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▸ zapoznaj się z naszą ofertą

Tech-System
40-600 Katowice, ul. Kościuszki 229

tel./fax (32) 202 62 25
tel.kom. 601 241 355

www.techsystem-automatyka.pl
e-mail: info@techsystem-automatyka.pl

VG9000 Series Flanged Valves
DN 15 – DN 100 • Cast Iron • PN 6 (K) & PN 10 (L)

Introduction

This improved VG9000 Series cast iron flanged valves are designed primarily to regulate the flow of water and low pressure steam in response to the demand of a controller, in heating, ventilating, and air conditioning systems. These valves are available in two-way Push-Down-To-Open and three way mixing configurations.

Four models of electric actuator are available as standard for this valve: The VA-7700 for DN 15…DN 50, VA7810 for DN 15…DN 65, RA-3000 and VA1000 for DN 65…DN 100 valves. The VA1000 actuator has 3-point or 0…10 V DC proportional control. All other actuators can be ordered with either 3-point or 0…10 V DC proportional control. The VA-7700 proportional control actuator, the VA7810 proportional control actuator and the VA1000 actuator have a self adjusting function for quick, easy and precise commissioning and servicing.

VG9000 Series Valves

Features and Benefits

❑ **PN 6 and PN 10 rated series from DN 15 to DN 100 in two-way PDTO and three-way mixing configurations**	Covers many common low pressure HVAC applications
❑ **Full DIN / IEC flow capacity for all valves DN 15… DN 100**	Cost efficient, offers maximum flow capacity per DN size
❑ **Uses Johnson Controls dual u-cup ring packing**	Provides Industry-leading reliability and long life
❑ **Brass Plug with soft seal for tight shut-off on both control and by-pass ports**	Provides maximum energy efficiency
❑ **Electric actuators available either factory mounted, or separately for in-situ installation**	Provides the optimal selection either for direct installations or for distribution centres
❑ **Face to Face dimensions in accordance with DIN / IEC standards**	Easier application in existing installations
❑ **Clamp coupler system for all sizes**	The same actuators for all JCI flanged valves

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Order No. 10.483 E

Application Overview

Valve bodies are made of cast iron and are available in sizes from DN 15 to DN 100. Flange fittings comply with EN1092-2 and ISO 7005-2 standards. The valve features a brass plug with soft seal and a stainless steel stem guided by dual u-cup ring packing.

The VG9000 valve is available in two-way configurations for Push-Down-To-Open operation and in three-way mixing configurations.

Two-way valves have equal percentage relationship between valve travel and flow at a constant pressure drop. Three-way valves have a combination of equal percentage and linear characteristic. An arrow is embossed on one side of the valve body indicating the direction of flow for correct installation.

Four models of electric actuator are available as standard and can be ordered either as factory fitted actuator / valve combinations or separately for in-situ installation.

Refer to this and the following pages for ordering data and additional details.

Ordering codes for Valve Bodies VG9000

Body pressure rating

K	PN 6
L	PN 10

	Size	k_{vs}
A1	DN 15	4.0
A2	DN 15	2.5
A3	DN 15	1.6
A4	DN 15	1.0
A5	DN 15	0.63
B1	DN 20	6.3
C1	DN 25	10
D1	DN 32	16
E1	DN 40	25
F1	DN 50	40
G1	DN 65	63
H1	DN 80	100
J1	DN 100	160

Valve Body Type

4	2-way Valve PDTO
8	3-way Mixing valve

For Example:

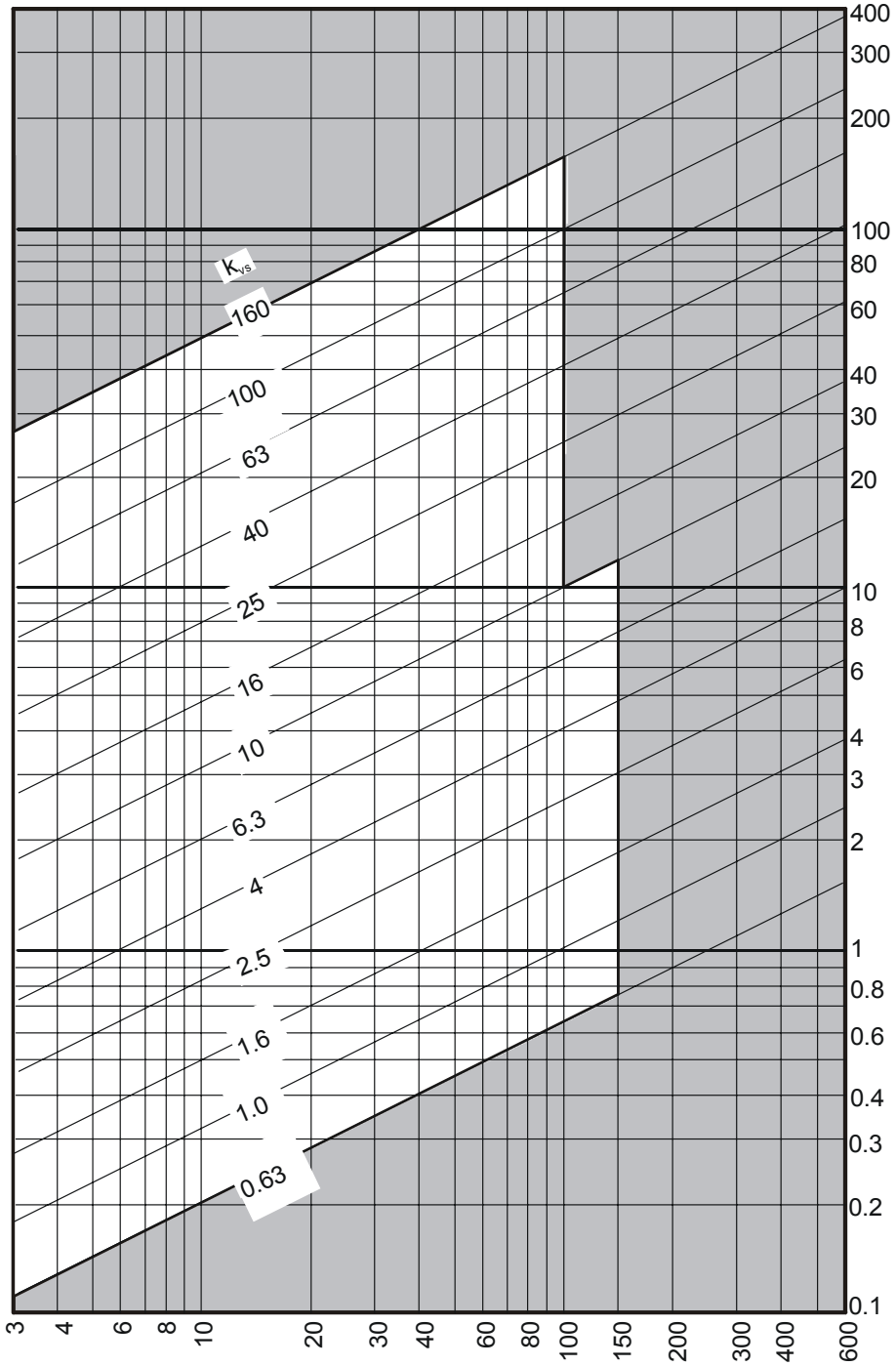
For a two-way valve, DN 65, k_{vs} 63, PN 10, the ordering code is:

VG94G1S1L

Valve selection

The valve size for water applications can be defined using the diagram below, where the intersection of the pressure drop over the valve and the flow has to stay within the white area.

k_v selection diagram for DN 15…100 valves:



Pressure drop Δ p, in kPa (100 kPa = 1 bar)

Valve - actuator combinations

This improved VG9000 series cast iron flanged valves can be combined with the following series pneumatic and electric actuators:

VA-7700 self-adjusting actuator (DN 15…DN 50)

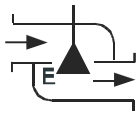
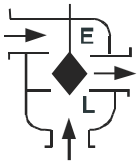
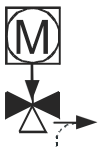
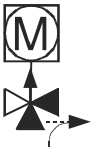
VA-7810 self-adjusting actuator (DN 15…DN 65)

RA-3000 electric actuator (DN 65…DN 100)

VA1000 electric non-spring & spring return actuators (DN 65… DN100)

Actuator Selection

Flow through the valve is dependent on the position of the plug, as indicated in the tables below. The function of the actuator / valve combination is dependent upon the action of the actuator and the type of valve used.

