1	205A	No	—	25 x 60 x 16.2	635 x 1524 x 411.5	280 lb	127 kg
HVFD3B3C1500G220/U	150 HP	8	NEMA 12	205A	No	—	56 x 48 x 15.1	1422 x 1219 x 384	350 lb	158.76 kg
HVFD3B3C1500G320/U	150 HP	8	NEMA 3R	205A	No	—	60 x 41 x 14	1524 x 1041 x 356	451 lb	204.6 kg

SmartVFD HVAC Drives with Bypass and/or Disconnect

Voltage: 460 Vac; **Configuration:** Drive with 3 Contactor Bypass; **Auto Bypass:** No; **Disconnect Type:** Fused; **Drive Input Fuses:** Yes; **Pilot Lights:** Yes

Product Number	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Dimensions, Approximate		Weight	
					(inch)	(mm)	(lb)	(kg)
HVFDSB3C0015G130/U	1.5 HP	4	NEMA 1	3.4A	8.9 x 38.9 x 10.3	226.06 x 810.26 x 261.62	44 lb	19.96 kg
HVFDSB3C0015G230/U	1.5 HP	4	NEMA 12	3.4A	16 x 37.5 x 11	304.8 x 952.5 x 279.4	53 lb	24.04 kg
HVFDSB3C0015G330/U	1.5 HP	4	NEMA 3R	3.4A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFDSB3C0020G130/U	2 HP	4	NEMA 1	4.8A	8.9 x 38.9 x 10.3	226.06 x 810.26 x 261.62	44 lb	19.96 kg
HVFDSB3C0020G230/U	2 HP	4	NEMA 12	4.8A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	53 lb	24.04 kg
HVFDSB3C0020G330/U	2 HP	4	NEMA 3R	4.8A	24.5 x 24 x 10.5	622.3 x 609.6 x 266.7	54 lb	24.49 kg
HVFDSB3C0030G130/U	3 HP	4	NEMA 1	5.6A	8.9 x 38.9 x 10.3	226.06 x 810.26 x 261.62	44 lb	19.96 kg
HVFDSB3C0030G230/U	3 HP	4	NEMA 12	5.6A	16 x 37.5 x 11	304.8 x 952.5 x 279.4	53 lb	24.04 kg
HVFDSB3C0030G330/U	3 HP	4	NEMA 3R	5.6A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFDSB3C0040G130/U	4 HP	4	NEMA 1	8A	8.9 x 38.9 x 10.3	226.06 x 810.26 x 261.62	44 lb	19.96 kg
HVFDSB3C0040G230/U	4 HP	4	NEMA 12	8A	16 x 37.5 x 11	304.8 x 952.5 x 279.4	53 lb	24.04 kg
HVFDSB3C0040G330/U	4 HP	4	NEMA 3R	8A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFDSB3C0050G130/U	5 HP	4	NEMA 1	9.6A	8.9 x 38.9 x 10.3	226.06 x 810.26 x 261.62	44 lb	19.96 kg
HVFDSB3C0050G230/U	5 HP	4	NEMA 12	9.6A	16 x 37.5 x 11	304.8 x 952.5 x 279.4	53 lb	24.04 kg
HVFDSB3C0050G330/U	5 HP	4	NEMA 3R	9.6A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFDSB3C0075G130/U	7.5 HP	4	NEMA 1	12A	8.9 x 38.9 x 10.3	226.06 x 810.26 x 261.62	44 lb	19.96 kg
HVFDSB3C0075G230/U	7.5 HP	4	NEMA 12	12A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	53 lb	24.04 kg
HVFDSB3C0075G330/U	7.5 HP	4	NEMA 3R	12A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFDSB3C0100G130/U	10 HP	5	NEMA 1	16A	8.9 x 41.7 x 10.3	226.06 x 881.38 x 261.62	55 lb	24.95 kg
HVFDSB3C0100G230/U	10 HP	5	NEMA 12	16A	16 x 41 x 11	406.4 x 1041.4 x 279.4	64 lb	29.03 kg
HVFDSB3C0100G330/U	10 HP	5	NEMA 3R	16A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.38 kg
HVFDSB3C0150G130/U	15 HP	5	NEMA 1	23A	8.9 x 41.7 x 10.3	226.06 x 881.38 x 261.62	57 lb	25.85 kg
HVFDSB3C0150G230/U	15 HP	5	NEMA 12	23A	16 x 41 x 11	406.4 x 1041.4 x 279.4	64 lb	29.03 kg
HVFDSB3C0150G330/U	15 HP	5	NEMA 3R	23A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.38 kg
HVFDSB3C0200G130/U	20 HP	5	NEMA 1	31A	8.9 x 41.7 x 10.8	226.06 x 881.38 x 274.32	59 lb	26.76 kg
HVFDSB3C0200G230/U	20 HP	5	NEMA 12	31A	16 x 45 x 11	406.4 x 1143 x 279.4	76 lb	34.47 kg
HVFDSB3C0200G330/U	20 HP	5	NEMA 3R	31A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.38 kg
HVFDSB3C0250G130/U	25 HP	6	NEMA 1	38A	12.4 x 55.2 x 11.3	314.96 x 1145.5 x 287.02	94.5 lb	42.86 kg
HVFDSB3C0250G230/U	25 HP	6	NEMA 12	38A	16 x 50.5 x 13	406.4 x 1282.7 x 330.2	120 lb	54.43 kg
HVFDSB3C0250G330/U	25 HP	6	NEMA 3R	38A	34.5 x 36 x 12	723.9 x 914.4 x 304.8	124 lb	56.25 kg
HVFDSB3C0300G130/U	30 HP	6	NEMA 1	46A	12.4 x 55.2 x 11.3	314.96 x 1145.5 x 287.02	98.5 lb	44.68 kg
HVFDSB3C0300G230/U	30 HP	6	NEMA 12	46A	16 x 50.5 x 13	406.4 x 1282.7 x 330.2	120 lb	54.43 kg
HVFDSB3C0300G330/U	30 HP	6	NEMA 3R	46A	34.5 x 36 x 12	723.9 x 914.4 x 304.8	124 lb	56.25 kg
HVFDSB3C0400G130/U	40 HP	6	NEMA 1	61A	12.4 x 55.2 x 11.3	314.96 x 1145.5 x 287.02	105.5 lb	47.85 kg
HVFDSB3C0400G230/U	40 HP	6	NEMA 12	61A	16 x 50.5 x 13	406.4 x 1282.7 x 330.2	136 lb	61.69 kg
HVFDSB3C0400G330/U	40 HP	6	NEMA 3R	61A	34.5 x 36 x 12	723.9 x 914.4 x 304.8	124 lb	56.25 kg
HVFDSB3C0500G130/U	50 HP	7	NEMA 1	72A	20.8 x 59 x 13.2	528.32 x 1308.1 x 335.28	175 lb	79.38 kg
HVFDSB3C0500G230/U	50 HP	7	NEMA 12	72A	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	150 lb	68.04 kg
HVFDSB3C0500G330/U	50 HP	7	NEMA 3R	72A	40.5 x 48 x 14	1028.7 x 1219.2 x 355.6	193 lb	87.54 kg
HVFDSB3C0600G130/U	60 HP	7	NEMA 1	87A	20.8 x 59 x 13.2	528.32 x 1308.1 x 335.28	184 lb	83.46 kg
HVFDSB3C0600G230/U	60 HP	7	NEMA 12	87A	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	165 lb	74.84 kg
HVFDSB3C0600G330/U	60 HP	7	NEMA 3R	87A	40.5 x 48 x 14	1028.7 x 1219.2 x 355.6	193 lb	87.54 kg
HVFDSB3C0750G130/U	75 HP	7	NEMA 1	105A	20.8 x 59 x 13.2	528.32 x 1308.1 x 335.28	195 lb	88.45 kg
HVFDSB3C0750G230/U	75 HP	7	NEMA 12	105A	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	193 lb	87.54 kg
HVFDSB3C0750G330/U	75 HP	7	NEMA 3R	105A	40.5 x 48 x 14	1028.7 x 1219.2 x 355.6	193 lb	87.54 kg
HVFDSB3C1000G130/U	100 HP	8	NEMA 1	140A	25 x 70 x 16.2	635 x 1524 x 411.48	285 lb	129.27 kg
HVFDSB3C1000G230/U	100 HP	8	NEMA 12	140A	56 x 48 x 15.1	1422 x 1219 x 384	369 lb	158.76 kg
HVFDSB3C1000G330/U	100 HP	8	NEMA 3R	140A	40.4 x 60 x 12	1026 x 1524 x 304.8	470 lb	213.2 kg
HVFDSB3C1250G130/U	120 HP	8	NEMA 1	170A	56 x 48 x 15.1	1422 x 1219 x 384	369 lb	167.4 kg
HVFDSB3C1250G230/U	120 HP	8	NEMA 12	170A	56 x 48 x 15.1	1422 x 1219 x 384	369 lb	158.76 kg
HVFDSB3C1250G330/U	120 HP	8	NEMA 3R	170A	40.4 x 60 x 12	1026 x 1524 x 304.8	470 lb	213.2 kg
HVFDSB3C1500G130/U	150 HP	8	NEMA 1	205A	56 x 48 x 15.1	1422 x 1219 x 384	369 lb	167.4 kg
HVFDSB3C1500G230/U	150 HP	8	NEMA 12	205A	56 x 48 x 15.1	1422 x 1219 x 384	369 lb	158.76 kg
HVFDSB3C1500G330/U	150 HP	8	NEMA 3R	205A	40.4 x 60 x 12	1026 x 1524 x 304.8	470 lb	213.2 kg

Product Selection - VFDs

SmartVFD HVAC Drives with Bypass and/or Disconnect

Voltage: 460 Vac; **Configuration:** Drive with 3 Contactor Bypass and Auto Bypass; **Auto Bypass:** Yes; **Disconnect Type:** Fused; **Drive Input Fuses:** Yes; **Pilot Lights:** Yes

Product Number	Horsepower	Frame Type	Type of Enclosure	Current Ratings	Dimensions, Approximate		Weight	
					(inch)	(mm)	(lb)	(kg)
HVFD3B3C0015G131/U	1.5 HP	4	NEMA 1	3.4A	8.9 x 38.9 x 10.3	226.06 x 810.26 x 261.62	46 lb	20.87 kg
HVFD3B3C0015G231/U	1.5 HP	4	NEMA 12	3.4A	16 x 37.5 x 11	304.8 x 952.5 x 279.4	53 lb	24.04 kg
HVFD3B3C0015G331/U	1.5 HP	4	NEMA 3R	3.4A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFD3B3C0020G131/U	2 HP	4	NEMA 1	8A	8.9 x 38.7 x 10.7	226.06 x 982.98 x 271.78	Call Customer Care	
HVFD3B3C0020G231/U	2 HP	4	NEMA 12	4.8A	16 x 37.5 x 11	304.8 x 952.5 x 279.4	53 lb	24.04 kg
HVFD3B3C0020G331/U	2 HP	4	NEMA 3R	4.8A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFD3B3C0030G131/U	3 HP	4	NEMA 1	5.6A	8.9 x 38.9 x 10.3	226.06 x 810.26 x 261.62	46 lb	20.87 kg
HVFD3B3C0030G231/U	3 HP	4	NEMA 12	5.6A	16 x 37.5 x 11	304.8 x 952.5 x 279.4	53 lb	24.04 kg
HVFD3B3C0030G331/U	3 HP	4	NEMA 3R	5.6A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFD3B3C0040G131/U	4 HP	4	NEMA 1	8A	8.9 x 38.9 x 10.3	226.06 x 810.26 x 261.62	46 lb	20.87 kg
HVFD3B3C0040G231/U	4 HP	4	NEMA 12	8A	16 x 37.5 x 11	304.8 x 952.5 x 279.4	53 lb	24.04 kg
HVFD3B3C0040G331/U	4 HP	4	NEMA 3R	8A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFD3B3C0050G131/U	5 HP	4	NEMA 1	9.6A	8.9 x 38.9 x 10.3	226.06 x 810.26 x 261.62	46 lb	20.87 kg
HVFD3B3C0050G231/U	5 HP	4	NEMA 12	9.6A	16 x 37.5 x 11	304.8 x 952.5 x 279.4	53 lb	24.04 kg
HVFD3B3C0050G331/U	5 HP	4	NEMA 3R	9.6A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49 kg
HVFD3B3C0075G131/U	7.5 HP	4	NEMA 1	12A	8.9 x 38.9 x 10.3	226.06 x 810.26 x 261.62	46 lb	20.87 kg
HVFD3B3C0075G231/U	7.5 HP	4	NEMA 12	12A	16 x 37.5 x 11	406.4 x 952.5 x 279.4	53 lb	24.04 kg
HVFD3B3C0075G331/U	7.5 HP	4	NEMA 3R	12A	24.5 x 24 x 12	622.3 x 609.6 x 304.8	54 lb	24.49kg
HVFD3B3C0100G131/U	10 HP	5	NEMA 1	16A	8.9 x 41.7 x 10.3	226.06 x 881.38 x 261.62	55 lb	25.4 kg
HVFD3B3C0100G231/U	10 HP	5	NEMA 12	16A	16 x 41 x 11	406.4 x 1041.4 x 279.4	64 lb	29.03 kg
HVFD3B3C0100G331/U	10 HP	5	NEMA 3R	16A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.38 kg
HVFD3B3C0150G131/U	15 HP	5	NEMA 1	23A	8.9 x 41.7 x 10.3	226.06 x 881.38 x 261.62	56 lb	25.4 kg
HVFD3B3C0150G231/U	15 HP	5	NEMA 12	23A	16 x 41 x 11	406.4 x 1041.4 x 279.4	64 lb	29.03 kg
HVFD3B3C0150G331/U	15 HP	5	NEMA 3R	23A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.38 kg
HVFD3B3C0200G131/U	20 HP	5	NEMA 1	31A	8.9 x 41.7 x 10.8	226.06 x 881.38 x 274.32	60 lb	27.22 kg
HVFD3B3C0200G231/U	20 HP	5	NEMA 12	31A	16 x 45 x 11	406.4 x 1143 x 279.4	76 lb	34.47 kg
HVFD3B3C0200G331/U	20 HP	5	NEMA 3R	31A	28.5 x 30 x 12	723.9 x 762 x 304.8	78 lb	35.38 kg
HVFD3B3C0250G131/U	25 HP	6	NEMA 1	38A	12.4 x 55.2 x 11.3	314.96 x 1145.5 x 287.02	96.5 lb	43.77 kg
HVFD3B3C0250G231/U	25 HP	6	NEMA 12	38A	16 x 50.5 x 13	406.4 x 1282.7 x 330.2	120 lb	54.43 kg
HVFD3B3C0250G331/U	25 HP	6	NEMA 3R	38A	34.5 x 36 x 12	723.9 x 914.4 x 304.8	124 lb	56.25 kg
HVFD3B3C0300G131/U	30 HP	6	NEMA 1	46A	12.4 x 55.2 x 11.3	314.96 x 1145.5 x 287.02	100.5 lb	45.59 kg
HVFD3B3C0300G231/U	30 HP	6	NEMA 12	46A	16 x 50.5 x 13	406.4 x 1282.7 x 330.2	120 lb	54.43 kg
HVFD3B3C0300G331/U	30 HP	6	NEMA 3R	46A	34.5 x 36 x 12	723.9 x 914.4 x 304.8	124 lb	56.25 kg
HVFD3B3C0400G131/U	40 HP	6	NEMA 1	61A	12.4 x 55.2 x 11.3	314.96 x 1145.5 x 287.02	107.5 lb	48.76 kg
HVFD3B3C0400G231/U	40 HP	6	NEMA 12	61A	16 x 50.5 x 13	406.4 x 1282.7 x 330.2	136 lb	61.69 kg
HVFD3B3C0400G331/U	40 HP	6	NEMA 3R	61A	34.5 x 36 x 12	723.9 x 914.4 x 304.8	124 lb	56.25 kg
HVFD3B3C0500G131/U	50 HP	7	NEMA 1	72A	20.8 x 59 x 13.2	528.32 x 1308.1 x 335.28	177 lb	80.29 kg
HVFD3B3C0500G231/U	50 HP	7	NEMA 12	72A	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	150 lb	68.04 kg
HVFD3B3C0500G331/U	50 HP	7	NEMA 3R	72A	40.5 x 48 x 14	1028.7 x 1219.2 x 355.6	193 lb	87.54 kg
HVFD3B3C0600G131/U	60 HP	7	NEMA 1	87A	20.8 x 59 x 13.2	528.32 x 1308.1 x 335.28	186 lb	84.37 kg
HVFD3B3C0600G231/U	60 HP	7	NEMA 12	87A	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	165 lb	74.84 kg
HVFD3B3C0600G331/U	60 HP	7	NEMA 3R	87A	40.5 x 48 x 14	1028.7 x 1219.2 x 355.6	193 lb	87.54 kg
HVFD3B3C0750G131/U	75 HP	7	NEMA 1	105A	20.8 x 59 x 13.2	528.32 x 1308.1 x 335.28	197 lb	89.36 kg
HVFD3B3C0750G231/U	75 HP	7	NEMA 12	105A	20 x 58.5 x 13.5	508 x 1485.9 x 342.9	193 lb	87.54 kg
HVFD3B3C0750G331/U	75 HP	7	NEMA 3R	105A	40.5 x 48 x 14	1028.7 x 1219.2 x 355.6	193 lb	87.54 kg
HVFD3B3C1000G131/U	100 HP	8	NEMA 1	140A	25 x 70 x 16.2	635 x 1524 x 411.48	287 lb	130.18 kg
HVFD3B3C1000G231/U	100 HP	8	NEMA 12	140A	56 x 48 x 15.1	1422 x 1219 x 384	369 lb	158.76 kg
HVFD3B3C1000G331/U	100 HP	8	NEMA 3R	140A	40.4 x 60 x 12	1026 x 1524 x 304.8	470 lb	213.2 kg
HVFD3B3C1250G131/U	120 HP	8	NEMA 1	170A	56 x 48 x 15.1	1422 x 1219 x 384	369 lb	167.4 kg
HVFD3B3C1250G231/U	120 HP	8	NEMA 12	170A	56 x 48 x 15.1	1422 x 1219 x 384	369 lb	158.76 kg
HVFD3B3C1250G331/U	120 HP	8	NEMA 3R	170A	40.4 x 60 x 12	1026 x 1524 x 304.8	470 lb	213.2 kg
HVFD3B3C1500G131/U	150 HP	8	NEMA 1	205A	56 x 48 x 15.1	1422 x 1219 x 384	369 lb	167.4 kg
HVFD3B3C1500G231/U	150 HP	8	NEMA 12	205A	56 x 48 x 15.1	1422 x 1219 x 384	369 lb	158.76 kg
HVFD3B3C1500G331/U	150 HP	8	NEMA 3R	205A	40.4 x 60 x 12	1026 x 1524 x 304.8	470 lb	213.2 kg

replacement opportunity



Universal Actuator for Fire & Smoke Dampers.

Honeywell is the leading supplier of fire and smoke actuators designed for UL555 and UL555S. Our current product line is the universal replacement for existing fire and smoke damper actuators.

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Submittal Data - VFDs

SmartVFD HVAC Drives with Bypass and/or Disconnect



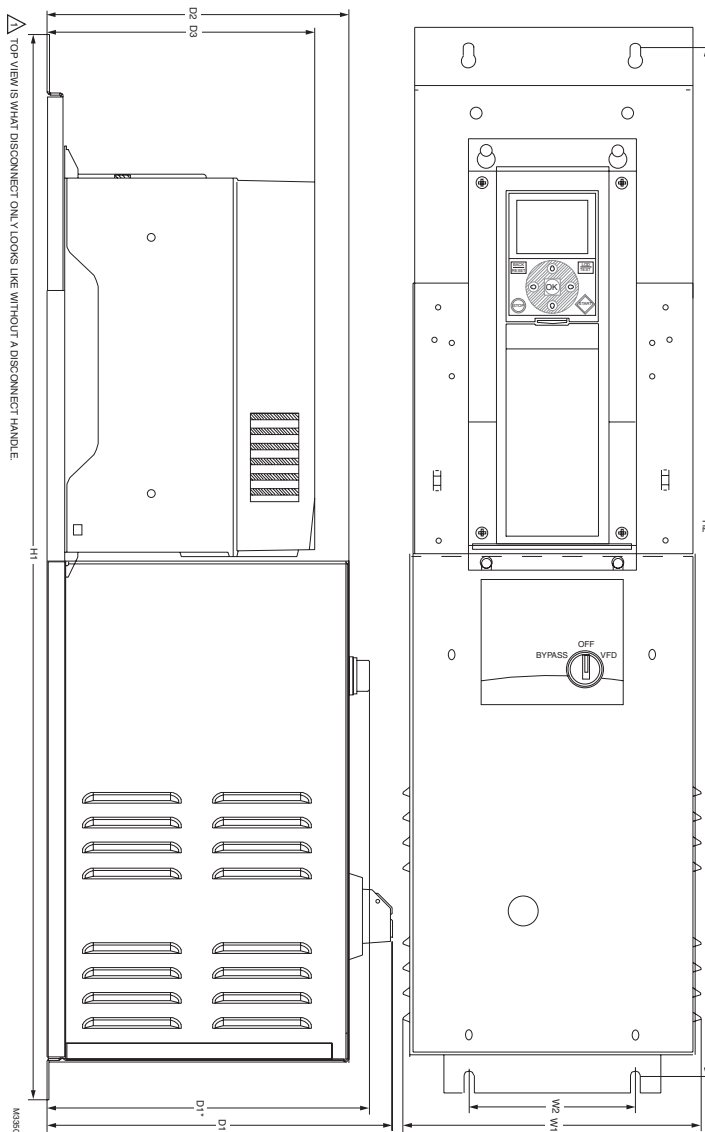
SmartVFD Drives are available in four configurations with bypass and/or disconnect as explained below. All configurations are available in NEMA 1, NEMA 12 and ventilated NEMA 3R.

Dimensional Drawings for SmartVFD HVAC Drives with Bypass and/or Disconnect

The following are the dimensional drawings and data for NEMA 1 drives with bypass and/or disconnect.

Refer to www.customer.honeywell.com for dimensional drawings for NEMA 12 or NEMA 3R models.

NEMA 1, SmartVFD HVAC Drive with 2-Contactor Bypass, No Disconnect



FEATURES

SmartVFD with Disconnect

- Fused Disconnect with no bypass

SmartVFD with 2-Contactor Bypass

Provides an economical means of bypassing the VFD.

- No Main Disconnect
- Freeze/Fire/Smoke Interlock

SmartVFD with 3-Contactor Bypass

Commission and test the VFD without affecting the operation of the motor. Provide additional bypass control capabilities with Auto bypass.

- Fused Disconnect
- Freeze/Fire/Smoke Interlock
- TEST position powers the VFD without sending power to the motor

SmartVFD with 3-Contactor Auto Bypass

SmartVFD with 3-Contactor Bypass plus VFD will automatically send the bypass into BYPASS mode:

- A contact closure sends the bypass into BYPASS mode
- Dry contacts indicate when the bypass is in BYPASS mode and can be used to alert the building management system.

Warranty

- 3 Years
- Repair Available

Refer to SmartVFD HVAC Standalone Drive Submittal Data herein for data regarding the included SmartVFD HVAC drive.

SmartVFD HVAC Drives with Bypass and/or Disconnect

NEMA 1, SmartVFD HVAC Drive with 2-Contactor Bypass, No Disconnect

Frame Size 4

Frame Size	HP and Voltage			Configuration	Dimensions							Weight Lb.
	208/230 VAC	460 VAC	600 VAC		W1	W2	H1	H2	D1	D2	D3	
4	0.75-4HP	1.5-7.5HP		Disconnect	8.92	4.98	31.91	30.8	10.36	9.04	8.01	33
*depth of 2 CONT only				2-Contractor	8.92	4.98	31.91	30.8	*9.64	9.04	8.01	38

Frame Size 5

Frame Size	HP and Voltage			Configuration	Dimensions							Weight Lb.
					W1	W2	H1	H2	D1	D2	D3	
5	5HP	10HP		Disconnect	8.92	4.98	34.72	33.61	10.36	9.04	8.96	43
* depth of 2 CONT only				2-Contractor	8.92	4.98	34.72	33.61	*9.64	9.04	8.96	48
5	7.5HP	15HP		Disconnect	8.92	4.98	34.72	33.61	10.36	9.04	8.96	43
				2-Contractor	8.92	4.98	34.72	33.61	*9.64	9.04	8.96	50
5	10HP	20HP		Disconnect	8.92	4.98	34.72	33.61	10.36	9.04	8.96	43
				2-Contractor	8.92	4.98	34.72	33.61	*9.64	9.04	8.96	50

Frame Size 6

Frame Size	HP and Voltage			Configuration	Dimensions							Weight Lb.
					W1	W2	H1	H2	D1	D2	D3	
6		25HP		Disconnect	12.42	4.98	45.17	43.9	11.31	9.57		50
* depth of 2 CONT only				2-Contractor	12.42	4.98	45.17	43.9	*10.1	9.57		55
6	15HP	30HP		Disconnect	12.42	4.98	45.17	43.9	11.31	9.57		50
				2-Contractor	12.42	4.98	45.17	43.9	*10.1	9.57		59
6	20HP	40HP		Disconnect	12.42	4.98	45.17	43.9	11.31	9.57		50
				2-Contractor	12.42	4.98	45.17	43.9	*10.1	9.57		59

Frame Size 7

Frame Size	HP and Voltage			Configuration	Dimensions							Weight Lb.
	208/230 Vac	460Vac			W1	W2	H1	H2	D1	D2		
7	25HP	50HP		Disconnect	20.84	20.09	51.57	47.5	13.28	11.44		130
* depth of 2 CONT only				2-Contractor	20.84	20.09	51.57	47.5	*12.28	11.44		130
7	30HP	60HP		Disconnect	20.84	20.09	51.57	47.5	13.28	11.44		141
				2-Contractor	20.84	20.09	51.57	47.5	*12.28	11.44		141
7	40HP	75HP		Disconnect	20.84	20.09	51.57	47.5	13.28	11.44		149
				2-Contractor	20.84	20.09	51.57	47.5	*12.28	11.44		149

Frame Size 8

Frame Size	HP and Voltage			Configuration	Dimensions							Weight (approx.) Lb.
	208/230	460Vac			W1	W2	H1	H2	D1	D2		
8	50HP	100HP		Disconnect	25	23.41	60	55	16.27	14.55		200
* depth of 2 CONT only				2-Contractor	25	23.41	60	55	*15.28	14.55		250
8	60HP	125HP		Disconnect	25	23.41	60	55	16.27	14.55		200
				2-Contractor	25	23.41	60	55	*15.28	14.55		265
8	75HP	150HP		Disconnect	25	23.41	60	55	16.27	14.55		200
				2-Contractor	25	23.41	60	55	*15.28	14.55		280

SmartVFD HVAC Drives with Bypass and/or Disconnect

Technical drawing of the M3350 safe, showing front and side views with dimensions and a warning symbol.

Dimensions:

- $D1$: Width of the main body.
- $D2$: Width of the top section.
- $D3$: Width of the bottom section.
- $H1$: Total height.

Warning Symbol: A triangle with an exclamation mark, indicating a warning.

Text: BOTH PISTOL GRIP AND DISCONNECT HANDLE ARE OVERLAID IN THE DRAWINGS. PISTOL GRIP IS ONLY USED ON THE 20 HP VERSION.

Model Number: M3350



SmartVFD HVAC Drives with Bypass and/or Disconnect

NEMA 1, SmartVFD HVAC Drive with 3-Contactor and 3-Contactor with Auto-Bypass, Fused Disconnect.

Frame Size 4

Frame Size	HP and Voltage			Configuration	Dimensions							Weight
	208/230 VAC	460 VAC	600 VAC		W1	W2	H1	H2	D1	D2	D3	Lb.
4	0.75-4HP	1.5-7.5HP		3-Contractor	8.92	4.98	38.91	37.8	10.36	9.04	8.01	44
				3-Contractor with Auto Bypass	8.92	4.98	38.91	37.8	10.36	9.04	8.01	38

Frame Size 5

Frame Size	HP and Voltage			Configuration	Dimensions							Weight
	208/230 Vac	460 Vac	600 Vac		W1	W2	H1	H2	D1	D2	D3	Lb.
5	5HP	10HP		3-Contractor	8.92	4.98	41.72	40.61	10.36	9.04	8.96	55.5
				3-Contractor with Auto-Bypass	8.92	4.98	41.72	40.61	10.36	9.04	8.96	56
5	7.5HP	15HP		3-Contractor	8.92	4.98	41.72	40.61	10.36	9.04	8.96	57
				3-Contractor with Auto-Bypass	8.92	4.98	41.72	40.61	10.36	9.04	8.96	57.5
5	10HP	20HP		3-Contractor	8.92	4.98	41.72	40.61	10.36	9.04	8.96	59.5
				3-Contractor with Auto-Bypass	8.92	4.98	41.72	40.61	10.36	9.04	8.96	60

Frame Size 6

Frame Size	HP and Voltage			Configuration	Dimensions							Weight
	208/230 Vac	460 Vac	600 Vac		W1	W2	H1	H2	D1	D2	D3	Lb.
6		25HP		3-Contractor	12.42	4.98	55.21	53.99	11.31	9.55		94.5
				3-Contractor with Auto-Bypass	12.42	4.98	55.21	53.99	11.31	9.55		96.5
6	15HP	30HP		3-Contractor	12.42	4.98	55.21	53.99	11.31	9.55		98.5
				3-Contractor with Auto-Bypass	12.42	4.98	55.21	53.99	11.31	9.55		100.5
6	20HP	40HP		3-Contractor	12.42	4.98	55.21	53.99	11.31	9.55		105.5
				3-Contractor with Auto-Bypass	12.42	4.98	55.21	53.99	11.31	9.55		107.5

Frame Size 7

Frame Size	HP and Voltage		Configuration	Dimensions							Weight
	208/230	460Vac		W1	W2	H1	H2	D1	D2	D3	Lb.
7	25HP	50HP	3-Contractor	20.84	20.09	59	55	13.28	11.44	11.08	135
			3-Contractor with Auto-Bypass	20.84	20.09	59	55	13.28	11.44	11.08	135
7	30HP	60HP	3-Contractor	20.84	20.09	59	55	13.28	11.44	11.08	150
			3-Contractor with Auto-Bypass	20.84	20.09	59	55	13.28	11.44	11.08	150
7	40HP	75HP	3-Contractor	20.84	20.09	59	55	13.28	11.44	11.08	170
			3-Contractor with Auto-Bypass	20.84	20.09	59	55	13.28	11.44	11.08	170

Frame Size 8

Frame Size	HP and Voltage		Configuration	Dimensions							Weight (approx.)
	208/230 Vac	460Vac		W1	W2	H1	H2	D1	D2	D3	Lb.
8	50HP	100HP	3-Contactor	25	24	70.06	55	16.2	14.6		285.8
			3-Contactor with Auto-Bypass	25	24	70.06	55	16.2	14.6		287
8	60HP	125HP	3-Contactor	25	24	70.06	55	16.2	14.6		295.3
			3-Contactor with Auto-Bypass	25	24	70.06	55	16.2	14.6		297
8	75HP	150HP	3-Contactor	25	24	70.06	55	16.2	14.6		331.3
			3-Contactor with Auto-Bypass	25	24	70.06	55	16.2	14.6		333

Submittal Data - VFDs

SmartVFD HVAC Drives with Bypass and/or Disconnect

NEMA 12, SmartVFD HVAC – All Configurations

Frame Size	HP and Voltage			Configuration	208/230 Vac Dimensions (in) & Weight (lb)				460 Vac Dimensions (in) & Weight (lb)				600 Vac Dimensions (in) & Weight (lb)			
	208/230 Vac	460 Vac	600 Vac		W	H	D	lb	W	H	D	lb	W	H	D	lb
4	0.75-3 HP	1.5-7.5 HP	N/A	Drive alone	5	12.9	7.5	13.2	5	12.9	7.5	13.2	5	12.9	7.5	13.2
				Disconnect	12	37.5	11	40	12	37.5	11	40	N/A			
				2-Contactor	16	37.5	11	55	16	37.5	11	53				
				3-Contactor	16	37.5	11	55	16	37.5	11	53				
				3-Contactor with Auto-Bypass	16	37.5	11	55	16	37.5	11	53				
5	5-10 HP	10 HP 15 HP 20 HP	Only drive alone is available as of this printing	Drive alone	5.7	16.5	8.4	22	5.7	16.5	8.4	22	5.7	16.5	8.4	22
				Disconnect	12	41	11	72	12	41	11	72	N/A			
				2-Contactor	16	41/41/45	11	70/70/84	16	41/41/45	11	64/64/76				
				3-Contactor	16	41/41/45	11	70/70/84	16	41/41/45	11	64/64/76				
				3-Contactor with Auto-Bypass	16	41/41/45	11	70/70/84	16	41/41/45	11	64/64/76				
6	15-20 HP	25 HP 30 HP 40 HP	Only drive alone is available as of this printing	Drive alone	7.7	21.9	9	44.1	7.7	21.9	9	44.1	7.7	21.9	9	44.1
				Disconnect	12	46.5	13	120	12/12/16	46.5	13	120/120/136	N/A			
				2-Contactor	16/20	50.5/54.5	13	125/140	16/16/20	50.5/50.5/54.5	13	120/120/136				
				3-Contactor	16/20	50.5/54.5	13	125/140	16/16/20	50.5/50.5/54.5	13	120/120/136				
				3-Contactor with Auto-Bypass	16/20	50.5/54.5	13	125/140	16/16/20	50.5/50.5/54.5	13	120/120/136				
7	25-40 HP	50 HP 60 HP 75 HP	Only drive alone is available as of this printing	Drive alone	9.3	25.4	10.2	82.7	9.3	25.4	10.2	82.7	9.3	25.4	10.2	82.7
				Disconnect	16	50.5	13.5	145/160/175	16	50.5	13.5	145/160/175	N/A			
				2-Contactor	20/24/30	58.5/65.5/70.5	13.5	160/175/200	20/24/30	58.5/65.5/70.5	13.5	150/165/193				
				3-Contactor	20/24/30	58.5/65.5/70.5	13.5	160/175/200	20/24/30	58.5/65.5/70.5	13.5	150/165/193				
				3-Contactor with Auto-Bypass	20/24/30	58.5/65.5/70.5	13.5	160/175/200	20/24/30	58.5/65.5/70.5	13.5	150/165/193				
8	50-75 HP	100 HP 125 HP 150 HP	Only drive alone is available as of this printing	Drive alone	11.4	38	13.5	154.3	11.42	38.03	13.5	154.3	11.42	38.03	13.5	154.3
				Disconnect	Contact Customer Care				Contact Customer Care				N/A			
				2-Contactor												
				3-Contactor												
				3-Contactor with Auto-Bypass												
9	100-125 HP	180-220 HP	150-200 HP	Drive alone	18.9	45.3	14.4	238.1	18.9	45.27	14.4	238.1	18.9	45.27	14.4	238.1

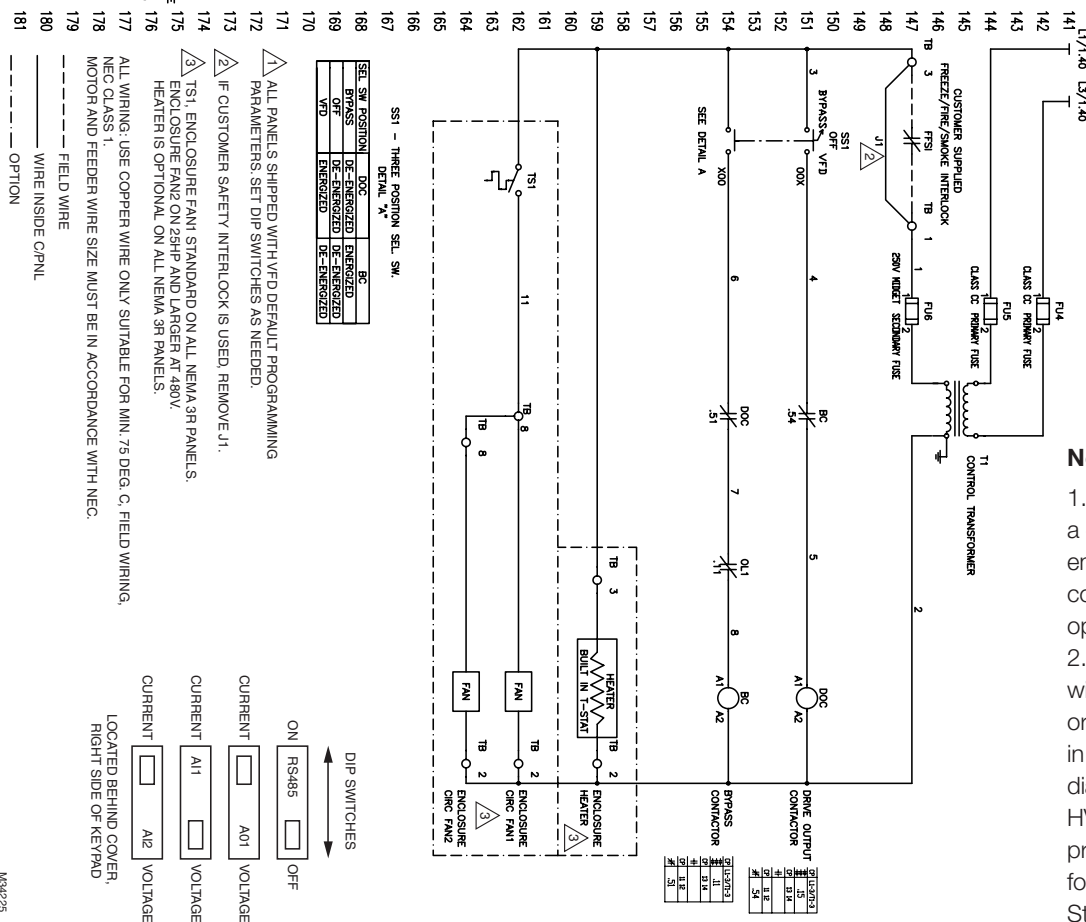
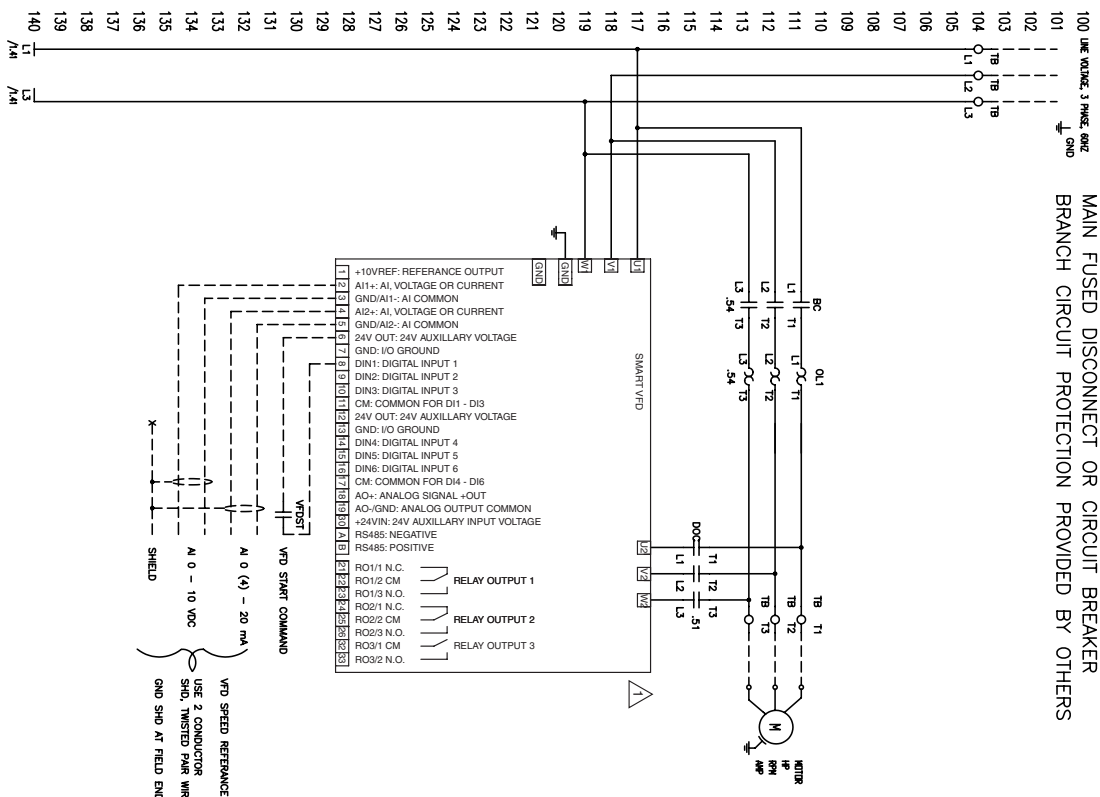
SmartVFD HVAC Drives with Bypass and/or Disconnect

