Control Valve

BOA-CVE H

Type Series Booklet

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Type Series Booklet BOA-CVE H

Contents

Control Valves / Measurement Valves

Control Valves to DIN/EN

BOA-CVE 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

- 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 6)

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 m³/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

Actuators (technical data refers to basic configuration):

- Configurable, microprocessor-controlled actuators
  Supply voltage: 24 V AC/DC / 230 V AC / 400 V AC
  Position setpoint: 4 - 20 mA
  Actual-position feedback: 4 - 20 mA
  Limit switching is torque-dependent in closing direction and stroke-dependent in opening direction.
- 3-point actuators
  Supply voltage: 230 V AC / 400 V AC
  Actual-position feedback: 2 limit switches
  Stopping via limit switches in closing direction and opening direction
- Actuating time between 23 and 150 seconds, depending on the K_{vs} value (stroke)
- Operating data stored in permanent memory
- After a power failure, operation is resumed in accordance with the operating data.

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 m³/h
- Balanced plug from DN 65 (≤ 200 °C)
- Other flange designs
- High-temperature resistant paint (grey aluminium)
- Certification to customer specification

Actuators:

- Actuator configured to match the order specification
- Integrated process controller
- Power back-up unit
- Heating of the motor space

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- Other supply voltages on request
- Other actuators (e.g. AUMA) on request.
- Local control unit

Product benefits

- Two-stage pressure reduction already integrated as standard to reduce noise emission
- Optional anti-cavitation design combines supporting 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)
- 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-CVE H operating manual	7525.81
Electric actuators, operating manual	7525.83
Typical tender for BOA-CVE H	7525.521

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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

Valve characteristics

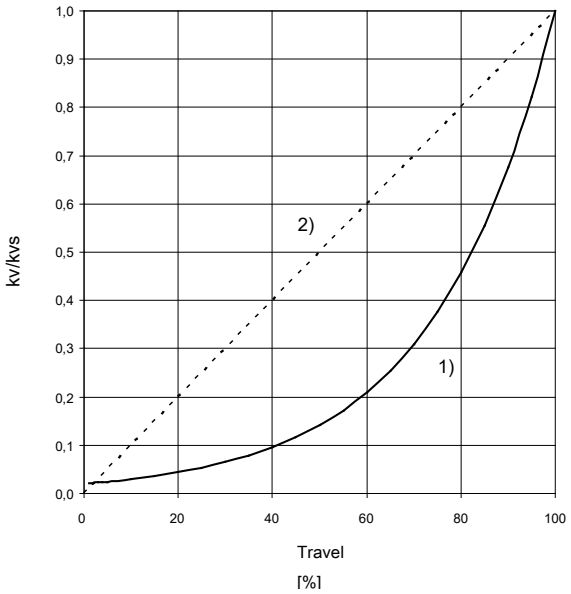

Fig. 1: Valve characteristics

1)	Equal-percentage	2)	Linear

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

Actuating times

Table 6: Standard actuating times for continuous-action actuation

Seat diameter	Travel	Actuator					
		EA-C 20	EA-C 40	EA-C 80	EA-C 140	EA-C 200	EA-C 250
[mm]	[mm]	[s]	[s]	[s]	[s]	[s]	[s]
4 - 25	20	22 - 44	-	-	-	-	-
32 - 100	32	36 - 72	36 - 72	46 - 107	25 - 50	80 - 160	80 - 160
125 - 150	45	-	50 - 100	64 - 150	35 - 70	115 - 225	115 - 225
200	60	-	-	-	46 - 92	150 - 300	150 - 300

Table 7: Standard actuating times for 3-point (Open/Stop/Closed) actuation **24 V/230 V**

