



# Johnson Controls HVAC Product Catalog



Temperature Sensor and Transmitter.....	4
TE-6300 Series Temperature Sensor.....	4
HT7000 Series Temperature Transmitter .....	7
<b>Temperature Control.....</b>	<b>9</b>
A19 Series Temperature Control.....	9
<b>Temperature &amp; Humidity Sensor and Transmitter.....</b>	<b>10</b>
HT7000 Series Temperature and Humidity Transmitter .....	10
RS7000 Series Room Temperature and Humidity Transmitter .....	12
HE-69 Series Duct Temperature and Humidity Sensor .....	14
<b>Presssure &amp; Differential Pressure Transmitter and Switch .....</b>	<b>17</b>
P499 Series Pressure Transducer.....	17
LPT7000 Series Liquid Pressure Transducer .....	19
P133 Series Differential Air Pressure Switch .....	21
DPT7000 Series Differential Pressure Transmitter .....	22
<b>Air Quality Sensor.....</b>	<b>24</b>
CD7000 Series CO <sub>2</sub> Transmitter .....	24
GS300 Series CO Transmitter .....	25
<b>Flow and Liquid Level Control.....</b>	<b>27</b>
FS80-C Flow Switch .....	27
<b>Thermostat .....</b>	<b>28</b>
T9000 Series Touch Screen Thermostat.....	28
T7000e Series LCD Thermostat.....	34
T7000 Series LCD Thermostat.....	36
<b>VAV Wall Module .....</b>	<b>42</b>
NSA7000 Series Network Sensor .....	42
TE730 Series Sensor.....	45



<b>Flow Meter and BTU Meter</b> .....	<b>46</b>
KEN Series Electromagnetic Flow Meter and KHN Series Electromagnetic BTU Meter .....	46
RLBC Series Ultrasonic BTU Meter.....	49
<b>Zone Valve &amp; Actuator</b> .....	<b>52</b>
VLC2000 Series Electric Zone Valves & Actuators.....	52
VG4000 Series Electric Zone Valves & Actuators .....	54
<b>Ball Valve &amp; Actuator</b> .....	<b>59</b>
VG1000 Series Threaded Control Ball Valves & Actuators.....	59
VG1000 Series Flanged Control Ball Valves & Actuators .....	66
<b>Globe Valve &amp; Actuator</b> .....	<b>69</b>
VGA7000 Series Threaded Globe Valves & Actuators .....	69
VGA8000 Series Flanged Globe Valves & Actuators.....	74
VGA9000 series Flanged Globe Valves & Actuators .....	80
VAP Series Electric Actuators .....	85
<b>Butterfly Valve and Actuator</b> .....	<b>89</b>
VF3000 Series Butterfly Valves and Actuators.....	89
VF5000 Series Butterfly Valves and Actuators.....	93
VF6000 Series Butterfly Valves and Actuators .....	98
VF7000 Series Butterfly Valves and Actuators.....	104
<b>Balancing Valve</b> .....	<b>108</b>
VPS-N Series Static Balancing Valves .....	112
VPPN Series Differential Pressure Balancing Valves .....	107
VPMF Series Pressure Independent Control Valves .....	117
VPMA Series Pressure Independent Control Valves.....	123
<b>Electric Damper Actuator</b> .....	<b>127</b>
M9104 Series Electric Npon-Spring Return Actuators .....	127
M9203 Series Electric Spring Return Actuators .....	130
M9208 series Electric Spring Return Actuators.....	132
M9220 Series Electric Spring Return Actuators .....	134
M9300 Series Electric Npon-Spring Return Actuators.....	136

# Temperature Sensor and Transmitter

## TE-6300 Series Temperature Sensor

### Introduction

The TE-6300 Temperature Sensor line provides economical solutions for a wide variety of temperature sensing needs, including wall-mount, outdoor-air, duct, strap-mount, well-insertion, duct-averaging, and VAV Modular Assembly (VMA) flange-mount duct-probe applications. The TE-6300 line offers both a metal and a plastic enclosure for the most popular models.

Sensors are available in the following types:

- 1k ohm thin-film nickel
- 1k ohm nickel averaging
- 1k ohm thin-film platinum
- 100 ohm platinum equivalent averaging
- 1k ohm platinum equivalent averaging
- 2.2k (2,252) ohm thermistor
- 10k ohm thermistor, Johnson Controls® Type II

### Features and Benefits

Each sensor is packaged with the necessary mounting accessories to maximize ordering and installation ease and to reduce both commissioning time and cost.

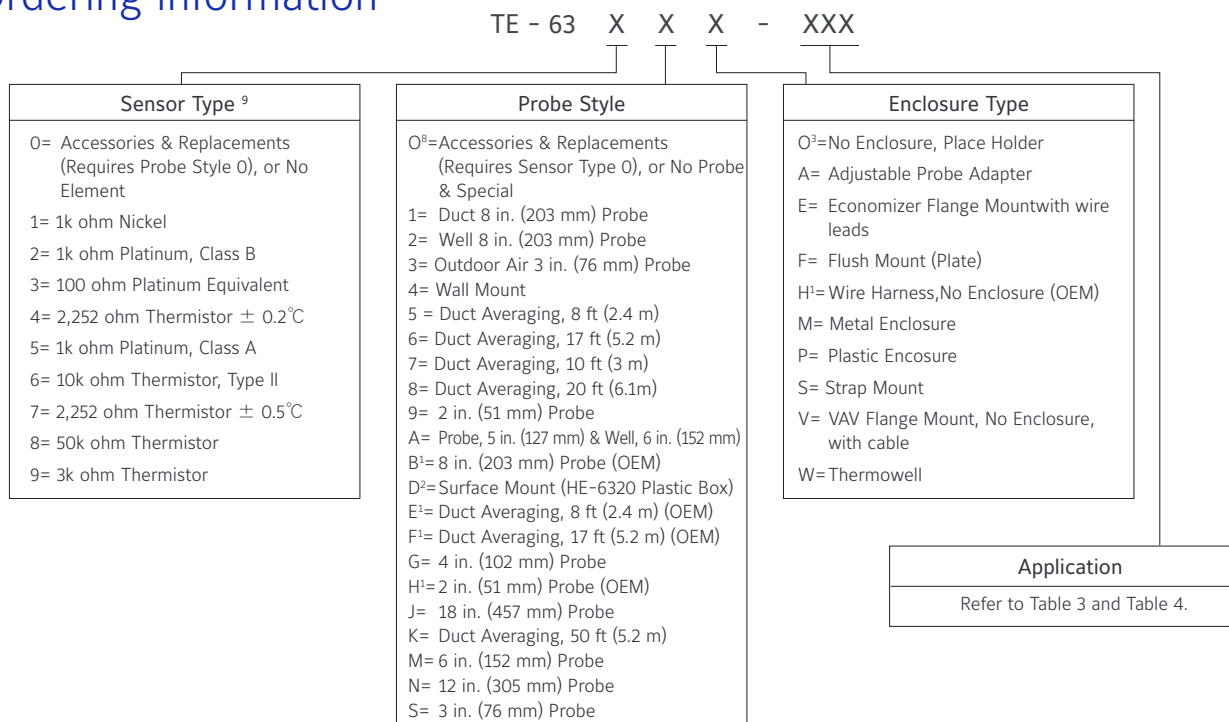
- **Full Line of Versatile Sensors** - Supports all your temperature sensing needs from a single supplier: wall-mount, outdoor-air, duct, duct-averaging, strap-mount, well-insertion, and flange-mount duct-probe.
- **Single Assembly Ordering** - Simplifies ordering; provides a complete assembly in one box.
- **Models Featuring an Integral National Pipe Thread (NPT) Adaptor** - Increase sensor connection strength, which eliminates the need for a special adaptor.



Figure 1: TE-6300 Series Temperature Sensors

- **Models with a Stainless Steel Sensor Probe** - Protect the sensor while increasing corrosion resistance.
- **Metal Enclosure (TE-63xxE, TE-63xxM, and TE-63xxV Models)** - Meets plenum requirements.
- **Models Featuring a Retainer for the Sensor Holder** - Allow you to lock the sensor holder into the conduit box.
- **Brushed Stainless Steel Mounting Plate** - Offers a durable, aesthetically pleasing design.
- **Low Profile Flush Mount Design (TE-63xxF Models)** - Provides a tamper-proof installation ideally suited for schools, sporting complexes, retailers, prisons, and more.

### Ordering Information



Note: Not all possible combinations are available. See Table 3 for available models.

# Temperature Sensor and Transmitter

## Technical Specifications

### TE-6300 Series Temperature Sensors (Part 1 of 3)

Sensor Reference Resistance	1k ohm nickel	1k ohms at 70° F (21°C)
	1k ohm nickel averaging	
	1k ohm platinum	1k ohms at 32° F (0°C)
	100 ohm platinum averaging	100 ohms at 32° F (0°C)
	1k ohm platinum averaging	1k ohms at 32° F (0°C)
	2.2k ohm thermistor	2,252 ohms at 77° F (25°C)
	10k ohm thermistor	10.0k ohms at 77° F (25°C)
Sensor Accuracy	1k ohm nickel	±0.34° F at 70° F (±0.19°C at 21°C)
	1k ohm nickel averaging	±3.4° F at 70° F (±1.9°C at 21°C)
	1k ohm platinum Class A (TE-635xx)	EN 60751 Class A, ± [0.15 + 0.002 *   T °C  ], ±0.19C° at 21°C (±0.35° F at 70° F)
	100 ohm platinum Class A	
	1k ohm platinum Class B (TE-632xx)	EN 60751 Class B, ± [0.30 + 0.005 *   T °C  ], ±0.41C° at 21°C (±0.73° F at 70° F)
	100 ohm platinum averaging	±1.0° F at 70° F (±0.58°C at 21°C)
	1k ohm platinum averaging	
2.2k ohm thermistor	±0.36° F (±0.2C° ) in the range: 32 to 158° F (0 to 70°C)	
10k ohm thermistor	±0.9° F (±0.5C° ) in the range: 32 to 158° F (0 to 70°C)	
Sensor Temperature Coefficient	1k ohm nickel	Approximately 3 ohms/° F (5.4 ohms/°C)
	1k ohm nickel averaging	
	1k ohm platinum	Approximately 2 ohms/° F (3.9 ohms/°C), 3,850 ppm/K
	100 ohm platinum averaging	Approximately 0.2 ohms/° F (0.39 ohms/°C)
	1k ohm platinum averaging	Approximately 2 ohms/° F (3.9 ohms/°C)
	2.2k ohm thermistor	Nonlinear, negative temperature coefficient (NTC)
	10k ohm thermistor	Nonlinear NTC, Johnson Controls Type II
Electrical Connection	TE-63xxE	22 AWG (0.6 mm diameter) x 6 in. (152 mm) long
	TE-63xxM	
	TE-63xxP	
	TE-63xxF	22 AWG (0.6 mm diameter) x 12 ft (3 m) braided copper wires, low voltage insulation, half-stripped ends
	TE-63xxP nickel averaging	18 AWG (1.0 mm diameter) x 6 in. (152 mm) long
	TE-63xS	22 AWG (0.6 mm diameter) x 10 ft (3 m) long plenum-rated cable
	TE-63xxA	22 AWG (0.6 mm diameter) x 10 ft (3 m) long plenum-rated cable, with 2-position plug terminal block for 1/4 in. (6.35 mm) external tab terminals on 0.197 in. (5 mm) centers
	TE-63xxV	

# Temperature Sensor and Transmitter

## Technical Specifications

### TE-6300 Series Temperature Sensors (Part 2 of 3)

Materials	Probes	Nickel averaging:	0.094 in. (2.4 mm) outside diameter (O.D.) copper tubing
		Nickel averaging adaptor:	0.25 in. (6.35 mm) O.D. brass
		Platinum averaging probe:	0.19 in. (4.8 mm) aluminum tubing
		All others:	0.25 in. (6.35 mm) O.D. stainless steel
	TE-63xxA	Mounting adaptor plate and gland:	thermoplastic
	TE-63xxF	Flush mount:	stainless steel
	TE-63xxM	Enclosure:	corrosion-protected steel
		Well sensor holder:	0.875 in. (22.2 mm) hex brass
	TE-63xxP	Conduit box and shield:	rigid thermoplastic
		Mounting plate:	aluminum
Sensor holder:		rigid thermoplastic	
Wall mount base plate:		corrosion-protected steel	
Wall mount cover:		rigid thermoplastic (white)	
TE-63xxE	Mounting flange:	stainless steel	
TE-63xxV			
Operating Conditions	TE-63xxA		-50 to 140° F (-46 to 60°C)
	TE-63xxF		32 to 104° F (0 to 40°C)
	TE-63xxE		-50 to 220° F (-46 to 104°C)
	TE-63xxM		
	TE-63xxP	Enclosure:	-50 to 122° F (-46 to 50°C)
		Sensor probe:	-50 to 220° F (-46 to 104°C)
	TE-63xS	Sensor probe:	-50 to 220° F (-46 to 104°C)
TE-63xxV	Wire harness:	-50 to 122° F (-46 to 50°C)	
Shipping Weight	TE-63xxA		0.2 lb (0.09 kg)
	TE-63xxE		
	TE-63xxF		0.25 lb (113.4 kg)
	TE-63xxM	Duct averaging:	0.9 lb (0.41 kg)
		Duct mount:	0.4 lb (0.18 kg)
		Well insertion:	0.5 lb (0.23 kg)
	TE-63xxP	Duct averaging:	0.5 lb (0.23 kg)
		Duct mount:	0.4 lb (0.18 kg)
Outdoor air:		0.5 lb (0.23 kg)	
Well insertion:		0.35 lb (0.16 kg)	
TE-63xS	Strap mount:	0.2 lb (0.09 kg)	
TE-63xxV	Duct averaging:	0.7 lb (0.32 kg)	
	Duct mount:	0.2 lb (0.09 kg)	

## Technical Specifications

### TE-6300 Series Temperature Sensors (Part 3 of 3)

Dimensions (H xWxD)	TE-63xxA		2.17 in. (55 mm) diameter plus 4 or 8 in. (102 or 203 mm) element
	TE-63xxE	Duct mount:	2.5 x 1.50 in. (57 x 38 mm) plus 2, 6, 8, or 12 in. (51, 152, 203, or 305 mm) element
	TE-63xxF	Flush mount:	4-1/2 x 2-3/4 in. (114 x 70 mm)
	TE-63xxM	Duct averaging:	1.87 x 1.87 x 1.80 in. (47.5 x 47.5 x 45.8 mm) plus 8 or 17 ft (2.4 or 5.2 m) element
		Duct mount:	1.87 x 1.87 x 1.80 in. (47.5 x 47.5 x 45.8 mm) plus 4, 8, or 18 in. (102, 203, or 457 mm) element
		Well insertion:	1.87 x 1.87 x 1.80 in. (47.5 x 47.5 x 45.8 mm) plus 6 or 8 in. (152 or 203 mm) element
	TE-63xxP	Duct averaging:	5.97 x 1.38 x 2.75 in. (152 x 35 x 70 mm) plus 8, 10, 17, or 20 ft (2.4, 3.0, 5.2, or 6.1 m) element
		Duct mount:	5.97 x 1.38 x 2.75 in. (152 x 35 x 70 mm) plus 6 or 8 in. (152 or 203 mm) probe
Outdoor air:		5.97 x 3.47 x 4.46 in. (152 x 88 x 113 mm)	
Wall mount:		2.09 x 3.12 x 1.80 in. (53 x 79 x 46 mm)	
Well insertion:		5.97 x 1.38 x 2.75 in. (152 x 35 x 70 mm) plus 6 or 8 in. (152 or 203 mm) probe	
TE-63xS	Strap mount:	0.25 in. (6.4 mm) diameter x3.00in. (76mm) long	
TE-63xxV	Duct averaging:	2.25 x 1.50 in. (57 x 38 mm) plus 8 or 17 ft (2.4 or 5.2 m) element	
	Duct mount:	2.25 x 1.50 in. (57 x 38 mm) plus 4 or 8 in. (102 or 203 mm) element	

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

## Johnson Controls HT7000 Series Temperature Transmitter

### Introduction

Johnson Controls HT7000 series temperature transmitter is designed for office building, hospital and other application, which is a basic sensor product can detect the ambient temperature parameter. This product selects high precision sensing element and circuit to convert the measured value into analog signal output to compatible with Johnson Controls BAS system.

### Feature

- Good long-term stability and anti-interference ability
- Static overvoltage and reverse connection protection
- IP65 High IP protection
- Multiple installation modes available



# Temperature Sensor and Transmitter

## Naming Rule

Series	Installation Mode	Temperature Measurement Range	Output	Probe length
HT7000	D: Duct Type	1: -40~60°C	V: Voltage output 0-10V	0: Default (0 for Duct type and Wall mount)
	W: Wall Mount	2: -20~80°C	C: Current output 4-20mA	1: 65mm
	I: Immersion Type	3: 0~50°C		2: 102mm
		4: -10~50°C		3: 152mm
		5: -40~150°C		4: 300mm (1-4 for immersion type only)

Note: Immersion product includes protection well, same length with probe. The material of protection well is SS304.

## Selection Table

Part Number	Output	Temperature Accuracy	Temperature Measurement Range	IP Protection	Probe Length
HT7000D1V0	0-10V	±0.3°C@25°C	-40~60°C	IP65	Default
HT7000D1C0	4-20mA	±0.3°C@25°C	-40~60°C	IP65	Default
HT7000D2V0	0-10V	±0.3°C@25°C	-20~80°C	IP65	Default
HT7000D2C0	4-20mA	±0.3°C@25°C	-20~80°C	IP65	Default
HT7000D3V0	0-10V	±0.3°C@25°C	0~50°C	IP65	Default
HT7000D3C0	4-20mA	±0.3°C@25°C	0~50°C	IP65	Default
HT7000W3V0	0-10V	±0.3°C@25°C	0~50°C	IP65	Default
HT7000W3C0	4-20mA	±0.3°C@25°C	0~50°C	IP65	Default
HT7000W1V0	0-10V	±0.3°C@25°C	-40~60°C	IP65	Default
HT7000W1C0	4-20mA	±0.3°C@25°C	-40~60°C	IP65	Default
HT7000W4V0	0-10V	±0.3°C@25°C	-10~50°C	IP65	Default
HT7000W4C0	4-20mA	±0.3°C@25°C	-10~50°C	IP65	Default
HT7000I5V1	0-10V	±0.3°C@25°C	-40~150°C	IP65	65mm
HT7000I5C1	4-20mA	±0.3°C@25°C	-40~150°C	IP65	65mm
HT7000I5V2	0-10V	±0.3°C@25°C	-40~150°C	IP65	102mm
HT7000I5C2	4-20mA	±0.3°C@25°C	-40~150°C	IP65	102mm
HT7000I5V3	0-10V	±0.3°C@25°C	-40~150°C	IP65	152mm
HT7000I5C3	4-20mA	±0.3°C@25°C	-40~150°C	IP65	152mm
HT7000I5V4	0-10V	±0.3°C@25°C	-40~150°C	IP65	300mm
HT7000I5C4	4-20mA	±0.3°C@25°C	-40~150°C	IP65	300mm

## Specification

Temperature sensing element	PT1000 (measure accuracy ±0.2K@25°C)
Temperature measurement range	Duct type: -20~80°C、-40~60°C、0~50°C
	Wall mount: -40~60°C、0~50°C、-10~50°C
	Immersion type: -40~150°C
Temperature accuracy	±0.3°C@25°C
Temperature output	0-10V 4-20mA
IP Protection	IP65
Power supply	Voltage output: 15~35VDC/24VAC±20%; Current output:18.5~35VDC (RL=500Ω) , 8.5~35VDC (RL=0Ω)
Output Load	≤500Ω (current output) , ≥3kΩ (voltage output)
Closure	PC (UL94-V0)
Working environment	-40~70°C & 0~95%RH (No condensation)
Storage environment	-30~70°C & 0~95%RH (No condensation)
Certificate	CE

## A19 Series Temperature Control

### Application

Johnson Controls hot water immersion controls provide various control functions for hydronic heating systems. These include high temperature cutout, operating, circulator or low temperature cutout.

All Series A19 temperature controls are designed for use only as operating controls. Where an operating control failure would result in personal injury and/or loss of property, it is the responsibility of the installer to add devices (safety, limit controls) or systems (alarm, supervisory systems) that protect against, or warn of, control failure.



Fig. 1 - The A19 Direct Mounting Control.

### Features

- Sealed, dusttight Pennswitch contact unit.
- Matching drawn bulb and well for rapid, efficient heat transfer.
- Manual reset, when supplied, is "Trip-Free." Reset must be pressed and released before operation will resume.
- Concealed dial stop permits control within maximum temperature selected or specified.
- Direct reading scales provide fast, easy "on-the-job" adjustment.

### General Description

A liquid expansion temperature element with copper bulb well gives fast control response.

The control can be easily removed from the bulb well by loosening the set screws and withdrawing the sensing bulb from the well. The control can be mounted in any position around the axis of the bulb well without changing the operating characteristics.

### Specifications

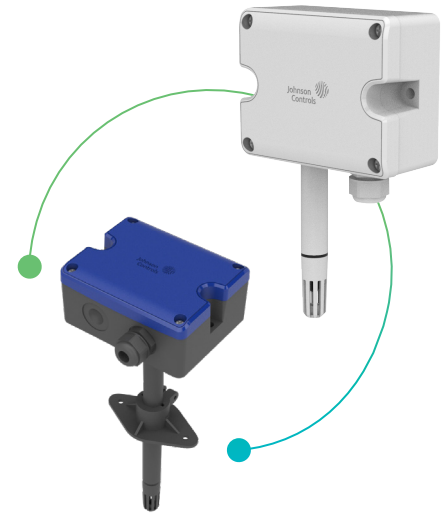
Type Number	A19AAB	Opon on Rise, Fixed Differential
	A19AAC	SPDT, Fixed Differential
	A19ABA	Close on Rise, Adjustable Differential
	A19ABB	Open on Rise, Adjustable Differential
	A19ABC	SPDT, Adjustable Differential
	A19ADB	Opon on Rise, Lockout with Manual Reset
	A19ADC	SPDT, Lockout with Manual Reset
Temperature Range		100 to 240° F (40 to 120°C)
Differential	Fixed	6° F (3.3°C)
	Adjustable	6° F (3.3°C) Min.; 24° F (13°C) Max.
Maximum Temperature	At Case	140° F (60°C)
	At Bulb	290° F (143°C)
Contact Action		Red to Yellow Closes on Temperature Rise Red to Blue Opens on Temperature Rise
Contact Units		Snap Acting, Enclosed Dusttight Pennswitch
Conduit Openings		One 7/8"(22mm) Diameter Hole for 1/2" Conduit
Enclosure		NEMA Type 1 General Purpose
Finish		Gray Baked Enamel
Material	Case	062"(1.57 mm) Cold Rolled Steel
	Cover	025"(0.64 mm) Cold Rolled Steel
Mounting		Immersion Well Mounts Directly in Boiler Tapping. Case of Remote Bulb Models Mounts to Flat Surface
Shipping Weight	Individual Pack	1.5 lb (0.7 kg)
	Overpack of 25 Units	37.5 lb (17 kg)
Terminal Screws		No.8-32 x 1/4" Binder Head With Cup Washers

# Temperature & Humidity Sensor and Transmitter

## Johnson Controls HT7000 series temperature and humidity transmitter

### Introduction

Johnson Controls HT7000 series temperature and humidity transmitter is designed for office building, hospital and other application, which is a basic sensor product can detect the ambient temperature and humidity parameter. This product selects high precision sensing element and circuit to convert the measured value into analog signal output to compatible with Johnson Controls BAS system.



### Feature

- Good long-term stability and anti-interference ability
- Static overvoltage and reverse connection protection
- IP65 High IP protection
- Multiple installation modes available

### Naming Rule

Series	Installation Mode	Temperature Measurement Range	Output	Humidity Accuracy
HT7000	D: Duct Type	1: -40~60°C	V: Voltage output 0-10V	3: ±3%RH
	W: Wall Mount	2: -20~80°C	C: Current output 4-20mA	
		3: 0~50°C		
		4: -10~50°C		

### Selection Table

Part Number	Output	Temperature Accuracy	Temperature Measurement Range	Humidity Accuracy	Humidity Measurement Range	IP Protection
HT7000D1V3	0-10V	±0.3°C@25°C	-40~60°C	±3%RH@ 25°C & 20-80%RH	0-100%RH	IP65
HT7000D1C3	4-20mA	±0.3°C@25°C	-40~60°C	±3%RH@ 25°C & 20-80%RH	0-100%RH	IP65
HT7000D2V3	0-10V	±0.3°C@25°C	-20~80°C	±3%RH@ 25°C & 20-80%RH	0-100%RH	IP65
HT7000D2C3	4-20mA	±0.3°C@25°C	-20~80°C	±3%RH@ 25°C & 20-80%RH	0-100%RH	IP65
HT7000D3V3	0-10V	±0.3°C@25°C	0~50°C	±3%RH@ 25°C & 20-80%RH	0-100%RH	IP65
HT7000D3C3	4-20mA	±0.3°C@25°C	0~50°C	±3%RH@ 25°C & 20-80%RH	0-100%RH	IP65
HT7000W1V3	0-10V	±0.3°C@25°C	-40~60°C	±3%RH@ 25°C & 20-80%RH	0-100%RH	IP65
HT7000W1C3	4-20mA	±0.3°C@25°C	-40~60°C	±3%RH@ 25°C & 20-80%RH	0-100%RH	IP65
HT7000W3V3	0-10V	±0.3°C@25°C	0~50°C	±3%RH@ 25°C & 20-80%RH	0-100%RH	IP65
HT7000W3C3	4-20mA	±0.3°C@25°C	0~50°C	±3%RH@ 25°C & 20-80%RH	0-100%RH	IP65
HT7000W4V3	0-10V	±0.3°C@25°C	-10~50°C	±3%RH@ 25°C & 20-80%RH	0-100%RH	IP65
HT7000W4C3	4-20mA	±0.3°C@25°C	-10~50°C	±3%RH@ 25°C & 20-80%RH	0-100%RH	IP65

# Temperature & Humidity Sensor and Transmitter

## Specification

Temperature sensing element	PT1000 (measure accuracy $\pm 0.2K@25^{\circ}C$ )
Humidity sensing element	Capacitor
Temperature measurement range	Duct type: $-40-60^{\circ}C$ , $-20-80^{\circ}C$ , $0-50^{\circ}C$ Wall mount: $-40-60^{\circ}C$ , $0-50^{\circ}C$ , $-10-50^{\circ}C$
Temperature accuracy	$\pm 0.3^{\circ}C@25^{\circ}C$
Temperature output	0-10V 4-20mA
Humidity measurement range	0-100%RH
Humidity accuracy	$\pm 3\%RH$ ( $25^{\circ}C$ , 20-80%RH)
Humidity output	0-10V, 4-20mA
IP Protection	IP65
Power supply	Voltage output: $15-35VDC/24VAC \pm 20\%$ ; Current output: $18.5-35VDC (RL=500\Omega)$ , $8.5-35VDC (RL=0\Omega)$
Output Load	$\leq 500\Omega$ (current output), $\geq 3k\Omega$ (voltage output)
Closure	PC (UL94-V0)
Working environment	$-20-60^{\circ}C$ & 5-95%RH (No condensation)
Storage environment	$-20-60^{\circ}C$ & 5-95%RH (No condensation)
Certificate	CE



# Temperature & Humidity Sensor and Transmitter

## RS7000 Series Room Temperature and Humidity Transmitter

### Introduction

The flush-mounted RS7000 series sensors are designed for use with Facility Explorer series or System 91 controllers from Johnson Controls and provides 0-10VDC signal directly proportional to the sensed temperature. Models are available with and without LCD display, room temperature set point adjustment, fan speed adjustment and temporary occupied override function.

RS-7060-0000 can toggle between temperature and RH on the display, and has the capability to set the desired default display to either temperature or RH. A fan mode push button is included in RS-7080-0002 to set the desired fan speed (OFF-LOW-MED-HIGH-AUTO). Besides RS-7040-0000, all other models have occupancy override button which allows user to signal the controller that the zone is occupied to override the scheduled mode.



Table 1: Features and Benefits

Features	Benefits
Aesthetic appearance	Modern design with larger LCD and thinner dimension, it's matching to many style rooms
Large backlit LCD	LCD is larger than 40% of front area, provide real time status of the environment with intuitive and clear user interface
Energy saving indicator	Green or red leaf symbol to indicate the RS7000 works in energy saving or not saving mode
New installation method	New method without opening RS7000 cover during installation, avoids the risk of components damage by screwdriver
Suitable for various installation box	Small back part which is suitable for all installation boxes available in China and Europe market.
Push button for user operation	User can change temperature set point, fan speed and occupied/unoccupied via push button. Easier for operation

Table 2: RS7000 series sensor product code number

Product code number	Color	LCD	Fan control	Humidity <sup>1</sup>	Temp adjustment <sup>2</sup>	F/C scale toggle	Occupancy override	Screw terminal	Output <sup>3</sup>
RS-7040-0000	White	No	No	Yes	N/A	No	No	ST	0-10VDC
RS-7060-0000	White	Yes	No	Yes	Set/WC	Yes	Yes	ST	0-10VDC
RS-7080-0002	White	Yes	Yes	No	Set/WC	Yes	Yes	ST	0-10VDC

1. For models with humidity sensor, the humidity value also can be displayed in LCD, and the measurement accuracy is  $\pm 3\%$ RH.

2. Set/WC means this model can work under set or WC (Warmer/Cooler) mode, selected in setting.

3. Each of room temperature, room humidity, temperature set point and fan speed corresponding to one 0-10VDC output. The occupancy corresponding to one open collector output.

# Temperature & Humidity Sensor and Transmitter

## Technical specifications: RS7000 series sensor

Supply Voltage	15VDC nominal
Terminations	Screw terminal block
Output	RS-7040-0000: two 0-10VDC output
	RS-7060-0000: three 0-10VDC output, one open collector output (30V@50mA)
	RS-7080-0002: three 0-10VDC output, one open collector output (30V@50mA)
Wire size	Screw terminal block 18-22AWG (1.0-0.6mmdiameter); 22AWG (0.6 mm diameter) recommended
Mounting	Flush-mounted
Temperature measurement range	0-40°C (32-104° F)
Humidity measurement range	Full range: 0-100% RH
Temperature accuracy	±0.5°C (±1° F)
Humidity accuracy	±3%RH
Default temperature set point adjustment range	5.0°C to 35.0°C (41.0-95.0° F) in 0.5° increments
Ambient conditions	Operating: 0-40°C (32-104° F), 10-90%RH, noncondensing, 29°C (85° F) maximum dew point
	Storage: -20-60°C (-4-140° F), 5-95% RH, noncondensing
Shipping weight	Approx. 300g
Compliance	CE mark
	RCM mark, Australia/NZ emissions compliance
	RoHS, REACH, WEEE



# Temperature & Humidity Sensor and Transmitter

## HE-69 Series Duct Temperature and Humidity Sensor

### Introduction

The HE-69xx Sensor Series contains relative humidity (RH) sensing products with  $\pm 2\%$  or  $\pm 3\%$  accuracy.

The HE-69xx Series Duct Probe Humidity and Temperature Sensors combine humidity and temperature sensing in an all-plastic enclosure for use inside ducts. These sensor models are available with a nickel or platinum temperature sensor.

The input power options are 14 VDC to 30 VDC or 20 VAC to 30 VAC. The output signal is 0 VDC to 10 VDC for humidity indication.



Figure 1: HE-69xx Series Duct Probe Humidity and Temperature Sensor

### Features and Benefits

- Tested and calibrated with equipment certified as compliant with National Institute of Standards and Technology (NIST) guidelines.
- $\pm 2\%$  RH accurate model includes test and calibration equipment certificate of calibration conformance.
- User-selectable output voltage range allows choice of standard voltage outputs for use with systems in service or new systems.
- All-plastic material for duct probe improves thermal performance and complies with Underwriters Laboratories Inc.<sup>®</sup> (UL) flammability ratings for plenum use; complies with Blue Angel (Germany) and TCO'95 (Sweden) environmental regulations.

The HE-69xx Series Duct Probe Sensors provide humidity and temperature sensing inside ducts. The humidity element senses over the entire range of 0% RH to 100% RH and is housed in a plastic enclosure that is easy to install.

Use temperature and humidity information from the HE-69xx Series Duct Probe Sensor to precisely calculate enthalpy. This calculation is important to determine an energy-efficient and cost-effective economization strategy.

Duct humidity is an important factor in the overall quality of indoor air. Use the HE-69xx Series Duct Probe Sensor to monitor and compare duct humidity with levels advised in ASHRAE ventilation standards.

### Product Overview

**Important:** The HE-69xx Series Duct Probe Humidity and Temperature Sensor is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the sensor could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the sensor.

# Temperature & Humidity Sensor and Transmitter

## Ordering Information

Table 1: HE-69xx Series Duct Probe Humidity and Temperature Sensors

	Ordering code number example	H	E	-	6	9	1	3	0	N	P	-	0
Application	H = Humidity sensing												
Device function	E = Element												
	-69												
Temperature sensor type	1 = 1K ohm Nickel 5 = 1K ohm Platinum, Class A												
Humidity sensor accuracy	3 = $\pm 3\%$ 2 = $\pm 2\%$												
Output signal	0 = 0 VDC to 10 VDC												
	N												
Enclosure style	P = Duct probe												
Logo	0 = Johnson Controls												

Table 2: HE-69xx Series Duct Probe Humidity and Temperature Sensors ordering information


Product code number	Temperature sensor type	RH Accuracy	Output scale, set point scale, control type	Enclosure style	Logo
HE-69120NP-0	Ni1000	$\pm 2\%$	Proportional, 0 V to 10 V	Duct, probe	Yes
HE-69130NP-0	Ni1000	$\pm 3\%$	Proportional, 0 V to 10 V	Duct, probe	Yes
HE-69520NP-0	Pt1000 Class A	$\pm 2\%$	Proportional, 0 V to 10 V	Duct, probe	Yes
HE-69530NP-0	Pt1000 Class A	$\pm 3\%$	Proportional, 0 V to 10 V	Duct, probe	Yes



# Temperature & Humidity Sensor and Transmitter

## Technical specifications

Table 3: HE-69xx Series Duct Probe Humidity and Temperature Sensor

Product	HE-69xx Series Duct Probe Humidity and Temperature Sensor		
Power requirements	12 VDC to 30 VDC or 18 VAC to 30 VAC at 50/60 Hz, Class 2		
Current draw	DC supply	5 mA excluding load	
	AC supply	14 mA excluding load	
Acceptable wire gauge	16 AWG to 24 AWG wire; 18 AWG wire preferred		
Humidity element at 77° F (25° C)	Signal	0 VDC to 5 VDC or 0 VDC to 10 VDC, 1K ohm maximum load	
	Accuracy	HE-69x2	±2% RH for 20% to 80% RH at 77° F (25°C)
			±4% RH for 10% to 20% and 80% to 90% RH at 77° F (25°C)
		HE-69x3	±3% RH for 20% to 80% RH at 77° F (25°C)
			±5% RH for 10% to 20% and 80% to 90% RH at 77° F (25°C)
Temperature coefficient	-0.03% RH/°C		
Temperature sensors	Thin film nickel	Accuracy	±0.34° F (0.18°C) at 70° F (21°C)
		Reference resistance	1K ohm at 70° F (21°C)
		Resistance change	Approximately 3 ohm/° F (5 ohm/°C)
	Silicon	Accuracy	±1° F (0.6°C) at 70° F (21°C)
		Reference resistance	1,035 ohm at 77° F (25°C)
		Resistance change	Approximately 4 ohm/° F (8 ohm/°C)
	Thin film platinum	Accuracy	±0.65° FF at 70° FF (±0.36° C at 21°C)
		Reference resistance	1K ohm at 32° F (0°C)
		Resistance change	Approximately 2 ohm/° F (4 ohm/°C)
Electrical connections	3-position and 2-position screw terminal blocks		
Ambient operating conditions	32° F to 140° F (0°C to 60°C)		
	0% to 100% RH, 85° F (29.4°C) maximum dew point		
Survival operating conditions	-40° F to 140° F (-40°C to 60°C)		
	0% to 100% RH, 85° F (29.4°C) maximum dew point		
Materials	Blue plastic cover with blue plastic housing and probe		
Dimensions	Duct probe (H x W x D)	3.28 in. x 3.25 in. x 8.27 in. (83 mm x 83 mm x 210 mm)	
	Probe (L x D)	6.25 in. x 0.98 in. (159 mm x 25 mm)	
Shipping weight	0.6 lb (0.3 kg)		
Compliance	United States	UL Listed, CCN XAPX, File E27734; to UL 60730-1; and IEC 60730-2-13. Plenum Rated (UL 2043)	
	Canada	cUL Listed, CCN XAPX7, File E27734; to CAN/CSA E60730-1; and CAN/CSAE60730-2-13	
	Europe	CE Mark - Johnson Controls declares that this product is in Compliance with the essential requirements and other relevant provisions of the EMC Directive.	
	Australia and New Zealand	RCM Mark, Australia/NZ Emissions Compliant	

# Pressure & Differential Pressure Transmitter and Switch

## P499 Series Pressure Transducer

### Introduction

The P499 Series Electronic Pressure Transducers are compact, economical, rugged, direct-mount pressure transducers designed for use in commercial refrigeration and air conditioning applications. These transducers produce an analog signal based on the sensed pressure.

The P499 Series transducers feature environmentally protected electronics with stainless steel construction. The digitally compensated P499 transducers are highly accurate over a broad temperature range, resisting the effects of wide ambient temperature swings, high humidity, condensation, and icing.

The pressure port is machined from a solid piece of 17-4PH stainless steel. No O-rings, organic materials, or welds are exposed to the pressure media, allowing for a leak-proof, all-metal, sealed pressure system.

The P499 Series transducers operate with any corrosive or non-corrosive pressure medium that is compatible with 17-4PH stainless steel, including water, condensate, carbon dioxide, glycol, most refrigerants (including ammonia), and many other compatible fluids and gases.



Figure 1: P499 Electronic Pressure Transducers; Style 47 Fitting Shown on the Left and Style 49 Fitting Shown on the Right

The P499 Series provides transducers in a variety of pressure ranges, covering most common refrigeration and air conditioning applications.

### Table 1: Features and Benefits

Features	Benefits
Single-Piece Machined 17-4PH Stainless Steel Pressure Port	Provides a durable assembly that eliminates refrigerant loss due to O-ring or weld failures; resists damage due to physical shock, vibration, and pressure pulsations; enables use with non-corrosive or corrosive pressure media that is compatible with 17-4PH stainless steel.
Environmentally-Protected Electronics	Withstand the effects of adverse conditions associated with typical HVAC and Refrigeration applications, including freeze/thaw applications on suction lines.
Reliable, Repeatable Performance and Long Operating Life	Minimizes service and replacement costs.
Many Available Pressure Ranges	Provide a single line of transducers for all refrigeration and air conditioning application needs.
Slender Body Design	Facilitates use of deep-socket wrenches for ease of installation; requires zero turning radius.
1% Total Error Band	Provides high-accuracy performance.
CE and UL Agency Listings	Allow for global applications.

### Order Information

#### Transducer Base Number

P499

#### Output Signal

- A 4 to 20 mA
- B 0 to 5 VDC
- C 1 to 5 VDC
- R 0.5 to 4.5 VDC Ratiometric
- V 0 to 10 VDC

#### Pressure Range

- 100 -10 to 100 psi
- 101 0 to 100 psi
- 102 0 to 200 psi
- 105 0 to 500 psi
- 107 0 to 750 psi

#### Packaging

- C Individual
- D Bulk
- K Kit: transducer, cable, and literature

#### Pressure connection

- A 1/8 in. 27 NPT External Thread (Style 49)
- B 1/4 in. SAE 45° Flare External Thread
- C 1/4 in. SAE 45° Flare Internal Thread (7/16-20 UNF) with Depressor (Style 47)
- D 1/4 in. 18 NPT External Thread
- E 1/2 in. 20 UNF-2A SAE External Thread with O-ring
- F 1/4 in. 18 NPTF External Thread
- G M16 x 1.5 Ermeto External Thread

#### Pressure Mode

- Gauge
- A Absolute (0.75% Accuracy)
- S Sealed Gauge (0.75% Accuracy)

#### Electrical Connection

- A AMP (compatible with 174357-2 and 174358-7 connectors)
- C Cable-Unshielded
- H Hirschmann Form C with mating cable socket (DIN43650)
- J Hirschmann Form A without mating cable socket (DIN43650)
- P Packard
- S Cable-Shielded

# Pressure & Differential Pressure Transmitter and Switch

## Technical Specifications

### P499 Series Electronic Pressure Transducers

Pressure Ranges		-10 to 100 psi, 0 to 100 psi, 0 to 200 psi, 0 to 500 psi, 0 to 750 psi
Maximum Working Pressure		2x Pressure Range; short duration; infrequent, abnormal condition
Burst Pressure		5x Pressure Range
Vacuum		30 microns (0.03 mm Hg); short term
Media Compatibility		All media compatible with 17-4PH stainless steel, including ammonia
Output Signal		0.5 to 4.5 VDC, 0 to 10 VDC, or 4 to 20 mA
Supply Voltage	0.5 to 4.5 VDC Ratiometric Output	5.0 ±0.25 VDC, Safety Extra-Low Voltage (SELV) or Class 2
	4 to 20 mA Output	9 to 30 VDC, SELV or Class 2
	0 to 10 VDC Output	12 to 30 VDC, SELV or Class 2
Direct-Mount Pressure Connections		1/8in. -27 NPT External Thread (Style 49), 1/4 in. SAE 45° Flare Internal Thread (7/16-20 UNF) with Depressor (Style 47)
Temperature and Humidity	Storage	-40 to 257° F (-40 to 125°C)
	Operating	-40 to 185° F (-40 to 85°C)
	Compensated Range	-4 to 185° F (-20 to 85°C)
	Humidity	0 to 100% RH
Linearity		±0.25% Full Span Best Fit Straight Line
Accuracy		±1% Full Span (maximum) over compensated temperature range
Materials	Pressure Port	17-4PH stainless steel construction
	Packard Connector	40% glass-filled Polyetherimide (PEI)
Vibration		20G, 20 to 200 Hz
Shock		200G / 11 ms
Compliance 	United States	UL Listed, File E29374, CCN NKPZ UL Recognized for Use in Class I, Division 2 Hazardous Locations, File E322274
	Canada	UL Listed, File E29374, CCN NKPZ7 UL Recognized for Use in Class I, Division 2 Hazardous Locations, File E322274
	Europe	CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC
	Australia/New Zealand	C-Tick Mark, Emissions Compliant

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult Johnson Controls/PENN Refrigeration Application Engineering at 1-800-275-5676. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

## LPT7000 Series Liquid Pressure Transducer

### Introduction

LPT7000 series liquid pressure transducer is designed for use in commercial HVAC applications. These transducers provide analog signal which allows DDC or PLC controllers manage the system pressure stabilization. This product series is featured with high accuracy and performance through its precision design, integrated electrical structure and full digital temperature compensation and calibration, and its 316L stainless steel liquid connection is a guarantee meeting a wide range of application requirements.