NEMA 3R, SmartVFD HVAC – All Configurations

Frame Size	HP and Voltage		Configuration	Dimensions (in)			Weight lb
	208/230 Vac	460 Vac		W	H	D	
4	0.75-3 HP	1.5-7.5 HP	Drive alone	20.5	20	10.5	39
			Disconnect	20.5	20	12	43
			2-Contactor	24.5	24	10.5	49
			3-Contactor	24.5	24	12	54
			3-Contactor with Auto-Bypass	24.5	24	12	54
5	5-10 HP	10 HP-20 HP	Drive alone	20.5	24	10.5	58
			Disconnect	24.5	24	12	61
			2-Contactor	28.5	24	10.5	72
			3-Contactor	28.5	30	12	78
			3-Contactor with Auto-Bypass	28.5	30	12	78
6	15-20 HP	25 HP-40 HP	Drive alone	28.5	36	10.5	80
			Disconnect	28.5	36	12	88
			2-Contactor	28.5	36	10.5	118
			3-Contactor	34.5	36	12	124
			3-Contactor with Auto-Bypass	34.5	36	12	124
7	25-40 HP	50 HP-75 HP	Drive alone	28.5	48	12.5	130
			Disconnect	28.5	48	14	149
			2-Contactor	28.5	48	12.5	185
			3-Contactor	40.5	48	14	193
			3-Contactor with Auto-Bypass	40.5	48	14	193
8	50-75 HP	100 HP-150 HP	Drive alone	40.5	60	12.5	299
			Disconnect	40.5	60	14	340
			2-Contactor	40.5	60	12.5	430
			3-Contactor	40.5	60	14	440
			3-Contactor with Auto-Bypass	40.5	60	14	440

SmartVFD HVAC Drives with Bypass and/or Disconnect

SmartVFD HVAC Drive with 2-Contactor Bypass (No Disconnect)

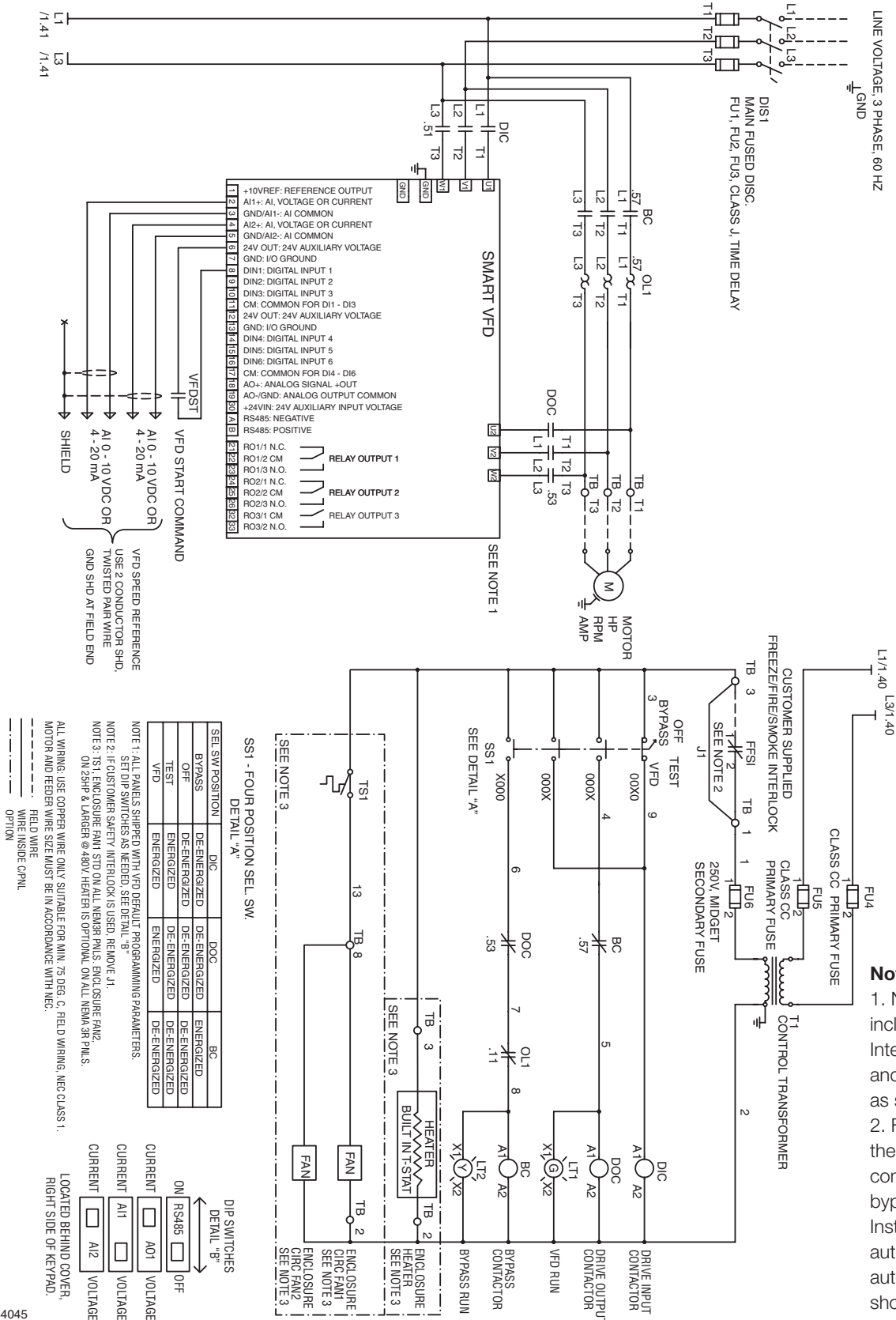


Notes:

1. NEMA 3R enclosures include a circulation fan(s). Integral enclosure heaters and/or cooling are available as special options.
2. For SmartVFD HVAC drive with disconnect wiring diagram or SmartVFD HVAC drive alone in a NEMA 3R enclosure wiring diagram, refer to the SmartVFD HVAC Wiring Diagram in the previous section: Submittal Data for SmartVFD HVAC Series Standalone Drives.

SmartVFD HVAC Drives with Bypass and/or Disconnect

SmartVFD HVAC Drive with 3-Contactor Bypass and Fused Disconnect

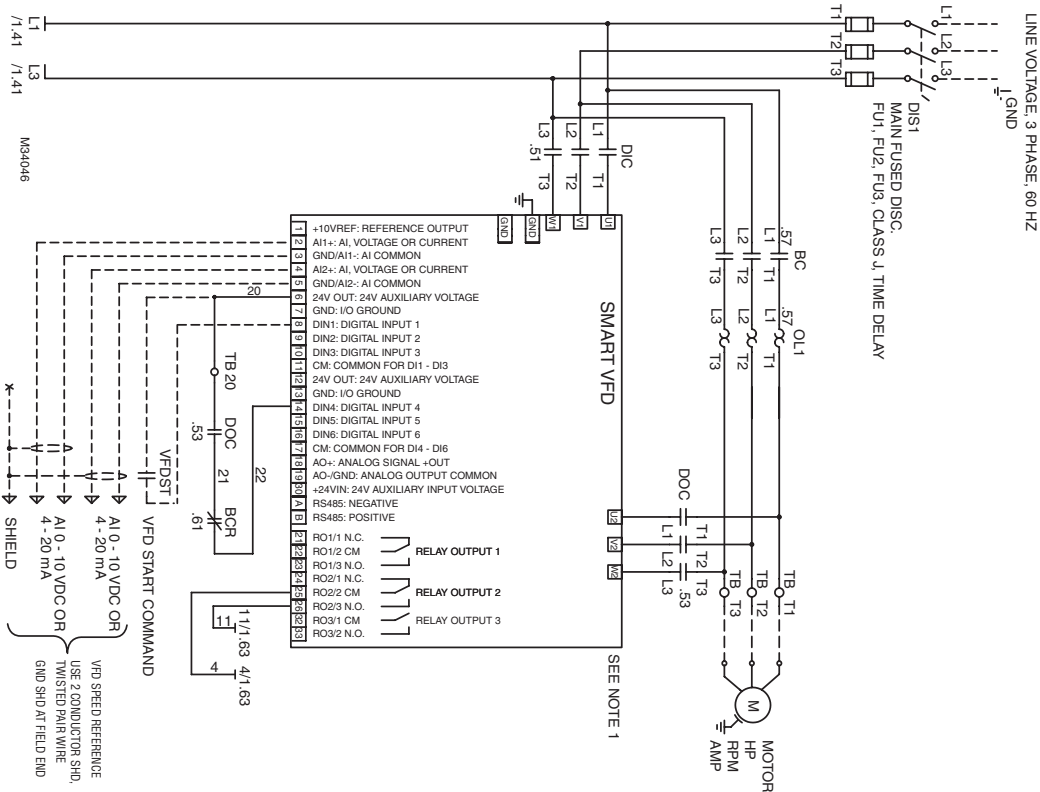


Notes:

1. NEMA 3R enclosures include a circulation fan(s). Integral enclosure heaters and/or cooling are available as special options.
2. For auto-bypass units the drive parameters come configured for auto-bypass. Refer to Installation Instructions to disable the auto-bypass or to reset the auto-bypass parameters should factory defaults be reset on the drive.

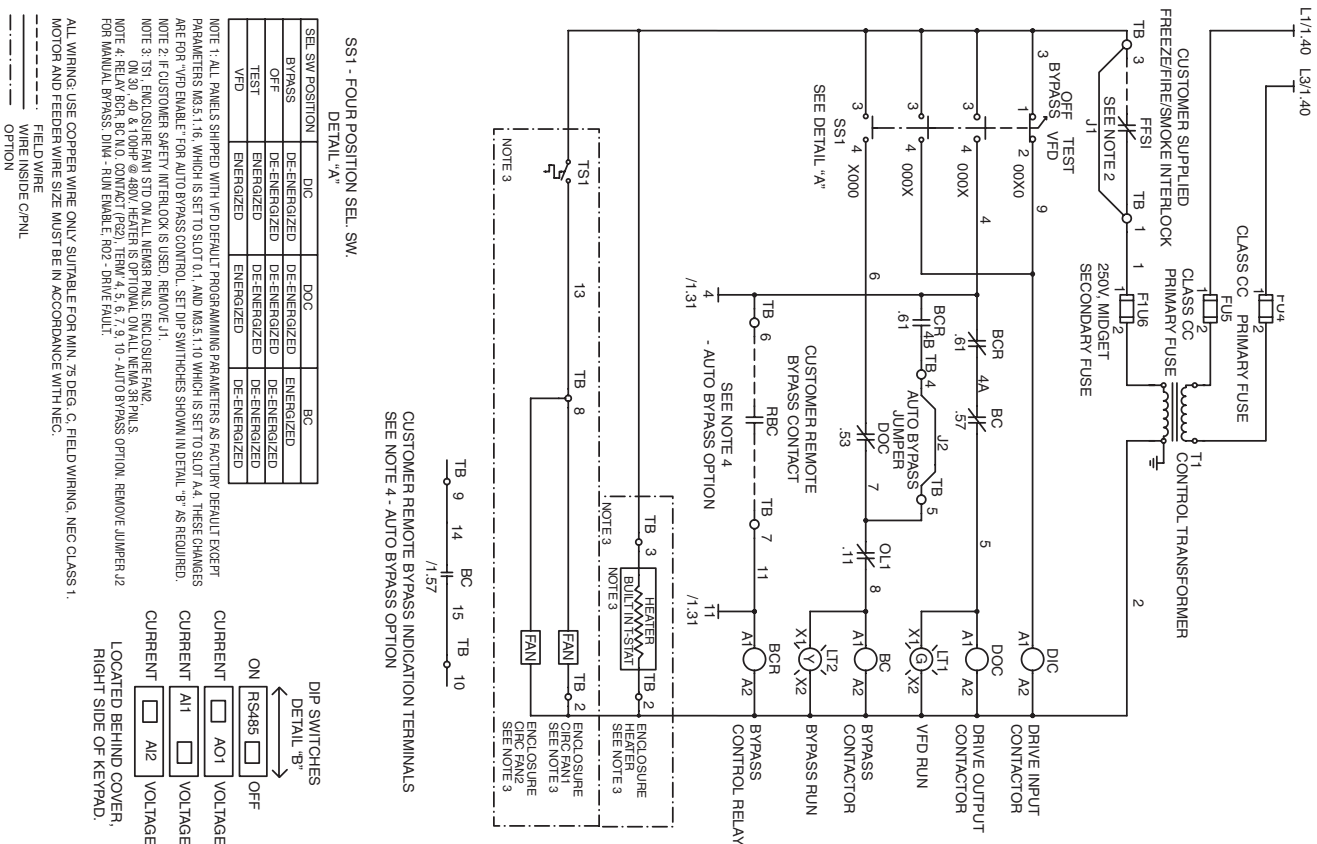
SmartVFD HVAC Drives with Bypass and/or Disconnect

SmartVFD HVAC Drive with 3-Contactor Auto-Bypass and Fused Disconnect



Notes:

1. NEMA 3R enclosures include a circulation fan(s). Integral enclosure heaters and/or cooling are available as special options.
2. For auto-bypass units the drive parameters come configured for auto-bypass. Refer to Installation Instructions 62-2032 to disable the auto-bypass or to reset the auto-bypass parameters should factory defaults be reset on the drive.



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Honeywell

Sensor Selection

Honeywell's complete line of sensors covers all necessary control applications and mounting options, making Honeywell your best sensor source. From temperature and current sensors to CO2 and enthalpy sensors and more, Honeywell sensors are the smart, cost-effective choice.

Section 6: Sensors

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Product Selection - Sensors

TR70 and TR40 Series, Wireless Sensors and Receivers

Spyder Sylk Sensors



	Display	Temperature	Humidity	C02	Customizable Parameters	Schedule Access
TR70-US	•	•			•	
TR70-H-US	•	•	•		•	
TR71	•	•			•	
TR71-H	•	•	•		•	
TR75	•	•			•	•
TR75-H	•	•	•		•	•
TR42	•	•				
TR42-H	•	•	•			
TR42-C02	•	•		•		
TR42-H-C02	•	•	•	•		
TR40		•				
TR40-H		•	•			
TR40-C02		•		•		
TR40-H-C02		•	•	•		

Wireless Sensors and Receivers



Model Number	Temp	Humidity	Selectable Setpoint	Occupied Override	Comments	Compatible Controllers	Compatible Thermostats
TR21-WK	•				Includes one prebound sensor and receiver	Honeywell controllers including Spyder, Excel 10, W7750, W7751, W7752, W7753 and non-Honeywell controllers with remote setpoint	T7350, T7351 and TB8575 Honeywell Thermostats and Non Honeywell thermostats with remote setpoint
TR21-WKU	•				Includes one prebound sensor and receiver, No Honeywell logo		
TR23-WK	•		•	•	Includes one prebound sensor and receiver		
TR23-WKU	•		•	•	Includes one prebound sensor and receiver, No Honeywell logo		
TR21-WS	•				Sensor only. For replacement. Requires a wireless receiver		
TR23-WS	•		•	•	Sensor only. For replacement. Requires a wireless receiver		
WRECVR					Wireless receiver only. For replacement. Requires a wireless sensor.		

Product Selection - Sensors

TR20, C7772A and T7560 Series Sensors

For use in XL10, Excel 10, 15, 50, 100, 500, Spyder, and T7350 applications

	Model Number	Model Number	Sensor Element Type	Sensor Type	Sensor Type	Selectable Setpoint	Occupied Override	LON Jack	Fan	Comments
Application	Honeywell Wall Module Model	Replaces Honeywell Model		Temp	Humidity					
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR21	T7770A1006	20K ohms non-linear	•						
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR21-A	T7770A3002	10K ohms non-linear for averaging only	•						
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR21-H	N/A	20K ohms non-linear	•	•			•		
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR21-J	T7770A2004	20K ohms non-linear	•				•		
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR22	T7770B1004 T7770B1020 T7770B1046	20K ohms non-linear	•		•		•		
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR23	TR7770C1002 TR7770C1028 TR7770C1044	20K ohms non-linear	•		•	•	•		
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR23-H	N/A	20K ohms non-linear	•	•	•	•	•		
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR23-KL	N/A	20K ohms non-linear	•		•	•	•		Knobs not included
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR23-H-KL	N/A	20K ohms non-linear	•	•	•	•	•		Knobs not included
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR23-N	T7770C1051	20K ohms non-linear	•		•	•	•		No Honeywell logo
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR24	T7770D1000	20K ohms non-linear	•			•	•		
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR22-F5	N/A	20K ohms non-linear	•		•		•	5 position	Not for use with T7350
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR23-F3	T7770E1023	20K ohms non-linear	•		•	•	•	3 position	Not for use with T7350
Excel 10, 15, 50, 100, 500, Spyder, T7350	TR23-F5	T7770F1005	20K ohms non-linear	•		•	•	•	5 position	Not for use with T7350
Excel 10, 15, 50, 100, 500, Spyder, T7350	C7772A1004	N/A	20K ohms non-linear	•						No Honeywell logo
Excel 10, 15, 50, 100, 500, Spyder, T7350	C7772A1012	N/A	20K ohms non-linear	•						With Honeywell logo
Excel 10, 20, 50, 80, 10, 500, 600	T7560A1018	N/A	20K ohms non-linear	•		•	•	Optional	Yes	LCD Display/white and blue
Excel 10, 20, 50, 80, 10, 500, 600	T7560A1042	N/A	20K ohms non-linear	•		•	•	Optional	Yes	LCD Display/all white
Excel 10, 20, 50, 80, 10, 500, 600	T7560B1016	N/A	20K ohms non-linear	•	•	•	•	Optional	Yes	LCD Display/white and blue
Excel 10, 20, 50, 80, 10, 500, 600	T7560B1032	N/A	20K ohms non-linear	•	•	•	•	Optional	Yes	LCD Display/all white
TR20 Series Sensors	KN0B-C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Replacement Knob (C*)
TR20 Series Sensors	KN0B-F	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Replacement Knob (F*)
TR20 Series Sensors	KN0B-O	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Replacement Knob +/-

Note: For use in XL10, Excel 10, 15, 50, 100, 500, Spyder and T7350 applications.

Product Selection - Sensors

T7047, T7147 Temperature Sensors and Economizer Sensors

Sensors for use in T7300 applications

Part Number	Sensing Element/Sensor Type	Color/Mounting	Features
T7047C2007	1420 ohms	Taupe, new styling	
T7047C2015	1420 ohms	Premier white, new styling	
T7047G2008	710 ohms	Taupe, new styling	Averaging only
T7047G2016	710 ohms	Premier white, new styling	Averaging only
T7147A2000	1420 ohms	Taupe, new styling	Override
T7147A2018	1420 ohms	Taupe, new styling	Override, warmer, cooler
T7147G2023	710 ohms	Taupe, new styling	Override, warmer, cooler, averaging only
T7022A1010	1420 ohms	Duct mount	
C7031G2014	PT3000	Outdoor mount	For use with T7350
C7031G2006	1715 ohms	Outdoor mount	For use with W7100

T775 Sensors



Part Number	Sensing Element	Description	Temperature Range
50021579-001	1097 ohms at 77° F	Standard temperature probe	-40° to 350° F (-40° to 177° C)
T775-SENS-WR	1097 ohms at 77° F	Water-resistant probe with 5-ft. leads	-40° to 270° F (-40° to 132° C)
T775-SENS-WT	1097 ohms at 77° F	Water-tight probe with 6-ft. leads	-40° to 270° F (-40° to 132° C)
T775-SENS-OAT	1097 ohms at 77° F	Outdoor air temperature sensor	-40° to 158° F (-40° to 70° C)
T775-SENS-STRAP	1097 ohms at 77° F	Strap-on	-40° to 250° F (-40° to 121° C)
C7031D2003	1097 ohms at 77° F	5-in. immersion sensor with wiring box (well included, 50001774-001)	-40° to 350° F (-40° to 177° C)
C7031B2005	1097 ohms at 77° F	6-in duct with wiring box	-40° to 250° F (-40° to 121° C)
C7031J2009	1097 ohms at 77° F	12-in. duct averaging sensor with four elements with wiring box	40° to 180° F (4° to 82° C)
C7046D1008	1097 ohms at 77° F	8-in. duct probe with mounting flange	40° to 150° F (4° to 66° C)
C7100D1001	1097 ohms at 77° F	12-in. flat response, duct averaging sensor with flange	40° to 220° F (4° to 104° C)
C7130B1009	1097 ohms at 77° F	Room mount sensor	-40° to 100° F (-40° to 38° C)

Analog and Communicating Economizer Sensors

	Part Number	Sensing Element	Temperature Range	Insertion Length	Type	Mounting & Application
Analog Economizer and Spyder	C7150B1004	3K ohms NTC at 77° F	-40° to 110° F (-40° to 43° C)	N/A	Duct - Temp Sensor	Mixed or discharge air sensor
	C7660A1000	4 - 20 mA	-40° to 149° F (-40° to 65° C)	N/A	Duct - Temp Sensor	Dry-bulb temperature sensor
	C7046A1004	3K ohms NTC at 77° F	40° to 150° F (4° to 66° C)	8 in.	Duct - Temp Sensor	Mixed or discharge air sensor
	C7046A1038	3K ohms NTC at 77° F	40° to 150° F (4° to 66° C)	12 in.	Duct - Temp Sensor	Mixed or discharge air sensor
	C7400A2001	4 - 20 mA	-40° to 150° F (-40° to 66° C)	NA	Duct - Enthalpy Sensor	Outdoor or return air sensor, may be used with duct mounting kit 50053060-001
JADE Economizer	C7400S1000	S-bus Temperature & Humidity	-40° to 150° F (-40° to 66° C)	N/A	Duct - Temp Sensor	Outdoor, return, discharge air sensor, may be used with duct mounting kit 50053060-001
Spyder	C7400S1010	S-bus Temperature & Humidity	-40° to 150° F (-40° to 66° C)	N/A	Duct - Temp Sensor	Outdoor, return, discharge air sensor, may be used with duct mounting kit 50053060-001
JADE Economizer and Spyder	C7250A1001	20K NTC	-40° to 150° F (-40° to 66° C)	N/A	Duct - Temp Sensor	Outdoor, mixed dry bulb sensor, may be used with duct mounting kit 50053060-001

Product Selection - Sensors

General Temperature Sensors



General Temperature Sensors

	Part Number	Sensing Element	Resistance	Operating Range	Mounting and Application
Wall Mount	C7130B1009	PT1000	1,097 Ohms PTC at 77°F	-40° to 100° F	Wall mount
Water	C7021D2001	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	5" w/ wiring enclosure, use well 50001774-001
Water	C7023D2001	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	5" w/ wiring enclosure, use well 50001774-001
Water	C7031D2003	PT1000	1097 ohms PTC at 77°F	-40° to 350° F	5" w/ wiring enclosure, includes well 50001774-001
Water	C7041D2001	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	5" w/ wiring enclosure, use well 50001774-001
Outdoor	C7021F2009	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 158° F	Outdoor weatherproof, connects to 1/2" conduit
Outdoor	C7023F2009	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 158° F	Outdoor weatherproof, connects to 1/2" conduit
Outdoor	C7031G2014	PT3000	3484 ohms at 77°F	-40° to 120° F	Outdoor weatherproof, connects to 1/2" conduit
Outdoor	C7041F2006	20K ohms NTC	20K ohms NTC at 77°F	-40° to 158° F	Outdoor weatherproof, connects to 1/2" conduit
Duct Mount	C7021J2007	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	12' duct averaging w/ wiring enclosure
Duct Mount	C7021R2000	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	12' duct averaging flexible copper
Duct Mount	C7021R2018	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	24' duct averaging flexible copper
Duct Mount	C7031J2009	PT1000	1097 ohms PTC at 77°F	40° to 180° F	12' duct averaging flexible copper
Duct Mount	C7041J2007	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	12 ft. Duct (Averaging) w/ wiring enclosure
Duct Mount	C7041R2000	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	12 ft. Duct flexible copper (Averaging)
Duct Mount	C7041R2018	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	24 ft. Duct flexible copper (Averaging)
Duct Mount	C7021B2005	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	6" duct w/ wiring enclosure
Duct Mount	C7021B2013	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	12" duct w/ wiring enclosure
Duct Mount	C7021C2003	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	18" duct w/wiring enclosure
Duct Mount	C7023B2005	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	6" duct w/ wiring enclosure
Duct Mount	C7023B2013	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	12" duct w/ wiring enclosure
Duct Mount	C7023C2003	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	18" duct w/ wiring enclosure
Duct Mount	C7031B2005	PT1000	1097K ohms NTC at 77°F	-40° to 250° F	6" duct w/wiring enclosure
Duct Mount	C7041B2005	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	6" duct w/ wiring enclosure
Duct Mount	C7041B2013	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	12" duct w/ wiring enclosure
Duct Mount	C7041C2003	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	18" duct w/ wiring enclosure
Water	C7021K2005	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	Strap-on pipe sensor with wiring enclosure
Water	C7023K2005	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	Strap-on pipe sensor with wiring enclosure
Water	C7041K2005	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	Strap-on with wiring enclosure
Water/Air	C7021N2001	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	Probe Sensor with 6' Lead
Water/Air	C7023N2001	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	Probe Sensor with 6' Lead
Water/Air	C7041N2020	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	Probe Sensor with 6' Lead
Wall Mount	C7021P2004	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	Small metal button sensor
Wall Mount	C7023P2004	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	Small metal button sensor
Wall Mount	C7041P2004	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	Small metal button sensor

Product Selection - Sensors

Current Sensors, Transmitters, Switches and Relays

Current Switches



Model #	Trip Point Type	Normally (Open/Closed)	Core (Solid/Split)	Amp Range	Trip Point	Contact Rating
CS-O-A	Adjustable	Open	Solid	0 to 250 A	0.5 to 220 A	0.2 A @ 200 VAC/VDC
CP-O-A		Open	Split		1.5 to 220 A	
CP-O-AL		Open	Split		0.6 to 180 A	
CP-C-A		Closed	Split		1.5 to 220 A	
CS-O-F	Fixed	Open	Solid	0 to 200 A	0.25 A or less	
CS-C-F		Closed	Solid		0.25 A or less	
CP-O-F		Open	Split		1.5 A or less	
CP-O-FL		Open	Split		0.5 A or less	
CP-C-F		Closed	Split		1.5 A or less	

Current Transmitters



Model #	Selectable Ranges	Measurement	AC Waveform	Core (Solid/Split)	Output Signal
CTS-A-250	0 to 100/200/250A	Average	Pure Sinusoidal	Solid	4 to 20 mA
CTP-A-200	0 to 100/150/200A	Average	Pure Sinusoidal	Split	4 to 20 mA
CTP-A-50-RMS	0 to 10/20/50A	True RMS	Distorted & Pure Sinusoidal	Split	4 to 20 mA
CTS-V-50	0 to 10/20/50A	Average	Pure Sinusoidal	Solid	0 to 5 VDC
CTP-V-50	0 to 10/20/50A	Average	Pure Sinusoidal	Split	0 to 10 VDC
CTS-V-150	0 to 50/100/150A	Average	Pure Sinusoidal	Solid	0 to 10 VDC
CTP-V-150	0 to 50/100/150A	Average	Pure Sinusoidal	Split	0 to 10 VDC



Mini Current Switches

Part Number	Description	Core Type	Normally Open or Normally Closed	Trip Point	Amperage Rating	Output Rating	LEDs
MCSS-F	"Go/No Go" Fixed Mini Current Switch	Solid	N/O	0.20 A	0.20 to 150 Amps	"0.5A Continuous, 36 Vac/Vdc"	Red LED - Above Trip Point, Blue LED - Under Trip Point
MCSP-F	"Go/No Go" Fixed Mini Current Switch	Split	N/O	0.55 A	0.55 to 150 Amps	"0.5A Continuous, 36 Vac/Vdc"	Red LED - Above Trip Point, Blue LED - Under Trip Point
MCSS-A	Adjustable Mini Current Switch	Solid	N/O	0.32-150 Amps	0.32 to 150 Amps continuous	"1A Continuous 36 Vac/Vdc"	N/A
MCSP-A	Adjustable Mini Current Switch	Split	N/O	0.70-150 Amps	0.70 to 150 Amps continuous	"1A Continuous 36 Vac/Vdc"	N/A

Command Relays



Part Number	Description	Coil Voltage	Contact Ratings (All SPDT)	Status LED
CR-DC-5A	5 Amp SPDT Relay	23-31.2Vdc, 15mA@24Vdc	5A (NO)/2A(NC) @ 250Vac, 5A(NO)/3A(NC) @ 125Vac	Yes
CR-DC-12A	12 Amp SPDT Relay	20-31.2Vdc, 16mA@24Vdc	12A @ 250Vac, 12A @ 30Vdc	Yes
CR-12DC-12A	12 Amp SPDT Relay	10-15.6Vdc, 30mA@12Vdc	12A @ 250Vac, 12A @ 30Vdc	Yes
CR-24AC-10A	10 Amp SPDT Relay	16-26.4Vac, 28mA@24Vac	10A @ 250Vac, 10A @ 24Vdc	Yes
CR-115AC-8A	8 Amp SPDT Relay	80-132Vac, 10mA@115Vac	8A @ 250Vac, 8A @ 30Vdc	Yes
CR-230AC-8A	8 Amp SPDT Relay	165-264Vac, 5mA@230Vac	8A @ 250Vac, 8A @ 30Vdc	Yes

Product Selection - Sensors

Humidity and Dew Point Sensors



Electronic Humidity Sensors

Part Number	Output Signal	RH Accuracy	Mounting & Application	Voltage Supply	Temp Sensor	Use With	Insertion Length
H7625A2010	Selectable 4-20mA, 0-10Vdc, or 0-5Vdc	± 2% from 20-95% RH	Wall	18-40 VDC / 18-28 VAC	20K ohm at 77° F	T7350, H775, XL50, XFC, W750B/C, W7753, W7760A/C, W7761	N/A
H7625B2006	Selectable 4-20mA, 0-10Vdc, or 0-5Vdc	± 2% from 20-95% RH	Duct	18-40 VDC / 18-28 VAC	20K ohm at 77° F	T7350, H775, XL50, XFC, W750B/C, W7753, W7760A/C, W7761	7.5" - "B" model only
H7626A2020	Selectable 4-20mA, 0-10Vdc, or 0-5Vdc	± 2% from 20-95% RH	Wall	18-40 VDC / 18-28 VAC	1097 ohm at 77°F	Excel 15, Excel 10, T7350, T775 Series 2000	N/A
H7626B2024	Selectable 4-20mA, 0-10Vdc, or 0-5Vdc	± 2% from 20-95% RH	Duct	18-40 VDC / 18-28 VAC	1097 ohm at 77°F	Excel 15, Excel 10, T7350, T775 Series 2000	7.5" - "B" model only
H7635A2012	Selectable 4-20mA, 0-10Vdc, or 0-5Vdc	± 3% from 20-95% RH	Wall	18-40 VDC / 18-28 VAC	20K ohm at 77° F	T7350, H775, XL50, XFC, W750B/C, W7753, W7760A/C, W7761	N/A
H7635B2018	Selectable 4-20mA, 0-10Vdc, or 0-5Vdc	± 3% from 20-95% RH	Duct	18-40 VDC / 18-28 VAC	20K ohm at 77° F	T7350, H775, XL50, XFC, W750B/C, W7753, W7760A/C, W7761	7.5" - "B" model only
H7635C2015	Selectable 4-20mA, 0-10Vdc, or 0-5Vdc	± 3% from 20-95% RH	Outdoor	18-40 VDC / 18-28 VAC	20K ohm at 77° F	T7350, H775, XL50, XFC, W750B/C, W7753, W7760A/C, W7761	
H7636A2022	Selectable 4-20mA, 0-10Vdc, or 0-5Vdc	± 3% from 20-95% RH	Wall	18-40 VDC / 18-28 VAC	1097 ohm at 77°F	Excel 15, Excel 10, T7350, T775 Series 2000	N/A
H7636B2026	Selectable 4-20mA, 0-10Vdc, or 0-5Vdc	± 3% from 20-95% RH	Duct	18-40 VDC / 18-28 VAC	1097 ohm at 77°F	Excel 15, Excel 10, T7350, T775 Series 2000	7.5" - "B" model only
H7656B2029	Selectable 4-20mA, 0-10Vdc, or 0-5Vdc	± 5% from 25-95% RH	Duct	18-40 VDC / 18-28 VAC	1097 ohm at 77°F	Excel 15, Excel 10, T7350, T775 Series 2000	N/A
H7655A1001	0-10 Vdc	5%	Wall	16-40 VDC / 16-30 VAC	None	Any controller that accepts 0-10 Vdc input	N/A
H7655B2014	Selectable 4-20mA, 0-10Vdc, or 0-5 Vdc	5%	Duct	18-40 VDC/18-28 VAC	20K ohm at 77° F	T7350, H775, XL50, XFC, W750B/C, W7753, W7760A/C, W7761	N/A
C7600A2008	4-20 mA	5% between 30-70% RH	Anywhere where it is exposed to freely circulating air	N/A	None	W7600 or controller requiring 4-20 mA reverse acting input	N/A
C7600B2008	2-10 Vdc	± 5 between 30-70% RH ± 7 between 10-90% RH	Wall	16-40 VDC / 16-30 VAC	None	H775 that accepts 2-10 Vdc output	N/A
C7600C2001	4-20 mA	5% between 30-70% RH	Anywhere where it is exposed to freely circulating air	N/A	None	W7600 or controller requiring 4-20 mA reverse acting input	N/A



Dew Point Sensors

Part Number	Output	Switch	Hysteresis
HSS-DPS	Potential-free relay with changeover contact	RH>90% ± 3% contact open; RH < 90% ± 3% closed	5% RH

Product Selection - Sensors

CO2 Sensors, Pressure Sensors and Transducers

Carbon Dioxide Sensors



Part Number	Output Signal	20K ohms Temp sensor	Display Screen	Honeywell Logo	Mounting	CO2 Range (accuracy)
C7232A1008	0/2 to 10 Vdc or 0/4 to 20 mA w/ one adjustable SPST relay output	No	Yes	Yes	Wall	0 to 2,000 ppm adjustable, +/- 30 ppm +/- 2% of reading at normal temperature and pressure
C7232A1016	0/2 to 10 Vdc or 0/4 to 20 mA w/ one adjustable SPST relay output	No	No	Yes	Wall	0 to 2,000 ppm adjustable, +/- 30 ppm +/- 2% of reading at normal temperature and pressure
C7232A1024	0/2 to 10 Vdc or 0/4 to 20 mA w/ one adjustable SPST relay output	No	Yes	No	Wall	0 to 2,000 ppm adjustable, +/- 30 ppm +/- 2% of reading at normal temperature and pressure
C7232A1032	0/2 to 10 Vdc or 0/4 to 20 mA w/ one adjustable SPST relay output	No	No	No	Wall	0 to 2,000 ppm adjustable, +/- 30 ppm +/- 2% of reading at normal temperature and pressure
C7232B1006	0/2 to 10 Vdc or 0/4 to 20 mA w/ one adjustable SPST relay output	No	Yes	Yes	Duct (8" insertion length)	0 to 2,000 ppm adjustable, +/- 30 ppm +/- 2% of reading at normal temperature and pressure
C7232B1014	0/2 to 10 Vdc or 0/4 to 20 mA w/ one adjustable SPST relay output	No	No	Yes	Duct (8" insertion length)	0 to 2,000 ppm adjustable, +/- 30 ppm +/- 2% of reading at normal temperature and pressure
C7232B1022	0/2 to 10 Vdc or 0/4 to 20 mA w/ one adjustable SPST relay output	No	Yes	No	Duct (8" insertion length)	0 to 2,000 ppm adjustable, +/- 30 ppm +/- 2% of reading at normal temperature and pressure
C7232B1030	0/2 to 10 Vdc or 0/4 to 20 mA w/ one adjustable SPST relay output	No	No	No	Duct (8" insertion length)	0 to 2,000 ppm adjustable, +/- 30 ppm +/- 2% of reading at normal temperature and pressure
C7262A1008	0/2 to 10 Vdc or 0/4 to 20 mA w/ one adjustable SPST relay output	Yes	Yes	Yes	TR20 Series Style Wall	0 to 2,000 ppm adjustable, +/- 30 ppm +/- 3% of reading from 59°F - 85°F (15°C - 30°C)
C7262A1016	0/2 to 10 Vdc or 0/4 to 20 mA w/ one adjustable SPST relay output	Yes	No	Yes	TR20 Series Style Wall	0 to 2,000 ppm adjustable, +/- 30 ppm +/- 3% of reading from 59°F - 85°F (15°C - 30°C)
C7632A1004	0-10 Vdc (fixed)	No	No	Yes	Wall	0 to 2,000 ppm fixed
C7632B1002	0-10 Vdc (fixed)	No	No	Yes	Duct	0 to 2,000 ppm fixed

P7650 Differential Pressure Transducers



Model	Mounting	Selectable w.c. Pressure Range, Uni or Bi-Directional	Velocity Mode	Display	Output	Supply Voltage
P7650A1000	Panel	+/-0-1", 0-.25", 0-.5", 0-1" w.c. or +/-25, 50, 100, 250 Pa Selectable	500/1,000/2,000/3,000 FPM 2.5/5/10/15MS	Yes	0-10Vdc, 0-5Vdc, and 4-20mA Selectable	12-30Vdc or 24Vac
P7650A1018				No		
P7650A1026		+/-0-1", 0-2", 0-5", 0-10" or +/-0.250, 0.500, 1.00, 2.50 kPa Selectable	3,000/4,000/5,000/6,000 FPM 15/20/25/30MS	Yes		
P7650A1034				No		
P7650B1008	Duct	+/-0-1", 0-.25", 0-.5", 0-1" w.c. or +/-25, 50, 100, 250 Pa Selectable	500/1,000/2,000/3,000 FPM 2.5/5/10/15MS	Yes		
P7650B1016				No		
P7650B1024		+/-0-1", 0-2", 0-5", 0-10" or +/-0.250, 0.500, 1.00, 2.50 kPa Selectable	3,000/4,000/5,000/6,000 FPM 15/20/25/30MS	Yes		
P7650B1032				No		
P7650U1040	Universal	+/-0-1", 0-.25", 0-.5", 0-1", 0-2", 0-5", 0-10" in. w.c. or +/-0.25, 0.5, 1.0, 2.5 kPa; or +/-25, 50, 100, 250 Pa Selectable	500/1,000/2,000/3,000/4,000/5,000/6,000/7,000 FPM 2.5/5/10/15/20/25/30/35 MS	No		
P7650U1052				Yes		

P7635 Differential Air Pressure Sensors



Model	Pressure Range	Range	Accuracy	Output	Supply Voltage
P7635D01M	0 to 0.1 in wc	Uni	0.5	4-20mA	+16-36 VDC (250 Ohm Load) +21-36 VDC (500 Ohm Load)
P7635D025M	0 to 0.25 in wc	Uni	0.5		
P7635D05M	0 to 0.5 in wc	Uni	0.5		
P7635D1M	0 to 1 in wc	Uni	0.5		
P7635D2M	0 to 2 in wc	Uni	0.5		
P7635D5M	0 to 5 in wc	Uni	0.5		
P7635D10M	0 to 10 in wc	Uni	0.5		
P7635B01M	-0.1 to 0.1 in wc	bi	0.5		
P7635B025M	-0.25 to 0.25 in wc	bi	0.5		
P7635B05M	-0.5 to 0.5 in wc	bi	0.5		
P7635B1M	-1 to 1 in wc	bi	0.5		
P7635D2V	0 to 2 in wc	Uni	0.5	0-10Vdc	

PWT Series Wet Differential Pressure Transducers



Model	Selectable Pressure Range	Output	Supply Voltage
PWT50	0-5, 0-10, 0-25, 0-50 psid	0-10Vdc, 0-5Vdc, and 4-20mA selectable	12-30Vdc or 24Vac
PWT100	0-10, 0-20, 0-50, 0-100 psid	0-10Vdc, 0-5Vdc, and 4-20mA selectable	12-30Vdc or 24Vac
PWT250	0-25, 0-50, 0-125, 0-250 psid	0-10Vdc, 0-5Vdc, and 4-20mA selectable	12-30Vdc or 24Vac

MLH Gauge Pressure Sensors



Model	Pressure Range	Pressure Connection	Output	Excitation
MLH050PSCDJ1235	0-50 psig	1/4" -18 NPT	4-20mA	9.5 Vdc to 30 Vdc
MLH150PSCDJ1236	0-150 psig	1/4" -18 NPT	4-20mA	9.5 Vdc to 30 Vdc
MLH300PSCDJ1237	0-300 psig	1/4" -18 NPT	4-20mA	9.5 Vdc to 30 Vdc
MLH500PSCDJ1240	0-500 psig	1/4" SAE Female Schrader	4-20mA	9.5 Vdc to 30 Vdc
MLH01KPSCDJ1241	0-1000 psig	1/4" SAE Female Schrader	4-20mA	9.5 Vdc to 30 Vdc

Submittal Data - Sensors

Spyder Sylk Sensors, TR70 Series



The TR71 and TR75 are two-wire, polarity insensitive, Sylk bus communicating wall modules, which communicate with Spyder® and some ComfortPoint™ programmable controllers.

