Control Valve

BOA-CVP H

Type Series Booklet

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Type Series Booklet BOA-CVP H

Contents

Control Valves / Measurement Valves

Control Valves to DIN/EN

BOA-CVP H

Main applications

- Hot-water heating systems
- Air-conditioning systems
- Boiler feed applications
- Boiler recirculation
- Chemical industry
- Process engineering
- Heat recovery systems
- Sugar industry

Fluids handled

- High-temperature hot water
- Saturated steam
- Liquids not chemically or mechanically aggressive to the valve materials

Operating data

Table 1: Operating properties

Characteristic	Value
Nominal pressure	PN 16/25/40
Nominal size	DN 15 - 200
Max. permissible pressure [bar]	40
Min. permissible temperature [°C]	≥ -10
Max. permissible temperature [°C]	≤ +450

Selection as per pressure/temperature ratings (⇨ Page 5)

Valve body materials

Table 2: Overview of available materials

Material	Material number	Temperature limit
EN-GJS-400-18-LT	5.3103	≤ 350 °C
GP 240 GH	1.0619+N	≤ 450 °C

Design details

Design

Control valve:

- Straight-way pattern with horizontal seat
- K_{vs} values: 2.5 to 630 m^3/h
- Rangeability 50:1
- Parabolic plug or V-port plug with equal-percentage or linear characteristic
- Two-stage pressure reduction (valve plug combined with multi-hole cage)
- Reduced K_{vs} values
- Spring-loaded PTFE V-packing ≤ 250 °C
- Graphite gland packing ≤ 450 °C
- Flanges to DIN EN 1092-2 type 21 (EN-GJS-400-18-LT) or DIN EN 1092-1 type 21 (GP 240 GH)
- Leakage class IV to DIN EN 60534-4

Pneumatic actuators:

- Mechanical position indicator
- Short actuating times
- Actuating forces of up to 19.5 kN with spring-to-close design
- Actuating forces of up to 55 kN with air-to-close design

Variants

Control valve:

- Seat with PTFE gasket up to 250 °C, leakage class VI
- Anti-cavitation design
- Very low K_{vs} values from 0.1 to 2.1 m^3/h
- Balanced plug from DN 65 (≤ 200 °C)
- Other flange designs
- High-temperature resistant paint (grey aluminium)
- Certification to customer specification

Pneumatic actuators:

- Electro-pneumatic positioner
- Pressure gauge block
- IY module
- Alarm module
- Limit switch, inductive (3-wire)
- Limit switch, mechanical
- 3/2-way solenoid valve
- Air filter/reducing station
- Manual override

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Product benefits

- Two-stage pressure reduction already integrated as standard to reduce noise emission
- Optional anti-cavitation design combines multi-hole cage and perforated plug.
- Easy to adjust to specific control tasks by selecting from various valve disc design (equal-percentage or linear) / seat diameter combinations
- Available with two types of stem seal: maintenance-free PTFE V-packing (< 250 °C) or adjustable graphite gland packing (450 °C)
- Readily accessible actuator pillars accommodate various add-on options (positioner, solenoid valve, limit switches, etc.)
- Electric actuator with parameterisable actuation: continuous-action or 3-point (Open/Stop/Closed); integration in a process control system via 0/2-10 V or 0/4-20 mA signal; available in various sizes up to 25 kN
- Easy to service: The valve trim can be dismantled without any special tools by unscrewing the bonnet bolts.
- Internal parts made of high-grade stainless steel (1.4571) for long service life and high chemical resistance
- Risk of leakage minimised by fully confined cover gasket

Product information

Product information as per Regulation No. 1907/2006 (REACH)

For information as per European chemicals regulation (EC) No. 1907/2006 (REACH) see https://www.ksb.com/en-global/company/corporate-responsibility/reach.

Product information as per Pressure Equipment Directive 2014/68/EU (PED)

The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 2014/68/EU (PED) for fluids in Groups 1 and 2.

Product information as per Directive 2014/34/EU (ATEX)

Version in compliance with European directive ATEX 2014/34/EU on request.

Product information as per UK Pressure Equipment (Safety) Regulations 2016

The valves satisfy the safety requirements of the UK Pressure Equipment (Safety) Regulations 2016 (PER) for fluids in Groups 1 and 2.

Product information as per UK Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016

Version in compliance with UK Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 on request.

Related documents

Table 3: Information/documents

Document	Reference number
BOA-CVP H operating manual	7525.82
Operating manual for pneumatic actuators	7525.84
Typical tender for BOA-CVP H	7524.521

Pressure/temperature ratings

Table 4: Test pressure and operating pressure: EN-GJS-400-18-LT

PN	Material	Shell test	Leak test (seat)	Permissible operating pressure [bar][1)2)]				
		With water						
		Tests P10 and P11 to DIN EN 12266-1	Test procedure 1 to DIN EN 60534-4	[°C]				
		[bar]	[bar]	-10 to +120	200	250	300	350
16	EN-GJS-400-18-LT	24	Δp	16	14,7	13,9	12,8	11,2
25	EN-GJS-400-18-LT	37,5	Δp	25	23	21,8	20	17,5

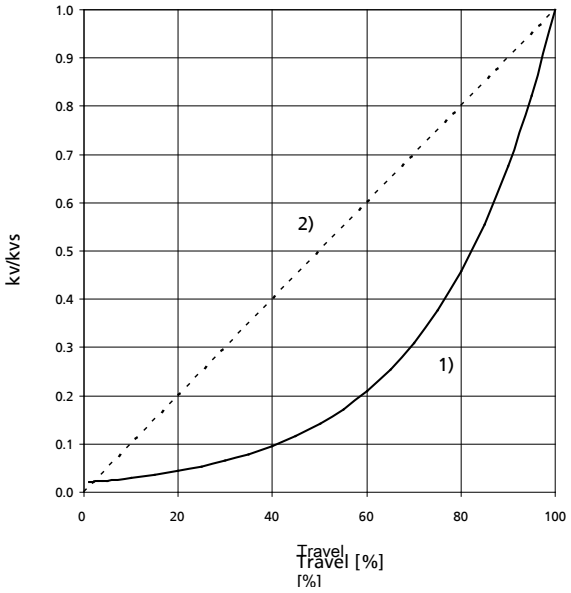
Table 5: Test pressure and operating pressure: GP 240 GH

PN	Material	Shell test	Leak test (seat)	Permissible operating pressure [bar][1)2)]								
		With water										
		Tests P10 and P11 to DIN EN 12266-1	Test procedure 1 to DIN EN 60534-4	[°C]								
		[bar]	[bar]	RT[3)]	100	150	200	250	300	350	400	450
40	GP 240 GH	60	Δp	40,0	37,1	35,2	33,3	30,4	27,6	25,7	23,8	13,1

1 Intermediate temperatures can be derived by linear interpolation.
2 Static load
3 RT: room temperature (-10 °C to +50 °C)

