

VG8000 Series Flanged Valves DN 15 - DN 150 • Nodular Iron • PN 16

Introduction

The VG8000 Series electrically and pneumatically operated nodular iron valves are designed primarily to regulate the flow of water and steam in response to the demand of a controller, in heating, ventilating, and air conditioning systems. These valves are available in two way, three way mixing and diverting configurations. Both electric and pneumatic actuators are available.



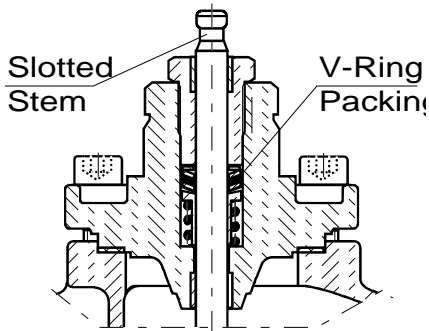
VG8000 Series Valves with pneumatic and electric Actuator

Features and Benefits

- | | |
|---|--|
| <p><input type="checkbox"/> Valves in 2-way, 3-way mixing and diverting configurations.</p> | <p>Covers all common HVAC applications.</p> |
| <p><input type="checkbox"/> PN 16 rated nodular iron valve bodies.</p> | <p>Compact, lighter and more ductile than gray iron.</p> |
| <p><input type="checkbox"/> Stainless steel Stem-plug-seat combination.</p> | <p>Stability and long life.</p> |
| <p><input type="checkbox"/> Use of standard Johnson Controls spring loaded, self-adjusting Viton-Teflon-Viton V-ring packing.</p> | <p>Reliable, field proven seal applicable to wide operating temperature range. No readjustment required.</p> |
| <p><input type="checkbox"/> Low leakage rate for two- and three-way valves.</p> | <p>Provides maximum energy efficiency.</p> |
| <p><input type="checkbox"/> Electric and Pneumatic actuators available for all valves, either factory mounted or for field mounting.</p> | <p>Allows applications of the best suited and cost-effective actuator.</p> |
| <p><input type="checkbox"/> Slotted stem with coupler for easy mounting of actuators.</p> | <p>Reduces installation cost.</p> |

Application Overview

Valve bodies are made of nodular iron and are available in sizes from 15 to 150 mm. Flanged connections comply with DIN and BS standards. The inner valve trim and seat ring is made of stainless steel. The valve chevron packing consists of spring loaded Viton-Teflon V-rings.



The VG8000 valves are available in two way configuration for NO (Push-Down-To-Close) operation and in three way configurations. The 2-way valves DN 15 to 40 are also available for NC (Push Down To Open) operation. The three way valves are available as mixing or diverting valves.

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 on one side of the valve body indicating the direction of flow for proper piping.

Models with Glycerin Cup Packing are available for medium temperature down to -10 °C.

A variety of electric and pneumatic actuators is available and can be ordered either factory mounted or for field mounting. Refer to this and following pages for ordering data and additional details.

Ordering codes for Valve Bodies

VG8 S1N

	Size	Kvs
2-way NO valves only		
A9	DN 15	0,1
A8	DN 15	0,16
A7	DN 15	0,25
A6	DN 15	0,4
All valves		
A5	DN 15	0,63
A4	DN 15	1,0
A3	DN 15	1,6
A2	DN 15	2,5
A1	DN 15	4,0
C2	DN 25	6,3
C1	DN 25	10
E2	DN 40	16
E1	DN 40	25
F1	DN 50	40
G1	DN 65	63
H1	DN 80	100
J1	DN 100	160
K1	DN 125	250
L1	DN 150	350
Valve Body Type		
2	2-way Valve NO	
4 *	2-way Valve NC.	
8	3-way Mixing valve	
9	3-way Diverting valve	

*) Only available in DN15 ... DN40 (Kvs values 0,63...25)

For example:

For a 2-way NO valve, DN65, Kvs 63, PN16, the ordering code is

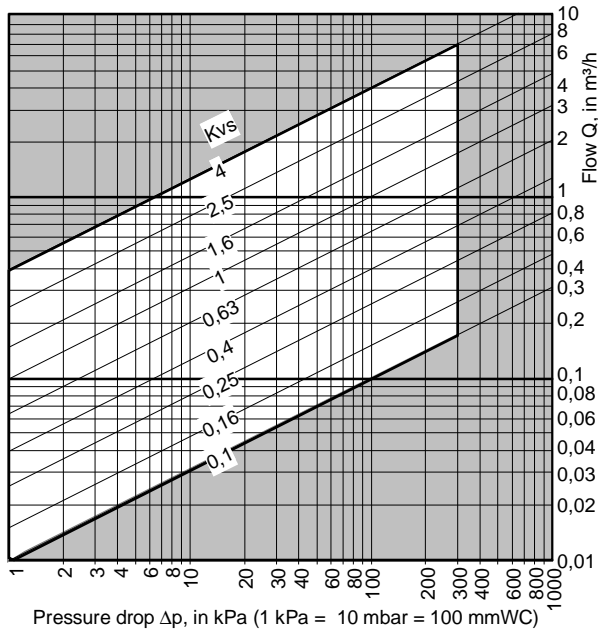
VG82G1S1N

For ordering a valve with Glycerin Cup Packing, add suffix "**20**" to the ordering code: i.e. VG8xxxS1N**20**.

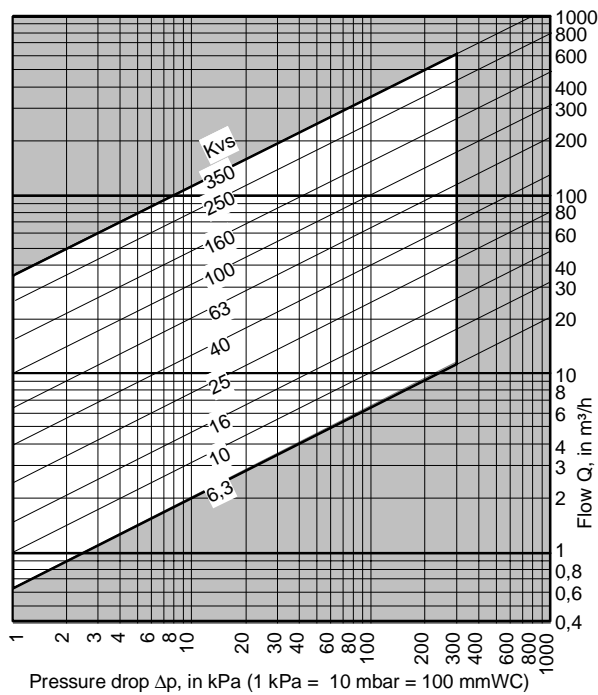
Valve selection

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

Kv selection diagram for DN 15 valves:



Kv selection diagram for DN 25...150 valves:



Valve - actuator combinations

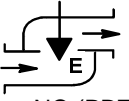
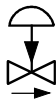








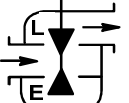




The VG8000 series flanged nodular iron valves can be combined with following series pneumatic and electric actuators:

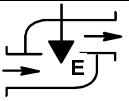




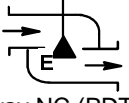



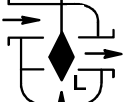




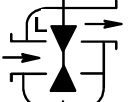




- MP-8000 pneumatic actuators (DN 15 ...40)
- PA-2000 pneumatic actuators (DN 50 ...150)
- VA-7200 electric actuators (DN 15 ...40)
- FA-1000 electric spring return actuators (DN 15 ...40)
- RA-3000 electric actuators(DN 15 ...150)
- FA-2000 electric spring return actuators (DN 50 ...80)
- FA-3000 heavy duty electric actuators (DN 100 ...150)

Actuator Selection

The hydraulic function of a valve depends on the position of the plug, as indicated in the tables below.

The action of the valve-actuator combination depends on the action of the actuator and the type of valve used.

Pneumatic actuator →	Direct acting pneumatic actuators MP-822xxxx0 and PA-2xx0-3x1x		Reverse acting pneumatic actuators MP-832xxxx0 and PA-2xx0-3x2x	
	Air pressure extends stem down	Spring retracts stem back up (no air)	Air pressure retracts stem up	Spring extends stem back down (no air)
 2-way NO (PDTC) VG82..				
 3-way mixing VG88..				
 3-way diverting VG89..				

Electric actuator →	Control mode		Fail safe position (spring return only)	
	Actuator extends stem down	Actuator retracts stem up	Power failure retracts stem up	Power failure extends stem down
 2-way NO (PDTC) VG82..				
 2-way NC (PDTO) VG84..	 (only FA-1000)	 (only FA-1000)	 (only FA-1000)	-
 3-way mixing VG88..				
 3-way diverting VG89..				

E = Equal percentage control characteristic ▶ = Flow
 L = Linear control characteristic ▷ = No flow

Pneumatic Actuator Selection

The pneumatic actuators can be mounted on the 2-way NO (PDTC) and on the 3-way valve series.