All models have a space-temperature sensor, network bus jack and an LCD panel with three softkeys and two Up/Down adjustment keys. The TR71-H and TR75-H models include an onboard humidity sensor.

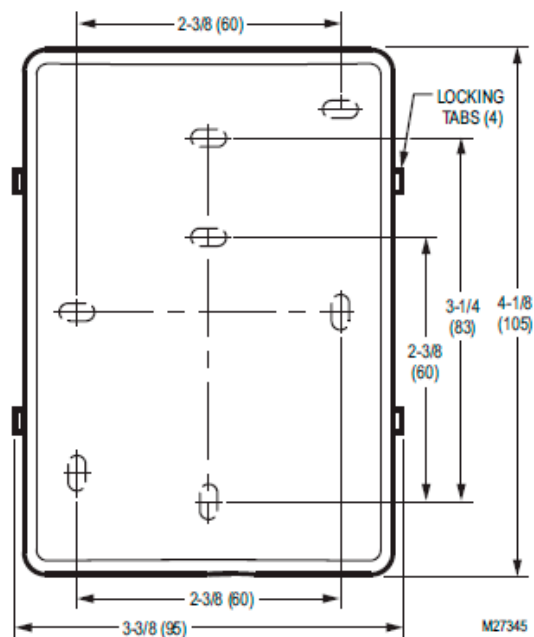
SPECIFICATIONS

Compatibility.....	Full feature set, including scheduling and password protection requires the latest Spyder firmware (field upgradeable with Spyder Flash Tool), Spyder Tool version greater than 5.18, and WEBs-AX Workbench version 3.4.57 or greater.
Construction	Two-piece construction, cover and internally wired subbase. Field wiring, 18 to 24 AWG (0.82 to 0.20 sq. mm), connects to a terminal block in the subbase.
Mounting Options.....	The LCD wall modules can be mounted on a standard two by four inch junction box or on a 60 mm diameter junction box. The modules may be mounted up to 200 ft. (61 m) from the programmable controller. Twisted pair wiring is recommended for distances longer than 100 ft. (30.5 m).
Environmental Ratings.....	Operating Temperature: 30 °F to 110 °F (-1 °C to 43 °C) Shipping Temperature: -40 °F to 150 °F (-40 °C to 65.5 °C) Relative Humidity: 5% to 95% non-condensing
Temperature Setpoint Range.....	Default range is 55 °F to 85 °F (10 °C to 35 °C); configurable for other ranges.
Temperature Sensor Accuracy.....	±0.36 °F at 77 °F (±0.2 °C at 25 °C)
Humidity Sensor Accuracy.....	±5% RH from 20% to 80% RH (TR71-H/TR75-H only)
Power.....	18 Vdc power is supplied to the wall module from the two-wire S-BUS connection to the programmable controller.
Accessories.....	50007298-001 (pack of 12) medium, cover plate; 6-7/8 x 5 in. (175 x 127 mm).
Approvals	CE; UL94-HB plastic enclosure; FCC Part 15, Class B

FEATURES

- Ability to control tenant access to controller parameters via password protection
- Ability to assign labels for enumerated values
- Customized parameter access, by using the Honeywell WEBs-AX Workbench tool
- Ability to link setpoint limits to a network variable
- Programmable for: Home screen options, tenant access, contractor access, optional password protection to contractor mode, access to controller parameters, setpoint, override, fan and other parameters
- Ability to access and adjust most parameters in the programmable controller.
- TR75 can access and adjust the controller schedule
- Ability to balance the VAV system from the wall module
- Home screen can display one to three of any of the following parameters: Temperature Setpoint, Room Temperature, Room Humidity, Outdoor Humidity, Outdoor Temperature and Time, or one of virtually any parameter in the controller
- The TR75 has more than twice the memory capacity for parameters as the TR71
- Network bus jack
- Simple two-wire terminal connection to the programmable controller (includes power) and an optional two-wire terminal connection for the network. All connections are polarity insensitive
- Permanent retention of user configuration, including setpoints after a power outage

DIMENSIONS DIAGRAM





The TR40 and TR42 are two-wire, non-polarity sensitive, Sylk communicating wall modules, which communicate with Spyder® programmable controllers.

The TR40 and TR42 are simple temperature wall modules with basic setpoint, override and fan options; designed for a broad range of applications.

SPECIFICATIONS

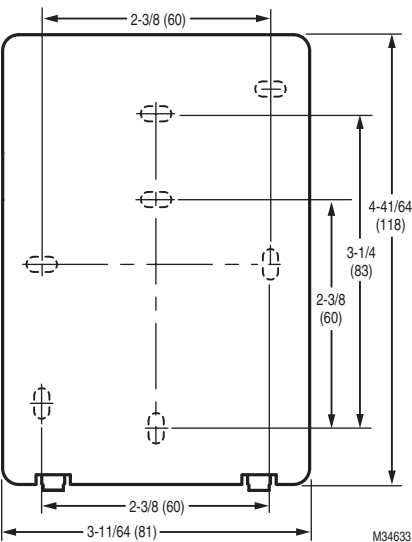
Environmental Ratings.....	Operating Temperature: 32 °F to 122 °F (0 °C to 50 °C) Shipping Temperature: -40 °F to 150 °F (-40 °C to 65.5 °C) Relative Humidity: 5% to 95% non-condensing
Accessories.....	50007298-001 (pack of 12) medium, cover plate; 6-7/8 x 5 in. (175 x 127 mm).
Approvals	CE; UL94-V0 plastic enclosure; FCC Part 15, Class B
Accuracy	Temperature: ± 0.2 °C at 25 °C (± 0.36°F at 77°F) Humidity: +/-3% RH from 20-80%RH CO2: +/- (30ppm +3% of measured value). Calibrated at the factory. Uses automatic background calibration. No calibration required for the life of the product. Meets CEC Title 24 requirement of +/-75ppm accuracy at 600ppm and 1000ppm ambient levels. For proper CO2 operation, install only in spaces that see at least 4 hours of continuous unoccupied time per week.

FEATURES

The TR40 and TR42 wall modules include:

- Two-wire, polarity insensitive Sylk provides both power and communication to the device.
 - Models available with display (TR42) or without display (TR40).
 - Models available with or without built-in humidity or CO2 sensors.
- All TR42 display wall modules include:**
- Fan speed options: Auto-On, Auto-Off-On, Auto-Off-Low-Med-High (configurable in the Niagara tool)
 - Override option (configurable in the Niagara tool)
 - Ability for tenant to change between °F and °C
 - Ability to provide tenant either a relative "warmer cooler" setpoint adjustment or absolute temperature setpoint adjustment
 - An installer mode with optional password protection that allows:
 - Switching between °F and °C
 - Temperature calibration
 - Humidity calibration
 - Numerical or Graphical setpoint adjustment
 - Adjustment of the Setpoint Range Limits
 - Adjustment of override time (Choose Network Time or 1-24 hours)
 - Choosing the sensor or setpoint value to be shown in the Home Screen, or choose to scroll through sensor and setpoint values.
 - Choosing between English and International icon display.

DIMENSIONS DIAGRAM



Submittal Data - Sensors

Wireless Sensors and Receivers



The WRECVR receiver and TR21-WS, TR23-WS, TR21-WK, and TR23-WK are a family of wireless wall modules and receiver for use with:

- Spyder Unitary Controllers: PUL, PVL, etc.
- Excel 10 W7750, W7751, W7752 and W7753 controllers
- T7350, T7351 and TB8575 low-voltage SuitePRO™ thermostats
- Will not work with TB7220, TB8220 or TB line voltage thermostats, XL15s, W7762, W7763 or certain other XL controllers
- Will work with WEBs-AX™ I/O Module products if using a separate transformer
- Compatibility with various other non-Honeywell controllers that accept 10K type2 NTC temperature inputs

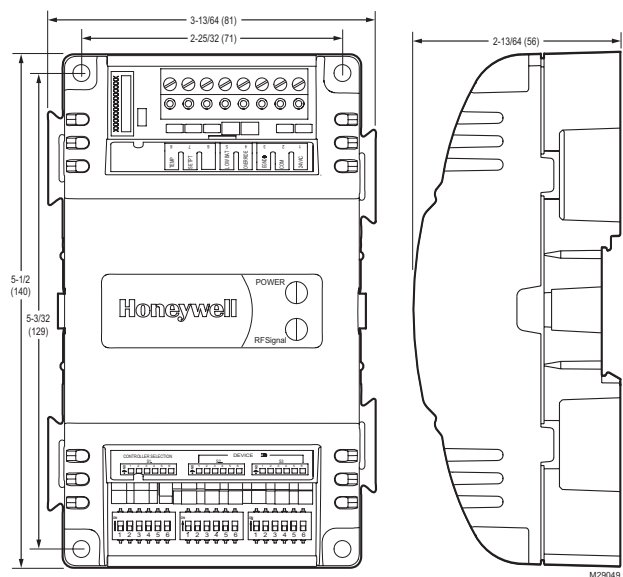
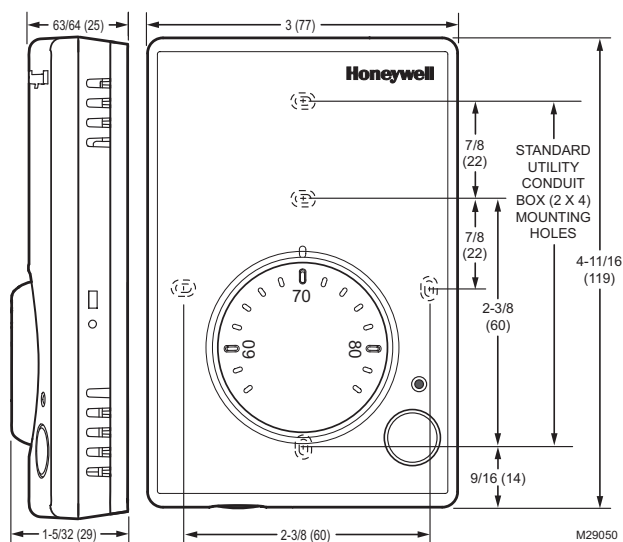
SPECIFICATIONS

Models.....	For specific model information, see Specification Data, form 63-1332.
Environmental Ratings.....	Wall Module Operating Temperature: 45° to 99 °F (7° to 37 °C). Receiver Operating Temperature: -40° to 150 °F (-40° to 65.5 °C). Storage Temperature: -40° to 150 °F (-40° to 65.5 °C). Operating Humidity: 5% to 95% RH (non-condensing)
Accuracy	+/- 1°F (+/- 0.5°C) across 12 °C to 30°C
Setpoint Range for TR23	56° to 84 °F (13° to 29 °C)
Accessories.....	50007298-001 (pack of 12) medium, cover plate; 6-7/8 x 5 in. (175 x 127 mm).
Power	Receiver Voltage: 20 – 30VAC/DC, 50/60Hz; 24VAC typical
Housing	Wall Module: UL94-HB Receiver: UL94-5VA
Radio Frequency	2.4 GHz (IEEE Std 802.15.4-2003 compliant) Open Range: 3000 feet Typical Range: 100 feet Output power: 16dBm Receiver power consumption: <1.5 VA@24VAC

FEATURES

- Wall module to Receiver (point to point) wireless kits can replace any standard wired sensor
- Wireless Kits (wall module and receiver) are pre-bound at the factory for quick installation
- Signal Strength LED built into the wall module
- Low battery indication
- Optional dip switches available to bind any wall module to any receiver
- Approximate 5-year battery life with AA Alkaline (included), 7.5 years with Lithium
- Locking screw discourages tampering and battery theft

DIMENSIONS DIAGRAM





- The TR21, TR22, TR23 and TR24 are a family of direct-wired wall modules for use with:
- Spyder Unitary Controllers: PUL, PVL
 - Excel 10 W7750, W7751a, W7752, and W7753 controllers
 - Honeywell Excel 800, 600, 500, 100, and 80 (all fully programmable) controllers
 - W7761 Controller
 - ComfortPoint LON Controllers: CP-UL, CP-VL
 - All models have a space temperature

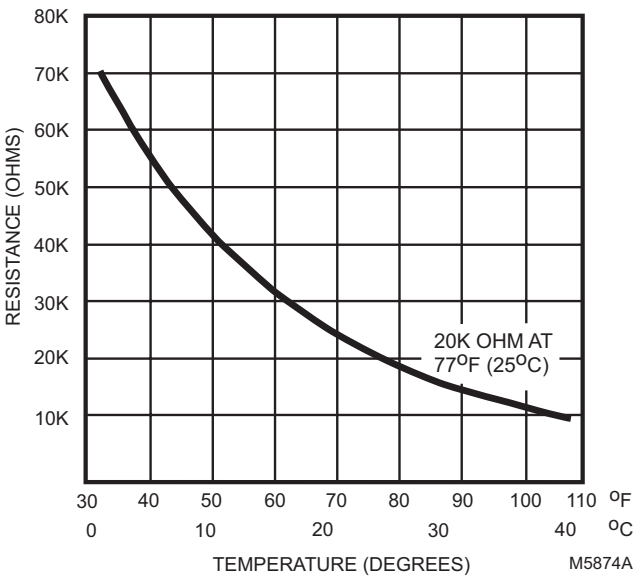
sensor. Some models have a temperature dial, setpoint adjustment, LONWORKS bus jack, override (bypass) with LED, and fan switch.

SPECIFICATIONS

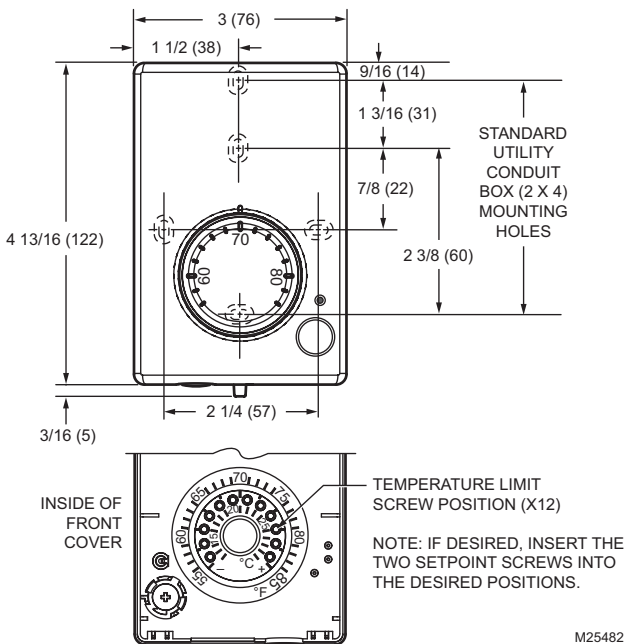
Models.....	For specific model information, see TR21, TR22, TR23, and TR24 Wall Modules – Specification Data, form 63-1321.
Environmental Ratings.....	Operating Temperature: 45° to 99° F (7° to 37° C). Shipping Temperature: -40° to 150° F (-40° to 65.5° C).
Accessories.....	50007298-001 (pack of 12) medium, cover plate; 6-7/8 x 5 in. (175 x 127 mm).
Approvals	CE; UL94 plastic enclosure; FCC Part 15, Class B
Sensor	All models are furnished with a 20K Ohm nonlinear NTC temperature sensor that follows a specific temperature resistance curve. NOTE: The TR21-A wall module model has two (2) 20K Ohm nonlinear NTC temperature sensors in parallel, which provide 10K NTC temperature sensing necessary for averaging.

FEATURES

- Models with setpoint adjustment.
- Models with humidity output.
- Models with occupied/unoccupied override (bypass) with LED.
- Models with three-position (auto/0/1) or 5-position (auto/0/1/2/3 speed) fan switch.
- LONWORKS® bus jack on all models except the TR21 and TR21-A models.
- Locking cover on all models.
- Operating range 45° to 99° F (7° to 37° C).
- Models (TR22 and TR23) with user-selectable temperature setpoint dials in Fahrenheit, Celsius and Relative (- to +).



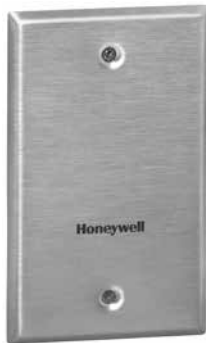
DIMENSIONS DIAGRAM



M25482

Submittal Data - Sensors

C7772A Series Wallplate Sensors



The C7772A series of Wallplate Temperature Sensors are designed to be used with the Excel 5000 family and other Honeywell controllers. The C7772F Series is designed to be used with the TB7600, TB7300 and TB7200 Series communicating thermostats and other controllers that require a 10K ohm NTC Type II sensor. The C7772G is designed to be used with WEBs-AX I/O modules and other controllers that require a 10K ohm NTC Type III sensor. The C7772 sensors provide a resistive output signal proportional to sensed room or space temperature. The C7772 is well

suited for low-profile wall-mounted applications where durability and tamper-proof construction is desired, such as schools, prisons and institutions.

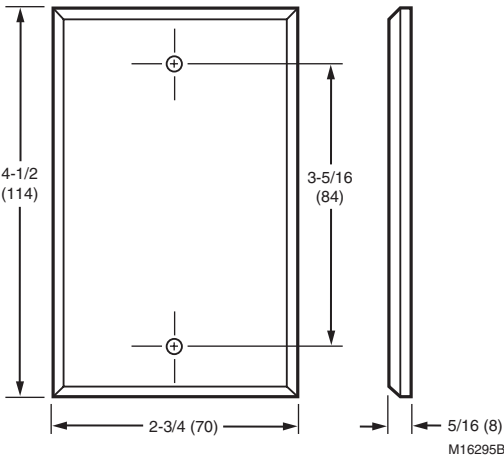
SPECIFICATIONS

Temperature Ratings	Operating: 45 °F to 99 °F (7 °C to 37 °C). Shipping: -40 °F to 150 °F (-40 °C to 65 °C).
Long-term temperature sensor drift (for 20K ohm sensors only)	Maximum sensor drift is nominally +/-0.13 °F after 5 years of operation, no appreciable drift thereafter. No calibration of the device is possible. Long term drift calibration/maintenance through controller software is typically not necessary.
Humidity Ratings	5 to 95% rh, non-condensing.
Sensor	C7772A furnished with a 20K non-linear NTC thermister, C7772F with a 10K non-linear NTC type II thermister, and C7772G with a 10K non-linear NTC type III thermister.
Approvals	National Electrical Code (NEC) Class II

FEATURES

- Low profile when mounted on industry standard utility conduit box.
- Rugged, brushed stainless steel wallplate.
- Integral foam pad isolates wallplate sensor from conduit box.
- Insulated screw terminals ensure reliable field wiring connection.
- Models available with a variety of resistive temperature sensor elements.

DIMENSIONS DIAGRAM



C7772 SENSOR RESISTANCE

	Typical Resistance (in ohms)	Typical Resistance (in ohms)	Typical Resistance (in ohms)
	C7772A	C7772F	C7772G
At 41°F (5°C)	54,200	25,392	23,467
At 50°F (10°C)	41,758	19,901	18,789
At 59°F (15°C)	32,427	15,712	15,137
At 68°F (20°C)	25,370	12,493	12,268
At 77°F (25°C)	20,000	10,000	10,000
At 86°F (30°C)	15,856	8,057	8,196
At 95°F (35°C)	12,654	6,531	6,754

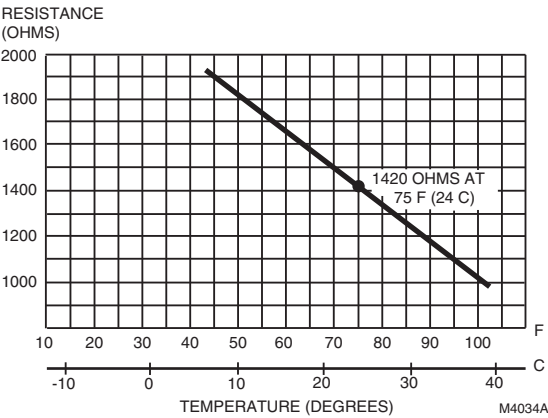


The T7047C and T7047G Electronic Thermostats and Remote Space Sensors are used in Series 70 Control Systems to provide modulating space temperature control.

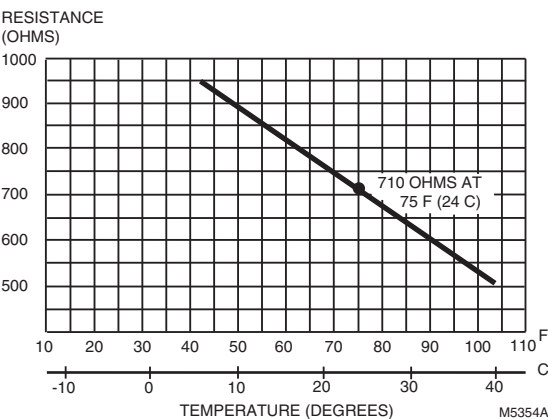
SPECIFICATIONS

Models.....	T7047C: 2-wire remote sensor for use with control systems such as the T7100, T7300, W927, W960 and W973. T7047G: 2-wire remote sensor without internal adjustment means, requires remote setpoint device such as T7100, T7300, S963B, 7067B or T7080B.
Temperature Sensor	Thermistor-resistor element.
Sensor Resistance.....	For the following negative temperature coefficient (NTC) devices, resistance decreases as temperature increases T7047C: 1420 ohms nominal at 75°F (24°C); resistance changes 15 ohms for each 1°F (0.6°C) temperature change. T7047G: 710 ohms nominal at 75°F (24°C); resistance changes 7.5 ohms for each 1°F (0.6°C) temperature change.
Mounting.....	Mounts on wall or 2 x 4 in. vertical outlet box with screws provided.

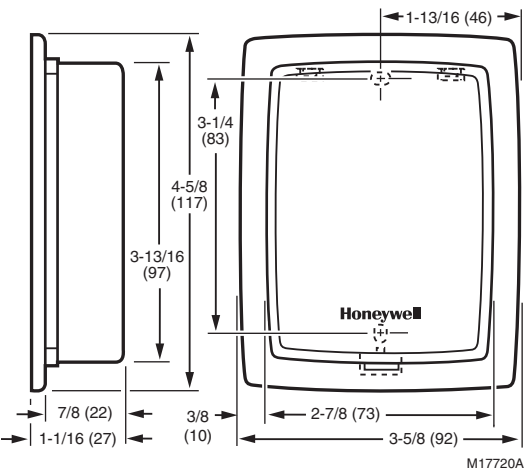
T7047C



T7047G



DIMENSIONS DIAGRAM



Submittal Data - Sensors

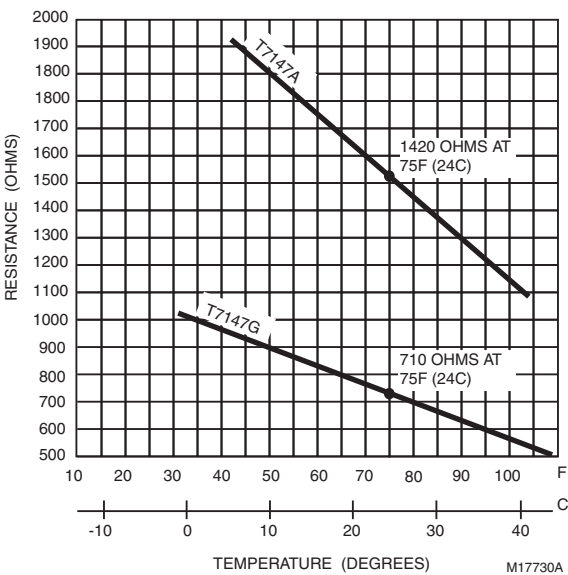
T7300 Sensors



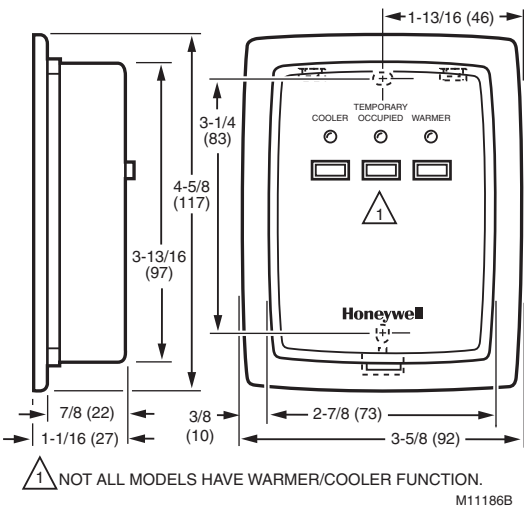
The T7147A and T7147G Remote Space Sensors and Override Modules are used with T7300/Q7300 Thermostat/ Subbase to provide space temperature control, switch initiation and override indication from a remote location.

SPECIFICATIONS

Temperature Sensor	Thermistor-resistor (NTC) element.
Sensor Resistance.....	Resistance decreases as temperature increases
	T7147A: 1420 ohms nominal at 75 °F (24 °C); resistance changes 15 ohms for each 1 °F (0.6 °C) temperature change.
	T7147G: 710 ohms nominal at 75 °F (24 °C); resistance changes 7.5 ohms for each 1 °F (0.6 °C) temperature change.
Mounting.....	Mounts on wall or 2 x 4 in. vertical outlet box with screws provided.



DIMENSIONS DIAGRAM





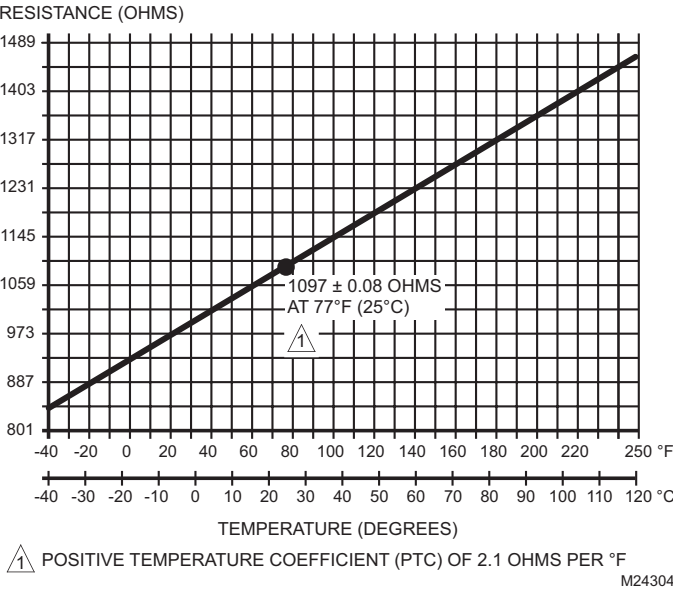
- Used with T775 Series 2000 Electronic Controllers
 - Some typical applications for the 50021579-001 and T775-SENS-WT/-WR sensors include:
 - Monitoring return air temperatures
 - Monitoring discharge air temperatures
 - Monitoring mixed air temperatures
- Use the T775-SENS-OAT to measure outside air temperature.

FEATURES

- Fast response time and highly accurate
- 1/2 in. (6.35 mm) stainless steel probe with a thermally conductive epoxy
- All sensors are 1,097 Ohms PTC at 77°F (25°C)
- The 50021579-001 is a standard temperature sensor for indoor applications
- The T775-SENS-WR is a water resistant sensor with 5 ft leads
- The T775-SENS-WT is a water tight sensor with 6 ft leads
- The T775-SENS-OAT is for sensing outdoor air temperature and is housed in a weatherproof case for outdoor use (knockouts allow for 1/2 in. conduit connection)
- Two-year warranty

SPECIFICATIONS

Operating temperature range	50021571-001: -40 F to 350 F (-40C to 177C) Short term spikes to 392F (200C) okay. T775-SENS-WR and T775-SENS-WT: -40F to 270F (-40C to 132C) T775-SENS-OAT: -40F to 158F (-40C to 70C)
Accuracy	Meets DIN-IEC-751 Class A standards for overall accuracy of +/- 0.06% at 32°F (0°C)
Self Heating Coefficient.....	4 mW/C (Measured in air with velocity of 1m/sec.)
Response Time.....	Air (Velocity = 1 m/s) = 15 sec. max.
Temperature Coefficient	3,850 ppm/C
Environmental Compliance	RoHS-Directive 2002/95/EC
Applied Current	1.0 mA Max.
Sensor Output	1 K Ohms at 32 F (0 C)
Approvals	RoHS: Compliant



Wiring Diagrams - Sensors

T775 Sensors

DIMENSIONS DIAGRAM

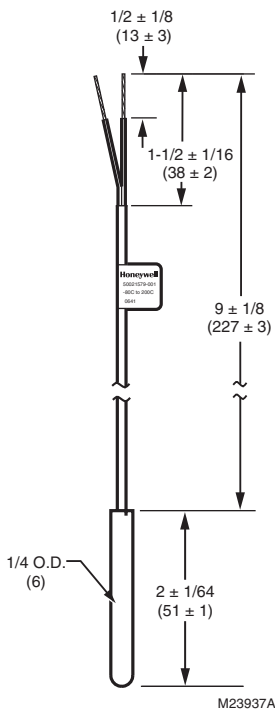


Fig. 1. 50021579-001 Dimensions in Inches (mm).

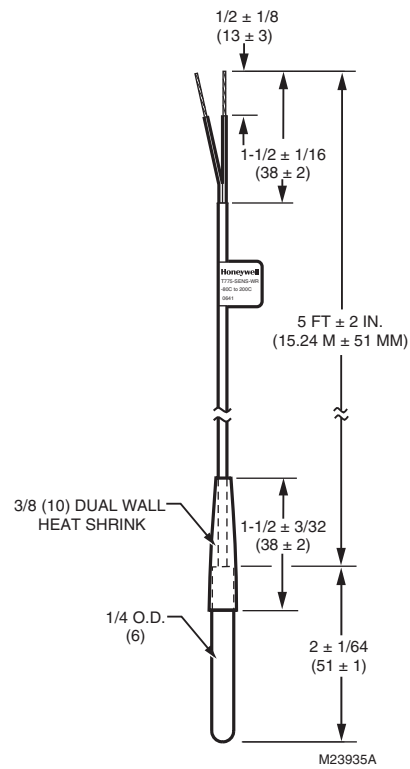


Fig. 2. T775-SENS-WR Dimensions in Inches (mm).

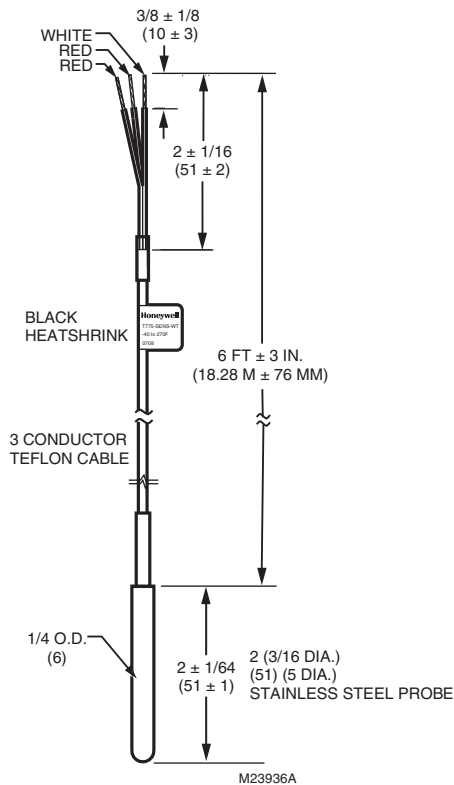


Fig. 3. T775-SENS-WT Dimensions in Inches (mm).

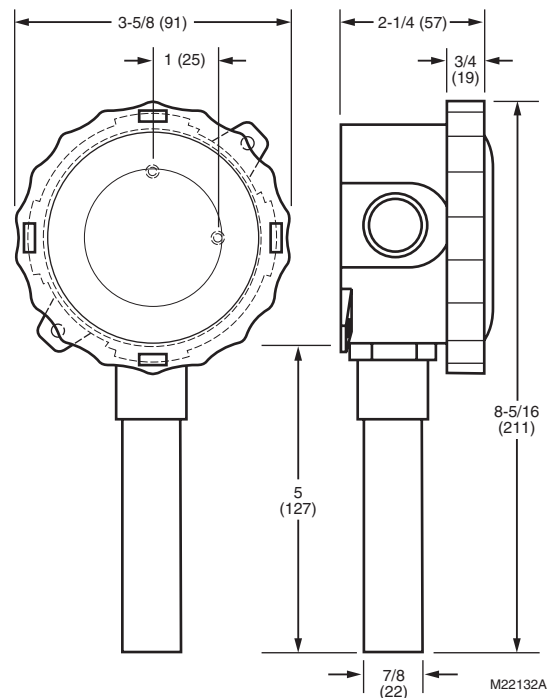


Fig. 4. T775-SENS-OAT Dimensions in Inches (mm).



The C7660 Selectable Outdoor Air Temperature Sensor is used with the W7459, W7215, W7212, W7213 and W7214 Economizer Controls. The economizer controls are mounted on an M7415/M7215 Actuator. They permit the use of outdoor air as the first stage of cooling in heating, ventilating and air conditioning (HVAC) systems.

The C7660 Selectable Temperature Sensor is only to be used with single temperature change over with the sensor located in the outdoor air.

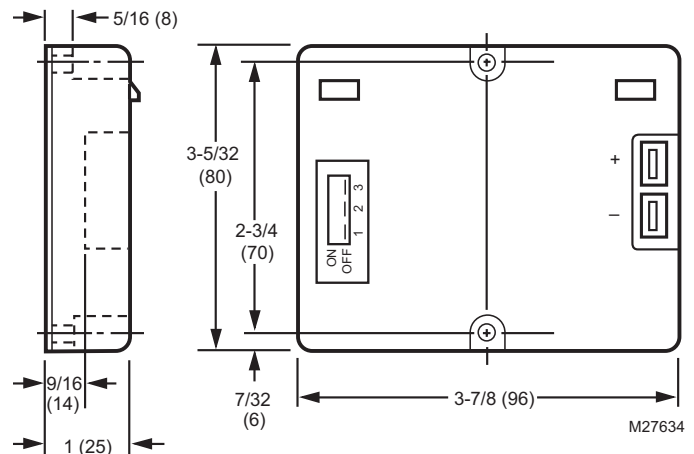
SPECIFICATIONS

Model.....	C7660 Selectable Temperature Sensor Case: Duct mount Temperature Sensing Element: Thermistor
Output Signal.....	4mA not OK to economize, 20 mA OK to economize
Operating Ambient Temperature Range ..	-40° to 149 °F (-40° to 65 °C).
Shipping Temperature Range	-40° to 149 °F (-40° to 65 °C).
Supply Voltage	Power to sensor is supplied through economizer or if not used with an economizer, logic power input is 21.6 vdc $\pm$ 1.5 vdc.
Electrical Connections.....	Two 1/4 in. (6.4 mm) quick connect terminals.
Hysteresis.....	Hysteresis +/- 1F; Economizer Cut-in 1F below setpoint, Cut-out 1F above setpoint
Accuracy	+/- 1° F
Approvals	Underwriters Laboratories Inc. Flammability Rating UL94-5V

FEATURES

- Senses temperature of outdoor air and provides a signal to economizer control with OK or not OK to economize.
- Selectable dip switch provides 8 change over temperature options.
- When temperature of outdoor air is below change over temperature, the outdoor air damper is opened to reduce the cooling load in the building.
- Provides 4 OR 20 mA output signal to economizer control; At 4 mA not OK to economize, 20 mA OK to economize.
- Highly accurate microprocessor control.
- Sensor is enclosed in a rugged, corrosion-resistant plastic case.
- Replaces C7650 temperature sensors and the control function of temperature change over in the economizer control.
- Easy to set change real time temperature settings. The installer can change the temperature set point without cutting power to the system.

DIMENSIONS DIAGRAM



Submittal Data - Sensors

Analog Economizer Sensors



The C7046 series of Duct Air Temperature Sensors for analog economizer applications and primary and/or secondary sensors in electronic control systems.

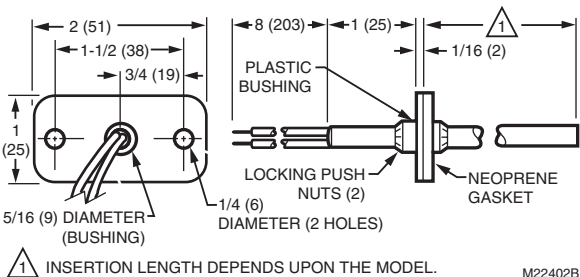
FEATURES

- C7046 Sensors have probe lengths of 6 in. (152 mm), 8 in. (203 mm) and 12 in. (305 mm).
- Carbon type, negative temperature coefficient (NTC) thermistor sensing element in the C7046A,B,C and platinum thin film, positive temperature coefficient (PTC) element in C7046D precisely measures temperature changes.
- No settings or calibration required.
- Solid state components not affected by dust or dirt.
- Fast reacting.
- Rugged stainless steel insertion probe.
- Mounts on duct or plenum surface with mounting flange or in a 2 in. by 4 in. (51 by 102 mm) junction box

SPECIFICATIONS

C7046 Air Temperature Sensor	C7046A used with W973, W7210, W7460 and other controllers; C7046B used with W7080; C7046C used with W973; and C7046D used with Excel controllers and T775 series 2000.
Mounting.....	Integral mounting flange requiring two No. 8 screws.
Sensing Element.....	C7046A,B,C: Carbon type, thermistor-resistor element, C7046D platinum thin film element, 1/4" (6 mm) diameter
Maximum Ambient Temperature	250 °F (121 °C).
Operating Temperature Range.....	40 to 150 °F (4 to 66 °C).
Wiring Connections	6 in. (152 mm) leadwires.
Performance Characteristics.....	Reaction Time Constant with Air Approach Velocity of 500 ft/min (2 m/sec): C7046A: 100 seconds. C7046A,C: Nominal Resistance: 3000 ohms at 77 °F (25 °C) Nominal Sensitivity: 70 ohms per degree F (124 ohms per degree C) at midrange. C7046B: 22.8K ohms NTC at 77F C7046D: 1097 ohms PTC at 77F
Resistance/Temperature (NTC)	

DIMENSIONS DIAGRAM



M22402B



The C7400A Enthalpy Sensor is used with the economizer logic modules with the A,B,C and D performance curves. The sensors combined with the economizer logic modules permit the use of outdoor air as the first stage of cooling in heating, ventilating and air conditioning (HVAC) systems.