### Key Features

- Fully welded structure
- Multi measurement range option
- Long-term stability
- Long life span
- Compact design, easy installation



### Naming Rule

Series	Output	Accuracy	Electrical	Pressure Port	Measurement Range
LPT7000	V: 0-10V	1: $\pm 0.25\%FS @ 25^{\circ}C$	S: 2m Cable	A: G1/4A	10: 0-10Bar
	C: 4-20mA	2: $\pm 0.5\%FS @ 25^{\circ}C$	H: Hirschmann PG9		16: 0-16Bar
					25: 0-25Bar

### Selection Table (Part 1 of 2)

Product Number	Output	Accuracy	Electrical	Pressure Port	Measurement Range
LPT7000V1SA10	0-10V	$\pm 0.25\%FS @ 25^{\circ}C$	2m Cable	G1/4A	0-10bar
LPT7000V1SA16	0-10V	$\pm 0.25\%FS @ 25^{\circ}C$	2m Cable	G1/4A	0-16bar
LPT7000V1SA25	0-10V	$\pm 0.25\%FS @ 25^{\circ}C$	2m Cable	G1/4A	0-25bar
LPT7000C1SA10	4-20mA	$\pm 0.25\%FS @ 25^{\circ}C$	2m Cable	G1/4A	0-10bar
LPT7000C1SA16	4-20mA	$\pm 0.25\%FS @ 25^{\circ}C$	2m Cable	G1/4A	0-16bar
LPT7000C1SA25	4-20mA	$0.25\%FS @ 25^{\circ}C$	2m Cable	G1/4A	0-25bar
LPT7000V2SA10	0-10V	$\pm 0.5\%FS @ 25^{\circ}C$	2m Cable	G1/4A	0-10bar
LPT7000V2SA16	0-10V	$\pm 0.5\%FS @ 25^{\circ}C$	2m Cable	G1/4A	0-16bar
LPT7000V2SA25	0-10V	$\pm 0.5\%FS @ 25^{\circ}C$	2m Cable	G1/4A	0-25bar

# Pressure & Differential Pressure Transmitter and Switch

## Selection Table (Part 2 of 2)

Product Number	Output	Accuracy	Electrical	Pressure Port	Measurement Range
LPT7000C2SA10	4-20mA	±0.5%FS @ 25°C	2m Cable	G1/4A	0-10bar
LPT7000C2SA16	4-20mA	±0.5%FS @ 25°C	2m Cable	G1/4A	0-16bar
LPT7000C2SA25	4-20mA	±0.5%FS @ 25°C	2m Cable	G1/4A	0-25bar
LPT7000V1HA10	0-10V	±0.25%FS @ 25°C	Hirschmann PG9	G1/4A	0-10bar
LPT7000V1HA16	0-10V	±0.25%FS @ 25°C	Hirschmann PG9	G1/4A	0-16bar
LPT7000V1HA25	0-10V	±0.25%FS @ 25°C	Hirschmann PG9	G1/4A	0-25bar
LPT7000C1HA10	4-20mA	±0.25%FS @ 25°C	Hirschmann PG9	G1/4A	0-10bar
LPT7000C1HA16	4-20mA	±0.25%FS @ 25°C	Hirschmann PG9	G1/4A	0-16bar
LPT7000C1HA25	4-20mA	±0.25%FS @ 25°C	Hirschmann PG9	G1/4A	0-25bar
LPT7000V2HA10	0-10V	±0.5%FS @ 25°C	Hirschmann PG9	G1/4A	0-10bar
LPT7000V2HA16	0-10V	±0.5%FS @ 25°C	Hirschmann PG9	G1/4A	0-16bar
LPT7000V2HA25	0-10V	±0.5%FS @ 25°C	Hirschmann PG9	G1/4A	0-25bar
LPT7000C2HA10	4-20mA	±0.5%FS @ 25°C	Hirschmann PG9	G1/4A	0-10bar
LPT7000C2HA16	4-20mA	±0.5%FS @ 25°C	Hirschmann PG9	G1/4A	0-16bar
LPT7000C2HA25	4-20mA	±0.5%FS @ 25°C	Hirschmann PG9	G1/4A	0-25bar

## Technical Specification

Pressure Sensing Element	Silicon Oil-filled Core
Measurement Range	0-10bar, 0-16bar, 0-25bar
Accuracy	±0.25%FS @ 25°C ±0.5%FS @ 25°C
Output	4-20mA, 0-10V
Power Supply	8-30VDC (4-20mA output); 14-30VDC (0-10V output)
Medium Temperature	-40~125°C
Electrical	Hirschmann PG9, 2M cable
Pressure Port	G1/4A
IP Standard	IP65 (Hirschmann PG9) , IP67 (2M cable)
Housing Material	316L Stainless Steel
O-Ring	EPDM
Medium	Water or Cooling water
Environment Temperature	-30°C~85°C
Storage Temperature	-40°C~100°C

## P133 Series Differential Air Pressure Switch

### Introduction

Johnson Controls P133 series differential air pressure switch is especially suitable for control and safety functions in air-conditioning systems in buildings, offices, hospitals and more. It is installed in environments with air and non-aggressive and non-inflammable gases. This switch senses a change in the (differential) pressure as the airflow changes. The (differential) pressure is applied to the two sides of a diaphragm in the control. The spring-loaded diaphragm moves and actuates the switch. The series can also be used to detect small positive gauge pressure or to detect a vacuum.



### Features

- One switch to measure relative pressure, vacuum or differential pressure
- Stylish aesthetic design
- Good long-term stability
- IP54 protection

### Typical Applications

- Detect clogged filter
- Air proving in heating or ventilation ducts
- Maximum airflow controller for variable air volume system
- Monitor fan operation

### Selection Table

*Models	Measuring range	Switching differential $\Delta P$
P133A-2-PKC-C	20-200Pa	10Pa
P133A-5-PKC-C	50-500Pa	20Pa
P133A-10-PKC-C	200-1000Pa	100Pa
P133A-25-PKC-C	500-2500Pa	150Pa

\* Please contact Johnson Controls for more models.

### Specification

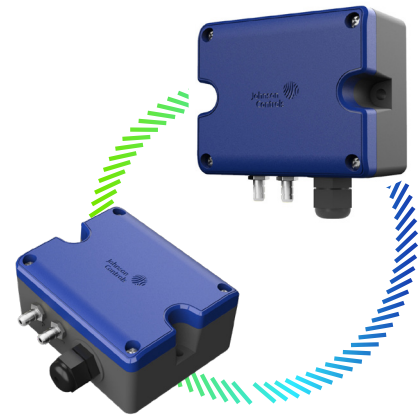
Medium	Air, non-inflammable and non-aggressive gases
Max. Pressure	10kPa
Microswitch	SPDT changeover contact
Electrical rating	Contact capacity max: 1.5A(0.4A)/250VAC
Mechanical Life	1,000,000 cycles
Protection	IP54
Accuracy pressure	$\leq \pm 15\%$ (min. 10Pa)
Pressure connectors	P1(+) Connection for higher pressure P2(-) Connection for lower pressure
Electrical connection	Spade terminal 6.35 x 0.80 mm or screw terminals
Cable entry	PG11
Temperature Range	Operating temperature: $-20^{\circ}\text{C} \sim +85^{\circ}\text{C}$ Storage temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Material	Cover: PC Case: PA66 Bottom: POM Diaphragm: Silicon
Approvals	CE
Accessories	Standard Kit: 1 L type metal bracket, 5 bracket screw, 2m of PVC hose, 2 PVC connectors, 5 mounting screw, 3 female quick plug terminal

# Pressure & Differential Pressure Transmitter and Switch

## DPT7000 Series Differential Pressure Transmitter

### Introduction

Johnson Controls DPT7000 series differential pressure transmitter can be used to measure the differential pressure of fan and filter as well as the gauge pressure of the space, and transmit the value to DDC or PLC, commonly used for monitor and control HVAC system, VAV system and dampers etc. The minimum measurement range is 0~10Pa and the maximum measurement range is -10000~10000Pa in order to meet a variety of different application requirements.



### Features

- Adjustable measurement range
- Adjustable multiple parameters
- Good long-term stability
- Long Lifecycle
- Dual output with 0-10v&4-20mA

### Naming Rule

DPT7000		DPT7000 Series Differential Pressure Transmitter	
Output		G:General type: 0-10v&4-20mA output	C:Current type: 4-20mA output with 2 wire
	DP Range	100: -100~100Pa	200: -1000~1000Pa 300: -10000~10000Pa

### Selection Table

Part Number	Measurement range	Output
DPT7000G100	-100~100Pa (adjustable)	General type: 0-10v&4-20mA
DPT7000G200	-1000~1000Pa(adjustable)	General type: 0-10v&4-20mA
DPT7000G300	-10000~10000Pa(adjustable)	General type: 0-10v&4-20mA
DPT7000C100	-100~100Pa(adjustable)	Current type: 4-20mA (2 wire)
DPT7000C200	-1000~1000Pa(adjustable)	Current type: 4-20mA (2 wire)
DPT7000C300	-10000~10000Pa(adjustable)	Current type: 4-20mA (2 wire)

Part Number	Default factory setting	Measurement Range 1	Measurement Range 2	Measurement Range 3	Measurement Range 4	Measurement Range 5
DPT7000G100	-100~100Pa	0~10Pa	0~25Pa	0~50Pa	0~75Pa	0~100Pa
DPT7000C100		-5~5Pa	-12.5~12.5Pa	-25~25Pa	-37.5~37.5Pa	-50~50Pa
DPT7000G200	-1000~1000Pa	0~100Pa	0~250Pa	0~500Pa	0~750Pa	0~1000Pa
DPT7000C200		-50~50Pa	-125~125Pa	-250~250Pa	-375~375Pa	-500~500Pa
DPT7000G300	-10000~10000Pa	0~1000Pa	0~2500Pa	0~5000Pa	0~7500Pa	0~10000Pa
DPT7000C300		-500~500Pa	-1250~1250Pa	-2500~2500Pa	-3750~3750Pa	-5000~5000Pa

# Pressure & Differential Pressure Transmitter and Switch

## Specification

Measure medium	Air and neutral gas
Measurement range	-100~100Pa -1000~1000Pa -10000~10000Pa
Overload pressure	5KPa (-100~100Pa) 10KPa (-1000~1000Pa) 80KPa (-10000~10000Pa)
Accuracy	±1%FS (-100~100Pa: ±1%FS@25°C)
Response time	0.5s, 1s, 2s, 4s adjustable(Default:0.5s)
Zero calibration function	Yes
Unit	Pa, mmH2O, mBar, inH2O, mmHG, KPa (Default: Pa)
Output	0-10v&4-20mA/4-20mA
Powe	12-30VDC (Current type); 12-30VDC & 24VAC±20% (General type)
Working temperature	-10~60°C
Medium temperature	-10~60°C
Storage temperature	-20~70°C
IP protection	IP65
Housing	PC (UL94-V0)
Certification	CE
Connector	Metal connector, Ø 6.2 mm
Electrical type	M16*1.5
Accessory	Includes: 1.5m PVC, 2 pressure tubes, mounting screws



## CD7000 Series CO<sub>2</sub> Transmitter

### Introduction

Johnson Controls CD7000 series CO<sub>2</sub> transmitter is designed for office building, hospital, school and other application, which is a basic sensor product can detect the ambient CO<sub>2</sub> value. This product selects high precision sensing element and circuit to convert the measured value into analog signal output to compatible with Johnson Controls BAS system. By monitoring the CO<sub>2</sub> value of the environment, it can help improve the level of air quality and operation efficiency.



### Features

- NDIR technology
- Good long-term stability
- Long Lifecycle
- Two installation modes available

### Naming Rule

CD7000	D	0
CD7000	CO <sub>2</sub> Transmitter	
	D	Type: D-Duct Type, W-Wall Mount
	0	Default Measurement range: 0-2000ppm

### Selection Table

Part Number	Measurement range	Installation Mode	IP Protection
CD7000D0	0-2000ppm	Duct Type	IP65
CD7000W0	0-2000ppm	Wall Mount	IP30

### Specification

Sensing element	NDIR sensor, with ABC self-calibration function
Sensing principle	Diffusion
Sensor Design lifecycle	10 years
CO <sub>2</sub> range	0-2000 ppm
Accuracy	± (50ppm+5% of reading)
Output	0-10V/4-20mA
Warm-up time	<180s
Response time	T90<=30s
Power	24VAC/DC±10%
Working environment	-10~50°C & 0-95%RH (no condensation)
Storage environment	-20~70°C & 0-95%RH (no condensation)
IP protection	IP30 Wall/IP65 Duct
Housing	ABS+PC (UL94-V0)

## GS300 Series CO Transmitter

### Introduction

The GS3000 Indoor Gas Detection Sensor Series uses an electrochemical sensor to monitor the carbon monoxide (CO) or nitrogen dioxide (NO<sub>2</sub>) level and to output a factory-calibrated signal. The output signals available for the CO detector are 4 mA to 20 mA, 0 VDC to 10 VDC, or a Modbus signal. Optionally, you can configure the device with an alarm relay. The output signal available for the NO<sub>2</sub> detector is 4 mA to 20 mA and comes standard with a configurable alarm relay.



Figure 1: GS3000 Indoor Gas Detection Sensor

### Ordering Information

Table 1: Selection chart

Product code	Description	Relay options	Output options	Order code
GS300	Wall or surface-mount CO detector	No relay	4 mA to 20 mA	GS300WMXXX4
			Modbus	GS300WMXXXM
			0 VDC to 10 VDC	GS300WMXXX1
		With relay	4 mA to 20 mA	GS300WMXR14
			0 VDC to 10 VDC	GS300WMXR11
GS301	Wall or surface-mount NO <sub>2</sub> detector	Adjustable relay	4 mA to 20 mA	GS301WMXR14
GS30x	GS3000 CO or NO <sub>2</sub> calibration kit	N/A	N/A	GS3CALKIT

Table 2: Replacement sensor pods

Product code	Description
GS3R0WMXXX4	Replacement CO sensor for GS300WMXXX4
GS3R0WMXXXM	Replacement CO sensor for GS300WMXXXM
GS3R0WMXXX1	Replacement CO sensor for GS300WMXXX1
GS3R0WMXR1A	Replacement CO sensor for GS300WMXR1A
GS3R0WMXR11	Replacement CO sensor for GS300WMXR11
GS3R1WMXR14	Replacement NO <sub>2</sub> sensor for GS301WMXR14



## Technical Specifications

Table 3: GS3000 Indoor Gas Detection Sensor technical specifications

Specification	Description
Carbon monoxide	Measurement: Electrochemical
	Sample method: Diffusion
	Measurement range: Analog: 0 ppm to 300 ppm Modbus: 0 ppm to 500 ppm
	Accuracy: ±5 ppm or ±5% of reading, whichever is greater 32° F to 122° F (0°C to 50°C), 15% RH to 95% RH
	Stability: <5% signal loss per year
	Response time: <35 seconds for 90% step change
	Expected lifespan: 5 to 7 years in air
	Output Signal: 4mA to 20 mA (non-relay version is loop-powered, relay version is sourcing), 0 VDC to 10 VDC, or Modbus, factory-calibrated
	Consumption: 20 mA maximum, non-relay model 40 mA maximum, relay model Optional alarm relay, not available with Modbus: Relay contacts: Form C contacts (N.O. and N.C.), 5 A at 250 VAC, 5 A at 30 VDC Relay trip point: 25 ppm, 60 ppm, or 150 ppm, jumper-selectable Relay hysteresis: 3% or 9 ppm
Nitrogen dioxide	Measurement: Electrochemical
	Sample method: Diffusion
	Measurement range: 0 ppm to 10 ppm
	Accuracy: ±0.2 ppm or ±5% of reading, whichever is greater
	Expected lifespan: >2 years in air
	Output signal: 4mA to 20 mA sourcing
	Consumption: 50 mA maximum Alarm Relay: Relay contacts: Form C contacts (N.O. and N.C.), 5 A at 30 VDC, p.f. = 1 Relay trip point: 1 ppm, 3 ppm, or 5 ppm, jumper-selectable Relay hysteresis: 3%
Operating conditions	-4° F to 122° F (-20°C to 50°C), 15% RH to 90% RH, 0.9 atm to 1.1 atm
Coverage area	7500 ft <sup>2</sup> (700 m <sup>2</sup> ) or 50 ft (15 m) radius
Power supply	24 VDC ±20% or 24 VAC ±10%, non-isolated half-wave rectified
Wiring connections	Screw terminal block, 14 AWG to 22 AWG
Enclosure	ABS, UL94-V0, IP65, NEMA 4X
Enclosure dimensions (H x W x D)	4.1 in. x 2.8 in. x 1.9 in. (10.4 cm x 7.1cm x 4.8 cm)
Country of origin	Canada
Compliance	Europe: CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC and RoHS Directives.



## FS80-C Flow Switch

### Introduction

The FS80-C Flow Switch controls fluid flow in lines carrying water, ethylene glycol, or other non-hazardous fluids. A variety of paddle sizes manage fluid flow rates in applications with pipe sizes greater than 1-inch trade size. The Single-Pole, Double-Throw (SPDT) feature is wired to energize one device and de-energize another device powered from the same source when liquid flow either exceeds or drops below the set flow rates.



Figure 1: FS80-C Flow Switch

### Features and Benefits

Maximum fluid pressure of 1.5MPa	Useable in a wide range of pressure flow conditions
Adjustable flow switch paddle	1 in. to 6 in. pipe application
Adjustable flow rate range	Setting selection according to system need
IP55 enclosure	Indoor or outdoor applications

### Application

**Important:** The FS80-C Flow Switch is designed for use only as operating controls. Where an operating control failure would result in personal injury and/or loss of property, it is the responsibility of the installer to add devices (safety limit controls) that protect against, or systems (alarm or supervisory systems) that warn of, control failure.

Use the FS80-C Flow Switch in applications with fluid pressures up to 1.5MPa. A typical application for a FS80-C Flow Switch is to shut down the refrigeration compressor on a fluid chiller system if flow stops, reducing chances of chiller freeze-ups.

#### IP55 enclosure

The FS80-C Flow Switch is suitable for both indoor or outdoor applications in high-humidity environments. Use this model with pipes carrying fluids at temperatures in the range of -25 - 110° C where fluid temperatures are above ambient dew point.

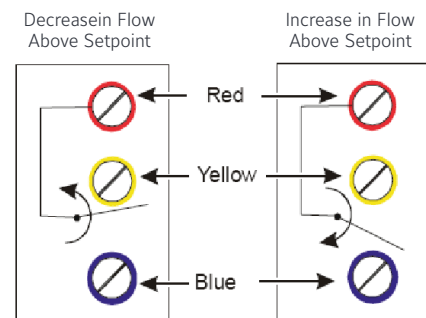


Figure 2: Switch action

The SPDT switch on the FS80-C Flow Switch has color-coded terminals. Red is common, and closed to blue upon flow increase and to yellow upon flow decrease. See Figure 2 and Table 1 for switch action and flow rates.

### Technical Specifications

Product	FS80-C Flow Switch	
Maximum fluid pressure	1.5MPa	
Fluid temperature	Minimum: -25° C Maximum: 110° C	
Ambient temperature	Minimum: -20° C Maximum: 60° C	
Electrical rating	110VAC	220VAC
Horsepower (HP)	1	1
Full load amperes (A)	16	8
Locked rotor amperes (A)	96	48
Non-inductive amperes (A)	16	16
Pilot duty	125VA at 24-277VAC	
Wiring connection	Screw type terminals	
Paddles	1 in., 2in., 3in., and 6in.	
Material	SS301	
Switch	SPDT	
Pipe connection	1" 11-1/2NPT threads	
Agency listings	CE	
Shipping weight, lb (kg)	1.26 (0.57)	

## T9000 Series Touch Screen Thermostats

### Futuristic and Hi-tech Exterior Design



reddot winner 2020

Winner of the 2020  
**Red Dot** Award for  
Product Design



With a frameless large touch screen, the T9000 Series Thermostats can display ambient temperature clearly and intuitively. The buttons are sensitive and very user-friendly.

The futuristic and hi-tech exterior design is loved by users from high-end office buildings, hotels, private hospitals, and high-end residential buildings.

### Superb materials for a stable performance

The service life of the relay is designed to be turned on / off for 100,000 times. The eco-friendly shell materials meet the CE standard for flame retardants. High-quality materials and components ensure that the thermostats are safe, eco-friendly and reliable. The PCB was produced with a high-standard gold depositing procedure, to ensure better electrical performance, more sensitive touch, and more durable.

The thermostats have been certified by multiple industry standards, including CE, RCM, REACH, RoHS, BTL, WEEE and GB, to ensure stable performance.



### Energy-efficient and eco-friendly

The T9000 Series Touch Screen Thermostats can be used to control ECM motors far better than industry standards, as they can reduce the motor's energy consumption by 30-50% and the motor's noise by 1-2 dB (A), to make the environment more comfortable.

In addition to the delay on / off function, the T9000 Series Touch Screen Thermostats can also activate the occupancy (eco) mode with the signal from a door card, a PIR (Passive Infrared) sensor or other dry contacts, to switch the set point of temperature, and to keep fan motor on low speed or shut down, so as to improve efficiency and save energy.



### Intelligent control and system optimization

The T9000 Series Touch Screen Thermostats support multiple operating modes, including cooling, heating, ventilating, and floor heating. They also provide other functions, including the occupancy mode and T9600 support remote temperature sensor. Some models adopt a 32-bit high-performance MCU to ensure more accurate control and more powerful functions. Some models support Modbus or BACnet protocols that can be seamlessly connected to the building automation system, to achieve the best room climate control.



### Diverse application scenarios

Each of the T9000 Series Touch Screen Thermostats supports multiple application scenarios. They can control multiple types of equipment, including the 2-pipe fan coil unit (FCU) / 4-pipe FCU; the water source heat pumps; the simple air handling units (AHUs), boilers and floor heating systems; the 3-speed motors and ECM motors; the 2-wiring / 3-wiring on / off valves, modulating control valves and floor heating valves; as well as other air purification units (e.g. TiO<sub>2</sub> / ESP).

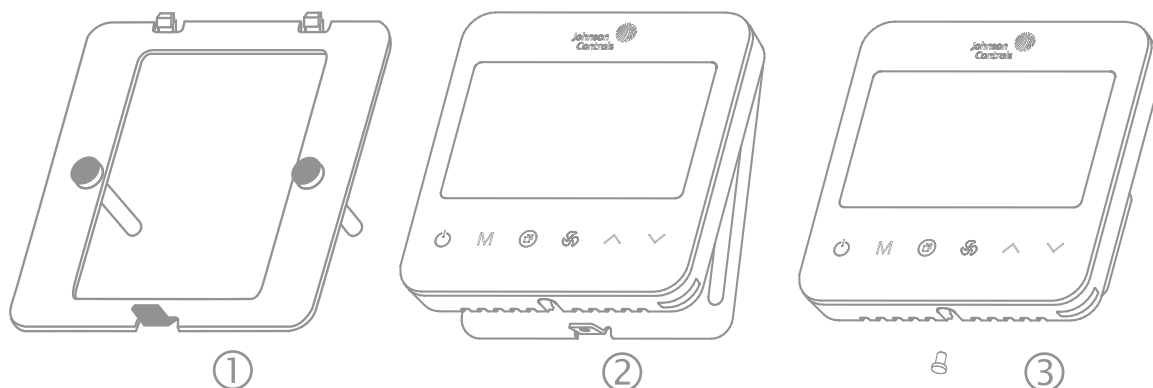
## List of the T9200 Series Touch Screen Thermostats

The T9200 Touch Screen Thermostats are standalone thermostats. They are designed to control cooling, heating, air conditioning and ventilating applications in commercial, industrial and residential projects.

The thermostats are powerful, and can be used to control 2-pipe FCU / 4-pipe FCU, Single-speed / 3-speed motors / ECM motors, and on / off valves / regulating valves. Its TiO<sub>2</sub> / ESP features can make the environment to cleaner. The occupancy mode supports comfortable and more energy-efficient temperature setting. The BI input supports dry contact signals from door cards, PIR (Passive Infrared) sensor, dew point sensors, filter's differential pressure switch, etc.

The products apply to multiple scenarios, for example, they can be used for FCU, single-speed AHUs, floor heating systems, water source heat pumps, and boilers.

Model	Application	Fan control	Valve control	Others control
T9200-TF20-1JS0	2-pipe FCU, On / Off valve	3-speed Fan	1 On / Off Valve	
	4-pipe FCU, On / Off valve	3-speed Fan	2 On / Off Valves	
	2-pipe FCU, 3-wire On / Off valve	3-speed Fan	1 3-wire On / Off Valve	
	2-pipe FCU with floor heating, On / Off valve	3-speed Fan	1 On / Off Valve	1 Floor Heating
	2-pipe FCU with TiO <sub>2</sub> / ESP, On / Off valve	3-speed Fan	1 On / Off Valve	1 TiO <sub>2</sub> / ESP
	Water source heat pump	3-speed Fan		1 Compressor 1 Revert Valve
	Boiler/Floor Heating			1 Boiler / Floor Heating
T9200-TB21-1JS0	2-pipe FCU, ECM fan, On / Off valve	ECM fan	1 On / Off Valve	
	4-pipe FCU, ECM fan, On / Off valve	ECM fan	2 On / Off Valve	
	2-pipe FCU, ECM fan, 3-wire On / Off valve	ECM fan	1 3-wire On / Off Valve	
	2-pipe FCU, ECM fan with TiO <sub>2</sub> / ESP, On / Off valve	ECM fan	1 On / Off Valve	1 TiO <sub>2</sub> / ESP
	2-pipe FCU, ECM fan with floor heating, On / Off valve	ECM fan	1 On / Off Valve	1 Floor Heating
	Water source heat pump	ECM fan		1 Compressor 1 Revert Valve
	2-pipe FCU, Prop valve	3-speed Fan	1 Proportion Valve	



Installation three steps

## List of the T9600 Series Touch Screen Thermostats

The T9600 Touch Screen Thermostats adopt the Modbus communication protocol. They are designed to control cooling, heating, air conditioning and ventilating applications in commercial, industrial and residential projects.

The thermostats are powerful, and can be used to control 2-pipe FCU / 4-pipe FCU, Single-speed / 3-speed motors / ECM motors, and on / off valves / regulating valves. Its TiO<sub>2</sub> / ESP features can make the environment to cleaner. The occupancy mode supports comfortable and more energy-efficient temperature setting. The BI input supports dry contact signals from door cards, PIR (Passive Infrared) sensor, dew point sensors, filter's differential pressure switch, etc. They support connect to remote sensors, sensor type JCI 10K NTC Temperature Sensors like TE-636S-1.

The products apply to multiple scenarios, for example, they can be used for FCU, single-speed AHUs, floor heating systems, water source heat pumps, and boilers.

Model	Application	Fan control	Valve control	Others control
T9601-TF20-1JS0	2-pipe FCU, On / Off valve	ECM fan	1 On / Off Valve	
	4-pipe FCU, On / Off valve	ECM fan	2 On / Off Valves	
	2-pipe FCU, 3-wire On / Off valve	ECM fan	1 3-wire On / Off Valve	
	2-pipe FCU with floor heating, On / Off valve	ECM fan	1 On / Off Valve	1 Floor Heating
	2-pipe FCU with TiO <sub>2</sub> / ESP, On / Off valve	ECM fan	1 On / Off Valve	1 TiO <sub>2</sub> / ESP
	Water source heat pump	ECM fan		1 Compressor 1 Revert Valve
	2-pipe FCU, Prop valve	ECM fan	1 Proportion Valve	
	2-pipe FCU, Prop valve with Floor Heating	ECM fan	1 Proportion Valve	1 Floor Heating
	2-pipe FCU, Prop valve with Radiator	ECM fan	1 Proportion Valve	1 Radiator
	AHU	Single speed fan	1 Proportion Valve	1 Damper
T9600-TF21-1JS0	2-pipe FCU, Prop valve	3-speed Fan	1 Proportion Valve	
	4-pipe FCU, Prop valve	3-speed Fan	2 Proportion Valves	
T9600-TF20-1JS0	2-pipe FCU, On / Off valve	3-speed Fan	1 On / Off Valve	
	4-pipe FCU, On / Off valve	3-speed Fan	2 On / Off Valves	
	2-pipe FCU, 3-wire On / Off valve	3-speed Fan	1 3-wire On / Off Valve	
	2-pipe FCU with floor heating, On / Off valve	3-speed Fan	1 On / Off Valve	1 Floor Heating
	2-pipe FCU with TiO <sub>2</sub> / ESP, On / Off valve	3-speed Fan	1 On / Off Valve	1 TiO <sub>2</sub> / ESP
	Water source heat pump	3-speed Fan		1 Compressor 1 Revert Valve
T9603-T000-1JF0	Floor heating			1 Floor Heating

**IMPORTANT:** The T9000 series touch screen thermostat is intended to provide and input to equipment under normal operating conditions. Where failure or malfunction of the thermostat could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the thermostat.

## Technical Specifications

Supply Voltage	100-240 VAC 50 / 60 Hz
Power consumption	Max. 5VA
Terminations	Screw terminal block
AO output(ECM Fan, Proportion Valve)	0-10VDC output, up to 20mA
Relay output (Fan, Valve, Tio2 and etc.)	relay (SPST) output, 2.2A (IR), cos $\Phi$ 0.98; 3.6A (IX), cos $\Phi$ 0.98; 5A (Resistive)
Remote Sensor input	T9600 models support remote sensor, 10K NTC JCI type II, e.g. TE-636S-1
BI input	Dry contact signal
Wire size	Screw terminal block: 1.0-1.5mm <sup>2</sup> rigid conductor for 5mm connector; 0.14-1.5 mm <sup>2</sup> rigid conductor for 3.5mm connector
Mounting	Flush-mounted
Temperature measurement range	0 to 49°C (32 to 99° F)
Temperature accuracy	1oC (2° F)
Default temperature set point range	5.0°C to 35.0°C in 0.5°C increments
Ambient conditions	Operating: 0 to 40°C (32 to 104oF), 10 to 90% RH, noncondensing, 29oC (85° F) maximum dew point
	Storage: -20 to 60°C (-4 to 140° F), 5 to 95% RH, noncondensing
Protection class	IP20
Pollution degree	2
Heat and fire resistance category	D
Temperature for ball pressure test	125°C
Limitation of operating time	Continuous
Shipping weight	Approx 300g
Compliance	CE mark
	RCM mark, Australia / NZ emissions compliance
	RoHS, REACH, WEEE
	RoHS, REACH, WEEE

**Note:**

User can configure one model to different applications by parameter setting  
 IR is steady-state current of FCU motor, and Ix is transient current of FCU motor  
 Remote sensor need to be ordered separately

# Thermostat

## T9800 Series Touch Screen Thermostats



The thermostats are powerful and can be used to control 2-pipe FCU / 4-pipe FCU, Single-speed / 3-speed motors / ECM motors, and on / off valves / regulating valves. Its TiO<sub>2</sub> / ESP features can make the environment to cleaner. The occupancy mode supports comfortable and more energy-efficient temperature setting. The BI input supports dry contact signals from door cards, PIR (Passive Infrared) sensor, dew point sensors, filter's differential pressure switch, etc. They support connect to remote sensors, sensor type JCI 10K NTC Temperature Sensors like TE-636S-1.

The products apply to multiple scenarios, for example, they can be used for FCU, single-speed AHUs, floor heating systems, water source heat pumps, and boilers.



Product Number	Application	Fan Control	Valve Control	Others Control	Input	Power Supply
T9800 -TF21-1JS0	2-pipe FCU, Prop valve	3-speed Fan	1 Proportion Valves		1 BI, Occupancy 1 Remote sensor	24 VAC
	4-pipe FCU, Prop valve	3-speed Fan	2 Proportion Valves			
	2-pipe FCU, On / Off valve	ECM fan	1 On / Off Valve			
	4-pipe FCU, On / Off valve	ECM fan	2 On / Off Valves			
	2-pipe FCU, 3-wire On / Off valve	ECM fan	1 3-wire On / Off Valve			
	2-pipe FCU with floor heating, On / Off valve	ECM fan	1 On / Off Valve	1 Floor Heating		
	2-pipe FCU with TiO <sub>2</sub> / ESP, On / Off valve	ECM fan	1 On / Off Valve	1 TiO <sub>2</sub> / ESP		
	Water source heat pump	ECM fan		1 Compressor 1 Revert Valve		
	2-pipe FCU, Prop valve	3-speed Fan	1 Proportion Valve			
	2-pipe FCU, Prop valve with Floor Heating	ECM fan	1 Proportion Valve	1 Floor Heating		
	2-pipe FCU, Prop valve with Radiator	ECM fan	1 Proportion Valve	1 Radiator		
AHU	Single speed fan	1 Proportion Valve	1 Damper			
T9800-TF20-1JS0	2-pipe FCU, On / Off valve	3-speed Fan	1 On / Off Valve		1 BI, Occupancy 1 Remote sensor	100~240 VAC
	4-pipe FCU, On / Off valve	3-speed Fan	2 On / Off Valves			
	2-pipe FCU, 3-wire On / Off valve	3-speed Fan	1 3-wire On / Off Valve			
	2-pipe FCU with floor heating, On / Off valve	3-speed Fan	1 On / Off Valve	1 Floor Heating		
	2-pipe FCU with TiO <sub>2</sub> / ESP, On / Off valve	3-speed Fan	1 On / Off Valve	1 TiO <sub>2</sub> / ESP		
	Water source heat pump	3-speed Fan		1 Compressor 1 Revert Valve		
Boiler			Boiler			
T9800-TB21-1JA0	2-pipe FCU, Prop valve	3-speed Fan	1 Proportion Valve		1 x 0~10 VDC input for feedback signal 1 BI, Occupancy 1 Remote sensor	

## Technical Specifications

Supply Voltage	100~240 VAC 50 / 60 Hz 20~30 VAC 50 / 60 Hz, only for T9800-TF21-1JS0
Power consumption	Max. 5 VA
Terminations	Screw terminal block
AO output(ECM Fan, Proportion Valve)	0~10 VDC output, up to 20 mA
Relay output (Fan, Valve, Tio2 and etc.)	relay (SPST) output, 2.2 A (IR), cos $\Phi$ 0.98; 3.6 A (IX), cos $\Phi$ 0.98; 5 A (Resistive)
Remote Sensor input	T9800 models support remote sensor, 10K NTC JCI type II, e.g. TE-636S-1
BI input	Dry contact signal
Build-in Humidity Sensor	Accuracy 5%
Analog Input	0~10 VDC, only for T9800-TB21-1JAO
Wire size	Screw terminal block: 1.0~1.5 mm <sup>2</sup> rigid conductor for 5 mm connector; 0.14~1.5 mm <sup>2</sup> rigid conductor for 3.5 mm connector
Mounting	Flush-mounted
Temperature measurement range	0 to 49°C (32 to 99 ° F)
Temperature accuracy	1 oC (2° F)
Default temperature set point range	5.0°C to 35.0°C in 0.5 oC increments
Ambient conditions	Operating: 0 to 40°C (32 to 104° F), 10 to 90% RH, noncondensing, 29°C (85° F) maximum dew point
	Storage: -20 to 60°C (-4 to 140° F), 5 to 95% RH, noncondensing
Protection class	IP20
Pollution degree	2
Heat and fire resistance category	D
Temperature for ball pressure test	125°C
Limitation of operating time	Continuous
Shipping weight	Approx 300 g
Compliance	CE mark
	RCM mark, Australia / NZ emissions compliance
	RoHS, REACH, WEEE
	BTL

### Note:

1. User can configure one model to different applications by parameter setting
2. IR is steady-state current of FCU motor, and Ix is transient current of FCU motor
3. Remote sensor need to be ordered separately

# Thermostat

## T7000e Series LCD Thermostat T7300, T7700

### Introduction

T7000e series are designed for cooling, heating through air conditioning in commercial, industrial, hotel, hospital, and residential applications.



### Features

#### Aesthetic design

Large LCD display screen, sensitive push buttons, curved edges and ultra-thin body

#### Energy saving

High standard control of ECM fans and modulating valves to reduce motor's energy consumption and make the environment more comfortable.

#### Efficient operation

All models support two/three wire valves and remote sensor functions, improves user experience in diverse applications.

#### Easy installation

A brand-new solution without opening thermostat cover during installation, avoids the risk of components damage by screwdriver.

#### Comfortable and healthy

Support the collaborative work of air purification unit such as TiO2/ESP to improve indoor air quality.

#### Intelligent control

Support multiple operating modes including cooling, heating, ventilation and occupancy (eco) mode. Some models support Modbus RTU communication protocol that can be connected to the building automation system, achieves the best room climate control.



## T7000e series thermostat models and applications

Models	FCU type	Fan control	Valve control	Other control	Power supply	Communication
T7300-TF60-9KSO	2-pipe	3-speed fan	2/3-wire on/off valve	TiO <sub>2</sub> /ESP	110~240VAC	
	4-pipe	3-speed fan	2/3-wire on/off valve	TiO <sub>2</sub> /ESP		
T7700-TF60-9KSO	2-pipe	3-speed fan	2/3-wire on/off valve	TiO <sub>2</sub> /ESP	110~240VAC	Modbus RTU
	4-pipe	3-speed fan	2/3-wire on/off valve	TiO <sub>2</sub> /ESP		
T7300-TF60-9MSO	2-pipe	ECM fan	2/3-wire on/off valve	TiO <sub>2</sub> /ESP	110~240VAC	
	2-pipe	3-speed fan	Modulating valve			
	2-pipe	ECM fan	Modulating valve	TiO <sub>2</sub> /ESP		
	4-pipe	ECM fan	3-wire on/off valve			
	4-pipe	ECM fan	2-wire on/off valve	TiO <sub>2</sub> /ESP		
	4-pipe	3-speed fan	Modulating valve			
T7700-TF60-9MSO	2-pipe	ECM fan	2/3-wire on/off valve	TiO <sub>2</sub> /ESP	110~240VAC	Modbus RTU
	2-pipe	3-speed fan	Modulating valve			
	2-pipe	ECM fan	Modulating valve	TiO <sub>2</sub> /ESP		
	4-pipe	ECM fan	3-wire on/off valve			
	4-pipe	ECM fan	2-wire on/off valve	TiO <sub>2</sub> /ESP		
	4-pipe	3-speed fan	Modulating valve			
T7300-TF61-9MSO	2-pipe	ECM fan	2/3-wire on/off valve	TiO <sub>2</sub> /ESP	24VAC	
	2-pipe	3-speed fan	Modulating valve			
	2-pipe	ECM fan	Modulating valve	TiO <sub>2</sub> /ESP		
	4-pipe	ECM fan	3-wire on/off valve			
	4-pipe	ECM fan	2-wire on/off valve	TiO <sub>2</sub> /ESP		
	4-pipe	3-speed fan	Modulating valve			

### Note:

1. All models support remote sensor or BI/occupancy features
2. User can configure one model to different applications by parameter setting
3. Remote sensor need to be ordered separately

IMPORTANT: The T7000 series LCD thermostat is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the thermostat could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the thermostat.

## Technical specifications T7000e series LCD thermostat

Power Supply	AC110-240V(±10%) 50/60 Hz
	AC24V(±10%) 50/60 Hz
Ambient conditions	Operating: 0~50°C(32~99°F), 5~90%RH, non-condensing
	Storage: -30~60°C(-22~140°F), 5~90%RH, non-condensing
Temperature measurement range	5~35°C(41~95°F)
Temperature display accuracy	±0.5°C(±0.5°F)
Temperature measurement accuracy	±1°C(±2°F)
Analog output (ECM Fan, Proportion Valve)	0-10VDC output, up to 20mA
Relay output	Fan: Inductive: 2.2A cos φ 0.98(Inrush 3.6A cos φ 0.98) Resistive: 5A Valve: 2(0.6)A
BI input	Dry contact signal
Remote sensor	Support 10K NTC type, SA1200-002
Wiring connection	Screw terminal block: 0.13-1.3mm <sup>2</sup> rigid conductor for 5mm connector; 0.2-0.8 mm <sup>2</sup> rigid conductor or flexible conductor with terminal lugs for 3.5mm connector
Mounting	Flush-mounted
Compliance	CE, RCM, RoHS, WEEE
Protection class	IP20

# Thermostat

## T7000 Series LCD Thermostat

## T7200 LCD Thermostat

### Introduction

Designed to control heating and cooling through air conditioning unit in commercial and residential application

Typical applications include the control of fan coil units, floor heating, packaged terminal air conditioners and combination of heating and cooling equipment. As part of the system, T7200 series thermostat can control two-way or three-way valve and multiple-speed line voltage fan or ECM fan.

T7200 features with large LCD screen that displays the status of work mode (cooling, heating, air venting, floor heating), fan speed, indoor temperature and set point etc.



### Features and Benefit

#### Large backlit LCD

LCD is larger than 40% of front area, provide real time status of the environment with intuitive and clear user interface.

#### New installation method

New method without opening T7200 cover during installation, avoids the risk of components damage by screwdriver.

#### Remote sensor

New models support remote sensor, which has significant improvements to simple AHU and hotel applications. Enhancing the user experience and achieving energy efficiency.

#### EEPROM storage of data

Thermostat retains the last events and parameter settings after power loss.

#### Push button for user operation

User can change working mode, temperature set point and fan speed via push buttons, easy for operation.



## T7200 series thermostat product number and applications

Product number	Application	Fan control	Valve control	Others control	Input
T7200-TB20-9J00	2-pipe FCU, On/Off valve	3-speed Fan	1 On/Off Valve		
	Floor heating			1 Floor Heating	
T7200-TB20-9JOB (Bulk MOQ36pcs)	2-pipe FCU, On/Off valve	3-speed Fan	1 On/Off Valve		
	Floor heating			1 Floor Heating	
T7200-TF20-9JS0	2-pipe FCU, On/Off valve	3-speed Fan	1 On/Off Valve		1 BI, Occupancy
	4-pipe FCU, On/Off valve	3-speed Fan	2 On/Off Valves		
	2-pipe FCU, 3-wire On/Off valve	3-speed Fan	1 3-wire On/Off Valve		
	2-pipe FCU with floor heating, On/Off valve	3-speed Fan	1 On/Off Valve	1 Floor Heating	
	2-pipe FCU with TiO2/ESP, On/Off valve	3-speed Fan	1 On/Off Valve	1 TiO2/ESP	
	Water source heat pump	3-speed Fan		1 Compressor 1 Revert Valve	
T7200-TB21-9JS0	2-pipe FCU, ECM fan, On/Off valve	ECM fan	1 On/Off Valve		1 BI, Occupancy
	4-pipe FCU, ECM fan, On/Off valve	ECM fan	2 On/Off Valve		
	2-pipe FCU, ECM fan, 3-wire On/Off valve	ECM fan	1 3-wire On/Off Valve		
	2-pipe FCU, ECM fan with TiO2/ESP, On/Off valve	ECM fan	1 On/Off Valve	1 TiO2/ESP	
	2-pipe FCU, ECM fan with floor heating, On/Off valve	ECM fan	1 On/Off Valve	1 Floor Heating	
	Water source heat pump	ECM fan		1 Compressor 1 Revert Valve	
	Single speed AHU	1-speed Fan	1 Proportion Valve	1 On/Off Damper	
	2-pipe FCU, Prop valve	3-speed Fan	1 Proportion Valve		
T7200-TF20-9JS1 (new model)	2-pipe FCU, On/Off valve	3-speed Fan	1 On/Off Valve		1 BI, Occupancy 1 Remote sensor
	4-pipe FCU, On/Off valve	3-speed Fan	2 On/Off Valves		
	2-pipe FCU, 3-wire On/Off valve	3-speed Fan	1 3-wire On/Off Valve		
	2-pipe FCU with floor heating, On/Off valve	3-speed Fan	1 On/Off Valve	1 Floor Heating	
	2-pipe FCU with TiO2/ESP, On/Off valve	3-speed Fan	1 On/Off Valve	1 TiO2/ESP	
	Water source heat pump	3-speed Fan		1 Compressor 1 Revert Valve	
T7200-TB21-9JS1 (new model)	2-pipe FCU, ECM fan, On/Off valve	ECM fan	1 On/Off Valve		1 BI, Occupancy 1 Remote sensor
	4-pipe FCU, ECM fan, On/Off valve	ECM fan	2 On/Off Valve		
	2-pipe FCU, ECM fan, 3-wire On/Off valve	ECM fan	1 3-wire On/Off Valve		
	2-pipe FCU, ECM fan with TiO2/ESP, On/Off valve	ECM fan	1 On/Off Valve	1 TiO2/ESP	
	2-pipe FCU, ECM fan with floor heating, On/Off valve	ECM fan	1 On/Off Valve	1 Floor Heating	
	Water source heat pump	ECM fan		1 Compressor 1 Revert Valve	
	Single speed AHU	1-speed Fan	1 Proportion Valve	1 On/Off Damper	
	2-pipe FCU, Prop valve	3-speed Fan	1 Proportion Valve		

IMPORTANT: The T7200 series LCD thermostat is intended to provide and input to equipment under normal operating conditions. Where failure or malfunction of the thermostat could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the thermostat.