All actuators are reversible to provide a Normally Closed or Normally Open (when no air pressure) operation on a 2-way NO (PDTC) valve body.

The actuators can also be optionally equipped with a factory mounted pilot positioner and/or with hand wheel. The basic positioner PY-1010 is direct acting and can be used with D.A. or R.A. actuators series MP8000 or PA-2000.

The available actuators are:

Valves DN 15 – 40 : MP8000 series

Valves DN 50 – 150 : PA-2000 series

Mounting kits for field mounting: hand wheel, feed-back potentiometer and auxiliary switches are available on request.

Ordering codes for Pneumatic Actuators

PA-2000 series

PA-2 -3

Spring Range	
2	20... 50 kPa
7	70...100 kPa
Action	
1	Direct Acting (D.A.)
2	Reverse Acting (R.A.)
Size	
3	300 cm ² , standard for DN 50...DN 80
6	600 cm ² , standard for DN 100...DN 150
7	600 cm ² , large actuator for DN 50...DN 80
Options (Feedback and switches)	
0	None
1	(2) auxiliary switches
2	Feedback 2kΩ
3	Feedback 2kΩ and (2) auxiliary switches
Positioner, factory mount.	
0	None
3	DA type (PY-1010)
Hand wheel, factory mounted	
0	None
1	with Hand wheel

MP8000 series

MP8 2 20

Options (feedback and switches)	
0	None
1	Feedback 2 kΩ
2	Feedback 2 kΩ and (2) auxiliary switches
3	(2) Auxiliary switches
Options (Positioner and hand wheel)	
5	None
6	Positioner D.A., PY-1010
7	Positioner D.A., PY-1010 with hand wheel
8	Hand wheel
Spring Range	
C	20...50 kPa
E	60...90 kPa
Size, action	
2	D.A., 160 cm ² diaphragm
3	R.A., 160 cm ² diaphragm

Electric Actuator Selection

Non Spring Return Actuators

VA-7200 Electric Actuators

The VA-7200 series synchronous motor-driven, magnetic clutch coupled actuator series are available for 3-point (floating) or for 0-10 V control. They provide a 1000 N nominal driving force and can be used on the DN 15...40 VG8000 valve series.

Ordering codes for VA-7200 Electric Actuators

VA-72 -820

Supply Voltage	
1	24 VAC, 50/60 Hz
3	230 VAC, 50/60 Hz
Control signal	
0	3-point (floating)
2	proportional (0...10 V) *
6	proportional (0..10V) with 0..10 V feedback signal **)**
Options	
0	None
2	2 Aux. switches *)
4	Hand wheel
5	Hand wheel with 2 aux. switches *)
7	Hand wheel with 1 Aux. switches and 1 switch for manual override signal*)

*) 24 VAC models only

**) Options can be Hand wheel only

RA-3000 Electric Actuators

The RA-3000 series synchronous motor-driven actuators are available for 3-point (floating) or with electronic positioner for 0-10 V control. They feature factory calibrated force endswitches to provide specified close-off ratings.

These actuators are available in three sizes, i.e. the RA-3000-7120 with 1000 N, the RA-3000-7220 with 1500 N, and the RA-3000-7320 with 3000 N minimal force. The RA-3000-7120 can be used for DN 15 to 40, the RA-3000-7220 for DN 50 to 80, and the RA-3000-7320 for sizes DN 50 to 150, according to max. close-off pressure ratings specified. Factory mounted options, such as feedback potentiometer 2 k Ω , auxiliary switches and manual override are available.

Ordering codes for RA-Electric Actuators

RA-3 -7

Force & Supply Voltage		
126	1000 N	24 VAC, 50/60 Hz
127	1000 N	230 VAC, 50/60 Hz
226	1500 N	24 VAC, 50/60 Hz
227	1500 N	230 VAC, 50/60 Hz
325	3000 N	24 VAC, 60 Hz
326	3000 N	24 VAC, 50 Hz
327	3000 N	230 VAC, 50 Hz
Options, factory mounted		
00	None	
03	(2) Aux. switches and 2 k Ω feedback potentiometer	
41	Positioner 0...10 VDC and (2) Aux. switches (only 24 VAC models)	
Manual override		
0	None	
1	with Manual override	

FA-3000 Electric Actuators

The FA-3000 motor-driven heavy duty actuators provide 6 500 N stem force and are available for 3-point (floating) or 0...10 V / 0(4)...20mA control including manual override. They feature factory calibrated force end switches to provide specified close-off ratings.

These actuators can be used in connection with DN 100...150 VG8000 valve bodies.