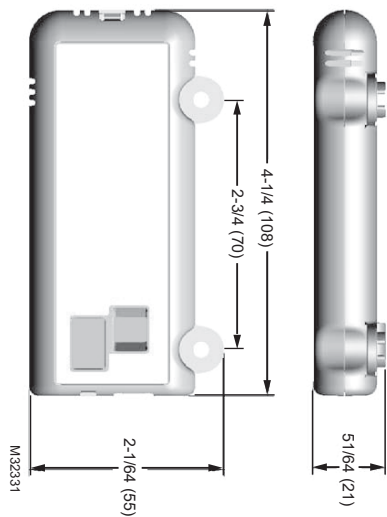
SPECIFICATIONS

C7400A enthalpy sensor for use with economizer logic modules with A,B,C, and D performance curves.	
Output Signal.....	4 to 20 mA current signal increases from 4 mA to 20 mA as enthalpy decreases.
Ambient Temperature Ranges.....	Shipping: -40 °F to 150 °F (-40 °C to 66 °C) Operating: 32 °F to 125 °F (0 °C to 52 °C)
Maximum Power Consumption.....	0.8VA maximum at 40Vdc 20mA
Supply Voltage	12 to 40 Vdc
Electrical Connections.....	Two 1/4 in. (6 mm) quick connect terminals.
Approvals	Underwriters Laboratories Inc. Flammability Rating UL94-5V

FEATURES

- Senses and combines temperature and humidity of outdoor air.
- Long lasting thermistor sensing element is accurate and stable over time.
- As enthalpy of outdoor air increases, the outdoor air damper closes to a preset minimum position.
- As enthalpy of outdoor air becomes low, the outdoor air damper opens to reduce the mechanical cooling load in the building.
- Maximum economizer savings is achieved when two C7400 Enthalpy Sensors are used for differential enthalpy changeover control.
- Compact size and lightweight construction allow easy mounting in HVAC rooftop unit.
- Sensor is enclosed in a rugged, corrosion-resistant glass fiber reinforced plastic duct-mount case.
- Provides a 4 to 20 mA output signal to Economizer Logic Module; setpoint is located on the logic module.

DIMENSIONS DIAGRAM



Submittal Data - Sensors

Communicating Economizer Sensors



The sensors are part of the JADE™ Economizer System (Model W7220) that permit the use of outdoor air as the first stage of cooling in heating, ventilating and air conditioning (HVAC) systems. With Spyder system, the C7400S1010 communicates temperature and humidity via Sylk to the controller.

The C7400S Sylk Bus sensor is a combination temperature and humidity sensor, which is intended to be used in commercial rooftop units for sensing air. The sensor is powered by and communicates on the Sylk Bus. The C7400S communicates temperature and humidity separately digitally on the Sylk Bus Communication Protocol. The JADE Economizer controller provides power and communications on the Sylk Bus for the C7400S Sylk Bus sensor.

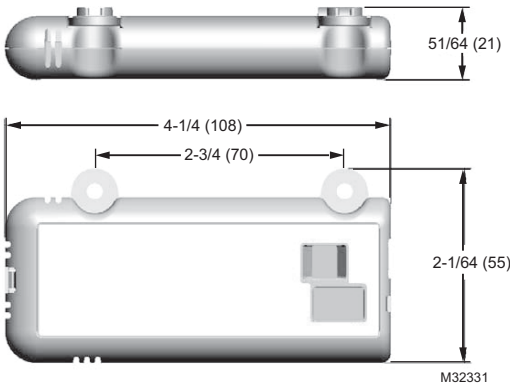
SPECIFICATIONS

Supply Voltage	7 to 21 Vdc
Power Consumption	5 mA
Output Rating	75 ohm load switched at 9600 Baud
Wiring: Sylk Bus.....	2-wire (18 to 22 AWG)
Operating Temperature range.....	-40 to 150 °F (-40 to 65 °C)
Storage Temperature range	-40 to 150 °F (-40 to 65 °C)
Shipping Temperature range.....	-40 to 150 °F (-40 to 65 °C)
Operating Relative Humidity range.....	5% to 95% RH noncondensing
Temperature and Humidity, C7400S:..	Temperature sensing range: -40 to 150 °F (-40 to 65 °C)
	Humidity sensing range: 0 to 100% RH with 5% accuracy.
Height	0.8 inches (20.5 mm)
Width	2.17 inches (55 mm)
Length	4.25 inches (108 mm)
Weight	0.58 lb. (0.265 kg)
Approvals	EN61000-6-3;EN61000-3-2;EN61000-3-3;EN61000-6-1; EN60730-1; Annex H.23 (emissions); Annex H.26 (immunity); CE Mark

FEATURES

- This unit mounted C7400S enthalpy sensor includes solid state temperature and humidity sensors.
- Outputs a digital communicating signal on a two-wire Sylkbus communications link, reporting the temperature and humidity separately to the controller.
- The controller then determines the enthalpy (total heat), enabling economizer modes of operation when outside air enthalpy is suitable for free cooling.
- Enthalpy sensors are compatible with Honeywell economizer systems.
- The enthalpy boundary curve is programmed via the controller. When the temperature and humidity are determined to be suitable based on the relationship to the boundary, the controller allows outside air for economizing
- Ambient temperature operating range from -40° to 150° F.
- Dual enthalpy sensors in outside air and return switches the controllers to economizer mode of operation anytime the outside enthalpy is less than the return air enthalpy. UL recognized component (Guide info XAPX).
- Select the C7400S1010 for use with the Spyder Controller to communicate temperature and humidity to your building automation system via Sylk.

DIMENSIONS DIAGRAM



Communicating Economizer Sensors



The C7250 Temperature sensor is designed for use as a 20k input to a controller for mixed air or discharge air temperature in rooftop packaged air conditioning equipment. Compatible with the JADE™ Economizer System (Model W7220) which provides power and communications for the C7250 temperature sensor.

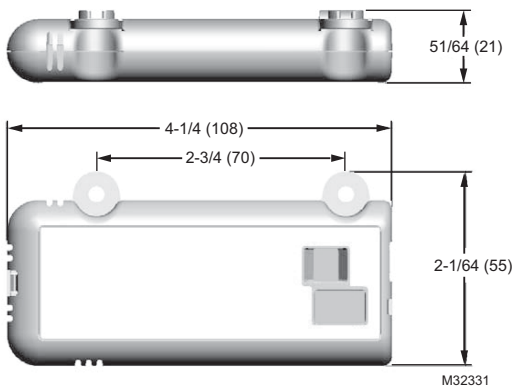
SPECIFICATIONS

Output Rating	20K ohms at 77 °F (25 °C), NTC
Wiring	2-wire (18 to 22 AWG)
Operating Temperature range.....	-40 to 150 °F (-40 to 65 °C)
Storage Temperature range	-40 to 150 °F (-40 to 65 °C)
Shipping Temperature range.....	-40 to 150 °F (-40 to 65 °C)
Temperature, C7250	Temperature sensing range: 0 to 150 °F (18 to 65 °C)
Height	0.8 inches (20.5 mm)
Width	2.17 inches (55 mm)
Length	4.25 inches (108 mm)
Weight	0.58 lb. (0.265 kg)
Approvals	EN61000-6-3;EN61000-3-2; EN61000-3-3;EN61000-6-1; EN60730-1 Annex H.23 (emissions); Annex H.26 (immunity); CE Mark FOR EU

FEATURES

- This unit mounted C7250A temperature sensor utilizes a 20K NTC sensor.
- Compatible with Honeywell W7220 JADE economizer controller

DIMENSIONS DIAGRAM



Submittal Data - Sensors

Immersion Temperature Sensors



FEATURES

- C7021D, C7023D, C7031D, C7041D for immersion mounted water temperature sensing
- Solid state components not affected by dust or dirt

SPECIFICATIONS

See Table 1 and 2 for additional specifications.

Compatibility.....	Use Series 2000 C7031, C7041 Temperature Sensors with Excel 10, 15, 80, 100, and 500 controllers. Series 2000 C7031D sensors are compatible with various Honeywell controllers. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O modules
Sensor Accuracy	±0.36 °F at 77 °F (±0.2 °C at 25 °C) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.

APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in domestic or commercial heating and cooling systems.

DIMENSIONS DIAGRAM

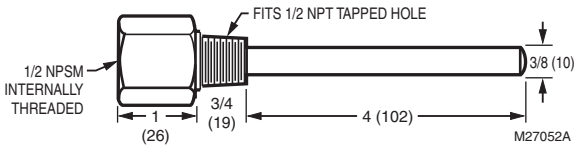
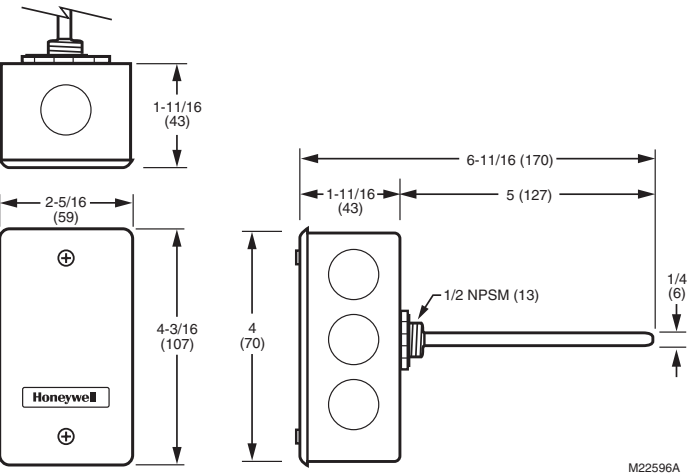


Fig. 1. 5-inch Stainless-Steel Immersion Well.

Submittal Data - Sensors

Immersion Temperature Sensors

Table 1: Specifications

Part Number	Sensing Element	Resistance	Operating Range	Mounting and Application
C7021D2001	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	5" w/wiring enclosure, use well 50001774-001
C7023D2001	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	5" w/wiring enclosure, use well 50001774-001
C7031D2003	PT1000	1097K	40° to 350° F	5" w/wiring enclosure, use well 50001775-001
C7041D2001	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	5" w/wiring enclosure, use well 50001774-001

Table 2: Sensor Resistance

	Typical Resistance (in ohms)			
	C7021 Sensors (10K Ohm NTC Type II)	C7023 Sensors (10K Ohm NTC Type III)	C7031 Sensors (1097 Ohms PTC)	C7041 Sensors (20K ohm NTC)
At 41°F (5°C)	25,392	23,467	1,020	54,200
At 50°F (10°C)	19,901	18,789	1,039	41,758
At 59°F (15°C)	15,712	15,137	1,059	32,427
At 68°F (20°C)	12,493	12,268	1,078	25,370
At 77°F (25°C)	10,000	10,000	1,097	20,000
At 86°F (30°C)	8,057	8,196	1,117	15,856
At 95°F (35°C)	6,531	6,754	1,136	12,654

Submittal Data - Sensors

Outdoor Air Temperature Sensors



FEATURES

- C7021F, C7023F, C7031G, C7041F sense outdoor air temperature and are weatherproof for outdoor use (knockouts allow for 1/2 in. conduit connection).
- Solid state components not affected by dust or dirt

SPECIFICATIONS

See Table 1 and 2 for additional specifications.

Compatibility.....	Use Series 2000 C7031, C7041 Temperature Sensors with Excel 10, 15, 80, 100 and 500 controllers. Series 2000 C7031G sensors are compatible with various Honeywell controllers. The C7031F2014 is compatible with the T7350 Commercial Thermostat. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O module
Sensor Accuracy.....	±0.36 °F at 77 °F (±0.2 °C at 25 °C) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.

APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in domestic or commercial heating and cooling systems.

DIMENSIONS DIAGRAM

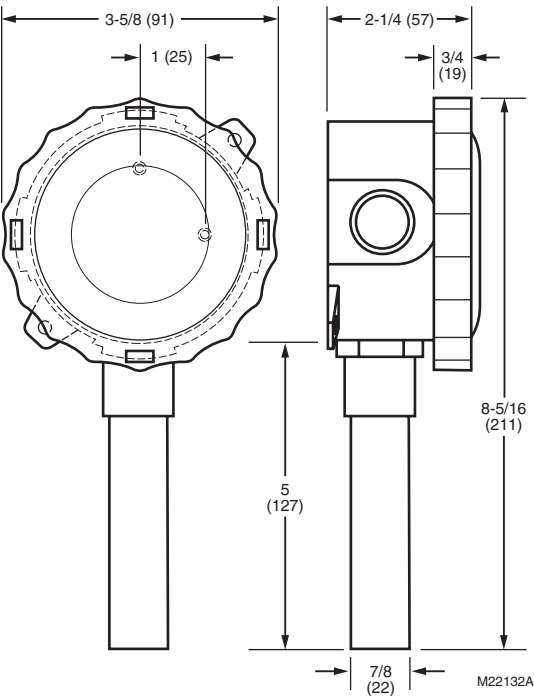


Fig. 1. C7031G, C7021F, C7023F, C7041F Dimensions in Inches (mm).

Submittal Data - Sensors

Outdoor Air Temperature Sensors

Table 1: Specifications

Part Number	Sensing Element	Resistance	Operating Range	Mounting and Application
C7021F2009	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 158° F	Outdoor weatherproof, connects to 1/2" conduit
C7023F2009	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 158° F	Outdoor weatherproof, connects to 1/2" conduit
C7031G2014	PT3000	3484 ohms at 77F	-40° to 120° F	Outdoor weatherproof, connects to 1/2" conduit
C7041F2006	20K ohms NTC	20K ohms NTC at 77°F	-40° to 158° F	Outdoor weatherproof, connects to 1/2" conduit

Table 2: Sensor Resistance

	Typical Resistance (in ohms)			
	C7021 Sensors (10K Ohm NTC Type II)	C7023 Sensors (10K Ohm NTC Type III)	C7031 Sensors (1097 Ohms PTC)	C7041 Sensors (20K ohm NTC)
At 41°F (5°C)	25,392	23,467	1,020	54,200
At 50°F (10°C)	19,901	18,789	1,039	41,758
At 59°F (15°C)	15,712	15,137	1,059	32,427
At 68°F (20°C)	12,493	12,268	1,078	25,370
At 77°F (25°C)	10,000	10,000	1,097	20,000
At 86°F (30°C)	8,057	8,196	1,117	15,856
At 95°F (35°C)	6,531	6,754	1,136	12,654

Submittal Data - Sensors

Duct Air Temperature Sensors



FEATURES

- C7021J/R, C7023J/R, C7031J, C7041J/R sense average duct air temperature.
- Solid state components not affected by dust or dirt

SPECIFICATIONS

See Table 1 and 2 for additional specifications.

Compatibility.....	Use Series 2000 C7031, C7041 Temperature Sensors with Excel 10, 15, 80, 100 and 500 controllers. Series 2000 C7031B,D,G,J sensors are compatible with various Honeywell controllers. The C7031G2014 is compatible with the T7350 Commercial Thermostat. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O modules
Sensor Accuracy	±0.36°F at 77°F (±0.2°C at 25°C) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.

APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in domestic or commercial heating and cooling systems.

DIMENSIONS DIAGRAM

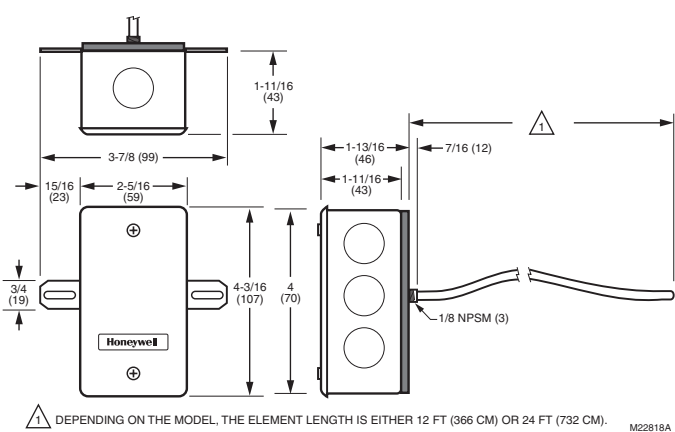


Fig. 1. C7021R, C7023R, C7041R Dimensions in Inches (mm).

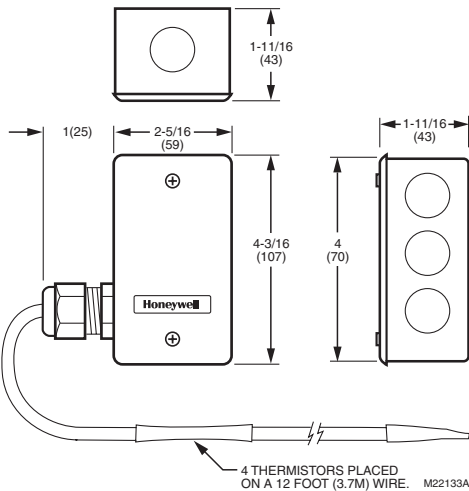


Fig. 2. C7021J, C7023J, C7031J, C7041J Dimensions in Inches (mm).

Table 1: Specifications

Part Number	Sensing Element	Resistance	Operating Range	Mounting and Application
C7021J2007	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	12' duct averaging w/wiring enclosure
C7021R2000	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	12' duct averaging flexible copper
C7021R2018	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	24' duct averaging flexible copper
C7023J2007	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	12' duct averaging w/wiring enclosure
C7023R2000	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	12' duct averaging flexible copper
C7023R2018	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	24' duct averaging flexible copper
C7031J2009	PT1000	1097 ohms PTC at 77°F	40° to 180° F	12' duct averaging flexible copper
C7041J2007	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	12 ft. Duct (Averaging) w/wiring enclosure
C7041R2000	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	12 ft. Duct flexible copper (Averaging)
C7041R2018	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	24 ft. Duct flexible copper (Averaging)

Table 2: Sensor Resistance

	Typical Resistance (in ohms)			
	C7021 Sensors (10K Ohm NTC Type II)	C7023 Sensors (10K Ohm NTC Type III)	C7031 Sensors (1097 Ohms PTC)	C7041 Sensors (20K ohm NTC)
At 41°F (5°C)	25,392	23,467	1,020	54,200
At 50°F (10°C)	19,901	18,789	1,039	41,758
At 59°F (15°C)	15,712	15,137	1,059	32,427
At 68°F (20°C)	12,493	12,268	1,078	25,370
At 77°F (25°C)	10,000	10,000	1,097	20,000
At 86°F (30°C)	8,057	8,196	1,117	15,856
At 95°F (35°C)	6,531	6,754	1,136	12,654

Submittal Data - Sensors

Duct Air Temperature Sensors



FEATURES

- C7021B/C, C7023B/C, C7031B, C7041B/C sense duct air temperature.
- Solid state components not affected by dust or dirt

SPECIFICATIONS

See Table 1 and 2 for additional specifications.	
Compatibility.....	Use Series 2000 C7031, C7041 Temperature Sensors with Excel 10, 15, 80, 100 and 500 controllers. Series 2000 C7031B sensors are compatible with various Honeywell controllers. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O modules
Sensor Accuracy	±0.36°F at 77°F (±0.2°C at 25°C) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.

APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in domestic or commercial heating and cooling systems.

DIMENSIONS DIAGRAM

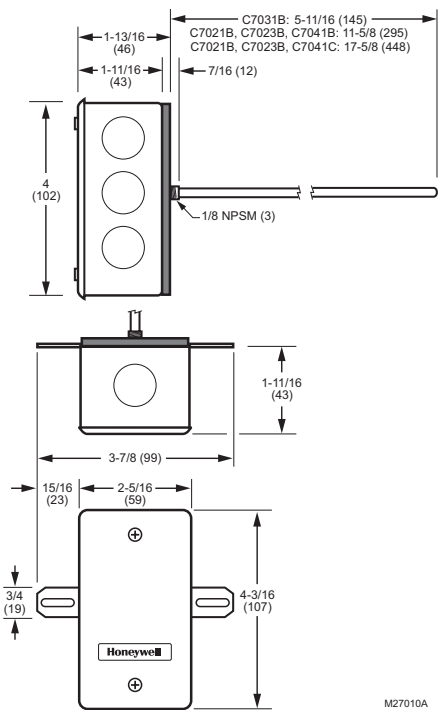


Fig. 1. C7021B/C, C7023B/C Dimensions in Inches (mm).

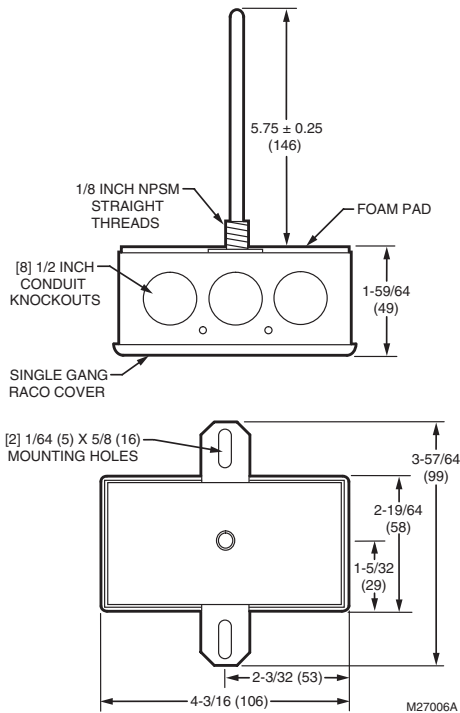


Fig. 2. C7031B Dimensions in Inches (mm).

Table 1: Specifications

Part Number	Sensing Element	Resistance	Operating Range	Mounting and Application
C7021B2005	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	6" duct w/wiring enclosure
C7021B2013	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	12" duct w/wiring enclosure
C7021C2003	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	18" duct w/wiring enclosure
C7023B2005	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	6" duct w/wiring enclosure
C7023B2013	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	12" duct w/wiring enclosure
C7023C2003	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	18" duct w/wiring enclosure
C7031B2005	PT1000	1097K ohms NTC at 77°F	-40° to 250° F	6" duct w/wiring enclosure
C7041B2005	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	6" duct w/wiring enclosure
C7041B2013	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	12" duct w/wiring enclosure
C7041C2003	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	18" duct w/wiring enclosure

Table 2: Sensor Resistance

	Typical Resistance (in ohms)			
	C7021 Sensors (10K Ohm NTC Type II)	C7023 Sensors (10K Ohm NTC Type III)	C7031 Sensors (1097 Ohms PTC)	C7041 Sensors (20K ohm NTC)
At 41°F (5°C)	25,392	23,467	1,020	54,200
At 50°F (10°C)	19,901	18,789	1,039	41,758
At 59°F (15°C)	15,712	15,137	1,059	32,427
At 68°F (20°C)	12,493	12,268	1,078	25,370
At 77°F (25°C)	10,000	10,000	1,097	20,000
At 86°F (30°C)	8,057	8,196	1,117	15,856
At 95°F (35°C)	6,531	6,754	1,136	12,654

Submittal Data - Sensors

Strap-On Water Temperature Sensors



FEATURES

- C7021K, C7023K, C7041K with strap-on mounting senses water temperature.
- Solid state components not affected by dust or dirt

SPECIFICATIONS

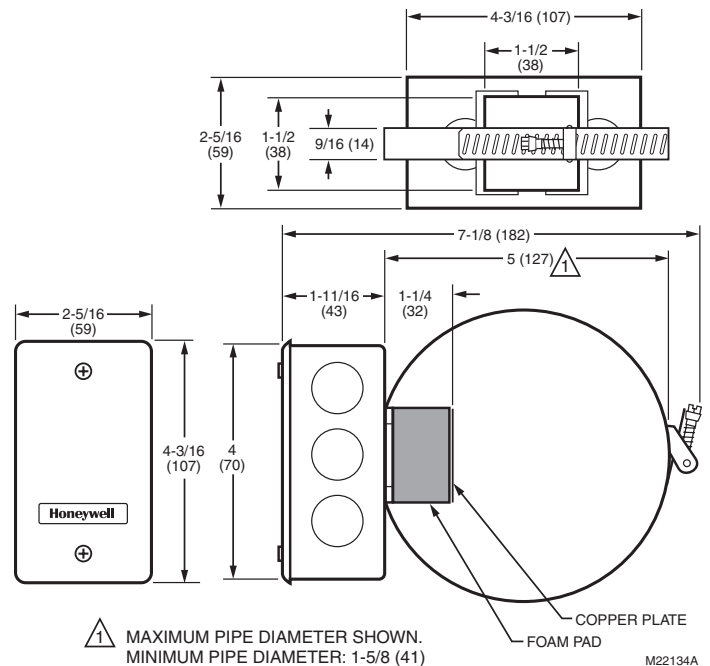
See Table 1 and 2 for additional specifications.

Compatibility.....	Use Series 2000 C7041 Temperature Sensors with Excel 10, 15, 80, 100, and 500 controllers. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O modules
Sensor Accuracy.....	$\pm 0.36^{\circ}\text{F}$ at 77°F ($\pm 0.2^{\circ}\text{C}$ at 25°C) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.

APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in domestic or commercial heating and cooling systems.

DIMENSIONS DIAGRAM



Submittal Data - Sensors

Strap-On Water Temperature Sensors

Table 1: Specifications

Part Number	Sensing Element	Resistance	Operating Range	Mounting and Application
C7021K2005	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	Strap-on pipe sensor with wiring enclosure
C7023K2005	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	Strap-on pipe sensor with wiring enclosure
C7041K2005	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	Strap-on with wiring enclosure

Table 2: Sensor Resistance

	Typical Resistance (in ohms)		
	C7021 Sensors (10K Ohm NTC Type II)	C7023 Sensors (10K Ohm NTC Type III)	C7041 Sensors (20K ohm NTC)
At 41°F (5°C)	25,392	23,467	54,200
At 50°F (10°C)	19,901	18,789	41,758
At 59°F (15°C)	15,712	15,137	32,427
At 68°F (20°C)	12,493	12,268	25,370
At 77°F (25°C)	10,000	10,000	20,000
At 86°F (30°C)	8,057	8,196	15,856
At 95°F (35°C)	6,531	6,754	12,654

Submittal Data - Sensors

Air or Water Temperature Sensor Probe



APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in residential or commercial heating and cooling systems.

FEATURES

- C7021N, C7023N, C7041N probe senses water or air temperature.
- Solid state components not affected by dust or dirt

SPECIFICATIONS

See Table 1 and 2 for additional specifications.

Compatibility.....	Use Series 2000 C7041 Temperature Sensors with Excel 10, 15, 80, 100 and 500 controllers. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs- AX I/O modules
Sensor Accuracy	±0.36°F at 77°F (±0.2°C at 25°C) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.

Table 1: Specifications

Part Number	Sensing Element	Resistance	Operating Range	Mounting and Application
C7021N2001	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	Probe Sensor with 6' Lead
C7023N2001	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	Probe Sensor with 6' Lead
C7041N2020	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	Probe Sensor with 6' Lead

Table 2: Sensor Resistance

	Typical Resistance (in ohms)		
	C7021 Sensors (10K Ohm NTC Type II)	C7023 Sensors (10K Ohm NTC Type III)	C7041 Sensors (20K ohm NTC)
At 41°F (5°C)	25,392	23,467	54,200
At 50°F (10°C)	19,901	18,789	41,758
At 59°F (15°C)	15,712	15,137	32,427
At 68°F (20°C)	12,493	12,268	25,370
At 77°F (25°C)	10,000	10,000	20,000
At 86°F (30°C)	8,057	8,196	15,856
At 95°F (35°C)	6,531	6,754	12,654

DIMENSIONS DIAGRAM

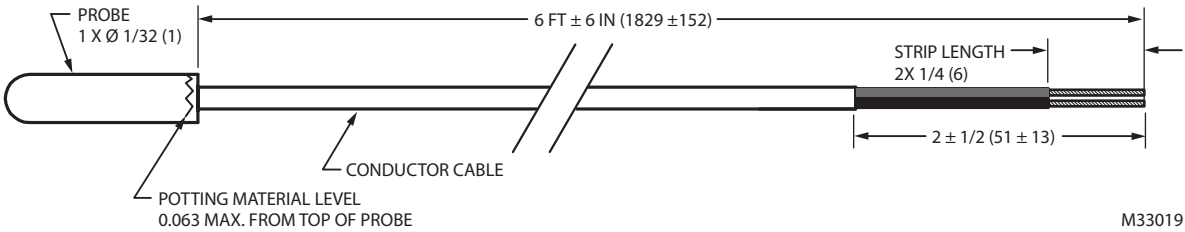


Fig. 1. C7021N, C7023N, C7041N Dimensions in Inches (mm).

Submittal Data - Sensors

Air Temperature Sensor



APPLICATION

The Series 2000 Electronic Temperature Sensors are designed for use with electronic controllers in domestic or commercial heating and cooling systems.

FEATURES

- C7021P, C7023P, C7041P senses air temperature.
- Solid state components not affected by dust or dirt

SPECIFICATIONS

See Table 1 and 2 for additional specifications.	
Compatibility.....	Use Series 2000 C7041 Temperature Sensors with Excel 10, 15, 80, 100 and 500 controllers. Series 2000 C7021 temperature sensors are compatible with TB7600, TB7300 and TB7200 communicating thermostats. Series 2000 C7023 temperature sensors are compatible with WEBs-AX I/O modules
Sensor Accuracy	±0.36°F at 77°F (±0.2°C at 25°C) for 20K ohm NTC sensors and 10K ohm NTC Type II and Type III sensors.

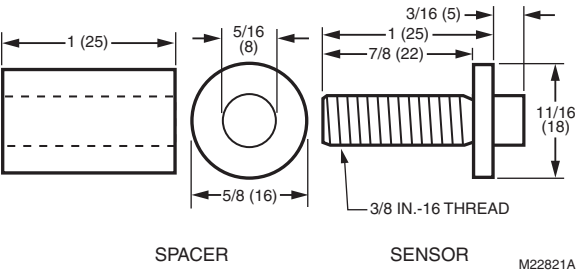
Table 1: Specifications

Part Number	Sensing Element	Resistance	Operating Range	Mounting and Application
C7021P2004	10K ohms NTC Type II	10K ohms NTC at 77°F	-40° to 250° F	Small metal button sensor
C7023P2004	10K ohms NTC Type III	10K ohms NTC at 77°F	-40° to 250° F	Small metal button sensor
C7041P2004	20K ohms NTC	20K ohms NTC at 77°F	-40° to 250° F	Small metal button sensor

Table 2: Sensor Resistance

	Typical Resistance (in ohms)		
	C7021 Sensors (10K Ohm NTC Type II)	C7023 Sensors (10K Ohm NTC Type III)	C7041 Sensors (20K ohm NTC)
At 41°F (5°C)	25,392	23,467	54,200
At 50°F (10°C)	19,901	18,789	41,758
At 59°F (15°C)	15,712	15,137	32,427
At 68°F (20°C)	12,493	12,268	25,370
At 77°F (25°C)	10,000	10,000	20,000
At 86°F (30°C)	8,057	8,196	15,856
At 95°F (35°C)	6,531	6,754	12,654

DIMENSIONS DIAGRAM



Submittal Data - Sensors

Current Switches, CS & CP



APPLICATIONS

- Overload Conditions
- Underload Conditions
- Normal Operating Conditions
- Broken Belts
- Belt Slippage
- Locked Rotors
- Equipment Failure
- Fans
- Pumps
- Compressors
- Motors
- Ovens
- Industrial Equipment
- Lighting Status and Usage
- Electrical Load Status
- Local Alarms (Strobes and Audible Alarms)
- Preventative Maintenance Scheduling

SPECIFICATIONS

Sensor Power	Induced from monitored conductor
Amperage Rating	0 to 200 Amps and 0 to 250 Amps (See table)
Operating Frequency Range.....	40 Hz to 1 kHz
Isolation Voltage	2220 Vac
Max AC Voltage.....	600 Vac
Adjustable Trip Point (Setpoint)	See table
Hysteresis (Dead Band)	10% of trip point, typical (for adjustable switches).
Status Indication.....	Red LED - Above Trip Point (adjustable switches) Monitored current is above Trip Point (fixed switches) Blue LED - Below Trip Point (adjustable switches)
Aperture (Hole) Size	3/4 in. (19 mm)
DIN Rail Size.....	35 mm
Unit Weight	See table
Enclosure Rating	UL94-V0
Operating Temperature Range.....	5° to 104 °F (-15° to 40 °C)
Operating RH Range.....	0 to 95% RH, non-condensing
Approvals	UL/CUL US Listed (UL 508) Ind. Control Equipment (File # E309723), CE
Environmental Compliance	RoHS-Directive 2002/95/EC WEEE-Directive 2002/96/EC

APPLICATION

The Current Switches are designed for use in any AC current monitoring application in which you are looking to monitor a particular piece of equipment for equipment failure, preventative maintenance, status, and electrical load status.

The current switches should be installed on the line side of the power to the electrical equipment.

The current switches are available in both solid and splitcore versions which also includes a 35 mm Din Rail mounting foot for easy installation in panel mount applications.

The solid-core versions are a great choice for new installations or OEM applications in which cost sensitivity, lower trip points and environmental issues may be of concern.

The split-core version of the current switches work great in retrofit applications and for use in service vehicles since one part will work in most applications and can be installed without disconnecting any wires.

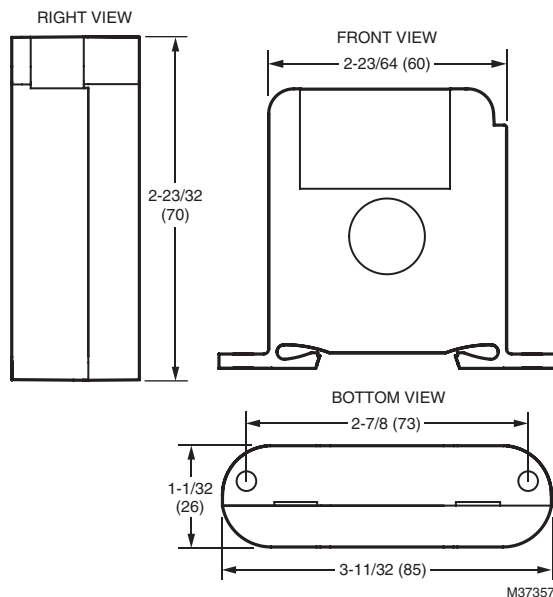
The switches can be used to determine the run time of your equipment as well as basic load trending applications where you want to know how long your piece of equipment runs when logging the contact closures on your building management system or PLC.

Model #	Trip Point Type	Amp Range	Trip Point	Contact Rating	Weight in lbs. (Kg)
CS-O-A	Adjustable	0 to 250 A	0.5 to 220 A	0.2 A @ 200 VAC/VDC	0.216 (0.097)
CP-O-A			1.5 to 220 A		0.270 (0.123)
CP-O-AL			0.6 to 180 A		0.280 (0.127)
CP-C-A			1.5 to 220 A		0.266 (0.121)
CS-O-F	Fixed	0 to 200 A	0.25 A or less		0.216 (0.097)
CS-C-F			0.25 A or less		0.216 (0.097)
CP-O-F			1.5 A or less		0.270 (0.123)
CP-O-FL			0.5 A or less		0.280 (0.127)
CP-C-F			1.5 A or less		0.270 (0.123)

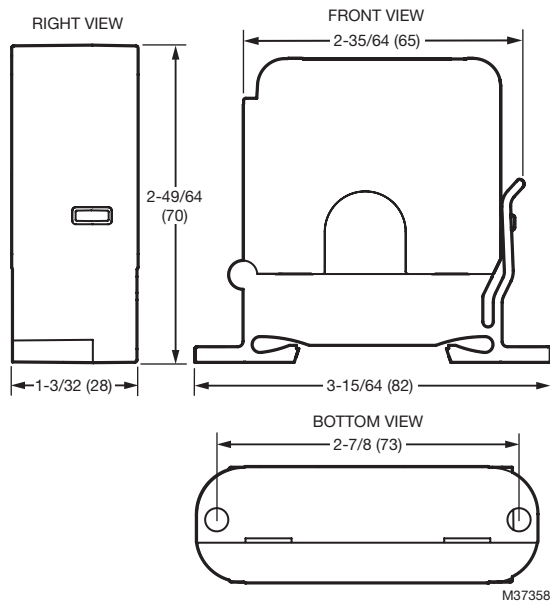
Table 1. Operating Specifications

Model #	Trip Point Type	Normally (Open/Closed)	Core (Solid/Split)	Amp Range	Trip Point	Contact Rating
CS-O-A	Adjustable	Open	Solid	0 to 250 A	0.5 to 220 A	0.2 A @ 200 VAC/VDC
CP-O-A		Open	Split		1.5 to 220 A	
CP-O-AL		Open	Split		0.6 to 180 A	
CP-C-A		Closed	Split		1.5 to 220 A	
CS-O-F	Fixed	Open	Solid	0 to 200 A	0.25 A or less	
CS-C-F		Closed	Solid		0.25 A or less	
CP-O-F		Open	Split		1.5 A or less	
CP-O-FL		Open	Split		0.5 A or less	
CP-C-F		Closed	Split		1.5 A or less	

DIMENSIONS DIAGRAM



Solid-core sensor dimensions in in. (mm).



Split-core sensor dimensions in in. (mm).

Submittal Data - Sensors

Current Transmitters, CTS & CTP 0–5/10Vdc Output Models



APPLICATIONS

- Load Trending
- Basic Power Monitoring
- Electronic Ballasts
- Computers/Data Centers
- Industrial
- Variable Speed Loads
- Pumps
- Compressors
- Fans
- Preventative Maintenance
- LEED
- Project Justification (ROI) Process Control
- Solid State Environments (SCR's)
- Single Speed Loads

SPECIFICATIONS

Monitored Current Type.....	AC Current
Maximum AC Voltage.....	600 VAC
Isolation Voltage.....	2200 VAC
Operating Frequency Range.....	50 to 600 Hz
Core Style	Solid-Core and Split-Core Versions
Supply Voltage	Induced from the Monitored Conductor (Insulated Conductors only)
Output Voltage.....	CTS-V-50: 0 to 5 Vdc CTP-V-50; CTS-V-150; CTP-V-150: 0 to 10 Vdc
Accuracy	CTS-V-50 (0-10 A Range Only): +/- 1% from 5-100 % of Selected Range CTS-V-150 & CTP-V-150 Series: +/- 1% from 5-100 % of Selected Range
Aperture Size.....	0.75 in. (19.05 mm)
DIN Rail Size.....	.35 mm
Unit Weight	CTS-V-50-xxx and CTS-V-150-xxx Series: 0.194 lbs. (0.088 kg) CTP-V-150-xxx Series: 0.274 lbs. (0.125 kg)
Operating Temperature Range.....	5 to 104°F (-15 to 40°C)
Minimum Mounting Distance.....	1" (2.6 cm) between current sensor & other magnetic devices (Relays, Contactors, Transformers)
Operating Humidity Range.....	0 to 95%, non-condensing
Terminal Block Torque Rating.....	4.43 to 5.31 in-lbs. (0.5 to 0.6 Nm)
Storage Temperature.....	41 to 95°F (5 to 35°C)
Approvals	UL/CUL US Listed (UL 508) Ind. Control Equipment (File # E309723), CE, RoHS2, WEEE

APPLICATION

The 0–5/10 Vdc Output Analog Current Sensors are designed for use in any AC current monitoring application in which you are looking to monitor a particular piece of equipment for proper operation. All voltage output current sensors use an “Average” current measuring method and should be used in applications with a pure Sinusoidal AC waveform that has very little or no distortion/noise on the conductor being monitored.

The current sensors are available in both solid and split-core versions which also includes a 35 mm Din Rail mounting foot for easy installation in panel mount applications.

The solid-core versions are a great choice for new installations or OEM applications in which cost sensitivity, lower trip points and environmental issues like dust and moisture may be of concern. The split-core version of the current sensors work great in retrofit applications and for use on service technicians vehicles since one or two parts will work in most applications and can be easily installed without disconnecting any wires. Voltage Output current sensors are available in both solid and split-core versions which also includes a 35 mm Din Rail mounting foot for easy installation in panel mount applications.