Valve characteristics

1)	Equal-percentage	2)	Linear



Possible combinations of nominal size and seat diameter

Table 6: Symbols key

Symbol	Description
●	Standard model
*	Available upon request.
-	Not possible

Table 7: Possible combinations of nominal size and seat diameter

DN	Seat diameter [mm]														
	4	8	12	15	20	25	32	40	50	65	80	100	125	150	200
15	*	●	●	●	-	-	-	-	-	-	-	-	-	-	-
20	*	●	●	●	●	-	-	-	-	-	-	-	-	-	-
25	*	●	●	●	●	●	-	-	-	-	-	-	-	-	-
32	*	*	*	*	●	●	●	-	-	-	-	-	-	-	-
40	*	*	*	*	*	●	●	●	-	-	-	-	-	-	-
50	*	*	*	*	*	*	●	●	●	-	-	-	-	-	-
65	*	*	*	*	*	*	*	●	●	●	-	-	-	-	-
80	*	*	*	*	*	*	*	*	●	●	●	-	-	-	-
100	*	*	*	*	*	*	*	*	*	●	●	●	-	-	-
125	*	*	*	*	*	*	*	*	*	*	●	●	●	-	-
150	*	*	*	*	*	*	*	*	*	*	*	●	●	●	-
200	*	*	*	*	*	*	*	*	*	*	*	*	●	●	●

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Maximum permissible closing pressures

Spring-to-close

Table 8: Actuator data

Characteristic	Actuator											
	PA-N300						PA-N540					
Diaphragm area [cm²]	300						540					
Max. control pressure [bar]	6						6					
Nominal stroke [mm]	20			32			32			45		
Spring range [bar]	0,5-0,8	1,1-1,6	1,6-2,4	0,5-0,9	1,1-1,8	1,6-2,8	0,7-1,0	1,4-2,1	2,0-3,2	0,7-1,2	1,4-2,4	2,0-3,7
Control pressure required [bar]	0,9	1,7	2,5	1,0	1,9	2,9	1,1	2,2	3,3	1,3	2,5	3,8
Actuating force [N]	1500	3300	4800	1500	3300	4800	3780	7560	10800	3780	7560	10800
Maximum stroke[4] (unmounted) [mm]	32						50					

Table 9: Actuator data

Characteristic	Actuator								
	PA-N1080								
Diaphragm area [cm²]	1080								
Max. control pressure [bar]	6								
Nominal stroke [mm]	32			45			60		
Spring range [bar]	0,6-0,8	1,2-1,6	1,8-2,3	0,6-0,9	1,2-1,7	1,8-2,5	0,6-0,9	1,2-1,8	1,8-2,7
Control pressure required [bar]	0,9	1,7	2,4	1,0	1,8	2,6	1,2	1,9	2,8
Actuating force [N]	6480	12960	19440	6480	12960	19440	6480	12960	19440
Maximum stroke[4] (unmounted) [mm]	80								

Table 10: Maximum closing pressures[5] if fluid approaches the valve disc from the opposite direction of valve closure; p2 = 0 bar
Model with V-packing
Values [bar]

Seat diameter [mm]					4	8	12	15	20	25	32	40	50	65	80	100	125	150	200
Stroke [mm]					20						32						45		60
PA-N300	Spring range [bar]	0,5-0,8	Control pressure required [bar]	0,9	40,0	40,0	40,0	40,0	33,8	21,8									
		1,1-1,6		1,7	-	-	40,0	40,0	40,0	40,0									
		1,6-2,4		2,5	-	-	-	-	40,0	40,0									
		0,5-0,9		1,0							13,2	8,2	5,0	2,6	1,8	0,8			
		1,1-1,8		1,9							32,9	21,1	13,4	7,7	4,9	3,0			
		1,6-2,8		2,9							40,0	31,9	20,5	12,0	7,8	4,8			
PA-N540		0,7-1,0		1,1							38,1	24,6	15,7	9,1	5,8	3,6			
		1,4-2,1		2,2							40,0	40,0	33,4	19,8	13,0	8,2			
		2,0-3,2		3,3							-	40,0	40,0	28,9	19,1	12,2			
		0,7-1,2		1,3													2,1	1,4	
		1,4-2,4		2,5													3,7	3,5	
		2,0-3,7		3,8													7,7	5,3	
PA-N1080		0,6-0,8		0,9										16,7	10,9	6,9			
		1,2-1,6		1,7										35,0	23,2	14,8			
		1,8-2,3		2,4										-	35,4	22,7			
		0,6-0,9		1,0													4,3	2,9	
		1,2-1,7		1,8													9,4	6,4	
		1,8-2,5		2,6													14,5	10,0	
		0,6-0,9		1															1,5
		1,2-1,8		1,9															3,5
		1,8-2,7		2,8															5,5

4 Replacement actuators must be pre-loaded to the above-mentioned spring ranges during mounting on site.
5 All values without balanced plug and based on leakage class IV (DIN EN 60534-4).

Table 11: Maximum closing pressures[5)] if fluid approaches the valve disc from the opposite direction of valve closure; p2 = 0 bar
Model with gland packing
Values [bar]

Seat diameter [mm]				4	8	12	15	20	25	32	40	50	65	80	100	125	150	200
Stroke [mm]				20						32						45		60
PA-N300	Spring range [bar]	0,5-0,8	Control pressure required [bar] 0,9	40,0	40,0	40,0	31,1	17,6	11,0									
		1,1-1,6	1,7	-	-	40,0	40,0	40,0	40,0									
		1,6-2,4	2,5	-	-	-	-	40,0	40,0									
		0,5-0,9	1,0							6,4	3,7	2,1	0,5	0,1	-			
		1,1-1,8	1,9							26,1	16,6	10,5	5,5	3,5	2,1			
		1,6-2,8	2,9							40,0	27,4	17,5	9,8	6,3	3,9			
PA-N540		0,7-1,0	1,1							31,3	20,1	12,8	6,9	4,4	2,6			
		1,4-2,1	2,2							40,0	40,0	30,5	17,6	11,5	7,3			
		2,0-3,2	3,3							-	40,0	40,0	26,8	17,6	11,2			
		0,7-1,2	1,3													1,4	0,9	
		1,4-2,4	2,5													3,0	3,0	
		2,0-3,7	3,8													7,0	4,8	
PA-N1080		0,6-0,8	0,9										14,5	9,5	5,9			
		1,2-1,6	1,7										32,9	21,7	13,9			
		1,8-2,3	2,4										-	34,0	21,8			
		0,6-0,9	1,0													3,6	2,4	
		1,2-1,7	1,8													8,7	5,9	
		1,8-2,5	2,6													13,8	9,5	
		0,6-0,9	1															1,2
		1,2-1,7	1,8															3,2
		1,8-2,5	2,6															5,3

Air-to-close

Table 12: Actuator data

Characteristic			Actuator											
			PA-N300						PA-N540					
Diaphragm area [cm²]			300						540					
Max. control pressure [bar]			6						6					
Nominal stroke [mm]			20			32			32			45		
Spring range [bar]			0,6-0,9	1,3-1,8	2,0-2,8	0,5-0,9	1,1-1,8	1,6-2,8	0,8-1,1	1,5-2,2	2,2-3,4	0,6-1,1	1,2-2,2	1,7-3,4
Control pressure required [bar]			1,0	1,9	2,9	1,0	1,9	2,9	1,2	2,3	3,5	1,2	2,3	3,5
Actuating force [N]	Control pressure [bar]	1,3	1200	-	-	1200	-	-	1080	-	-	1080	-	-
		2	3300	600	-	3300	600	-	4860	-	-	4860	-	-
		3	6300	3600	600	6300	3600	600	10260	4320	-	10260	4320	-
		4	9300	6600	3600	9300	6600	3600	15660	9720	3240	15660	9720	3240
		5	12300	9600	6600	12300	9600	6600	21060	15120	8640	21060	15120	7020
		6	15300	12600	9600	15300	12600	9600	26460	20520	14040	26460	20520	12420
Maximum stroke[6)] (unmounted) [mm]			32						50					