Valve Type	Electric Actuator **VA-77xx-820x** **VA781x-xGx-12** **VA1xxx-GGA-1** **RA-3xxx-7xxx**
 **VG94xxS1x** 2-way PDTO	 Actuator stem extends
	 Actuator stem retracts
 **VG98xxS1x** 3-way mixing	 Actuator stem extends
	 Actuator stem retracts
E = Equal % control characteristic L = Linear control characteristic	▲ = Flow △ = No flow

VA-7700 Electronic Actuators

The VA-7700 series synchronous motor-driven actuator is available with 3-point (floating) control and optional manual override, or proportional DC 0…10 V models with a **self-adjustment** feature for easy, quick, precise commissioning and servicing. It provides 500 N nominal thrust and can be used with DN 15…DN 50 two-way and mixing valve configurations in accordance with the max. close-off pressure ratings specified

Device codes for VA-7700 Electric Actuators

Device code	Power supply	Manual override
Incremental models (3-point)		
VA-7700-8201	AC 24 V	None
VA-7700-8203	AC 230 V	None
VA-7740-8201	AC 24 V	Mechanical
VA-7740-8203	AC 230 V	Mechanical
Proportional models (DC 0…10 V / 0 (4)…20mA)		
VA-7706-8201	AC 24 V	Electrical
VA-7746-8201	AC 24 V	Electrical and Mechanical

VA7810 Electric Actuators

The VA7810 non-spring return actuator with 1000N thrust for valves in heating, ventilation and air conditioning applications is available for floating (3-point) control or proportional control.

All models have manual override as standard. Proportional models are **self-calibrating**. The actuator is intended for use with Johnson Controls VG9000 flanged valves.

It provides 1000 N nominal stem force and can be used with DN 15...DN 65 valves in accordance with the max. close-off pressure ratings specified.

Ordering codes for VA7810 Electric Actuators

Ordering code	Actuator Description
Floating Control	
VA7810-ADA-12	AC 230 V
VA7810-AGA-12	AC 24 V
VA7810-AGC-12	AC 24 V, 2 aux. switches
VA7810-AGH-12	AC 24 V, 2kΩ Feedback pot.
Proportional Control	
VA7810-GGA-12	AC 24 V DC 0(2)…10 V or 0(4)… 20 mA
VA7810-GGC-12	AC 24 V 2 Aux. switches DC 0(2)…10 V or 0(4)… 20 mA

VA1000 Electric self-adjusting actuators

The VA1000 2500N thrust non-spring return and 2000N thrust spring return valve-actuators are self-adjusting and therefore have a greatly reduced installation and commissioning time. They are of modular construction so that for instance, the required type of control signal is achieved simply by fitting a module with the required function in-situ.

This actuator can be used with DN 65… DN 100 valves in accordance with the close-off pressures specified.

24V Actuator ordering codes

Ordering code	Description
VA1125-GGA-1	**2500N; Non-spring return**
VA1220-GGA-1	**2000N; spring return retracts**
VA1420-GGA-1	**2000N; spring return extends**

Accessory modules for in-situ installation

VA1000-M230	**AC 230V module**
VA1000-P2	**2kΩ feedback potentiometer**
VA1000-S2	**2 SPDT aux. switches**
VA1000-SRU	**Split range unit module for proportional actuators only**
111 6348 011	**Cable adaptor M20x1.5**
111 6349 011	**Cable adaptor M16x1.5**

Either feedback potentiometer or aux. switches can be fitted not both.

RA-3000 Electric Actuators

The RA-3000 series, synchronous motor-driven actuator is available for 3-point (floating) or DC 0…10 V proportional control. It features factory calibrated limit switches to provide specified close-off ratings.

This actuator is available for the improved VG9000 series in two sizes, the RA-3xxx-712x with 1600 N minimal thrust for size DN 65 and the RA-3xxx-732x with 3000 N minimal thrust for size DN 80…100 valves in accordance with the max. close-off pressure ratings specified. Factory fitted options, such as a 2kΩ feedback potentiometer, auxiliary switches and manual override are available.

Note: The adapter nut must be removed from the valve before the RA-3000 actuator can be fitted!