Ordering codes for FA-3000 Actuators

FA-32 -741

Supply Voltage	
1	230 VAC, 50/60 Hz
6	24 VAC, 50/60 Hz
Options, factory mounted	
00	None
01	(2) Aux. switches E
02	2 k Ω feedback potentiometer R2
03	(2) Aux. switches E and 2 k Ω feedback pot. R2
40	Pos. 0...10 V / 0(4)...20 mA *)
41	Pos. 0...10 V / 0(4)...20 mA and (2) Aux. switches *)

*) only 24 VAC models

Spring Return Actuators

FA-1000 Electro-hydraulic Spring Return Actuators

The FA-1000 series electro-hydraulic spring return actuators provide 700 N minimal force and are available for 3-point (floating) or 0...10 V / 0(4)...20 mA control including manual override. They can be used in combination with DN 15...40 VG8000 valve bodies.

The FA-1000 actuators retract the stem on power failure thus when mounted on a 2-way NO (PDT C) (respectively a 2-way NC (PDT O)) valve to open (respectively to close) the valve.

See also the "Actuator Selection Table"

Ordering codes for FA-1000 Electric Spring Return Actuators

FA-10 -210

Supply Voltage	
1	230 VAC, 50/60 Hz
6	24 VAC, 50/60 Hz
Control signal	
00	3-point (floating)
40	0...10 V / 0(4)...20 mA *)

*) 24 VAC models only

FA-2000 Electric Spring Return Actuators

The FA-2000 series synchronous motor-driven S.R. actuators are available for 3-point (floating) or with electronic positioner for 0-10 V / 0(4)...20 mA control. They feature overtravel spring with endswitch to determine maximum close-off pressure as specified. On power failure, the actuator returns to normal position.

The FA-2200 models extend, and the FA-2500 retract the stem on power failure thus when

mounted on a 2-way NO (PDTC) valve to close respectively to open the valve.

Electric manual override is available with all models. Factory mounted auxiliary switches and feedback potentiometer 2 kΩ can be optionally ordered.

These actuators can be used in connection with DN 50...80 VG8000 valve bodies.

Ordering codes for FA-2000 Electric Spring Return Actuators

FA- -751

Supply Voltage	
1	230 VAC 50 Hz
6	24 VAC 50 Hz
Options, factory mounted	
00	None
01	(2) Aux. switches E
02	2 kΩ feedback R2
03	(2) Aux. switches E and 2 kΩ feedback R2
40	Positioner 0...10 VDC *)
41	Positioner 0...10 VDC *) and (2) Aux. switches
Spring Return action	
22	Stem extends on power failure
25	Stem retracts on power failure

*) Only 24VAC models

Ordering procedure

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

For example:

For a 2-way valve, DN 65, Kvs 63, PN16 plus actuator with electric positioner 0...10 V input, 24 VAC 50 Hz supply, order:

- item 1 **VG82G1S1N** (valve body)
- item 2 **RA-3041-7326** (actuator)

Alternatively, if actuator is requested to be factory mounted, order:

- item 1 **VG82G1S1N** (valve body)
- item 2 **RA-3041-7326 +M** (actuator)

Close-off pressures

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

Actuator model		Body Size (DN)	2-way N.O (PDTC) with reverse acting actuator (valves close with actuator spring) or 3-way See Table “Actuator selection”		2-way N.O (PDTC) with direct acting actuator (valves close with actuator supply air pressure) or 3-way See Table “Actuator selection”			
Stroke (mm)	Eff. area (cm ²)		with 0 kPa supply		with 120 kPa supply		with 160 kPa supply	
			Spring range (kPa)		Spring range (kPa)		Spring range (kPa)	
			20-50	70-100, 60-90 for MP8000 *)	20-50 *)	70-100, 60-90 for MP8000	20-50 *)	70-100, 60-90 for MP8000
MP8000 13 160		15	600	1600	1600	1600	1600	1600
		25	80	1600	1600	560	1600	1600
		40	-	580	740	100	1380	740
PA-2000-3300 25 300		50	400	850	850	400	1500	690
		65	200	650	650	200	1160	530
		80	-	300	300	-	550	230
PA-2000-3700 25 600		50	370	1600	1600	370	1600	1600
		65	270	1560	1560	270	1600	1290
		80	100	750	750	100	1260	620
PA-2000-3600 42 600		100	40	480	480	40	820	390
		125	10	290	290	10	510	240
		150	-	170	170	-	310	140