Table 13: Actuator data

Characteristic	Actuator								
	PA-N1080								
Diaphragm area [cm²]	1080								
Max. control pressure [bar]	6								
Nominal stroke [mm]	32			45			60		
Spring range [bar]	0,7-0,9	1,4-1,8	2,2-2,7	0,6-0,9	1,3-1,8	2,0-2,7	0,6-0,9	1,2-1,8	1,8-2,7
Control pressure required [bar]	1,0	1,9	2,8	1,0	1,9	2,9	1,0	1,9	2,9

6 Replacement actuators must be pre-loaded to the above-mentioned spring ranges during mounting on site.

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Characteristic			Actuator								
			PA-N1080								
Actuating force [N]	Control pressure [bar]	1,3	4320	-	-	4320	-	-	4320	-	-
		2	11880	2160	-	11880	2160	-	11880	2160	-
		3	22680	12960	3240	22680	12960	3240	22680	12960	3240
		4	33480	23760	14040	33480	23760	14040	33480	23760	14040
		5	44280	34560	24840	44280	34560	24840	44280	34560	24840
		6	55080	45360	35640	55080	45360	35640	55080	45360	35640
Maximum stroke[7] (unmounted) [mm]			80								

Table 14: Maximum closing pressures [8] if fluid approaches the valve disc from the opposite direction of valve closure; p2 = 0 bar
Model with V-packing
Values [bar]

Seat diameter [mm]			4	8	12	15	20	25	32	40	50	65	80	100	125	150	200
Stroke [mm]			20						32						45		60
PA-N300	Control pressure required [bar]	1,3	40,0	40,0	40,0	40,0	26,0	16,6	9,9	6,0	3,6	1,8	1,0	0,4			
		2	-	-	40,0	40,0	40,0	40,0	32,9	21,1	13,4	7,7	4,9	3,0			
		3	-	-	-	-	-	40,0	40,0	40,0	27,5	16,2	10,6	6,7			
		4	-	-	-	-	-	-	40,0	40,0	40,0	24,7	16,3	10,3			
		5	-	-	-	-	-	-	-	-	40,0	33,2	21,9	14,0			
		6	-	-	-	-	-	-	-	-	-	40,0	27,6	17,7			
PA-N540		1,3							8,6	5,2	3,0	1,4	0,7	0,3	-	-	
		2							40,0	32,3	20,7	12,1	7,9	4,9	3,0	2,0	
		3							-	40,0	40,0	27,4	18,1	11,5	7,3	5,0	
		4							-	-	-	40,0	28,3	18,1	11,5	7,9	
		5							-	-	-	-	38,5	24,7	15,8	10,9	
		6							-	-	-	-	-	31,3	20,0	13,9	
PA-N1080		1,3										10,6	6,9	4,2	2,6	1,7	0,8
		2										32,0	21,1	13,5	8,5	5,8	3,2
		3										-	40,0	26,7	17,0	11,8	6,6
		4										-	-	-	25,6	17,7	9,9
		5										-	-	-	-	23,7	13,3
		6										-	-	-	-	-	-

Table 15: Maximum closing pressures[8] if fluid approaches the valve disc from the opposite direction of valve closure; p2 = 0 bar
Model with gland packing
Values [bar]

Seat diameter [mm]			4	8	12	15	20	25	32	40	50	65	80	100	125	150	200
Stroke [mm]			20						32						45		60
PA-N300	Control pressure required [bar]	1,3	40,0	40,0	28,0	18,0	9,8	5,8	3,1	1,6	0,7	-	-	-			
		2	-	-	40,0	40,0	40,0	40,0	26,1	16,6	10,5	5,5	3,5	2,1			
		3	-	-	-	-	-	40,0	40,0	38,2	24,6	14,0	9,1	5,7			
		4	-	-	-	-	-	-	40,0	40,0	38,6	22,5	14,8	9,4			
		5	-	-	-	-	-	-	-	-	40,0	31,0	20,5	13,1			
		6	-	-	-	-	-	-	-	-	-	39,5	26,1	16,7			
PA-N540		1,3							1,8	0,7	0,1	-	-	-	-	-	
		2							40,0	27,9	17,8	10,0	6,4	4,0	2,3	1,5	
		3							-	40,0	40,0	25,2	16,6	10,6	6,5	4,5	
		4							-	-	-	40,0	26,8	17,2	10,8	7,4	
		5							-	-	-	-	37,0	23,8	15,0	10,4	
		6							-	-	-	-	-	30,3	19,3	13,4	
PA-N1080		1,3										8,4	5,4	3,3	1,9	1,2	0,5
		2										29,8	19,7	12,5	7,8	5,3	2,9
		3										-	40,0	25,7	16,3	11,3	6,3
		4										-	-	38,9	24,8	17,2	9,6

7 Replacement actuators must be pre-loaded to the above-mentioned spring ranges during mounting on site.
8 All values without balanced plug and based on leakage class IV (DIN EN 60534-4).

Seat diameter [mm]			4	8	12	15	20	25	32	40	50	65	80	100	125	150	200
Stroke [mm]			20						32						45		60
PA-N1080	Control pressure required [bar]	5										-	-	-	-	23,2	13,0
		6										-	-	-	-	-	-