## Technical specifications

Supply Voltage	100–240 VAC 50/60 Hz
Power consumption	Max. 5VA
Terminations	Screw terminal block
AO output (ECM Fan, Proportion Valve)	0–10VDC output, up to 20mA
Relay output (Fan, Valve, Tio2 and etc.)	relay (SPST) output, 2.2A(IR), $\cos\Phi$ 0.98; 3.6A (IX), $\cos\Phi$ 0.98; 5A(Resistive)
BI input	Dry contact signal
Remote sensor	Support JCI 10K NTC type, e.g. TE-636S-1; China 10K NTC type, SA1200-002
Wire size	Screw terminal block: 1.0–1.5mm <sup>2</sup> rigid conductor for 5mm connector; 0.14–1.5 mm <sup>2</sup> rigid conductor for 3.5mm connector
Mounting	Flush-mounted
Temperature measurement range	0 to 49°C (32 to 99°F)
Temperature accuracy	1°C (2°F)
Default temperature set point range	5.0°C to 35.0°C in 0.5°C increments
Ambient conditions	Operating: 0 to 40°C (32 to 104°F), 10 to 90% RH, noncondensing, 29°C (85°F) maximum dew point
	Storage: -20 to 60°C (-4 to 140°F), 5 to 95% RH, noncondensing
Protection class	IP20
Pollution degree	2
Heat and fire resistance category	D
Temperature for ball pressure test	125°C
Limitation of operating time	Continuous
Product category	Type 1.B P42(74)
Shipping weight	Approx 300g
Compliance	CE mark
	RCM mark, Australia/NZ emissions compliance
	RoHS, REACH, WEEE

**Note:**

1. User can configure one model to different applications by parameter setting
2.  $I_R$  is steady-state current of FCU motor, and  $I_X$  is transient current of FCU motor
3. T7200-TB20-9J00 and T7200-TB20-9J0B don't have remote sensor input and binary input;  
T7200-TF20-9JS0 and T7200-TB21-9JS0 only have binary input
4. T7200- TF20-9JS1 and T7200-TB21-9JS1 have remote sensor input and binary input, remote sensor needs to be ordered separately.

## T7600 Modbus LCD Thermostat

### Introduction

The T7600 series Modbus LCD thermostats are designed to control heating and cooling through air conditioning unit in commercial and residential application.

Typical applications include the control of fan coil units, floor heating, packaged terminal air conditioners and combination of heating and cooling equipment. As part of the system, T7600 series thermostat can control two-way or three-way valve and multiple-speed line voltage fan or ECM fan.

T7600 features with large LCD screen that displays the status of work mode (cooling, heating, air venting, floor heating), fan speed, indoor temperature and set point etc. T7600 are equipped with Modbus communication, which provide information to building automation system in order to implement enhanced energy saving strategies.



Table 1: Features and Benefits

Features	Benefits
Large backlit LCD	LCD is larger than 40% of front area, provide real time status of the environment with intuitive and clear user interface
New installation method	New method without opening T7600 cover during installation, avoids the risk of components damage by screwdriver
Modbus communication	Modbus communication with adjustable address and baud rate
Suitable for various installation box	Small back part which is suitable for all installation boxes available in China and Europe market
EEPROM storage of data	Thermostat retains the last events and parameter settings after power loss.
Multiple color	There are two standard color: White and Black. Other colors also can be customized
Push button for user operation	User can change working mode, temperature set point and fan speed via push buttons, easy for operation

**IMPORTANT:** The T7600 series Modbus LCD thermostat is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the thermostat could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the control system. Incorporate and maintain other devices, such as supervisory or alarm systems or safety or limit controls, intended to warn of or protect against failure or malfunction of the thermostat.



## Table 2: T7600 series thermostat product code number and corresponding application

Product code number	Application	Valve control	Others control	Fan control
T7601-TF20-9JSO	2-pipe FCU, relay valve	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	N/A	1 x 0-10VDC output for ECM fan
	4-pipe FCU, relay valve	2 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	N/A	
	2-pipe FCU, 3-wire relay valve	2 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	N/A	
	2-pipe FCU with floor heating, relay valve	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	
	2-pipe FCU with TiO2/ ESP, relay valve	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	
	Water source heat pump	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	
	2-pipe FCU, AO valve	1 x 0-10VDC output, match 100k ohms actuator impedance	N/A	
T7600-TF21-9JSO	2-pipe FCU, AO valve	1 x 0-10VDC output, match 100k ohms actuator impedance	N/A	
	4-pipe FCU, AO valve	2 x 0-10VDC output, match 100k ohms actuator impedance	N/A	
T7600-TF20-9JSO	2-pipe FCU, relay valve	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	N/A	3 x relay (SPST) output for three speed fan , 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8
	4-pipe FCU, relay valve	2 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	N/A	
	2-pipe FCU, 3-wire relay valve	2 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	N/A	
	2-pipe FCU with floor heating, relay valve	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	
	2-pipe FCU with TiO2/ ESP, relay valve	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	
	Water source heat pump	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	
T7603-T000-9JFO	Floor heating	1 x relay (SPST) output, 2A(IR), cos $\Phi$ 0.8; 3A (IX), cos $\Phi$ 0.8	N/A	N/A

**Note:**

1. User can configure one model to different applications by parameter setting
2. All above models in table have Modbus communication, remote sensor input (remote sensor need to be ordered separately, TE-636S-1) and binary input for occupancy detection
3. All above models in table are white color, other colors can be customized, but there are MOQ (Minimum Order Quantity) requirement
4. IR is steady-state current of FCU motor, and IX is transient current of FCU motor

## Technical specifications

Supply Voltage	110-240 VAC 50/60 Hz
Power consumption	Max. 5VA
Terminations	Screw terminal block
Communication	Modbus RTU
Wire size	Screw terminal block: 1.0-1.5mm <sup>2</sup> rigid conductor for 5mm connector; 0.14-1.5 mm <sup>2</sup> rigid conductor for 3.5mm connector
Mounting	Flush-mounted
Temperature measurement range	0 to 49°C (32 to 99°F)
Temperature accuracy	1°C (2°F)
Default temperature set point range	5.0°C to 35.0°C in 0.5° increments
Ambient conditions	Operating: 0 to 40°C (32 to 104°F), 10 to 90% RH, noncondensing, 29°C (85°F) maximum dew point
	Storage: -20 to 60°C (-4 to 140°F), 5 to 95% RH, noncondensing
Protection class	IP20
Pollution degree	2
Heat and fire resistance category	D
Temperature for ball pressure test	125°C
Limitation of operating time	Continuous
Product category	Type 1.B P42 (74)
Internal temperature sensor type	10K NTC type II
Shipping weight	Approx 300g
Compliance	CE mark
	RCM mark, Australia/NZ emissions compliance
	RoHS, REACH, WEEE

## NSA7000 Series Network Sensor

### NSA-FTB7000

The flush-mounted NSA7000 series network sensor with LCD is an electronic zone sensor designed to function directly with Johnson Controls® BACnet® MS/TP digital controllers in heating, ventilating and air conditioning (HVAC) systems. This model monitors the temperature set point, zone temperature, and transmits this data to a field controller on the sensor actuator (SA) bus.

This model has occupancy override button which allows user to signal the controller that the zone is occupied to override the scheduled mode, and equipped with both a modular jack and screw terminals for easy wiring.

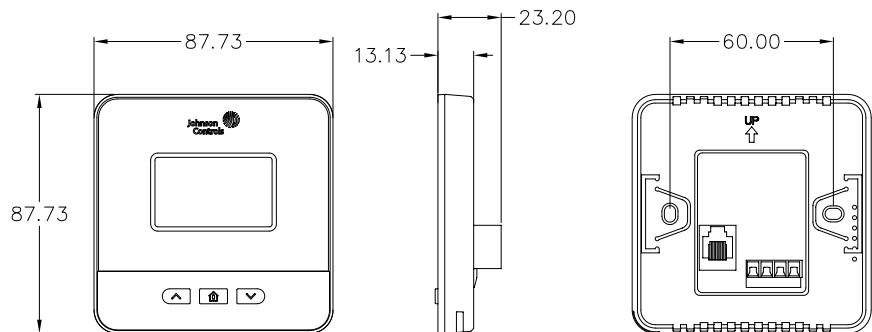


### Features and Benefits

Features	Benefits
Up to 16 address can be set	User can set NSA7000 address in field via push button and LCD display, and up to 16 address can be set
Both MJ and ST are available	Both MJ (Modular Jack) and ST (Screw Terminal) are available in one model, easy for installation
Suitable for various installation box	Small back part which is suitable for all installation boxes available in China and Europe market.
Push button for user operation	User can change temperature set point and occupied/unoccupied via push button. Easier for operation

**IMPORTANT:** Use this NSA7000 sensor only as an operating control. Where failure or malfunction of the NSA7000 sensor could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the system. Incorporate and maintain other devices such as supervisory or alarm systems or safety or limit controls intended to warn of, or protect against, failure or malfunction of the NSA7000 sensor.

### Product dimensions



### Technical specifications

Part Number	NSA-FTB7000
Supply Voltage	9.8 to 16.5 VDC; 15VDC nominal (From SA Bus)
Current consumption	35mA maximum
Terminations	Modular jack and screw terminal block
Sensor addressing	Factory set address 199, set range from 199 to 215
Wire size	Modular jack: 24 AWG or 26 AWG (0.5 or 0.4 mm diameter) recommended; Three twisted pair (six conductors) Screw terminal block: 18-22 AWG (1.0-0.6 mm diameter); 22AWG (0.6 mm diameter) recommended
Communication rate	Auto-detect: 9.6k, 19.2k, 38.4k or 76.8k bps
Mounting	Flush-mounted
Temperature measurement range	0-40°C (32-104°F)
Temperature accuracy	±0.5°C (±1°F)
Default temperature set point adjustment range	10.0-30.0°C (50.0-86.0oF) in 0.5°C increments
Ambient conditions	Operating: 0-40°C (32-104°F), 10-90% RH, noncondensing Storage: -20-60°C (-4-140°F), 5-95% RH, noncondensing
Product weight	Approx. 66g
Compliance	CE, UKCA
	RCM mark, Australia/NZ emissions compliance
	RoHS, REACH, WEEE

## NSA-FHN70X1-0, NSA-FTD70X3-0, NSA-FTB70X3-0, NSA-FHR71X3-0

The flush-mounted NSA7000 series network sensor with LCD is an electronic zone sensor designed to function directly with Johnson Controls® BACnet® MS/TP digital controllers in heating, ventilating and air conditioning (HVAC) systems. Models in this series monitor the temperature set point, zone temperature and humidity, and transmit this data to a field controller on the sensor actuator (SA) bus.

NSA-FHR71X3-0 can toggle between temperature and RH on the display, and has the capability to set the desired default display to either temperature or RH. A fan mode push button is included in NSA-FTD70X3-0 to set the desired fan speed (OFF-LOW-MED-HIGH-AUTO). Besides NSA-FHN70X1-0, all other models have occupancy override button which allows user to signal the controller that the zone is occupied to override the scheduled mode.

For communication wiring flexibility, all models equipped with both a modular jack and screw terminals, connecting the NSA7000 network sensor to controllers.



Table 1: Features and Benefits

Features	Benefits
Up to 16 address can be set	User can set NSA7000 address in field via push button and LCD display, and up to 16 address can be set
Both MJ and ST are available	Both MJ (Modular Jack) and ST (Screw Terminal) are available in one model, easy for installation
Large backlit LCD	LCD is larger than 40% of front area, provide real time status of the environment with intuitive and clear user interface
Energy saving indicator	Green or red leaf symbol to indicate the NSA7000 works in energy saving or not saving mode
New installation method	New method without opening NSA7000 cover during installation, avoids the risk of components damage by screwdriver
Suitable for various installation box	Small back part which is suitable for all installation boxes available in China and Europe market.
Multiple color	There are three standard color: White, Black and Gold. Other colors also can be customized
Push button for user operation	User can change temperature set point, fan speed and occupied/unoccupied via push button. Easier for operation

**IMPORTANT:** Use this NSA7000 sensor only as an operating control. Where failure of malfunction of the NSA7000 sensor could lead to personal injury or property damage to the controlled equipment or other property, additional precautions must be designed into the system. Incorporate and maintain other devices such as supervisory or alarm systems or safety or limit controls intended to warn of, or protect against, failure or malfunction of the NSA7000 sensor.



## Table 2: NSA7000 series network sensor product code number

Product code number	Color1	LCD	Fan control	Humidity2	Temp. adjustment3	F/C scale toggle	Occupancy override	Screw terminal4	Address selection5
NSA-FHN7001-0	White	No	No	Yes ( $\pm 3\%$ )	N/A	No	No	ST/MJ	No
NSA-FTD7003-0	White	Yes	Yes	No	Set/WC	Yes	Yes	ST/MJ	Yes
NSA-FTB7003-0	White	Yes	No	No	Set/WC	Yes	Yes	ST/MJ	Yes
NSA-FHR7103-0	White	Yes	No	Yes ( $\pm 3\%$ )	Set/WC	Yes	Yes	ST/MJ	Yes

1. For models with humidity sensor, the humidity value also can be displayed in LCD, and the measurement accuracy is  $\pm 3\%$ RH.
2. Set/WC means this model can work under set or WC (Warmer/Cooler) mode, selected in setting.
3. All models equipped with both ST (Screw Terminal) and MJ (Modular Jack) can be selected by user in the field.
4. The address can be selected in setting (199-215), and default address is 199. User need to calculate the current consumption, to decide max. NSA7000 connected in one SA Bus.

### Technical specifications: NSA7000 series network sensor

Supply Voltage	9.8 to 16.5 VDC; 15VDC nominal (From SA Bus)
Current consumption	35mA maximum
Terminations	Modular jack and screw terminal block
Sensor addressing	All models with factory set address 199. NSA-FTD70X3-0, NSA-FTB70X3-0 and NSA- FHR71X3-0 can set address from 199 to 215 in setting page
Wire size	Modular jack: 24 AWG or 26 AWG (0.5 or 0.4 mm diameter) recommended; Three twisted pair (six conductors)
	Screw terminal block: 18-22 AWG (1.0-0.6 mm diameter); 22AWG (0.6 mm diameter) recommended
Communication rate	Auto-detect: 9.6k, 19.2k, 38.4k or 76.8k bps
Mounting	Flush-mounted
Temperature measurement range	0-40°C (32-104°F)
Humidity measurement range	Full range: 0-100% RH
Temperature accuracy	$\pm 0.5^{\circ}\text{C} (\pm 1^{\circ}\text{F})$
Humidity accuracy	$\pm 3\%$ RH
Default temperature set point adjustment range	10.0-30.0°C (50.0-86.0°F) in 0.5°C increments
Ambient conditions	Operating: 0-40°C (32-104°F), 10-90% RH, noncondensing, 29°C (85°F) maximum dew point
	Storage: -20-60°C (-4-140°F), 5-95% RH, noncondensing
Shipping weight	Approx. 300g
Compliance	CE mark
	RCM mark, Australia/NZ emissions compliance
	RoHS, REACH, WEEE

## TE730 Series Sensor

### Introduction

The TE730 Series Temperature Sensors provide temperature sensing in room wall-mount applications. This arrangement allows local temperature setpoint adjustment and temporary occupancy override.

A setpoint dial is included on all models to adjust the temperature setpoint. A manual occupancy override push button is available on one model to allow the user to request a time-of-day scheduling override, when the space is occupied outside of the normal occupied hours schedule.

The wires connecting the temperature sensor to the controller are terminated with a modular jack connection. All models include a Sensor Actuator (SA) Bus access port (6-pin modular jack) for connecting accessories. This feature allows a technician to commission or service the controller via the temperature sensor.

Refer to the TE730 Series Temperature Sensors Installation Instructions (Part No. 24-10674-0) for important product application information.



TE730 Series Temperature Sensors with Occupancy Override Push Button (Left) and without Occupancy Override Push Button (Right)

### Features

- large setpoint dial — provides ease of temperature setpoint adjustments by the user
- occupancy override push button (TE730-39C-0 model) — allows the user to request a time-of-day scheduling override when the space is occupied outside of the normal occupied hours schedule
- compact and easy to install design — interfaces directly with the field controller via modular jack connections
- 6-pin modular jack SA Bus access port — allows a technician to commission or service the field controller via the TE730 Series Temperature Sensor

### Repair Information

Do not attempt to field repair the TE730 Series Temperature Sensor. As with any electrical device, always keep the air vents clean and free from dust or obstruction. If the TE730 Series Temperature Sensor fails to operate within its specifications, replace the unit. For a replacement temperature sensor, contact the nearest Johnson Controls® representative.

### Selection Chart

Product Code Number	Temperature Sensor Type	Temperature Setpoint Adjustment Dial	Integral Manual Occupancy Override Push Button	Connection	Enclosure Dimensions (Height x Width x Depth)
TE730-29C-0	Platinum 1k ohm Thin Film Resistive	Yes	No	Modular Jack	80 x 80 x 36 mm (3-1/4 x 3-1/4 x 1-7/16 in.)
TE730-39C-0	Platinum 1k ohm Thin Film Resistive	Yes	Yes	Modular Jack	80 x 80 x 36 mm (3-1/4 x 3-1/4 x 1-7/16 in.)

### Technical Specifications

TE730 Series Temperature Sensors	
Temperature Sensor Type	Platinum 1k ohm Thin Film Resistive
Temperature Sensor Coefficient	Approximately 3.9 ohms per °C (2 ohms per °F)
Temperature Sensor Reference Resistance	1k ohms at 0°C (32°F)
Temperature Sensor Accuracy	±0.56°C/±1.0°F at 21°C (70°F)
Temperature Setpoint Range	Adjustable 15 to 29°C (59 to 84°F)
Temperature Sensor Response Time	13 Minutes at 0.05 m/s (10 fpm)
Field Connections	8-Pin Modular Jack Connector
SA Bus Access	6-Pin Modular Jack Connector with Bottom Access for a Wireless Commissioning Converter or VAV Balancing Tool
Ambient Operating Conditions	0 to 40°C (32 to 104°F); 10 to 90% RH, Noncondensing; 30°C (86°F) Maximum Dew Point
Ambient Storage Conditions	-40 to 60°C (-40 to 140°F); 5 to 95% RH, Noncondensing; 30°C (86°F) Maximum Dew Point
Materials	White Thermoplastic Enclosure
Shipping Weight	0.1 kg (0.3 lb)

## KEN Series Electromagnetic Flow Meter

Johnson Controls KEN series Inline Electromagnetic Flow Meters measure flow rate or flow speed of electrically conductive liquids in wide application of chiller plant, air side equipment, raw water metering, water distribution, and sea water etc.

## KHN Series Electromagnetic BTU Meter

Johnson Controls KHN series Inline Electromagnetic BTU Meters are used to measure the cooling or heating capacity in wide application of chiller plant, air side equipment, and heat transfer station etc.



### Features

#### Premium measuring accuracy:

deliver high measuring accuracy to enable users to save the energy or water consumption.

#### Robust and reliable design:

no moving parts, a long maintenance-free life under through its operation period.

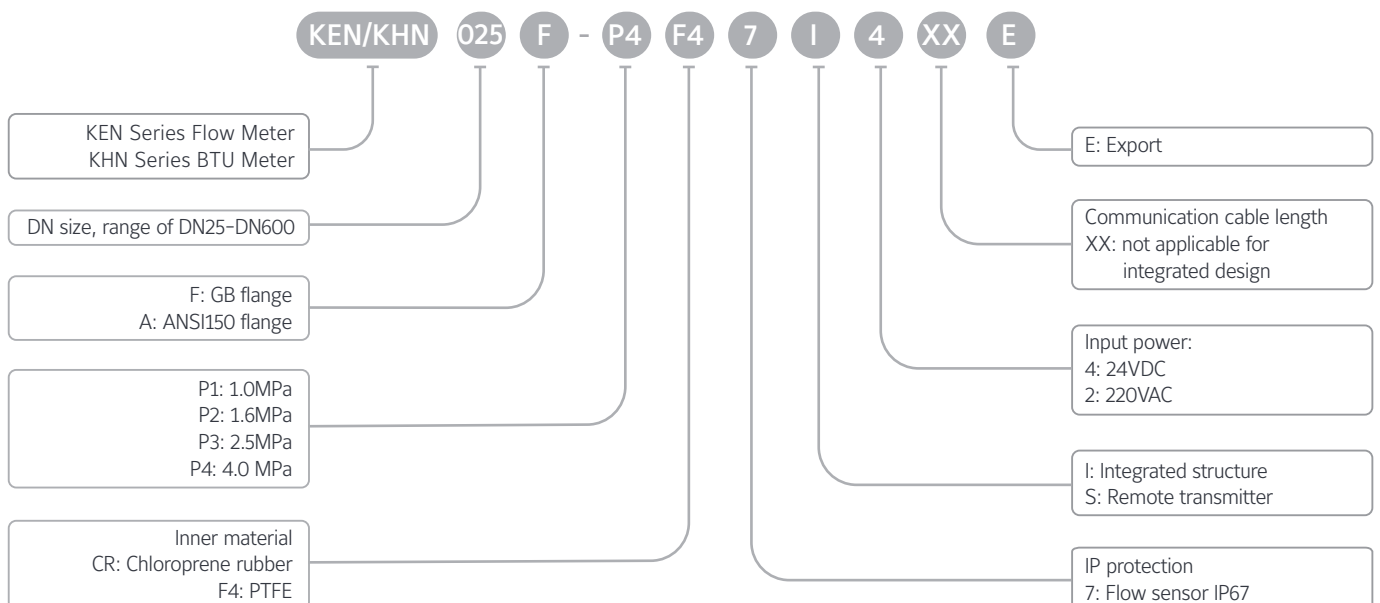
#### Easy operation & maintenance:

Each meter is calibrated and programmed before shipment. The product is standard with LCD display for local operation, or remote operation communicating to building automation systems. Its type 316L stainless steel electrode material and various inner material options enable the meter to be free- maintenance in applications. Two PT1000 temperature sensors are in standard offering package.

#### Wide application range:

cover multiple wide applications to measure the flow rate of liquid. The flow meter can operate at ambient temperature range of  $-25^{\circ}\text{C}$  ~  $60^{\circ}\text{C}$  , and liquid temperature is up to  $120^{\circ}\text{C}$  .

### Product Selection



## Technical data sheets

Specifications	
Accuracy	Class 0.5 (Flow meter)
	Class 2 (BTU meter)
Repeatness	0.17%
Flow type	Liquid electrical conductivity $\geq 20 \mu S/cm$
Size range	DN25-DN600
Working pressure	1.0-4.0MPa according to DN size
Pipe connection	GB or ANSI flange (option)
Input power	24VDC
	220VAC
Output	4-20mA analog
	Modbus RTU (RS485)
Transmitter IP protection class	IP67
Flow sensor IP protection class	IP67
	IP68 (for remote structure)
Construction	
Sensor housing	Carbon steel
Pipe connection	Carbon steel
Inner material	Chloroprene rubber
	PTFE
Measuring electrodes	Type 316L stainless steel
Working condition	
Operating ambient temperature	-25°C~60°C
Storage ambient temperature	-40°C~60°C
Liquid temperature	-10°C~60°C (CR inner material)
	-20°C~120°C (PTFE inner material)
Electrical connections	
Cable entry	M20x1.5
Certificate	CE

# Flow Meter and BTU Meter

## Key Product List

Flow meter SKU	BTU meter SKU	DN	Inner material	PN(mPa)	Vnormal (m <sup>3</sup> /h) (Flow rate 0.5-5m/s)	Vmin (m <sup>3</sup> /h)	Vmax (m <sup>3</sup> /h)
KEN025F-P4F471XXXE	KHN025F-P4F471XXXE	DN25	PTFE	4.0	0.88-8.8	0.88	17.6
KEN032F-P4F471XXXE	KHN032F-P4F471XXXE	DN32	PTFE	4.0	1.45-14.5	1.45	29
KEN040F-P4F471XXXE	KHN040F-P4F471XXXE	DN40	PTFE	4.0	2.3-23	2.3	46
KEN050F-P4CR71XXXE	KHN050F-P4CR71XXXE	DN50	CR	4.0	3.5-35	3.5	70
KEN050F-P4F471XXXE	KHN050F-P4F471XXXE	DN50	PTFE	4.0	3.5-35	3.5	70
KEN065F-P4CR71XXXE	KHN065F-P4CR71XXXE	DN65	CR	4.0	6-60	6	120
KEN065F-P4F471XXXE	KHN065F-P4F471XXXE	DN65	PTFE	4.0	6-60	6	120
KEN080F-P4CR71XXXE	KHN080F-P4CR71XXXE	DN80	CR	4.0	9-90	9	180
KEN080F-P4F471XXXE	KHN080F-P4F471XXXE	DN80	PTFE	4.0	9-90	9	180
KEN100F-P2CR71XXXE	KHN100F-P2CR71XXXE	DN100	CR	1.6	14-140	14	280
KEN125F-P2CR71XXXE	KHN125F-P2CR71XXXE	DN125	CR	1.6	22-220	22	440
KEN150F-P2CR71XXXE	KHN150F-P2CR71XXXE	DN150	CR	1.6	32-320	32	640
KEN200F-P1CR71XXXE	KHN200F-P1CR71XXXE	DN200	CR	1.0	56-560	56	1120
KEN200F-P2CR71XXXE	KHN200F-P2CR71XXXE	DN200	CR	1.6	56-560	56	1120
KEN250F-P1CR71XXXE	KHN250F-P1CR71XXXE	DN250	CR	1.0	88-880	88	1760
KEN250F-P2CR71XXXE	KHN250F-P2CR71XXXE	DN250	CR	1.6	88-880	88	1760
KEN300F-P1CR71XXXE	KHN300F-P1CR71XXXE	DN300	CR	1.0	127-1270	127	2540
KEN300F-P2CR71XXXE	KHN300F-P2CR71XXXE	DN300	CR	1.6	127-1270	127	2540
KEN350F-P1CR71XXXE	KHN350F-P1CR71XXXE	DN350	CR	1.0	170-1700	170	3400
KEN350F-P2CR71XXXE	KHN350F-P2CR71XXXE	DN350	CR	1.6	170-1700	170	3400
KEN400F-P1CR71XXXE	KHN400F-P1CR71XXXE	DN400	CR	1.0	220-2200	220	4400
KEN400F-P2CR71XXXE	KHN400F-P2CR71XXXE	DN400	CR	1.6	220-2200	220	4400
KEN450F-P1CR71XXXE	KHN450F-P1CR71XXXE	DN450	CR	1.0	280-2800	280	5600
KEN450F-P2CR71XXXE	KHN450F-P2CR71XXXE	DN450	CR	1.6	280-2800	280	5600
KEN500F-P1CR71XXXE	KHN500F-P1CR71XXXE	DN500	CR	1.0	350-3500	350	7000
KEN500F-P2CR71XXXE	KHN500F-P2CR71XXXE	DN500	CR	1.6	350-3500	350	7000
KEN600F-P1CR71XXXE	KHN600F-P1CR71XXXE	DN600	CR	1.0	500-5000	500	10000
KEN600F-P2CR71XXXE	KHN600F-P2CR71XXXE	DN600	CR	1.6	500-5000	500	10000

Note: KEN/KHN.....XXD: first X means product power supply, 24VDC/220VAC can be chosen, the second XX means length of remote cable, only for remote type products.

## Johnson Controls RLBC Series Ultrasonic BTU meter

### Introduction

RLBC Series Ultrasonic BTU Meter is a high performance, low power electronic heat meter developed with reference related standards. It is used to measure and display the heat released (absorbed) by the heat (cold) liquid flowing through the heat-cooled exchange system. It consists of flow sensor, microprocessor and pairing temperature sensor. The microprocessor gets the flow signal through flow sensor and the signal of water temperature at the entrance and exit from the temperature measuring circuit, and then calculates exchanged heat by the heat-carrying liquid according to the standard heat calculation formula. This product can be used in commercial building, apartment for FCU and AHU system to calculate cooling or heating load.

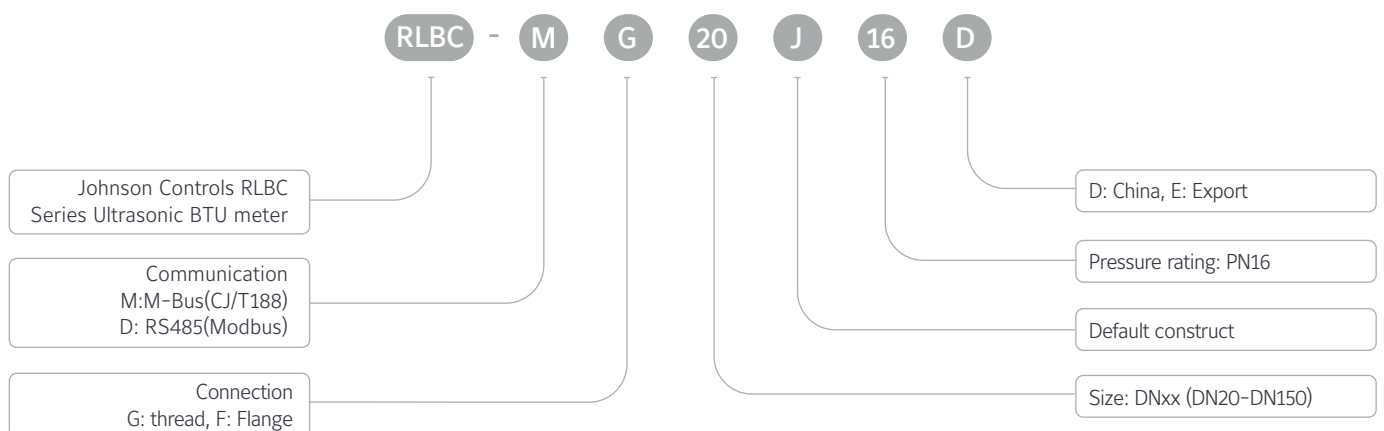
RLBC series BTU meter have the option of RS485 and Modbus interface for user to choose, with related devices can complete remote energy management system, which can achieve real-time data reading and control the user's power consumption conveniently.



### Features

- Low battery alarming.
- Automatic data correction technology.
- Alarms when the temperature sensor is disconnected or has a short cut.
- High definition and wide temperature LCD display.
- 8 levels of flow rate and separately adjusted, with high precision.
- Ultra-low power consumption.
- Measuring mechanism has no moving parts and no wear and tear forever. The measuring accuracy will not be influenced by using period.
- Easy deployment, horizontal or vertical installation.
- M-Bus/RS485 communication interface, long distance communication.
- Can be used as integrated or remote type

### Naming Rule



## Selection Table

Part Number	Size	Permanent flow rate (m <sup>3</sup> /h)	Range of flow rate (m <sup>3</sup> /h)	Connection	Communication
RLBC-MG20J16E	DN20	2.5	0.05~5.0	Threaded (GB/T7303)	M-Bus(CJ/T188)
RLBC-MG25J16E	DN25	3.5	0.07~7.0	Threaded (GB/T7303)	M-Bus(CJ/T188)
RLBC-MG32J16E	DN32	6.0	0.12~12.0	Threaded (GB/T7303)	M-Bus(CJ/T188)
RLBC-MG40J16E	DN40	10.0	0.20~20.0	Threaded (GB/T7303)	M-Bus(CJ/T188)
RLBC-MF50J16E	DN50	15.0	0.60~30.0	Flanged (ISO7005-2)	M-Bus(CJ/T188)
RLBC-MF65J16E	DN65	25.0	1.00~50.0	Flanged (ISO7005-2)	M-Bus(CJ/T188)
RLBC-MF80J16E	DN80	40.0	1.60~80.0	Flanged (ISO7005-2)	M-Bus(CJ/T188)
RLBC-MF100J16E	DN100	60.0	2.40~120.0	Flanged (ISO7005-2)	M-Bus(CJ/T188)
RLBC-MF125J16E	DN125	100.0	4.00~200.0	Flanged (ISO7005-2)	M-Bus(CJ/T188)
RLBC-MF150J16E	DN150	150.0	6.00~300.0	Flanged (ISO7005-2)	M-Bus(CJ/T188)
RLBC-DF50J16E	DN50	15.0	0.60~30.0	Flanged (ISO7005-2)	RS485(Modbus)
RLBC-DF65J16E	DN65	25.0	1.00~50.0	Flanged (ISO7005-2)	RS485(Modbus)
RLBC-DF80J16E	DN80	40.0	1.60~80.0	Flanged (ISO7005-2)	RS485(Modbus)
RLBC-DF100J16E	DN100	60.0	2.40~120.0	Flanged (ISO7005-2)	RS485(Modbus)
RLBC-DF125J16E	DN125	100.0	4.00~200.0	Flanged (ISO7005-2)	RS485(Modbus)
RLBC-DF150J16E	DN150	150.0	6.00~300.0	Flanged (ISO7005-2)	RS485(Modbus)



## Technical Specification

	Size	Permanent flow rate (m <sup>3</sup> /h)	Minimum flow rate (m <sup>3</sup> /h)	Maximum flow rate (m <sup>3</sup> /h)
Flow Sensor	DN20	2.5	0.05	5.0
	DN25	3.5	0.07	7.0
	DN32	6.0	0.12	12.0
	DN40	10.0	0.2	20.0
	DN50	15.0	0.6	30.0
	DN65	25.0	1.0	50.0
	DN80	40.0	1.6	80.0
	DN100	60.0	2.4	120.0
	DN125	100.0	4.0	200.0
	DN150	150.0	6.0	300.0
Temperature sensor	Temperature range		4°C~95°C	
	Temperature difference range		3K~90K	
	Minimum display temperature		0.1°C	
Minimum display of flow rate	0.01 m <sup>3</sup> (DN20-DN40) , 0.1 m <sup>3</sup> (DN50-DN150)			
Minimum display of heat power	1 kW-h (DN20-DN40) , 0.01 MW-h (DN50-DN150)			
Static working current	≤ 7uA			
Battery lifetime	> 6years (Meter-reading frequency 24Hours/Times)			
Digit number of display screen	8 digits			
Maximum accumulated heat power	4.2×10 <sup>9</sup> kW-h (Only final 8 numbers can be displayed when accumulated heat power is more than 99999999 kW-h) (DN20-DN40)			
	4.2×10 <sup>6</sup> MW-h (Only final 8 numbers can be displayed when accumulated heat power is more than 999999.99 MW-h) (DN50-DN150)			
Maximum accumulated flow rate	4.2×10 <sup>9</sup> m <sup>3</sup> (Only final 8 numbers can be displayed when accumulated flow rate is more than 999999.99m <sup>3</sup> ) (DN20-DN40)			
	4.2×10 <sup>9</sup> m <sup>3</sup> (Only final 8 numbers can be displayed when accumulated flow rate is more than 9999999.9m <sup>3</sup> ) (DN50-DN150)			
Working status indicator	Display in cycle			
Accuracy	Class 2			
Pressure rating	1.6MPa			
Loss of pressure	≤ 0.025MPa			
Power supply	DC3.6V lithium battery, DC12V±0.6VDC (Modbus)			
IP Protection	IP68 (DN20-DN40), IP54 (DN50-DN150)			
Connection	Thread (DN20-DN40, GB/T7307), Flange (DN50-DN150, ISO7005-2)			
Valve body material	Brass (DN20-DN40, HPb58—2), Ductile Cast Iron (DN50-DN150, QT450—10)			
Communication	M-Bus (CJ/T188 protocol) (DN20-DN150), RS485 (Modbus protocol) (DN50-DN150)			
Ambient operating temperature	5°C- 55°C			
Ambient storage conditions	temperature -25°C~55°C, relative humidity < 93%RH			

## VLC2000 Series Electric Zone Valves & Actuators

### Overview

The VLC2000 Series is designed to control water flow according to signal received from the thermostat. This maintains the room temperature by adjusting water flow through the fan coil unit.

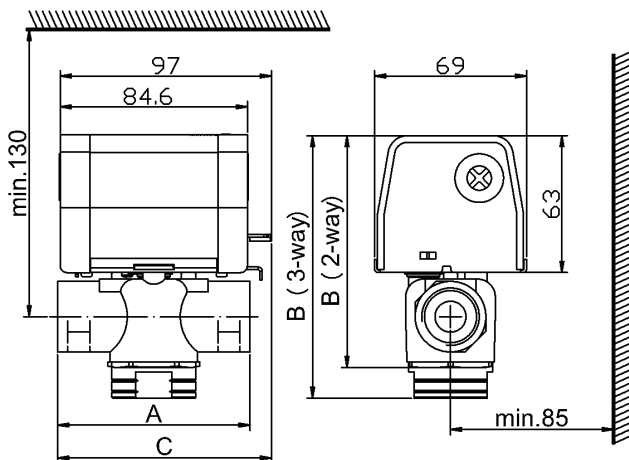
The VLC2000 Series features a spring return function, and are available in DN15/20/25/32 valve sizes. The valve and actuator can be easily assembled or disassembled on the field without accessories and commissioning.



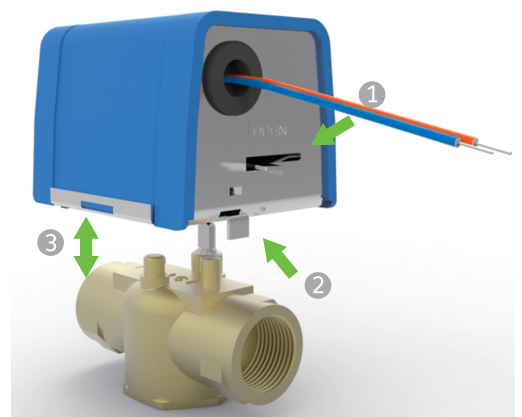
### Sizing Table (Actuator included)

Model	Size	Type	Kv (Cv)	Close-off pressure	Weight (g)	Dimensions (mm)		
						A	B	C
VLC2200FC-C	DN15	2-way	1.7 (2.0)	0.45 MPa (65PSI)	700	70	106	91
VLC2200GC-C	DN20		2.2 (2.5)	0.35 MPa (50PSI)	850	87	106	99
VLC2200HC-C	DN25		3.0 (3.5)	0.20 MPa (30PSI)	1000	95.5	112	103
VLC2200JC-C	DN32		3.6 (4.2)	0.20 MPa (30PSI)	1200	104	123	107
VLC2300FC-C	DN15	3-way	1.7 (2.0)	0.45 MPa (65PSI)	750	70	115	91
VLC2300GC-C	DN20		2.6 (3.0)	0.35 MPa (50PSI)	900	87	120	99
VLC2300HC-C	DN25		3.4 (4.0)	0.20 MPa (30PSI)	1050	95.5	128	103

### Dimensions (mm)



### Valve and Actuator Assembly



- For normally-closed valve actuator installation, the manual operating lever must be placed in the 'open' position.
- It is important to note that the manual operating lever will move to the 'automatic' position when the valve is powered up for the first time.

## VLC2000 Application

The VLC2000 Series valves are designed for closed system applications. Open system applications are not recommended as high levels of dissolved oxygen and chlorine present in open systems may erode the valve material, resulting in premature failure.

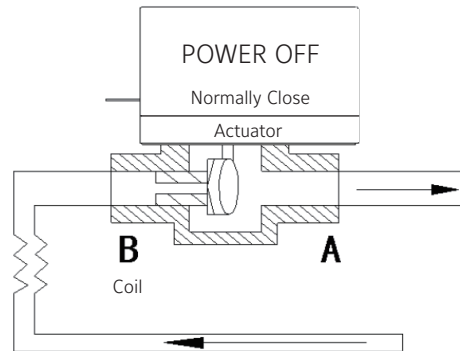


Fig.1: 2-way normally closed to the coil

3-way is only configured as N.C. to B port for N.O. configuration to the coil. simply turn the valve around.

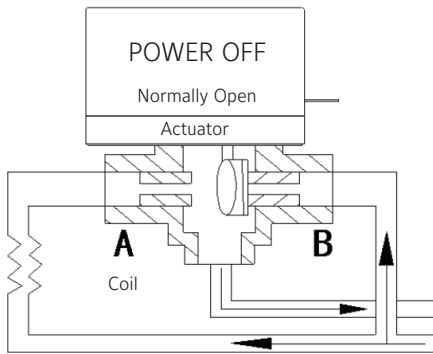


Fig.2: 3-way valve in mixing configuration, normally open to coil

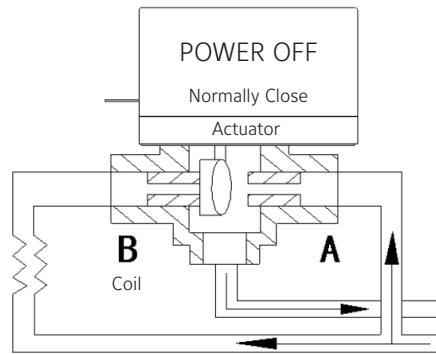


Fig.3: 3-way valve in mixing configuration, normally closed to coil

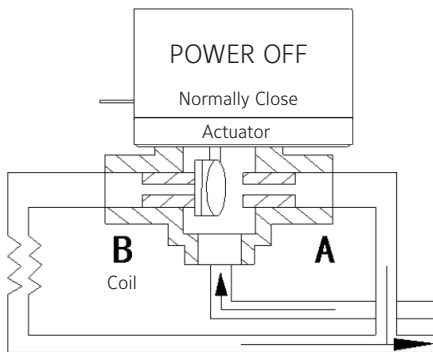


Fig.4: 3-way valve in diverting configuration, normally closed to coil

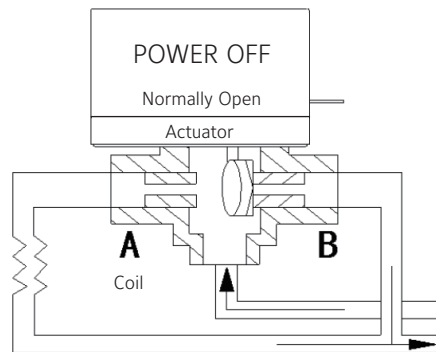


Fig.5: 3-way valve in diverting configuration, normally open to coil

## Specifications

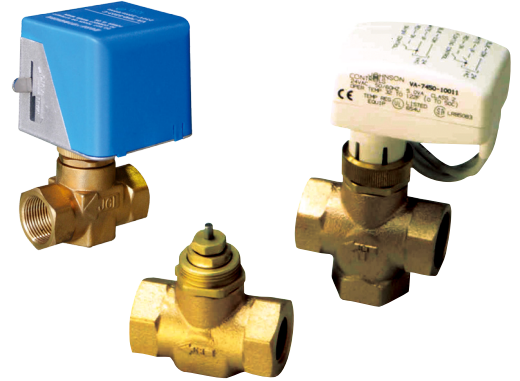
Medium	Chilled or hot water	Pipe connections	ISO7/1 Rp (BSPP)
Fluid temperature range	0 ~ 94°C	Power supply	220 ± 10% VAC, 50/60Hz
Working temperature range	0 ~ 50°C	Rated power	≤ 7VA
Working humidity range	10%~85%RH, non-condensing	Control	ON/OFF
Storage temperature	-10~60°C	Running time	Open <18 seconds, Close <8 seconds
Rated pressure	PN20	Action	Spring return, normally close
Working pressure	300 psi / 2.0 Mpa	Material	Valve body: Brass Sealing: EPDM

## VG4000 Series Electric Zone Valves & Actuators

### Overview

VG4000 Series High-Capacity/High-Closeoff Electric Zone Valves are designed to regulate the flow of water in response to the demand of a controller in zone and Variable Air Volume (VAV) reheat coil applications. The high-capacity/high-closeoff capability of the VG4400xx-C and VG4800xx-C also makes this family of valves an ideal choice for fan coil and baseboard radiation applications. Normally Closed (N.C.) VG4000 series valve is designed for use with VA-7010 Series on/off control actuators and VA-7450 Series floating or proportional control actuators. These electric actuators can be ordered separately for field installation.

Refer to the VA-7010 Series Electric On/Off Actuator Product/Technical Bulletin or the VA-7450 Electronic Valve Actuator Product/Technical Bulletin for specific information regarding either actuator series.