Ordering codes for RA-Electric Actuators

RA-3 □□ -7□□

Force & Supply Voltage

126	1600 N 24 V, 50/60 Hz
127	1600 N 230 V,50/60 Hz
325	3000 N 24 V, 60 Hz
326	3000 N 24 V, 50 Hz
327	3000 N 230 V, 50 Hz

Options, factory mounted

00	None
03	(2) Aux. switches and 2 kΩ feedback potentiometer
41	Positioner 0...10 VDC and (2) Aux. switches (only 24 VAC models)

Manual override

0	None
1	with Manual override

Ordering procedure

The valves and actuators can be ordered separately or factory mounted. When factory mounted, please add **"+M"** to the order code for the actuator.

For example:

For a 2-way PN 10, DN 65, K_{vs} 63, valve plus actuator with electric positioner, 0...10 V input, AC 24 V 50/60 Hz supply and manual override order:

Item 1 **VG94G1S1L** (valve body)
Item 2 **VA7810-GGA12** (actuator)

Alternatively, to order a factory fitted combination:

Item 1 **VG94G1S1L** (valve body)
Item 2 **VA7810-GGA12+M** (actuator)

Close-off pressures

Maximum Close-off pressures for electric actuator / valve combinations (kPa)

		Valve body Size DN								
		15	20	25	32	40	50	65	80	100
	k_{vs}	*	6.3	10	16	25	40	63	100	160

Actuator	Thrust (N)	PN 6 close-off pressures																	
		⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈
VA-7700-820x	500	600				590	490	360	280	190	130	100	60	-		-		-	
VA7810-xxx-12	1000	600								480	440	290	260	150	130	-		-	
VA1125-GGA-1	2500	-	-	-	-	-	-	620		400		240							
VA1x20-GGA-1	2000	-	-	-	-	-	-	470		300		180							
RA-3000-712x	1600	-	-	-	-	-	-	380	360	-		-							
RA-3000-732x	3000	-	-	-	-	-	-	-		510	500	320	310						

		PN 10 close-off pressures																	
		⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈	⋈
VA-7700-820x	500	1000		980	880	640	430	400	240	210	110	110	40	-		-		-	
VA7810- xxx-12	1000	1000						900	790	510	420	310	240	160	120	-		-	
VA1125-GGA-1	2500	-	-	-	-	-	-	620		400		240							
VA1x20-GGA-1	2000	-	-	-	-	-	-	470		300		180							
RA-3000-712x	1600	-	-	-	-	-	-	390	360	-		-							
RA-3000-732x	3000	-	-	-	-	-	-	-		510	490	320	310						

* 0.63 / 1 / 1.6 / 2.5 / 4

Installation and Servicing

When mounting the VG9000 series valves, please follow the instructions below:

- It is recommended that the valves be mounted upright, in a conveniently accessible location.
- The actuator must not be covered with insulating material.
- Sufficient clearance must be allowed for actuator removal (refer to the dimension drawings).
- Install the valve so that the plug seats against the direction of flow as indicated by the arrow(s) embossed on the valve body.
- Johnson Controls must approve use of the VG9000 series valves with fluids other than specified.
- On electrically actuated valve assemblies, all wiring must be in accordance with applicable electrical code requirements.
- Input lines to the actuator must be wired correctly to open or close the valve as intended.

When servicing the VG9000 series valves, make sure that:

- The electrical power to the actuator is isolated.
- You do not touch or attempt to connect or disconnect wires when electrical power is on.

WARNING

Shock Hazard

Disconnect the power supply before wiring connections are made to prevent personal injury.

Equipment Damage Hazard

Make and check all wiring connections before applying power to the system. Short circuited or improperly connected wires may result in permanent damage to the unit.