Flow characteristics

Equal-percentage characteristics, rangeability 50:1

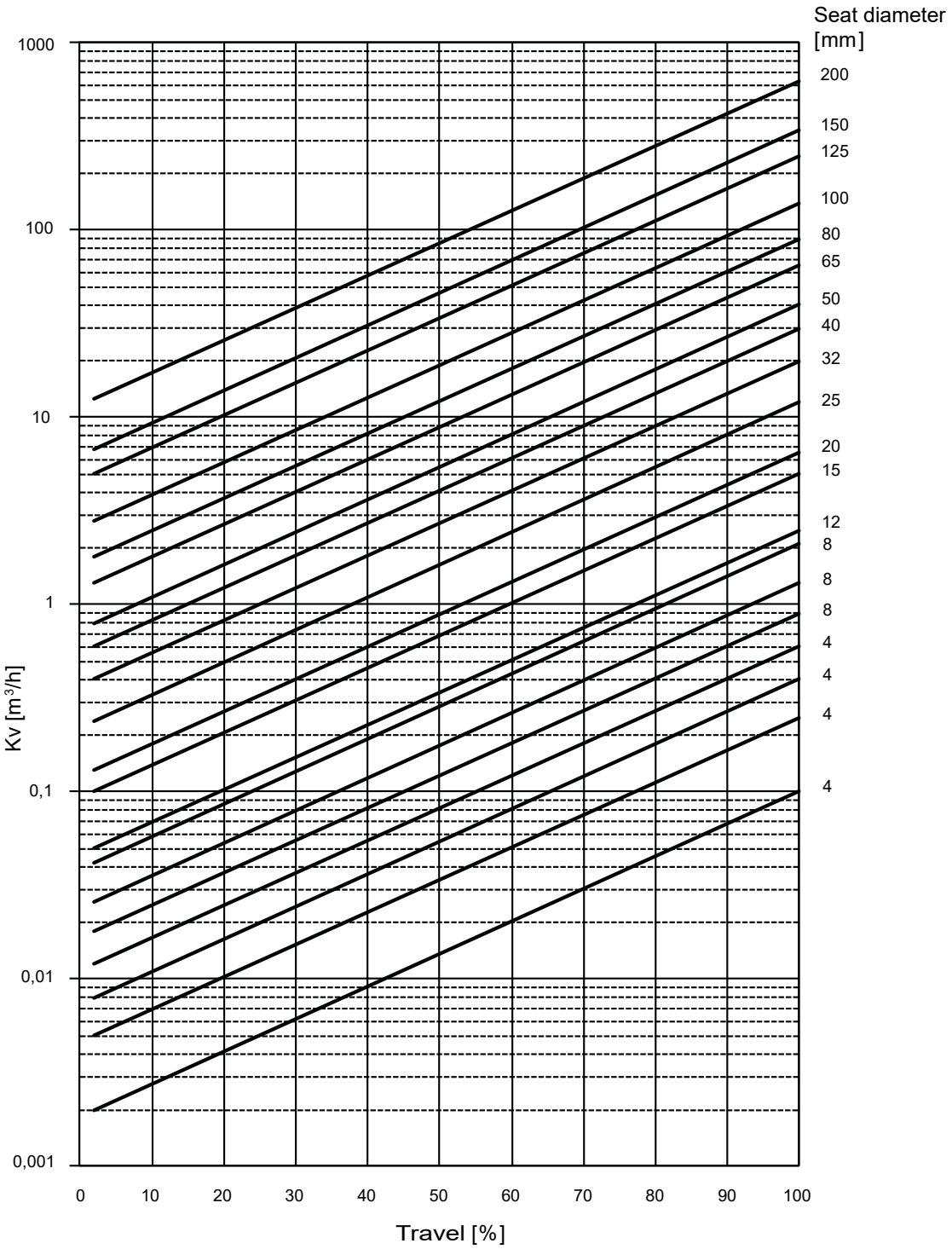

Table 16: Flow coefficients

Seat diameter [mm]	4				8			12	15	20	25	32	40	50	65	80	100	125	150	200
K_{vs} value [m³/h]	0,10	0,25	0,40	0,60	0,90	1,30	2,10	2,50	5	6,5	12	20	30	40	65	90	140	250	340	630

Linear characteristics, rangeability 50:1

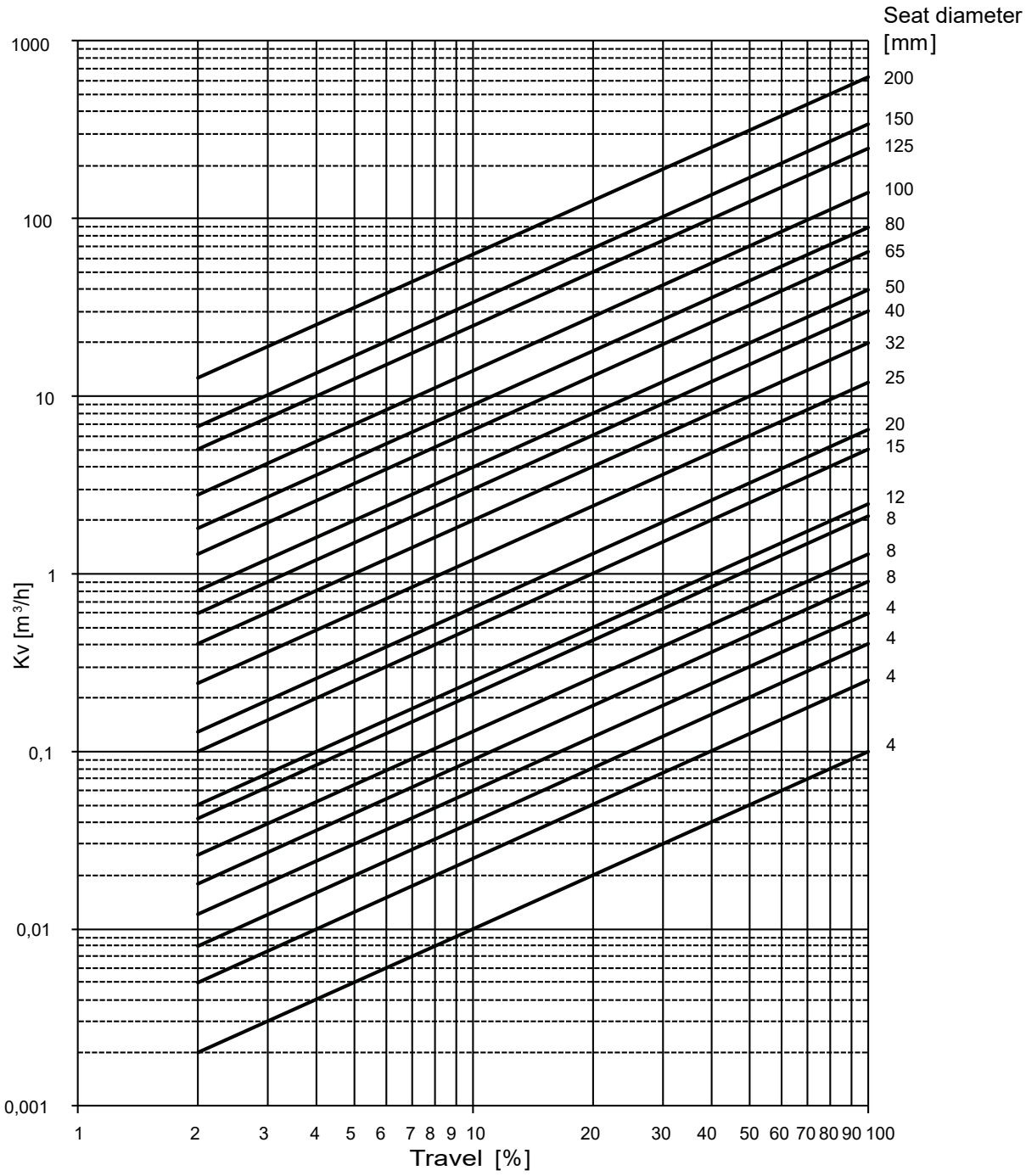

Table 17: Flow coefficients

Seat diameter [mm]	4				8			12	15	20	25	32	40	50	65	80	100	125	150	200
K_{vs} value [m³/h]	0,10	0,25	0,40	0,60	0,90	1,30	2,10	2,50	5	6,5	12	20	30	40	65	90	140	250	340	630

Technical data

Technical data - control valve

Table 18: Technical data of BOA-CVP H

Characteristic	Value
Nominal pressure	PN 16, PN 25, PN 40
Valve characteristic	Equal-percentage, linear
Leakage class	IV: 0.01 % of k_{vs} value to DIN EN 60534-4 VI (optional): to DIN EN 60534-4

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Characteristic	Value
Permissible pressure	16 bar, 25 bar, 40 bar
Flanged ends	PN 16 and PN 25 to DIN EN 1092-2, PN 40 to DIN EN 1092-1
Fluid temperature	-10 to +450 °C

Technical data - actuators

Table 19: Technical data of actuators

Characteristic	Actuator type		
	PA-N300	PA-N540	PA-N1080
Diaphragm area [cm^2]	300	540	1080
Max. control pressure [bar]	6	6	6
Total volume [l]	1,0	4,8	12,5
Stroke volume [l]	0,6	3,2	8,7
Air supply connection	NPT $^1/_4$	NPT $^1/_2$	NPT $^3/_4$
Weight without handwheel [kg]	13	32	120
Weight with handwheel [kg]	16	51	144
Ambient temperature [°C]	-40 to +80[9)]		
Function	Either spring-to-close or spring-to-open		

The maximum operating pressure of the actuators is 6 bar.