### Features and Benefits

Forged Brass Body and Stainless Steel Stem and Spring	Ensures long life
Ideal for Zone, VAV Reheat Coil, Fan Coil, and Baseboard Radiation Applications	Offers a broad range of applications
EPT Rubber Plug for Bubble-Tight Shutoff	Maximizes energy savings
Easy, Field-Replaceable Packing	Shortens repairing time
Actuator can be Field Installed After Piping	Simplifies installation in confined locations
Built-In Return Spring for VA-7010 Series Electric Actuators	Allows the valve to return to normal position when the actuator is de-energized

Table 1: Ordering Code for VG4000 Series Zone Valve with Threaded (Internal BSP) End Connections

Valve Code Number	Size (in.)	Kv	Close-off Pressure* (PSIG)	On/Off	On/Off	On/Off	Floating	0 ~ 10VDC Proportional
				24VAC 50/60Hz	120VAC 50/60Hz	230VAC 50/60Hz	24VAC 50/60Hz	24VAC 50/60Hz
				VA-7010-8001**	VA-7010-8502-C	VA-7010-8503-C	VA-7450-1001**	VA-7452-1001**
Two-Way N.C. (Push-Down-to-Open, PDT0)								
VG4400FC-C	1/2	2.1 ~ 2.2	50 (345kPa)	Yes	Yes	Yes	Yes	Yes
VG4400GC-C	3/4	2.5 ~ 2.6	50 (345kPa)	Yes	Yes	Yes	Yes	Yes
VG4400HC-C	1	3.0 ~ 3.1	50 (345kPa)	Yes	Yes	Yes	Yes	Yes
Three-Way N.C. (Push-Down-to-Open, PDT0)								
VG4800FC-C	1/2	2.1 ~ 2.2	50 (345kPa)	Yes	Yes	Yes	Yes	Yes
VG4800GC-C	3/4	2.5 ~ 2.6	50 (345kPa)	Yes	Yes	Yes	Yes	Yes

\* The close-off pressure for three-way mixing valves is 50 psig(345kPa) on the normally closed port and 25 psig(172kPa) on the normally open port.

\*\* NA/Europe types

Table 2: Drop (PSI) vs. Flow Rate in Gallons per Minute (GPM)

Pipe Size (Sweat or Threaded End Connections)	1/2 in.	3/4 in.	1 in.
Kv	2.1 ~ 2.2	2.5 ~ 2.6	3.0 ~ 3.1
Pressure Drop (PSI)	Flow Rate (GPM)		
1	2.6	3.0	3.6
2	3.6	4.3	5.1
3	4.5	5.3	6.3
4	5.1	6.1	7.3
5	5.8	6.8	8.1
6	6.3	7.5	8.9
7	6.8	8.0	9.6
8	7.3	8.6	10.3
9	7.7	9.1	10.9
10	8.1	9.6	11.5
11	8.5	10.1	12.0
12	8.9	10.5	12.6
13	9.3	11.0	13.1
14	9.6	11.4	13.6
15	10.0	11.8	14.0
16	10.3	12.2	14.5
17	10.6	12.5	15.0
18	10.9	12.9	15.4
19	11.2	13.3	15.8
20	11.5	13.6	16.2
21	11.8	13.9	16.6
22	12.1	14.3	17.0
23	12.3	14.6	17.4
24	12.6	14.9	17.8
25	12.9	15.2	18.1
26	13.1	15.5	18.5
27	13.4	15.8	18.8
28	13.6	16.1	19.2
29	13.9	16.4	19.5
30	14.1	16.7	19.9

## Actuator Assemblies

VG4400/4800 Series High-Capacity/High-Close-off Electric Zone Valves are specifically designed for use with VA-7010 Series on/off control actuators and VA-7450 Series floating or proportional control actuators.

Note: For soldering reasons, factory-ordered assemblies featuring sweat end connections are shipped with the actuator separated from the valve body.

### Operation

**IMPORTANT:** It is recommended that the VG4000 Series Valve be mounted within 90 degrees of the upright position.

### VA-7010 Series (On/Off Control)

When power is applied to the actuator, the motor drives the gear assembly, pushing the valve stem down against the force of the return spring. When power is removed, the actuator retracts, allowing the return spring to move the valve stem up in the direction of its normal position. Figure 2 illustrates the effect that valve stem movement has on flow.

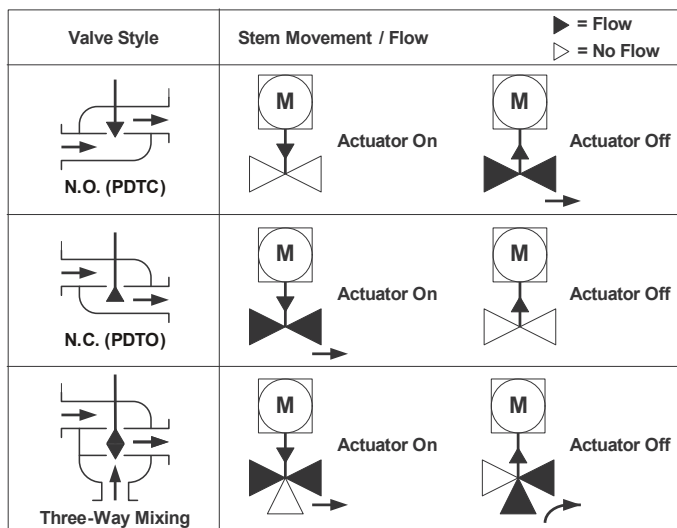


Figure 2: Effect of Valve Stem Movement on Flow

### VA-7450-1001 (Floating Control)

When power is applied to the Common (blue) and Down (red) wires, the motor drives the gear assembly, pushing the valve stem down against the force of the return spring. When power is applied to the Common (blue) and Up (white) wires, the actuator retracts, allowing the return spring to move the valve stem up to its normal position. When power is removed, the actuator will hold its position.

If power remains applied to either the red or white wire, the actuator will time out and shut the motor off after approximately 80 seconds, holding its current position. Figure 2 illustrates the effect that valve stem movement has on flow.

### VA-7452-1001 (Proportional Control)

When the control signal increases, the actuator motor drives the gear assembly, pushing the valve stem down against the force of the return spring.

When the control signal decreases, the actuator retracts, allowing the return spring to move the valve stem up in the direction of its normal position.

Upon loss of power, the actuator will hold its position. Figure 2 illustrates the effect that valve stem movement has on flow.

## Dimensions

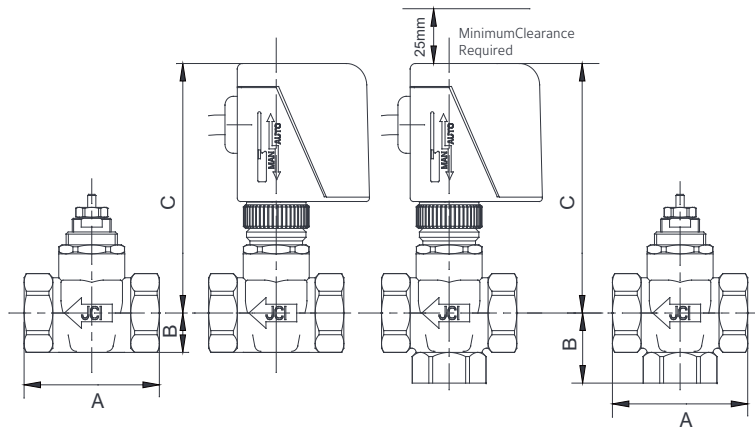


Figure 3: VA-7010 Actuated VG4000 Series Valve Dimensions, in. (mm) (Refer to Table 3)

Table 3: Dimensions for VA-7010 Actuated VG4400/4800 Series Assemblies with Threaded (Internal BSP) End Connections, mm

Dimension*	Two or Three-Way Valve Assemblies				
	Two-way 1/2 in. (DN15)	Two-way 3/4 in. (DN20)	Two-way 1 in. (DN25)	Three-way 1/2 in. (DN15)	Three-way 3/4 in. (DN20)
A	66	66	90	66	66
B	18	18	24	32	32
C	109	109	109	109	109

\*For actuator-only dimensions, refer to the VA-7010 Series Electric On/Off Actuator Product/Technical Bulletin

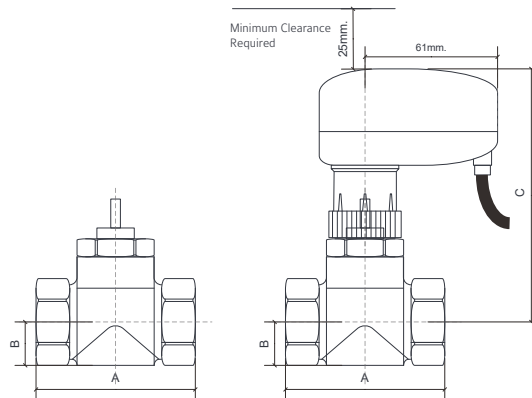


Figure 4: VA-7450 Actuated VG4000 Series Valve Dimensions, in. (mm) (Refer to Table 4)

Table 4: Dimensions for VA-7450 Actuated VG4000 Series Assemblies with Threaded (Internal BSP) End Connections, mm

Dimension*	Two or Three-Way Valve Assemblies				
	Two-way 1/2 in. (DN15)	Two-way 3/4 in. (DN20)	Two-way 1 in. (DN25)	Three-way 1/2 in. (DN15)	Three-way 3/4 in. (DN20)
A	66	66	90	66	66
B	18	18	24	32	32
C	105	105	105	105	105

\* For actuator-only dimensions, refer to the VA-7450 Electronic Valve Actuator Product/Technical Bulletin

# Zone Valve & Actuator

## Technical Data

Product	VG4000 Series High-Capacity/High-Closeoff Electric Zone Valves				
Models	VG4400FC-C	VG4400GC-C	VG4400HC-C	VG4800FC-C	VG4800GC-C
Body Rating	PN16 Maximum Pressure: 300 PSIG (2,067 kPa)				
Service*	Hot and Cold Water for HVAC Systems				
Valve Sizes	1/2 in. (DN15)	3/4 in. (DN20)	1 in. (DN25)	1/2 in. (DN15)	3/4 in. (DN20)
Maximum Close-off Pressure	50 PSIG				
Leakage	0.01% of Maximum Flow; 100% Protection Tested				
End Connections	Threaded (Internal BSP)				
Stroke	3mm				
Body Type	Two-Way PDT0(NC) Two-Way PDT0(NC) Two-Way PDT0(NC) Three-Way Mixing Three-Way Mixing				
Material					
Valve Body	Forged Brass				
Packing Nut and Cage	Brass				
Stem	ANSI 300 Stainless Steel				
Spring	Stainless Steel				
Plug	EPT Rubber				
Packing	Two EPT Rubber O-Rings				
Fluid Temperature Limits	2 ~ 95°C (35 ~ 203°F)				
Ambient Temperature Limits	2 ~ 50°C (35 ~ 122°F)				
Flow Characteristics	On/Off with VA-7010 Series Actuator; Two-Way Valves with VA-7480 Series Actuator Approximately Equal Percentage; Three-Way Valves with VA-7480 Series Actuator Approximately Linear for Service Port				
Valve Body Shipping Weight, lb (kg):	1/2 in. (DN15 Two-Way) 1.03 (0.47)"	3/4 in. (DN20 Two-Way) 0.86 (0.39)"	1 in. (DN25 Two-Way) 1.52 (0.69)"	1/2 in. (DN15 Three-Way) 1.14 (0.52)	3/4 in. (DN20 Three-Way) 0.95 (0.43)"
Actuator Shipping Weight, lb (kg)	VA-7010 Series: 1.10 (0.50) VA-7480 Series: 0.44 (0.2)				

\* Proper water treatment is recommended; refer to VDI 2035 Standard.

## VG1000 Series Threaded Control Ball Valves & Actuators

### Introduction

DN15...50, PN40

VG1000 series ball valves Series Ball Valves are designed to regulate the flow of hot or chilled water in response to the demand of a controller in HVAC systems. The ball valves could be directly mounted with Johnson Controls VA9100 / VA9300 non-spring return actuators or VA9200 spring return actuators for on/off, floating, or proportional control.

### Features

- Built-in Amodel flow characterizing disk to realize precise flow control
- Variety of Kvs per size to cover all load conditions
- Blowout-proof stem and double O-ring seals to ensure a leak-free seal and safety
- Reinforced PTFE seats to provide better wear resistance



DN15-DN50

### Ordering Information

VG	1	X	X	X	XX	-X	
VG	Valve						
	1	Ball Valve					
		2	Two-way				
		8	Three-way				
			0	BSPP threaded connection			
				5	Stainless steel trim and stem		
					XX	Valve size	
						-X	Identification code

Common product models are listed below. For more product models, please consult the Johnson Controls sales representatives.



# Ball Valve & Actuator

## Ordering Information

Size (mm)	Characterizing Disk	Control Port (Kvs)	Bypass Port (Kvs)	Two-way	Three-way
DN15	Y	1.0	0.6	VG1205AD-N	VG1805AD-N
		1.6	1.0	VG1205AE-N	VG1805AE-N
		2.5	1.6	VG1205AF-N	VG1805AF-N
		4.0	2.5	VG1205AG-N	VG1805AG-N
		6.3	4.0	VG1205AL-N	VG1805AL-N
	N	10	5.0	VG1205AN-N	VG1805AN-N
DN20	Y	4.0	2.5	VG1205BG-N	VG1805BG-N
		6.3	4.0	VG1205BL-N	VG1805BL-N
	N	10	5.0	VG1205BN-N	VG1805BN-N
DN25	Y	6.3	4.0	VG1205CL-N	VG1805CL-N
		10	5.0	VG1205CN-N	VG1805CN-N
	N	16	8.0	VG1205CP-N, VG1205CP-C	VG1805CP-N
DN32	Y	10	6.3	VG1205DN-N	VG1805DN-N
		16	10	VG1205DP-N, VG1205DP-C	VG1805DP-N
	N	25	12.5	VG1205DR-N, VG1205DR-C	VG1805DR-N
DN40	Y	16	10	VG1205EP-N	VG1805EP-N
		25	16	VG1205ER-N, VG1205ER-C	VG1805ER-N
	N	40	20	G1205ES-N, VG1205ES-C	VG1805ES-N
DN50	Y	25	16	VG1205FR-N	VG1805FR-N
		40	25	VG1205FS-N, VG1205FS-C	VG1805FS-N
	N	63	31.5	VG1205FT-N, VG1205FT-C	VG1805FT-N

## Selection Table

	Ball Valve		Actuator	Max. Close-off Pressure
Two-way	DN15	VG1205Ax-x	VA9104	1378kPa
			VA9310	
			VA9203	
	DN20	VG1205Bx-x	VA9104	
			VA9310	
			VA9203	
	DN25	VG1205Cx-x	VA9104	
			VA9310	
			VA9203	
	DN32	VG1205Dx-x	VA9104 <sup>①</sup>	
			VA9310	
			VA9208	
	DN40	VG1205Ex-x	VA9104 <sup>①</sup>	800kPa
			VA9310	1378kPa
			VA9208	
DN50	VG1205Fx-x	VA9104 <sup>①</sup>	500kPa	
		VA9310	1378kPa	
		VA9208		
Three-way	DN15	VG1805Ax-x	VA9104	1378kPa
			VA9310	
			VA9203	
	DN20	VG1805Bx-x	VA9104	
			VA9310	
			VA9203	
	DN25	VG1805Cx-x	VA9104	
			VA9310	
			VA9203	
	DN32	VG1805Dx-x	VA9310	
			VA9208	
			VA9310	
	DN40	VG1805Ex-x	VA9310	
			VA9208	
	DN50	VG1805Fx-x	VA9310	
VA9208				

①: Only applicable to VG1205xx-N and VG1205xx-C valves.

1. VA9104 and VA9300 Series Actuators are non-spring return, and VA9203 and VA9208 Series Actuators are spring return.

2. VA9104, VA9300, VA9203 and VA9208 have a maximum fluid temperature limit of 100°C unless used with the M9000-561 thermal barrier.

3. To avoid excessive wear or drive time on the motor for VA9104, use a controller and/or software that provides a timeout function to remove the signal at the end of rotation (stall). The IGx and SSx models have an auto shutoff function to avoid excessive wear or drive time on the motor.

# Ball Valve & Actuator

## Technical Specifications

- Rated pressure: PN40
  - Medium: Chilled/hot water; glycol solution (max concentration 50%)
  - Medium temperature: -10 - 120 °C
  - Flow characteristics: Two-way: equal percentage  
Three-way: equal percentage for control port, and linear for bypass port
  - Leakage: control port:  $\leq 0.01\%$  Kvs (ANSI Class IV IEC 60534-4)  
bypass port:  $\leq 1\%$  Kvs
  - Valve-pipe connection: BSPP (Rp, ISO7/1)
  - Storage temperature: -10 - 65 °C, no condensation
- Materials  
Body: forged brass  
Stem: stainless steel  
Trim: stainless steel  
Seats: reinforced PTFE, with EPDM O-ring backing  
Characterizing disk: AMODEL<sup>®</sup> AS-1145HS Polyphthalamide Resin

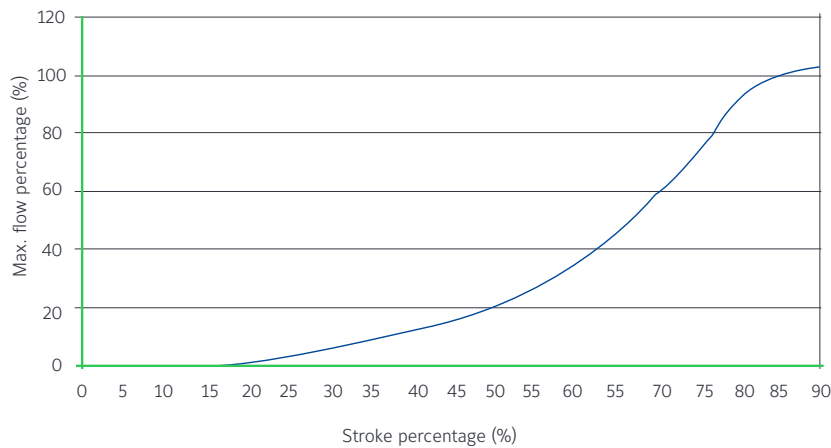


Fig1: Flow characteristics curve

## Typical Applications of VG12xx /18xx Ball Valves

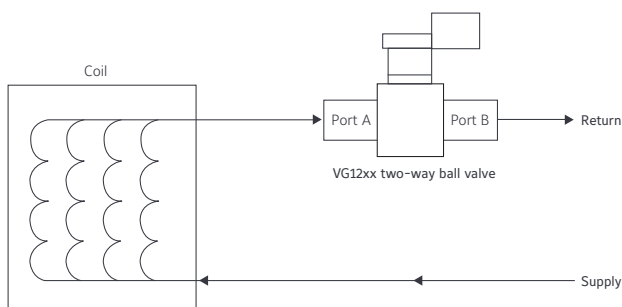


Fig2: Typical two-way valve application

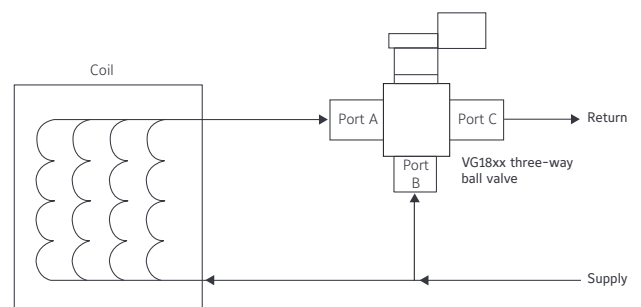


Fig3: Typical three-way valve application

Note: Recommend to mount the valve downstream from the coil to minimize head transfer to the actuator.

Check the valve carefully prior to restart after off season or long down-time to avoid any torque increase arising from shut down and application problems.  
Before installing an electric actuator in the field, rotate the valve stem several times to eliminate the torque built up due to long-term storage.

## VA9104 Series Non-Spring Return Rotary Electric Actuators

Model #	Rated torque	Power supply	Control type	Feedback signal	Rotation time for 90° (s)	Electrical connection
VA9104-AGA-1S	4Nm	24VAC	Floating		60s (60Hz) 72s (50Hz)	1.2m cable
VA9104-AGA-3S		24VAC	Floating			M3 screw terminals
VA9104-IGA-1S		24VAC	On/off or floating (with timeout)			1.2m cable
VA9104-IGA-3S		24VAC	On/off or floating (with timeout)			M3 screw terminals
VA9104-IUA-1S		85-256VAC	On/off or floating (with timeout)			1.2m cable
VA9104-GGA-1S		24VAC	0(2) - 10VDC or 0(4) - 20mA (with field-furnished 500 ohm resistor)	0(2)-10VDC		1.2m cable
VA9104-GGA-3S		24VAC	0(2) - 10VDC or 0(4) - 20mA (with field-furnished 500 ohm resistor)			M3 screw terminals

Note: For more information, refer to the VA9104 Series Electric Actuators Product Bulletin.

## VA9310 Non-Spring Return Rotary Electric Actuator

Model #	Rated torque	Power supply	Control type	Feedback signal	Rotation time for 90° (S)	Auxiliary switch
VA9310-AUA-3	10 Nm	100- 240 VAC	On/off or floating		90	M9300-2 or M9300-1 <sup>②</sup>
VA9310-HGA-3	10 Nm	24 VAC/VDC	On/off or floating or 0(2) - 10VDC	0(2)-10VDC <sup>①</sup>	90	

Notes: For more information, refer to the M/VA9310 Series Actuators Product Bulletin.

① Applicable to only control type of 0(2)-10VDC.

② Auxiliary switch needs to be ordered separately. M9300-2 = 2 SPDT, M9300-1 = 1 SPDT.

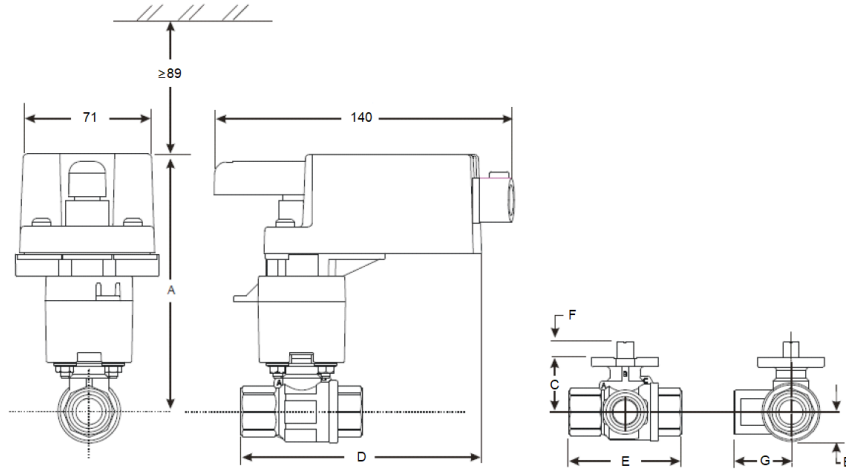
## VA920x Spring Return Rotary Electric Actuators

Model #	Rated torque	Power supply	Control type	Feedback signal	Power-on rotation time for 90° (S)	Spring return time (S)	Auxiliary switch
VA9203-AGA-1Z	3 Nm	24 VAC/VDC	Floating or On/off		90	16	-
VA9203-AGB-1Z	3 Nm	24 VAC/VDC	Floating or On/off		90	16	1 SPDT
VA9203-BUA-1	3 Nm	100-230 VAC	On/off		53-71	22	-
VA9203-BUB-1	3 Nm	100-230 VAC	On/off		53-71	22	1 SPDT
VA9203-BGA-1	3 Nm	24 VAC/VDC	On/off		53-71	22	-
VA9203-BGB-1	3 Nm	24 VAC/VDC	On/off		53-71	22	1 SPDT
VA9203-GGA-1Z	3 Nm	24 VAC/VDC	0(2)-10VDC	0-10VDC	90	16	-
VA9203-GGB-1Z	3 Nm	24 VAC/VDC	0(2)-10VDC	0-10VDC	90	16	1 SPDT
VA9208-AGA-1	8 Nm	24 VAC/VDC	Floating or On/off		150	22	
VA9208-AGC-1	8 Nm	24 VAC/VDC	Floating or On/off		150	22	2 SPDT
VA9208-BDA-1	8 Nm	230 VAC	On/off		53-71	21	
VA9208-BDC-1	8 Nm	230 VAC	On/off		53-71	21	2 SPDT
VA9208-BGA-1	8 Nm	24 VAC/VDC	On/off		53-71	21	
VA9208-BGC-1	8 Nm	24 VAC/VDC	On/off		53-71	21	2 SPDT
VA9208-GGA-1	8 Nm	24 VAC/VDC	0(2)-10VDC	0-10VDC	150	22	
VA9208-GGC-1	8 Nm	24 VAC/VDC	0(2)-10VDC	0-10VDC	150	22	2 SPDT

For more information, refer to the VA9203 Series Actuators Product Bulletin or the VA9208 Series Actuators Product Bulletin.

# Ball Valve & Actuator

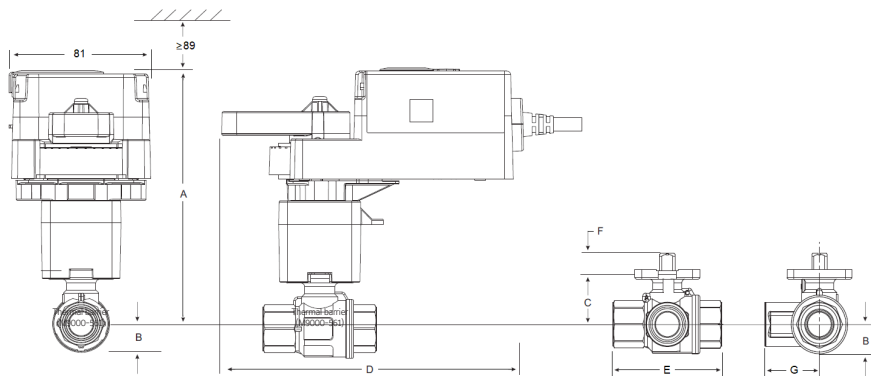
## Assembly Dimensions 1 (VG1205/1805 + VA9104 Series Actuators) (mm)



Valve Size	Actuator	A without thermal barrier	A with thermal barrier	B	C	D	E	F	G
DN15	VA9104	98	135	17	31	129	67	9	33
DN20	VA9104	98	135	17	31	133	75	9	38
DN25	VA9104	100	137	19	33	141	92	9	46
DN32	VA9104	111	146	26	44	150	109	9	54
DN40	VA9104	115	150	29	48	155	119	9	59
DN50	VA9104	120	155	37	53	165	139	9	74

Note: The M9000-561 thermal barrier is not included in the standard offering and needs to be ordered separately.

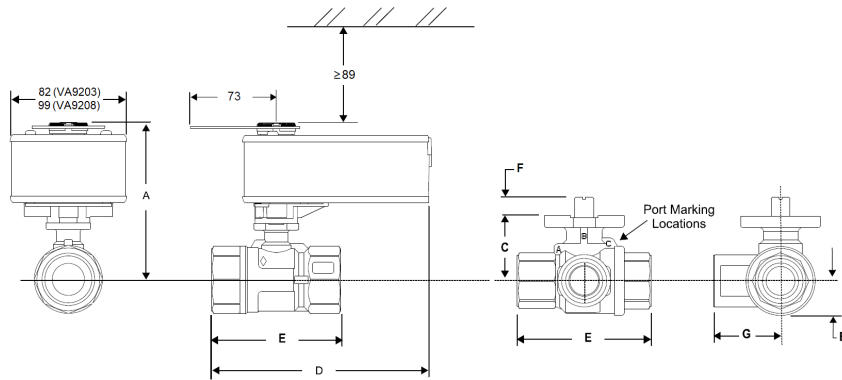
## Assembly Dimensions 2 (VG1205/1805 + VA9310 Series Actuators) (mm)



Valve size	Actuator	A without thermal barrier	A with thermal barrier	B	C	D	E	F	G
DN15	VA9310	121	146	17	31	169	67	9	33
DN20	VA9310	121	146	17	31	169	75	9	38
DN25	VA9310	123	148	19	33	169	92	9	46
DN32	VA9310	134	159	26	44	169	109	9	54
DN40	VA9310	138	163	29	48	169	119	9	59
DN50	VA9310	143	168	37	53	169	139	9	74

Note: The M9000-561 thermal barrier is not included in the standard supply, and needs to be ordered separately.

## Assembly Dimensions 3 (VG1205/1805 + VA9203/9208 Series Actuators) (mm)



Valve size	Actuator	A without thermal barrier	A with thermal barrier	B	C	D	E	F	G
DN15	VA9203	117	152	17	31	167	67	9	33
DN20	VA9203	117	152	17	31	171	75	9	38
DN25	VA9203	119	154	19	33	180	92	9	46
DN32	VA9208	195	235	26	44	184	109	9	54
DN40	VA9208	200	240	29	48	189	119	9	59
DN50	VA9208	204	244	37	53	195	139	9	74

Note: The M9000-561 thermal barrier is not included in the standard offering and needs to be ordered separately.



## VG1000 Series Flanged Control Ball Valves & Actuators

### Overview

DN65...150, PN16

The VG12F5 series ball valves are designed for water control in HVAC systems. The valve can be used together with Johnson Controls rotary actuator to accurately regulate the flow in response to the requirements of the controller. These ball valves can be directly mounted with Johnson Controls VA9300 series actuators for fast field installation and easy valve insulation.



### Features

- Integral flow characterizing disc achieves high control performance
- Fixed ball design ensures consistent torque
- Double o-rings reinforce stem sealing
- Low leakage rate prevents energy loss
- Integrated flanged valve body makes installation efficient
- Dirty resistance allows long life characteristic

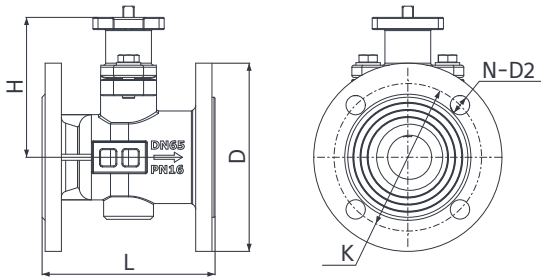
### Ordering Information

VG	1	X	X	X	XX	-	C
VG	Valve						
	1	Control Ball Valve					
		2	Two - way				
			F	Integrated flanged body (ISO7005-2)			
				5	Stainless steel ball and stem assembly		
					GT	DN65 (2-1/2"), Kvs =75	
					HU	DN80 (3"), Kvs =120	
					JV	DN100 (4"), Kvs =160	
					KW	DN125 (5"), Kvs =270	
					LX	DN150 (6"), Kvs =390	
					-	C	Place of origin: C = Made in China

### Selection Table

Two-way Ball Valve			Close-off Pressure max. (kPa)		
Product Number	Size	Kvs			
VG12F5GT-C	DN65	75	800		500
VG12F5HU-C	DN80	120	800		500
VG12F5JV-C	DN100	160	800		500
VG12F5KW-C	DN125	270		800	
VG12F5LX-C	DN150	390		500	
Actuator Type			Non-spring return		Spring return
Actuator Series			VA9320 Series	VA9335 Series	M9220 Series
Actuator Torque			20 Nm	35 Nm	20 Nm
Linkage to Actuator			-		M9000-52F-C

## Dimensions



DN	L(mm)	D(mm)	K(mm)	N-D2(mm)	H(mm)	Weight(Kg)
DN65	170	185	145	4-19	137.5	11
DN80	180	200	160	8-19	145	14
DN100	190	220	180	8-19	155	17
DN125	200	250	210	8-19	175	23
DN150	210	285	240	8-23	192.5	31

## Technical Specifications

- Pressure Rating: PN16
- Fluid Type: Regulation of hot / chilled water with glycol up to max. 50% vol. in HVAC system
- Fluid Temperature: -10 °C to 120 °C
- Flow Characteristic: Equal percentage
- Leakage: ≤0.01% Kvs (ANSI Class IV IEC 60534-4)
- Pipe Connection: Flanged ISO7005-2
- Storage Temperature: -10 to 65 °C, No condensation
- Materials:
  - Valve body: Ductile Iron
  - Stem: Stainless steel
  - Ball: Stainless steel
  - Seat: Enhanced PTFE

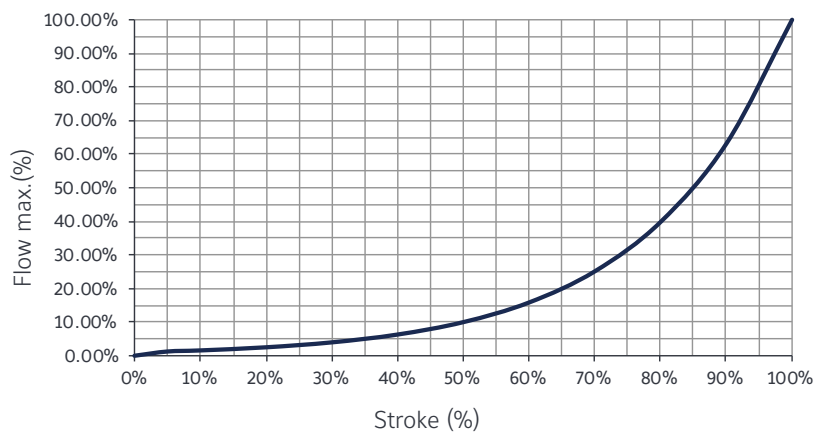


Fig1: Flow Characteristic

## Non Spring Return Actuators

Product Number	Power Supply	Control Signal	Feedback	Running time (S)	Auxiliary Switch
VA9320-AUA-3	100- 240 VAC	Floating / On-off	-	90	M9300-2 or M9300-1 <sup>②</sup>
VA9320-HGA-3	24 VAC/VDC	Floating / On-off / 0(2)-10VDC	0(2)-10VDC <sup>①</sup>	90	
VA9335-AUA-3	100- 240 VAC	Floating / On-off	-	150	
VA9335-HGA-3	24 VAC/VDC	Floating / On-off / 0(2)-10VDC	0(2)-10VDC <sup>①</sup>	150	

Note: See "VA9320/9335" Product Bulletin for more information of actuators.

① : Only available when control signal is 0(2)-10VDC.

② : The auxiliary switch has to be ordered separately, M9300-2 = 2 SPDT, M9300-1 = 1 SPDT.

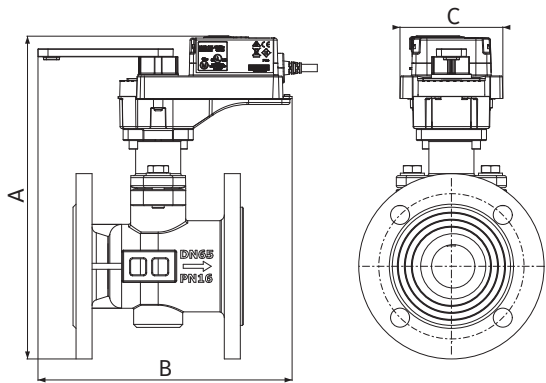
# Ball Valve & Actuator

## Spring Return Actuators

Product Number	Power Supply	Control Signal	Feedback	Running time (S)	Spring-return time (S)	Auxiliary Switch
M9220-AGA-3	24 VAC/VDC	Floating	-	150	20	-
M9220-AGC-3	24 VAC/VDC	Floating	-	150	20	2 SPDT
M9220-BDA-3	230 VAC	On-off	-	24-57	11-15	-
M9220-BDC-3	230 VAC	On-off	-	24-57	11-15	2 SPDT
M9220-BGA-3	24 VAC/VDC	On-off	-	24-57	11-15	-
M9220-BGC-3	24 VAC/VDC	On-off	-	24-57	11-15	2 SPDT
M9220-HGA-3	24 VAC/VDC	0(2)-10VDC	0-10VDC	150	20	-
M9220-HGC-3	24 VAC/VDC	0(2)-10VDC	0-10VDC	150	20	2 SPDT

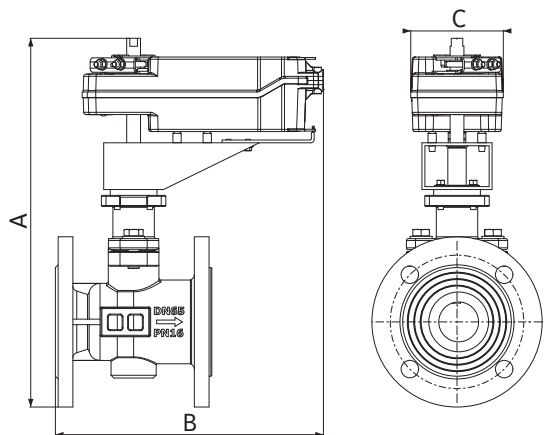
Note: See "M9220" Product Bulletin for more information of actuators.

## Assembly Dimensions (Valve with Va9320/9335 Actuator)



Size	A(mm)	B(mm)	C(mm)
DN65	322.3	250	103
DN80	337.3	250	103
DN100	357.3	250	103
DN125	392.3	250	103
DN150	427.3	250	103

## Assembly Dimensions (Valve with M9220 actuator)



Size	A(mm)	B(mm)	C(mm)
DN65	400	291	100
DN80	415	296	100
DN100	435	301	100

## VGA7000 Series Threaded Globe Valves & Actuators

### Features

- DN15 to DN50 available
- Kvs 0.63 to 40m<sup>3</sup>/h
- High-grade Stainless Steel for Valve body and stem
- Standard threaded connection of ISO7-1 Rp
- Fitted with VAP-B with various  $\Delta P$  available for different applications



### Technical Data

Rated pressure	PN16
Threaded connection	ISO7-1 Rp
Media	Water, glycol solutions (<50%)
Temperature range	-10~120°C
Valve Characteristics	DN20~25 equal percentage at full range
	DN15, DN32~50 equal percentage at 0~40%, modified equal percentage at 40~100%
	For 3-Way bypass port, Linear at all sizes and opening
Leakage rage	≤0.01% of Kvs
Rangibility	>50:1

Note: When media temperature is below 2°C, a stem heater is required. Please order "VGA-H1" .

### Material

Valve body	Stainless steel
Valve trim	Stainless steel
Valve stem	Stainless steel
Sealing structure	V model sealing gland + stainless steel spring self-compensation
Stem sealing	PTFE+VITON



### Model List

Size	2-way	3-way mixing/diverting	Stroke (mm)	Kvs (m <sup>3</sup> /h) at control port	Kvs (m <sup>3</sup> /h) at bypass port (for 3-way only)
DN15	VGA7201AC	VGA7803AC	10	0.63	0.63
	VGA7201AD	VGA7803AD	10	1	1
	VGA7201AE	VGA7803AE	10	1.6	1.6
	VGA7201AF	VGA7803AF	10	2.5	2.5
	VGA7201AG	VGA7803AG	10	4	4
DN20	VGA7201BL	VGA7803BL	10	6.3	6.3
DN25	VGA7201CN	VGA7803CN	15	10	10
DN32	VGA7201DP	VGA7803DP	20	16	16
DN40	VGA7201ER	VGA7803ER	20	25	25
DN50	VGA7201FS	VGA7803FS	20	40	40

Note: 3-way mixing and diverting share same valve body, flow direction is indicated on nameplate

# Globe Valve & Actuator

## Selection Table

<p>VGA7000 DN15-DN50 2 Way Globe Valves with Electrical Actuators</p> 			Non Spring Return		
			VAP600S	VAP1000S	
			Floating 0 (2) to 10 VDC 0 (4) to 20 mA	Floating 0 (2) to 10 VDC 0 (4) to 20 mA	
<b>Position Feedback</b>					
			0(2) to 10 VDC or 0(4) to 20 mA	■	■
<b>Power Requirement</b>					
			24 VAC /VDC	■	■
			220 VAC +/-15% 50/60 Hz		
<b>Electrical Connections</b>					
			Screw terminal	■	■
DN	Kvs	2-way	<b>Close-off Pressure (kPa)</b>		
DN15	0.63	VGA7201AC	<b>1300</b>	1600	
DN15	1	VGA7201AD	<b>1300</b>	1600	
DN15	1.6	VGA7201AE	<b>1300</b>	1600	
DN15	2.5	VGA7201AF	<b>1300</b>	1600	
DN15	4	VGA7201AG	<b>1300</b>	1600	
DN20	6.3	VGA7201BL	<b>1300</b>	1600	
DN25	10	VGA7201CN	<b>850</b>	1300	
DN32	16	VGA7201DP	<b>550</b>	900	
DN40	25	VGA7201ER	350	<b>600</b>	
DN50	40	VGA7201FS	240	<b>400</b>	
			VAP600S-24-B	VAP1000S-24-B	

Bold numbers for close-off pressure indicate preferred value for HVAC application

## VGA7000 DN15-DN50 3 Way Globe Valves with Electrical Actuators



### Non Spring Return

VAP600S

VAP1000S



Floating  
0 (2) to 10 VDC  
0 (4) to 20 mA

Floating  
0 (2) to 10 VDC  
0 (4) to 20 mA

#### Position Feedback

0(2) to 10 VDC or 0(4) to 20 mA



#### Power Requirement

24 VAC /VDC



220 VAC+/-15% 50/60 Hz

#### Electrical Connections

Screw terminal



#### Close-off Pressure (kPa)

DN	Kvs	3-way	Close-off Pressure (kPa)			
			Mixing	Diverting	Mixing	Diverting
DN15	0.63	VGA7803AC	<b>1300</b>	<b>650</b>	1600	800
DN15	1	VGA7803AD	<b>1300</b>	<b>650</b>	1600	800
DN15	1.6	VGA7803AE	<b>1300</b>	<b>650</b>	1600	800
DN15	2.5	VGA7803AF	<b>1300</b>	<b>650</b>	1600	800
DN15	4	VGA7803AG	<b>1300</b>	<b>650</b>	1600	800
DN20	6.3	VGA7803BL	<b>1300</b>	<b>650</b>	1600	800
DN25	10	VGA7803CN	<b>850</b>	<b>425</b>	1300	650
DN32	16	VGA7803DP	<b>550</b>	<b>275</b>	900	450
DN40	25	VGA7803ER	350	175	<b>600</b>	<b>300</b>
DN50	40	VGA7803FS	240	120	<b>400</b>	<b>200</b>

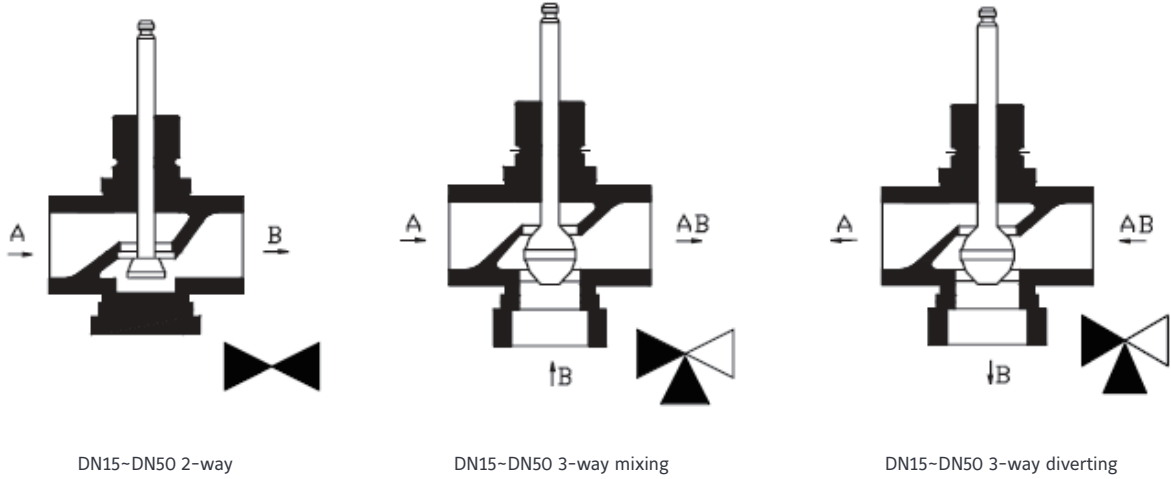
VAP600S-24-B

VAP1000S-24-B

Bold numbers for close-off pressure indicate preferred value for HVAC application

# Globe Valve & Actuator

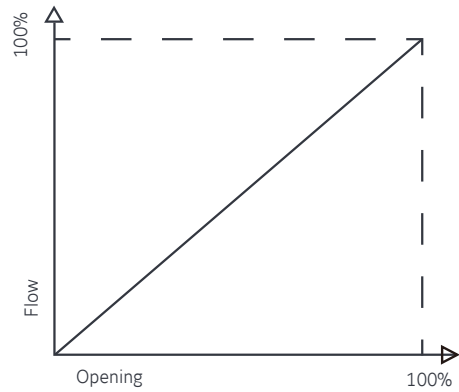
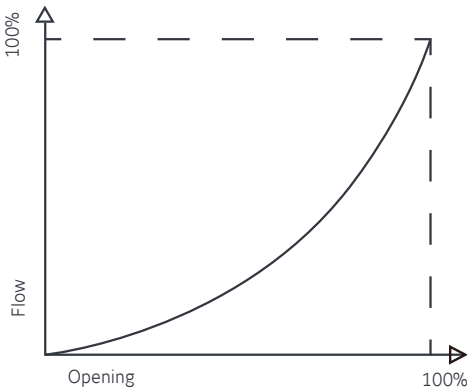
## Mechanical Design



## Flow Characteristic

A - AB: DN20~DN25, Equal percentage  
 DN15, DN32~50, Equal percentage at 0-40%,  
 while modified equal percentage at 40-100%;

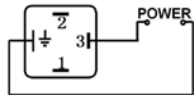
B - AB: Linear



## Accessory (Stem Heater)

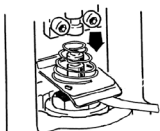


VGA-H1 Stem Heater

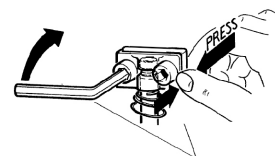
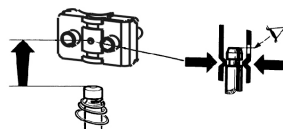


Wiring Diagram

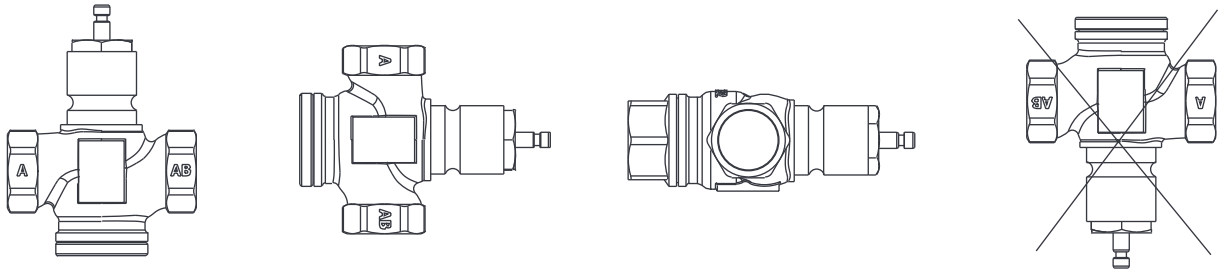
Model	Stroke	Power Supply	Power Consumption	Heating Temperature
VGA-H1	≤20mm	24VAC/DC	15w	80-120°C



Note: the side with "24V 15W" shall be placed to face down



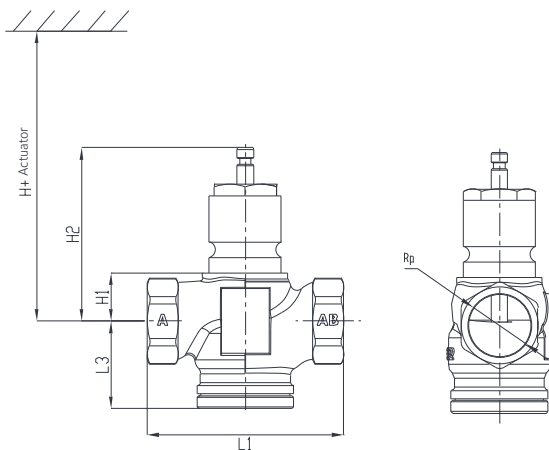
## Installation



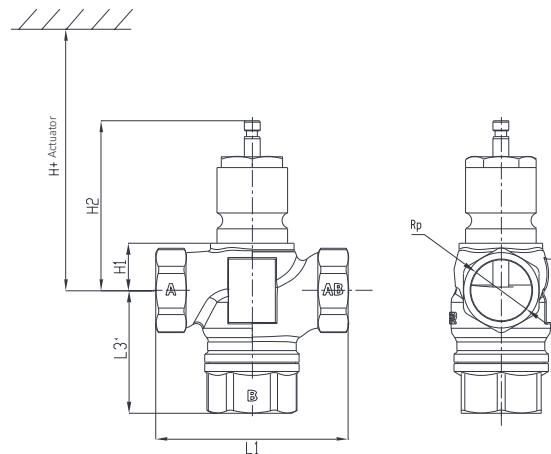
- The valves are to be installed by skilled personnel and in strict accordance with the installation instructions and local regulations. Johnson Controls assumes no responsibility for damages or injuries resulting from non-compliance with installation instructions or standard good practice when mounting, operating or maintaining the valve, even if not explicitly mentioned herein.
- The valve and the pipes must be free of dirt, welding beads, etc.
- The valves are designed for a fluid temperature range, flow direction, as well as for a maximum pressure, as shown in this installation instruction.
- There should be no mechanical tension in the pipe work when the valve is fitted.