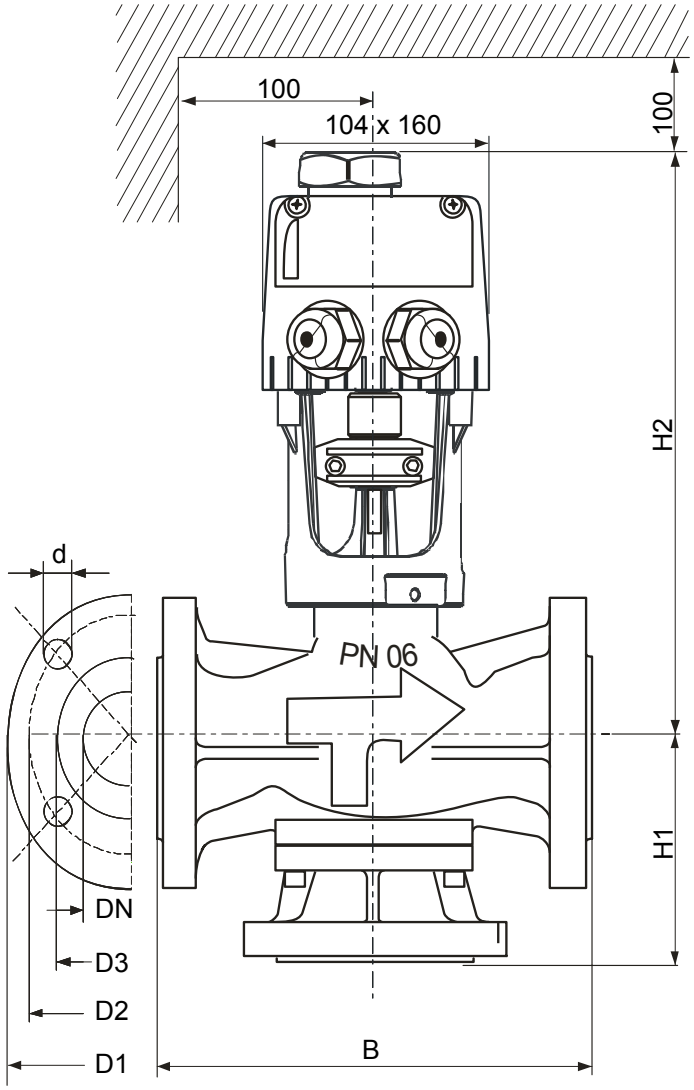
- No pressure is applied to the piping system when servicing the valve.