For trouble-free operation, the control air (6 bar max.) required for actuation must meet the following requirements:

- Instrument air quality to DIN ISO 8573.1 with a maximum particle size of 5 µm, a maximum particulate concentration of 5 mg/m^3 and Quality Class 3.
- Water content: max. dew point 2 °C (Quality Class 4); a different dew point applies if the actuator is operated at a high-altitude site or at low ambient temperatures.
- Oil content: max. 25 mg of oil in 1 m^3 of air (Quality Class 5) to DIN ISO 8573.1. If the actuator is operated at temperatures below 0 °C, dry control air must be used.

Contact the manufacturer if other control air qualities or special control media are to be used.

Requirements on ambient air:

- The actuators comply with Category C2 of DIN EN 12944-2.
- Contact the manufacturer if the actuators are to be used in an aggressive ambient atmosphere.

Function and working principle

The pneumatic actuator translates pneumatic control signals into a linear stem movement. The return force required is provided by the compression springs arranged on the diaphragm plate. If the air supply should fail, the spring force will return the actuator to its original position.

The actuator's working principle – spring-to-open/air-to-close (NO) or spring-to-close/air-to-open (NC) – is determined by the way the springs are fitted.

Actuator variants and accessories

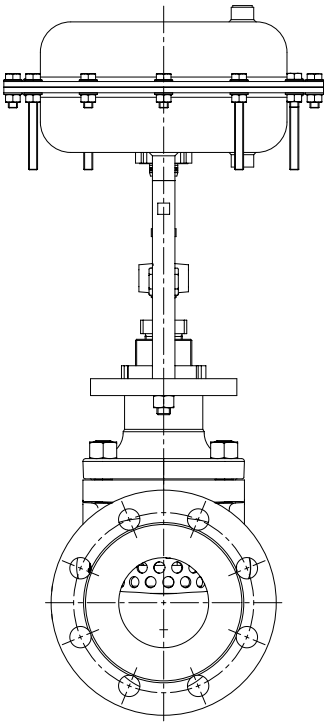
Table 20: Variants and accessories

Variant/Accessory	Manufacturer and type	Note
Electro-pneumatic positioner[10)]	KSB SMARTRONIC MA	4 - 20 mA input signal or HART protocol
Electro-pneumatic positioner[10)]	Siemens SIPART- PS 2, 6DR5010-0NG00-0AA0	4 - 20 mA input signal
Pressure gauge block	Siemens, 6DR4004-1M	2 pressure gauges
IY module	Siemens, 6DR4004-8J	4 - 20 mA output signal
Alarm module	Siemens, 6DR4004-8A	3 alarm outputs / 1 binary input
Limit switch, inductive (3-wire)	Schneider Electric XS4P12PA340	-
Limit switch, mechanical	Schneider Electric XCKP2102P16	-
3/2-way solenoid valve, G $^1/_4$"	Joyner, MH 310701	24 VAC or 230 VAC, 50 Hz
Air filter/reducing station with pressure gauge G $^1/_4$"	Hecomatic FR 14 S	-
Manual override	-	-

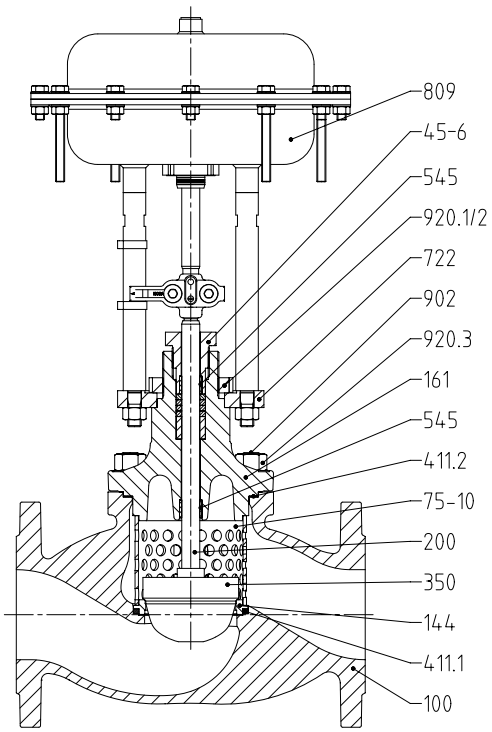
9 The temperature is limited by the materials of the diaphragm and sealing elements.

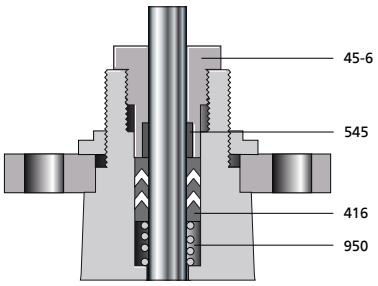
10 Mounting to NAMUR

Materials

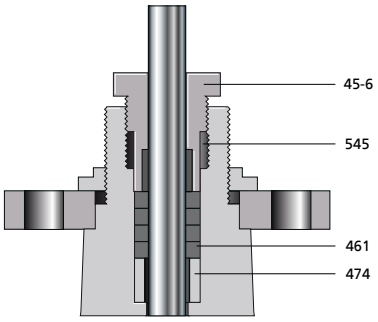


BOA-CVP H control valve





PTFE V-packing



Graphite gland packing

Table 21: Parts list

Part No.	Description	Material	Material number	Note
100	Body	EN-GJS-400-18-LT	5.3103	DN 20-150
		GP 240 GH	1.0619	DN 15-200
144	Seat	X6CrNiMoTi17-12-2	1.4571	-
161	Body bonnet	EN-GJS-400-18-LT	5.3103	DN 20-150
		GP 240 GH	1.0619	DN 15-200
200	Stem	X6CrNiMoTi17-12-2	1.4571	-
350	Valve disc	X6CrNiMoTi17-12-2	1.4571	-
		GX5CrNiMo 19-11-2	1.4408	DN 200
411.1	Seat gasket	Pure graphite	-	-
411.2	Bonnet gasket	CrNiSt/graphite	-	-
416	V-packing	Carbon PTFE	-	-
45-6	Stuffing box screw	X5CrNi18-10	1.4301	-
461	Gland packing	Graphite	-	-
474	Thrust ring	X5CrNi18-10	1.4301	-
545	Bearing bush	Sint A50	-	-
75-10	Multi-hole cage	X5CrNi18-10	1.4301	-
722	Top flange	Steel	-	-
809	Actuator	-	-	-
902	Stud	21CrMoV5-7	1.7709	-
920.1	Hexagon nut	Galvanised steel	-	-
920.2	Slotted round nut	Galvanised steel	-	-
920.3	Hexagon nut	25CrMo4	1.7218+QT+A2D	-
950	Spring	X5CrNi18-10	1.4301	-