## Dimensions

VGA72xx 2-way Valve



VGA78xx 3-way Valve



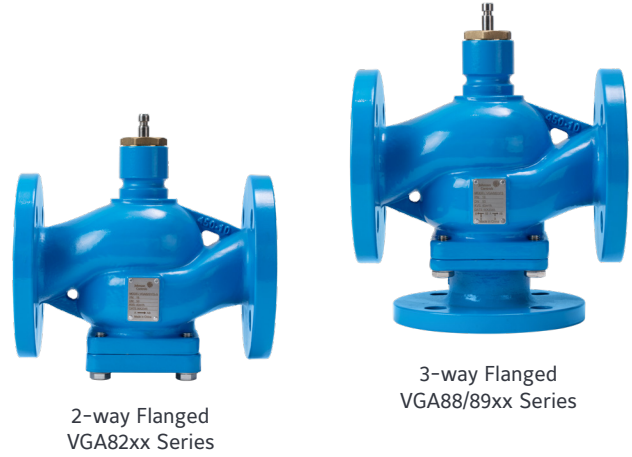
DN	Rp	L1 mm	L3 mm 2-way	L3 mm 3-way	H1 mm	H2 mm	Weight kg 2-way	Weight kg 3-way	H-1 mm	H-2 mm
15	1/2"	75	38	53	20	97	1	1.1	275	275
20	3/4"	80	38	55	20	97	1.2	1.2	275	275
25	1"	105	43	60	26	103	1.6	1.6	281	281
32	1-1/4"	120	52.5	76	29.5	106	2	2.1	285	285
40	1-1/2"	130	53	79	36	113	2.5	2.6	291	291
50	2"	150	68	92	51	128	3.8	3.8	306	306

Note: H-1: for 600N(VAP600S) actuator; H-2: for 1000N(VAP1000S) actuator

## VGA8000 Series Flanged Globe Valves & Actuators

### Features

- DN15 to DN250 available
- Kvs 0.63 to 700 m<sup>3</sup>/h
- High-grade ductile iron QT450-10 for valve body
- Standard flange connection of ISO7005-2
- Fitted with VAP-B with various  $\Delta P$  available for different applications



### Technical Data

Rated pressure	PN16
Flange connection	ISO7005-2
Media	Water, glycol solutions (<50%)
Temperature range	-10~120°C
Valve Characteristics	DN25~80 equal percentage at full range
	DN15~20, DN100~250 equal percentage at 0~40%, modified equal percentage at 40~100%
	For 3-Way bypass port, Linear at all sizes and opening
Leakage rage	≤0.01% of Kvs
Rangibility	>50:1

Note: When media temperature is below 2 °C, a stem heater is required. Please order "VGA-H1" for DN15 to DN65 while "VGA-H2" for DN80 to DN250.

### Material

Valve body	Ductile iron of QT450-10
Valve trim	Stainless steel
Valve stem	Stainless steel
Sealing structure	V model sealing gland + stainless steel spring self-compensation
Stem sealing	PTFE+VITON



## Model List

Size	2-way	3-way mixing	3-way diverting	Stroke (mm)	Kvs (m <sup>3</sup> /h) at control port	Kvs (m <sup>3</sup> /h) at bypass port (for 3-way only)
DN15	VGA8201AC	VGA8803AC	VGA8903AC	20	0.63	0.63
	VGA8201AD	VGA8803AD	VGA8903AD	20	1	1
	VGA8201AE	VGA8803AE	VGA8903AE	20	1.6	1.6
	VGA8201AF	VGA8803AF	VGA8903AF	20	2.5	2.5
	VGA8201AG	VGA8803AG	VGA8903AG	20	4	4
DN20	VGA8201BL	VGA8803BL	VGA8903BL	20	6.3	6.3
DN25	VGA8201CN	VGA8803CN	VGA8903CN	20	10	10
DN32	VGA8201DP	VGA8803DP	VGA8903DP	20	16	16
DN40	VGA8201ER-N	VGA8803ER	VGA8903ER	20	25	25
DN50	VGA8201FS-N	VGA8803FS	VGA8903FS	20	40	40
DN65	VGA8201GT-N	VGA8803GT-N	VGA8903GT-N	20	63	63
DN80	VGA8201HU-N	VGA8803HU-N	VGA8903HU-N	30	100	100
DN100	VGA8201JV-N	VGA8803JV-N	VGA8903JV-N	40	160	160
DN125	VGA8201NW-N	VGA8803NW-N	VGA8903NW-N	40	250	250
DN150	VGA8201PX-N	VGA8803PX-N	VGA8903PX-N	40	350	350
DN200	VGA8201RY-N	-	-	40	520	-
DN250	VGA8201SZ-N	-	-	40	700	-



# Globe Valve & Actuator

## Selection Table

VGA8000 DN15-DN250 2 Way Globe Valves with Electrical Actuators			Non Spring Return			
			VAP600S	VAP1000S	VAP1000L	VAP3000L
						
<b>Position Feedback</b>						
0 (2) to 10 VDC or 0 (4) to 20 mA			■	■	■	■
<b>Power Requirement</b>						
24 VAC /VDC			■	■	■	■
220 VAC+/-15% 50/60 Hz						
<b>Electrical Connections</b>						
Screw terminal			■	■	■	■
DN	Kvs	2-way	<b>Close-off Pressure (kPa)</b>			
DN15	0.63	VGA8201AC	<b>1300</b>	1600		
DN15	1	VGA8201AD	<b>1300</b>	1600		
DN15	1.6	VGA8201AE	<b>1300</b>	1600		
DN15	2.5	VGA8201AF	<b>1300</b>	1600		
DN15	4	VGA8201AG	<b>1300</b>	1600		
DN20	6.3	VGA8201BL	<b>1300</b>	1600		
DN25	10	VGA8201CN	<b>850</b>	1300		
DN32	16	VGA8201DP	<b>550</b>	900		
DN40	25	VGA8201ER-N	<b>1000</b>	1600		
DN50	40	VGA8201FS-N	<b>1000</b>	1600		
DN65	63	VGA8201GT-N			<b>1600</b>	
DN80	100	VGA8201HU-N			<b>1600</b>	
DN100	160	VGA8201JV-N				<b>1600</b>
DN125	250	VGA8201NW-N				<b>1600</b>
DN150	350	VGA8201PX-N				<b>1600</b>
DN200	520	VGA8201RY-N				<b>1600</b>
DN250	700	VGA8201SZ-N				<b>1600</b>
			VAP600S-24-B	VAP1000S-24-B	VAP1000L-24-B	VAP3000L-24-B

Bold numbers for close-off pressure indicate preferred value for HVAC application

## VGA8000 DN15-DN150 3 Way Globe Valves with Electrical Actuators



### Non Spring Return

VAP600S

VAP1000S

VAP3000L



Floating  
0 (2) to 10 VDC  
0 (4) to 20 mA

Floating  
0 (2) to 10 VDC  
0 (4) to 20 mA

Floating  
0 (2) to 10 VDC  
0 (4) to 20 mA

#### Position Feedback

0 (2) to 10 VDC or 0 (4) to 20 mA

#### Power Requirement

24 VAC /VDC

220 VAC+/-15% 50/60 Hz

#### Electrical Connections

Screw terminal

DN	Kvs		Mixing	Diverting	Close-off Pressure (kPa)					
	Control	By-pass			Mixing	Diverting	Mixing	Diverting	Mixing	Diverting
DN15	0.63	0.63	VGA8803AC	VGA8903AC	<b>1000</b>	<b>500</b>				
DN15	1	1.0	VGA8803AD	VGA8903AD	<b>1000</b>	<b>500</b>				
DN15	1.6	1.6	VGA8803AE	VGA8903AE	<b>1000</b>	<b>500</b>				
DN15	2.5	2.5	VGA8803AF	VGA8903AF	<b>1000</b>	<b>500</b>				
DN15	4	4	VGA8803AG	VGA8903AG	<b>1000</b>	<b>500</b>				
DN20	6.3	6.3	VGA8803BL	VGA8903BL	<b>1000</b>	<b>500</b>				
DN25	10	10	VGA8803CN	VGA8903CN	<b>850</b>	<b>425</b>				
DN32	16	16	VGA8803DP	VGA8903DP	<b>550</b>	<b>275</b>	900	450		
DN40	25	25	VGA8803ER	VGA8903ER	<b>350</b>	<b>175</b>	600	300		
DN50	40	40	VGA8803FS	VGA8903FS	240	120	<b>400</b>	<b>200</b>		
DN65	63	63	VGA8803GT-N	VGA8903GT-N					<b>750</b>	<b>375</b>
DN80	100	100	VGA8803HU-N	VGA8903HU-N					<b>500</b>	<b>250</b>
DN100	160	160	VGA8803JV-N	VGA8903JV-N					<b>325</b>	<b>160</b>
DN125	250	250	VGA8803NW-N	VGA8903NW-N					<b>200</b>	<b>100</b>
DN150	350	350	VGA8803PX-N	VGA8903PX-N					<b>140</b>	<b>70</b>

VAP600S-24-B

VAP1000S-24-B

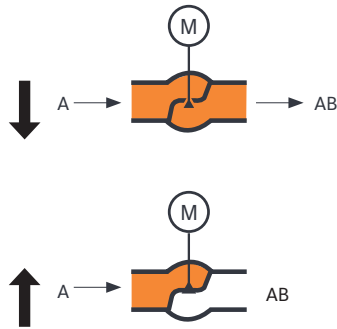
VAP3000L-24-B

Bold numbers for close-off pressure indicate preferred value for HVAC application

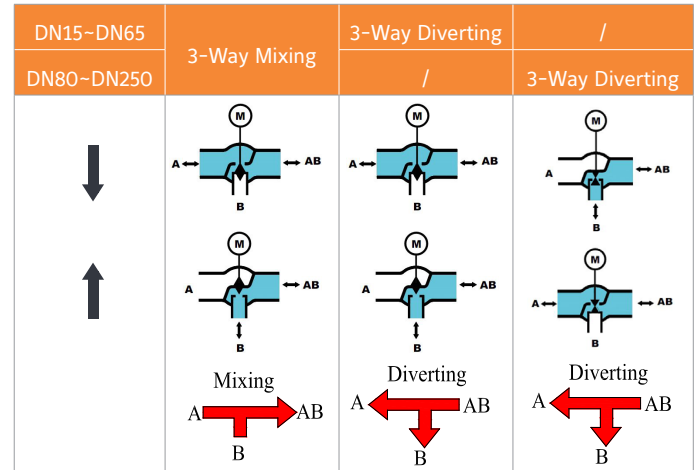
# Globe Valve & Actuator

## Mechanical Design

2-way VGA82xx



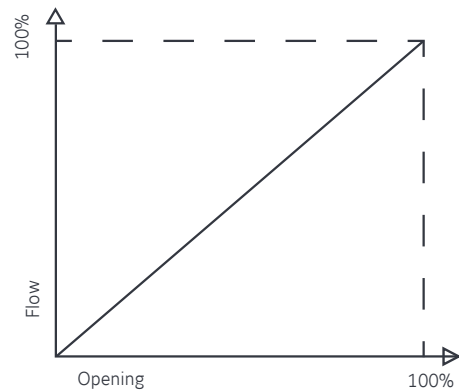
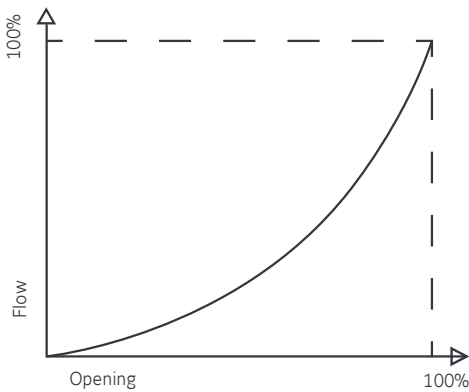
3-way VGA88xx/89xx



## Flow Characteristic

A - AB: DN25~DN80, Equal percentage  
 DN15~20, DN100~250, Equal percentage at 0-40%,  
 while modified equal percentage at 40-100%;

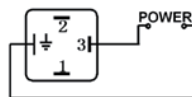
B - AB: Linear



## Accessory (Stem Heater)

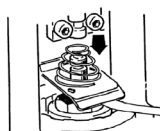


VGA-H1/H2 Stem Heater

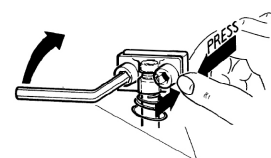
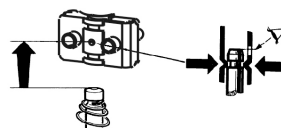


Wiring Diagram

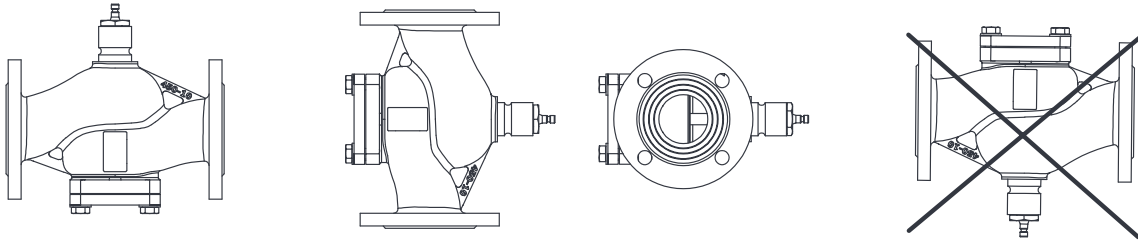
Model	Stroke	Power Supply	Power Consumption	Heating Temperature
VGA-H1	20mm	24VAC/DC	15w	80-120°C
VGA-H2	30mm/40mm	24VAC/DC	15w	80-120°C



Note: the side with "24V 15W" shall be placed to face down



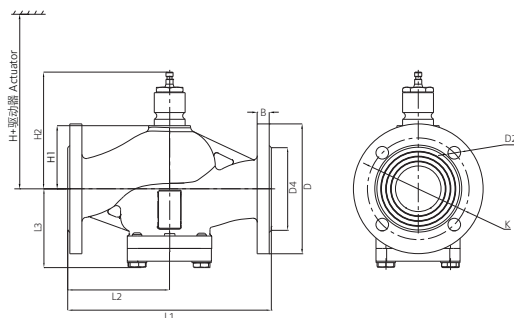
## Installation



- The valves are to be installed by skilled personnel and in strict accordance with the installation instructions and local regulations. Johnson Controls assumes no responsibility for damages or injuries resulting from non-compliance with installation instructions or standard good practice when mounting, operating or maintaining the valve, even if not explicitly mentioned herein.
- The valve and the pipes must be free of dirt, welding beads, etc.
- The valves are designed for a fluid temperature range, flow direction, as well as for a maximum pressure, as shown in this installation instruction.
- There should be no mechanical tension in the pipe work when the valve is fitted.

## Dimensions

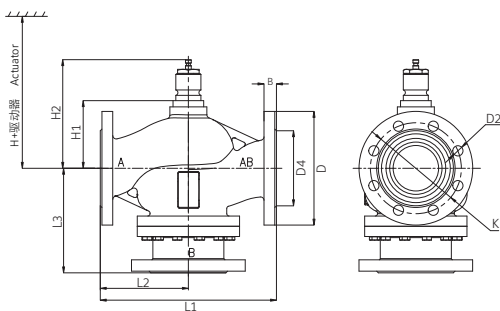
### 2-way VGA82xx:



DN	B mm	D mm	D2 mm	D4 mm	K mm	L1 mm	L2 mm	L3 mm	H1 mm	H2 mm	Weight kg	H-1 mm	H-2 mm	H-3 mm
15	14	95	4-14	46	65	130	65	70	41	117	3.6	296	/	/
20	16	105	4-14	56	75	150	75	70	46	122	4.6	301	/	/
25	16	115	4-14	65	85	160	80	75	48	124	5.2	303	/	/
32	18	140	4-19	76	100	180	90	80	59	135	7.4	314	/	/
40	18	150	4-19	84	110	200	100	82	50	126	9.4	305	/	/
50	20	165	4-19	99	125	230	115	98	60	136	13	315	/	/
65	20	185	4-19	118	145	290	145	112	90	166	20	/	365	375
80	22	200	8-19	132	160	310	155	130	120	196	31	/	395	405
100	23	220	8-19	156	180	350	175	150	136	212	46	/	/	421
125	24	250	8-19	184	210	400	200	175	157	233	59	/	/	442
150	25	285	8-23	211	240	480	240	200	171	247	77	/	/	456
200	26	340	12-23	266	295	500	250	238	185	261	122	/	/	470
250	31	405	12-28	319	355	600	300	264	205	281	185	/	/	490

Note: H-1 for 600N(VAP600S)/1000N(VAP1000S) Actuator, H-2 for 1000N(VAP1000L) Actuator, H-3 for 3000N(VAP3000L) Actuator

### 3-way VGA88xx/89xx:



DN	B mm	D mm	D2 mm	D4 mm	K mm	L1 mm	L2 mm	L3 mm	H1 mm	H2 mm	Weight kg	H-1 mm	H-2 mm
15	14	95	4-14	46	65	130	65	106	41	117	4.5	296	/
20	16	105	4-14	56	75	150	75	106	46	122	5.7	301	/
25	16	115	4-14	65	85	160	80	111	48	124	6.3	303	/
32	18	140	4-19	76	100	180	90	121	59	135	9.4	314	/
40	18	150	4-19	84	110	200	100	122	50	126	11.7	305	/
50	20	165	4-19	99	125	230	115	136	60	136	15.6	315	/
65	20	185	4-19	118	145	290	145	156	90	166	24	/	375
80	22	200	8-19	132	160	310	155	185	120	196	34	/	405
100	23	220	8-19	156	180	350	175	202	164	241	49	/	449
125	24	250	8-19	184	210	400	200	240	157	233	63	/	442
150	25	285	8-23	211	240	480	240	270	171	247	82	/	456
200	26	340	12-23	266	295	500	250	315	185	261	129	/	470
250	31	405	12-28	319	355	600	300	370	205	281	195	/	490

Note: H-1 for 600N(VAP600S)/1000N(VAP1000S) Actuator, H-2 for 3000N(VAP3000L) Actuator,

## VGA9000 Series Flanged Globe Valves & Actuators

### Features

- DN65 to DN150 available
- Kvs 63 to 350 m<sup>3</sup>/h
- High-grade stainless steel for valve body
- Standard flange connection of ISO7005-2



2-way Flanged  
VGA92xx Series

3-way Flanged  
VGA98xx Series

### Technical Data

Rated pressure	PN16
Flange connection	ISO7005-2
Media	Water, glycol solution (< 50%), deionized water
Temperature range	Normal temperature type: -10~130°C / Low temperature type: -25~80°C
Valve characteristics	DN65~80 equal percentage at full range
	DN100~150 equal percentage at 0~40%, modified equal percentage at 40~100%
	For 3-way bypass port, linear at all sizes and opening
Leakage rate	≤ 0.01% Kvs
Rangibility	>50:1

Note: When media temperature is below 2 °C, a stem heater is required. Please order "VGA-H1" for DN65 while "VGA-H2" for DN80 to DN150.



### Material

Valve body	Stainless steel
Valve trim	Stainless steel
Valve stem	Stainless steel
Sealing structure	V model sealing gland + stainless steel spring self-compensation
Stem sealing	Normal temperature type: PTFE + VITON
	Low temperature type: PTFE + HNBR

### Model List



Size	2-way		3-way mixing / diverting		Stroke (mm)	Kvs (m <sup>3</sup> /h) at control port	Kvs (m <sup>3</sup> /h) at bypass port (for 3-way only)
	Normal temperature type	Low temperature type	Normal temperature type	Low temperature type			
DN65	VGA9201GT-R	VGA9201GT-L	VGA9803GT-R	VGA9803GT-L	20	63	63
DN80	VGA9201HU-R	VGA9201HU-L	VGA9803HU-R	VGA9803HU-L	30	100	100
DN100	VGA9201JV-R	VGA9201JV-L	VGA9803JV-R	VGA9803JV-L	40	160	160
DN125	VGA9201NW-R	VGA9201NW-L	VGA9803NW-R	VGA9803NW-L	40	250	250
DN150	VGA9201PX-R	VGA9201PX-L	VGA9803PX-R	VGA9803PX-L	40	350	350

## Selection Table

VGA9000 DN65-DN150 2-way Flanged Globe Valve with Electrical Actuators			Non Spring Return	
			VAP1000L	VAP3000L
				
<b>Position Feedback</b>				
0 (2) to 10 VDC or 0 (4) to 20 mA			■	■
<b>Power Requirement</b>				
24 VAC /VDC			■	■
220 VAC+/-15% 50/60 Hz				
<b>Electrical Connections</b>				
Screw terminal			■	■
DN	Kvs	2-way	Close-off pressure (kPa)	
DN65	63	VGA9201GT-R	1600	/
		VGA9201GT-L		
DN80	100	VGA9201HU-R	1600	/
		VGA9201HU-L		
DN100	160	VGA9201JV-R	/	1600
		VGA9201JV-L		
DN125	250	VGA9201NW-R	/	1600
		VGA9201NW-L		
DN150	350	VGA9201PX-R	/	1600
		VGA9201PX-L		
			VAP1000L-24-B	VAP3000L-24-B

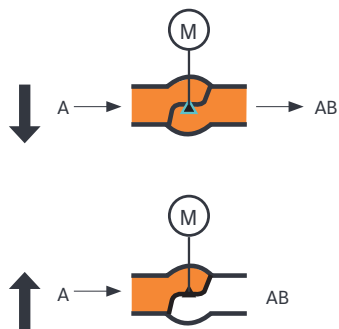
# Globe Valve & Actuator

## Selection Table

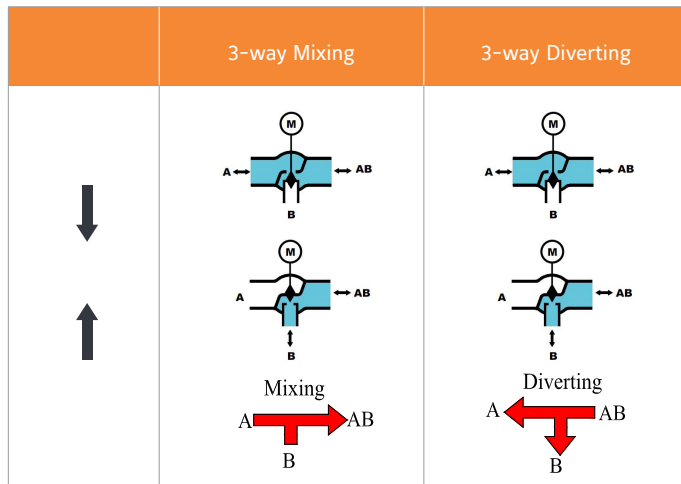
<p>VGA9000 DN65-DN150 3-way Flanged Globe Valve with Electrical Actuators</p> 			Non Spring Return																																			
			VAP3000L																																			
<p><b>Position Feedback</b></p> <p>0 (2) to 10 VDC or 0 (4) to 20 mA</p>																																						
			<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Floating 0 (2) ~ 10 VDC 0 (4) ~ 20 mA</p>																																			
<p><b>Power Supply</b></p> <p>24 VAC /VDC</p> <p>220 VAC+/-15% 50/60 Hz</p>			<p>■</p> <p>■</p>																																			
			<p>■</p>																																			
<p><b>Electrical Connections</b></p> <p>Screw terminal</p>			<p>■</p>																																			
			<p>Close-off pressure (kPa)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">DN</th> <th rowspan="2">Kvs</th> <th rowspan="2">3-way</th> <th colspan="2">Close-off pressure (kPa)</th> </tr> <tr> <th>Mixing</th> <th>Diverting</th> </tr> </thead> <tbody> <tr> <td rowspan="2">DN65</td> <td rowspan="2">63</td> <td>VGA9803GT-R</td> <td rowspan="2">750</td> <td rowspan="2">375</td> </tr> <tr> <td>VGA9803GT-L</td> </tr> <tr> <td rowspan="2">DN80</td> <td rowspan="2">100</td> <td>VGA9803HU-R</td> <td rowspan="2">500</td> <td rowspan="2">250</td> </tr> <tr> <td>VGA9803HU-L</td> </tr> <tr> <td rowspan="2">DN100</td> <td rowspan="2">160</td> <td>VGA9803JV-R</td> <td rowspan="2">325</td> <td rowspan="2">160</td> </tr> <tr> <td>VGA9803JV-L</td> </tr> <tr> <td rowspan="2">DN125</td> <td rowspan="2">250</td> <td>VGA9803NW-R</td> <td rowspan="2">200</td> <td rowspan="2">100</td> </tr> <tr> <td>VGA9803NW-L</td> </tr> <tr> <td rowspan="2">DN150</td> <td rowspan="2">350</td> <td>VGA9803PX-R</td> <td rowspan="2">140</td> <td rowspan="2">70</td> </tr> <tr> <td>VGA9803PX-L</td> </tr> </tbody> </table>		DN	Kvs	3-way	Close-off pressure (kPa)		Mixing	Diverting	DN65	63	VGA9803GT-R	750	375	VGA9803GT-L	DN80	100	VGA9803HU-R	500	250	VGA9803HU-L	DN100	160	VGA9803JV-R	325	160	VGA9803JV-L	DN125	250	VGA9803NW-R	200	100	VGA9803NW-L	DN150	350	VGA9803PX-R
DN	Kvs	3-way	Close-off pressure (kPa)																																			
			Mixing	Diverting																																		
DN65	63	VGA9803GT-R	750	375																																		
		VGA9803GT-L																																				
DN80	100	VGA9803HU-R	500	250																																		
		VGA9803HU-L																																				
DN100	160	VGA9803JV-R	325	160																																		
		VGA9803JV-L																																				
DN125	250	VGA9803NW-R	200	100																																		
		VGA9803NW-L																																				
DN150	350	VGA9803PX-R	140	70																																		
		VGA9803PX-L																																				
			<p>VAP3000L-24-B</p>																																			

## Mechanical design

2-way VGA92xx



3-way VGA98xx



## Flow characteristic

A - AB: DN65-DN80, equal percentage, see Figure1  
 DN100-150, equal percentage @ 0-40% while modified equal percentage @40-100%, see Figure2

B - AB: Linear, see Figure3

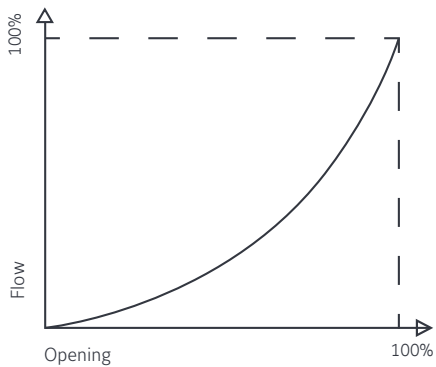


Figure 1

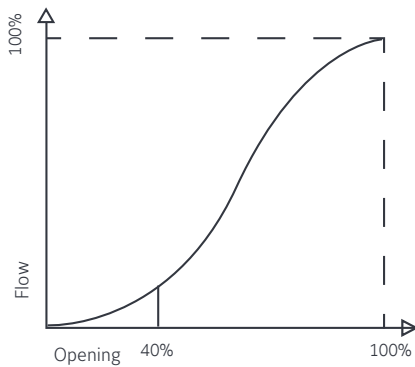


Figure 2

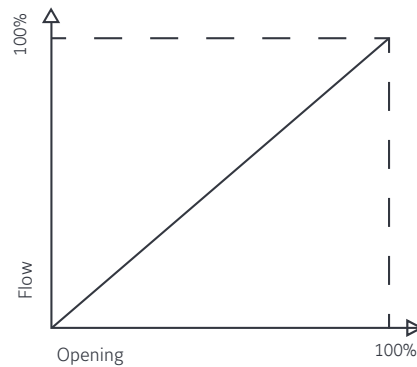
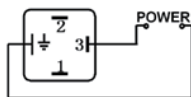


Figure 3

## Accessories (Stem Heater)



VGA-H1/H2 Stem Heater

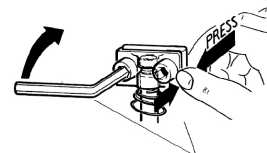
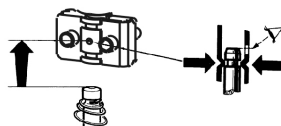


Wiring Diagram

Model	Stroke	Power Supply	Power Consumption	Heating Temperature
VGA-H1	20mm	24VAC/DC	15w	80-120°C
VGA-H2	30mm/40mm	24VAC/DC	15w	80-120°C

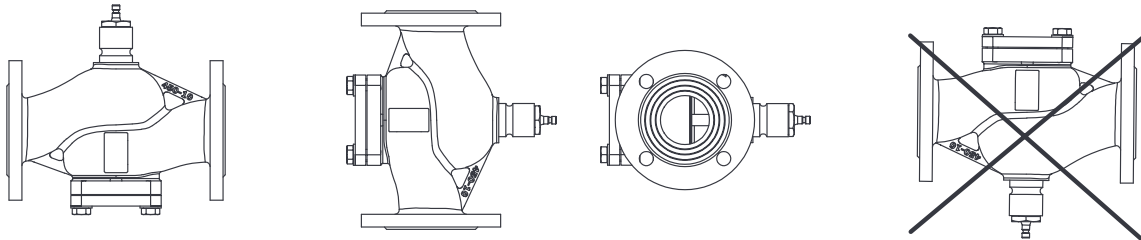


Note: the side with "24V 15W" shall be placed to face down



# Globe Valve & Actuator

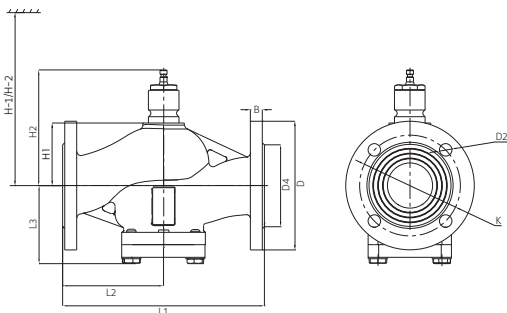
## Installation



- The valves are to be installed by skilled personnel and in strict accordance with the installation instructions and local regulations. Johnson Controls assumes no responsibility for damages or injuries resulting from non-compliance with installation instructions or standard good practice when mounting, operating or maintaining the valve, even if not explicitly mentioned herein.
- The valve and the pipes must be free of dirt, welding beads, etc.
- The valves are designed for a fluid temperature range, flow direction, as well as for a maximum pressure, as shown in this installation instruction.
- There should be no mechanical tension in the pipe work when the valve is fitted.

## Dimensions

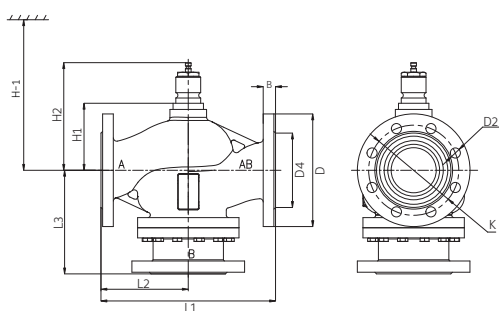
2-way VGA92xx



DN	B mm	D mm	D2 mm	D4 mm	K mm	L1 mm	L2 mm	L3 mm	H1 mm	H2 mm	Weight kg	H-1 mm	H-2 mm
65	20	185	4-19	118	145	290	145	104	70	146.5	15.2	345	/
80	22	200	8-19	132	160	310	155	120.5	77	153.5	20.1	352	/
100	23	220	8-19	156	180	350	175	135.5	93	169.5	29	/	378
125	24	250	8-19	184	210	400	200	155.5	118	194.5	37.5	/	403
150	25	285	8-23	211	240	480	240	170.5	138	291.5	53.3	/	423

Note: H-1 for 1000N (VAP1000L) Actuator, H-2 for 3000N (VAP3000L) Actuator

3-way VGA98xx



DN	B mm	D mm	D2 mm	D4 mm	K mm	L1 mm	L2 mm	L3 mm	H1 mm	H2 mm	Weight kg	H-1 mm
65	20	185	4-19	118	145	290	145	145	70	146.5	17.8	355
80	22	200	8-19	132	160	310	155	170.5	77	153.5	23.6	365
100	23	220	8-19	156	180	350	175	184	93	169.5	32.5	378
125	24	250	8-19	184	210	400	200	212.5	118	194.5	42	403
150	25	285	8-23	211	240	480	240	243.5	138	291.5	57.8	423

Note: H-1 for 3000N (VAP3000L) Actuator

## VAP Series Electric Actuators

### Overview

600N, 1000N, 3000N

The VAP series BLDC motor-driven actuators are available for proportional control or 3-point (floating) control. They feature stroke calibration and manual operating which are user friendly to job sites.

In combination with VGA7000, VGA8000 or VPMA series valves, they provide specified close-off pressure according to the application requests.

### Features

- Proportional control, floating control mode selectable
- Multiple input and feedback signal selectable
- Stroke calibration ensure stroke consistency with valve
- Manual override and LED status indication
- Running time adjustable for different applications
- Direct mounting on valves, no linkage required



### Ordering Information

VA	P	600	S	-24	-B
VA	Valve Actuator				
	P	Type: Proportional control / Floating control			
		600	Rated Force: 600 = 600N, 1000 = 1000N, 3000 = 3000N		
			S	Rated Stroke: S = 30mm, L = 50mm	
				-24	Power supply: -24 = 24V, 50/60Hz
					-B
					Action (factory setting):
					-B = Actuator stem extends when input signal increases
					-C/CN = Actuator stem retracts when input signal increases

### Selection Table

Product Number	Rated Force (N)	Rated Stroke (mm)	Connection to valve	Action	Valve Series
VAP600S-24-B	600	30	S12	actuator stem extends when input signal increases	VGA7000 series Globe Valve VGA8000 series Globe Valve
VAP1000S-24-B	1000	30	S12		
VAP1000L-24-B	1000	50	S14		
VAP3000L-24-B	3000	50	S14		
VAP600S-24-C/CN	600	30	S12	actuator stem retracts when input signal increases	VPMA series PICV
VAP1000L-24-C/CN	1000	50	S14		
VAP3000L-24-C/CN	3000	50	S14		

Note: See "VGA7000 series Valve", "VGA8000 series Valve" and "VPMA series Valve" Product Bulletins for more information of valves and compatibility selection tables.

## Technical Specifications

Control Modes	Proportional Control	Floating Control
Input Signal	0(2)~10VDC / 0(4)~20mA	3-point
Feedback Signal	0(2)~10VDC / 0(4)~20mA	
Supply Voltage (50/60Hz)	24VAC / VDC $\pm$ 15%	
Power Consumption	VAP600xx / VAP1000xx : 27VA (24VAC), 12VA (24VDC)	
	VAP3000xx : 40VA (24VAC), 20VA (24VDC)	
Running Speed	Selectable (High speed: 1s/mm; Low speed: 2s/mm)	
Input Impedance	100k $\Omega$ min. at 0(2)~10V; 0.15k $\Omega$ max. at 0(4)~20mA	
Operating Status Indications	LED	
Enclosure protection	IP65 (EN60529)	
Cable Entry	Waterproof connector PG13.5	
Wiring terminal	1 ~ 6mm <sup>2</sup>	
Ambient Operating Condition	-25°C to 65°C, $\leq$ 95% RH%, non-condensing	
Ambient Storage Condition	-40°C to 65°C, $\leq$ 95% RH%, non-condensing	
Materials	Cover	PC
	Housing and Yoke	Stainless Steel
Net weight (kg)	VAP600xx / VAP1000xx : 3.0kg; VAP3000xx : 3.8kg	
CE Compliance	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive.	

## Wiring Diagram

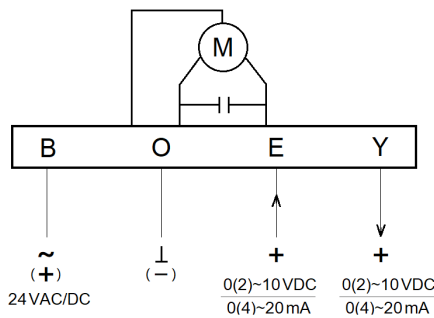


Fig 3: Proportional Application

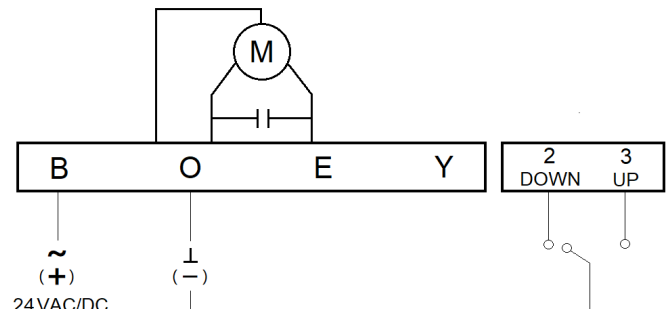


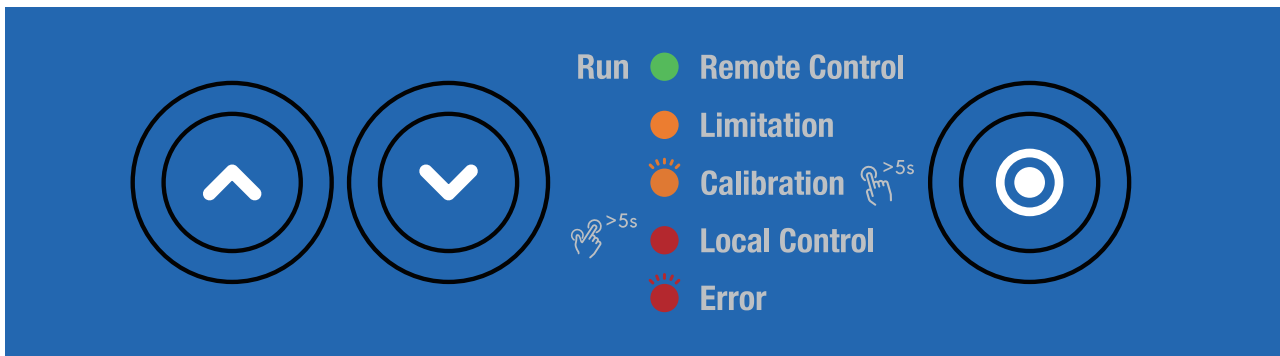
Fig 4: Floating Application



## Manual Operating and Led Instruction

VAP series actuator has 3 buttons with LED indications:

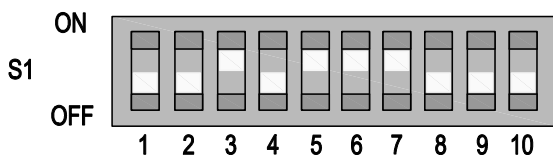
1. The actuator provides 2 manual modes: manual override and electric manual operating (local control mode).
2. Insert the crank (under the actuator) in the hexagonal hole on the cover, the power to motor is cut-off and manual override is engaged.
3. Press the "▲" and "▼" buttons at the same time for more than 5 seconds, then release the actuator to enter the local control mode (electric manual operating). After setting is completed, press the "▲" and "▼" buttons again for more than 5 seconds then release to exist local control mode.