*) Recommended spring ranges

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

Actuator	Stroke (mm)	Force (N)	Body Size DN								
			15	25	40	50	65	80	100	125	150
Non Spring Return Actuators											
VA-7200	13	1000	1600	1570	440	-	-	-	-	-	-
RA-3000-712x	13	1000	1600	1600	640	-	-	-	-	-	-
RA-3000-722x	25	1500	-	-	-	540	410	180	-	-	-
RA-3000-732x	42	3000	-	-	-	1350	1050	500	310	190	110
FA-3200-741x	42	6500	-	-	-	-	-	-	770	480	300
Spring Return Actuators											
FA-1000	13	700	1600	1270	340 *)	-	-	-	-	-	-
FA-2000-751x	25	2400	-	-	-	1030	800	370	-	-	-

*) For higher close-off pressure, please contact your JC supplier

Installation and Servicing

When mounting the VG8000 series valves, please follow the instructions below:

- It is recommended that the valves are mounted in an upright position 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 on page 6 and 7)
- The valve must be piped with the flow(s) in the direction(s) indicated by the arrow(s) so that the plug seats against the flow.
- Use of the VG8000 series valves with fluids other than specified must be approved by Johnson Controls.
- 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 for the valve to move in the proper direction.

When servicing the VG8000 series valves, make sure that:

- the pneumatic or electrical power to the actuator is turned off or isolated.
- you do not touch or attempt to connect or disconnect wires when electrical power is on.

**WARNING****Equipment Damage Hazard**

Disconnect the power supply before wiring connections are made to prevent possible damage to the equipment. 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.

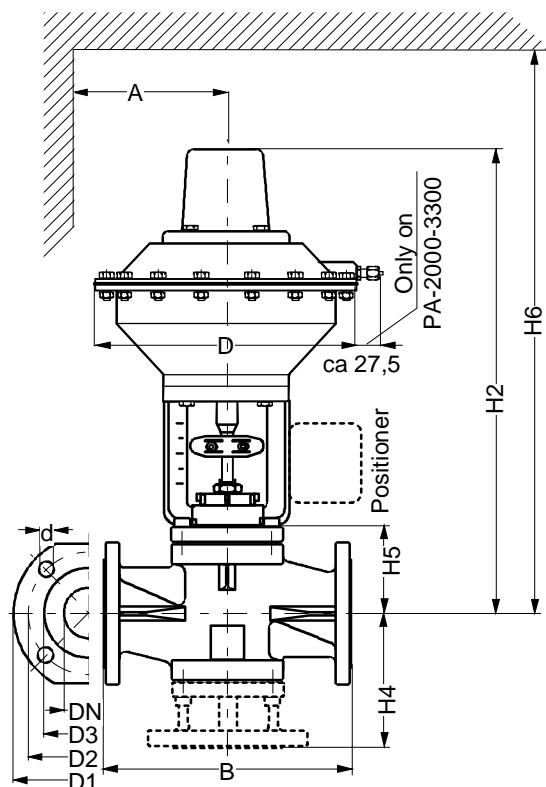
- no pressure is applied to the piping system when servicing the valve.
- no attempt is made to remove the spring of a pneumatic actuator from its housing.

Ordering Code for Replacement Packing Kits

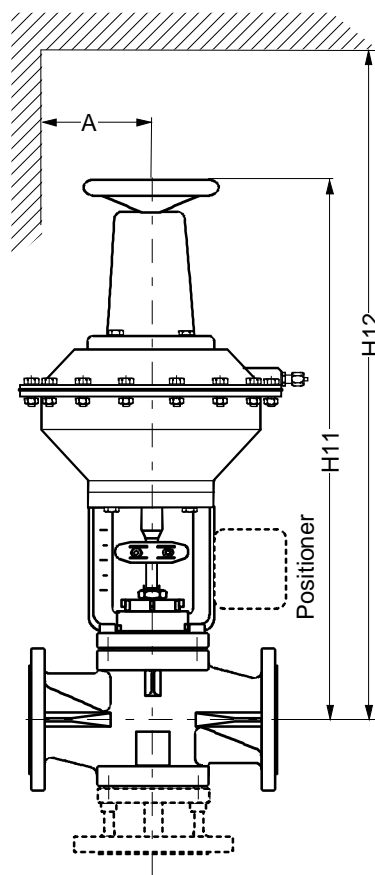
Ordering Code	For valves	Ordering code for mounting set
Standard packing kit:		
121 4393 011	DN15...40	-
121 4409 011	DN 50...80	-
121 4433 011	DN 100...50	-
* Glycerin cup packing kit:		
121 4434 011	DN 15 - 40	121 4434 111
121 4435 011	DN 50 - 80	121 4435 111
121 4436 011	DN 100 - 150	121 4436 111
* Mounting set required		

Dimensions with pneumatic actuator (in mm.)