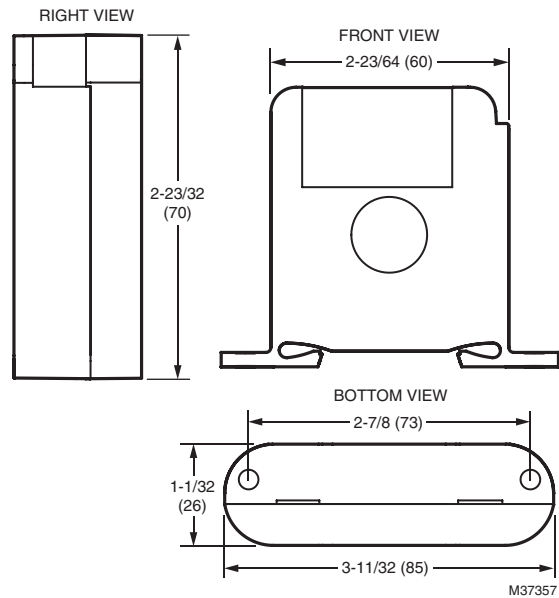
For best results, the voltage output current sensors should not be used in applications with switching power supplies or variable speed drives due to the limited operating frequency range. Applications may include monitoring a resistive type load such as an incandescent light bulb, heating element as well as any single speed linear load.

Model #	Selectable Ranges	Measurement	AC Waveform	Core (Solid/Split)	Output Signal
CTS-V-50	0 to 10/20/50A	Average	Pure Sinusoidal	Solid	0 to 5 VDC
CTP-V-50	0 to 10/20/50A	Average	Pure Sinusoidal	Split	0 to 10 VDC
CTS-V-150	0 to 50/100/150A	Average	Pure Sinusoidal	Solid	0 to 10 VDC
CTP-V-150	0 to 50/100/150A	Average	Pure Sinusoidal	Split	0 to 10 VDC

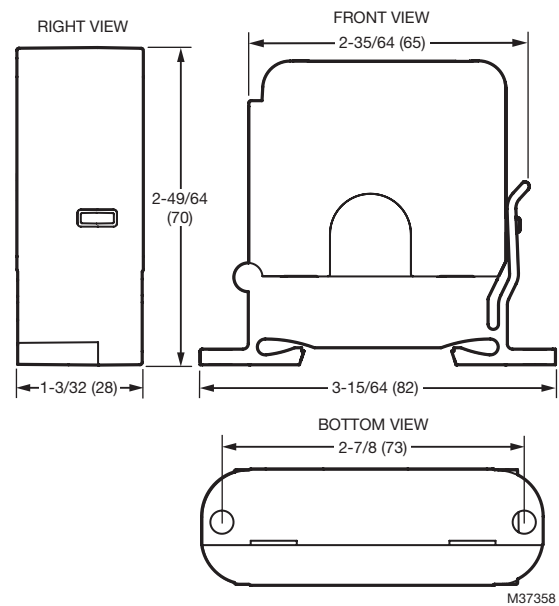
Table 1. Operating Specifications

Product Number	Selectable Ranges	Measurement	AC Waveform	Core (Solid/Split)	Output Signal
CTS-V-50	0 to 10/20/50A	Average	Pure Sinusoidal	Solid	0 to 5 VDC
CTP-V-50	0 to 10/20/50A	Average	Pure Sinusoidal	Split	0 to 10 VDC
CTS-V-150	0 to 50/100/150A	Average	Pure Sinusoidal	Solid	0 to 10 VDC
CTP-V-150	0 to 50/100/150A	Average	Pure Sinusoidal	Split	0 to 10 VDC

DIMENSIONS DIAGRAM



Solid-core sensor dimensions in in. (mm).



Split-core sensor dimensions in in. (mm).

Submittal Data - Sensors

Current Transmitters, CTS & CTP 4–20mA Output Models



APPLICATIONS

- Load Trending
- Basic Power Monitoring
- Electronic Ballasts
- Computers/Data Centers
- Industrial
- Variable Speed Loads
- Pumps
- Compressors
- Fans
- Preventative Maintenance
- LEED
- Project Justification (ROI)
- Process Control
- Solid State Environments (SCR's)
- Single Speed Loads

SPECIFICATIONS

Monitored Current Type.....	AC Current
Maximum AC Voltage.....	600 VAC
Isolation Voltage.....	2200 VAC
Operating Frequency Range.....	CTP-A-200 & CTS-A-250: 40 to 1 KHz CTP-A-50-RMS: 15 to 100 Hz
Supply Voltage.....	+8.5 to 30 VDC (Reverse Polarity Protected) 250 Ohm Load (1-5 VDC): +13.5 to 30 VDC 500 Ohm Load (2-10 VDC): +18.5 to 30 VDC
Supply Current.....	25 mA minimum
Output Signal.....	4 to 20 mA (2-Wire, Loop Powered)
Maximum Output Signal.....	Limited to 25 mA
Accuracy.....	CTS-V-50 (0-10 A Range Only): +/- 1% from 5-100 % of Selected Range CTS-V-150 & CTP-V-150 Series: +/- 1% from 5-100 % of Selected Range
Response Time.....	CTS-A-xxx and CTP-A-XXX: < 600 mS (Rise and Fall Time) CTP-A-50-RMS: 600 mS (Rise Time) and 2800 mS (Fall Time)
Aperture Size.....	0.75 in. (19.05 mm)
DIN Rail Size.....	35 mm
Unit Weight.....	CTS-A-xxx: 0.260 lbs. (0.118 kg) CTP-A-xxx: 0.274 lbs. (0.124 kg) CTS-A-xxx-RMS: 0.190 lbs. (0.087 kg) CTP-A-xxx-RMS: 0.190 lbs. (0.087 kg)
Storage Temperature.....	41 to 95°F (5 to 35°C)
Operating Temperature Range.....	5 to 104 °F (-15 to 40 °C)
Operating Humidity Range.....	0 to 95 %, non-condensing
Approvals.....	CE (-RMS Versions): CE to IEC 61326-1: 2012 Class A, UL/CUL US Listed (UL 508) Ind. Control Equipment (File # E309723), RoHS2, WEEE
Minimum Mounting Distance.....	1 in. (2.6 cm) between current sensor and other magnetic devices (Relays, Contactors, Transformers)
Terminal Block Torque Rating.....	4.43 to 5.31 in-lbs. (0.5 to 0.6 Nm)
Wire Size.....	18 to 24 AWG (0.823 to 0.205 mm2) Copper wire only

APPLICATION

The 4-20 mA Output Analog Current Sensors are designed for use in any AC current monitoring application in which you are looking to monitor a particular piece of equipment for proper operation. All voltage output current sensors use an “Average” current measuring method and should be used in applications with a pure Sinusoidal AC waveform that has very little or no distortion/noise on the conductor being monitored.

The current sensors are available in both solid and split-core versions which also includes a 35 mm Din Rail mounting foot for easy installation in panel mount applications.

The solid-core versions are a great choice for new installations or OEM applications in which cost sensitivity, lower trip points and environmental issues like dust and moisture may be of concern. The split-core version of the current sensors work great in retrofit applications and for use on service technicians vehicles since one or two parts will work in most applications and can be easily installed without disconnecting any wires. Voltage Output current sensors are available in both solid and split-core versions which also includes a 35 mm Din Rail mounting foot for easy installation in panel mount applications.

For best results, the voltage output current sensors should not be used in applications with switching power supplies or variable speed drives due to the limited operating frequency range. Applications may include monitoring a resistive type load such as an incandescent light bulb, heating element as well as any single speed linear load.

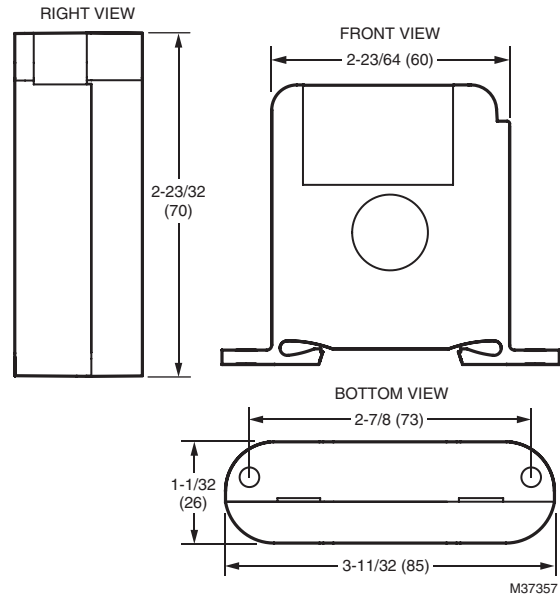
In applications where variable speed drives or waveforms include distortion/noise, Honeywell recommends the use of the CTP-A-50-RMS Series sensors where you need to supply 24 VDC power to the current sensors with a 4-20 mA signal. A 249 Ohm or 499 Ohm 1 Watt resistor can be used to convert the 4-20 mA signal into a usable 1-5 or 2-10 VDC output signal at your building management system or PLC. Note that the “True RMS” sensors are able to be used in all applications since the “True RMS” current sensors provide the best overall accuracy and should be used in applications which include Variable Frequency Drives, Switching Power Supplies, Computers and Data Centers, Electronic Ballasts, SCR's, and Variable Speed Loads.

Product Number	Selectable Ranges	Measurement	AC Waveform	Core (Solid/ Split)	Output Signal
CTS-A-250	0 to 100/200/250A	Average	Pure Sinusoidal	Solid	4 to 20 mA
CTP-A-200	0 to 100/150/200A	Average	Pure Sinusoidal	Split	4 to 20 mA
CTP-A-50-RMS	0 to 10/20/50A	True RMS	Distorted & Pure Sinusoidal	Split	4 to 20 mA

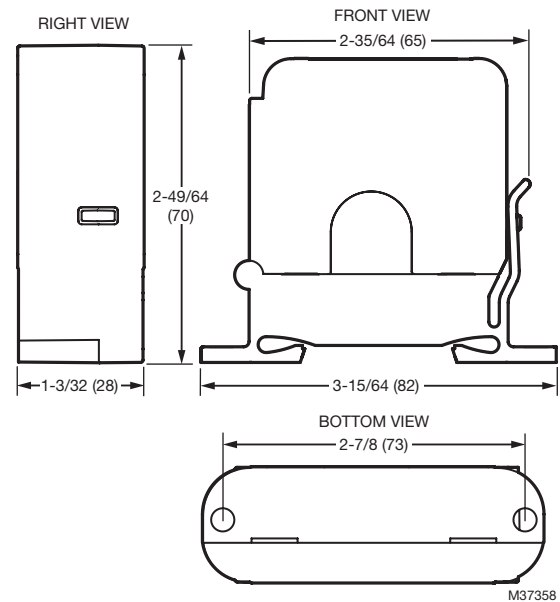
Table 1. Operating Specifications

Product Number	Selectable Ranges	Measurement	AC Waveform	Core (Solid/Split)	Output Signal
CTS-A-250	0 to 100/200/250A	Average	Pure Sinusoidal	Solid	4 to 20 mA
CTP-A-200	0 to 100/150/200A	Average	Pure Sinusoidal	Split	4 to 20 mA
CTP-A-50-RMS	0 to 10/20/50A	True RMS	Distorted & Pure Sinusoidal	Split	4 to 20 mA

DIMENSIONS DIAGRAM



Solid-core sensor dimensions in in. (mm).



Split-core sensor dimensions in in. (mm).

Submittal Data - Sensors

Mini Current Switches, MCSS & MCSP



SPECIFICATIONS

Sensor Power	Induced from monitored conductor
Amperage Rating	MCSS-F: 0.20 to 150 Amps
	MCSP-F: 0.55 to 150 Amps
	MCSS-A: 0.32 to 150 Amps continuous
	MCSP-A: 0.70 to 150 Amps continuous
Max. Sensing Current Voltage.....	600 VAC Isolation Voltage: 2,200 VAC
Output Rating	MCSS-F: 0.5 A Continuous, 36 VAC/VDC
	MCSP-F: 0.5 A Continuous, 36 VAC/VDC
	MCSS-A: 1.0 A Continuous, 36 VAC/VDC
	MCSP-A: 1.0 A Continuous, 36 VAC/VDC
Status LED Indication (MCSS-A/MCSP-A models only).....	Red LED: Above Trip Point Blue LED: Under Trip Point
	NOTE: Do NOT use the LEDs to indicate whether the sensors have power applied to them.
Operating Frequency	50 Hz, 60 Hz
Isolation Voltage	2,200 VAC
Aperture (Hole) Size	MCSS: 0.55" dia., up to 1 AWG cables
	MCSP: 0.53" dia., up to 1 AWG cables
Trip Point	MCSS-F: Fixed @ below 0.20 A
	MCSP-F: Fixed @ below 0.55 A
Dimensions (L x W x H).....	MCSS: 2.50" x 1.96" x 0.95"
	MCSP: 2.65" x 2.35" x 0.95"
Operating Temperature Range.....	-30 to 60 °C (-22 to 140 °F)
Operating Humidity Range.....	0 to 95% RH, non-condensing

APPLICATION

The Honeywell MCSS and MCSP series current switches are miniature “Go/No Go” current status switches designed to provide status information on AC current supplied equipment. The output of these switches uses a N/O solid-state switch (more reliable than a relay) and is non-polarity sensitive.

The MCSS series is an excellent option for new installations where the conductors can be run through the solid-core housing before connecting the wires. The MCSP series are ideal for retrofit applications, since their split-core design allows them to be opened and clamped around the existing wires without disconnecting the current being monitored. Both of these units do not need power supplied to them as they induce the current from the conductors being monitored. The MCSS series has a fixed trip point of below 0.20 A while the MCSP series has a fixed trip point of below 0.55 A. When the current in the conductor exceeds this threshold, the sensor will be “Closed.” The sensor will indicate “Open” when the current is interrupted or falls to 0 A. The adjustable switches, MCSS-A and MCSP-A, include two Status LED indicators that will indicate three states: tripped on, current present but below trip point, and current off or below the low end of the adjustable trip point range. Also these adjustable current switches can be used to monitor any change in AC current. A change in current may indicate motor failure, belt loss/slippage, or mechanical failure. Any time one of these events occurs, the current can significantly decrease, thus tripping the current switch and immediately notifying the Building Management System of the failure or problem.

Table 1. Operating Specifications

Model	Core Type	Switch Type	Trip Point	Output Switch Rating	Max. Sensing Current Voltage	Max. Continuous Current	Max. Current for 6 seconds	Max. Current for 1 second
MCSS-F	Solid	Fixed	< 0.20 Amps	0.50 Amp @ 36 VAC/ VDC	600 VAC	158 Amps	240 Amps	600 Amps
MCSP-F	Split	Fixed	< 0.55 Amps					
MCSS-A	Solid	Adjustable	0.32 - 150 Amps	1.00 Amp @ 36 VAC/ VDC				
MCSP-A	Split	Adjustable	0.70 - 150 Amps					

DIMENSIONS DIAGRAM

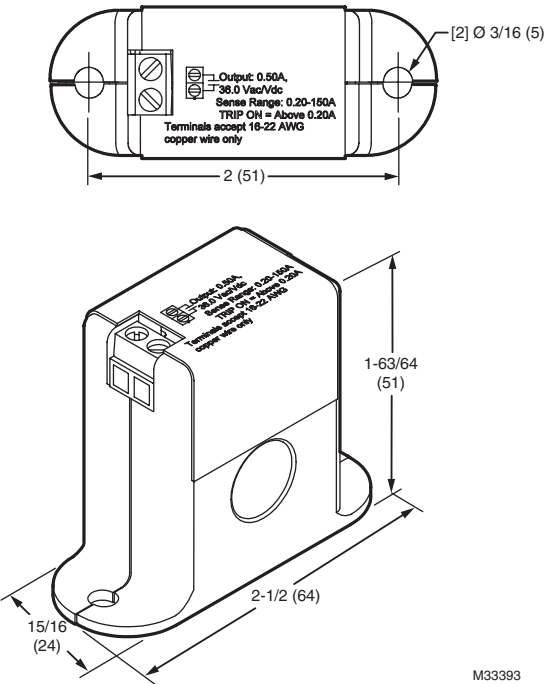


Fig. 1. Dimensions in Inches (mm) of the Solid Core Models MCSS-F and MCSS-A.

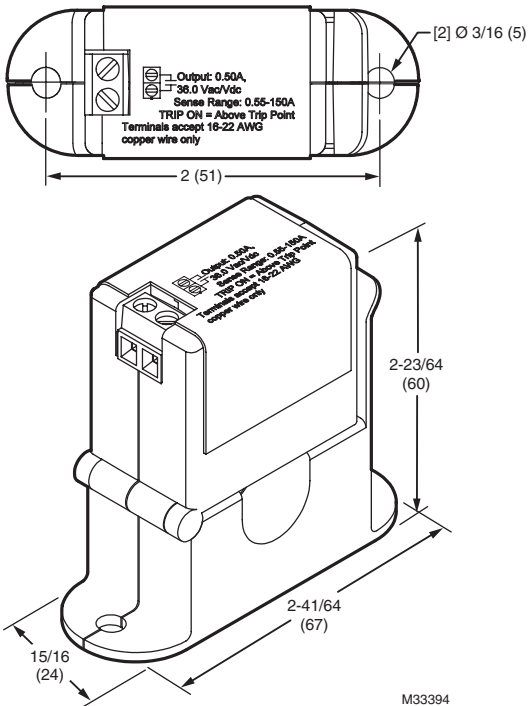


Fig. 2. Dimensions in Inches (mm) of the Split Core Models MCSS-F and MCSS-A.

Submittal Data - Sensors

Command Relays



FEATURES

- 35mm DIN-rail mounting flange
- SPDT Form 1C Relay contacts
- Pilot duty rated
- LED status indication
- Stackable for streamlined installation
- Can be used with any Honeywell analog current sensor or switch

APPLICATION

The CR (Command Relay) Series brings control (start/stop) functionality to your load trending and fan/pump/motor status monitoring applications. Each unit has a Form 1C-SPDT relay which means you have both a N/O and a N/C contact in the same unit. (See Table 1 for output ratings). The 35mm DIN-rail Mounting Flange will allow you to use the CR Series with any Honeywell analog current sensor or switch. The stacking feature will also allow you to reduce the required panel space, since up to two CR Series Command Relays may be stacked together during installation.

The command relays are for use with:

- Motor control
- Lighting applications
- Interposing relay
- Control pumps/compressors
- Appliances/industrial equipment

Table 1. Operating Specifications

Part #	Description	Contact Ratings (All SPDT)	Coils
CR-DC-5A	5 Amp SPDT Relay, 23-31.2 VDC Coil Voltage	5A (NO)/2A(NC) @ 250VAC, 5A(NO)/3A(NC) @ 125VAC	23-31.2VDC, 15mA@24VDC
CR-DC-12A	12 Amp SPDT Relay, 20-31.2 VDC Coil Voltage	12A @ 250VAC, 12A @ 30VDC	20-31.2VDC, 16mA@24VDC
CR-12DC-12A	12 Amp SPDT Relay, 10-15.6 VDC Coil Voltage	12A @ 250VAC, 12A @ 30VDC	10-15.6VDC, 30mA@12VDC
CR-24AC-10A	10 Amp SPDT Relay, 16-26.4 VAC Coil Voltage	10A @ 250VAC, 10A @ 24VDC	16-26.4VAC, 28mA@24VAC
CR-115AC-8A	8 Amp SPDT Relay, 80-132 VAC Coil Voltage	8A @ 250VAC, 8A @ 30VDC	80-132VAC, 10mA@115VAC
CR-230AC-8A	8 Amp SPDT Relay, 165-264 VAC Coil Voltage	8A @ 250VAC, 8A @ 30VDC	165-264VAC, 5mA@230VAC

DIMENSIONS DIAGRAM

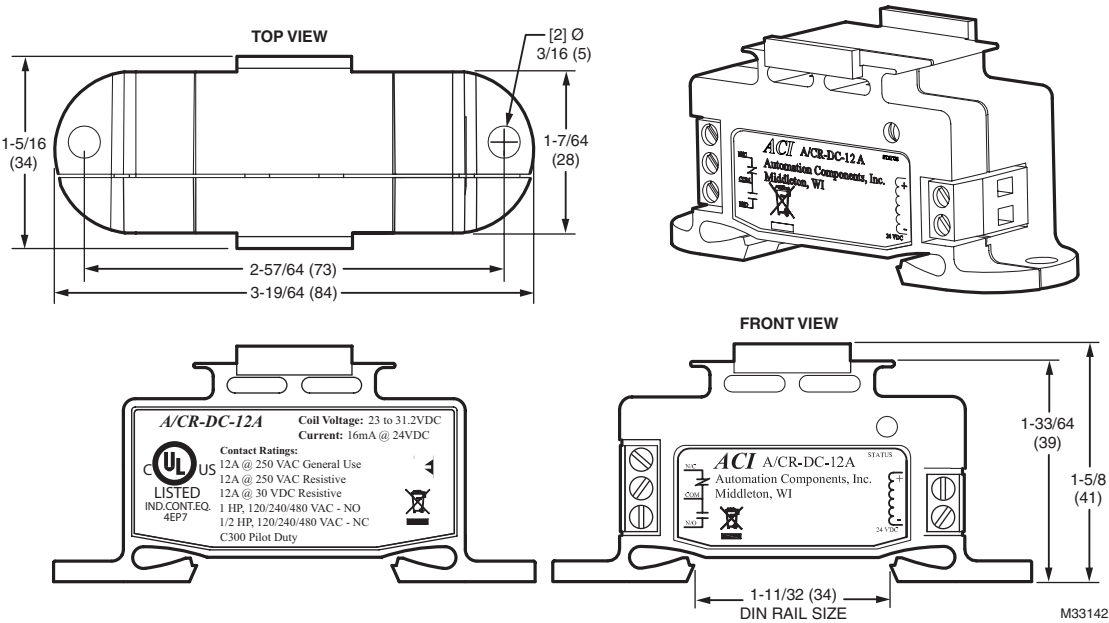


Fig. 1. Dimensions in Inches (mm).

Submittal Data - Sensors

Humidity/Temperature Sensors



FEATURES

- Thermoset polymer capacitive sensing element for high accuracy and fast response
- Multi-layer construction sensing element provides excellent resistance to wetting, dust and common environment
- Highly accurate, repeatable, stable output with negligible hysteresis
- Temperature compensated output
- Zero and span trimmers and increment/decrement recalibration feature.
- All units have selectable 4-20mA, 0-10Vdc, or 0-5Vdc output.

APPLICATION

The H7625, H7635 and H7655 are highly accurate, stable humidity transducers designed for use with HVAC controllers such as the T7350 Thermostat, H775 Remote Humidity Controller, and W7760 Direct Digital Controllers. The multi-layer thermoset polymer capacitive sensing element has stable low-drift performance and fast response time.

SPECIFICATIONS

Operating RH Range.....	0 to 100% RH.
Humidity Accuracy.....	±2%, ±3% or ±5% from 20 to 95% RH.
1K Ohm Temperature Accuracy.....	± (0.15 + 0.002t) C t = actual temperature in C
20K Ohm Temperature Accuracy.....	±0.4 °F at 77 °F (±0.2 °C at 25 °C)
1K Ohm Temperature	Room: 32 to 122 °F (0 to 50 °C).
Output Range.....	Duct: -58 to 572 °F (-50 to 300 °C).
20K Ohm Temperature	Room: 40° to 110 °F (4° to 43 °C).
Output Range.....	Duct/Outdoor: -40° to 240 °F (-40° to 116 °C).
Hysteresis.....	Less than ±0.5% RH.
Supply Voltage	4-20mA Output: 250 Ohm Load 15 – 40 VDC / 18 - 28 VAC 4-20mA Output: 500 Ohm Load 18 – 40 VDC / 18 - 28 VAC (500 Ohm Load Max) 0-5 VDC Output: 12 - 40 VDC / 18 - 28 VAC (10K Load Minimum) 0-10 VDC Output: 18 - 40 VDC / 18 – 28 VAC (10K Load Minimum)
Maximum Supply Current.....	Current Mode: 24 mA. Voltage Mode: 8 mA.
Finish	Room Enclosure: ABS Plastic (UL94-VO rated). Duct Enclosure: ABS Plastic (UL94-5VA rated). Outdoor Enclosure: ASA Plastic (UL-94V0 rated).
Compensated Temperature Range..	Room: 32 to 122 °F (-0 to 50 °C).
(Full RH Range)	Duct/Outdoor: -10 to 140 °F (-23 to 60 °C)
Humidity Response Time	200 seconds.
Saturation Response Time	10 minutes.
Sensitivity.....	0.1%RH.
Interchangeability.....	Less than ±3% RH nominal.
Repeatability.....	0.5% RH.
Long term drift.....	Less than 2% RH drift/5 years.

Table 1. Operating Specifications

Model Number	Replaces	RH Accuracy	Mounting	Temperature Sensor	Output Signal	Used With
H7625A2010	H7625A1008	2%	Room	20K ohm at 77F, reference 206598	Selectable 4-20mA, 0-10Vdc, or 0-5Vdc	T7350, H775, XL50, XL500, XFC, W7750B/C, W7753, W7760A/C, W7761
H7635A2012	H7635A1006	3%				
H7625B2006	H7625B1006	2%	Duct			
H7635B2018	H7635B1004	3%				
H7655B2014	H7655B1009	5%	Outdoor			
H7635C2015	H7635C1002	3%				
H7626A2020		2%	Room	1097 ohm at 77F		T775
H7636A2022		3%				
H7626B2024		2%	Duct			
H7636B2026		3%				
H7656B2029		5%				

DIMENSIONS DIAGRAM

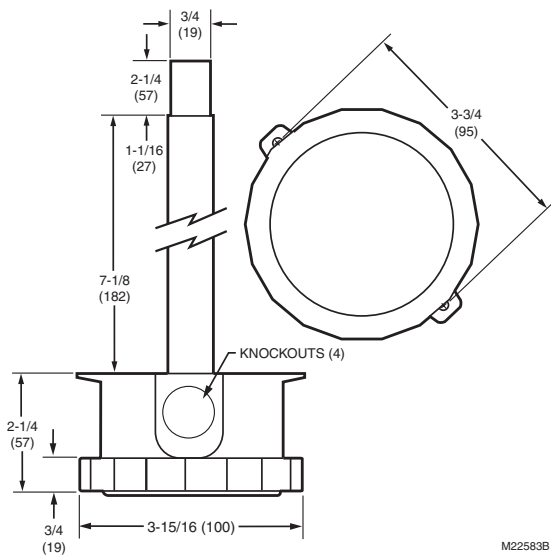


Fig. 1. Duct-mount Sensor Dimensions in In (mm).

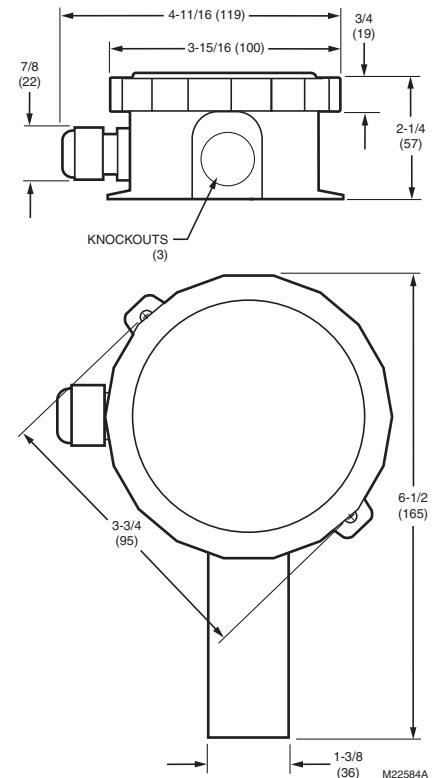


Fig. 2. Outdoor-mount Sensor Dimensions in Inches (mm).

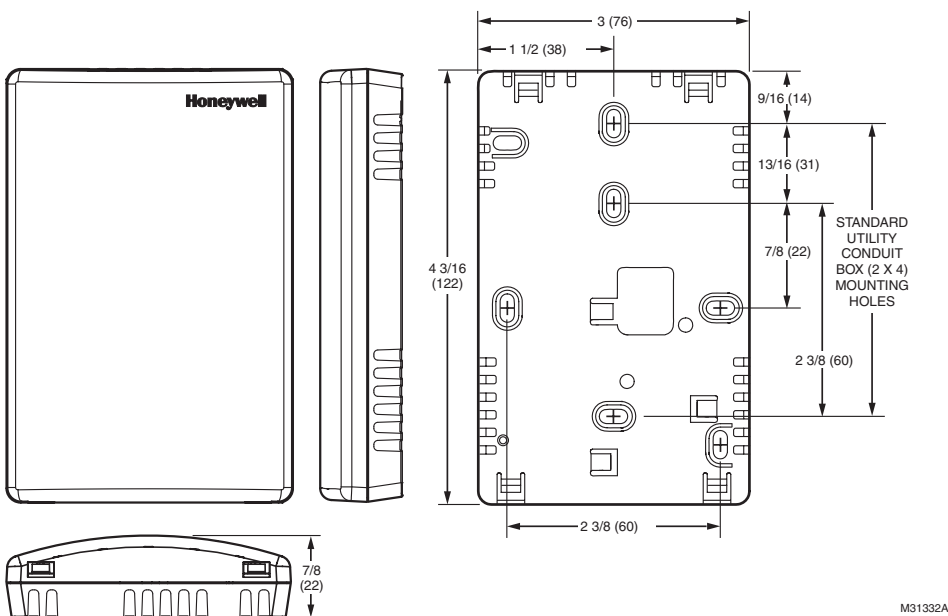


Fig. 3. Wall-mount Sensor Dimensions in In (mm).

Submittal Data - Sensors

Electronic Humidity Sensors



APPLICATION

H7655 and C7600 Solid State Humidity Sensors sense the relative humidity level of an area and is used with any controller capable of processing a 0-10 Vdc or 2-10 Vdc signal.

FEATURES

- Long-lasting solid state sensing element is accurate and stable over time.
- Enclosed in rugged, wall-mounted plastic case.
- Vents on top and sides of cover allow air flow to humidity sensing element.
- Compact size and lightweight construction provide easy mounting.
- C7600B provides 2-10 Vdc output directly proportional to relative humidity and can be used with the H775 Humidity Controller.
- H7655A provides 0-10 Vdc output directly proportional to relative humidity and can be used with the T7350 Temperature/Humidity Controller.

SPECIFICATIONS

Dimensions	See Fig. 1.
Case	Rugged, lightweight, compact plastic, easy to install.
Electrical Ratings	Input: 16-40 Vdc or 16-30 Vac.
Output	C7600B: 2-10 Vdc voltage signal; increases from 2 to 10Vdc as humidity increases. Output voltage is directly proportional to relative humidity increase. See Fig. 2. H7665A: 0-10 Vdc voltage signal; increases from 0 to 10Vdc as humidity increases. Output voltage is directly proportional to relative humidity increase. See Fig. 3.
Maximum Power Consumption.....	0.3 VA.
Mounting	Wall mount (directly to wall or standard outlet box).
Ambient Temperature Ranges.....	Operating: 32 °F to 125 °F (0 °C to 52 °C). Shipping: -40 °F to +150 °F (-40 °C to +66 °C).
Humidity Range	10 to 90 percent RH, noncondensing.
Humidity Accuracy	From 30 to 70% RH: ±5 percent RH. From 10 to 90% RH: ±7 percent RH.

DIMENSIONS DIAGRAM

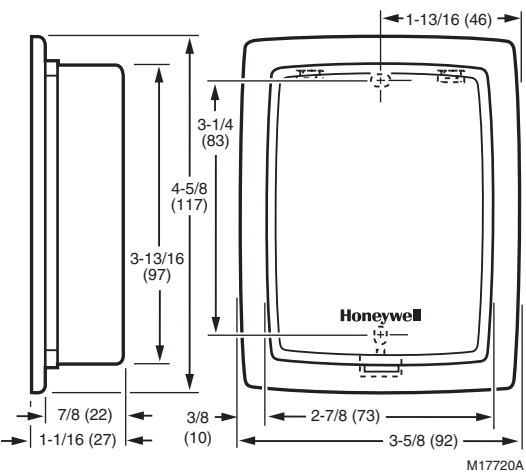


Fig. 1. C7600B, H7665A Dimensions in In (mm).

OUTPUT VOLTAGE CHARTS

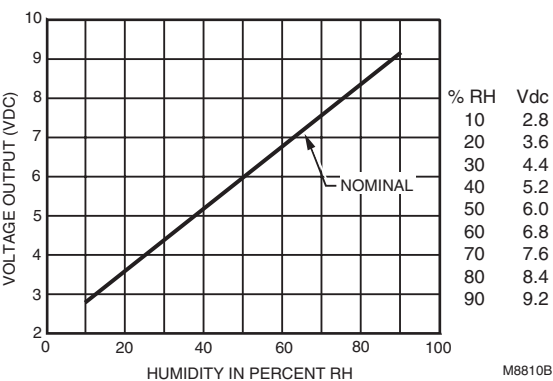


Fig. 2. C7600B Nominal Output Voltage Vs. Relative Humidity.

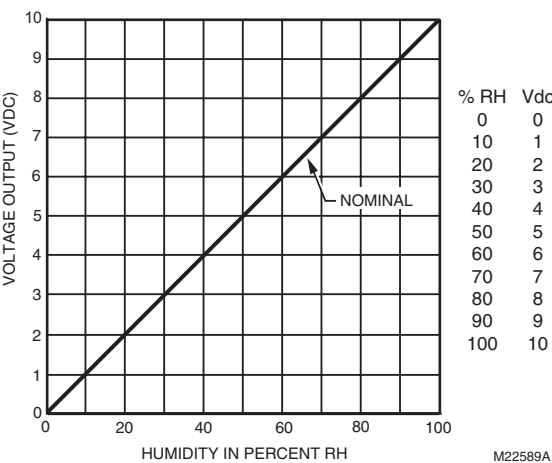


Fig. 3. H7665A Nominal Output Voltage Vs. Relative Humidity.

Submittal Data - Sensors

Dew Point Sensors



FEATURES

- Does not wait to detect when the dew point has already been reached, but rather provides an early warning of the approaching dew point
- Compact design
- Fast response
- Module is coated, thus protected against contamination
- Simple and easy mounting
- Status indication

SPECIFICATIONS

Supply Voltage	24 Vac/Vdc $\pm$ 20%
Power Consumption	< 10 mA (ac) / < 3 mA (dc)
Switch-points	RH > 90% $\pm$ 3% contact "open" RH < 90% $\pm$ 3% contact "closed"
Switching hysteresis	5% RH
Output	Potential-free relay with changeover contact
Switching voltage max	24 Vac/dc
Switching current max	1 A
Response time at change of pipe/wall temperature	< 3 min
Response time at change of relative humidity	< 25 s
Weight approx.	60 g
Operation temperature	0...50 °C (32...122 °F)
Storage temperature	20...70 °C (-4...158 °F)
Humidity	10...100% RH
Status indication	LED, red
Dust protection	Special coating (permeable for water vapor)
Housing protection	class IP40
Housing material	PC, fire resistant according to UL94-V0

APPLICATION

The HSS-DPS early-warning dew point switch is used to monitor the formation of condensation on chilled ceilings or to prevent condensation at critical spots of HVAC systems. It is also used as a dew point monitor for systems operating near the dewpoint. The dew point switch measures the relative humidity near the dew point using its high-quality capacitive sensor. At reaching the switching point the output will provide an early warning signal for the initiation of control steps (increasing the initial water temperature, reducing the cooling capacity, switching on the heating, etc...). An additional status light indicates the condensation danger. Thanks to the special protection coating, sensor and electronics are highly insensitive to dust and dirt. HSS-DPS dew point switch can be mounted on walls, ducts and pipes up to 50mm (2").

DIMENSIONS DIAGRAM

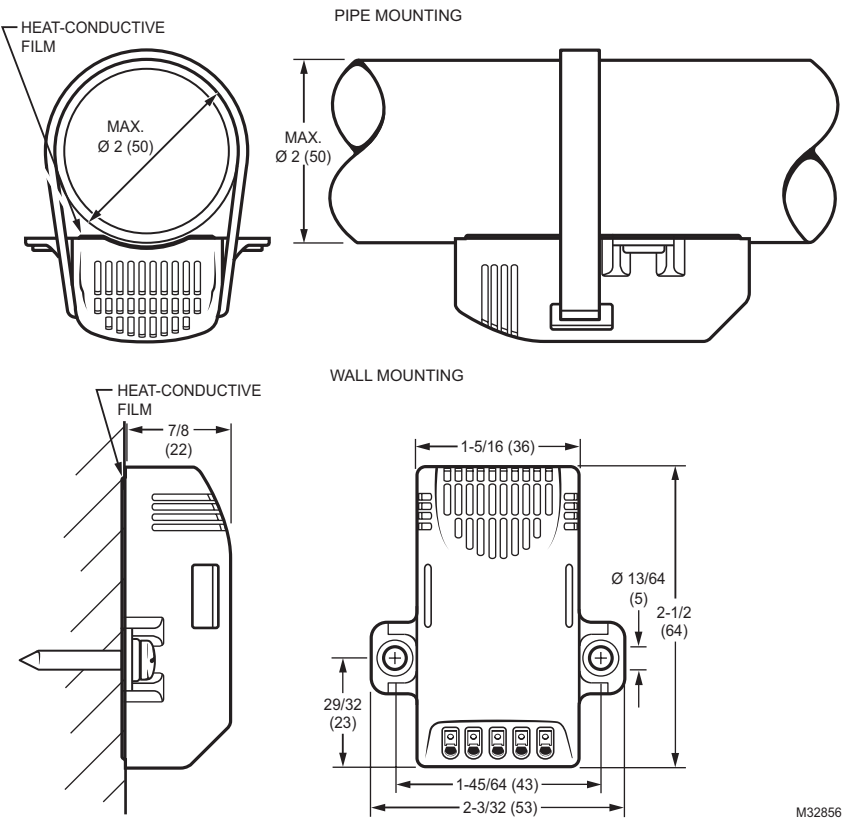


Fig. 1. Mounting (Dimensions in mm).

Submittal Data - Sensors

Carbon Dioxide Sensors

SPECIFICATIONS

Models.....	C7232 Sensor and Controller. A standalone carbon dioxide (CO ₂) sensor with two jumper-adjustable outputs (one analog and one SPST relay). C7232A: Wall mount model. C7232B: Duct mount model. NOTE: Models are available with or without a 4-digit LCD that indicates the current CO ₂ concentration.
Dimensions.....	C7232A: See Fig. 1. C7232B: See Fig. 2.
Sensor Response Time	1 min.
CO ₂ Sensor Operation	Non-dispersive infrared (NDIR).
CO ₂ Sensor Sampling	Diffusion
CO ₂ Sensor Range	0 to 2000 ppm
CO ₂ Sensor Accuracy.....	± (30 ppm +2% of reading)*
* This product complies with Title 24 Part 6, CEC Standard for Residential and Non-Residential Buildings—2005, when installed according to instructions.	
Power Supply	24 Vac/dc ±20%, 50/60 Hz (Class 2).
Maximum Power Consumption.....	3W.
Peak Current (at 20 ms)	600 mA.
Relay Configuration.....	Shipped N.O.
Contact Rating.....	1A at 50 Vac/24 Vdc.
Minimum Permissible Load	1 mA at 5 Vdc.
Linear Analog Output	Voltage: 0/2-10 Vdc (resistive load greater than 5000 ohms). Current: 0/4-20 mA (resistive load less than 500 ohms).
Outputs.....	Analog: 0-10 Vdc (Default: 2-10 Vdc, 500 to 1500 ppm). Relay: Normally Open SPST (Default: Close at 800 ppm).
Ambient Ratings.....	Temperature: Operating: +32°F to +122°F (0°C to +50°C). Storage: -4°F to +158°F (-20°C to +70°C). Relative Humidity (non-condensing): 0 to 95 percent.
CO ₂ Pressure Dependence	1.4% change in reading per 1 kPa deviation from 100 kPa.
Wiring Connections	C7232A: 20-gauge cable with six 8 in. leadwires. C7232B: 20-gauge cable with six 6 in. leadwires.
Mounting.....	C7232A: Vertical surface with standard single-gang junction box. C7232B: Sheet metal duct with a sampling tube. Automatic Background Calibration (ABC) default: On.
Calibration	This product is factory calibrated. No field calibration is necessary for the life of this product.
Approvals	CE Underwriters Laboratories Inc. Listed, File No. E4436 cUL C7232B: Flammability Rating, UL94-5V. C7232A: NEMA 1. C7232B: NEMA 3.