LED Indication ( ▲ and ▼ )		LED Indication ( ● )	
Green steady on	Moving to position	Green steady on	Remote control mode
Orange steady on	Position reached	Orange blinking (1Hz)	Stroke calibrating
Red blinking (1Hz)	Alarm	Red blinking (2Hz)	Alarm
Red steady on	Local control mode	Red steady on	Local control mode

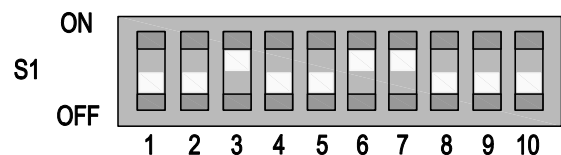
## Dip Switch Settings

Factory Setting (white buttons are the switches):



VAPxxx-24-B

Input and feedback signal: 0~10 VDC  
Stem extends when input signal increases



VAPxxx-24-C/CN

Input and feedback signal: 0~10 VDC  
Stem retracts when input signal increases

## Technical Specifications

DIP	Function	Setting and Description	
S1-1	Input/feedback signal	ON	4-20mA or 2-10V
		OFF	0-20mA or 0-10V
S1-2 S1-3	Type of input signal	S1-2 ON S1-3 OFF	Current input signal
		S1-2 OFF S1-3 ON	Voltage input signal
S1-4	Type of feedback signal	ON	Current feedback signal
		OFF	Voltage feedback signal
S1-5	Action of movement	ON	Stem extends when input signal increases; Stem retracts when input signal decreases
		OFF	Stem retracts when input signal increases; Stem extends when input signal decreases
S1-6	Action at signal loss	ON	The actuator acts in corresponding to the minimum input signal
		OFF	1) The actuator acts in corresponding to the maximum input signal (applicable to voltage input signal) 2) The actuator acts in corresponding to the minimum input signal (applicable to current input signal)
S1-7	Stroke calibration	ON	Automatic stroke calibration when powered
		OFF	Manual stroke calibration
S1-8	Control type	ON	Floating (3 points) control
		OFF	Proportional control
S1-9	Pre-set position at signal loss ①	ON	Actuator stays in position when signal loss (only applicable to input signal of 4-20mA)
		OFF	Actuator acts in corresponding to the setting of S1-6
S1-10	Running speed	ON	High speed: 1s/mm
		OFF	Low speed: 2s/mm

Note: ① Staying in position at signal loss is only available when input signal is 4-20mA.

### Max. flow rate Setting: Only for VAPxxxx-24-CN

S2

Scale - Flow (valve stroke opening percentage)	
scale	0 1 2 3 4 5 6 7 8 9
flow	100% 28% 36% 44% 52% 60% 68% 76% 84% 92%

Once the scale is set, the maximum stroke of actuator (valve) is as in the table, and the max. flow through valve is also limited accordingly. For example, when the scale is set to 5, the max. opening of valve stroke is 60% and the max. flow rate could be found in corresponding technical documents.  
Note: See "Installation Guide" for max. flow selection tables of each VPMA valve.

### Dimensions (mm)

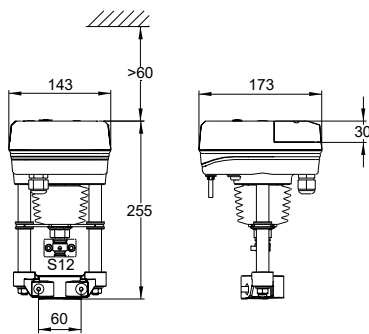


Fig 5: VAP600S / VAP1000S

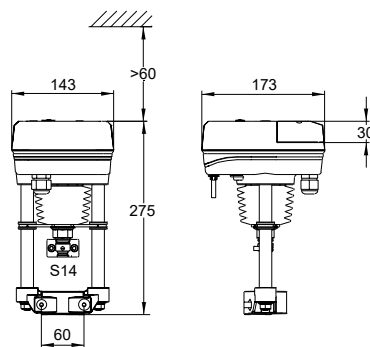


Fig 6: VAP1000L

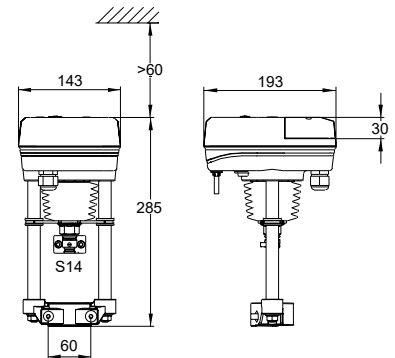


Fig 7: VAP3000L

## VF3000 Series Butterfly Valves and VA5000 Series Actuators

### Overview

DN50...1000, PN16

The VF3000 series butterfly valves are used for shutting off or regulating the flow of hot or chilled water in a HVAC system.

Mounted with VA5000 series actuators, the valves operate with a wide range of applications, including two-position and modulating control of hot, chilled, or condenser water, and up to 50/50 glycol solutions.

The valves and actuators are calibrated in the factory and packed separately for ease of delivery and installation.



### Features

- Y-sealed stem ensures long-term life span
- Vulcanized liners simplifies on-site installation
- Low torque design saves installation space
- Planetary gear mechanism permits compact structure with high transmission efficiency
- Anti-condensation and over-temperature protection assure reliable long-running
- Automatic clutch empowers seamless switching of manual and motorized operations
- Stereoscopic position display makes clear visibility of valve status

### Ordering Information

Table 1: VF3000 series Butterfly Valves

V	F	3	4	8	1	P	A	2	-	C	Butterfly Valve	
		3									Product Series	3=3000 series (PN16)
			4								Valve Type	4=Two way
				8							Pipe Connection	3 = Lug 6 = Wafer 8 = Flange
					1						Flow Characteristic	1=equal percentage (0% to 60% opening)
						P					Valve Size	Codes and specifications are shown in the product specification table, P=DN600(24 in.)
							A				Disc Material	A=Ductile Iron (GGG40) with Nylon 11 coating S=Stainless Steel (SS304)
								2			Max. Close-off Pressure	=16 bar 2 =10 bar
										C	Identifier	Made in China

Example: VF3481GS-C=PN16 butterfly valve, flanged connection, DN200, SS304 disc, 16 bar max. close-off pressure (maximum permissible differential pressure at which the motorized butterfly valve will close securely).

For more details, please consult the Johnson Controls sales representatives.

# Butterfly Valve and Actuator

Table 2: VA5000 series Electric Actuators

V	A	5	0	0	3	B	D	C	B	1	-	C	Actuator	
		5											Product Series	5=5000 series
			0	0	3								Torque	Codes and specifications are shown in the actuator specification table
						B							Control Type	B=On/Off C=Modulating
							D						Power supply	D= 220VAC+10%, 50Hz
								C					Auxiliary Switch	C=Two switches
									B	1			Connection (to valve)	ISO5211 (Codes and specifications are shown in the actuator specification table)
												C	Identifier	Made in China

Example: VA5005BDCB1-C=On/Off electric actuator, 50Nm, 220VAC, with 2 auxiliary switches, B1 type up flange connection (to valve). For more details, please consult the Johnson Controls sales representatives.

## Selection Table

Table 3: 1000kPa Close-off Pressure

VF3000 series Butterfly Valve					Electric Actuator																
PN16, DN50 - DN1000"					Max. Close-off Pressure (kPa)																
					On/Off	VA9320-AUA-3	VA9335-AUA-3	VA5003DCB1-C	VA5005BDCB1-C	VA5008BDCB2-C	VA5020BDC1-C	VA5040BDC2-C	VA5060BDC1-C	VA5080BDC2-C	VA5100BDC1-C	VA5170BDC1-C	VA5230BDC1-C	VA5350BDC2-C	VA5500DCG1-C	VA5800BDC2-C	
Size	Kvs	Wafer	Lug	Flanged	Modulating	VA9320-HGA-3	VA9335-HGA-3	VA5003DCB1-C	VA5005DCB1-C	VA5008BDC2-C	VA5020BDC1-C	VA5040BDC2-C	VA5060BDC1-C	VA5080BDC2-C	VA5100BDC1-C	VA5170BDC1-C	VA5230BDC1-C	VA5350BDC2-C	VA5500DCG1-C	VA5800DCG2-C	
DN50	87	VF3461Ax-C	VF3431Ax-C	VF3481Ax-C		1000	1000														
DN65	162	VF3461Bx-C	VF3431Bx-C	VF3481Bx-C		1000	1000														
DN80	239	VF3461Cx-C	VF3431Cx-C	VF3481Cx-C			1000	1000													
DN100	565	VF3461Dx-C	VF3431Dx-C	VF3481Dx-C			1000	1000													
DN125	820	VF3461Ex-C	VF3431Ex-C	VF3481Ex-C					1000												
DN150	1536	VF3461Fx-C	VF3431Fx-C	VF3481Fx-C						1000											
DN200	3039	VF3461Gx-C	VF3431Gx-C	VF3481Gx-C							1000										
DN250	4619	VF3461Hx-C	VF3431Hx-C	VF3481Hx-C								1000									
DN300	7137	VF3461Jx-C	VF3431Jx-C	VF3481Jx-C									1000								
DN350	10309	VF3461Kx-C	VF3431Kx-C	VF3481Kx-C										1000							
DN400	14176	VF3461Lx-C	VF3431Lx-C	VF3481Lx-C											1000						
DN450	18776	VF3461Mx-C	VF3431Mx-C	VF3481Mx-C												1000					
DN500	24142	VF3461Nx-C	VF3431Nx-C	VF3481Nx-C													1000				
DN600	37298	VF3461Px2-C	VF3431Px2-C	VF3481Px2-C														1000			
DN700	42820	VF3461Qx2-C	VF3431Qx2-C	VF3481Qx2-C															1000		
DN800	59040	VF3461Rx2-C	VF3431Rx2-C	VF3481Rx2-C																1000	
DN900	74719	VF3461Tx2-C	VF3431Tx2-C	VF3481Tx2-C																	1000
DN1000	103590	VF3461Ux2-C	VF3431Ux2-C	VF3481Ux2-C																	1000

Note: x stands for disc material: A=ductile iron(GGG40) with nylon11 coating; S=stainless steel (SS304).

## Technical Specifications

**Table 5: Valve Specifications**

Product Series		VF3000 series Butterfly Valves
Medium		Hot / chilled Water, glycol solution (< 50% concentration) in HVAC system
Medium temperature		-10°C~120°C
Close-off pressure		1000kPa/1600kPa (refer to table 3 and table 4)
Pressure rating		PN16
Materials	Valve Body	Ductile iron (GGG40)
	Seat	EPDM
	Stem	Stainless steel
	Valve disc	Ductile iron (GGG40) with Nylon 11 coating or Stainless steel (SS304)
Pipe connection		ISO 7005-2 (PN16)

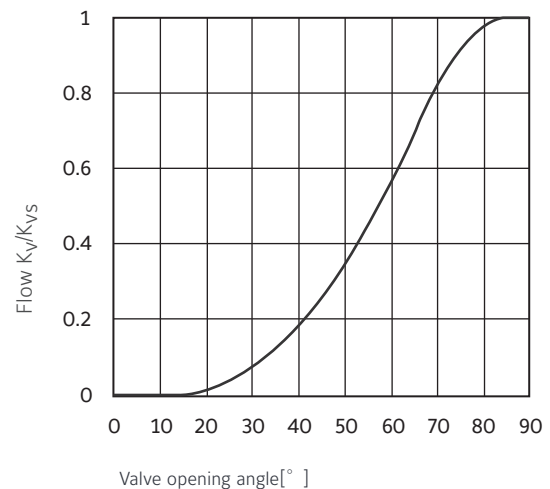
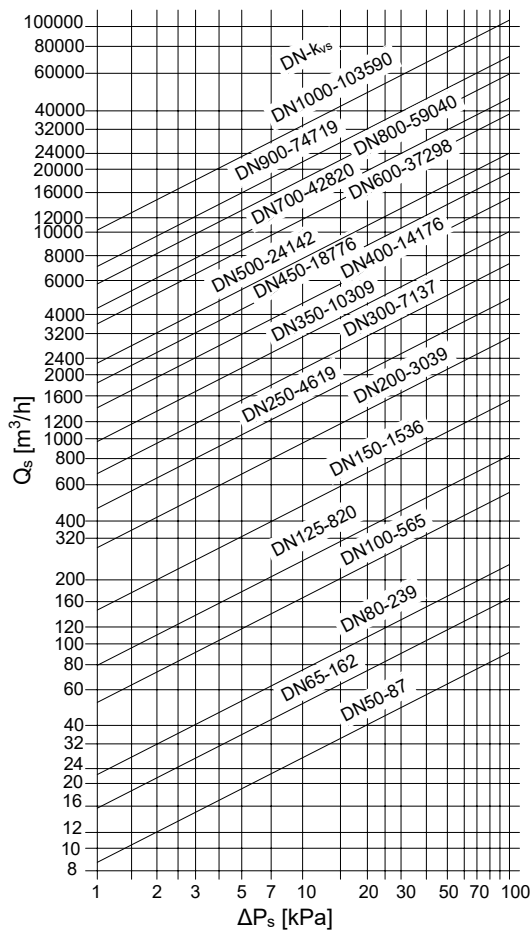
**Table 6: Actuator Specifications**

Product Series		VA5000 series Electric Actuators													
Model		VA5003	VA5005	VA5008	VA5010	VA5020	VA5040	VA5060	VA5080	VA5100	VA5170	VA5230	VA5350	VA5500	VA5800
Rated torque (Nm)		35	50	80	100	200	400	600	800	1000	1700	2300	3500	5000	8000
Power consumption (VA)	On/Off models	40	40	40	110	110	180	180	180	230	440	440	440	440	440
	Modulating models	50	50	50	115	115	185	180	185	235	445	445	445	445	445
Input signal	On/Off models	220 VAC ± 10%, 50/60Hz													
	Modulating models	4 - 20mA or 0(2) - 10V													
Input impedance		150 ohms (current signal) or ≥100k ohms (voltage signal) (applicable to modulating models only)													
Output signal	On/Off models	Dry contacts (fully open and closed)													
	Modulating models	4 - 20mA or 0 (2) - 10V													
Output impedance		≤750 ohms (current signal) or ≥5k ohms (voltage signal) (applicable to modulating models only)													
Switch contact rating		10A(250VAC), 10A(30VDC)				16A(250VAC), 16A(30VDC)									
Rated stroke		90 ± 1°													
Rated time for full stroke (s)		11	15	22	19	39	29	39	47	47	34	47	76	105	143
Ambient operating temperature		-20 ~ 65°C (-4 ~ 149°F)													
CE compliance		EMC: 2014/30/EU, LVD: 2014/35/EU													
IP rating		IP67													

# Butterfly Valve and Actuator

Table 7: Valve flow characteristic

Size	Flow coefficient Kv								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
DN50	0.1	1.3	6.5	16	30	49	72	86	87
DN65	0.2	4.9	14	27	48	80	125	156	162
DN80	0.3	8.0	16	29	54	96	158	217	239
DN100	2.4	15	37	77	128	209	315	520	565
DN125	6.4	37	64	122	208	338	524	747	820
DN150	7.4	49	105	183	324	522	897	1330	1536
DN200	17	68	174	298	506	856	1439	2437	3039
DN250	22	180	334	571	1003	1682	2803	4203	4619
DN300	35	195	444	801	1379	2369	4697	6494	7137
DN350	38	292	619	1340	2388	3952	6254	9381	10309
DN400	45	401	850	1843	3285	5434	8600	12901	14176
DN450	52	532	1126	2441	4349	7197	11391	17087	18776
DN500	57	684	1448	3138	5593	9254	14646	21969	24142
DN600	62	1057	2238	4849	8641	14298	22627	33941	37298
DN700	76	1568	3148	5740	8651	16414	25978	38967	42820
DN800	84	2065	4144	7557	11927	17831	27158	41624	59040
DN900	92	2613	5245	9563	15094	22566	34369	52677	74719
DN1000	105	3619	7262	13241	20899	31285	47651	73032	103590



$\Delta P_s$  = Differential pressure across butterfly valve at 90° opening  
 $Q_s$  = Flow through butterfly valve at 90° opening

Fig 1: Flow diagram and characteristic

## VF5000 Series Butterfly Valves and VA5000 Series Actuators

### Overview

DN50...600, PN25

The VF5000 series butterfly valves are used for shutting off or regulating the flow of hot or chilled water in a HVAC system.

Mounted with VA5000 series actuators, the valves operate with a wide range of applications, including two-position and modulating control of hot, chilled, or condenser water, and up to 50/50 glycol solutions.

The valves and actuators are calibrated in the factory and packed separately for ease of delivery and installation.



### Features

- Y-sealed stem ensures long-term life span
- Vulcanized liners simplifies on-site installation
- Low torque design saves installation space and cost
- Planetary gear mechanism permits compact structure with high transmission efficiency
- Anti-condensation and over-temperature protection assure reliable long-running
- Automatic clutch empowers seamless switching of manual and motorized operations
- Stereoscopic position display makes clear visibility of valve status

### Ordering Information

Table 1: VF5000 series Butterfly Valves

V F 5 4 6 1 L S 3 - C	Butterfly Valve
5	Product Series 5=5000 series (PN25)
4	Valve Type 4=Two way
6	Pipe Connection 6=Wafer, 3=Lug
1	Flow Characteristic 1=equal percentage (0% to 60% opening)
L	Valve Size Codes and specifications are shown in the product specification table, L=DN400 (16 in.)
S	Disc Material S=Stainless Steel (SS304)
3	Max. Close-off Pressure 3=16 bar 4=25 bar
C	Identifier Made in China

Example: VF5461JS3-C=PN25 butterfly valve, wafer connection, DN300, SS304 disc, 16 bar max. close-off pressure (maximum permissible differential pressure at which the motorized butterfly valve will close securely).

\*For more details, please consult the Johnson Controls sales representatives.

# Butterfly Valve and Actuator

Table 2: VA5000 series Electric Actuators

V	A	5	0	0	3	B	D	C	B	1	-	C	Actuator	
		5											Product Series	5=5000 series
			0	0	3								Torque	Codes and specifications are shown in the actuator specification table
						B							Control Type	B=On/Off C=Modulating
							D						Power supply	D= 220VAC+10%, 50Hz
								C					Auxiliary Switch	C=Two switches
									B	1			Connection (to valve)	ISO5211 (Codes and specifications are shown in the actuator specification table)
												C	Identifier	Made in China

Example: VA5005BDCA1-C=On/Off electric actuator, 50Nm, 220VAC, with 2 auxiliary switches, A1 type up flange connection (to valve).

\*For more details, please consult the Johnson Controls sales representatives.

## Selection Table

Table 3: 1600kPa Close-off Pressure

VF5000 series Butterfly Valve				Electric Actuator												
PN25, DN50-DN600				On/Off	VA5003BDCA1-C	VA5003BDCB1-C	VA5005BDCB1-C	VA5010BDCB1-C	VA5040BDCB1-C	VA5040BDCC1-C	VA5040BDCC2-C	VA5060BDCC1-C	VA5080BDCC2-C	VA5170BDCE1-C	VA5230BDCE1-C	VA5350BDCE1-C
				Modulating	VA5003CDCA1-C	VA5003CDCB1-C	VA5005CDCB1-C	VA5010CDCB1-C	VA5040CDCC1-C	VA5040CDCC2-C	VA5060CDCC1-C	VA5080CDCC2-C	VA5170CDCE1-C	VA5230CDCE1-C	VA5350CDCE1-C	
Size	Kvs	Wafer	Lug	Max. Close-off Pressure (kPa)												
DN50	87	VF5461AS3-C	VF5431AS3-C	1600												
DN65	162	VF5461BS3-C	VF5431BS3-C	1600												
DN80	239	VF5461CS3-C	VF5431CS3-C	1600												
DN100	565	VF5461DS3-C	VF5431DS3-C		1600											
DN125	820	VF5461ES3-C	VF5431ES3-C			1600										
DN150	1536	VF5461FS3-C	VF5431FS3-C				1600									
DN200	3039	VF5461GS3-C	VF5431GS3-C					1600								
DN250	4619	VF5461HS3-C	VF5431HS3-C						1600							
DN300	7137	VF5461JS3-C	VF5431JS3-C							1600						
DN350	10309	VF5461KS3-C	VF5431KS3-C								1600					
DN400	14176	VF5461LS3-C	VF5431LS3-C									1600				
DN450	18776	VF5461MS3-C	VF5431MS3-C										1600			
DN500	24142	VF5461NS3-C	VF5431NS3-C											1600		
DN600	37298	VF5461PS3-C	VF5431PS3-C													1600

Table 4: 2500kPa Close-off Pressure

VF5000 series Butterfly Valve				Electric Actuator													
PN25 DN50 - DN600				On/Off	VA5003BDCA1-C	VA5005BDCA1-C	VA5008BDCB1-C	VA5020BDCB1-C	VA5020BDCB2-C	VA5040DCC1-C	VA5080DCCD1-C	VA5100DCCD1-C	VA5170DCCD1-C	VA5230DCE1-C	VA5350DCCF3-C	VA5350DCCF1-C	VA5500DCCG2-C
				Modulating	VA5003CDCA1-C	VA5005CDCA1-C	VA5008CDCB1-C	VA5020CDCB1-C	VA5020CDCB2-C	VA5040DCC1-C	VA5080DCCD1-C	VA5100DCCD1-C	VA5170DCCD1-C	VA5230DCE1-C	VA5350DCCF3-C	VA5350DCCF1-C	VA5500DCCG2-C
Size	Kvs	Wafer	Lug	Max. Close-off Pressure (kPa)													
DN50	87	VF5461AS4-C	VF5431AS4-C	2500													
DN65	162	VF5461BS4-C	VF5431BS4-C	2500													
DN80	239	VF5461CS4-C	VF5431CS4-C		2500												
DN100	565	VF5461DS4-C	VF5431DS4-C			2500											
DN125	820	VF5461ES4-C	VF5431ES4-C				2500										
DN150	1536	VF5461FS4-C	VF5431FS4-C					2500									
DN200	3039	VF5461GS4-C	VF5431GS4-C						2500								
DN250	4619	VF5461HS4-C	VF5431HS4-C							2500							
DN300	7137	VF5461JS4-C	VF5431JS4-C								2500						
DN350	10309	VF5461KS4-C	VF5431KS4-C									2500					
DN400	14176	VF5461LS4-C	VF5431LS4-C										2500				
DN450	18776	VF5461MS4-C	VF5431MS4-C											2500			
DN500	24142	VF5461NS4-C	VF5431NS4-C												2500		
DN600	37298	VF5461PS4-C	VF5431PS4-C														2500



# Butterfly Valve and Actuator

## Technical Specifications

Table 5: Valve Specifications

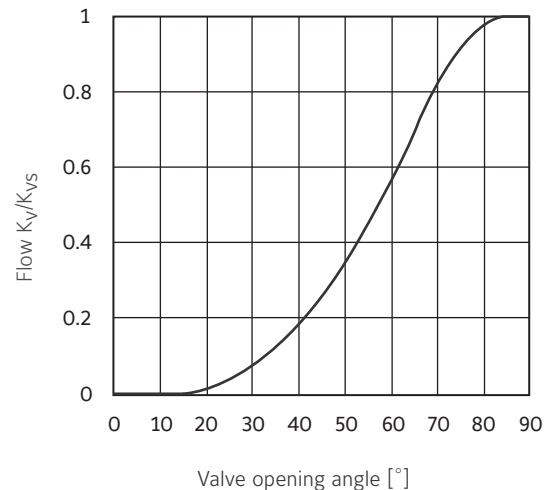
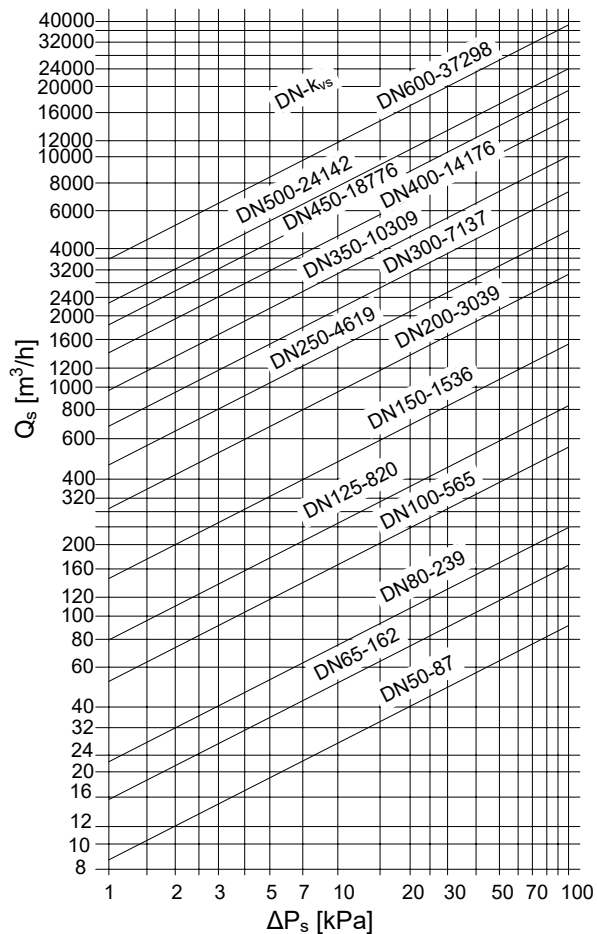
Product Series		VF5000 series Butterfly Valves
Medium		Hot / chilled Water, glycol solution (< 50% concentration) in HVAC system
Medium temperature		-10°C ~120°C
Close-off pressure		1600kPa/2500kPa (refer to table 3 and table 4)
Pressure rating		PN25
Materials	Valve Body	Ductile iron (GGG40)
	Seat	EPDM
	Stem	Stainless steel
	Valve disc	Stainless steel (SS304)
Pipe connection		ISO 7005-2 (PN25)

Table 6: Actuator Specifications

Product Series		VA5000 series Electric Actuators												
Model		VA5003	VA5005	VA5008	VA5010	VA5020	VA5040	VA5060	VA5080	VA5100	VA5170	VA5230	VA5350	VA5500
Rated torque (Nm)		35	50	80	100	200	400	600	800	1000	1700	2300	3500	5000
Power consumption (VA)	On/Off models	40	40	40	110	110	180	180	180	230	440	440	440	440
	Modulating models	45	45	45	115	115	185	185	185	235	445	445	445	445
Input signal	On/Off models	220 VAC ±10%, 50/60Hz												
	Modulating models	4 - 20mA or 0(2) - 10V												
Input impedance		150 ohms (current signal) or ≥100k ohms (voltage signal) (applicable to modulating models only)												
Output signal	On/Off models	Dry contacts (fully open and closed)												
	Modulating models	4 - 20mA or 0(2) - 10V												
Output impedance		≤750 ohms (current signal) or ≥5k ohms (voltage signal) (applicable to modulating models only)												
Switch contact rating		10A(250VAC), 10A(30VDC)				16A(250VAC), 16A(30VDC)								
Rated stroke		90 ± 1°												
Rated time for full stroke (s)		11	15	22	19	39	29	39	47	47	34	47	76	105
Ambient operating temperature		-20 ~ 65°C (-4 ~149°F)												
CE compliance		EMC: 2014/30/EU, LVD: 2014/35/EU												
IP rating		IP67												

Table 7: Valve flow characteristic

Size	Flow Coefficient Kv								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
DN50	0.1	1.3	6.5	16	30	49	72	86	87
DN65	0.2	4.9	14	27	48	80	125	156	162
DN80	0.3	8.0	16	29	54	96	158	217	239
DN100	2.4	15	37	77	128	209	315	520	565
DN125	6.4	37	64	122	208	338	524	747	820
DN150	7.4	49	105	183	324	522	897	1330	1536
DN200	17	68	174	298	506	856	1439	2437	3039
DN250	22	180	334	571	1003	1682	2803	4203	4619
DN300	35	195	444	801	1379	2369	4697	6494	7137
DN350	38	292	619	1340	2388	3952	6254	9381	10309
DN400	45	401	850	1843	3285	5434	8600	12901	14176
DN450	52	532	1126	2441	4349	7197	11391	17087	18776
DN500	57	684	1448	3138	5593	9254	14646	21969	24142
DN600	62	1057	2238	4849	8641	14298	22627	33941	37298



$\Delta P_s$  = Differential pressure across butterfly valve at 90° opening  
 $Q_s$  = Flow through butterfly valve at 90° opening

Fig 1: Flow diagram and characteristic

# Butterfly Valve and Actuator

## VF6000 series Butterfly Valves and VA300/VA200 series Electric Actuators

### Introduction

The VF6000 series butterfly valves are used for shutting off or regulating the flow of hot or chilled water in a HVAC system.

Mounted with VA300/VA200 series actuators, the valves operate with a wide range of applications, including two-position and modulating control of hot, chilled, or condenser water, and up to 50/50 glycol solutions.

The valves and actuators are calibrated in the factory and packed separately for ease of delivery and installation.



VF6000 series Butterfly Valve and VA300/VA200 series Actuator

### Features

Groove-type seat	Reliable sealing and less torque during service life
Specialized broad seat sealing	Wide applicability of various types of flanges
Mid-plummer-block spliced pole	Valve shaft prevented from disengaging from the body due to frequent vibration
Automatic clutch	Seamless switching between manual and motorized operations
Anti-condensation and over-temperature protection	Assurance of reliable long-running
Planetary gear mechanism	High transmission efficiency with compact structure
Stereoscopic position display	Clear visibility of valve status



## Ordering Information

Table 1: VF6000 series Butterfly Valves

V F 6 4 6 1 A A - C	Butterfly Valve	
6	Product Series	6 =6000 series (PN16)
4	Valve Type	4=Two way
6	Pipe Connection	6 =wafer, 3 =lug, 8 =flange
1	Flow Characteristic	1=equal percentage (0% to 60% opening)
A	Valve Size	A=2 in. (DN50)    B=2.5 in. (DN65) C=3 in. (DN80)    D=4 in. (DN100) E=5 in. (DN125)    F=6 in. (DN150) G=8 in. (DN200)    H=10in. (DN250) J=12in. (DN300)    K=14in. (DN350) L=16in. (DN400)    M=18in. (DN450) N=20in. (DN500)    P=24in.(DN600) Q=28in.(DN700)    R=32in.(DN800) T=36in.(DN900)    U=40in.(DN1000)
	Disc Material	A=Ductile Iron (GGG40) with Nylon 11 coating S=Stainless Steel (SS304)
	Identifier	Made in China

Example: VF6461GA-C=PN16 butterfly valve, wafer connection, DN200, GGG40 with Nylon 11 coating disc.  
For more product details, please refer to the selection table or consult the Johnson Controls sales representatives.

Table 2: VA5000 series Electric Actuators




V A 3 0 3 B D C - C	Actuator	
3	Close-off	3=16bar    2=10bar
0 3	Rated Torque	Codes and specifications are shown in the actuator specification table
B	Control Type	B=On/Off C=Modulating
D	Power Supply	D= 220VAC+10%,50Hz
C	Auxiliary Switch	C=Two switches
- C	Identifier	Made in China

Example: VA303BDC-C=On/Off electric actuator, 50Nm, 220VAC, with 2 auxiliary switches, 16 bar close-off when used with valve.  
For more product details, please refer to the selection table or consult the Johnson Controls sales representatives.



## Selection Table

Table 4: 1600kPa Close-off Pressure

VF6000 series Butterfly Valves PN16, DN50-DN1000					Non-spring Return Actuators																																			
					M9300			VA200																																
																																								
					On/Off or Floating, 230V	On/Off or Floating, 0(2) to 10 VDC or 0(4) to 20mA (with resistor)	On/Off or Floating, 230V	On/Off or Floating, 0(2) to 10VDC or 0(4) to 20mA (with resistor)	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA	On/Off	0 (2)-10 VDC or 0 (4)-20 mA		
					Auxiliary Switch					M9300-2 (optional)																														
2 SPDT, 3.0 (1.5) A @ 24 VAC																																								
2 SPST, 16 A @ 250 VAC																																								
2 SPST, 10 A @ 250 VAC																																								
Position Feedback																																								
0(2) to 10VDC																																								
0(2) to 10VDC or 0(4) to 20mA																																								
Power Supply																																								
230 VAC +/- 10% 50/60 Hz																																								
24 VAC +20%/-15% 24VDC +/- 10%																																								
Electrical Connections																																								
Screw terminal																																								
Cable																																								
Accessories																																								
Heater																																								
DN	Kv Full Open	Kv 60° Opening	Wafer Connection	Lug Connection	Max. Close-off Pressure (kPa)																																			
DN50	193	60	VF6461Ax-C	VF6431Ax-C	1,000		1,000																																	
DN65	315	95	VF6461Bx-C	VF6431Bx-C	1,000		1,000																																	
DN80	425	126	VF6461Cx-C	VF6431Cx-C		1,000	1,000																																	
DN100	723	221	VF6461Dx-C	VF6431Dx-C		1,000		1,000																																
DN125	1,243	394	VF6461Ex-C	VF6431Ex-C					1,000																															
DN150	1,859	542	VF6461Fx-C	VF6431Fx-C						1,000																														
DN200	3,124	995	VF6461Gx-C	VF6431Gx-C							1,000																													
DN250	4,757	1,462	VF6461Hx-C	VF6431Hx-C								1,000																												
DN300	7,058	2,125	VF6461Jx-C	VF6431Jx-C									1,000																											
DN350	8,319	2,573	VF6461Kx-C	VF6431Kx-C										1,000																										
DN400	11,458	3,381	VF6461Lx-C	VF6431Lx-C											1,000																									
DN450	13,612	3,925	VF6461Mx-C	VF6431Mx-C																																				
DN500	18,748	5,348	VF6461Nx-C	VF6431Nx-C																																				
DN600	25,217	7,561	VF6461PxN-C	VF6431PxN-C																																				
DN700	36,821	10,659	VF6461Qx-C	-																																				
DN800	45,995	14,123	VF6461Rx-C	-																																				
DN900	61,044	18,184	VF6461Tx-C	-																																				
DN1000	68,874	21,939	VF6461Ux-C	-																																				
Actuator					VA9320-AUA-3	VA9320-HGA-3	VA9335-AUA-3	VA9335-HGA-3	VA201BDC-C	VA201CDC-C	VA201BCN-C	VA201CDCN-C	VA202BDCN-C	VA202BDC-C	VA202CDC-C	VA203BDCN-C	VA203BDC-C	VA203CDC-C	VA204BDC-C	VA204CDC-C	VA205BDC-C	VA205CDC-C	VA206BDC-C	VA206CDC-C	VA207BDC-C	VA207CDC-C	VA208BDC-C	VA208CDC-C	VA209BDC-C	VA209CDC-C	VA210BDC-C	VA210CDC-C	VA211BDCN-C	VA211CDCN-C	VA212BDC-C	VA212CDC-C				

Note: x stands for disc material: A=ductile iron(GGG40) with nylon11 coating; S=stainless steel (SS304).

# Butterfly Valve and Actuator

## Technical Specifications

Table 5: Valve Specifications

Product Series		VF6000 Series Butterfly Valves
Medium		Hot / chilled Water, glycol solution (< 50% concentration) in HVAC system
Medium temperature		-10°C~100°C
Close-off pressure		1000kPa/1600kPa (refer to table 3 and table 4)
Pressure rating		PN16
Materials	Valve Body	Cast Iron, GGG25 (DN50-DN150) , Ductile Iron, GGG40 (DN200-DN1000)
	Seat	EPDM
	Stem	Stainless Steel
	Disc	Ductile iron (GGG40) with Nylon 11 coating or Stainless steel (SS304)
Pipe connection		ISO 7005-2 Wafer (DN50-DN1000) Lug (DN50-DN600)

Table 6: Actuator Specifications (1/2)

Product Series		VA-2xx Series Electric Actuators						
Model		VA201	VA201...N	VA202	VA203	VA204	VA205	VA206
Rated torque (Nm)		35	50	80	200	400	600	800
Power consumption (VA)	On/Off models	40	40	40	110	180	180	180
	Modulating models	45	45	45	115	185	185	185
Input signal	On/Off models	220Vac, ±10%, 50/60Hz						
	Modulating models	4 - 20mA or 0(2) - 10V						
Input impedance		150 ohms (current signal) or ≥100k ohms (voltage signal) (applicable to modulating models only)						
Output signal	On/Off models	Dry contacts (fully open and closed)						
	Modulating models	4 - 20mA or 0(2) - 10V						
Switch contact rating		10A (250VAC) , 10A (30VDC)			16A (250VAC) , 16A (30VDC)			
Rated stroke		90±1°						
Rated time for full stroke (s)		11	15	22	39	29	39	47
Ambient operating temperature		-4 to 149° F (-20 to 65° C)						
CE compliance		EMC: 2014/30/EU, LVD: 2014/35/EU						
IP rating		IP67						
Weight (kg)		3.1	3.1	3.7	11	22	22	22

## Technical Specifications

Table 7: Actuator Specifications (2/2)

Product Series		VA-2xx Series Electric Actuators					
Model		VA207	VA208	VA209	VA210	VA211...N	VA212
Rated torque (Nm)		1,000	1,700	2,300	3,500	5,000	8,000
Power consumption (VA)	On/Off models	230	440	440	440	440	440
	Modulating models	235	445	445	445	445	445
Input signal	On/Off models	220Vac, ±10%, 50/60Hz					
	Modulating models	4 - 20mA or 0(2) - 10V					
Input impedance		150 ohms (current signal) or ≥100k ohms (voltage signal) (applicable to modulating models only)					
Output signal	On/Off models	Dry contacts (fully open and closed)					
	Modulating models	4 - 20mA or 0 (2) - 10V					
Switch contact rating		16A (250VAC) , 16A (30VDC)					
Rated stroke		90±1°					
Rated time for full stroke (s)		47	34	47	76	105	143
Ambient operating temperature		-4 to 149° F (-20 to 65° C)					
CE compliance		EMC: 2014/30/EU. LVD: 2014/35/EU					
IP rating		IP67					
Weight (kg)		22	36	36	76	76	107

Table 8: Actuator Specifications

Product Series		VA-3xx Series Electric Actuators					
Model		VA301	VA302	VA303	VA304	VA305	VA306
Rated torque (Nm)		35	80	200	400	600	800
Power consumption (VA)	On/Off models	40	110	110	180	180	180
	Modulating models	45	115	115	185	185	185
Input signal	On/Off models	220Vac, ±10%, 50/60Hz					
	Modulating models	4 - 20mA or 0(2) - 10V					
Input impedance		250 ohms					
Output signal	On/Off models	Dry contacts (fully open and closed)					
	Modulating models	4 - 20mA or 0(2) - 10V					
Switch contact rating		10A (250VAC) , 10A (30VDC)	16A (250VAC) , 16A (30VDC)				
Rated stroke		90±1°					
Rated time for full stroke (s)		11	19	39	29	39	47
Ambient operating temperature		-4 to 149° F (-20 to 65° C)					
CE compliance		EMC: 2014/30/EU, LVD: 2014/35/EU					
IP rating		IP67					
Weight (kg)		3.1	11	11	22	22	22

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

# Butterfly Valve and Actuator

## VF7000 Series Butterfly Valves and VA400 Series Actuators

### Introduction

The VF7000 Series PN25 Butterfly Valves and VA400 Actuators are designed to shut off or regulate the flow of hot or chilled water in an HVAC system, especially in the large air handling unit.

This series covers models from DN50 to DN600 with different modes of control through either on/off or modulating type actuators.

Actuators and valves are calibrated in the factory and are packed separately for ease of delivery and installation.



Figure 1: VF7000 Series PN25 Butterfly Valve and Actuator

### Features

Double-eccentric design	Enables high performance
Floating seat	Reliable sealing results in a longer service life
Professionally designed sealing surface	Broadside and arc design is suitable for various types of flanges
Mid-plummer block-spliced pole	Lower shaft prevented from disengaging from the body due to frequent vibration
Valve phase indicator	Displays valve position
Software for over-torque control	Ensures valves close fully
Shaft with spline design	Ensures torque transmission and control accuracy
Automatic clutch	Automatic switching is more convenient and reliable
Protective design	Provides over-torque protection and anti-condensation heater
Worm gear drive	High transmission torque and self-locking

## Model Selection

Table 1: Ordering code for VF7000 Series Butterfly Valves

V	F	7	4	6	1	A	A	-	C	Butterfly valve	
7										Rated pressure	6=PN16 7=PN25
4										Body type	4=Two-way
6										Connection	6=Wafer
1										Flow characteristics	1= Equal percentage
A										Valve size	A=2 in. (DN50)    B=2.5 in. (DN65) C=3 in. (DN80)    D=4 in. (DN100) E=5 in. (DN125)    F=6 in. (DN150) G=8 in. (DN200)    H=10in. (DN250) J=12in. (DN300)    K=14in. (DN350) L=16in. (DN400)    M=18in. (DN450) N=20in. (DN500)    P=24in. (DN600)
A										Reserve	A=None
- C										Origin	Made in China

Table 2: Ordering code for VA400 Series Actuators

VA	4	03	A	B	D	C	N	-	C	Actuator	
4										3=For VF6000 PN16 Butterfly Valve 4=For VF7000 PN25 Butterfly Valve	
03										Torque	02=45Nm    03=180Nm 04=320Nm    05=370Nm 08=1650Nm    09=2200Nm 10=3200Nm    11=4000Nm
A										Dimensions of connector	A=Dimension 1 B=Dimension 2
B										Control Signals	B=On/off C=Modulating
D										Power	D=220V AC
C										Auxiliary switch	C=Two switches
N										Reserve	
- C										Origin	Made in China

# Butterfly Valve and Actuator

## Specifications

Product	VF7000 Series PN25 Butterfly Valves and VA400 Actuators	
Application	Regulation of hot water and chilled water in HVAC system	
<b>Valves</b>		
Media and Temperature	Water temperature ranges from -10-100° C, For non-continuous flow, temperature can reach up to 120° C	
Diameter	DN50-DN600	
Close-off Pressure	2.5MPa	
Nominal Pressure	PN25	
Materials	Body	Carbon Steel, A216 GrWCB
	Seat	PTFE
	Stem	Stainless steel, A564 Gr.630
	Disc	Stainless steel, A351 Gr.CF8
Pipe Connection	Complies to ISO 7005-1	
<b>VA400 Actuator</b>		
Power Supply	220VAC ±10% 50/60Hz	
Torque	See Table 3	
Running Time	See Table 3	
Motor Power	See Table 3	
Input Signal	On/off or 4-20mA/0-10V/2-10V	
Output Signal	End of switch or 4-20mA/0-10V/2-10V	
Protective Class	IP67	
Ambient Temperature	-20 ~ 65°C	
Worm Gear	Energy efficient with self-lock feature	
Heater	Anti-condensation	
Casting Materials	Aluminium	
Surface Coating	Epoxy resin	

Table 3: VA400 Actuator performance summary

Model (On/off)	Model (Modulating)	Torque (Nm)	Running Time (S)	Motor Power (W)
VA402ABDCN-C	VA402ACDCN-C	45-55	19	40
VA402BBDCN-C	VA402BCDCN-C	90-105	19	40
VA403ABDCN-C	VA403ACDCN-C	180-200	39	40
VA404ABDCN-C	VA404ACDCN-C	320-360	29	90
VA404BBDCN-C	VA404BCDCN-C	320-360	29	90
VA405ABDCN-C	VA405ACDCN-C	370-395	39	90
VA408ABDCN-C	VA408ACDCN-C	1650-1800	34	200
VA409ABDCN-C	VA409ACDCN-C	2200-2400	47	200
VA410ABDCN-C	VA410ACDCN-C	3200-3600	76	200
VA411ABDCN-C	VA411ACDCN-C	4000-4400	105	200

## Specifications

Table 4: On/Off Type Summary

DN Size		Butterfly Valve Model	Actuator Model
mm	inch		
50	2"	VF7461AA-C	VA402ABDCN-C
65	2.5"	VF7461BA-C	VA402ABDCN-C
80	3"	VF7461CA-C	VA402BBDCN-C
100	4"	VF7461DA-C	VA402BBDCN-C
125	5"	VF7461EA-C	VA403ABDCN-C
150	6"	VF7461FA-C	VA403ABDCN-C
200	8"	VF7461GA-C	VA404ABDCN-C
250	10"	VF7461HA-C	VA404BBDCN-C
300	12"	VF7461JA-C	VA405ABDCN-C
350	14"	VF7461KA-C	VA408ABDCN-C
400	16"	VF7461LA-C	VA409ABDCN-C
450	18"	VF7461MA-C	VA409ABDCN-C
500	20"	VF7461NA-C	VA410ABDCN-C
600	24"	VF7461PA-C	VA411ABDCN-C

Table 5: Modulating Type Summary

DN Size		Butterfly Valve Model	Actuator Model
mm	inch		
50	2"	VF7461AA-C	VA402ACDCN-C
65	2.5"	VF7461BA-C	VA402ACDCN-C
80	3"	VF7461CA-C	VA402BCDCN-C
100	4"	VF7461DA-C	VA402BCDCN-C
125	5"	VF7461EA-C	VA403ACDCN-C
150	6"	VF7461FA-C	VA403ACDCN-C
200	8"	VF7461GA-C	VA404ACDCN-C
250	10"	VF7461HA-C	VA404BCDCN-C
300	12"	VF7461JA-C	VA405ACDCN-C
350	14"	VF7461KA-C	VA408ACDCN-C
400	16"	VF7461LA-C	VA409ACDCN-C
450	18"	VF7461MA-C	VA409ACDCN-C
500	20"	VF7461NA-C	VA410ACDCN-C
600	24"	VF7461PA-C	VA411ACDCN-C

## Balancing Valve

### VPS-N Series Static Balancing Valves

Designed for various applications, especially for flow rate balancing in HVAC system, with good flow characteristics.