Seat diameter	Travel	Actuator					
		EA-C 20	EA-C 40	EA-C 80	EA-C 140[4)]	EA-C 200	EA-C 250
[mm]	[mm]	[s]	[s]	[s]	[s]	[s]	[s]
4 - 25	20	40	-	-	-	-	-
32 - 100	32	64	64	49	72 (49)	32	32
125 - 150	45	-	90	69	100 (69)	45	45
200	60	-	-	-	133 (92)	60	60

Table 8: Standard actuating times for 3-point (Open/Stop/Closed) actuation **400 V**

Seat diameter	Travel	Actuator					
		EA-C 20	EA-C 40	EA-C 80	EA-C 140	EA-C 200	EA-C 250
[mm]	[mm]	[s]	[s]	[s]	[s]	[s]	[s]
4 - 25	20	15	-	-	-	-	-
32 - 100	32	23	23	64	72	32	32
125 - 150	45	-	33	90	100	45	45
200	60	-	-	-	133	60	60

Possible combinations of nominal size and seat diameter

Table 9: Symbols key

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

Table 10: 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	*	*	*	*	*	*	*	*	*	*	*	*	●	●	●

4 Standard actuating times for 24 V in brackets

Maximum permissible closing pressures

Stem sealed by PTFE V-packing

Table 11: Closing pressures if fluid approaches the valve disc from the opposite direction of valve closure; p2 = 0 bar
Values in bar

Seat diameter	Travel	Actuator (actuating forces)					
		EA-C 20	EA-C40	EA-C80	EAC-140	EA-C 200	EA-C 250
[mm]	[mm]	(2 kN)	(4,5 kN)	(8 kN)	(14 kN)	(20 kN)	(25 kN)
4	20	40,0	-	-	-	-	-
8		40,0	-	-	-	-	-
12		40,0	-	-	-	-	-
15		40,0	40,0	-	-	-	-
20		40,0	40,0	-	-	-	-
25		27,9	40,0	-	-	-	-
32	32	17,0	40,0	40,0	-	-	-
40		10,7	28,7	40,0	-	-	-
50		6,6	18,3	34,8	40,0	-	-
65		3,5	10,6	20,5	37,5	-	-
80		2,1	6,8	13,5	24,8	36,1	-
100		1,2	4,2	8,5	15,8	23,2	29,3
125	45	0,6	2,5	5,3	10,0	14,8	18,7
150		0,3	1,7	3,6	6,9	10,2	12,9
200	60	-	-	-	3,8	5,7	7,2

Stem sealed by graphite gland packing

Table 12: Closing pressures if fluid approaches the valve disc from the opposite direction of valve closure; p2 = 0 bar
Values in bar

Seat diameter	Travel	Actuator (actuating forces)					
		EA-C 20	EA-C40	EA-C80	EAC-140	EA-C 200	EA-C 250
[mm]	[mm]	(2 kN)	(4,5 kN)	(8 kN)	(14 kN)	(20 kN)	(25 kN)
4	20	40,0	-	-	-	-	-
8		40,0	-	-	-	-	-
12		40,0	-	-	-	-	-
15		40,0	40,0	-	-	-	-
20		25,3	40,0	-	-	-	-
25		16,1	40,0	-	-	-	-
32	32	9,6	37,0	40,0	-	-	-
40		5,8	23,8	40,0	-	-	-
50		3,4	15,2	31,6	40,0	-	-
65		1,2	8,2	18,1	37,9	-	-
80		0,5	5,3	11,9	23,2	34,5	-
100		0,2	3,2	7,5	14,8	22,1	28,3
125	45	-	1,8	4,5	9,2	14,0	17,9
150		-	1,1	3,0	6,3	9,6	12,4
200	60	-	-	-	3,5	5,3	6,9