Version without hand wheel



Version with hand wheel



Valve and Actuator dimensions

Valve body				MP8200 & MP8300							
DN	B	H4	H5	A	A *)	D	H2	H6	H11	H12	
15	130	100	76	160	220	219	342	492	448	600	
25	160	106	76	160	220	219	342	492	448	600	
40	200	140	79	160	220	219	345	495	551	600	

*) For actuator with positioner

				PA-2000-3300						PA-2000-3600 & PA-2000-3700					
DN	B	H4	H5	A	D	H2	H6	H11	H12	A	D	H2	H6	H11	H12
50	230	145	101	235	290	479	629	593	743	250	384	609	809	767	967
65	290	156	102	235	290	480	630	594	744	250	384	610	810	768	968
80	310	180	108	235	290	486	636	600	750	250	384	616	816	774	974
100	350	225	136	-	-	-	-	-	-	250	384	644	844	802	1002
125	400	255	155	-	-	-	-	-	-	250	384	663	863	821	1021
150	480	290	175	-	-	-	-	-	-	250	384	683	883	841	1041

Flange Dimensions

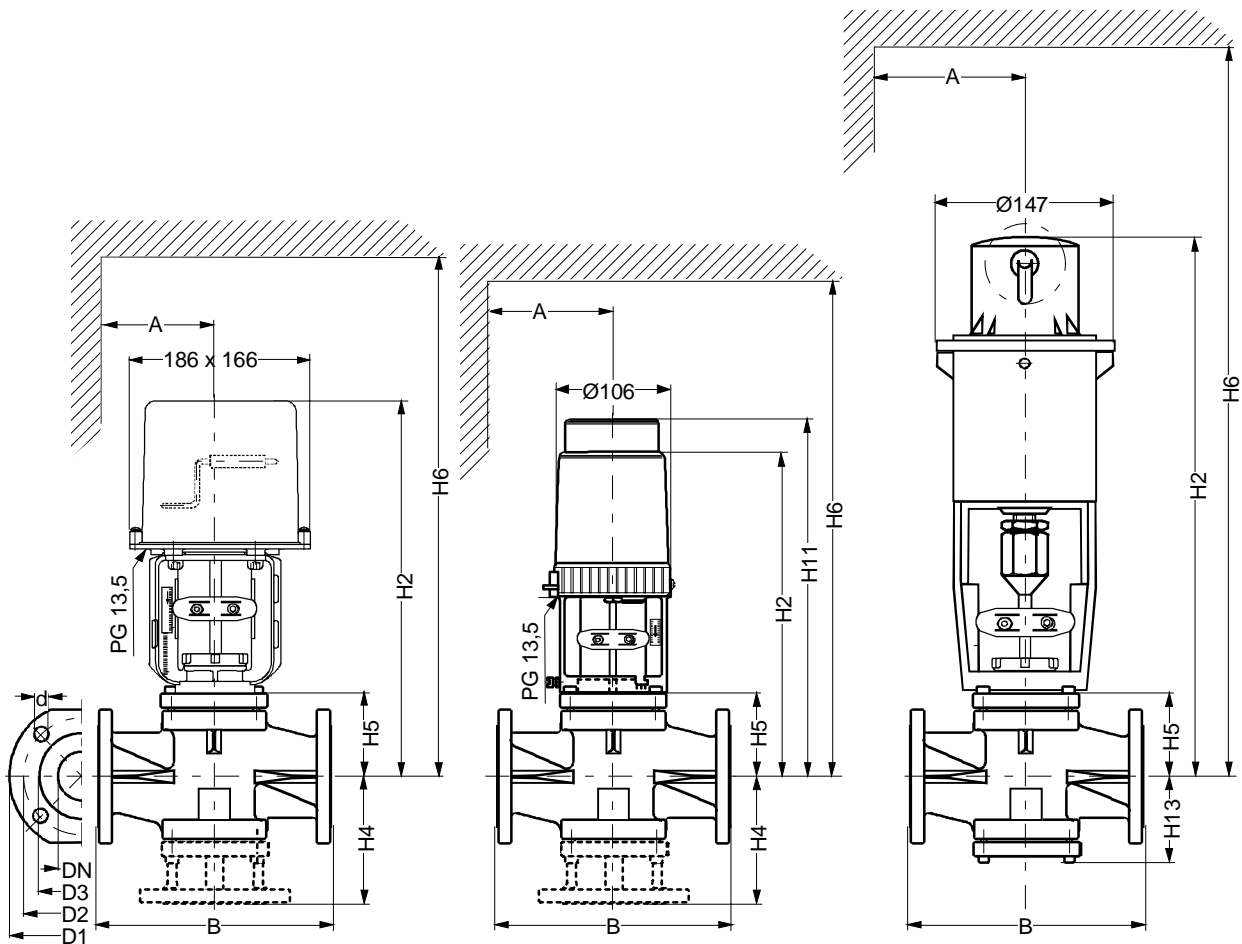
DN	D1	D2	D3	d	Bolts	Holes	DN	D1	D2	D3	d	Bolts	Holes
15	95	65	45	13,5	M12 x 45	4	80	200	160	138	17,5	M16 x 65	8
25	115	85	68	13,5	M12 x 50	4	100	220	180	158	17,5	M16 x 70	8
40	150	110	88	17,5	M16 x 55	4	125	250	210	188	17,5	M16 x 75	8
50	165	125	102	17,5	M16 x 60	4	150	285	240	212	22	M20 x 75	8
65	185	145	122	17,5	M16 x 60	4							