Ordering Code for Replacement Packing Kits

Ordering Code	For valves
VG7000-6001	DN 15…40
VG7000-6002	DN 50...100

Dimensions (in mm): VA-7700 Self-adjusting electric actuator

for DN 15…50 valves

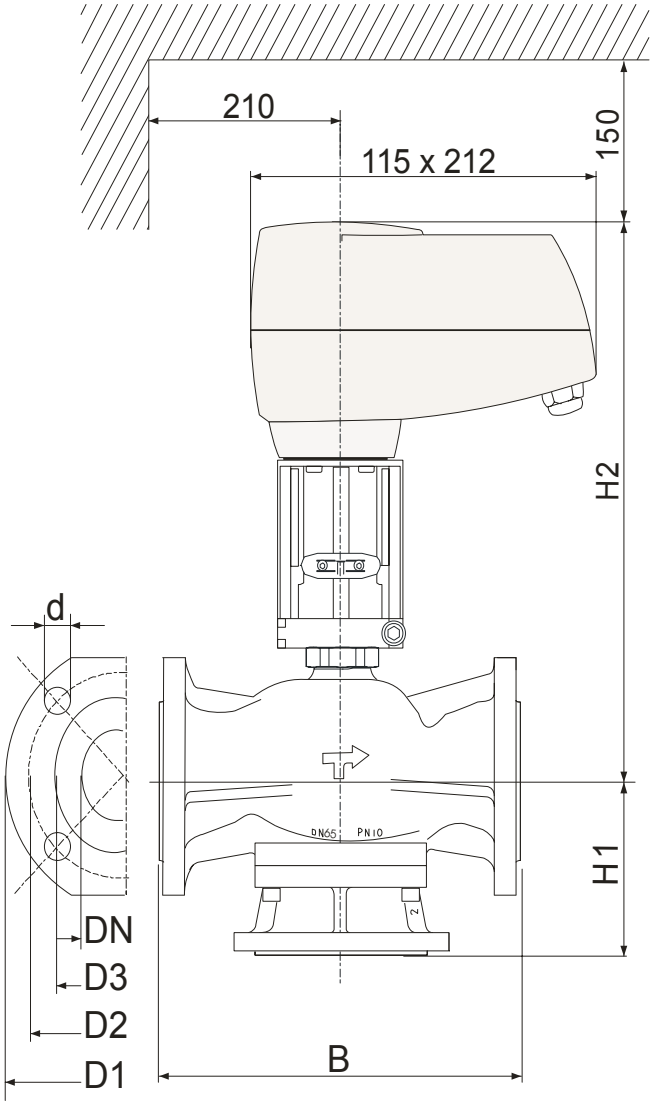


	VA-7700	
	H2	
DN	PN 6	PN 10
15	208	
20	208	
25	232	
32	243	
40	242	
50	249	

	PN 6							PN 10						
DN	B	D1	D2	D3	d	H1	Holes	B	D1	D2	D3	d	H1	Holes
15	130	80	55	38	11	65	4	130	95	65	46	14	65	4
20	140	90	65	48	11	70	4	150	105	75	56	14	75	4
25	150	100	75	58	11	75	4	160	115	85	65	14	80	4
32	180	120	90	69	14	90	4	180	140	100	76	19	90	4
40	180	130	100	78	14	90	4	200	150	110	84	19	100	4
50	200	140	110	88	14	100	4	230	165	125	99	19	115	4