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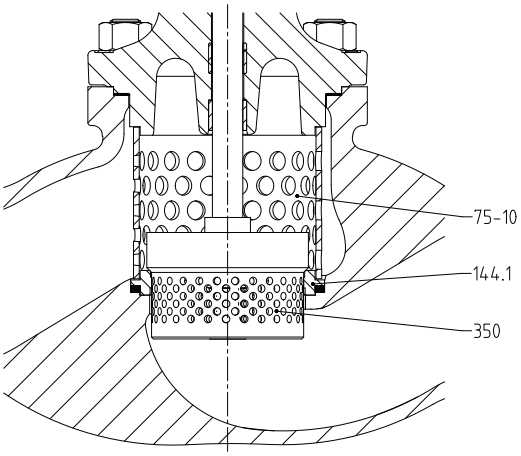
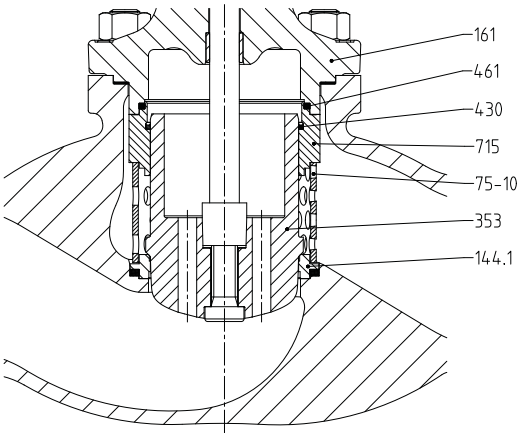
Variants



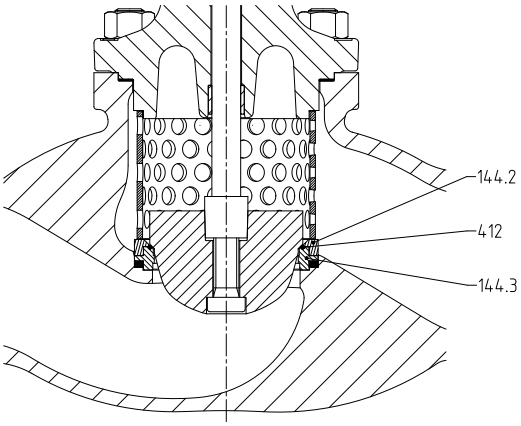
Anti-cavitation design

The fluid enters the valve in closing direction. The perforated plug 350, which defines the required characteristic curve, is guided in the seat 144.1. The bubbles implode inside the perforated plug 350, so that cavitation damage is avoided. This design variant is mainly used for liquid fluids and high differential pressures.



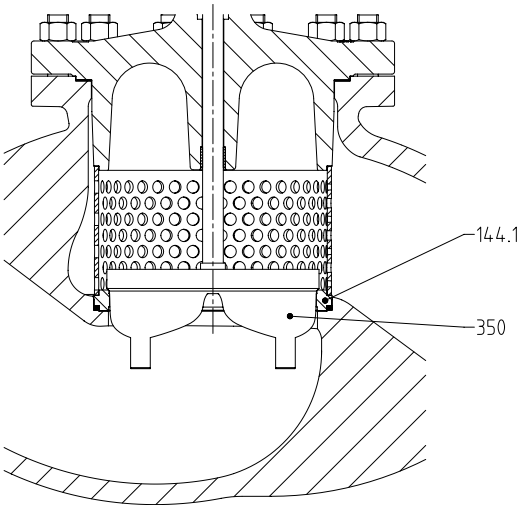
Balanced plug design

A balanced plug 353 is required if the differential closing pressures are exceeded on valves of DN 65 or higher. The plug is guided like a piston in guide tube 715. Owing to the holes in the plug base, the pressure also acts on the rear side of the plug, which minimises the forces acting on the plug. Sealing in the guide tube is effected by a U-ring 430 and gland packing 461.



Seat with PTFE ring

On valves designed for leakage class VI, sealing of the seat/disc interface is effected by means of a PTFE O-ring 412 held in its recess by the lower seat component 144.3 and the upper seat component 144.2.



V-port plug

The V-port plug 350, which is available for DN 200 only, is guided in seat 144.1, resulting in increased stability when the valve is in the fully open position. The characteristic curve required is defined by the shape of the ports.

Dimensions and weights

Dimensions and weights of BOA-CVP H control valve

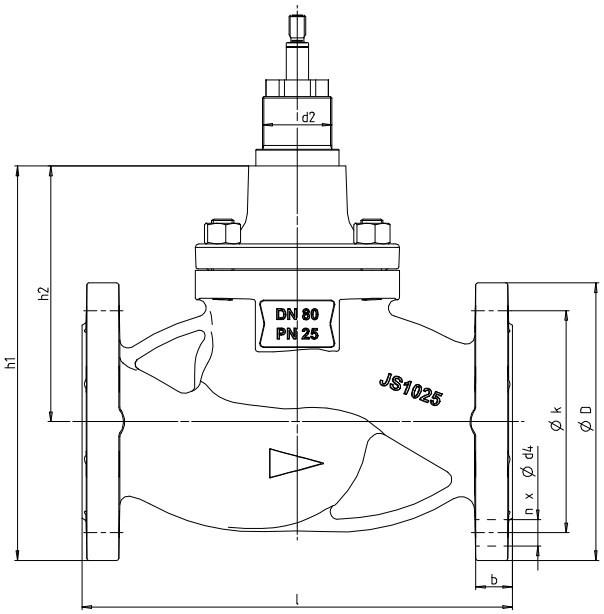


Fig. 1: Control valve without actuator

Table 22: Dimensions and weights

PN	DN	l	h_1	h_2	d_2	D	b	k	n	d_4	[kg]
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
16	20	150	153,5	101,0	M39	105	16	75	4	14	6,3
	25	160	164,5	107,0	M39	115	16	85	4	14	6,9
	32	180	216,0	146,0	M39	140	18	100	4	19	10,4
	40	200	226,0	151,0	M39	150	18	110	4	19	11,6
	50	230	227,0	144,5	M39	165	20	125	4	19	13,8
	65	290	272,5	181,0	M50	185	20	145	4	19	22,3
	80	310	284,0	184,0	M50	200	22	160	8	19	28,4
	100	350	328,0	218,0	M50	220	24	180	8	19	38,4
	125	400	384,5	260,0	M50	250	26	210	8	19	60,5
	150	480	403,5	261,0	M50	285	26	240	8	23	83,0
25	20	150	153,5	101,0	M39	105	16	75	4	14	6,3
	25	160	164,5	107,0	M39	115	16	85	4	14	6,9
	32	180	216,0	146,0	M39	140	18	100	4	19	10,4
	40	200	226,0	151,0	M39	150	18	110	4	19	11,6
	50	230	227,0	144,5	M39	165	20	125	4	19	13,8
	65	290	272,5	181,0	M50	185	20	145	8	19	22,3
	80	310	284,0	184,0	M50	200	22	160	8	19	32,4
	100	350	335,5	218,0	M50	235	24	190	8	23	42,4
	125	400	394,5	260,0	M50	270	26	220	8	28	67,5
	150	480	411,0	261,0	M50	300	26	250	8	28	91,5
40	15	130	148,5	101,0	M39	95	16	65	4	14	6,4
	20	150	153,5	101,0	M39	105	18	75	4	14	7,0
	25	160	164,5	107,0	M39	115	18	85	4	14	7,6
	32	180	216,0	146,0	M39	140	18	100	4	18	11,0
	40	200	226,0	151,0	M39	150	18	110	4	18	12,4
	50	230	227,0	144,5	M39	165	20	125	4	18	17,5
	65	290	272,5	181,0	M50	185	22	145	8	18	27,0
	80	310	284,0	184,0	M50	200	24	160	8	18	35,0
	100	350	335,5	218,0	M50	235	24	190	8	22	48,3
	125	400	394,5	260,0	M50	270	26	220	8	26	86,7
	150	480	411,0	261,0	M50	300	28	250	8	26	118,1