Dimensions with electric actuators RA-3000, VA-7200 and FA-1000 (in mm.) (DN 15 - 40)

RA-3000

VA-7200

FA-1000



Valve and Actuator dimensions

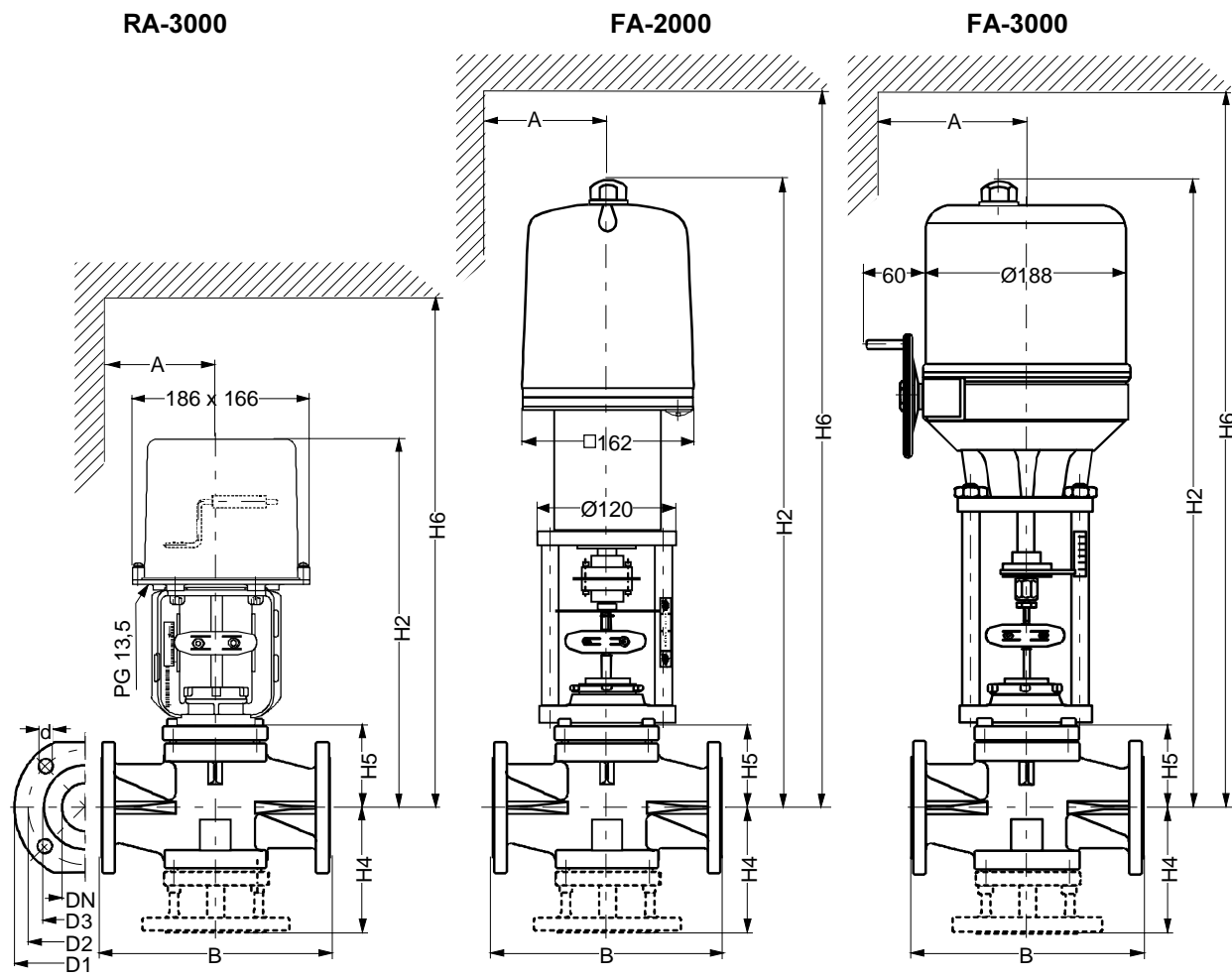
DN	Valve body				RA-3000			VA-7200				FA-1000		
	B	H4	H5	H13	A	H2	H6	A	H2	H11	H6	A	H2	H6
15	130	100	76	70	160	383	550	160	288	315	470	160	469	600
25	160	106	76	72	160	383	550	160	288	315	470	160	469	600
40	200	140	79	89	160	386	550	160	291	318	470	160	473	600