DN15~DN50



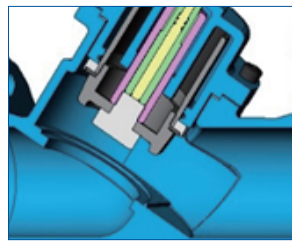
DN65~DN500

### Features

①



②



③



#### ① Digit Indication Hand-wheel

Accurate and clear indication of the scale, enabling operators of easy and correct commissioning.

#### ② Full Closing Design

Balancing design enables easy closing of valve with zero leakage.

#### ③ High-grade Materials for DN65~DN500

QT450-10 High-grade ductile iron for valve body. High-grade stainless steel for balancing disc and stem with sound anti-corrosion performance.

## Ordering Information

Model	Size (in.)	DN (mm)	Kvs	Temp (°C)
VPS015N-C	1/2"	15	5.8	-25~150
VPS020N-C	3/4"	20	8	
VPS025N-C	1"	25	11	
VPS032N-C	1-1/4"	32	17	
VPS040N-C	1-1/2"	40	25	
VPS050N-C	2"	50	34	
VPS065N-C	2-1/2"	65	107	
VPS080N-C	3"	80	153	
VPS100N-C	4"	100	272	

Model	Size (in.)	DN (mm)	Kvs	Temp (°C)
VPS125N-C	5"	125	430	-25~150
VPS150N-C	6"	150	647	
VPS200N-C	8"	200	1085	
VPS250N-C	10"	250	1630	
VPS300N-C	12"	300	2495	
VPS350N-C	14"	350	3229	
VPS400N-C	16"	400	4888	
VPS450N-C	18"	450	6433	
VPS500N-C	20"	500	7678	

## Specification

- Application: HVAC system
- Function: Balancing, pre-setting, measuring, closing
- PN: PN16
- Connection Standard: DN15~DN50: ISO7-1 Rp  
DN65~DN500: ISO7005-2
- Temperature: -25° C ~150° C
- Valve Body: DN15~DN50: Brass Hpb59-1  
DN65~DN500: Ductile iron QT450-10
- Stem: DN15~DN50: Brass  
DN65~DN500: Stainless Steel
- Balancing disc: DN15~DN50: Brass  
DN65~DN500: Stainless Steel
- Hand-wheel: DN15~DN50: PA  
DN65~DN500: Al

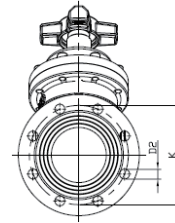
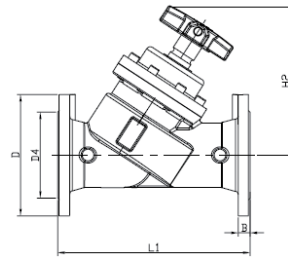
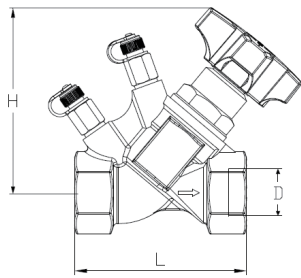


# Balancing Valve

## Valve opening vs Kv

	DN15	DN20	DN25	DN32	DN40	DN50	DN65	DN80	DN100	DN125	DN150	DN200	DN250	DN300	DN350	DN400	DN450	DN500
0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.5	0.62	0.57	1.59	2.19	3.00	3.92	8.73	11.2	17.8	28.8	63.3	21.5	31.3	30.2	84.0	125.2	87.6	19.9
1.0	0.98	0.97	2.31	3.47	4.66	5.96	9.88	13.1	20.9	41.8	84.8	22.6	32.2	34.0	116.4	142.9	113.3	39.8
1.5	1.88	2.23	3.02	4.91	5.95	7.87	13.0	14.6	22.7	49.5	111.2	23.8	33.3	41.4	145.6	156.3	166.1	59.6
2.0	2.92	3.77	3.78	8.46	7.94	12.0	16.7	16.3	25.9	60.0	132.0	27.7	41.6	61.1	167.5	178.9	200.5	79.5
2.5	3.89	5.00	6.16	11.9	12.3	20.7	18.0	18.0	30.5	76.0	154.0	40.9	65.8	93.5	199.1	204.5	243.6	99.4
3.0	4.88	6.26	8.45	14.3	19.5	28.1	22.0	20.8	40.8	110.3	194.4	60.7	97.5	126.0	224.5	217.2	284.9	119.3
3.5	5.54	7.63	10.2	16.0	22.2	32.1	29.8	25.2	63.3	169.8	247.4	95.1	151.1	161.3	250.6	256.7	317.5	145.6
4.0	5.78	8.04	10.9	16.9	25.1	34.2	41.0	34.8	101.0	215.6	310.0	161.8	266.3	246.9	334.7	278.5	365.1	171.9
4.5	—	—	—	—	—	—	53.3	50.5	132.6	260.5	363.5	250.5	401.6	387.7	482.5	407.8	419.2	236.4
5.0	—	—	—	—	—	—	63.1	70.0	157.4	298.3	416.5	353.5	537.5	557.3	628.3	538.8	535.8	300.9
5.5	—	—	—	—	—	—	71.3	83.3	184.0	327.9	471.3	447.1	665.6	739.7	832.9	670.9	631.3	487.6
6.0	—	—	—	—	—	—	76.6	95.3	209.9	354.8	512.8	522.0	768.5	902.8	1061.7	965.6	815.3	674.3
6.5	—	—	—	—	—	—	82.0	107.0	232.8	376.7	533.9	591.7	870.7	1032.6	1242.4	1273.8	1116.6	1070.2
7.0	—	—	—	—	—	—	88.4	118.0	247.7	382.7	559.5	649.3	942.1	1156.7	1411.5	1527.1	1500.8	1466.1
7.5	—	—	—	—	—	—	94.5	128.3	257.2	392.5	591.0	708.4	1032.5	1268.7	1539.5	1834.0	1789.8	1747.0
8.0	—	—	—	—	—	—	98.9	140.0	272.0	404.4	610.3	762.9	1110.8	1375.6	1684.6	2168.0	2053.2	2027.8
8.5	—	—	—	—	—	—	102.3	147.9	272.0	418.8	633.1	820.3	1200.0	1473.3	1772.1	2288.6	2297.1	2212.8
9.0	—	—	—	—	—	—	106.6	153.0	272.0	430.0	647.0	845.0	1266.8	1583.1	1896.6	2460.6	2503.3	2397.7
9.5	—	—	—	—	—	—	—	—	—	—	—	889.9	1314.5	1676.5	2011.1	2566.7	2794.6	2581.3
10.0	—	—	—	—	—	—	—	—	—	—	—	919.6	1376.7	1771.2	2109.4	2701.7	2956.5	2764.9
10.5	—	—	—	—	—	—	—	—	—	—	—	953.9	1435.4	1853.0	2214.8	2870.9	3169.7	2985.1
11.0	—	—	—	—	—	—	—	—	—	—	—	979.3	1485.1	1927.8	2333.3	3038.9	3402.9	3205.4
11.5	—	—	—	—	—	—	—	—	—	—	—	1013.7	1515.5	2010.0	2413.0	3176.8	3678.6	3381.0
12.0	—	—	—	—	—	—	—	—	—	—	—	1028.9	1559.0	2069.0	2510.7	3333.4	3805.6	3556.5
12.5	—	—	—	—	—	—	—	—	—	—	—	1060.0	1585.4	2117.0	2581.2	3419.9	4002.4	3641.4
13.0	—	—	—	—	—	—	—	—	—	—	—	1084.8	1630.0	2193.3	2685.2	3578.7	4134.1	3726.3
13.5	—	—	—	—	—	—	—	—	—	—	—	—	—	2257.3	2755.3	3676.8	4294.9	3845.5
14.0	—	—	—	—	—	—	—	—	—	—	—	—	—	2308.7	2771.6	3817.9	4385.9	3964.7
14.5	—	—	—	—	—	—	—	—	—	—	—	—	—	2342.9	2800.2	3951.9	4535.0	4086.2
15.0	—	—	—	—	—	—	—	—	—	—	—	—	—	2388.8	2858.8	4066.3	4666.1	4207.7
15.5	—	—	—	—	—	—	—	—	—	—	—	—	—	2446.0	2949.8	4198.3	4790.8	4316.1
16.0	—	—	—	—	—	—	—	—	—	—	—	—	—	2495.2	2955.5	4272.0	4864.1	4424.6
16.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2993.0	4341.8	4999.2	4512.9
17.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3028.8	4437.3	5256.7	4601.1
17.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3078.1	4531.5	5395.9	4721.5
18.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3136.4	4600.0	5553.6	4841.9
18.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3183.6	4682.8	5739.2	4947.7
19.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3228.9	4722.8	5883.5	5053.5
19.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4753.9	5932.0	5177.6
20.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4785.0	6082.4	5301.8
20.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4836.7	6269.7	5436.6
21.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4888.4	6433.3	5571.5
21.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5861.1
22.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6150.7
22.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6296.8
23.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6443.0
23.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6772.1
24.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7101.2
24.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7389.5
25.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7677.9

## Dimension



DN	D	L	H	Weight (Kg)
15	1/2"	80	102	0.8
20	3/4"	85	104	0.9
25	1"	98	105	1.2
32	1-1/4"	110	115	1.6
40	1-1/2"	120	122	2.0
50	2"	150	135	3.7

DN	B mm	D4 mm	D2 mm	D mm	L1 mm	H2 mm	Weight (Kg)
65	20	118	4-19	185	290	222	15
80	20	132	8-19	200	310	257	21
100	22	156	8-19	220	350	275	30
125	22	184	8-19	250	400	332	45
150	24	211	8-23	285	480	396	65
200	24	266	12-23	340	600	498	123
250	26	319	12-28	405	730	555	195
300	28	370	12-28	460	850	630	320
350	30	429	16-28	520	980	733	440
400	32	480	16-31	580	1100	800	630
450	40	548	20-31	640	1200	810	885
500	44	609	20-34	715	1250	900	1125

## Valve pre-setting

### DN15-DN50

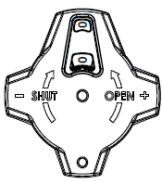


Fig 1

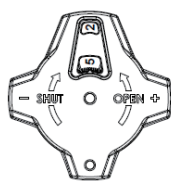


Fig 2

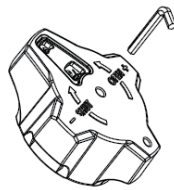


Fig 3

Fig 1: Status of closing

Fig 2: Pre-setting as 2.5 turns, indicated by two numbers. External one shows the integer while the internal one shows decimal.

Fig 3: A 3mm hexagon wrench can be used to rotate clockwise until fully closed. The pre-setting is the maximum valve opening.

### DN65-DN500

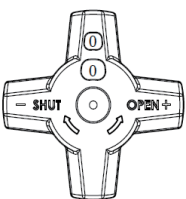


Fig 1

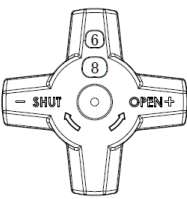


Fig 2

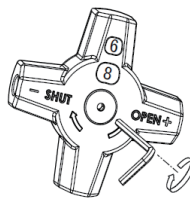


Fig 3

Fig 1: Status of closing

Fig 2: Pre-setting as 6.8 turns, indicated by two numbers. External one shows the integer while the internal one shows decimal.

Fig 3: A 5mm or 8mm hexagon wrench (for DN65-DN150 or DN200-DN500) can be used to rotate clockwise until fully closed. The pre-setting is the maximum valve opening.

# Balancing Valve

## VPPN Series Differential Pressure Balancing Valves

### Overview

DN25...250, PN16/PN25

VPPN series differential pressure balancing valve is designed to control constant pressure differential on both ends of the equipment to improve the control stability and accuracy, lower noise level of control valve and also to make balancing commissioning easy.



### Features

- Pressure port integrated inside the low-pressure chamber, no risk of clash or damage on site
- Pressure port on high-pressure chamber equipped with lock valve
- Integrated design of balancing diaphragm, enabling higher reliability
- $\Delta P$  is set by hand wheel with convenient installation

### Order Information

Table1: PN16 Pressure Rating

Model	$\Delta P L$		$\Delta P$ Range kPa
	Size		
	DN	Inch.	
VPP025LN-C	25	1"	5-30
VPP032LN-C	32	1-1/4"	5-30
VPP040LN-C	40	1-1/2"	5-30
VPP050LN-C	50	2"	5-30
VPP065LN-C	65	2-1/2"	20-80
VPP080LN-C	80	3"	20-80
VPP100LN-C	100	4"	20-80
VPP125LN-C	125	5"	20-80
VPP150LN-C	150	6"	20-80
VPP200LN-C	200	8"	20-80
VPP250LN-C	250	10"	20-80

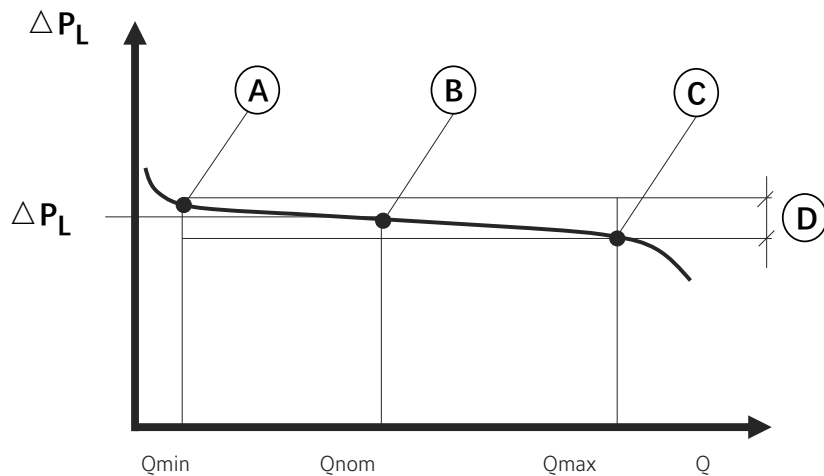
Model	$\Delta P L$		$\Delta P$ Range kPa
	Size		
	DN	Inch.	
VPP025HN-C	25	1"	25-70
VPP032HN-C	32	1-1/4"	25-70
VPP040HN-C	40	1-1/2"	25-70
VPP050HN-C	50	2"	25-70
VPP065HN-C	65	2-1/2"	40-160
VPP080HN-C	80	3"	40-160
VPP100HN-C	100	4"	40-160
VPP125HN-C	125	5"	40-160
VPP150HN-C	150	6"	40-160
VPP200HN-C	200	8"	40-160
VPP250HN-C	250	10"	40-160

Table 2: PN25 Pressure Rating

Model	Size		ΔP Range
	DN	Inch.	kPa
	VPP025LN-25-C	25	1"
VPP032LN-25-C	32	1-1/4"	5-30
VPP040LN-25-C	40	1-1/2"	5-30
VPP050LN-25-C	50	2"	5-30
VPP065LN-25-C	65	2-1/2"	20-80
VPP080LN-25-C	80	3"	20-80
VPP100LN-25-C	100	4"	20-80
VPP125LN-25-C	125	5"	20-80
VPP150LN-25-C	150	6"	20-80
VPP200LN-25-C	200	8"	20-80
VPP250LN-25-C	250	10"	20-80

Model	Size		ΔP Range
	DN	Inch.	kPa
	VPP025HN-25-C	25	1"
VPP032HN-25-C	32	1-1/4"	25-70
VPP040HN-25-C	40	1-1/2"	25-70
VPP050HN-25-C	50	2"	25-70
VPP065HN-25-C	65	2-1/2"	40-160
VPP080HN-25-C	80	3"	40-160
VPP100HN-25-C	100	4"	40-160
VPP125HN-25-C	125	5"	40-160
VPP150HN-25-C	150	6"	40-160
VPP200HN-25-C	200	8"	40-160
VPP250HN-25-C	250	10"	40-160

## Operation Range



A. Kv.min    B. Kv.nom    C. Kv.max    D.  $\Delta PL \leq 40\text{kPa} \pm 25\%$ ;  $\Delta PL > 40\text{kPa} \pm 20\%$

1. Select the required  $\Delta PL$  in below table
2. Select the valve size which is the same as pipeline
3. Confirm the flow rate is below  $q_{max}$ , if not, please select the larger size or larger  $\Delta PL$

# Balancing Valve

$\Delta P$ : 5-30kPa	$\Delta PL$ (kPa)				
	5	15	20	25	30
Size	Qmax	Qmax	Qmax	Qmax	Qmax
DN25	1.38	2.25	2.74	3.24	3.53
DN32	2.53	4.06	4.86	5.42	6.14
DN40	4.03	7.23	8.42	9.14	10.23
DN50	6.32	11.42	13.16	14.86	16.23

$\Delta P$ : 25-70kPa	$\Delta PL$ (kPa)					
	25	30	40	50	60	70
Size	Qmax	Qmax	Qmax	Qmax	Qmax	Qmax
DN25	3.27	3.57	4.18	4.72	5.12	5.52
DN32	5.46	6.24	7.16	8.06	8.93	9.45
DN40	9.75	10.35	12.19	13.86	14.86	15.87
DN50	14.86	16.32	19.13	20.96	22.86	24.83

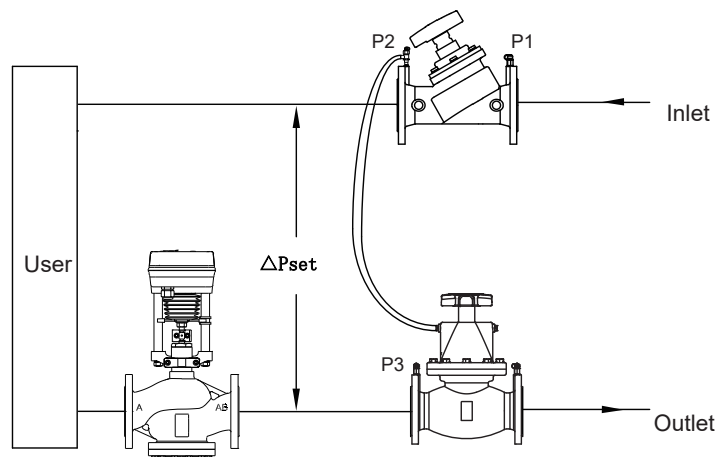
$\Delta P$ : 20-80kPa	$\Delta PL$ (kPa)						
	20	30	40	50	60	70	80
Size	Qmax	Qmax	Qmax	Qmax	Qmax	Qmax	Qmax
DN65	26.4	31.5	37.6	37.2	41.6	45.3	48.4
DN80	32.6	39.6	44.2	48.2	55.2	58.3	61.2
DN100	67.2	73.6	77.3	82.3	86.3	90.4	93.5
DN125	88.6	96.4	102.3	114.5	129.5	131.5	140.2
DN150	108.6	123.5	131.2	142.3	151.3	162.3	170.3
DN200	90.5	114.17	144.7	170.2	191.3	221.6	236.6
DN250	134.2	169.3	214.5	252.3	283.6	328.6	350.8

$\Delta P$ : 40-160kPa	$\Delta PL$ (kPa)												
	40	50	60	70	80	90	100	110	120	130	140	150	160
Size	Qmax	Qmax	Qmax	Qmax	Qmax	Qmax	Qmax	Qmax	Qmax	Qmax	Qmax	Qmax	Qmax
DN65	34.2	38.4	42.3	46.4	49.3	52.3	56.4	69.3	64.5	66.8	68.3	70.2	72.3
DN80	45.2	50.2	53.2	57.3	61.4	64.3	70.3	73.2	76.2	78.3	82.3	85.2	88.2
DN100	76.8	86.4	87.4	93.2	98.6	107.5	114.7	125.6	128.6	137.6	143.2	150.2	156.3
DN125	106.3	116.3	127.6	136.4	143.5	152.6	161.3	168.3	174.3	180.3	188.6	196.3	202.5
DN150	134.6	146.3	188.4	182.3	192.5	208.6	214.6	220.3	228.6	236.4	242.3	248.6	254.3
DN200	152.6	181.1	210.8	226.9	238.3	261.3	279.4	295.7	305.6	315.9	328.1	338.8	345.5
DN250	226.3	268.5	312.6	336.4	353.4	387.5	414.3	438.4	453.2	468.4	486.5	502.4	512.3

## Technical Features

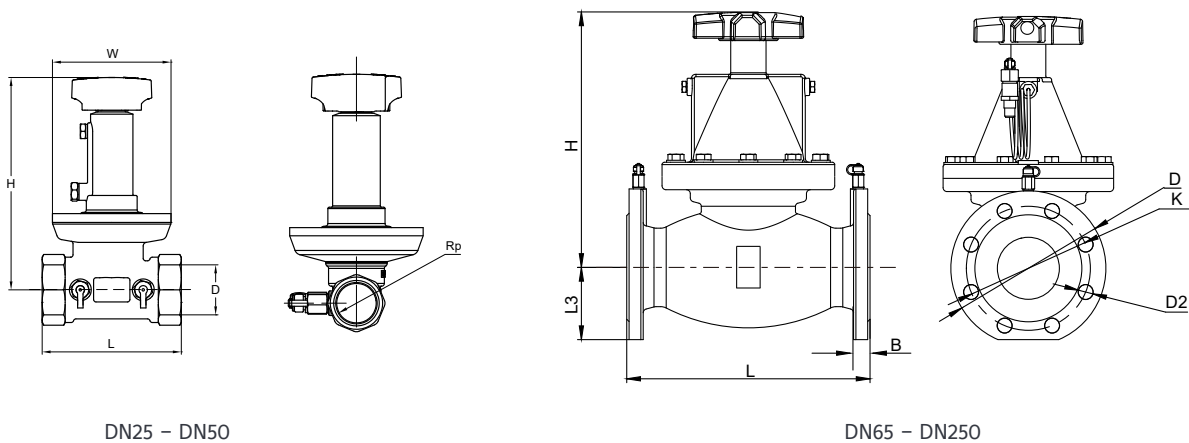
<ul style="list-style-type: none"> <li>• Pressure Rating: PN16 or PN25</li> </ul>	<ul style="list-style-type: none"> <li>Valve Body: Brass HPB59-1 (DN25 ~ DN50)</li> <li>Ductile Iron QT450-10 (DN65 ~ DN250)</li> </ul>
<ul style="list-style-type: none"> <li>• Medium: Regulation of hot / chilled water with glycol up to max. 50% vol. in HVAC system</li> </ul>	
<ul style="list-style-type: none"> <li>• Medium temperature: -10 ~ 120 °C</li> </ul>	<ul style="list-style-type: none"> <li>Stem: Brass HPB59-1 (DN25 ~ DN50)</li> </ul>
<ul style="list-style-type: none"> <li>• Environment temperature: 0 ~ 65 °C, ≤ 95%RH</li> </ul>	<ul style="list-style-type: none"> <li>Stainless steel S304 (DN65 ~ N250)</li> </ul>
<ul style="list-style-type: none"> <li>• Connection: DN25-DN50: Threaded connection ISO7-1 Rp</li> <li>DN65-DN150: Flanged connection ISO7005-2</li> </ul>	<ul style="list-style-type: none"> <li>Diaphragm: EPDM</li> </ul>

## Installation Diagram



Attention: VPPN shall be installed on return pipe with correct flow direction.

## Dimension (mm)



DN25 - DN50

DN65 - DN250

# Balancing Valve

## PN16

Size		Dimension (mm)								Weight
mm	inch	B	D	D2	K	W	H	L	L3	kg
25	1		/	/	/	98	168	100	/	2.1
32	1-1/4		/	/	/	98	172	102	/	2.3
40	1-1/2		/	/	/	98	176	115	/	2.7
50	2		/	/	/	98	182	125	/	3.1
65	2-1/2	19	Φ185	4-Φ19	Φ145	/	299	290	86	24
80	3	19	Φ200	8-Φ19	Φ160	/	325.5	310	92	31
100	4	19	Φ220	8-Φ19	Φ180	/	358	350	102	42
125	5	19	Φ250	8-Φ19	Φ210	/	394	400	116	58
150	6	19	Φ285	8-Φ23	Φ240	/	425	480	132	83
200	8	20	Φ340	12-Φ23	Φ295	/	498	500	162	113
250	10	22	Φ405	12-Φ28	Φ355	/	555	600	195	162

## PN25

Size		Dimension (mm)								Weight
mm	inch	B	D	D2	K	W	H	L	L3	kg
25	1		/	/	/	98	168	100	/	2.1
32	1-1/4		/	/	/	98	172	102	/	2.3
40	1-1/2		/	/	/	98	176	115	/	2.7
50	2		/	/	/	98	182	125	/	3.1
65	2-1/2	19	Φ185	8-Φ19	Φ145	/	299	290	86	24
80	3	19	Φ220	8-Φ19	Φ160	/	325.5	310	92	31
100	4	19	Φ235	8-Φ23	Φ190	/	358	350	102	42
125	5	19	Φ270	8-Φ28	Φ220	/	394	400	116	58
150	6	19	Φ300	8-Φ28	Φ250	/	425	480	132	83
200	8	20	Φ360	12-Φ28	Φ310	/	498	500	162	113
250	10	24.5	Φ425	12-Φ31	Φ370	/	555	600	195	162

# VPMF Series Pressure Independent Control Valves

## Overview

DN15...32, PN25

The VPMF series Pressure Independent Control Valve is the combination of a differential pressure regulator and a regulating valve for flow adjustment. It automatically limits the water flow rate, irrespective of pressure and allows the flow to be modulated to match the load. This leads to a considerable reduction in temperature variations and adjustment movements and the extended life of moving devices connected to it.

The VPMF valve offers complete adjustment flexibility. In combination with Johnson Controls actuators they can be set to a specific flow rate value and allow precise modulating control. Once the maximum flow setting is pre-set using the graduated scale, the flow will be modulated by means of the control valve and actuator independently of the system pressure. The valve always guarantees a suitable flow rate, therefore avoiding high energy consumption.

Since flow rate is the only parameter to be considered, choosing a suitable valve is fast and easy.

Since the VPMF valve performs the functions of two valves (balancing and adjustment), installation costs are considerably reduced.

Since it is not necessary to adjust the valve after its installation, the valve can work immediately after it has been assembled and it eliminates system adjustment cost.



## Features

- Specific devices are not necessary
- Wide range of operating differential pressure
- Compact design that allows installation in small spaces such as fan-coils or narrow supply spaces
- Simple flow rate adjustment
- Dirty resistance allows long life characteristic
- Pressure ports selectable

## Ordering Information

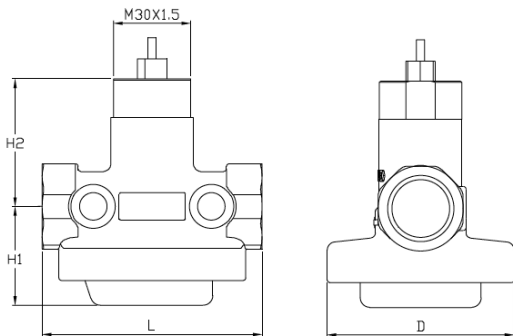
VP	M	F	7	020	P	-C
VP	Balancing valve					
	M	Type: mechanical pressure independent control				
		F	Application: Fan Coil Unit			
			7	Pressure Rating: PN25		
				020	Valve Size: 015 = DN15, 020 = DN20, 025 = DN25, 032 = DN32	
					without pressure port	
				P	with pressure port	
					-C	Place of origin: C = Made in China

# Balancing Valve

## Selection Table

Product Number	Size	Flow rate max. (m <sup>3</sup> /h)	Stroke (mm)	Start-up max. (kPa)	Δ P max. (kPa)	Pressure Ports
VPMF7015-C	DN15	0.9	4	35	500	No
VPMF7020-C	DN20	1.3	4	35	500	No
VPMF7025-C	DN25	2.0	4	35	500	No
VPMF7032-C	DN32	3.5	4	40	500	No
VPMF7015P-C	DN15	0.9	4	35	500	Yes
VPMF7020P-C	DN20	1.3	4	35	500	Yes
VPMF7025P-C	DN25	2.0	4	35	500	Yes
VPMF7032P-C	DN32	3.5	4	40	500	Yes

## Dimensions



DN	L(mm)	D(mm)	H1(mm)	H2(mm)	Weight(kg)
15	74	62	34	46.5	0.6
20	80	68	36	46.5	0.8
25	85	69	42.5	46.5	0.9
32	100	81	53.5	46.5	0.9

Note: \* Weight data is without pressure port fittings (=50g).

## Technical Specifications

- Pressure Rating: PN25
- Fluid Type: Regulation of hot / chilled water with glycol up to max. 50% vol. in HVAC system
- Fluid Temperature: -10 °C to 120 °C
- Flow Rate Accuracy: ± 5%
- Leakage: ≤0.01% (ANSI Class IV IEC 60534-4)
- Pipe Connection: ISO7-1 Rp
- Actuator Connection: M30 x 1.5
- Stem Movement: PDTC (Push Down To Close)
- Storage temperature: -10 to 60 °C
- Materials:
  - Valve body: Brass (Hpb59-1), nickel-plated
  - Stem: SS304
  - Diaphragm: Enhanced EPDM

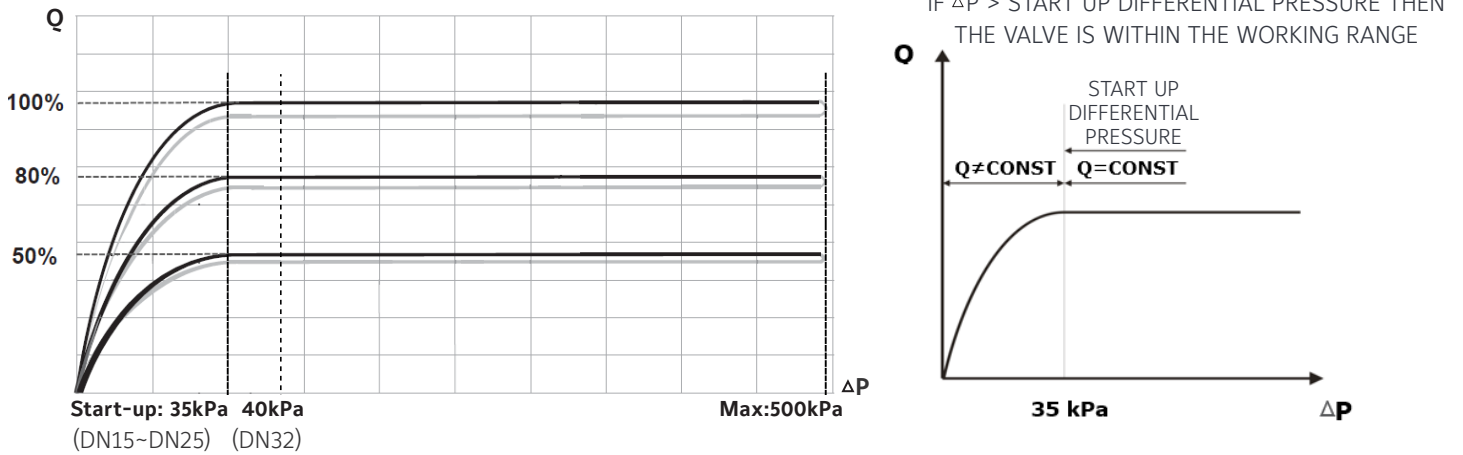


Fig 1: Dynamic Characteristic Curves

Note:  
Choose the smaller value of max. DP and close-off pressure in table "ACTUATOR COMPATIBILITY" as upper limit of working range after actuator is selected.



Max flow rate setting indicator

## Flow Rate Settings

Scale - Flow (m <sup>3</sup> /h)									
Size	2	3	4	5	6	7	8	9	10
DN15	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8	0.9
DN20	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1.0	1.3
DN25	0.3	0.6	0.7	0.8	1.0	1.2	1.4	1.6	2.0
DN32	1.2	1.6	1.9	2.3	2.7	2.9	3.2	3.3	3.5

Fig 2: Max flow rate adjustment

## Actuator Compatibility

Valve Size	Actuator Force	Close-off Pressure max.	Actuator Force	Close-off Pressure max.	Actuator Force	Close-off Pressure max.
DN15	100N	400 kPa	120N	500 kPa	160N	500 kPa
DN20	100N	400 kPa	120N	500 kPa	160N	500 kPa
DN25	100N	400 kPa	120N	500 kPa	160N	500 kPa
DN32	100N	250 kPa	120N	300 kPa	160N	400 kPa

# Balancing Valve

## Following Actuators are Available

### Thermal Actuators

Models	VA-7088-23	VA-7088-21
Type of Control	ON/OFF	
Action	Stem retracts when energized	
Supply Voltage (50/60 Hz)	230 VAC $\pm$ 10%	24 VAC/VDC + 20%...-10%
Power Consumption	1 W	
Switching Current for Micro Switch	5A resistive load 1A inductive load	3A resistive load 1A inductive load
Nominal Force	100N + 5%	
Nominal Stroke	5 mm	
Running Time	~ 4 min	~ 4.5 min
Electrical Connection	1.5m PVC cable, wire sections 2 x 0.75 mm <sup>2</sup>	
IP Rating	IP54 (EN60529)	
Ambient Operating Condition	0° C to 60° C, non-condensing	
Ambient Storage Condition	-25° C to 60° C, non-condensing	
Connection to Valves	M30 x 1.5	
Weight (excl. packaging)	0.1 Kg	
CE Compliance	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of:	
	EMC Directive and Low Voltage Directive	EMC Directive

Note: See "VA-7088" Product Bulletin for more information of actuators.

## Wiring Diagram

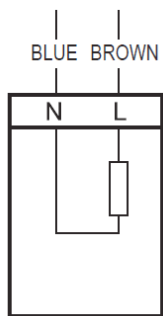


Fig 3: VA7088-2x Wiring Diagram

## Dimensions

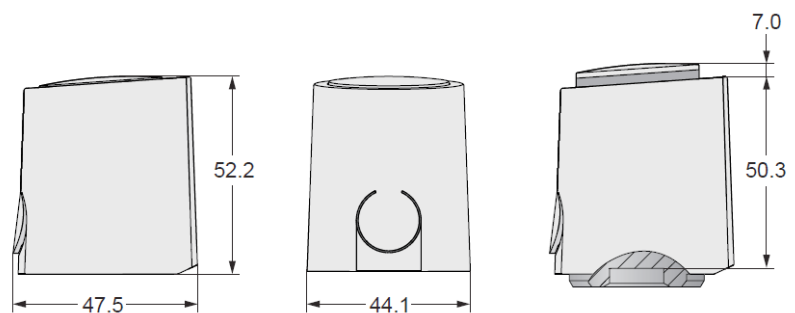


Fig 4: VA7088-2x Dimensions

## Motorized Actuators

Models	VA-7481-0003	VA-7483-8201
Type of Control	Floating or PAT	Proportional
Action	<b>Input</b>	
	Brown wire energised	↓ Actuator stem extends
	Orange wire energised	↑ Actuator stem retracts
Supply Voltage (50/60 Hz)	230 VAC ± 10%	24 VAC/VDC ± 15%
Power Consumption	2.2 W	1.5 W
Input Signal	---	0(2)···10VDC
Feedback Signal	---	0(2)···10 VDC
Nominal Force	120 N	160N
Max. Mechanical Stroke	6.3 mm	6.3 mm
Factory Stoke Config.	---	Auto stroke detection
Running Time	8 sec/mm	8 sec/mm
Operating Status Indications	LED	
Electrical Connection	1.5m PVC cable, wire sections 3 x 0.75 mm <sup>2</sup>	2m PVC cable, wire sections 4 x 0.35 mm <sup>2</sup>
IP Rating	IP43 (EN60529)	IP54 (EN60529)
Ambient Operating Condition	0 °C to 50 °C, 10 to 90 RH%	
Ambient Storage Condition	-20 °C to 65 °C, 5 to 95 RH%	
Connection to Valve	M30 x 1.5	
Weight	0.2 Kg	
CE Compliance	Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and Low Voltage Directive	

Note: See "VA-748x" Product Bulletin for more information of actuators.

## Dimensions

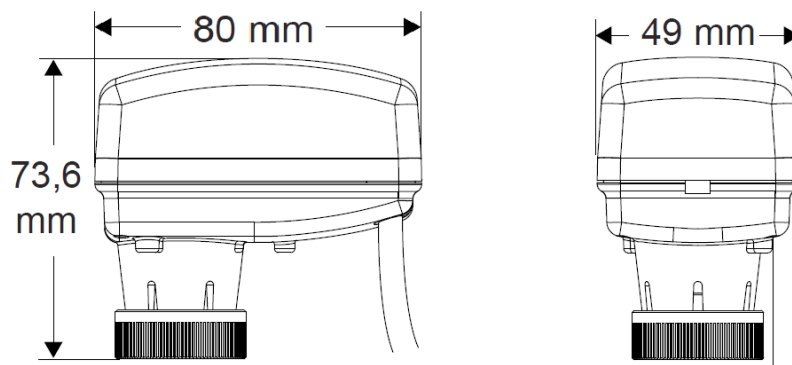
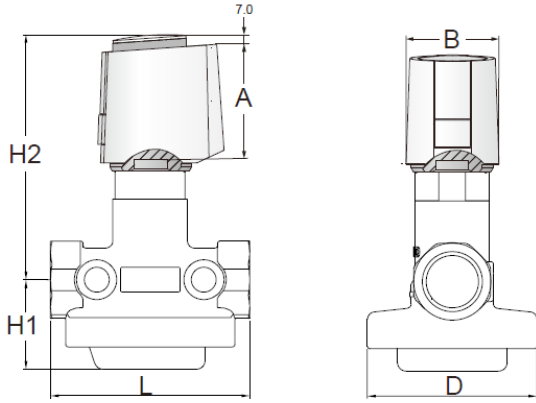


Fig 5: VA748x Dimensions

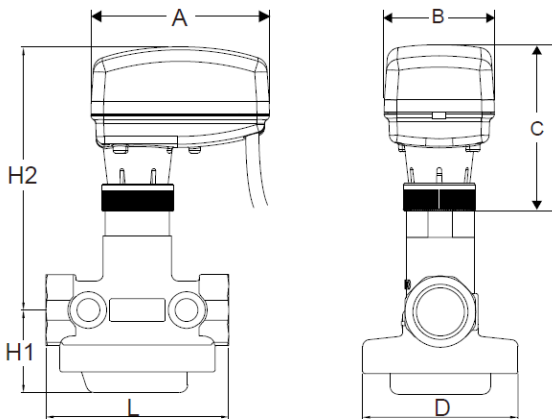
# Balancing Valve

## Assembly Dimensions (Valve with thermal actuator)



DN	L (mm)	D (mm)	H1 (mm)	H2 (mm)	A (mm)	B (mm)
15	74	62	34	104	53	44.3
20	80	68	36	104	53	44.3
25	85	69	42.5	104	53	44.3
32	100	81	53.5	104	53	44.3

## Assembly Dimensions (Valve with motorized actuator)



DN	L (mm)	D (mm)	H1 (mm)	H2 (mm)	A (mm)	B (mm)	C (mm)
15	74	62	34	115	80	49	73.6
20	80	68	36	115	80	49	73.6
25	85	69	42.5	115	80	49	73.6
32	100	81	53.5	115	80	49	73.6



# VPMA Series Pressure Independent Control Valves

## Overview

DN32...250, PN16, 2-way

The VPMA series Pressure Independent Control Valve is a combination of a differential pressure regulator and a regulating valve for flow adjustment. VPMA offers a remarkable adjustment flexibility.

In combination with VAP actuator, it automatically limits the water flow rate, irrespective of pressure and allows precise modulating control, therefore avoiding too high energy consumption.

Since VPMA valve performs the functions of two valves (balancing and adjustment), the installation costs are considerably reduced.

Since it is not necessary to adjust the valve after installation, the system adjustment costs is eliminated.



DN32-DN50

DN65-DN250

## Features

- Wide range of operating differential pressure
- High control accuracy provides the equal percentage flow curve
- Pressure ports selectable (threaded valves)
- Built-in balancing tube allows compact size and avoid damages
- Dirty resistance allows long life characteristic

## Ordering Information

VP	M	A	6	050	P	-C	
VP	Balancing Valve						
	M	Type: mechanical pressure independent control					
		A	Typical Application: AHU				
			6	Pressure Rating: 6 = PN16			
				050	Valve Size: 032 = DN32 ... 250 = DN250		
					Without pressure ports		
					P	With pressure ports	
						-C	Place of origin

Note: See available product number for ordering in "Selection Table".