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PN	DN	l	h_1	h_2	d_2	D	b	k	n	d_4	[kg]
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
40	200	600	507,5	320,0	M50	375	34	320	12	30	171,6

Mating dimensions as per standard

Face-to-face lengths:	DIN EN 558/1, ISO 5752/1
Flanges PN 16/25:	DIN EN 1092-2, flange type 21-2
Flanges PN 40:	DIN EN 1092-1, flange type 21-2
Raised face PN 10/16:	DIN EN 1092-2, type B
Raised face PN 40:	DIN EN 1092-1, type B

Dimensions and weights of pneumatic actuator types PA-N300, PA-N540 and PA-N1080

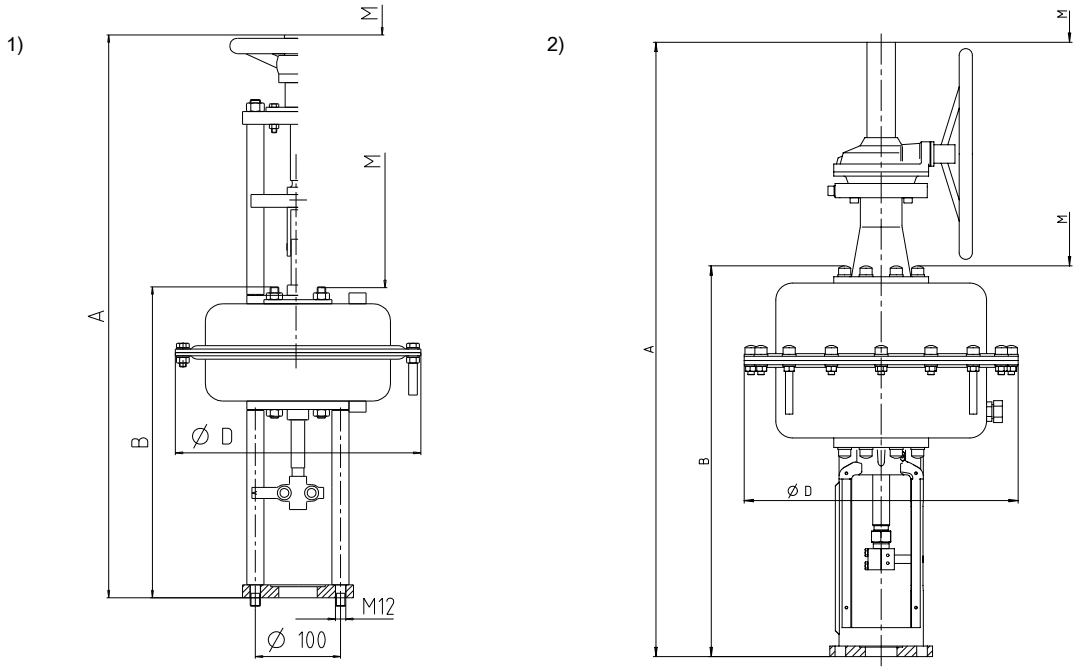

Fig. 2: 1) PA-N300 and PA-N540; 2) PA-N1080

Table 23: Dimensions and weights

Actuator type	A	B	D	M[11)]	[kg]
	[mm]	[mm]	[mm]	[mm]	
PA-N300	656	347	284	600	13
PA-N540	865	534	380	600	43
PA-N1080	1164	739	520	600	120

11 Min. clearance for removal

Dimensions and weights of manual override

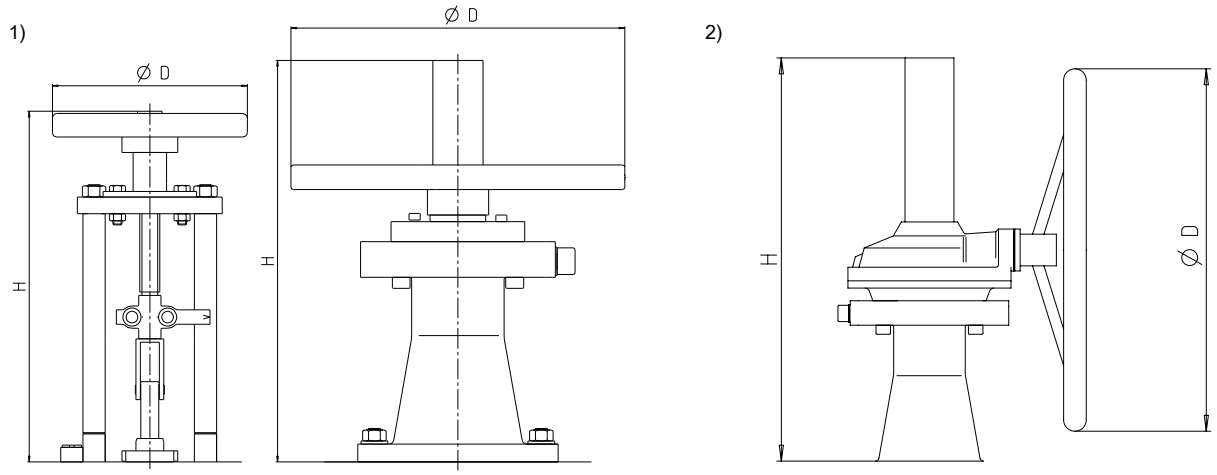

Fig. 3: 1) Manual override of PA-N300 and PA-N540; 2) Manual override of PA-N1080

Table 24: Dimensions and weights

Actuator type	H	D	[kg]
	[mm]	[mm]	
PA-N300	315	175	3
PA-N540	361	300	19
PA-N1080	450	400	24

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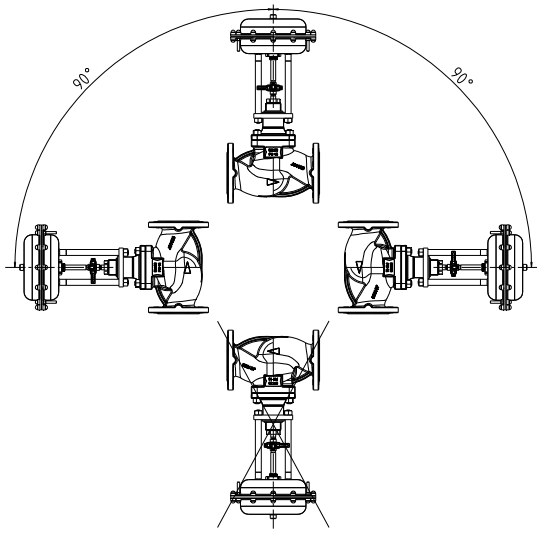
Installation information

- Flow through control valves is in the direction of the embossed arrow on the valve body as standard. An alternating direction of flow is permissible; however, if fluid flow does not comply with the flow direction arrow on the valve body, the actual throughflow will be lower than the maximum throughflow indicated on the name plate.
- Recommendation: A strainer fitted upstream of the control valve will further enhance the control valve's functional reliability.