FEATURES

- Used for CO₂ based ventilation control.
- Models available with LCD that provides sensor readings and status information.
- Non-Dispersion-Infrared (NDIR) technology used to measure carbon dioxide gas.
- Device provides voltage or current output based on CO₂ levels.
- Models available with SPST relay output.
- Automatic Background Calibration (ABC) algorithm based on long-term evaluation reduces required typical zero-drift check maintenance.

APPLICATION

The C7232 Sensor and Controller is a standalone carbon dioxide (CO₂) sensor for use in determining ventilation necessity with HVAC controllers. The C7232 measures the CO₂ concentration in the ventilated space or duct. The C7232 is used in ventilation and air conditioning systems to control the amount of fresh outdoor air supplied to maintain acceptable levels of CO₂ in the space.

DIMENSIONS DIAGRAM

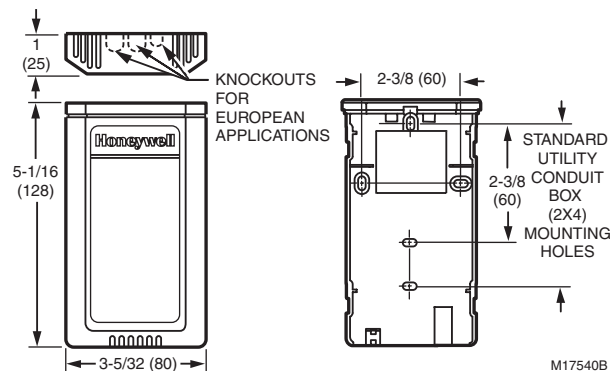


Fig. 1. C7232A Dimensions in In (mm).

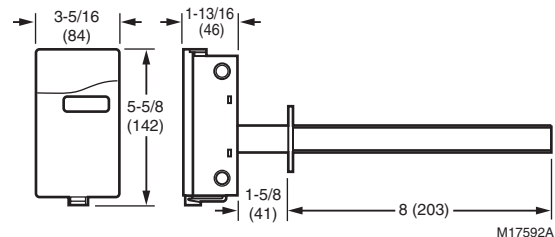


Fig. 2. C7232B Dimensions in In (mm).



SPECIFICATIONS

Models.....	C7632 Sensor and Controller. A stand-alone carbon dioxide (CO ₂) sensor with one 0-10 Vdc analog output.
	C7632A: Wall mount model.
	C7632B: Duct mount model.
Dimensions.....	C7632A: See Fig. 1.
	C7632B: See Fig. 2.
Operating Temperature	+32°F to +122°F (0°C to +50°C).
Storage Temperature.....	-4°F to +158°F (-20°C to +70°C).
Relative Humidity (non-condensing)	0 to 95 percent.
Automatic Background Calibration (ABC) default.....	On.
Electrical Ratings.....	Power Supply: 24 Vac ±20%, 50/60 Hz (Class 2).
Maximum Power Consumption.....	Average: 1W.
	Peak: 2W.
Peak Current (at 20 ms)	300 mA.
Linear Analog Output	0-10 Vdc.
Mounting.....	C7632A: Vertical surface with standard single-gang junction box.
	C7632B: Sheet metal duct with a sampling tube.
CO ₂ Pressure Dependence	1.6% change in reading per 1 kPa deviation from 100 kPa.
Output.....	Analog: 0-10 Vdc, 0-2000 ppm (fixed).
Sensor Performance Ratings	Response Time: 1 min.
Carbon Dioxide Sensor	Operation: Non-dispersive infrared (NDIR).
Sampling	Diffusion.
Range.....	0 to 2000 ppm (fixed).
Annual Drift.....	±10 ppm (nominal).
Accuracy	±(30 ppm+2%) at normal temperature/pressure.
Wiring Connections	C7632A: Terminal block.
	C7632B: 20-gauge cable with three 6 in. leadwires.
Approvals	CE.
	C7632B: Flammability Rating, UL94-5V.
	C7632A: NEMA 1.
	C7632B: NEMA 3.

FEATURES

- Non-Dispersion-Infrared (NDIR) technology used to measure carbon dioxide gas.
- Gold-plated sensor provides long-term calibration stability.
- Device provides voltage output based on CO₂ levels.
- Used for CO₂ based ventilation control.
- Automatic Background Calibration (ABC) algorithm based on long-term evaluation reduces required typical zero-drift check maintenance.
- Fixed 0 to 10 Vdc from 0 to 2000 ppm. No adjustments are necessary.
- Compatible with Honeywell Excel 10, 15, 5000 and any controller requiring 0-10 Vdc input.

APPLICATION

The C7632 Sensor and Controller is a standalone carbon dioxide (CO₂) sensor for use in determining ventilation necessity with heating ventilation and air conditioning (HVAC) controllers. The C7632 measures the CO₂ concentration in the ventilated space or duct. The C7632 is used in HVAC systems to control the amount of fresh outdoor air supplied to maintain acceptable levels of CO₂ in the space.

DIMENSIONS DIAGRAM

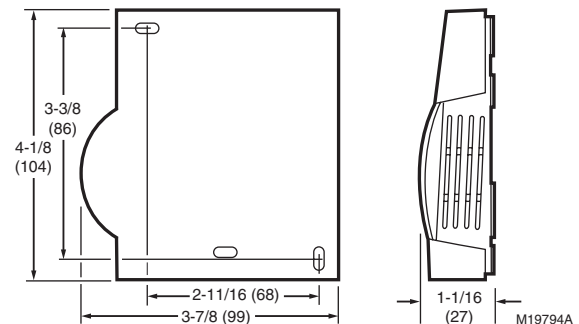


Fig. 1. C7632A Dimensions in Inches (mm).

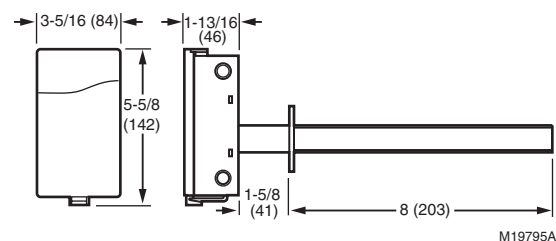


Fig. 2. C7632B Dimensions in Inches (mm).

Submittal Data - Sensors

Carbon Dioxide/Temperature Sensor



FEATURES

- Used for CO₂ based ventilation control.
- Integral 20K ohm NTC temperature output.
- Models available with LCD that provides CO₂ ppm level.
- Non-Dispersion-Infrared (NDIR) technology used to measure carbon dioxide gas.
- Device provides voltage or current output based on CO₂ levels.
- Models available with SPST relay output.
- Automatic Background Calibration (ABC) algorithm based on long-term evaluation reduces required typical zero-drift check maintenance.

APPLICATION

The C7262 Sensor is a stand-alone carbon dioxide (CO₂) and temperature sensor for use in determining ventilation necessity with HVAC controllers. The C7262 measures the CO₂ concentration and temperature in the ventilated space. The C7262 is used in ventilation and air conditioning systems to control the amount of fresh outdoor air supplied to maintain acceptable levels of CO₂ in the space and to sense the temperature of the space.

DIMENSIONS DIAGRAM

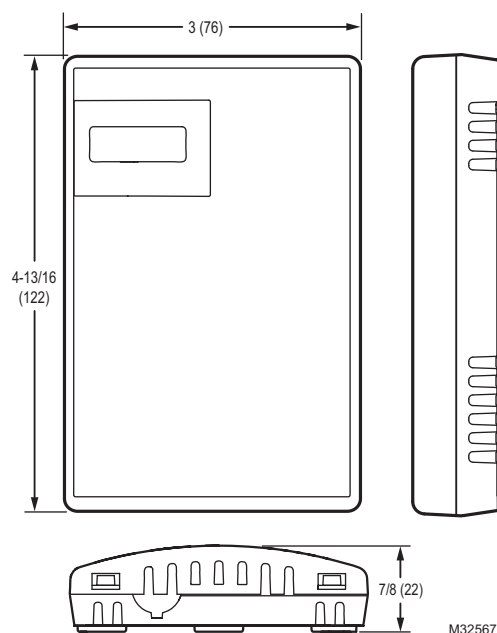


Fig. 1. C7262A dimensions in inches (mm).

SPECIFICATIONS

Models.....	C7262 Sensor. A stand-alone carbon dioxide (CO ₂) and temperature sensor with two jumper-adjustable CO ₂ outputs (one analog and one SPST relay). C7262A1008: Wall module with display. C7262A1016: Wall module without display.
Dimensions.....	See Fig. 1.
Operating Temperature	+32°F to +122°F (0°C to +50°C).
Storage Temperature.....	-4°F to +158°F (-20°C to +70°C).
Relative Humidity (non-condensing)	0 to 95 percent.
Automatic Background Calibration (ABC) default.....	On.
Electrical Ratings.....	Power Supply: 24 Vac $\pm$ 20%, 50/60 Hz (Class 2).
Maximum Power Consumption.....	1W
Peak Current (20 ms duration)	At rated voltages it is 120mA or less.
Linear Analog Output.	Voltage: 0/2-10 Vdc (resistive load greater than 5000 ohms). Current: 0/4-20 mA (resistive load less than 500 ohms).
Mounting.....	Vertical surface with standard single-gang junction box.
CO ₂ Pressure Dependence	1.6% change in reading per 1 kPa deviation from 100 kPa.
Sensor Performance Ratings	Response Time: Less than 3 min.
Carbon Dioxide Sensor	Operation: Non-dispersive infrared (NDIR). Accuracy: $\pm$ (30 ppm + 3% of reading) from 59°F to 85°F (15°C to 30°C).
Sampling	Diffusion.
Range.....	0 to 2000 ppm (adjustable).
Accuracy	$\pm$ (30 ppm + 3% of reading) from 59°F to 85°F (15°C to 30°C).
Wiring Connections	Terminals (16 gauge maximum)
Approvals	CE.



APPLICATION

The P7650 sensor can measure either air pressure or velocity. It is available in three installation configurations: duct, panel or universal. Duct and panel models have two pressure and velocity options: 0-1" WC / 0-3,000 FPM or 1-10" WC / 3,000-6,000 FPM with four field-selectable sub-ranges.

The universal model comes in one pressure/velocity range: 0-10" WC / 0-6,000 FPM with seven fieldselectable sub-ranges. All variants are available with and without display. The P7650 has an IP65/NEMA 4 environmental rating and a 5-year limited warranty.

- Duct static pressure (Pressure mode)
- Building or room pressure (Pressure mode)
- Filter status (Pressure mode)
- Air flow measurement (Velocity mode)

SPECIFICATIONS

Media Compatibility.....	Dry air or inert gas
Input Power	Three-wire Volt mode: 24 Vac or 12-30 Vdc*
Output Power Field-selectable	Two-wire mA mode: 12-30 Vdc* 2-wire, loop-powered 4-20 mA** (DC only, clipped and capped), 24 Vac/dc or 3-wire 0-5V/0-10V***
Response Time.....	Standard: T95 in 20 sec, Fast: T95 in 2 sec, DIP switch selectable
Pressure Mode	Selectable unidirectional or bidirectional (example: unidirectional 0 to 1 inch w.c., or bi-directional -1 to 1 inch w.c.), DIP switch selectable
Velocity Mode	Velocity is set up in Feet/Minute or Meters/second
Display (Option)	Pressure mode: Signed 3-1/2 digit LCD, indicates pressure, overrange indicator Velocity mode: Signed 4-1/2 digit LCD, indicates velocity, overrange indicator
Proof Pressure	3 psid (20.6 kPa)
Burst Pressure	5 psid (34.5 kPa)
Pressure Mode Accuracy	±1% F.S. (combined linearity and hysteresis)
Velocity Mode Accuracy.....	±90 FPM (±0.45 MS) plus 5% of measured value****
Temperature Effect	1" (250 Pa) models: 0.05%/°C; 10" (2.5 kPa) models: 0.01%/°C (Relative to 25 °C) 0 to 50 °C (32 to 122 °F)
Zero Drift (1-year)	1" (250 Pa) models: 2.0% max.; 10" (2.5 kPa) models: 0.5% max.

FEATURES

Reduce field failures

- Excellent tolerance to overpressure & vibration reduces field failures

Reduce setup

- Selectable ranges and scales reduce setup time and number of models to stock

High accuracy

- High accuracy digital sensor with seven selectable sub-ranges maintains calibration and reduces callbacks

Water-resistant housing

- IP65/NEMA 4 housing allows for mounting in wash-down locations

Maintenance free

- High reliability sensor technology for long-term, maintenance-free operation

Circuit protection

- Circuit protection avoids damage due to incorrect input wiring

Zero Adjust	Pushbutton auto-zero and digital input (2-pos terminal block)
Operating Environment	0 to 60 °C (32 to 140 °F)
Altitude of Operation	0 to 3000 m
Pollution Degree	2
Humidity Range.....	100% RH, non-condensing
Mounting Location.....	For indoor use only.
Fittings	Brass barb; 0.24" (6.1 mm) o.d.
Limited Warranty	5 years
Environmental Rating	IP65, NEMA 4
Flammability Rating	Plastic enclosure is UL 94 5VA fire retardant ABS
Accessories.....	32003169-001 4 in. Duct Pressure Pick-up Probe. P7650L6, P7650L8, P7650L10, P7650L12, or P7650L14, Velocity Pick-up Probes. (Last number is probe length, i.e., P7650L6 has 6 inch probe, etc) P7650Lx can also be used for pressure, use only one of the two pick-ups

EMC Conformance: EN 61000-6-3:2007 and A1:2011 Class B, EN 61000-6-1:2007

* Class 2 power source.

** Minimum input voltage for 4 to 20 mA operation: 250 W loop = 12 Vdc; 500 W loop = 19 Vdc.

*** Minimum load resistance for Volt operation: 5 kW.

**** For measured values between 200 and 7000 FPM (1 and 35 MS).

Submittal Data - Sensors

Pressure Transducers

Table 1. Operating Specifications

Model	Mounting	Selectable W.C. Range	Display	Output	Supply Voltage
P7650A1000	Panel	0-.1", 0-.25", 0-.5", 0-1"	Yes	0-10 Vdc, 0-5 Vdc, and 4-20 mA selectable	12-30 Vdc or 24 Vac
P7650A1018	Panel	0-.1", 0-.25", 0-.5", 0-1"	No	0-10 Vdc, 0-5 Vdc, and 4-20 mA selectable	12-30 Vdc or 24 Vac
P7650A1026	Panel	0-1", 0-2.5", 0-5", 0-10"	Yes	0-10 Vdc, 0-5 Vdc, and 4-20 mA selectable	12-30 Vdc or 24 Vac
P7650A1034	Panel	0-1", 0-2.5", 0-5", 0-10"	No	0-10 Vdc, 0-5 Vdc, and 4-20 mA selectable	12-30 Vdc or 24 Vac
P7650B1008	Duct	0-.1", 0-.25", 0-.5", 0-1"	Yes	0-10 Vdc, 0-5 Vdc, and 4-20 mA selectable	12-30 Vdc or 24 Vac
P7650B1016	Duct	0-.1", 0-.25", 0-.5", 0-1"	No	0-10 Vdc, 0-5 Vdc, and 4-20 mA selectable	12-30 Vdc or 24 Vac
P7650B1024	Duct	0-1", 0-2.5", 0-5", 0-10"	Yes	0-10 Vdc, 0-5 Vdc, and 4-20 mA selectable	12-30 Vdc or 24 Vac
P7650B1032	Duct	0-1", 0-2.5", 0-5", 0-10"	No	0-10 Vdc, 0-5 Vdc, and 4-20 mA selectable	12-30 Vdc or 24 Vac
P7650U1040	Universal	0-.1", 0-.25", 0-.5", 0-1" 0-2.5", 0-5", 0-10"	No	0-10 Vdc, 0-5 Vdc, and 4-20 mA selectable	12-30 Vdc or 24 Vac
P7650U1052	Universal	0-.1", 0-.25", 0-.5", 0-1" 0-2.5", 0-5", 0-10"	Yes	0-10 Vdc, 0-5 Vdc, and 4-20 mA selectable	12-30 Vdc or 24 Vac

DIMENSIONS DIAGRAM

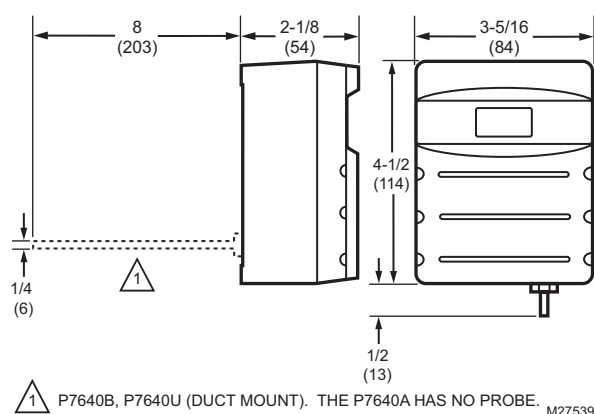


Fig. 1. Dimensions in Inches (mm).

Differential Air Pressure Sensors



The P7635 Series Low Differential Pressure transmitters are designed for use in OEM or high density panel mounting applications. Key installation features include an integral 35 mm Din rail mounting foot, vertically orientated wiring and pressure connections, and a pushbutton zero function conveniently located on the front cover. The P7635 incorporates a high accuracy, piezoresistive, silicon sensing element which senses differential pressure and provides a linear 4 to 20 mA or DC voltage output equal to the specified pressure range. This technology reduces warmup shift while also reducing the effect of package stress for increased long term stability.

In addition, the unit contains a de-pluggable terminal block that can be removed for ease of installation. This unit must be ordered with a single uni or bi-directional pressure range and output signal from +/- 0.1" of water column to a maximum pressure of +/- 10" of water column depending on your application. See the DLP Series pressure transmitter for a unit with 8 field selectable pressure ranges and three field selectable output signals.

All P7635 Series pressure transmitters are calibrated using NIST Certified equipment.

APPLICATIONS

- Building and Duct Static Pressure
- Filter Monitoring
- Air Flow Measurement
- Process Control
- Roof Top Units
- Air Handlers
- Clean Rooms
- Isolation Rooms
- Data Centers

SPECIFICATIONS

Media Compatibility.....	Dry air or inert non-conductive gases
Supply Voltage (VDC).....	0-5 VDC Output: +12-36 VDC 1-6 VDC & 0-10 VDC Output: +16-36 VDC 4-20 mA Output: +16-36 VDC (250 Ohm Load) +21-36 VDC (500 Ohm Load)
Supply Voltage (VAC).....	24 VAC +/- 10%, 50/60 Hz

Output Signals.....	4-20 mA: 2-wire Loop Powered (output limited to 20.5 mA maximum) 4-20 mA: 3-Wire, VAC Powered (output limited to 20.5 mA maximum) 0-5 VDC, 1-6 VDC, 0-10 VDC: 3-Wire, VAC or VDC Powered (output limited to 5.25, 6.25, & 10.25 VDC)
Response Time (T95).....	8 sec
Proof Pressure	Ranges < 1" wc (248.84 pa): 270" wc (67.2 kPa) Ranges > 1" wc (0.2488 kPa) to < 10" wc (2.488 kPa): 350" wc (87.12 kPa) Ranges > 10" wc (2.488 kPa) to < 40" wc (9953.6 kPa): 562" wc (140 kPa)
Burst Pressure	Ranges < 1" wc (248.84 pa): 415" wc (103.3 kPa) Ranges > 1" wc (0.2488 kPa) to < 10" wc (2.488 kPa): 550" wc (136.9 kPa) Ranges > 10" wc (2.488 kPa) to < 40" wc (9953.6 kPa): 1004.7" wc (250 kPa)
Accuracy	+/- 0.5% FSO (Standard)
Temperature Effects	+/- 0.056% FSO/°F (+/- 0.10% FSO/°C)
Zero Adjust	Pushbutton Zero Function (Recommended after 15 minutes warm up)
Operating Temperature	32 to 185°F (0 to 85°C)
Operating Humidity	10 to 95% RH, non-condensing
Storage Temperature.....	-40 to 176°F (-40 to 80°C)
Storage Temperature.....	10 to 95% RH, non-condensing
Flammability Rating.....	UL 94 V-0

DIMENSIONS DIAGRAM

Model	Pressure Range	Units	Range	Accuracy	Output	Supply Voltage	
P7635D01M	0 to 0.1 in wc	in. wc	Uni	0.5	4-20mA	+16-36 VDC (250 Ohm Load) +21-36 VDC (500 Ohm Load)	
P7635D025M	0 to 0.25 in wc		Uni				
P7635D05M	0 to 0.5 in wc		Uni				
P7635D1M	0 to 1 in wc		Uni				
P7635D2M	0 to 2 in wc		Uni				
P7635D5M	0 to 5 in wc		Uni				
P7635D10M	0 to 10 in wc		Uni				
P7635B01M	-0.1 to 0.1 in wc		bi		0-10Vdc		
P7635B025M	-0.25 to 0.25 in wc		bi				
P7635B05M	-0.5 to 0.5 in wc		bi				
P7635B1M	-1 to 1 in wc		bi				
P7635D2V	0 to 2 in wc		Uni				

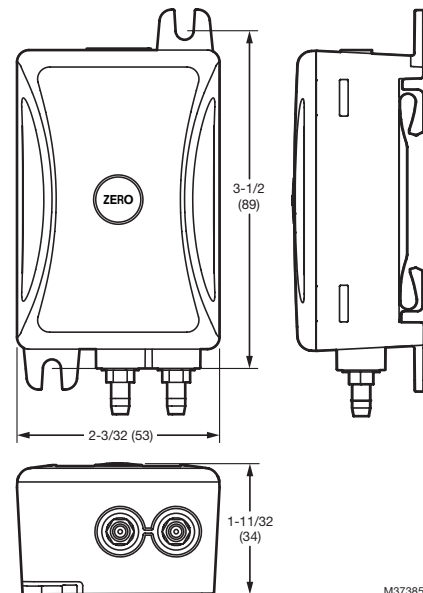


Fig. 1. Dimensions in Inches (mm).

Submittal Data - Sensors

Differential Pressure Transducers



APPLICATION

The PWT Series wet/wet differential pressure sensors provide reliable, accurate measurement and control of proper applications, including the monitor and control of pump differential pressure, chiller/boiler differential pressure drop and CW/HW system differential pressure. The PWT Series is ideal for measuring pressure across pumps, filters, heat exchangers, compressors and other non-corrosive wet media applications.

FEATURES

- The PWT Pressure Sensors incorporate microprocessor profiled sensors for exceptional accuracy and reliability.
- Field-selectable 4-20 mA, 0-5 Vdc, or 0-10 Vdc output.
- Jumper-selectable slow or fast response time.
- Switch-selectable pressure ranges (See Table 2).
- The jumper-selectable output switch for normal (4-20 mA) or reverse (20-4mA) operation provides application flexibility.
- Rugged, die-cast enclosure provides NEMA 4 sealing.
- Jumper-selectable port swap feature.
- All models offer both push button and digital input to zero the output. A microprocessor algorithm prevents accidental zero adjustment during normal operation.
- Used with the PWT-BV bypass valve manifold.

SPECIFICATIONS

Models.....	See Table 1.
Dimensions.....	See Fig. 1.
Media Compatibility.....	17-4 PH stainless steel
Supply Voltage	12 to 30 VDC, 24 VAC nom.
Maximum Current Draw DC	125 mA; AC: 280 mA
Proof Pressure	2x max. F.S. range
Burst Pressure	5x max. F.S. range
Accuracy at 25°C*	Ranges A, B, C: ±1% F.S.** Range D: ±2% F.S.**
Temperature Compensated Range	0° to 50 °C (32° to 122 °F); TC Zero <1.5% of product F.S. per sensor; TC Span <1.5% of product F.S. per sensor
Sensor Operating Range.....	-20° to 85 °C (-4° to 185 °F)
Long Term Stability	±0.25%
Zero Adjust	Push button auto-zero and digital input (2-position terminal block)
Operating Environment	-10° to 55 °C (14° to 131 °F); 10- 90% RH noncondensing
Fittings	1/8 in. NPT female, stainless steel 17-4 PH

* Accuracy combines linearity, hysteresis, and repeatability.

** F.S. is defined as full span of selected range in bidirectional mode.

Table 1. PWT Series Wet Differential Pressure Transducers

Model	Selectable Pressure Range	Output	Supply Voltage
PWT50	0-5, 0-10, 0-25, 0-50 psid	0-10Vdc, 0-5Vdc, and 4-20mA selectable	12-30Vdc or 24Vac
PWT100	0-10, 0-20, 0-50, 0-100 psid	0-10Vdc, 0-5Vdc, and 4-20mA selectable	12-30Vdc or 24Vac
PWT250	0-25, 0-50, 0-125, 0-250 psid	0-10Vdc, 0-5Vdc, and 4-20mA selectable	12-30Vdc or 24Vac

DIMENSIONS DIAGRAM

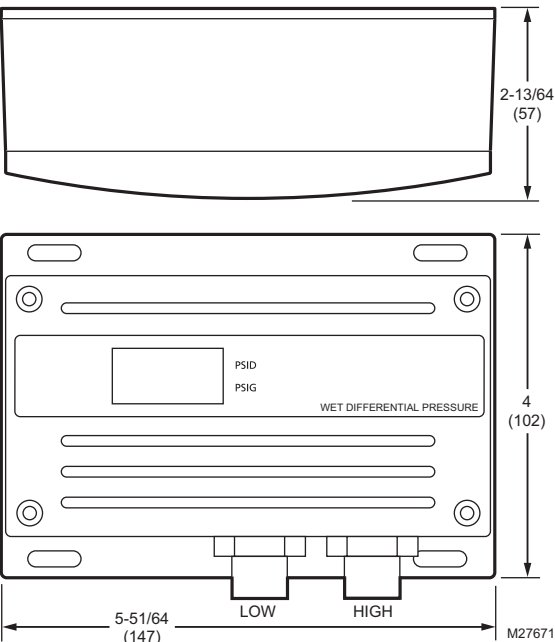


Fig. 1. Dimensional in in. (mm).

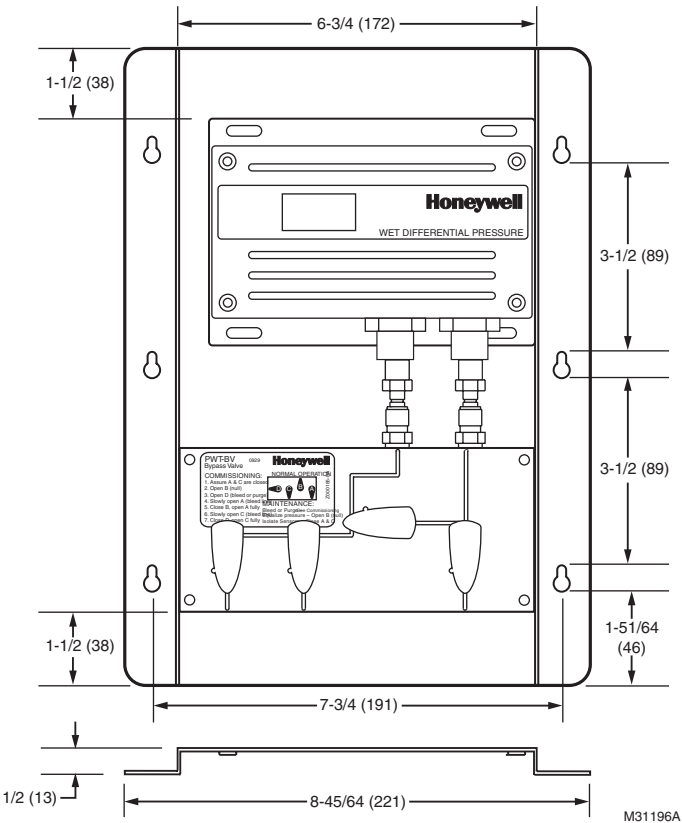


Fig. 2. Dimensional Drawing of PWT-BV Bypass Valve Manifold showing PWT (not included) for Reference Only.

Submittal Data - Sensors

Gauge Pressure Sensors



APPLICATION

The MLH Series is a two-wire 4-20mA gauge pressure sensor. This digitally compensated sensor offers an unparalleled value and performance combination, making it the ideal pressure sensing solution for demanding applications. The MLH series is available in pressure ranges up to 1000 psi.

FEATURES

- Available in 50, 150, 300, 500 and 1000 psi.
- All metal wetted parts for use in a wide variety of fluid applications.
- Suitable for use with refrigerants.
- No internal elastomeric seals mean no o-ring compatibility issues.
- 3 meter cable standard.
- Reverse polarity and overvoltage protection—protects against reversed excitation.
- Less than 2 ms response time provides accurate, high speed measurement.
- Select models available with 1/4-in. SAE female Schrader connection with valve depressor.
- Exceeds CE heavy industrial EMC for use in areas of high RFI/EMI.

SPECIFICATIONS

(All specifications are measured at 25°C (77°F) and at rated excitation unless otherwise specified.)

Operating temperature range	-40° C to 125° C (-40° F to 257° F)
Storage temperature range	-40° C to 125° C (-40° F to 257° F)
Compensated temperature range.....	-40° C to 125° C (-40° F to 257° F)
Proof Pressure	3X Working Pressure Range (50-500 psi) 2X Working Pressure Range (1000 psi)
Burst Pressure	10X Working Pressure Range
Dimensions.....	See Fig. 1 and 2.
Housing Material	Black plastic — Amodel AS-4133 HS - PPA
Material in contact with media.....	Stainless steel 304L and Haynes 214 alloy
Excitation.....	9.5Vdc to 30Vdc
Signal Output.....	4mA to 20mA
Zero Output	4.0mA
Full Scale Span (FSS).....	16mA (4 to 20mA)
Supply rejection ratio.....	90db
Termination	Cable (3 meter) Red Lead (Excitation) White Lead (Output Signal)
Shock.....	50 g peak [5 ms], 100 g peak [11 ms]
Vibration	MI - STD- 810C. Figure 514.2-5, Curve AK, Table 514.2-V, Random Vibration Test [overall g rms = 20.7 min.]

TABLE 1. MLH Specifications

Parameter	Specification
Response Time	<2 ms
Accuracy ¹	
<100 psi	±0.50% FSS
≥100 psi	±0.25% FSS
Total error band ²	
<300 psig (-40°C to 125°C [-40°F to 257°F])	±3% FSS
≥300 psig (>65°C to 125°C [>149°F to 257°F])	±2% FSS

¹ Includes pressure non-linearity (BFS), pressure hysteresis, and non-repeatability. Thermal errors are not included.

² Includes zero error, span error, thermal effect on zero, thermal effect on span, thermal hysteresis, pressure-non-linear-ity, pressure hysteresis, and non-repeatability.

TABLE 2. MLH Models

Old Part Number	New Part Number	Pressure Range	Pressure Connection
50035430-050/U	MLH050PSCDJ1235	0-50 psig	1/4"-18 NPT
50035430-150/U	MLH150PSCDJ1236	0-150 psig	1/4"-18 NPT
50035430-300/U	MLH300PSCDJ1237	0-300 psig	1/4"-18 NPT
50035430-500/U	MLH500PSCDJ1240	0-500 psig	1/4" SAE female Schrader
50035430-01K/U	MLH01KPSCDJ1241	0-1000 psig	1/4" SAE female Schrader

DIMENSIONS DIAGRAM

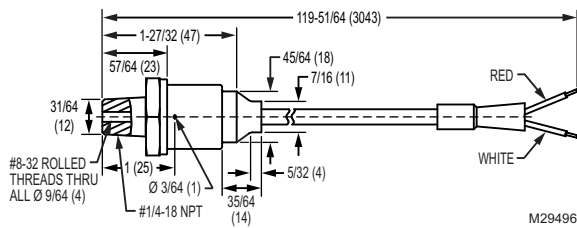


Fig. 1. MLH050PSCDJ1235/MLH150SCDJ1236/MLH300PSCDJ1237 Dimensions in Inches (mm).

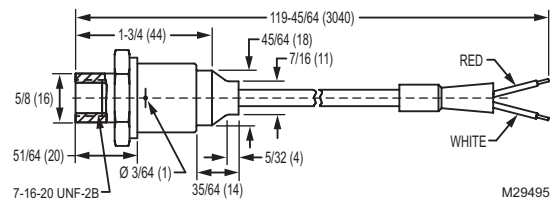


Fig. 2. MLH01KPSCDJ1241/MLH500PSCDJ1240 Dimensions in Inches (mm).

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Appendix A: Valve Selection and Sizing

Introduction

This section provides information on valve selection and sizing. Valves must be selected for ability to meet temperature, pressure, flow control characteristic, and piping connection requirements of the hydronic system. Valve sizing is critical to ensure support for heating and cooling loads with adequate valve capacity, yet able to control system flow to provide stable building conditions efficiently.

Definitions

Valve Components

Actuator: The part of an automatic control valve that moves the stem based on an electric, electronic, or pneumatic signal from a controller. The actuator and valve can be two separate devices or together they can be one device.

Body: The valve casting through which the controlled fluid flows (Fig. 1).

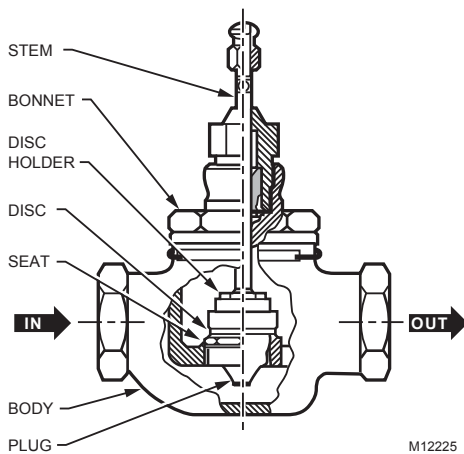


Fig. 1. Globe Valve Components.

Bonnet: The part that screws to the top of the valve body and contains the packing that seals and guides the valve stem.

Disc: The part of the valve assembly that contacts the valve seat to close off flow of the controlled fluid. Some valve assemblies are built so the disc is replaceable. Replaceable discs are usually made of a composition material softer than metal. "Metal trim" valves use precisely-machined metal plugs and seats operated by high force actuators instead of a disk.

Plug: The part that varies the opening for the fluid to flow through the valve body. The following describes the three most common types of plugs:

- A contoured plug has a shaped end that is usually end-guided at the top or bottom (or both) of the

valve body. The shaped end controls fluid flow through the valve with respect to stem travel.

- A V-port plug has a cylinder, called a skirt, that rides up and down in the valve seat ring. The skirt guides the plug and varies the flow area with respect to stem travel via its shaped openings.
- A quick-opening plug is flat and is either end-guided or guided by wings riding in the valve seat ring. The flat plug provides maximum flow soon after it lifts from the valve seat.

Port: The opening in the valve seat.

Seat: The stationary part of the valve body that has a raised lip to contact the valve disc when closing off flow of the controlled fluid.

Stem: The shaft that runs through the valve bonnet and connects an actuator to the valve plug.

Trim: All parts of the valve that contact the controlled fluid. Trim includes the stem, packing, plug, disc, and seat; it does not include the valve body.

Valve Flow Characteristics

Direction of Flow: The correct flow of the controlled fluid through the valve is usually indicated on the valve body. If the fluid flow through the valve is incorrect, the disc can slam into the seat as it approaches the closed position. The result is poor control, excessive valve wear, and noisy operation. In addition, the actuator must work harder to reopen the closed valve since it must overcome the pressure exerted by the fluid on top of the disc rather than have the fluid assist in opening the valve by exerting pressure under the disc. Gate and butterfly valves may offer bi-directional flow.

Equal percentage: A valve which changes flow by an equal percentage (regardless of flow rate) for similar movements in stem travel (at any point in the flow range).

Linear: A valve which provides a flow-to-lift relationship that is directly proportional. It provides equal flow changes for equal lift changes, regardless of percentage of valve opening.

Quick-opening: A valve which provides maximum possible flow as soon as the stem lifts the disc from the valve seat.

Valve flow characteristic: The relationship between the stem travel of a valve, expressed in percent of travel, and the fluid flow through the valve, expressed in percent of full flow.

Appendix A: Valve Selection and Sizing

Valve Flow Terms

Rangeability: The ratio of maximum flow to minimum controllable flow. Approximate rangeability ratios are 50 to 1 for V-port globe valves and 30 to 1 for contoured plug valves.

EXAMPLE:

A valve with a total flow capacity of 100 gpm full open and a rangeability of 30 to 1, can accurately controls flow accurately as low as 3 gpm.

Tight shut-off/close-off: A valve condition in which virtually no leakage of the controlled fluid occurs in the closed position. Generally, only single-seated valves provide tight shut-off. Double-seated valves typically have a one to three percent leakage in the closed position.

Turndown: The ratio of maximum flow to minimum controllable flow of a valve installed in a system. Turndown is equal to or less than rangeability.

EXAMPLE:

For the valve in the rangeability example, if the system requires a 66 gpm maximum flow through the valve and since the minimum accurately controllable flow is 3 gpm, the turndown is 22.

Valve Ratings

Flow coefficient (capacity index): Used to state the flow capacity of a control valve for specified conditions. In the control valve industry currently one of three flow coefficients is used depending upon the location and system of units; British A_v , European k_{vs} , or United States C_v . The flow coefficients have the following relationships:

$$\begin{aligned} A_v &= 0.0000278 k_{vs} \\ A_v &= 0.0000240 C_v \\ k_{vs} &= 0.865 C_v \end{aligned}$$

The flow coefficient A_v is in cubic meters per second and can be determined from the formula:

$$A_v = Q \sqrt{\frac{\rho}{\Delta p}}$$

Where:

Q = volumetric flow in cubic meters per second.
 ρ = fluid density in kilograms per cubic meter.
 Δp = static pressure loss across the valve in pascals.

The flow coefficient k_{vs} is water flow in cubic meters per hour with a static pressure loss across the valve of

10^5 pascals (1 bar) within the temperature range of 5 to 40°C and can be determined from the formula:

$$k_{vs} = Q \sqrt{\frac{\Delta p k_{vs}}{\Delta p} \cdot \frac{\rho}{\rho_w}}$$

Where:

Q = volumetric flow in cubic meters per hour.
 ρ = fluid density in kilograms per cubic meter.
 ρ_w = density of water in kilograms per cubic meter.
 $\Delta p k_{vs}$ = static pressure loss of 10^5 pascals.
 Δp = static pressure loss across the valve in pascals.

The flow coefficient C_v is water flow in gallons per minute with a pressure loss across the valve of one pound per square inch within the temperature range of 40 to 100F and can be determined for other conditions from the formula:

$$C_v = Q \sqrt{\frac{1}{\Delta p} \cdot \frac{\rho}{\rho_w}}$$

Where:

Q = volumetric flow in US gallons per minute.
 ρ = fluid density in pounds per cubic foot.
 ρ_w = density of water in pounds per cubic foot within the temperature range of 40 to 100F
 Δp = static pressure loss across the valve in pounds per square inch.

Close-off rating: The maximum pressure drop that a valve can withstand without leakage while in the full closed position. The close-off rating is a function of actuator power to hold the valve closed against pressure drop, by structural parts such as the stem can be the limiting factor. The construction of gate-style valves, such as ball valves, often allows them to hold back high head pressures in the closed position, although the actuator may not be powerful enough to operate the valve against such forces.

EXAMPLE:

A valve with a close-off rating of 10 psi could have 40 psi upstream pressure and 30 psi downstream pressure. Note that in applications where failure of the valve to close is hazardous, the maximum upstream pressure must not exceed the valve close-off rating, regardless of the downstream pressure.