***D*imensions (in mm): VA-7810 Self-adjusting electric actuator**

for DN 15…65 valves

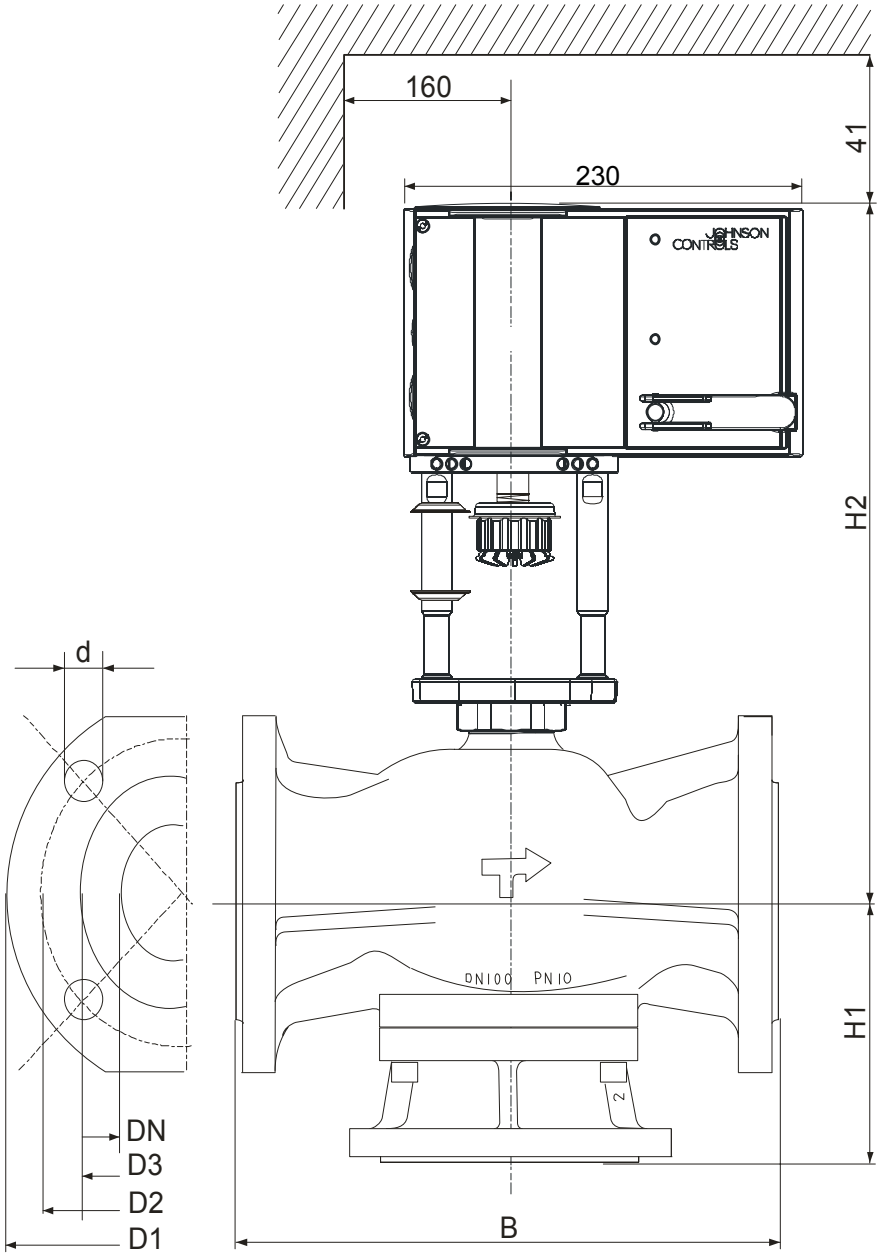


	VA-7810	
	H2	
DN	**PN 6**	**PN 10**
15	272	
20	272	
25	296	
32	307	
40	306	
50	313	
65	341	

	PN 6							PN 10						
DN	**B**	**D1**	**D2**	**D3**	**d**	**H1**	**Holes**	**B**	**D1**	**D2**	**D3**	**d**	**H1**	**Holes**
15	130	80	55	38	11	65	4	130	95	65	46	14	65	4
20	140	90	65	48	11	70	4	150	105	75	56	14	75	4
25	150	100	75	58	11	75	4	160	115	85	65	14	80	4
32	180	120	90	69	14	90	4	180	140	100	76	19	90	4
40	180	130	100	78	14	90	4	200	150	110	84	19	100	4
50	200	140	110	88	14	100	4	230	165	125	99	19	115	4
65	240	160	130	108	14	120	4	290	185	145	118	19	145	4

*D*imensions in mm, VA1125-GGA-1 & VA1x20 Electric Actuators

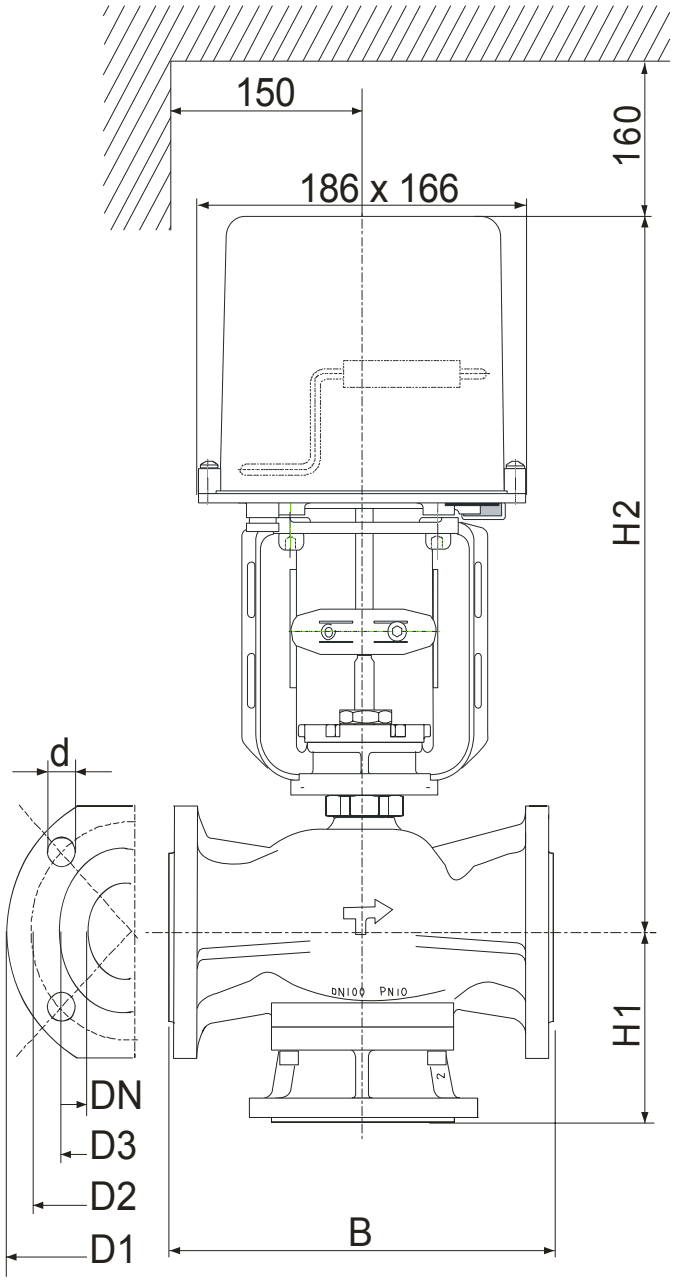
for DN 65 – 100 valves.