Flange Dimensions

DN	D1	D2	D3	d	Bolts	Holes
15	95	65	45	13,5	M12 x 45	4
25	115	85	68	13,5	M12 x 50	4
40	150	110	88	17,5	M16 x 55	4

Dimensions with electric actuators RA-3000, FA-2000 and FA-3000 (in mm.)

(DN 50 - 150)



Valve and Actuator dimensions

DN	Valve body			RA-3000			FA-2000			FA-3000		
	B	H4	H5	A	H2	H6	A	H2 *)	H6 *)	A	H2 **)	H6 **)
50	230	145	101	160	408	580	160	642	880	-	-	-
65	290	156	102	160	409	580	160	643	880	-	-	-
80	310	180	108	160	415	580	160	649	880	-	-	-
100	350	225	136	160	443	600	-	-	-	300	625	830
125	400	255	155	160	462	630	-	-	-	300	626	830
150	480	290	175	160	482	640	-	-	-	300	632	830

*) add 45 mm for models with positioner

**) add 23 mm for models with positioner

Flange Dimensions

DN	D1	D2	D3	d	Bolts	Holes
50	165	125	102	17,5	M16 x 60	4
65	185	145	122	17,5	M16 x 60	4
80	200	160	138	17,5	M16 x 65	8
100	220	180	158	17,5	M16 x 70	8
125	250	210	188	17,5	M16 x 75	8
150	285	240	212	22	M20 x 75	8

Specifications

Product	VG8000 Series flanged valves									
Models	2-way NO (PDTC) DN 15...150, 2-way NC (PDTO) DN 15...40, 3-way mixing and diverting DN 15...150									
Service	Water, glycol solutions or steam for HVAC applications (proper water treatment is recommended, refer to VDI 2035)									
Valve body data:	DN	15	25	40	50	65	80	100	125	150
	Kvs	(*)	6,3 10	16 25	40	63	100	160	250	350
Weight (kg):	2-way	4	5,4	10	13	18	24	32,5	53,5	72,5
	3-way	5,4	7,2	13	18	24	32	43	72	108
Nominal stroke	13 mm				25 mm			42 mm		
Body pressure rating	PN 16 Limits according to DIN 2401:									
	<p>The graph plots Pressure rating in bar on the y-axis (0 to 16) against Medium temperature in °C on the x-axis (-10 to 170). A horizontal line is drawn at 16 bar from -10°C to 120°C. From 120°C, the line slopes downward to 14 bar at 170°C. A label '14 bar' points to the end of this line.</p>									
Medium temperature limits	+2...+170 °C (above 120 °C limitations according to DIN 4747 and DIN 4752): ...-10 °C with optional glycerin cup									
Body material	Nodular iron GGG 40, W-Nr. 0.7040									
Stem/Plug/Seat material	Stainless steel, W-Nr. 1.4305									
Flange dimensions	DIN 2526 Form C DIN 3202 F1 (for face to face)									
Packing	Teflon-Viton-Teflon V-ring combination, spring loaded and self adjusting									
Control characteristics	Equal percentage for 2-way valves Equal percentage plus linear for 3-way valves									
Rangeability	100 (25 for Kvs 0,1 to 0,63)									
Leakage	max. 0,05 % of Kvs									
Operating pressure drop	Max. 300 kPa recommended									

(*) Kvs values for DN 15 valves (see also "Ordering codes for valve bodies")

0,1	0,16	0,25	0,4	0,63	1,0	1,6	2,5	4
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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.

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