# Balancing Valve

## Selection Table

Valve Number	Size	Flow rate max (m <sup>3</sup> /h)	Rated Stroke (mm)	Start-up $\Delta P$ (kPa)	$\Delta P$ max. (kPa)	Pressure Ports	Actuator Number
VPMA6032-C	DN32	4	20	35	500	No	VAP600S-24-C/CN
VPMA6032P-C	DN32	4	20	35	500	Yes	VAP600S-24-C/CN
VPMA6040-C	DN40	6	20	35	500	No	VAP600S-24-C/CN
VPMA6040P-C	DN40	6	20	35	500	Yes	VAP600S-24-C/CN
VPMA6050-C	DN50	8	20	35	500	No	VAP600S-24-C/CN
VPMA6050P-C	DN50	8	20	35	500	Yes	VAP600S-24-C/CN
VPMA6065P-C	DN65	21	20	35	500	Yes	VAP600S-24-C/CN
VPMA6080P-C	DN80	28	40	35	500	Yes	VAP1000L-24-C/CN
VPMA6100P-C	DN100	50	40	35	500	Yes	VAP1000L-24-C/CN
VPMA6125P-C	DN125	90	40	35	500	Yes	VAP1000L-24-C/CN
VPMA6150P-C	DN150	145	40	35	500	Yes	VAP1000L-24-C/CN
VPMA6200P-C	DN200	208	40	35	500	Yes	VAP3000L-24-C/CN
VPMA6250P-C	DN250	240	40	35	500	Yes	VAP3000L-24-C/CN

## Technical Specifications

- Pressure Rating: PN16
- Fluid Type: Regulation of hot / chilled water with glycol up to max. 50% vol. in HVAC system
- Fluid Temperature: -10°C ~ 120°C
- Flow Characteristic: Equal percentage
- Stem Movement: PDTC (Push Down To Close)
- Leakage:  $\leq 0.01\%$  Kvs (ANSI Class IV IEC 60534-4)
- Flow Rate Accuracy:  $\pm 5\%$
- Pipe Connection: DN32-DN50 Threaded ISO7-1 Rp  
DN65-DN250 Flanged ISO7005-2
- Pressure Port Connection: G1/4
- Ambient Operating Condition: -10 ~ 65°C,  $\leq 95\%$ RH, non-condensing
- Ambient Storage Condition: -25°C ~ 60°C,  $\leq 95\%$ RH, non-condensing
- Materials:
  - Valve Body: Brass, nickel-plated (DN32 - 50)  
Ductile Iron (DN65 - DN250)
  - Stem: Stainless Steel
  - Plug: Stainless Steel
  - Diaphragm: Enhanced EPDM
  - Stem Seal: PTFE + fluorine rubber

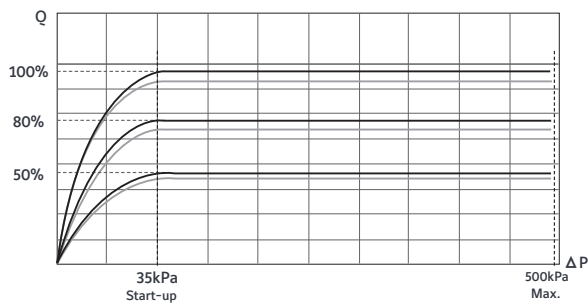


Fig 1: Dynamic Characteristic Curves

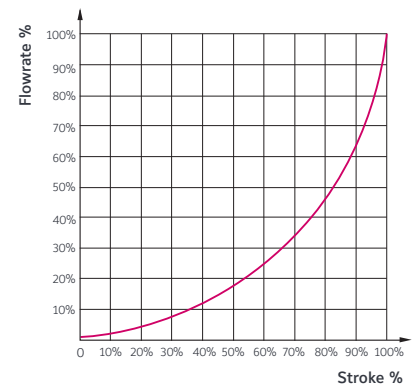
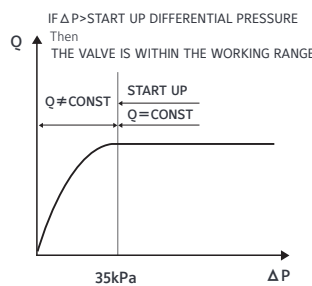


Fig 2: Flow characteristic - equal percentage

## Valve Dimensions

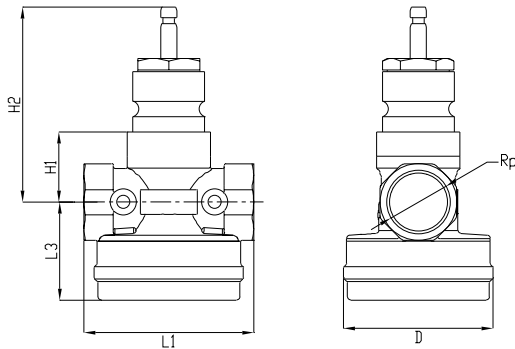


Fig 3: DN32-DN50

Size	Rp	L1 mm	L3 mm	D mm	H1 mm	H2 mm	Weight kg
DN32	1-1/4"	104	59	92	33	109.5	7.4
DN40	1-1/2"	115	63	105	36	112.5	9.4
DN50	2"	130	70.5	120	40.5	117	13

Note: Weight data is without pressure port fittings (=50g).

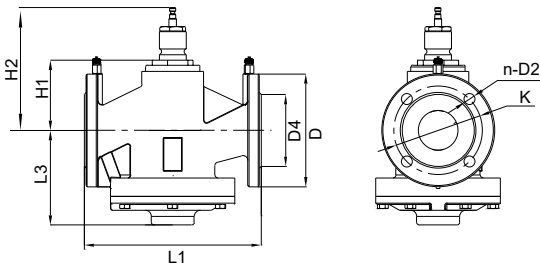


Fig 4: DN65-DN250

Size	D mm	n-D2 mm	D4 mm	K mm	L1 mm	L3 mm	H1 mm	H2 mm	Weight kg
DN65	185	4-19	118	145	290	155	115	191.5	24
DN80	200	8-19	132	160	310	167	148	224.5	34
DN100	220	8-19	156	180	350	181	150	226.5	49
DN125	250	8-19	184	210	400	197	163	239.5	63
DN150	285	8-23	211	240	480	222	198	274.5	82
DN200	340	12-23	266	295	500	245	180	256.5	129
DN250	405	12-28	319	355	600	277	210	286.5	195

## Actuator Compatibility

### VAP SERIES NON-SPRING RETURN ACTUATOR

- Supply Voltage: 24VAC / DC ± 15%, 50/60Hz
- Control Type: Proportional control or Floating control
- Input Signal: 0 (2)~10VDC / 0 (4)~20mA or PAT (Position Adjustment Time)
- Feedback Signal (applies only to proportional control mode): 0(2)~10VDC / 0(4)~20mA
- Protection Class: IP65

Actuator Number	Rated Force (N)	Rated Stroke (mm)	Running Time (low speed) (s/mm)	Running Time (high speed) (s/mm)	Connection to Valve
VAP600S-24-C/CN	600	30	2	1	S12
VAP1000L-24-C/CN	1000	50			S14
VAP3000L-24-C/CN	3000	50			S14

Note: See "VAP series Actuators" Product Bulletin for more information of actuators.

# Balancing Valve

## Wiring Diagram

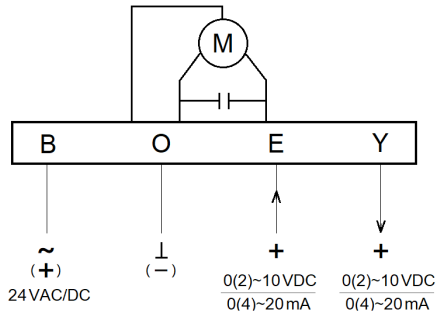


Fig 5: Proportional Application

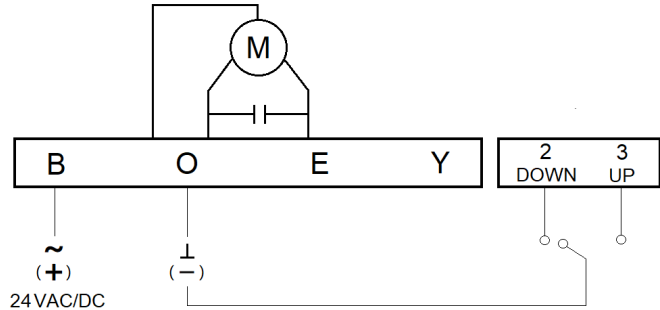


Fig 6: Floating Application

Note: See "VAP series Actuators" Product Bulletin for more operating of actuator and DIP switches settings.

## Assembly Dimensions

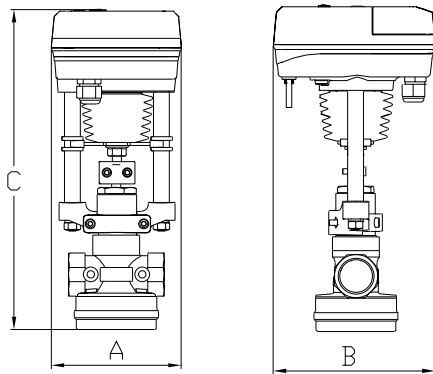


Fig 7: DN32 ~DN50 Assembly

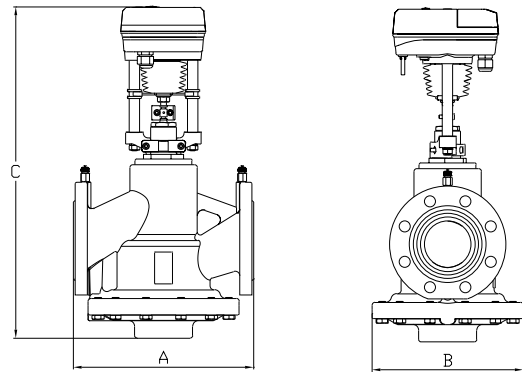


Fig 8: DN65 ~DN250 Assembly

Size	A (mm)	B (mm)	C (mm)
DN32	143	173	347
DN40	143	173	354
DN50	143	173	366
DN65	290	230	525
DN80	310	260	590
DN100	350	282	606
DN125	400	304	635
DN150	480	384	695
DN200	500	430	710
DN250	600	500	772

**Software License.** Any software (including firmware) included in or with this product is licensed, not sold, and is subject to the terms of the Johnson Controls End User License Agreement available at <https://www.johnsoncontrols.com/buildings/legal/digital/generaleula>. Any open source software included in or with this product is subject to the terms of its respective license. By using any of the foregoing software, you are also agreeing to be bound to the terms of such licenses.

## M9104 Series Electric Non-Spring Return Actuators

### Introduction

The M(VA)9104 series non-spring return electric actuators are compact and suitable for damper or water valve control in HVAC systems. This compact actuator offers an operating torque of 4Nm and is available in a variety of control modes such as on/off, floating, and proportional control.

The series M9104 damper actuators are suitable for diameters up to 13mm (1/2 in.) round damper shaft or up to 10mm (3/8 in.) diameter damper shafts. The VA9104 Series Ball Valve Actuator can be installed directly on Johnson Controls VG1000 Series ball valves without the need for additional mounting accessories.



### Features

Characteristic	Benefit
The maximum audible noise level at a distance of 1 meter is 35 dBA	Silent operation
Synchronous drive (-AGA, -IGA, -GGA models)	Constant running time, independent of load
Electromagnetic clutch protection	Protects the actuator gear from damage due to over torque
100,000 cycles	Assure long time reliability
Direct mounting using a single screw	Save installation time and cost
Manual Override	Adjust the valve manually without power supply
Electrical connection of cable or screw terminals	Quick and easy for wiring
Optional field-mounted protective cover	Follow NEMA 4X, IP66 compliant



# Electric Damper Actuator

## Selection Chart

Code Number	Torque	Rotation Time for 90°	Power Requirement		Input Signal			Position Feedback	Electrical connection	
	N.m	Running (second)	24VAC, 50/60Hz	100 to 240VAC, 50/60Hz	Floating control (without timeout function).	On/off or floating control (with timeout function).	Proportional control	DC 0(2) to10V	1.2m PVC Cable	M3 screw terminals (Requires a flat-blade screwdriver)
M9104-AGA-1S M9104-AGA-2S	4	60 @60 Hz 72 @50 Hz	×		×				×	
VA9104-AGA-1S VA9104-AGA-2S	4	60 @60 Hz 72 @50 Hz	×		×				×	
M9104-IGA-1S	4	60 @60 Hz 72 @50 Hz	×			×			×	
VA9104-IGA-1S	4	60 @60 Hz 72 @50 Hz	×			×			×	
M9104-IUA-1S	4	60 @60 Hz 72 @50 Hz		×		×			×	
VA9104-IUA-1S	4	60 @60 Hz 72 @50 Hz		×		×			×	
M9104-GGA-1S	4	60 @60 Hz 72 @50 Hz	×				×	×	×	
VA9104-GGA-1S	4	60 @60 Hz 72 @50 Hz	×				×	×	×	
M9104-AGA-3S	4	60 @60 Hz 72 @50 Hz	×		×					×
VA9104-AGA-3S	4	60 @60 Hz 72 @50 Hz	×		×					×
M9104-IGA-3S	4	60 @60 Hz 72 @50 Hz	×			×				×
VA9104-IGA-3S	4	60 @60 Hz 72 @50 Hz	×			×				×
M9104-GGA-3S	4	60 @60 Hz 72 @50 Hz	×				×			×
VA9104-GGA-3S	4	60 @60 Hz 72 @50 Hz	×				×			×

## Technical Specifications

Power Requirements	M(VA)9104-AGA-xS	AC 24 V +25%/-20%, 50/60 Hz, 2.1 VA, Class 2, SELV
	M(VA)9104-IGA-xS	AC 24 V +25%/-20%, 50/60 Hz, 3.0 VA, Class 2, SELV
	M(VA)9104-GGA-xS	AC 24 V +25%/-20%, 50/60 Hz, 2.9 VA, Class 2, SELV
	M(VA)9104-IUA-xS	AC 100 to 240 V (-15%+10%), 50/60 Hz, 0.07A, 7.5 VA
Control Type	M(VA)9104-AGA-xS	Floating control without timeout
	M(VA)9104-IGA-xS	On/off or floating control with timeout
	M(VA)9104-GGA-xS	Proportional control
	M(VA)9104-IUA-xS	On/off or floating control with timeout
Input Signal	M(VA)9104-AGA-xS	AC 24 V +25%/-20%, 50/60 Hz, Class 2, SELV, without timeout
	M(VA)9104-IGA-xS	AC 24 V +25%/-20%, 50/60 Hz, Class 2, SELV, with timeout
	M(VA)9104-GGA-xS	DC 0 (2) to 10 V or 0 (4) to 20 mA with field furnished 500 ohm resistor
	M(VA)9104-IUA-xS	AC 100 to 240 V (-15%+10%), 50/60 Hz, 0.07A, 7.5 VA
Feedback signal	M(VA)9104-GGA-1S	0 to 10 VDC or 2 to 10 VDC for 90° , Corresponds to input signal span selection
Rotation range	M (VA) 9104 series	93° ±3° , CW or CCW
Cycles	M (VA) 9104 series	100,000 Full Stroke Cycles; 2,500,000 Repositions at Rated Running Torque
Audible noise	M (VA) 9104 series	35 dBA Nominal at 1 m
Electrical connections	M(VA)9104-xGA-3S	M3 screw terminal block (requires a flat blade screwdriver).
	M(VA)9104-xGA-1S	48 in. (1.2 m) UL 444 Type CMP Plenum Rated Cable with 19 AWG (0.75 mm <sup>2</sup> ) conductors and .25 in. (6 mm) ferrule ends
	M(VA)9104-IUA-1S	1.2m (48 in.) Cable, with 18 AWG (1.02 mm) conductor and 10mm (3/8 in.).Flexible metal conduit fittings
Mechanical connections	M9104 series	Up to 1/2 in. (13 mm) Diameter Round Damper Shaft or 3/8 in. (10 mm) Square Damper Shaft
IP rating	M(VA)9104-xxA-1S/2S	NEMA 1, IP42
	M(VA)9104-xxA-3S	NEMA 1, IP40
Operation conditions	M (VA) 9104 series	-4 to 140° F (-20 to 60° C); 90% RH Maximum, Noncondensing
Storage conditions	M (VA) 9104 series	-20 to 150° F (-29 to 66° C); 90% RH Maximum, Noncondensing
Shipping Weight	M9104 series	0.5 kg (1.0 lb)
	VA9104 series	0.55 kg (1.25 lb)
Compliance	M (VA) 9104 series	USA: UL Listed, CCN XAPX, File 27734 Plenum rated, UL2043, suitable for use in other environmental spaces (plenums) in accordance with section 300.22.(c) of the National Electrical Code
		Canada: cUL Listed, CCN XAPX7, File 27734 Plenum Rated Per CSA 22.2 No. 236/UL 1995, Heating and Cooling Equipment
		Europe: Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive.
		Australia & New Zealand: C-Tick, Australian/New Zealand Emission Compliant
		United Kingdom: UKCA DoC, UK compliant

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

# Electric Damper Actuator

## M9203 Series Electric Spring Return Actuators

### Introduction

The M9203 Spring Return Electric Damper Actuator series has been specially developed for the motorized operation of air dampers in Air Conditioning Systems. It provides a 3 Nm torque.

When the control signal is applied the actuator drives the damper to the operational position.

After a power failure the stored energy in the spring immediately brings the damper to the safety position.

The compact design and universal adapter fitted with limitation of rotation angle make this actuator highly versatile.

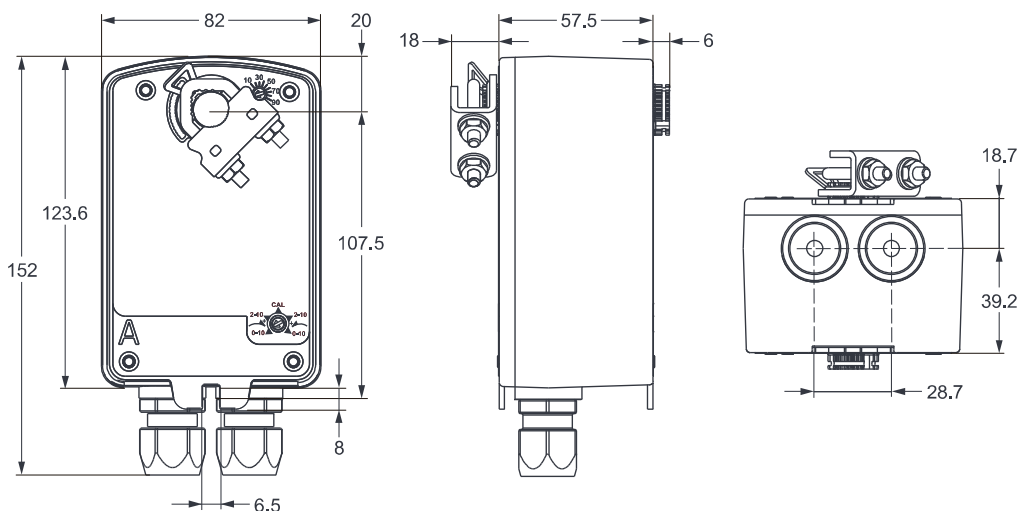


3 Nm Rotary Actuators for Dampers

### Features

- 24 V AC/DC and 240 V AC power supply
- ON/OFF, Floating and Proportional Control
- Direct mounting on round shaft 6 to 12 mm or square shafts 6 to 8 mm.
- Integral cables with coloured and numbered conductors Reversible mounting
- Limitation of rotation angle
- Override control (proportional models only)
- Optional auxiliary switch
- IP54 Enclosure protection

### Dimensions (in mm)



## Ordering Information

Codes	Running time (s/mm)	Control signals	Supply voltage (50/60 Hz)	1 Auxiliary Switch	
M9203-AGA-1	150	ON/OFF and Floating	24 VAC/DC	-	
M9203-AGB-1				■	
M9203-AGA-1Z	90			-	
M9203-AGB-1Z				■	
M9203-BGA-1	60	ON/OFF	100 - 240VAC	-	
M9203-BGB-1				■	
M9203-BUA-1				-	
M9203-BUB-1				■	
M9203-BUA-1Z	27		-		
M9203-BUB-1Z			■		
M9203-GGA-1	150		Proportional	24VAC/DC	-
M9203-GGB-1					■
M9203-GGA-1Z	90	-			
M9203-GGB-1Z		■			

## Accessories (order separately)

Codes	Description
M9000-322	Weathershield kit for damper application of M9203 and M9208 series electric spring return Actuators (quantity 1)
M9000-342	Weathershield kit for VG1000 series ball valve application of M(VA)9104, M(VA)9203 and M(VA)9208 series electric spring return Actuators (quantity 1)
M9000-400	Jackshaft linkage adapter kit (quantity 1)
M9000-560	Ball valve linkage kit for applying M9203 and M9208 series electric Actuators to VG1000 series valves (quantity 1)
M9000-561	Thermal barrier kit for M9000-560 ball valve linkage Extends M0(A)9104, M(VA)9203 and M0(A)9208 series electric spring return Actuators applications to include low pressure steam (quantity 1)
M9000-604	Replacement anti-rotation bracket Kit for M9203, M9208, M921 O and M9220 series electric spring return Actuators (quantity 1)
M9000-607	Position indicator for VG1000 series ball valve applications (quantity 5)
M9203-100	Remote mounting kit with crankarm kit (quantity 1)
M9203-110	Universal mounting kit without Crankarm kit (quantity 1)
M9203-115	Universal mounting kit with crankarm kit (quantity 1)
M9203-150	Crankarm kit (quantity 1)
M9203-250	Remote mounting kit with crankarm kit and damper linkage for D1300 dampers (quantity 1)
M9203-603	Adjustable stop kit for M9203 series electric spring return Actuators (quantity 1)

## M9208 Series Electric Spring Return Actuators

### Introduction

The M9208 Spring Return Electric Damper Actuator series has been specially developed for the motorized operation of air dampers in Air Conditioning Systems.

It provides a 8 Nm torque.

When the control signal is applied the actuator drives the damper to the operational position.

After a power failure the stored energy in the spring immediately brings the damper to the safety position.

The compact design and universal adapter fitted with limitation of rotation angle make this actuator highly versatile.



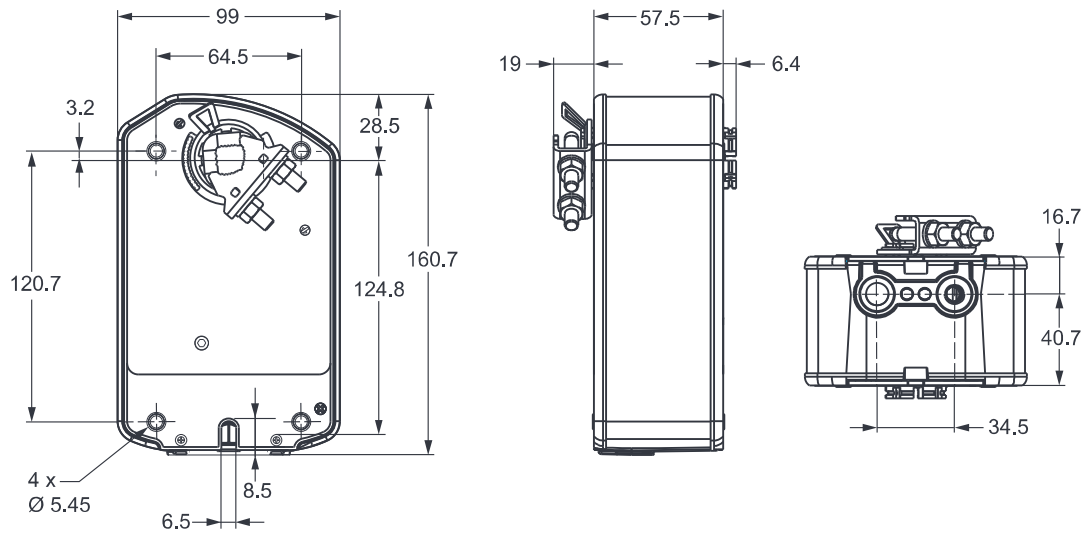
8 Nm Rotary Actuators for Dampers

### Features

- 24 V AC/DC and 240 V AC power supply
- ON/OFF, Floating and Proportional Control
- Direct mounting on round shaft 8 to 16 mm or square shafts 6 to 12 mm. Optional Jackshaft coupler (M9208-600) available for 12 to 19 mm round shaft or 10 to 14 mm square shaft
- Integral cables with coloured and numbered conductors
- Limitation of rotation angle
- Manual positioning with crank handle
- Optional integrated auxiliary switches
- IP54 Enclosure protection



## Dimensions (in mm)



## Ordering Information

Codes	Running time (s)		Control signals	Supply voltage (50/60 Hz)	2 Auxiliary Switch
	Motor	Spring			
M9208-AGA-1	150	17...25	ON/OFF and Floating	24 V AC/DC	-
M9208-AGC-1					■
M9208-BGA-1	55...71	13...26	ON/OFF	24 V AC	-
M9208-BGC-1					■
M9208-BDA-1	55...71	13...26	ON/OFF	230 V AC	-
M9208-BDC-1					■
M9208-GGA-1	150	17...25	Proportional 0...10 V DC / 2...10 V DC	100 - 240 V AC	-
M9208-GGC-1					■

## M9220 Series Electric Spring Return Actuators

### Introduction

The M9220 Spring Return Electric Damper Actuator series has been specially developed for the motorized operation of air dampers in Air Conditioning Systems.

It provides a 20 Nm torque.

When the control signal is applied the actuator drives the damper to the operational position.

After a power failure the stored energy in the spring immediately brings the damper to the safety position.



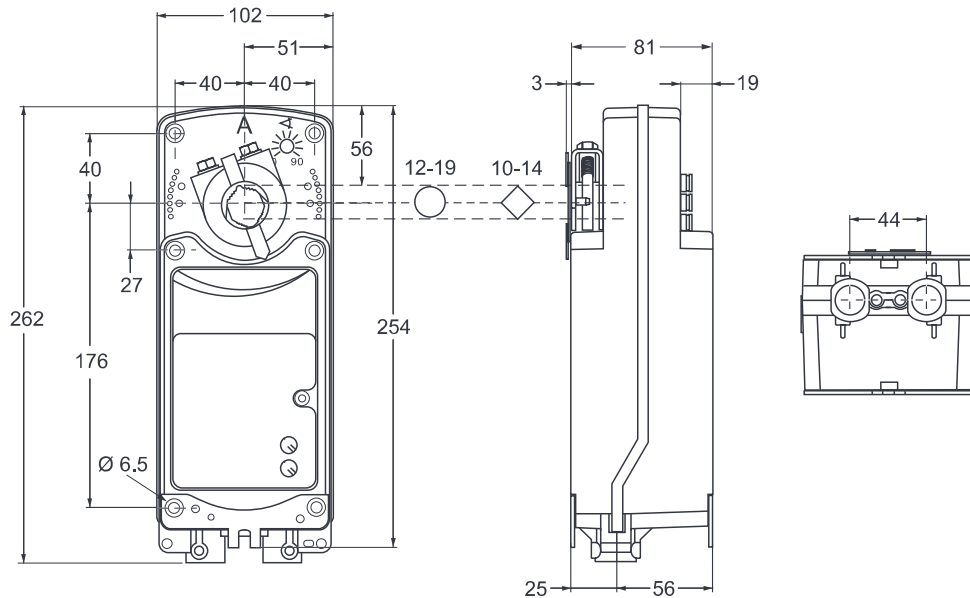
20 Nm Rotary Actuators for Dampers

### Features

- 24 V AC/DC and 240 V AC power supply
- ON/OFF, Floating and Proportional Control
- Direct mounting on round shaft 0 12 to 19 mm or square shafts 10-12-14 mm. Optional Jackshaft coupler (M9220-600) available for 0 19 to 27 mm round shaft or 16-18-19 mm square shaft
- Integral cables with coloured and numbered conductors Limitation of rotation angle
- Manual positioning with crank handle
- Optional integrated auxiliary switches
- IP54 Enclosure protection



## Dimensions (in mm)



## Ordering Information

Codes	Running time (s/mm)		Control signals	Supply voltage (50/60 Hz)	2 Auxiliary Switch
	Motor	Spring			
M9220-AGA-1	150	20	ON/OFF and Floating	24 V AC/DC	-
M9220-AGC-1					■
M9220-BDA-1	25...57	11...15	ON/OFF	230 V AC	-
M9220-BDC-1					■
M9220-BGA-1					-
M9220-BGC-1					■
M9220-GGA-1	150	26	Proportional (2)... 10 V DC	24 V AC/DC	-
M9220-GGC-1			■		
M9220-HGA-1			Proportional 0(2)... 10 V DC with span offset		-
M9220-HGC-1			■		

# Electric Damper Actuator

## M9300 Series Electric Non-Spring Return Actuators

### Introduction

The M/VA9300 Series Electric Non-Spring Return Actuators provide control of dampers in HVAC also control of valves such as ball valve and butterfly valve. All actuators in this series provide 8Nm to 35Nm torque.

The series provides Automatic Signal Input Detection, which allows automatic recognition of input signals for on/off, floating, and proportional control.

The series are configured for direct mounting and do not require damper linkage. Actuators can be mounted directly to a damper shaft from 10mm to 27 mm diameter and 16 to 19 mm square with a universal clamp.

An accessory crank arm and remote mounting kit are available for applications where the actuator cannot be direct-coupled to the damper shaft.



Fig.1 M(VA) 9300 Series

### Table 1: Features and Benefits

Features	Benefits
Automatic Signal Input Detection, On/Off, Floating, and Proportional Control with Adjustable Span and Offset	Increases availability at distributors and simplifies retrofits
Self-Calibrating Input Signal to Adjust Stroke	Eliminates the need for a complex calibration procedure when adjusting stops
Electronic Stall Detection	Protects from overload at all angles of rotation. The actuator may be stalled anywhere in its rotation range without the need for mechanical end switches
100,000 Cycles and 2.5 Millions Repositions	Assure long time reliability
Underwriters Laboratories Inc.® (UL), CE Mark, and RCM Compliance	Provides internationally recognized regulatory agency approvals



## Technical Specifications

Code Number	Running torque	Rotation time for 90°	Power supply		Input signal			Position feedback	Mechanical connection			Electrical connection		Auxiliary switches
	N·m	Running (seconds)	24V AC/DC	85 to 264 VAC	On/off	Floating	Proportional Dc 0 (2) to 10 V(with adjustable Span and Offset)	DC 0 (2) to 10 V	Round: 9.5 to 19 mm Square: 8 to 16 mm	Round: 19 to 27 mm Square: 16 to 19 mm	Round: 10 to 19 mm Square: 10 to 16 mm	1.2m halogen free cable 82 mm <sup>2</sup> conductors and 6 mm ferrule ends	13 mm NPSM threaded conduit connectors	1 x SPDT or 2 x SPDT
M9308-AGA-1Z	8 N·m	8	X		X	X			X			X	Optional1	Optional2
M9308-AUA-1Z	8 N·m	8		X	X	X			X			X	Optional1	Optional2
M9310-AUA-3	10 N·m	90		X	X	X			X			X	Optional1	Optional2
VA9310-AUA-3	10 N·m	90		X	X	X						X	Optional1	Optional2
M9310-HGA-3	10 N·m	90	X		X	X	X	X3	X			X	Optional1	Optional2
VA9310-HGA-3	10 N·m	90	X		X	X	X	X3				X	Optional1	Optional2
M9320-AUA-1	20 N·m	90		X	X	X				X		X	Optional1	Optional2
VA9320-AUA-3	20 N·m	90		X	X	X						X	Optional1	Optional2
M9320-HGA-1	20 N·m	90	X		X	X	X	X3		X		X	Optional1	Optional2
VA9320-HGA-3	20 N·m	90	X		X	X	X	X3				X	Optional1	Optional2
M9320-AUA-4	20 N·m	90		X	X	X					X	X	Optional1	Optional2
M9320-HGA-4	20 N·m	90	X		X	X	X	X3			X	X	Optional1	Optional2
M9335-AUA-1	35 N·m	150		X	X	X				X		X	Optional1	Optional2
VA9335-AUA-3	35 N·m	150		X	X	X						X	Optional1	Optional2
M9335-HGA-1	35 N·m	150	X		X	X	X	X3		X		X	Optional1	Optional2
VA9335-HGA-3	35 N·m	150	X		X	X	X	X3				X	Optional1	Optional2
M9335-AUA-4	35 N·m	150		X	X	X					X	X	Optional1	Optional2
M9335-HGA-4	35 N·m	150	X		X	X	X	X3			X	X	Optional1	Optional2

1. Order separately M9300-100 (quantity 5)
2. Order separately M9300-1 or M9300-2
3. Feedback is only available when 0(2) to 10V proportional input is used.

# Electric Damper Actuator

## Accessories (order separately)

Code number	Description
M9000-322	NEMA 4X, IP66/67 weather shield kit for damper application of M9104, M9310, M9203 and M9208 Series Electric Actuators
M9000-342	NEMA 4X, IP66/67 weather shield kit for VG1000 Series Ball application of VA9104, VA9310, VA9203 and VA9208 Series Electric Actuators (quantity 1)
M9000-561	Thermal Barrier Kit, extends the VA9104, VA9310, VA9203 and VA9208 Series Electric Actuators applications to include low pressure steam
M9000-604	Replacement anti-rotation bracket kit for M9310, M9203, M9208, M9210 and M9220 Series Electric Actuators
M9000-606	Position indicator (quantity 5)
M9300-1	External auxiliary switch kit, one single-pole, double-throw (SPDT)
M9300-2	External auxiliary switch kit, two (SPDT)
M9300-100	Threaded conduit adapters for 13 mm electrician's fittings (quantity 5)
M9300-140	External auxiliary feedback potentiometer, 140 ohm (optional for 140 ohm position feedback)
M9000-151	Remote mounting kit, with crankarm and damper linkage for M9108, M9116, M9124, and M9300 Series Electric Damper Actuators
M9300-1K	External auxiliary feedback potentiometer, 1k ohm (optional for 1k ohm position feedback)
M9300-2K	External auxiliary feedback potentiometer, 2k ohm (optional for 2k ohm position feedback)
M9300-10K	External auxiliary feedback potentiometer, 10k ohm (optional for 10k ohm position feedback)
M9310-500	Ball valve linkage kit for converting M9308 and M9310 Series Electric Damper Actuators into VA9308 and VA9310 Series Electric Valve Actuators to operate VG1000 ball valves
M9310-600	Standard coupler kit for M9308 and M9310 Series Electric Damper Actuators; round 10 to 19 mm and square 10 to 16 mm

## Technical Specifications

### M9308-AxA-1Z and M9310-AUA-1 Series Electric Non-Spring Return Actuators

Product description	M9308-AGA-1Z: Floating and on/off mode	M9308-AUA-1Z: Floating and on/off mode	M9310-AUA-1: Floating and on/off mode
Power requirements	AC 24 V+20% at 50/60 Hz, Class 2 (North America) or SELV (Europe), 12.7 VA running; DC 24V ±10% Class 2 (North America) or SELV (Europe), 5.7 W running	Nominal AC 120 V at 60 Hz: 0.07 A running	Nominal AC 120 V at 60 Hz: 0.04 A running
Transformer sizing requirements	≥13 VA	-	-
Input signal/adjustments	AC 19.2 to 28.8 V at 50/60 Hz or DC 24 V ±10% Class 2 (North America) or SELV (Europe)	AC 100 to 240 V (AC 85 to 264 V) at 50/60 Hz	
Running torque	8 N·m		10 N·m
Rotation range	Mechanically limited 35 to 95° (±3°) in 5° increments		
Rotation time for 90° of travel	8 seconds, constant at all operating conditions		90 seconds, constant at all operating conditions
Cycles	60,000 full stroke cycles; 1,500,000 repositions		100,000 full stroke cycles; 2,500,000 repositions
Audible noise	<52 dBA at 0 to 8 N·m load, at a distance of 1 m		<35 dBA at 1 m
Electrical connections	1.2 m halogen free cable with 18 AWG (0.82 mm <sup>2</sup> ) conductors and 6mm ferrule ends		
Conduit connections	13 mm NPSM threaded conduit connectors with M9300-100 Conduit Connector (optional with the M9308-AGA-2Z)		
Ambient conditions	<b>Operating:</b> -22 to 140° F (-30 to 60° C), 95% RH, noncondensing <b>Storage:</b> -40 to 185° F (-40 to 85° C), 95% RH, noncondensing		
Enclosure	NEMA 5/IP54		
Shipping weight	2 lb (0.9 kg)		
Compliance	<b>United States:</b> UL Listed, CCN XAPX, File E27734: 10 UL 60730-1: Automatic Electrical Controls for Household and Similar Use, Part 1; and UL 60730-2-14: Part 2, Particular Requirements for Electric Actuators. Plenum Rated (UL 2043). Suitable for use in Other Environmental Air Space (Plenum) in accordance with section 300.22 (c) of the National Electrical code.		
	<b>Canada:</b> UL Listed, CCN XAPX7, File E27734, to CAN/CSA E60730-1:02: Automatic Electrical Controls for Household and Similar Use, Part 1; and CAN/CSA-E60730-2-14, Particular Requirements for Electric Actuators.		
	<b>Europe:</b> CE Mark Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive.		
	<b>Australia and New Zealand:</b> RCM Mark, Australia/NZ Emissions Compliant		

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

# Electric Damper Actuator

## Technical Specifications


### M(VA)9310-HGA-3 Electric Non-Spring Return Actuator

Product description	On/off and floating mode	Proportional mode
Power requirements	AC 24 V +20% at 50/60 Hz, Class 2 (North America) or SELV (Europe), 4.7 VA running; DC 24 V +10% Class 2 (North America) or SELV (Europe), 1.3 W running	
Transformer sizing requirements	≥6 VA	
Input signal/adjustments	AC 19.2 to 28.8 V at 50/60 Hz or DC 24 V ±10% Class 2 (North America) or SELV (Europe)	DC 0 (2) to 10 V or 0 (4) to 20 mA with field furnished 500 ohm 1/4 W resistor offset: DC 0 to 10 V Span: Dc 2 to 10 V
Control impedance	4.7k ohm	100k ohm
Feedback signal	-	DC 0 (2)to 10 V
Running torque	10 N·m	
Rotation range	Mechanically limited 35 to 95° (±3°) in 5° increments	
Rotation time for 90° of travel	90 seconds, constant for all operating conditions	
Rotation time auto-calibration	35 seconds	
Cycles	100,000 full stroke cycles; 2,500,000 repositions	
Audible noise	<35 dBA at 0 to 10 N·m load, at a distance of 1 m	
Electrical connections	1.2 m halogen free cable with 18 AWG (0.82 mm <sup>2</sup> ) conductors and 6mm ferrule ends	
Conduit connections	13 mm NPSM threaded conduit connectors with M9300-100 Conduit Connector (optional with the M9308-AGA-2Z)	
Ambient conditions	<b>Operating:</b> -22 to 140° F (-30 to 60° C), 95% RH, noncondensing <b>Storage:</b> -40 to 185° F (-40 to 85° C), 95% RH, noncondensing	
Enclosure	NEMA 5/IP54	
Shipping weight	2 lb (0.9 kg)	
Compliance 	<b>United States:</b> UL Listed, CCN XAPX, File E27734: 10 UL 60730-1: Automatic Electrical Controls for Household and Similar Use, Part 1; and UL 60730-2-14: Part 2, Particular Requirements for Electric Actuators. Plenum Rated (UL 2043). Suitable for use in Other Environmental Air Space (Plenum) in accordance with section 300.22 (c) of the National Electrical code. <b>Canada:</b> UL Listed, CCN XAPX7, File E27734, to CAN/CSA E60730-1:02: Automatic Electrical Controls for Household and Similar Use, Part 1; and CAN/CSA-E60730-2-14, Particular Requirements for Electric Actuators.	
	<b>Europe:</b> CE Mark Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive.	
	<b>Australia and New Zealand:</b> RCM Mark, Australia/NZ Emissions Compliant	

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

## Technical Specifications

### M(VA)9320 and M(VA)9335 Series Electric Non-Spring Return Actuators

Product description	M9320-HGA-x and M9335-HGA-x		M9320-AUA-x and M9335-AUA-x
	On/off and floating mode	Proportional mode	On/off and floating mode
Power requirements	AC 24 V (AC 19.2 to 28.8 V) at 50/60 Hz. Class 2 (North America) or SELV (Europe) M9320-HGA-x: 5.7 VA running M9335-HGA-x: 6.1 VA running DC 24 V (DC 21.6 to 26.4 V) Class 2 (North America) or SELV (Europe) M9320-HGA-x: 2.1 W running M9335-HGA-x: 2.1 W running		Nominal Ac 120 V at 60 Hz M9320-AUA-x: 0.05 A running M9335-AUA-x: 0.05 A running
Transformer sizing requirements	≥7 VA		-
Input signal/adjustments	AC 19.2 to 28.8 V at 50/60 Hz or DC 24 V ±10% Class 2 (North America) or SELV (Europe)	DC 0 (2) to 10 V or 0 (4) to 20 mA with field furnished 500 ohm 1/4 W resistor Offset Dc 0 to 10 V Span: DC 2 to 10 V	AC 100 to 240 V (AC 85 to 264 V) at 50/60 Hz
Control impedance	4.7k ohm	100k ohm	-
Feedback signal	-	DC 0 (2) to 10V	-
Running torque	M9320: 20 N·m M9335: 35 N·m		
Rotation range	Mechanically limited 35 to 95° (±3°) in 5° increments		
Rotation time for 90° of travel	M9320: 90 seconds; constant for all operating conditions M9335: 150 seconds; constant for all operating conditions		
Rotation time auto-calibration	M9320: 35 seconds M9335: 75 seconds		
Cycles	M9320: 100,000 full stroke cycles; 2,500,000 repositions M9335: 30,000 full stroke cycles; 750,000 repositions		
Audible noise	<45 dBA at maximum load, at a distance of 1 m		
Electrical connections	1.2 m halogen free cable with 18 AWG (0.82 mm <sup>2</sup> ) conductors and 6mm ferrule ends		
Conduit connections	Optional 13 mm NPSM threaded conduit connectors with M9300-100 Conduit Connector		
Mechanical connections	M93xx-xxA-3 Round: 19 to 27 mm Square: 16 to 19 mm M93xx-xxA-4 Round: 10 to 19 mm Square: 10 to 16 mm		
Ambient conditions	Operating: -22 to 140° F (-30 to 60° C), 95% RH, noncondensing Storage: -40 to 185° F (-40 to 85° C), 95% RH, noncondensing		
Enclosure	NEMA 5/IP54		
Compliance 	<b>United States:</b> UL Listed, CCN XAPX, File E27734: 10 UL 60730-1: Automatic Electrical Controls for Household and Similar Use, Part 1; and UL 60730-2-14: Part 2, Particular Requirements for Electric Actuators. Plenum Rated (UL 2043). Suitable for use in Other Environmental Air Space (Plenum) in accordance with section 300.22 (c) of the National Electrical code. <b>Canada:</b> UL Listed, CCN XAPX7, File E27734, to CAN/CSA E60730-1:02: Automatic Electrical Controls for Household and Similar Use, Part 1; and CAN/CSA-E60730-2-14, Particular Requirements for Electric Actuators.		
	<b>Europe:</b> CE Mark Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive and the Low Voltage Directive.		
	<b>Australia and New Zealand:</b> RCM Mark, Australia/NZ Emissions Compliant		
Shipping weight	2 lb (0.9 kg)		

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

## Johnson Controls:

At Johnson Controls (NYSE:JCI) we transform the environments where people live, work, learn and play. As the global leader in smart, healthy and sustainable buildings, our mission is to reimagine the performance of buildings to serve people, places and the planet.

With a history of more than 135 years of innovation, Johnson Controls delivers the blueprint of the future for industries such as healthcare, schools, data centers, airports, stadiums, manufacturing and beyond through its comprehensive digital offering OpenBlue. With a global team of 100,000 experts in more than 150 countries, Johnson Controls offers the world's largest portfolio of building technology, software as well as service solutions with some of the most trusted names in the industry.

For more information, visit [www.johnsoncontrols.com](http://www.johnsoncontrols.com) or follow us @johnsoncontrols on Twitter.

### AUSTRALIA

123 Epping Rd,  
Macquarie Park  
NSW 2113,  
Australia

### HONG KONG

11/F & 12/F,  
Millennium City 6,  
392 Kwun Tong Road,  
Kwun Tong,  
Kowloon, Hong Kong

### INDONESIA

Wisma 77, 16th Floor,  
Jl. S. Parman Kav. 77,  
Sliipi,  
Jakarta 11410,  
Indonesia

### MALAYSIA

Luxor Tech Centre, Level 2,  
No. 1A, Jalan Teknologi,  
Taman Sains Selangor 1,  
Kota Damansara, PJU 5,  
47810 Petaling Jaya, Selan-  
gor Darul Ehsan, Malaysia

### SINGAPORE

31 International  
Business Park Road,  
#03-02, Lobby D & E,  
Singapore 609921

### KOREA

34, Mareunnae-ro,  
Jung-gu,  
Seoul, 04555, Korea

### THAILAND

33/4 The Ninth  
Towers, Grand Rama  
9, 29<sup>th</sup> Floor, Tower B  
Rama 9 Road  
Huaykwang,  
Bangkok, 10310  
Thailand

### Taiwan

10F., No. 28, Qingcheng  
St., Taipei City 105403,  
Taiwan

Manufacturer reserves the right to change specifications without prior notice