	VA1000			
	H1		H2	
DN	PN 6	PN 10	PN 6	PN 10
65	145		364	
80	155		377	
100	175		389	

	PN 6							PN 10						
DN	B	D1	D2	D3	d	H1	Holes	B	D1	D2	D3	d	H1	Holes
65	240	160	130	108	14	120	4	290	185	145	118	19	145	4
80	260	190	150	124	19	130	4	310	200	160	132	19	155	8
100	300	210	170	144	19	150	4	350	220	180	156	19	175	8

*D*imensions in mm, RA-3000 Electric Actuator (DN 65 – 100)



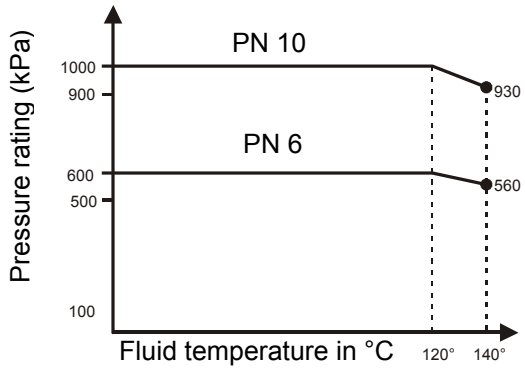
RA-3000				
	H1		H2	
DN	PN 6	PN 10	PN 6	PN 10
65	145		388	
80	155		401	
100	175		413	

	PN 6							PN 10						
DN	B	D1	D2	D3	d	H1	Holes	B	D1	D2	D3	d	H1	Holes
65	240	160	130	108	14	120	4	290	185	145	118	19	145	4
80	260	190	150	124	19	130	4	310	200	160	132	19	155	8
100	300	210	170	144	19	150	4	350	220	180	156	19	175	8

Specifications

Product		VG9000 Series flanged valves								
Models		2-way PDTO; 3-way mixing								
Service		Water, glycol solutions (max. 50%) for HVAC applications (proper water treatment is recommended, refer to VDI 2035)								
Valve body data:	**DN**	15	20	25	32	40	50	65	80	100
	K_{vs}	(*)	6.3	10	16	25	40	63	100	160
Weight (kg) PN 6/PN 10	**2-way**	2.1/2.8	2.6/3.4	3.3/4.2	5.4/6.7	6.1/8.2	6.9/10.4	11.4/15.9	17.8/22.5	24.2/31.1
PN 6/PN 10:	**3-way**	2.5/3.5	3.3 / 4.5	4/5.4	6.6/8.9	7.4/10.4	8.8/13.6	13.6/20.6	21.1/28.1	27.8/37.8
Nominal stroke		8 mm		13 mm	19 mm				25 mm	

Body pressure rating (EN 1092-2)	**PN 6** 600 kPa Up to 120°C; 560 kPa at 140°C	**PN 10** 1000 kPa Up to 120°C; 930 kPa at 140°C



Face to face dimensions	DIN EN EN 558-1; Flanges DIN EN 1092-2
Fluid temperature limits	+2...+140 °C
Body surface protection	Blue lacquer
Material	
Body	EN 1561 GJL250 (GG25)
Stem	Stainless steel, (X5CrNiMo1712)
Plug	Brass (CuZn40Pb2), with soft seat – FKM rubber Viton B
Seat	Cast iron in 2-way and 3-way valves (integral to the body)
Dual u-cup ring packing	Self adjusting Ethylene, Propylene, Rubber (EPR) U-cup ring pack

Flow characteristics	Two-way valves and 3-way control port	3-way valves bypass port
Control characteristics	Equal percentage	Linear
Practical rangeability	$k_{vs} / k_{vr} > 25:1$	
Sensitivity (ideal rangeability)	$n_{gl} = 3.22$	-
Leakage	Max. 0.01% of k_{vs} DIN EN 1349 IV L1	
Operating pressure drop	DN 15…DN 25 max. 150 kPa DN 32… DN 100 max. 100 kPa,	
Shipping/storage	-20°C	
Standards and specifications	DIN EN60534-1, DIN EN1092-2, DIN EN 1349, PN 10 is also as per DIN EN558-1	

(*) K_{vs} coefficients for DN 15 valves (see also "Ordering codes for valve bodies")

0.63	1.0	1.6	2.5	4

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

JOHNSON CONTROLS

Johnson Controls International, Inc.
Headquarters: Milwaukee, Wisconsin, USA
European Customer Service Centre: Westendhof 3, D-45143 Essen, Germany
European Factories: Essen (Germany), Leeuwarden (The Netherlands) and Lomagna (Italy)
Branch Offices Principal European Cities. : Printed in Germany