The valve close-off rating is independent of the actual valve body rating. See definition of BODY RATING (ACTUAL).

Appendix A: Valve Selection and Sizing

Close-off rating of three-way valves: The maximum pressure difference between either of the two inlet ports and the outlet port for mixing valves, or the pressure difference between the inlet port and either of the two outlet ports for diverting valves.

Pressure drop: The difference in upstream and downstream pressures of the fluid flowing through the valve.

Pressure drop (critical): The flow of a gaseous controlled fluid through the valve increases as the pressures drop increases until reaching a critical point. This is the critical pressure drop.

Any increase in pressure drop beyond the critical pressure drop is dissipated as noise and cavitation rather than increasing flow. The noise and cavitation can destroy the valve and adjacent piping components.

Body rating (nominal): The theoretical pressure rating, expressed in psi, of the valve body exclusive of packing, disc, etc. The nominal rating is often cast on the valve body and provides a way to classify the valve by pressure. A valve of specified body material and nominal body rating often has characteristics such as pressure-temperature ratings, wall thickness, and end connections which are determined by a society such as ANSI (American National Standards Institute). Figure 2 shows ANSI pressure-temperature ratings for valves. Note that the nominal body rating is not the same as the actual body rating.

Body rating (actual): The correlation between safe, permissible flowing fluid pressure and flowing fluid temperature of the valve body (exclusive of the packing, disc, etc.). The nominal valve body rating is the permissible pressure at a specific temperature.

EXAMPLE:

From Figure 2, a valve with an ANSI rating of 150 psi (ANSI Class 150) has an actual rating of 225 psi at 250F.

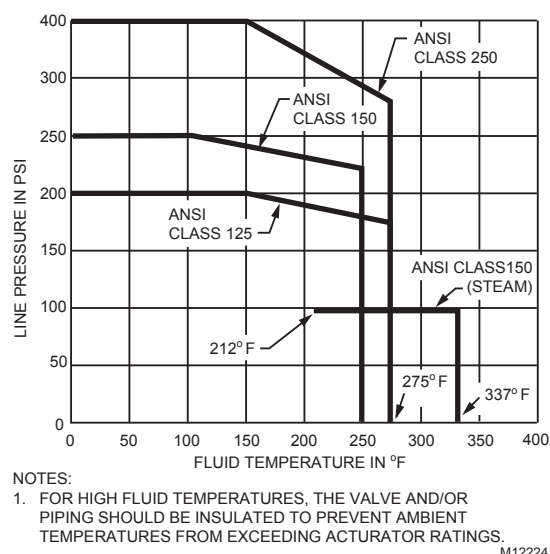


Fig. 2. Sample ANSI Pressure-Temperature Ratings for Valves.

Maximum pressure and temperature: The maximum pressure and temperature limitations of fluid flow that a valve can withstand. These ratings may be due to valve packing, body, or disc material or actuator limitations. The actual valve body ratings are exclusively for the valve body and the maximum pressure and temperature ratings are for the complete valve (body and trim). Note that the maximum pressure and temperature ratings may be less than the actual valve body ratings.

EXAMPLE:

The body of a valve, exclusive of packing, disc, etc., has a pressure and temperature rating of 125 psi at 335F. If the valve contains a composition disc that can withstand a temperature of only 240F, then the temperature limit of the disc becomes the maximum temperature rating for the valve.

Valve Types

Ball valve: A ball valve has a precision ball between two seats with a body (Fig. 3). Ball valves have several port sizes for a given body size and go from closed to open with a 90 degree turn of the stem. They are available in both two-way and three-way configurations. For HVAC applications, ball valve construction includes brass and cast iron bodies; stainless steel, chrome plated brass, and cast iron balls; resilient seats with various temperature ratings. Ball valves provide tight shut-off, while full port models have low flow resistance, and models with flow characterizing inserts can be selected for modulating applications.

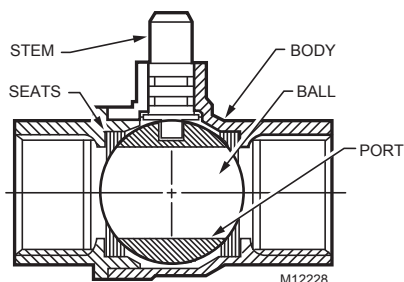


Fig. 3. Ball Valve.

Butterfly valve: A valve with cylindrical body, a shaft, and a rotating disc (Fig. 4). The disc rotates 90 degrees from open to closed. The disc seats against a resilient body liner or spring-loaded metal seat and may be manufactured for tight shut-off or made smaller for reduced operating torque at lower close-off. Butterfly valves have limited rangeability for modulating applications so are used mainly for two-way operation. For three-way applications, two butterfly valves are assembled to a pipe tee with linkage for simultaneous operation.

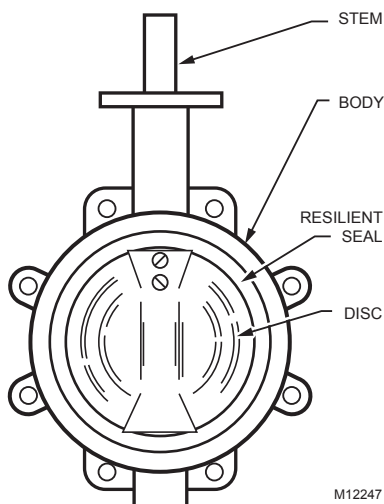


Fig. 4. Butterfly Valve.

Double-seated valve: A valve with two seats, plugs, and discs.

Double-seated valves are suitable for applications where fluid pressure is too high to permit a single seated valve to close. The discs in a double-seated valve are arranged so that in the closed position there is minimal fluid pressure forcing the stem toward the open or closed position; the pressure on the discs is essentially balanced. For a valve of given size and port area, the double-seated valve requires less force to operate than the single-seated valve so the double seated valve can use a smaller actuator than a single seated.

Also, double-seated valves often have a larger port area for a given pipe size. A limitation of double-seated valves is that they do not provide tight shut-off. Since both discs rigidly connect together and changes in fluid temperature can cause either the disc or the valve body to expand or contract, one disc may seat before the other and prevent the other disc from seating tightly.

Flanged-end connections: A valve that connects to a pipe by bolting a flange on the valve to a flange screwed onto the pipe. Flanged connections are typically used on large valves only.

Gate valve: A valve that controls flow using a gating mechanism, usually a plate, that moves across the valve seat instead of pushing against the flow. The actuator works against the friction of the seals rather than directly against the force of the water. Gate valves are inherently self-sealing and are often capable of high close-off pressures without an actuator. Ball valves are a type of gate valve.

Globe valve: A valve which controls flow by moving a circular disk against or away from a seat. When used in throttling control a contoured plug (throttling plug) extends from the center of circular disk through the center of the seat for precise control (Fig. 1).

Pressure-balanced valve: A globe valve with a sealed pressure chamber built into the plug, which equalizes head pressure across the seat and allows most of the actuator force to be used to close off the flow, resulting in very high close-off ratings with very low seat leakage.

Reduced-port valve: A valve with a capacity less than the maximum for the valve body. Ball, butterfly, and smaller globe valves are available with reduced ports to allow correct sizing for good control.

Appendix A: Valve Selection and Sizing

Single-seated valve: A valve with one seat, plug, and disc.

Single-seated valves are suitable for applications requiring tight shut-off. Since a single-seated valve has nothing to balance the force of the fluid pressure exerted on the plug, it requires more closing force than a double-seated valve of the same size and therefore requires more actuator force than a double-seated valve.

Threaded-end connection: A valve with threaded pipe connections. Valve threads are usually tapered female, to National Pipe Thread standards, but male connections are available for special applications. Some valves have an integral union for easier installation.

Three-way valve: A valve with three ports. The internal design of a three-way valve classifies it as a mixing or diverting valve. Three-way valves control liquid in modulating or two-position applications and do not provide tight shut-off.

Two-way valve: A valve with one inlet port and one outlet port. Two-way valves control water or steam in two-position or modulating applications and provide tight shut-off in both straight through and angle patterns.

Valve Material and Media

Valves with bronze or cast iron bodies having brass or stainless steel trim perform satisfactorily in HVAC hydronic systems when the water is treated properly. Failure of valves in these systems may be an indication of inadequate water treatment. The untreated water may contain dissolved minerals (e.g., calcium, magnesium, or iron compounds) or gases (e.g., carbon dioxide, oxygen, or ammonia). Inadequate treatment results in corrosion of the system. Depending on the material of the valve, the color of the corrosion may indicate the substance causing the failure (Table 1).

Table 1. Corrosive Elements in Hydronic Systems.

Brass or Bronze Component	
Corrosive Substance	Corrosion Color
Chloride	Light Blue-Green
Ammonia	Blue or Dark Blue
Carbonates	Dark Blue-Green
Magnesium or Calcium	White
Oxides	Black (water)
Sulphide (Hydrogen)	Black (Gas)
Iron	Rust
Iron or Steel Component	
Corrosive Substance	Corrosion Color
Magnesium or Calcium	White
Iron	Rust

Petroleum products from sources such as cutting oils, solder flux, etc. can cause some rubber compounds to swell and interfere with moving parts.

Chloramines, chemical compounds of ammonia and chlorine used to treat municipal drinking water, are reported to attack some rubber compounds commonly used in closed loop hydronic systems.

Particulate present in the system can interfere with, and sometimes damage moving parts. Examples include: rust (Fe_2O_3), magnetite (Fe_3O_4), sand (quartz granules), silt from municipal water, iron filings from pipe threads, and scale precipitated from hard water. Rust, in particular, is highly abrasive and can rapidly wear out stem seals, causing leaks.

To prevent damage to valves and pumps, a complete flushing of the system during commissioning, including the existing structure when building an addition, may be required to remove physical particulate. Additional components may also be needed, such as in-line Y-strainers for large objects such as stones or solder blobs and mechanical filtration, such as a 50 micron 10% side-stream filter piped in parallel with the system pumps.

Glycol solutions may be used to prevent hydronic systems freezing. Glycol solutions should be formulated for HVAC systems. Some available glycol solutions formulated for other uses contain additives that are injurious to some system seals. In addition, hydronic seals react differently to water and glycol such that when a new system is started up with water or glycol the seals are effective. The hydronic seals are likely to leak if the system is later restarted with media changed from water to glycol or glycol to water. To prevent leakage part of the process of media changeover should include replacing seals such as, pump and valve packing. Glycol mixtures are usually limited to 50% concentration. At 60% concentration, glycol mixtures have their minimum freezing temperature, but can have unstable phase changes which may severely damage a system.

Valve Selection

Proper valve selection matches a valve to the control and hydronic system physical requirements. First consider the application requirements and then consider the valve characteristics necessary to meet those requirements. The following questions provide a guide to correct valve selection.

- What is the piping arrangement and size?

The piping arrangement indicates whether a two-way or three-way mixing or diverting valve is needed. The piping size gives some indication of whether the valve requires a screwed end or a flanged end connection.

- Does the application require two-position control or proportional control? Does the application require a normally open or normally closed valve? Should the actuator be direct acting or reverse acting?

In its state of rest, the valve is normally open or closed depending on the load being controlled, the fluid being controlled, and the system configuration.

For chilled water coils, it is usually preferable to close the valve on fan shutdown to prevent excessive condensation around the duct and coil, and to save pumping energy. This may be accomplished with either normally closed valves or a variety of other control schemes. Lower cost and more powerful normally open valve assemblies may be used with the close-on-shutdown feature and allow, in the case of pneumatic systems, the capability to provide heating or cooling in the event of air compressor failure.

Converter control valves should be normally closed and outdoor air preheat valves should be normally open.

- Is tight shut-off necessary? What differential pressure does the valve have to close against? How much actuator close-off force is required?

Valves should never be allowed to "dead head" a pump unless the pumps are controlled by variable speed drive systems capable of detecting such conditions and shutting down the pumps.

Single-seated valves provide tight shut-off, while double-seated valves do not. Double seated valves are acceptable for use in pressure bypass or in-line throttling applications.

The design and flow capacity of a valve determine how much actuator force is required for a given close-off. Therefore, the valve must first be sized, then, the valve and actuator selected to provide the required close-off.

- What type of medium is being controlled? What are the temperature and pressure ranges of the medium?

Valves must be compatible with system media composition, maximum and minimum temperature, and maximum pressure. The temperature and pressure of the medium being controlled should not exceed the maximum temperature and pressure ratings of the valve.

For applications such as chlorinated water or brine, select valve materials to avoid corrosion.

- What is the pressure drop across the valve? Is the pressure drop high enough?

The full open pressure drop across the valve must be high enough to allow the valve to exercise control over its portion of the hydronic system. However, the full open pressure drop must not exceed the valve's rating for quiet service and normal life. Closed pressure drop must not exceed valve and actuator close-off rating.

Globe Valve

Globe valves are popular for HVAC applications. They are available in pipe sizes from 1/2 in. to 12 in. and in a large variety of capacities, flow characteristics, and temperature and pressure capabilities. They provide wide rangeability and tight shutoff for excellent control over a broad range of conditions. Globe valves are made in two-way, straight or angle configurations and three-way mixing and diverting designs. Globe valves close against the flow and have arrows on the body indicating correct flow direction. Incorrect piping can result in stem oscillations, noise, and high wear.

A two-way globe valve has one inlet port and one outlet port (Fig. 5) in either a straight through or angle pattern. The valve can be either push-down-to-close or push-down-to-open.

Pneumatic and electric actuators with linear motion to operate globe valves are available for operation with many control signals.

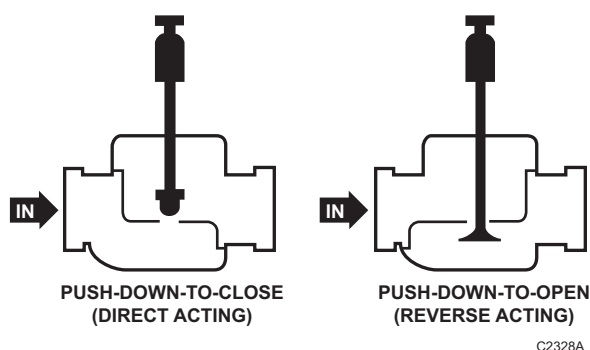


Fig. 5. Two-Way Globe Valves.

Appendix A: Valve Selection and Sizing

Ball Valve

Ball valves are available for two-position applications either manual (hand) or power operated or for modulating applications with direct coupled electric actuators. Ball valves are relatively low cost, provide tight close off, and are available in two-way and three-way configurations. As with all other valves, ball valves must be properly sized to provide good flow control.

When used in modulating service, ball valves must be specifically designed for modulating service as compared to two-position service. Packing must provide leak-free sealing through thousands of cycles to ensure trouble-free HVAC service. The ball, stem and seals should be made of materials that minimizes sticking and breakaway torque to achieve smooth operation.

Two-way ball valves have equal percentage flow control characteristics and flow in full-port models can be in either direction.

Three-way ball valves can be used in either mixing or diverting service. Full port models have linear flow control characteristics for constant total flow. A popular option with 3-way valves is a 20% flow capacity reduction in the B port to equalize pressure losses in a coil-bypass application.

Butterfly Valve

Butterfly valves (Fig. 6) control the flow of hot, chilled, or condenser water in two-position or proportional applications. Butterfly valves are available in two-way or three-way configurations. Tight shutoff may be achieved by proper selection of actuator force and body lining. The three-way valve can be used in mixing or diverting applications with the flow in any direction. The three-way valve consists of two butterfly valves that mount on a flanged cast iron tee and are linked to an actuator which opens one valve as it closes the other. Minimum combined capacity of both valves occurs at the half-open position.

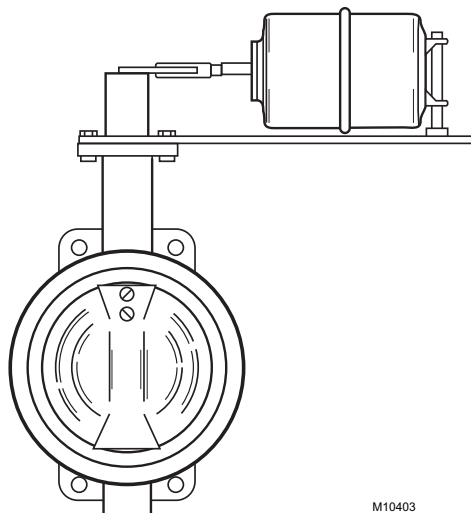


Fig. 6. Butterfly Valve.

When butterfly valves are used for proportional control, they must be applied using conservative pressure drop criteria. If the pressure drop approaches the critical pressure drop, unbalanced forces on the disc can cause oscillations, poor control, and/or damage to the linkage and actuator, even though the critical flow point is not reached. Modulating control is usually limited to a range of 15 to 65 degrees of disk rotation.

Butterfly valves are usually found in larger pipe sizes. For example, two butterfly valves could be piped in a mixing application to control the temperature of the water going back to the condenser. The valves proportion the amount of tower water and condenser water return that is flowing in the condenser water supply line.

Two-way Valve

Two-way valves are available as globe, ball, or butterfly valves. The combination of valve body and actuator (called valve assembly) determines the valve stem position. Two-way valves control steam or water in two-position or proportional applications (Fig. 7). They provide tight shutoff and are available with quick-opening, linear, or equal percentage flow characteristics. Control valves are typically installed on the supply side of convectors and radiators, and the return side of small-bore water coils used in fan-forced equipment.

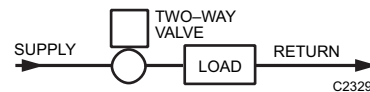


Fig. 7. Two-Way Valve Application.

Ideally, a control system has a linear response over its entire operating range. The sensitivity of the control to a change in temperature is then constant throughout the entire control range. For example, a small increase in temperature provides a small increase in cooling. A nonlinear system has varying sensitivity. For example, a small increase in temperature can provide a large increase in cooling in one part of the operating range and a small increase in another part of the operating range. To achieve linear control, the combined system performance of the actuator, control valve, and load must be linear. If the system is linear, a linear control valve is appropriate (Fig. 8). If the system is not linear, a nonlinear control valve, such as an equal percentage valve, is appropriate to balance the system so that resultant performance is linear.

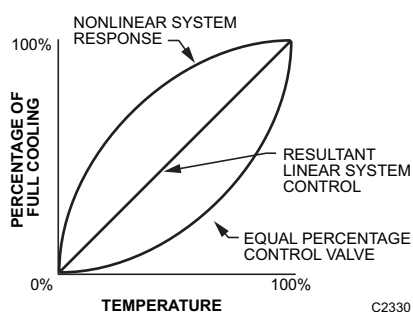


Fig. 8. Linear vs. Nonlinear System Control.

QUICK-OPENING VALVE

A quick-opening two-way valve includes only a disc guide and a flat or quick-opening plug. This type of valve is used for two position control of steam. The pressure drop for a quick opening two-way valve should be 10 to 20 percent of the piping system pressure differential, leaving the other 80 to 90 percent for the load and piping connections. Figure 9 shows the relationship of flow versus stem travel for a quick-opening valve. To achieve 90 percent flow, the stem must open only 20 percent. Linear or equal percentage valves can be used in lieu of quick-opening valves in two-position control applications as the only significant positions are full open and full closed.

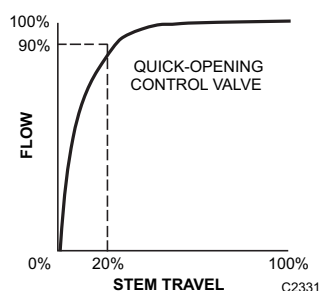


Fig. 9. Flow vs. Stem Travel Characteristic of a Quick-Opening Valve.

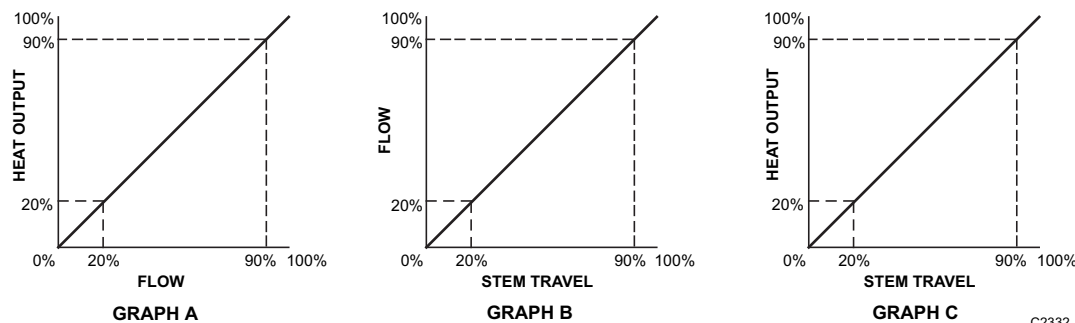


Fig. 10. Heat Output, Flow, and Stem Travel Characteristics of a Linear Valve.

EQUAL PERCENTAGE VALVE

An equal percentage valve includes a contoured plug or contoured V-port shaped so that similar movements in stem travel at any point in the flow range change the existing flow an

Linear Valve

A linear valve may include a V-port plug or a contoured plug. This type of valve is used for proportional control of steam or chilled water, or in applications that do not have wide load variations. Typically in steam or chilled water applications, changes in flow through the load (e.g., heat exchanger, coil) cause proportional changes in heat output. For example, Figure 10 shows the relationships between heat output, flow, and stem travel given a steam heat exchanger and a linear valve as follows:

- Graph A shows the linear relationship between heat output and flow for the steam heat exchanger. Changes in heat output vary directly with changes in the fluid flow.
- Graph B shows the linear relationship between flow and stem travel for the linear control valve. Changes in stem travel vary directly with changes in the fluid flow.

NOTE: As a linear valve just starts to open, a minimum flow occurs due to clearances required to prevent sticking of the valve. Some valves have a modified linear characteristic to reduce this minimum controllable flow. This modified characteristic is similar to an equal percentage valve characteristic for the first 5 to 10 percent of stem lift and then follows a linear valve characteristic for the remainder of the stem travel.

- Graph C shows the linear relationship between heat output and stem travel for the combined heat exchanger and linear valve. Changes in heat output are directly proportional to changes in the stem travel.

Thus a linear valve is used in linear applications to provide linear control.

equal percentage, regardless of flow rate. In mathematical terms, this is an exponential response.

Appendix A: Valve Selection and Sizing

EXAMPLE:

When a valve with the stem at 30 percent of its total lift and existing flow of 3.9 gpm (Table 2) opens an additional 10 percent of its full travel, the flow measures 6.2 gpm or increases 60 percent. If the valve opens an additional 10 percent so the stem is at 50 percent of its full travel, the flow increases another 60 percent and is 9.9 gpm.

Table 2. Stem Position vs. Flow for Equal Percentage Valve.

Stem		Flow	
Change	Position	Rate	Change
—	30% open	3.9 gpm	—
10% increase	40% open	6.2 gpm	60% increase
10% increase	50% open	9.9 gpm	60% increase

An equal percentage valve is used for proportional control in hot water applications and is useful in control applications where wide load variations can occur. Typically in hot water applications, large reductions in flow through the load (e.g., coil) cause small reductions in heat output. An equal percentage valve is used in these applications to achieve linear control. For example, Figure 11 shows the heat output, flow, and stem travel relationships for a hot water coil, with 200F, entering water and 50F entering air and an equal percentage valve, as follows:

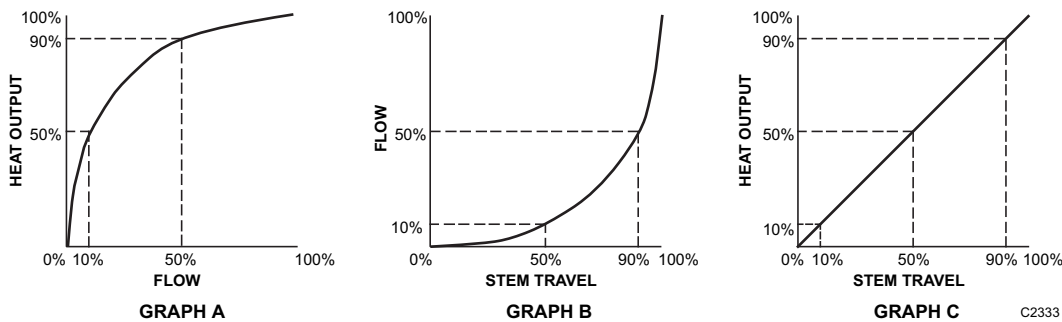


Fig. 11. Heat Output, Flow, and Stem Travel Characteristics of an Equal Percentage Valve.

Three-way Valves

Three-way valves (Fig. 12) control the flow of liquids in mixing or diverting valve applications (Fig. 13). The internal design of a three-way globe valve enables it to seat against the flow of liquid in the different applications. An arrow cast on the valve body indicates the proper direction of liquid flow. It is important to connect three-way valve piping correctly or oscillations, noise, and excessive valve wear can result. Three-way valves are typically have linear flow characteristics, although, some are equal percentage for flow through the coil with linear flow characteristics for flow through the coil bypass. Ball valves are also available in a three-way configuration, while two butterfly valves can be made to act as a three-way valve.

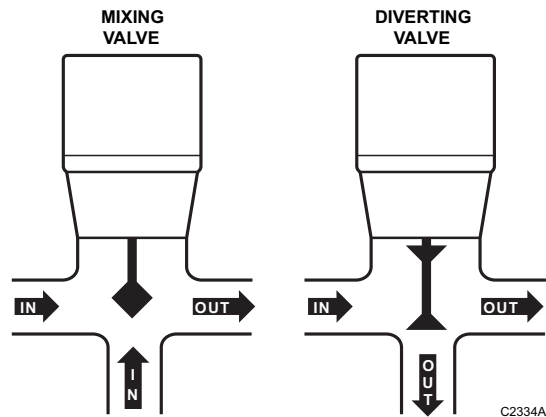


Fig. 12. Three-Way Valves.

- Graph A shows the nonlinear relationship between heat output and flow for the hot water coil. A 50 percent reduction in flow causes a 10 percent reduction in heat output. To reduce the heat output by 50 percent, the flow must decrease 90 percent.
- Graph B shows the nonlinear relationship between flow and stem travel for the equal percentage control valve. To reduce the flow 50 percent, the stem must close 10 percent. If the stem closes 50 percent, the flow reduces 90 percent.
- Graph C shows the relationship between heat output and stem travel for the combined coil and equal percentage valve. The combined relationship is close to linear. A 10 percent reduction in heat output requires the stem to close 10 percent, a 50 percent reduction in heat output requires the stem to close 50 percent, and a 90 percent reduction in heat output requires the stem to close 90 percent.

The equal percentage valve compensates for the characteristics of a hot water application to provide a control that is close to linear.

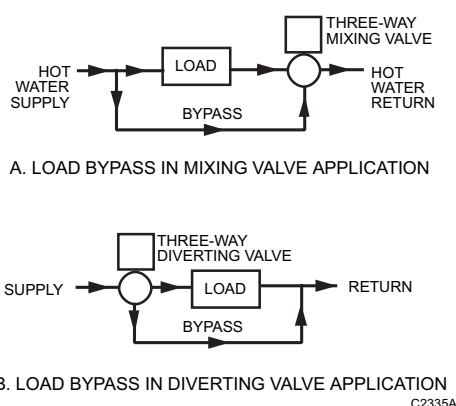


Fig. 13. Three-Way Valve Applications.

MIXING VALVE

A mixing valve provides two inlet ports and one common outlet port. The valve receives liquids to be mixed from the inlet ports and discharges the liquid through the outlet port (Fig. 12). The position of the valve disc determines the mixing proportions of the liquids from the inlet ports.

The close-off pressure in a mixing valve equals the maximum value of the greater inlet pressure minus the minimum value of the downstream pressure.

EXAMPLE:

A mixing valve application has a maximum pressure of 25 psi on one inlet port, maximum pressure of 20 psi on the other inlet port, and minimum downstream pressure of 10 psi on the outlet port. The close-off pressure is $25 \text{ psi} - 10 \text{ psi} = 15 \text{ psi}$. The application requires a mixing valve with at least a 15 psi close-off rating. The actuator selected must have a high enough force to operate satisfactorily.

In globe mixing valve applications, the force exerted on the valve disc due to unbalanced pressure at the inlets usually remains in the same direction. In cases where there is a reversal of force, the force changes direction and holds the valve disc off the seat, cushioning it as it closes. If the pressure difference for the system is greater than the pressure ratings of available globe mixing valves, use a ball mixing valve or two butterfly valves in a tee configuration.

Globe mixing valves are not suitable for modulating diverting valve applications. If a mixing valve is piped for modulating diverting service, the inlet pressure slams the disc against the seat when it nears the closed position. This results in loss of control, oscillations, and excessive valve wear and noise. Mixing valves are acceptable using about 80 percent of the close-off rating, but not recommended, in two-position diverting valve applications.

DIVERTING VALVE

A globe diverting valve provides one common inlet port and two outlet ports. The diverting valve uses two V-port plugs which seat in opposite directions and against the common inlet flow. The valve receives a liquid from one inlet port and discharges the liquids through the outlet ports (Fig. 12) depending on the position of the valve disc. If the valve disc is against the bottom seat (stem up), all the liquid discharges through the side outlet port. If the valve disc is against the top seat (stem down), all the liquid discharges through the bottom outlet port.

The close-off pressure in a diverting valve equals the maximum value of the inlet pressure minus the minimum value of the downstream pressure.

Globe diverting valves must not be used for mixing service. As with mixing valves used for diverting service, media pressure drop across the valve can cause it to slam shut with resulting loss of control.

EXAMPLE:

A diverting valve application has 20 psi maximum on the inlet port, one outlet port discharging to the atmosphere, and the other outlet port connecting to a tank under 10 psi constant pressure. The pressure difference between the inlet and the first outlet port is 20 psi and between the inlet and second outlet port is 10 psi. The application requires a diverting valve with at least 20 psi close-off rating.

Valve Sizing

Every valve has a capacity index or flow coefficient (C_v). Typically determined for the globe and ball valves at full open and about 60 degrees open for butterfly valves. C_v is the quantity of water in gpm at 60F that flows through a valve with a pressure differential of 1 psi. Sizing a valve requires knowing the medium (liquid or gas) and the required pressure differential to calculate the required C_v . When the required C_v is not available in a standard valve, select the next closest and calculate the resulting valve pressure differential at the required flow to verify acceptable performance.

After determination of the valve C_v , calculation of the flow of any medium through that valve can be found if the characteristics of the medium and the pressure drop across the valve are known.

Appendix A: Valve Selection and Sizing

Water Valves

Determine the capacity index (C_v) for a valve used in a water application, using the formula:

$$C_v = \frac{Q\sqrt{G}}{\sqrt{h}}$$

Where:

- Q = Flow of fluid in gallons per minute required to pass through the valve.
- G = Specific gravity of the fluid (water = 1).
- h = Pressure drop in psi. See Figures 14 and 15 for glycol solution correction values.

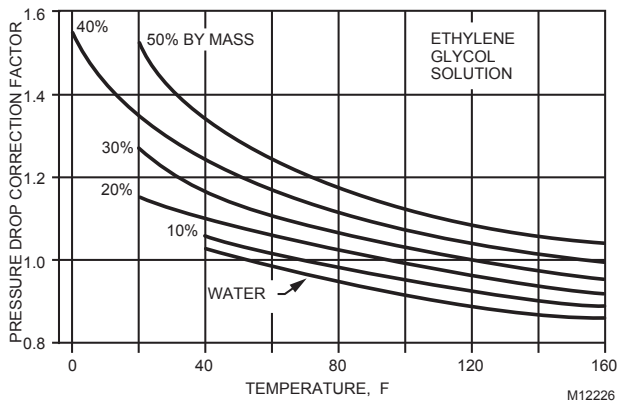
NOTE: The calculated C_v will rarely match the C_v of an available valve. For most accurate proportional control, select the valve with the next lower C_v value, and increase the pressure drop across the control valve to achieve the required flow through the coil by reducing the setting of the balancing valve. Otherwise, turn-down ratio will be reduced, proportionally.

For example, if the calculated C_v is 87, and the two closest C_v values are 63 and 100, the best choice for control precision would be the valve with a C_v of 63, and increase pressure drop across the valve by 90%.

If increased pressure drop is not possible, use the valve with C_v of 100, and accept a 13% reduction in valve rangeability.

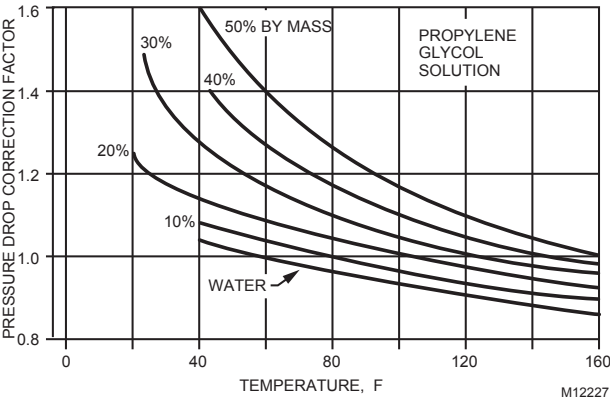
For two-position control, always chose the largest C_v greater than the coil with acceptable close-off pressure rating.

Determining the C_v of a water valve requires knowing the quantity of water (gpm) through the valve and the pressure drop (h) across the valve. If the fluid is a glycol solution, use the pressure drop multipliers from either Figure 14 or 15. See the sections on QUANTITY OF WATER and WATER VALVE PRESSURE DROP. Then select the appropriate valve based on C_v , temperature range, action, body ratings, etc., per VALVE SELECTION guidelines.



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Fig. 14. Pressure Drop Correction for Ethylene Glycol Solutions



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Fig. 15. Pressure Drop Correction for Propylene Glycol Solutions.

Quantity of Water

To find the quantity of water (Q) in gallons per minute use one of the following formulas:

- When Btu/hr is known:

$$Q = \frac{Btu/hr}{K \times TD_w}$$

Where:

- Btu/hr= Heat output.
- K = Value from Table 3; based on temperature of water entering the coil. The value is in pounds per gallon x 60 minutes per hour.
- TD_w = Temperature difference of water entering and leaving the coil.

Table 3. Water Flow Formula Table

Water		Water	
Temp F	K	Temp F	K
40	502	200	484
60	500	225	483
80	498	250	479
100	496	275	478
120	495	300	473
150	490	350	470
180	487	400	465

2. For hot water coil valves:

$$Q = \frac{cfm \times 1.08 \times TD_a}{K \times TD_w}$$

Where:

- cfm = Airflow through the coil.
- 1.08 = A scaling constant. See Note.
- TD_a = Temperature difference of air entering and leaving the coil.
- K = Value from Table 3; based on temperature of water entering the coil (pounds per gallon x 60 minutes per hour).
- TD_w = Temperature difference of water entering and leaving the coil.

NOTE: The scaling constant 1.08 is derived as follows:

$$1.08 = \frac{0.24 BTU}{lbairF} \times \frac{60 min}{1 hr} \times \frac{1 lbair}{13.35 ft^3}$$

Where:

$$\frac{1 lbair}{13.35 ft^3} = \text{the specific volume of air at standard conditions of temperature and atmospheric pressure.}$$

Simplifying the equation:

$$1.08 = \frac{14,40 Btu min}{F hr 13.35 ft^3}$$

To find the scaling constant for air conditions other than standard, divide 14.40 Btu by specific volume of air at those conditions.

3. For fan system chilled water coil valves:

$$Q = \frac{cfm \times Btu/lb}{113 \times TD_w}$$

Where:

- cfm = Airflow through the coil.
- Btu/lb = Heat per pound of dry air removed. Includes both sensible and latent heat.
- 113 = A scaling constant.
- TD_w = Temperature difference of water entering and leaving the coil.

WATER VALVE PRESSURE DROP

To determine valve pressure drop:

1. For two-way valves consider the following guidelines for valve pressure drop:
 - a. Include the pressure drop in the design of the water circulating system.
 - In systems with two-way valves only, it is often necessary to provide a pump relief bypass or some other means of differential pressure control to limit valve pressure drops to the valve capabilities. For control stability at light loads, pressure drop across the fully closed valve should not exceed triple the pressure drop used for sizing the valve.
 - To avoid high pressure drops near the pump, reverse returns are recommended in large systems.
 - b. The pressure drop across an open valve should be about half of the pressure difference between system supply and return, enough so that the valve, not the friction through the coil or radiator, controls the volume of water flow or the valve pressure drop should be equal to or greater than the pressure drop through the coil or radiator, plus the pipe and fittings connecting them to the supply and return mains.
 - c. Verify allowable full open and full closed pressure drops for all proportional and two-position water valves with appropriate manufacturer literature.
 - d. Make an analysis of the system at maximum and minimum rates of flow to determine whether or not the pressure difference between the supply and return mains stays within the limits that are acceptable from the stand point of control stability and close-off rating.
2. For two- and three-way valves consider the following guidelines for valve pressure drop:
 - a. In load bypass applications (Fig. 13) such as radiators, coils, and air conditioning units, the pressure drop should be 50 to 70 percent of the minimum difference between the supply and return main pressure at design operating conditions.
 - b. A manual balancing valve may be installed in the bypass to equalize the load drop and the bypass drop.
3. When selecting pressure drops for three-way mixing valves in boiler bypass applications (Fig. 13), consider the following:
 - a. Determine the design pressure drop through the boiler including all of the piping, valves, and fittings from the bypass connection through the boiler and up to the three-way valve input.
 - b. The valve pressure drop should be equal to or greater than the drop through the boiler and the fittings. If the valve drop is much smaller than the boiler pressure drop at design, effective control is obtained only when the disc is near one of the two seats. The mid-portion of the valve lift will be relatively ineffective.

Appendix A: Valve Selection and Sizing

- c. A manual balancing valve may be installed in the boiler bypass to equalize the boiler drop and the bypass drop.

WATER VALVE SIZING EXAMPLES

EXAMPLE 1:

A two-way linear valve is needed to control flow of 45F chilled water to a cooling coil. The coil manufacturer has specified an eight-row coil having a water flow pressure drop of 3.16 psi. Further, specifications say that the coil will produce 55F leaving air with a water flow of 14.6 gpm. Supply main is maintained at 40 psig, return is at 30 psig. Select required capacity index (C_V) of the valve.

Use the water valve C_V formula to determine capacity index for Valve V1 as follows:

$$C_V = \frac{Q\sqrt{G}}{\sqrt{h}}$$

Where:

- Q = Flow of fluid in gallons per minute required is 14.6 gpm.
G = Specific gravity of water is 1.
h = Pressure drop across the valve. The difference between the supply and return is 10 psi. 50% to 70% x 10 psi = 5 to 7 psi. Use 6 psi for the correct valve pressure drop. Note that 6 psi is also greater than the coil pressure drop of 3.16 psi.

Substituting:

$$C_V = \frac{14.6\sqrt{1}}{\sqrt{6}} = 6$$

Select a linear valve providing close control with a capacity index of 6 and meeting the required pressure and temperature ratings.

EXAMPLE 2:

A bypass valve is required to prevent flow through the chiller from dropping below 90 percent of design flow. When sizing valves for pump or chiller bypass applications (Fig. 16), system conditions that cause the valve to open or close completely must be considered before a pressure drop can be selected.

Assume the following:

- System flow at design, 1000 gpm
- Pump head at design, 48 ft
- Pump head at 90 percent flow, 50 ft
- Pressure across mains at AHU 1 at design flow, 28 ft
- Chiller pressure drop, 12 ft
- Chiller piping loop design pressure drop, 8 ft

With full system flow, Valve V5 is closed. Pressure drop across V5 equals the pump head minus the friction drops to V5. Pressure drop across Valve V5 is then 48 ft – 12 ft (chiller drop) – 4 ft (supply drop) – 4 ft (return drop) or 28 ft.

With system flow at 90 percent, the pump head rises to 50 ft, while the friction drops fall to the lower values shown in Figure 16. For additional information on chiller bypass operation see Chiller, Boiler, and Distribution System Applications section. Pressure drop across V5 equals the pump head minus the friction drops to V5. Pressure drop across Valve V5 is then 50 ft – 9.6 ft (chiller drop) – 3.2 ft (supply drop) – 3.2 ft (return drop) or 34 ft. Converting ft to psi, 34 ft x 0.4335 psi/ft = 14.7 psi.