Installation positions:



Actuator installation positions

If the valve is installed in inclined position, the actuator must be mounted with the pillars positioned in such a way as to achieve the maximum moment of resistance. From a position of 30° off the vertical, it is advisable to support the actuator's weight. This is particularly important if piping vibrations are to be expected.

Specification sheet for valve selection

Operating data

Point of control	Measuring/control task[12)]			Potentially explosive atmosphere (zone)	
Ambient temperature	[°C]	Max.		Min.	
Max. permissible sound pressure level	[dB(A)]				
Pipe	-	DN		PN	
Fluid handled	-				
State when entering valve	-	Liquid		Steam	
	-	Gas			

Process data

		Min.	**Normal**	Max.
Volume flow rate (liquid)	[m³/h]			
Mass flow rate (gas/steam)	[kg/h]			
Inlet temperature	[°C]			
Inlet pressure (a) p1	[bar]			
Outlet pressure (a) p2	[bar]			
Inlet density	[kg/m³]			
Kinematic viscosity	[cSt]			

Valve data

Flow direction	-	Δp opens		Δp closes	
Nominal size, nominal pressure	-	DN		PN	
Line connection/Pattern	-	Straight-way pattern, raised-face flange, type B (DIN EN 1092-2/1092-1)			
Body/bonnet material	-	Nodular cast iron EN-GJS-400-18-LT (PN 16/25) or cast steel GP 240 GH (PN 40)			
Characteristic	-	Linear		Equal-percentage	
Selected flow coefficient	K_{vs} value				
Seat/disc diameter	[mm]				
Packing material	-	PTFE		Graphite	
Leakage class (DIN EN 60534-4)	-	IV		VI	

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12 Measuring, open-loop and closed-loop control task

Actuator data

Δp closes (actuator selection)	[bar]				
Function		Spring-to-open (NO)		Spring-to-close (NC)	
Control pressure	[bar]				
Electro-pneumatic positioner		□ Sipart PS2 2-wire 4-20 mA			
Additional modules integrated in the unit		□ IY module for actual-position feedback, 4-20 mA			
		□ Alarm module for 3 alarm outputs and 1 binary input			
Supplementary equipment		□ Pressure gauge block (with 2 pressure gauges)			
		□ Filter/reducing station			
		3/2-way solenoid valve			
		230 V		24 V	
		Mechanical limit switch			
		1 x		2 x	
		Inductive limit switch			
		1 x		2 x	

The pneumatic actuators are offered complete with tubing as standard. Piping and add-on parts from specific manufacturers on request.

The data in bold is mandatory in all RFQs.

Chemical resistance chart

The information provided in this chemical resistance chart is based on experience, the Dechema lists as well as manufacturer information. Corrosion resistance is largely dependent on the operating conditions, temperatures and concentrations. Hydroabrasive wear in fluids containing solids is not covered in this list. The information provided in this list is for orientation only. Warranty claims may not be asserted on the basis of this list.

Table 25: Symbols key

Symbol	Description
✓	The fluid handled is not normally aggressive toward the materials.
✖	The fluid handled is aggressive toward the materials. Valve cannot be used.
○	The materials and/or the valve can only be used under certain operating conditions. Please enquire accordingly, stating the operating conditions such as concentration, temperature, pH and composition of the fluid handled.

Table 26: Chemical resistance chart for water[13)]

Fluids handled	
Brackish water[14)]	✖
Service water[14)]	✓
Fire-fighting water	✓
Chlorinated water (≤ 0.6 mg/kg)	✓
Deionised water (demineralised water)[15)]	○
Distilled water[15)]	○
Boiler feed water	✓
Hot water	✓
High-temperature hot water	✓
Condensate	✓
Oil-free cooling water	✓
Oil-containing cooling water	✓
Ozonised water (≤ 0.5 mg/kg)	✓
Pure water	✓
Seawater	✖
Scale-forming water[14)]	○
Raw water[14)]	✓
Partly desalinated water[15)]	○
Fully desalinated water[15)]	○
Municipal waste water[14)16)]	✓
Industrial waste water[14)17)]	✓

Table 27: Chemical resistance chart for oils (aromatic content 5 mg/kg)

Fluids handled	
Vegetable oils	✓
Mineral oils	✓
Synthetic oils	○
Crude oil	✓
Petroleum	✓
Light fuel oil	✓
Linseed oil	✓
Oil/water emulsion[14)]	✓
Jet fuel	✓
Petrol	✓
Kerosene	✓

Table 28: Chemical resistance chart for refrigerants

Fluids handled	
Ammonium hydroxide (≤ 30 %, ≤ 25 °C)	✓
Glycol (ethylene glycol)	✓
Propylene glycol	✓
Water/glycol mixture (20 % ≤ c ≤ 50 %, ≤ 90 °C)	✓
Inorganic cooling brine, pH 7.5	✓

Table 29: Chemical resistance chart for thermal oils

Fluids handled	
Synthetic thermal oils	○
Mineral-based thermal oils	○

Table 30: Chemical resistance chart for acids

Fluids handled	
Hydrochloric acid	✖
Sulphuric acid (pure, technical, concentrated)	✖
Sulphurous acid	✖
Fatty acid	✖
Nitric acid	✖

Table 31: Chemical resistance chart for cleaning agents

Fluids handled	
Lye for bottle rinsers (e.g. P3) ≤ 80 °C[14)]	○
Lye for metal cleaning ≤ 80 °C[14)]	○

Table 32: Chemical resistance chart for steam

Fluids handled	
Saturated steam	✓

Table 33: Chemical resistance chart for other fluids

Fluids handled	
Sodium hydroxide (≤ 50 %, ≤ 50 °C)	○
Natural gas	✓
Oil-containing compressed air	✓
Dry chlorine (≤ 30 °C)	✓
Ammonia	✓
Butane (liquefied gas)	✓
Aqueous glycerine	✓
Carbon dioxide (gas)	✓
Carbon dioxide (aqueous solution)	✖

13 General criteria for water to be handled by products made of non-alloyed materials: pH > 7; chlorides (Cl-) < 150 mg/kg; chlorine (Cl) < 0.6 mg/kg. Other factors to be considered: hardness, carbon dioxide content (CO_2), oxygen (O_2) and dissolved substances. Contact KSB if limits are exceeded.

14 Without solids

15 Can only be used for installations and the respective water quality as specified in the VdTÜV 1466 or VDI 2035 guidelines. A pH ≥ 9.5 and an oxygen content of ≤ 0.02 mg/l are also recommended.

16 Biologically treated

17 Non-corrosive, non-abrasive

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