Substituting the flow of water, specific gravity of water, and pressure drop in the C_V formula shows that the Valve V5 should have a C_V of 235.

$$C_V = \frac{900\sqrt{1}}{\sqrt{14.7}} = 235$$

Appendix A: Valve Selection and Sizing

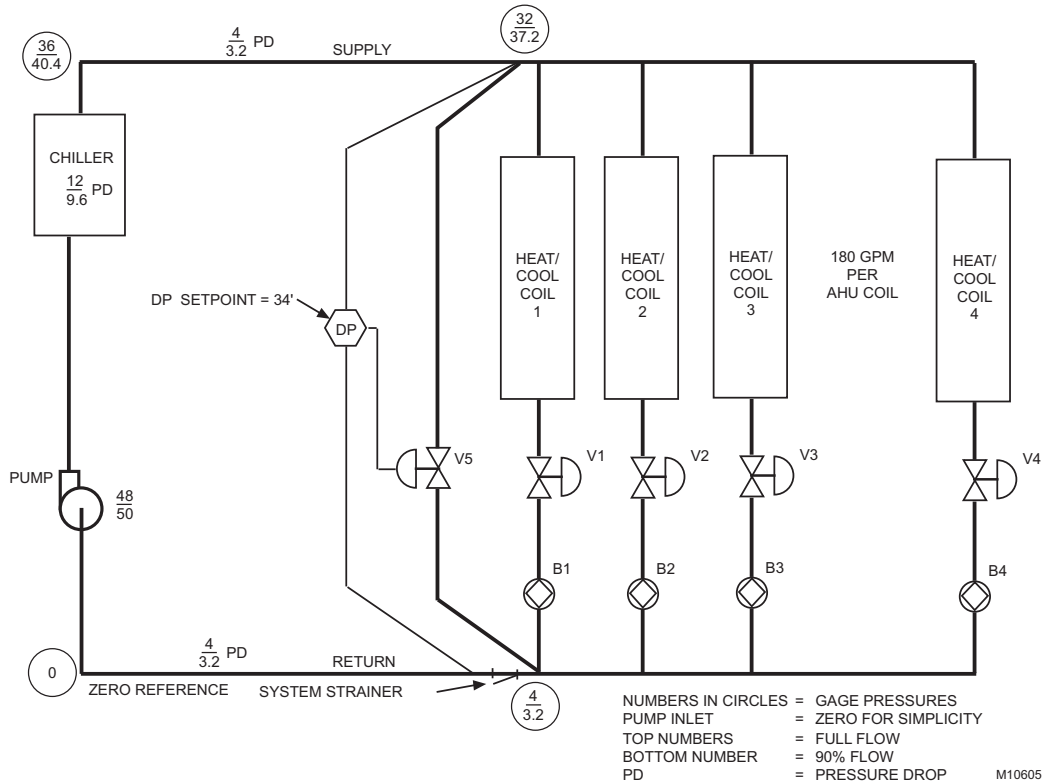


Fig. 16. Chiller Bypass Application.

EXAMPLE 3:

Sizing water valves for heating coils is especially critical. In Figure 17, a valve with a C_v of 12 will have 30 percent of the available pressure drop when full open, while a valve with a C_v of 5 will have 70 percent of the available pressure drop. As shown in Figure 18, the valve with 70 percent of the available pressure drop essentially provides the equal percentage water flow control, resulting in linear coil heat transfer and stable temperature control. The valve with only 30 percent of the available pressure drop has a more linear flow control which results in nonlinear coil heat transfer. See EQUAL PERCENTAGE VALVE section for further information.

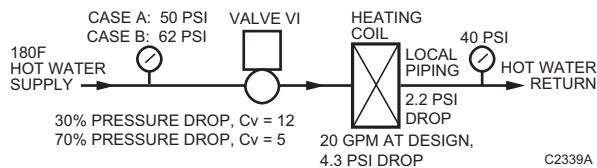


Fig. 17. Equal Percentage Valve Hot Water Application.

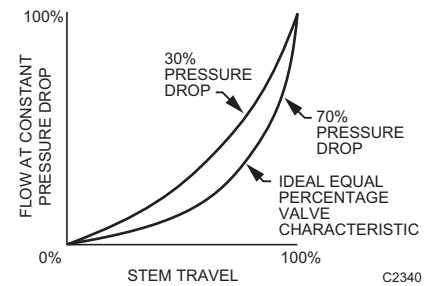


Fig. 18. Effect of Pressure Drop in Hot Water Valve Sizing.

EXAMPLE 4:

A three-way mixing valve is needed for a heat exchanger application with a bypass line. Water flow is specified at the rate of 70 gpm. Manufacturer data for the exchanger indicates a pressure drop of 1.41 ft of water through the exchanger coils.

Appendix A: Valve Selection and Sizing

Use the water valve C_v formula to determine capacity index for Valve V1 as follows:

$$C_v = \frac{Q\sqrt{G}}{\sqrt{h}}$$

Where:

- Q = Flow of fluid in gallons per minute required to pass through the valve is 70 gpm.
 G = Specific gravity of water is 1.
 h = Pressure drop across the valve. Plans of the heating system indicate three-inch supply and return mains. From an elbow equivalent table and pipe friction chart found in the ASHRAE Handbook or other reference manuals, the calculated pressure drop through a three-inch tee and the piping from the valve and the tee to the exchanger is 0.09 psi. Heat exchanger pressure drop is 1.41 ft of water or 1.41 ft x 0.433 psi/ft = 0.61 psi. Total pressure drop from bypass connection through the heat exchanger and to the hot-water input of the three-way valve is 0.61 + 0.09 or 0.70 psi.

Since the valve pressure drop (h) should be equal to or greater than the drop through the heat exchanger and fittings, 0.70 psi is used as the valve pressure drop.

For optimum control, a manual balancing valve is installed in the bypass line to equalize the pressure drops in the exchanger and bypass circuits.

$$C_v = \frac{70\sqrt{1}}{\sqrt{0.70}} = 83.6 \text{ or } 84$$

Substituting the flow of water, specific gravity of water, and pressure drop in the C_v formula shows that the valve should have a C_v of 83.6 or 84.

Select a linear valve providing close control with a capacity index of 84 and meeting the required pressure and temperature ratings.

Steam Valves

Calculate the required capacity index (C_v) for a valve used in a steam application, using the formula:

$$C_v = \frac{(1 + 0.00075s)Q\sqrt{V}}{63.5\sqrt{h}}$$

Where:

- Q = Quantity of steam in pounds per hour required to pass through the valve.
 V = Specific volume of steam, in cubic feet per pound, at the average pressure in the valve. For convenience Table 5 at the end of the STEAM VALVES section lists the square root of the specific volume of steam for various steam pressures. Therefore, use the value in this column of the table as is; do not take its square root.
 63.5 = A scaling constant.
 h = Pressure drop in psi.
 s = Superheat in degrees F.

Determining the C_v for a steam valve requires knowing, the quantity of steam (Q) through the valve, the pressure drop (h) across the valve, and the degrees of superheat. See QUANTITY OF STEAM and STEAM VALVE PRESSURE DROP. Then select the appropriate valve based on C_v , temperature range, action, body ratings, etc., per VALVE SELECTION guidelines.

NOTE: When the superheat is 0F, then (1 + 0.00075s) equals 1 and may be ignored.

QUANTITY OF STEAM

To find the quantity of steam (Q) in pounds per hour use one of the following formulas:

1. When Btu/hr (heat output) is known:

$$Q = \frac{\text{Btu/hr}}{1000\text{Btu/lbsteam}}$$

Where:

- Btu/hr = Heat output.
 1000 Btu/lb= A scaling constant representing the approximate heat of vaporization of steam.

2. For sizing steam coil valves:

$$Q = \frac{\text{CFM} \times \text{TD}_a \times 1.08}{1000\text{Btu/lbsteam}}$$

Where:

- cfm = Cubic feet per minute (ft³/min) of air from the fan.
 TD_a = Temperature difference of air entering and leaving the coil.
 1.08 = A scaling constant. See NOTE.
 1000 Btu/lb= A scaling constant representing the approximate heat of vaporization of steam.

Appendix A: Valve Selection and Sizing

NOTE: The scaling constant 1.08 is derived as follows:

$$1.08 = \frac{0.24 \text{ BTU}}{\text{lb air F}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{1 \text{ lb air}}{13.35 \text{ ft}^3}$$

Where:

$$\frac{1 \text{ lb air}}{13.35 \text{ ft}^3} = \text{the specific volume of air at standard conditions of temperature and atmospheric pressure.}$$

Simplifying the equation:

$$1.08 = \frac{14.40 \text{ Btu min}}{\text{F hr } 13.35 \text{ ft}^3}$$

To find the scaling constant for air conditions other than standard, divide 14.40 Btu by specific volume of air at those conditions.

3. For sizing steam to hot water converter valves:

$$Q = \text{gpm} \times \text{TD}_w \times 0.49$$

Where:

gpm = Gallons per minute of water flow through converter.

TD_w = Temperature difference of water entering and leaving the converter.

0.49 = A scaling constant. This value is derived as follows:

$$0.49 = \frac{8.33 \text{ lb water}}{1 \text{ gal}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{1 \text{ lb steam}}{1000 \text{ Btu}} \times \frac{1 \text{ Btu}}{\text{lb water F}}$$

Simplifying the equation:

$$0.49 = \frac{0.49 \text{ min lb steam}}{\text{gal hr F}}$$

4. When sizing steam jet humidifier valves:

$$Q = \frac{(W_1 - W_2) \text{ lb moisture}}{\text{lb air}} \times \frac{1}{13.35 \text{ ft}^3} \times \frac{\text{ft}^3}{\text{min}} \times \frac{60 \text{ min}}{\text{hr}}$$

Where:

W1 = Humidity ratio entering humidifier, pounds of moisture per pound of dry air.

W2 = Humidity ratio leaving humidifier, pounds of moisture per pound of dry air.

$\frac{13.35 \text{ ft}^3}{\text{lb air}}$ = The specific volume of air at standard conditions of temperature and atmospheric pressure.

$\frac{\text{ft}^3}{\text{min}}$ = Cubic feet per minute (cfm) of air from the fan.

$\frac{60 \text{ min}}{\text{hr}}$ = A conversion factor.

Simplifying:

$$Q = 4.49 \frac{(W_1 - W_2) \text{ lb moisture}}{\text{hr}}$$

5. When Equivalent Direct Radiation (EDR) is known:

$$Q = \text{EDR (Total)} \times 0.24$$

Where:

EDR (Total) = Radiators are sized according to Equivalent Direct Radiation (EDR). If controlling several pieces of radiation equipment with one valve, add the EDR values for all pieces to obtain the total EDR for the formula.

0.24 = A scaling constant, lb steam/unit EDR. See Table 4.

Table 4. Output of Radiators and Convectors.

Average Radiator of Convector Temperature, Deg F	Cast Iron Radiator Btu/Hr/EDR ^a	Convector, Btu/Hr/EDR ^b
215	240	240
200	209	205
190	187	183
180	167	162
170	148	140
160	129	120
150	111	102
140	93	85
130	76	69
120	60	53
110	45	39
100	31	27
90	18	16

a At Room Temperature

b At 65 F Inlet Air Temperature

STEAM VALVE PRESSURE DROP

Proportional Applications

When specified, use that pressure drop (h) across the valve.

When not specified:

1. Calculate the pressure drop (h) across the valve for good modulating control:

$$h = 80\% \times (\text{Pm} - \text{Pr})$$

NOTE: For a zone valve in a system using radiator orifices use:

$$h = (50 - 75)\% \times (\text{Pm} - \text{Pr})$$

Where

Pm = Pressure in supply main in psig or psia (gauge or absolute pressure).

Pr = Pressure in return in psig or psia. A negative value if a vacuum return.

Appendix A: Valve Selection and Sizing

2. Determine the critical pressure drop:

$$h_{\text{critical}} = 50\% \times P_{\text{ma}}$$

Where:

P_{ma} = Pressure in supply main in psia (absolute pressure)

psia = psig + 14.7

Use the smaller value h or h_{critical} when calculating C_v .

Two-Position Applications

Use line sized valves whenever possible. If the valve size must be reduced, use:

$$h = 20\% \times (P_{\text{m}} - P_{\text{r}})$$

Where

P_{m} = Pressure in supply main in psig or psia (gage or absolute pressure).

P_{r} = Pressure in return in psig or psia. A negative value if a vacuum return.

STEAM VALVE SIZING EXAMPLES

EXAMPLE 1:

A two-way linear valve (V1) is needed to control high-pressure steam flow to a steam-to-water heat exchanger. An industrial-type valve is specified. Steam pressure in the supply main is 80 psig with no superheat, pressure in return is equal to atmospheric pressure, water flow is 82.5 gpm, and the water temperature difference is 20F.

Use the steam valve C_v formula to determine capacity index for Valve V1 as follows:

$$C_v = \frac{(1 + 0.00075s)Q\sqrt{V}}{63.5\sqrt{h}}$$

Where:

Q = The quantity of steam required to pass through the valve is found using the converter valve formula:

$$Q = \text{gpm} \times TD_w \times 0.49$$

Where:

gpm = 82.5 gpm water flow through exchanger

TD_w = 20F temperature difference

0.49 = A scaling constant

Substituting this data in the formula:

Q = 808.5 pounds per hour

h = The pressure drop across a valve in a modulating application is:

$$h = 85\% \times (P_{\text{m}} - P_{\text{r}})$$

Where:

P_{m} = Upstream pressure in supply main is 80 psig.

P_{r} = Pressure in return is atmospheric pressure or 0 psig.

Substituting this data in the pressure drop formula:

$$h = 0.80 \times (80 - 0)$$

$$= 0.80 \times 80$$

$$= 64 \text{ psi}$$

The critical pressure drop is found using the following formula:

$$h_{\text{critical}} = 50\% \times (\text{psig} + 14.7 \text{ psi})$$

$$h_{\text{critical}} = 0.50 \times (80 \text{ psig upstream} + 14.7 \text{ psi})$$

$$= 0.50 \times 94.7 \text{ psi}$$

$$= 47.4 \text{ psi}$$

The critical pressure drop (h_{critical}) of 47.4 psi is used in calculating C_v , since it is less than the pressure drop (h) of 64 psi. Always, use the smaller of the two calculated values.

V = Specific volume (V) of steam, in cubic feet per pound at average pressure in valve (P_{avg}):

$$P_{\text{avg}} = P_{\text{m}} - \frac{h}{2}$$

$$= 80 - \frac{47.4}{2} = 80 - 23.6 = 56.4 \text{ psig}$$

The specific volume of steam at 56.4 psig is 6.14 and the square root is 2.48.

63.5 = A scaling constant.

Substituting the quantity of steam, specific volume of steam, and pressure drop in the C_v formula shows that the valve should have a C_v of 4.6.

$$C_v = \frac{(1 + 0.00075 \times 0) \times 808.5 \times 2.48}{63.5\sqrt{47.4}}$$

$$= \frac{1745.6}{63.5 \times 6.88} = 4.6$$

NOTE: If P_{avg} is rounded off to the nearest value in Table 5 (60 psi), the calculated C_v is 4.5 a negligible difference.

Appendix A: Valve Selection and Sizing

Select a linear valve providing close control with a capacity index of 4 and meeting the required pressure and temperature ratings.

NOTE: For steam valves downstream from pressure reducing stations, the steam will be superheated in most cases and must be considered.

EXAMPLE 2:

In Figure 19, a linear valve (V1) is needed for accurate flow control of a steam coil that requires 750 pounds per hour of steam. Upstream pressure in the supply main is 5 psig and pressure in the return is 4 in. Hg vacuum minimum.

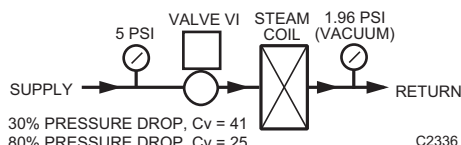


Fig. 19. Linear Valve Steam Application.

Use the steam valve C_v formula to determine capacity index for Valve V1 as follows:

$$C_v = \frac{(1 + 0.00075s)Q\sqrt{V}}{63.5\sqrt{h}}$$

Where:

- Q = Quantity of steam required to pass through the valve is 750 pounds per hour.
- h = The pressure drop across a valve in a modulating application is found using:
 $h = 80\% \times (P_m - P_r)$
- and:
- P_m = Upstream pressure in supply main is 5 psig.
- P_r = Pressure in return is 4 in. Hg vacuum.

NOTE: 1 in. Hg = 0.49 psi and 1 psi = 2.04 in. Hg.

Therefore,
4 in. Hg vacuum = -1.96 psig.

$$\begin{aligned} h &= 0.80 \times [5 - (-1.96)] \\ &= 0.80 \times 6.96 \\ &= 5.6 \text{ psi} \end{aligned}$$

The critical pressure drop is found using the following formula:

$$h_{\text{critical}} = 50\% \times (\text{psig} + 14.7 \text{ psi})$$

$$\begin{aligned} h_{\text{critical}} &= 0.50 \times (5 \text{ psig upstream} + 14.7 \text{ psi}) \\ &= 0.50 \times 19.7 \text{ psia} \\ &= 9.9 \text{ psi} \end{aligned}$$

The pressure drop (h) of 5.6 psi is used in calculating the C_v , since it is less than the critical pressure drop (h_{critical}) of 9.9 psi.

V = Specific volume (V) of steam, in cubic feet per pound at average pressure in valve (P_{avg}):

$$\begin{aligned} P_{\text{avg}} &= P_m - \frac{h}{2} \\ &= 5 - \frac{5.6}{2} = 5 - 2.8 = 2.2 \text{ psig} \end{aligned}$$

The specific volume of steam at 2.2 psig is 23.54 and the square root is 4.85.

63.5 = A scaling constant.
 s = 0

Substituting the quantity of steam, specific volume of steam, and pressure drop in the C_v formula shows that Valve V1 should have a C_v of 24.17 or the next higher available value (e.g., 25).

$$\begin{aligned} C_v &= \frac{(1 + 0.00075 \times 0) \times 750 \times 4.85}{63.5\sqrt{5.6}} \\ &= \frac{3637.5}{63.5 \times 2.37} = 24.17 \end{aligned}$$

NOTE: If P_{avg} is rounded off to the nearest value in Table 5 (2 psi), the calculated C_v is 24.30.

Select a linear valve providing close control with a capacity index of 25 and meeting the required pressure and temperature ratings.

EXAMPLE 3:

Figure 20 shows the importance of selecting an 80 percent pressure drop for sizing the steam valve in Example 2. This pressure drop (5.6 psi) approximates the linear valve characteristic. If only 30 percent of the available pressure drop is used ($0.30 \times 6.96 \text{ psi} = 2.10 \text{ psi}$ or 2 psi), the valve C_v becomes:

$$\begin{aligned} C_v &= \frac{(1 + 0.00075s)Q\sqrt{V}}{63.5\sqrt{h}} \\ C_v &= \frac{750 \times 4.85}{63.5\sqrt{2}} = 40.5 \end{aligned}$$

Appendix A: Valve Selection and Sizing

This larger valve (2 psi drop) has a steeper curve that is further away from the desired linear valve characteristic. See LINEAR VALVE under VALVE SELECTION for more information.

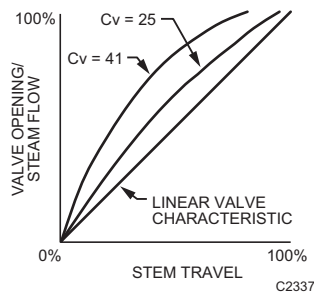


Fig. 20. Effect of Pressure Drop in Steam Valve Sizing.

Table 5. Properties of Saturated Steam.

Vacuum, Inches of Mercury	Boiling Point or Steam Temperature (Deg F)	Specific Volume (V), cu. ft/lb	$\sqrt{V}$ (For valve sizing)	Maximum Allowable Pressure Drop, psi.
29	76.6	706.00	26.57	0.23
25	133.2	145.00	12.04	1.2
20	161.2	75.20	8.672	2.4
15	178.9	51.30	7.162	3.7
14	181.8	48.30	6.950	3.9
12	187.2	43.27	6.576	4.4
10	192.2	39.16	6.257	4.9
8	196.7	35.81	5.984	5.4
6	201.0	32.99	5.744	5.9
4	204.8	30.62	5.533	6.4
2	208.5	28.58	5.345	6.9

Gage Pressure, psig	Boiling Point or Steam Temperature (Deg F)	Specific Volume (V), cu. ft/lb	$\sqrt{V}$ (For valve sizing)	Maximum Allowable Pressure Drop, psi.
0	212.0	26.79	5.175	7.4
1	215.3	25.20	5.020	7.8
2	218.5	23.78	4.876	8.4
3	221.5	22.57	4.751	8.8
4	224.4	21.40	4.626	9.4
5	227.1	20.41	4.518	9.8
6	229.8	19.45	4.410	10.4
7	232.3	18.64	4.317	10.8
8	234.8	17.85	4.225	11.4
9	237.1	17.16	4.142	11.8

Gage Pressure, psig	Boiling Point or Steam Temperature (Deg F)	Specific Volume (V), cu. ft/lb	$\sqrt{V}$ (For valve sizing)	Maximum Allowable Pressure Drop, psi.
10	239.4	16.49	4.061	12.4
11	241.6	15.90	3.987	12.8
12	243.7	15.35	3.918	13.4
15	249.8	13.87	3.724	14.8
20	258.8	12.00	3.464	17.4
25	266.8	10.57	3.251	19.8
30	274.0	9.463	3.076	22.4
35	280.6	8.56	2.93	24.8
40	286.7	7.826	2.797	27.4
45	292.4	7.209	2.685	29.8
50	297.7	6.682	2.585	32.4
55	302.6	6.232	2.496	34.8
60	307.3	5.836	2.416	37.4
65	311.8	5.491	2.343	39.8
70	316.0	5.182	2.276	42.4
75	320.0	4.912	2.216	44.8
80	323.9	4.662	2.159	47.4
85	327.6	4.445	2.108	49.8
90	331.2	4.239	2.059	52.4
95	334.6	4.060	2.015	54.8
100	337.9	3.888	1.972	57.4
110	344.1	3.595	1.896	62.3
120	350.0	3.337	1.827	67.4
130	355.2	3.12	1.766	72.3
140	360.9	2.923	1.710	77.4
150	366.2	2.746	1.657	82.3
160	370.6	2.602	1.613	87.4
170	375.5	2.462	1.569	92.3
180	379.6	2.345	1.531	97.4
190	383.9	2.234	1.495	102.3
200	387.8	2.134	1.461	107.4
225	397.4	1.918	1.385	119.8
250	406.0	1.742	1.320	132.4
275	414.2	1.595	1.263	145.0
300	421.8	1.472	1.213	157.4
350	435.6	1.272	1.128	182.4
400	448.1	1.120	1.058	207.4
450	459.5	0.998	0.999	232.4
500	470.0	0.900	0.949	257.4
550	479.7	0.818	0.904	282.4
600	488.8	0.749	0.865	307.4
650	497.3	0.690	0.831	332.4
700	505.4	0.639	0.799	357.4
800	520.3	0.554	0.744	407.4
900	533.9	0.488	0.699	457.4
1000	546.3	0.435	0.659	507.4

Technology Comparison of Control Ball and Globe Valves

Attribute	Control Ball Valve	Globe Valve	Advantage	Reason
Flow Characteristics	Quadratic (with characterization)	Equal percent to design temp.	Globe	BAS controller expects flow from valve at low signal
	Linear (full port)	Linear		
	Delayed opening / early close-off	Continuous from start		
Rangeability (turn-down ratio)	Fixed minimum flow results in 1. Low TDR at low Cv 2. High TDR at high Cv	50:1 = 2% steps (HON)	Globe	Small sizes are the most common applications and need high TDR
		100:1 (Siemens claim)		
		Maximum 25:1 (JCI)		
Operating Differential Pressure	20 – 25 psid for characterized ports (plate distortion)	20 – 25 psid for quiet operation (cavitation at low flow)	— —	20+ psid is not typical of control valve applications
Close-Off Differential Pressure	High with low Torque actuators (water pressure aids sealing)	Inversely proportional to Cv, and proportional to actuator force	Control Ball	Globe is comparable in small sizes
	Capable of dead-heading pumps*	Pressure balanced is high		PB more expensive
Seat Leakage	ANSI Class IV (< 0.01% Cv) @ A port (Does not apply to B port without seals)	ANSI Class III w/ small metal seats ANSI Class IV with resilient seat and larger metal seated valves	Control Ball	Less leakage reduces energy use with chilled water
Trim (internal construction)	Plated brass ball and stem	Resilient material on metal seat	— —	Long term performance of ball valve in automatic control unknown
		Stainless steel ball and stem Brass plug on brass seat		
	Rubber and Teflon stem O-rings	Stainless steel plug on SS seat		
Steam Ratings	Low pressure (full port only)	Low pressure	Globe	Greater versatility. Equal % flow available with globe
	— —	High pressure		
Cv Ratings	Multiple Cv's per valve size	Multiple Cvs @ 1/2" size	Ball	Lower installed cost with no loss of control capability
Line Size Piping	Line size piping with lower Cv	Reducers often needed > 1/2"	Ball	Lower installed cost with no loss of control capability
Pipe Sizes	1/2" – 3" Threaded	1/2" – 3" Threaded ANSI 150	Globe	Wider applications
	4" – 6" ANSI 125 Flanged	2-1/2" – 6" ANSI 125 and 250 Flanged		
3-Way Body Styles	Combo mixing/diverting	Mixing models	Control Ball	Easier to select. Piping different mixing & diverting
	B port seal required for tight close-off	Diverting models		
Physical Size	Low profile at large sizes	Large profile at large sizes	Control Ball	Depends on application
	Relatively large in 1/2" pipe	Small size in 1/2" pipe	Globe	
Control Inputs	Floating/2-position, modulating	Floating/2-position, modulating	— —	Depends on application
	Some pneumatic actuators available	Large linear pneumatic installed base	Globe	
Fail Safe Operation	N/O or N/C by actuator position	N/O or N/C up to 3"	Control Ball	Globe needs higher power actuators
	Stay-in-place	Stay-in-place		
Valve Serviceability	Requires unions for valve access VBN stems replaceable	In-line serviceable	Globe	B.V. must be removed from piping
CE Preference	Growing with time	Well established	Globe	Familiar technology (habit)
Contractor Preference	Valve comes with actuator	Actuator selection separate	Control Ball	Easier to select
Actuator Selection	Match valve and damper DCAs	Requires linkage for DCAs	Control Ball	Added cost for globe valve

*Pumps require pressure cut-offs or supply-return differential pressure regulators to avoid pump seal damage and potential leakage that can result without flow-through. Unless used in end-of-line-service, control valves do not need to close off against full pump head.

Appendix B: NEMA Standard Classification Code for Enclosures

NEMA 1—General purpose. for indoor protection, where conditions are not unusually severe.

NEMA 2—Drip tight. Designed to exclude falling moisture or dirt. Particularly applicable to cooling rooms, laundries, etc., where condensation is prevalent. For indoor use.

NEMA 3—Weather Resistant (weatherproof). For outdoor use; designed to withstand all normal exposure to natural elements. Controls mounted on pullout racks for easy access. With rain hood and weather seals.

NEMA 4—Watertight. Withstands water pressure from 1 in. hose nozzle, 65 gallons per minute, from distance of not less than 10 ft for five minutes. Suitable for maritime applications, breweries, etc.

NEMA 5—Dust-tight. Equipped with dust-tight gaskets. Suitable for mills and other high-dust atmospheres.

NEMA 6—Submersible. For submerged operation under specified pressures and time.

NEMA 7—Hazardous Locations, National Electrical Code Class 1 (circuit breaks in air).

NEMA 8—Hazardous Locations, National Electrical Code Class 1 (circuit breaks immersed in oil).

NEMA 9—Hazardous Locations, National Electrical Code Class 2.

NEMA 10—Explosion-proof. Meets U.S. Bureau of Mines requirements for explosive atmospheres.

NEMA 11—Acid or Fume Resistant. Provides for immersion of enclosed equipment in oil.

NEMA 12—Industrial Use. Excludes oils, dust, moisture, to satisfy individual requirements.

Appendix C: Best Practices for Low Power Control Signal Wiring

Low power analog signals are commonly used for proportional control signal wiring in HVAC applications. Following are a series of best practices for the prevention of corruption of these signals due to electro-magnetic interference (“EMI”).

EMI is typically caused by coupling of the electro-magnetic field that surrounds all wires carrying current. It may also be caused by radio frequency sources such as “walkie talkies” using amplitude modulated signals. A strong EM field can induce electrical noise in wires up to 2 V in amplitude. The strongest coupling comes between closely spaced, parallel wires. Inductive and high power motor loads are some of the strongest sources of EMI, along with electronics lighting ballasts, dimmers, and variable frequency motor drives. More potential EMI sources in a building mean that greater attention needs to be paid to effective wiring practices.

All control wiring should consist of twisted pairs of wires, which resist interference better than straight, non-twisted conductors. Stranded conductors offer less resistance to current flow than solid wires, and are more flexible making them easier to install; however, care must be taken to ensure that all the conductors in the wire are properly installed and that “whiskers” do not short out any wiring connections.

Shielded Wiring

Control signals can be protected from EMI using shielded wire. The more continuous the shield, the more effective it is. Braided shield is commonly used for microphone cables because of its superior flexibility. HVAC wiring is fixed, does not require high flexibility during use, and is better served with lower cost cables using continuous foil shielding and a “drain wire”.

1. All signal wiring in hospitals should be shielded to prevent the potential for interference with medical equipment such as high power MRI and CT scanners.
2. All 0~10 Vdc control signals should be run in shielded cable. EMI noise can be interpreted as control signaling, depending on the noise suppression circuitry in the controlled equipment.
3. Long runs of wiring from 24 V power supply transformers should be shielded in heavy electrical noise environments to prevent EMI from coupling through the actuator's power supply.
4. In typical commercial buildings, 2~10 Vdc signals do not require shielded wiring.
5. Current flow is much more difficult to induce in wiring than voltage, and current-based control signals usually do not require shielded cable except in heavy industrial applications.
 - a. If the terminal equipment only accepts voltage input, install a 500 ohm, ¼ Watt (or larger), 1% resistor across the control input terminals to convert a 4~20 mA(dc) signal to 2~10 Vdc.
 - b. If multiple actuators are connected in parallel, install this resistor at the first actuator in the group.

- c. Any standard resistor (“EIA”) value between 490 and 510 ohms is acceptable, and can be purchased at retail outlets that sell electronic components.

6. Floating, pulse-width modulated, and two-position actuators use switched 24 Vac control or power signals and so rarely require shielded wiring.

Wiring Techniques

1. No wiring should ever be assumed to be interference-proof. Never strap signal cables to other conductors or conduit, especially line voltage.
2. Never run signal wires in raceways or wiring troughs with other conductors. Keep signal wires at least a yard away from line voltage wiring. Higher voltage wiring requires greater separation.
3. When necessary, cross line voltage conductors with signal wiring at 90° (right angles), to minimize signal coupling.
4. Electromagnetic shielding is a static phenomenon; any current running through the shield will negate any protection the shield may have provided. Only ground (or “earth”) a shield drain wire at one point, preferably where the signal will be the weakest, for example: at the actuator.
 - a. Do not ground the secondary of the 24 V power supply in the control system. This will create a secondary current path and negate the protection of any shielding.
 - b. If there is a burner ignition system, power it with its own transformer and use an interface relay for isolation, if necessary.
 - c. Use relays with built-in coil arc suppression, such as a Honeywell R8229.
5. Insulate all exposed shielding and drain wire joins and splices so that they cannot contact electrical ground, especially junction boxes and conduit. Do not use the ground screw of a junction box as a tie point. Use a separate electrical ground wire if required for safety extra-low voltage wiring by local code.
6. Both rigid and flexible conduit are continuously grounded (“bonded”) for electrical safety, and cannot function as a signal shield. Where local codes require mechanical protection for all wiring, shielded signal cable may be run inside conduit, following the practices listed above.

Additional References

Most of these wiring techniques were developed to protect the very low-strength signals in audio recording. The 20 mA current loop signal was originally used with teletype (“TWX”) equipment communicating over telephone lines and adapted for proportional analog control signaling in industrial process control. Further information and background theory can be found in:

1. Audio Engineering Handbook, edited by Blair K. Benson, McGraw-Hill
2. Handbook for Sound Engineers, by Glen Ballou
3. Standard Handbook of Audio Engineering, by Jerry Whitaker and Blair K. Benson, McGraw-Hill.

Honeywell

ENVIRONMENTAL AND ENERGY SOLUTIONS

WARRANTY POLICY

Honeywell warrants the products in this catalog (except those parts designated on Honeywell's price lists as not covered by this warranty) to be free from defects due to workmanship or materials, under normal use and service, for the following warranty periods.

Sixty (60) months from date of installation

- Prestige®, Prestige® IAQ, Lyric™ Round Thermostat, Lyric™ T6, T6 Pro, T5 Series, VisionPRO®, Commercial VisionPRO®, Commercial PRO®, FocusPRO®, Wireless FocusPRO®, PRO 4000, PRO 3000, LineVoltPRO™, Digital Round™, and Modern Round™ (T87K, N) Series Thermostats with a date code of 0501 or later
- Air Cleaners, Humidifiers, Ventilators, Ultraviolet Treatment, Indoor Air Quality, and Zoning products with a date code of 0501 or later, excluding replacement maintenance parts
- MS, MN and fast acting 2-position Direct Couple actuators; MVN rotary valve actuators
- Commercial Valves: VBN and VBF ball valves, and VRN pressure independent control valves
- JADE economizer when used with Honeywell sensors and actuators
- AquaPUMP circulating pump
- C7189R RedLINK Wireless Indoor Air Sensor
- C7061 UV Detector

Sixty (60) months from date of manufacture

- Access and Video Systems power supplies

Thirty-six (36) months from date of shipment

- Variable frequency drive devices (VFD) and accessories

Thirty-six (36) months from date of installation

- AUBE branded thermostats, timers, and switches
- LCBS Connect controllers, wall modules and gateways

Twenty-four (24) months from date of installation

- PRO 2000 and PRO 1000 thermostats
- Other Honeywell indoor air quality and zoning products with a date code of 0452 or earlier, unless otherwise specified
- AQ2000 Aquatrol panels and AQ1000 thermostats
- RedLINK Entry/Exit Remote
- RedLINK Vent Boost Remote

Twenty-four (24) months from date of manufacture

- Pan-Tilt-Zoom Domes for Access and Video Systems

Eighteen (18) months from date of shipment,

- All WEBs and Security controllers, unless specified otherwise (warranty replacement parts will be warranted for 90 days or the balance of the original warranty period, whichever is longer)

Twelve (12) months from date of installation

- Water Solutions products
- Redlink Wireless Outdoor Air Sensor
- Redlink Portable Comfort Control
- Redlink Internet Gateway
- Unitary controllers including Spyder, Stryker, and Sylk IO modules

Twelve (12) months from date of shipment

- Building automation security accessories.

The warranty period for all other products is twelve (12) months from date of installation.

If a product is defective due to workmanship or materials, is removed within the applicable warranty period, and is returned to Honeywell in accordance with the procedure described below, Honeywell will, at its option, either repair, replace or credit the customer for the purchase price of the product, in accordance with the procedure described below. This warranty extends only to persons or organizations who purchase products in this catalog for resale.

The expressed warranty above constitutes the entire warranty of Honeywell with respect to the products in this catalog and IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL HONEYWELL BE RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGES OF ANY NATURE WHATSOEVER.

INSTRUCTIONS—INSTALLING OR SERVICING CONTRACTOR OR DEALER

When replacing a Honeywell product under warranty, including those products furnished on original heating and/or cooling equipment, you should rely on your local Honeywell Wholesaler or Distributor for prompt and efficient product replacement service.

No warranty claim for product replacement or credit will be honored by Honeywell without a completed return authorization form or manual return authorization form issued by Honeywell Customer Care

INSTRUCTIONS—WHOLESALE OR DISTRIBUTOR

The following will apply to the return of any product to Honeywell under this warranty, except any products which are not variable frequency drives or WEBs and are:

- identified with a Honeywell Return Goods Authorization Form (obtained from the B2B website at Customer.Honeywell.com)
- display the Return Authorization Form number and return address label on the outside of the return carton. Make sure a copy of the form is enclosed in the return carton
- packed separately from other returns and protected from shipping damage;
- have certification by the installer or servicing dealer that the product was removed, due to failure, within the applicable warranty period;

- are received transportation pre-paid at: Honeywell Intl Inc. Returned Goods 705, Avenue Montrichard Saint-Jean-Sur-Richelieu, QC J2X 5K8
- and are found by Honeywell's inspection to be defective in workmanship or materials under normal use and service

will be handled in accordance with one of the two following procedures, as specified by the customer making the return.

- 1. CREDIT PROCEDURE.** Honeywell will issue credit, at Honeywell's lowest wholesaler net price in effect at the time of the return (as set forth on Honeywell's then current price sheet) or at the actual invoice amount if a copy of that invoice is attached to the packing list. (TRADELINE Replacement Exchange Products will be at Honeywell's lowest replacement exchange net price in effect at the time of such return, as shown on Honeywell's then current price sheet.) Honeywell reserves the right to disallow this credit option in cases of warranty abuse.
- 2. REPLACEMENT PROCEDURE.** Warranty replacement procedure must be used for in-warranty emergency replacement orders. Customer will not be credited for items not meeting warranty criteria as outlined by policy. Please return the defective item to the address listed on the return authorization form.

List Water Solutions products on a separate Return Goods Order form, marked "Water Solutions".

All new and unused VBN control ball valves MUST be approved by your Honeywell sales representative before returned.

WEBs return products must be processed through WEBs Customer Care. Defective hardware products under warranty have to be returned to Tridium in Richmond, VA. Security Access and Video products must have prior authorization.

All VFD warranty return products must be coordinated through the Commercial Components Hotline (1-888-516-9347 option 4) staff and VFD Warranty and Repair Program Coordinator (ECC-VFD Coordinator). All VFD warranty returns must have prior authorization and must be returned to the specified Honeywell VFD Service Center.

The warranty will not be honored if:

- product is damaged or missing parts or accessory items including batteries.
- product exhibits evidence of field misapplications.

Final disposition of any warranty claim will be determined solely by Honeywell. If inspection by Honeywell does not disclose any defect covered by the warranty, the product will be returned or scrapped as instructed by the customer and Honeywell's regular service charges will apply. Products returned to the customer may be sent shipping charges collect.

If you have any questions relative to product returns to Honeywell, contact your Customer Care Representative:

Honeywell International Inc.
Customer Care MN10-131A
1985 Douglas Drive
Golden Valley, MN 55422
1-800-565-6282

SPECIAL MESSAGE TO INDUSTRIAL USERS AND BUILDING OWNERS

Thank you for using Honeywell products.

As a user, when you purchase a Honeywell product from this catalog you should expect performance from the product and, if it fails, replacement of the product by the installing dealer.

Typically, you will have purchased a Honeywell product under the following circumstances:

1. To modernize or refurbish your existing commercial and/or process control system.
2. You have purchased new commercial and/or process heating, cooling, air cleaning or humidification equipment that is furnished

with Honeywell controls or components (refer to your owner's manual furnished with the equipment).

3. A control has failed on your existing commercial and/or process heating and/or cooling equipment and is replaced by a Honeywell TRADELINE product.

With few exceptions, you utilize the services of a competent plumbing, heating and/or cooling dealer/contractor for new or replacement work performed.

Although our warranty does not extend to you, Honeywell does extend a warranty to your supplier.

Your supplier can rely on its local Honeywell Wholesaler/Distributor or Honeywell for prompt replacement.

If you have any questions, need additional information or would like to comment on Honeywell's products or services, please write or phone:

Honeywell International Inc.
Customer Care MN10-131A
1985 Douglas Drive North
Golden Valley, MN 55422-4386
1-800-565-6282

or check your telephone directory (white pages) for one of many Honeywell field sales offices.

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