All values with standard, non-balanced plug and based on leakage class IV

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Flow characteristics

Equal-percentage characteristic, rangeability 50:1

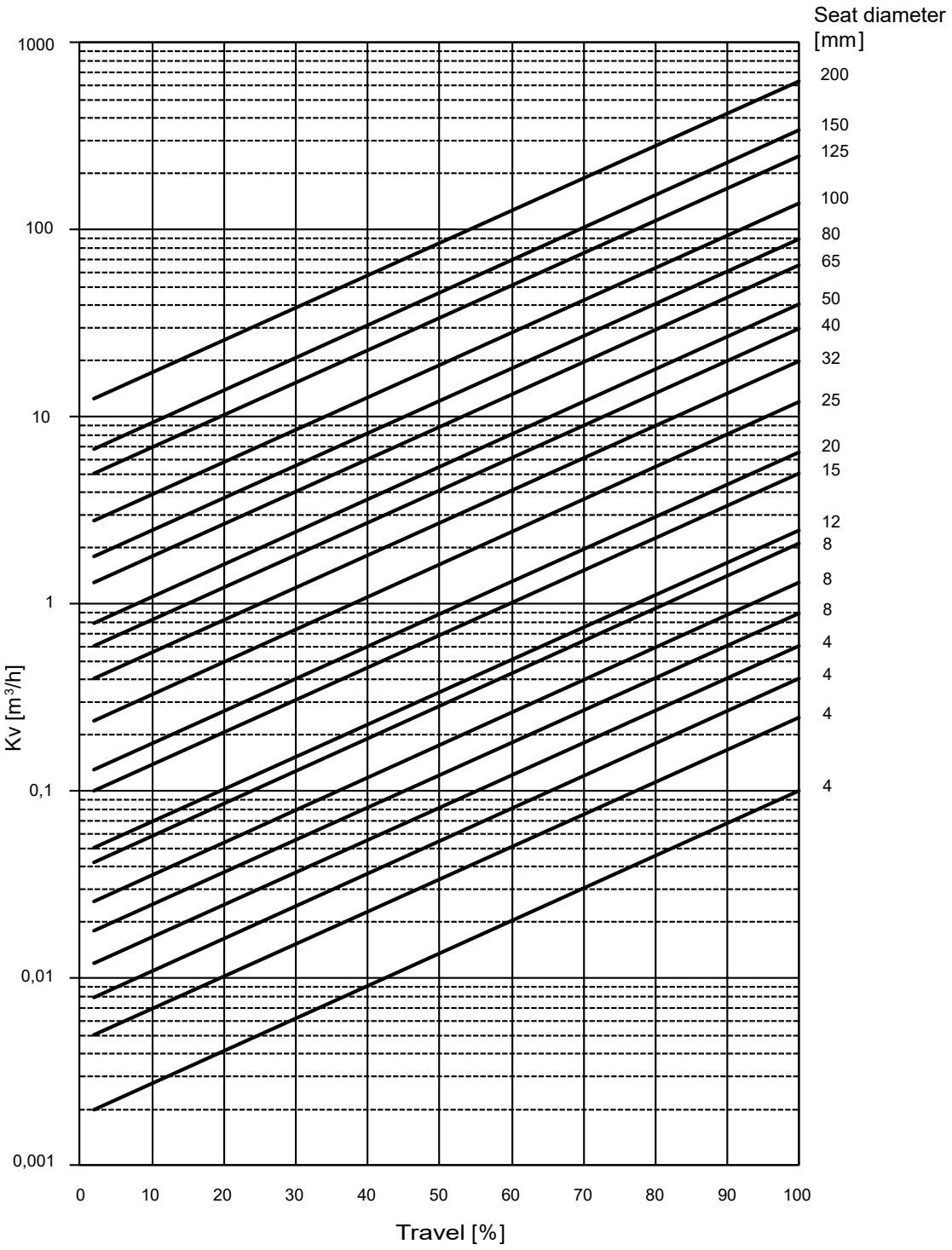

Table 13: Flow coefficients

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

Values valid for parabolic plug; values for anti-cavitation design (perforated plug) always 1 seat diameter smaller e.g. seat 200 corresponds to Kvs value 340 m3/h.

Linear characteristic, rangeability 50:1

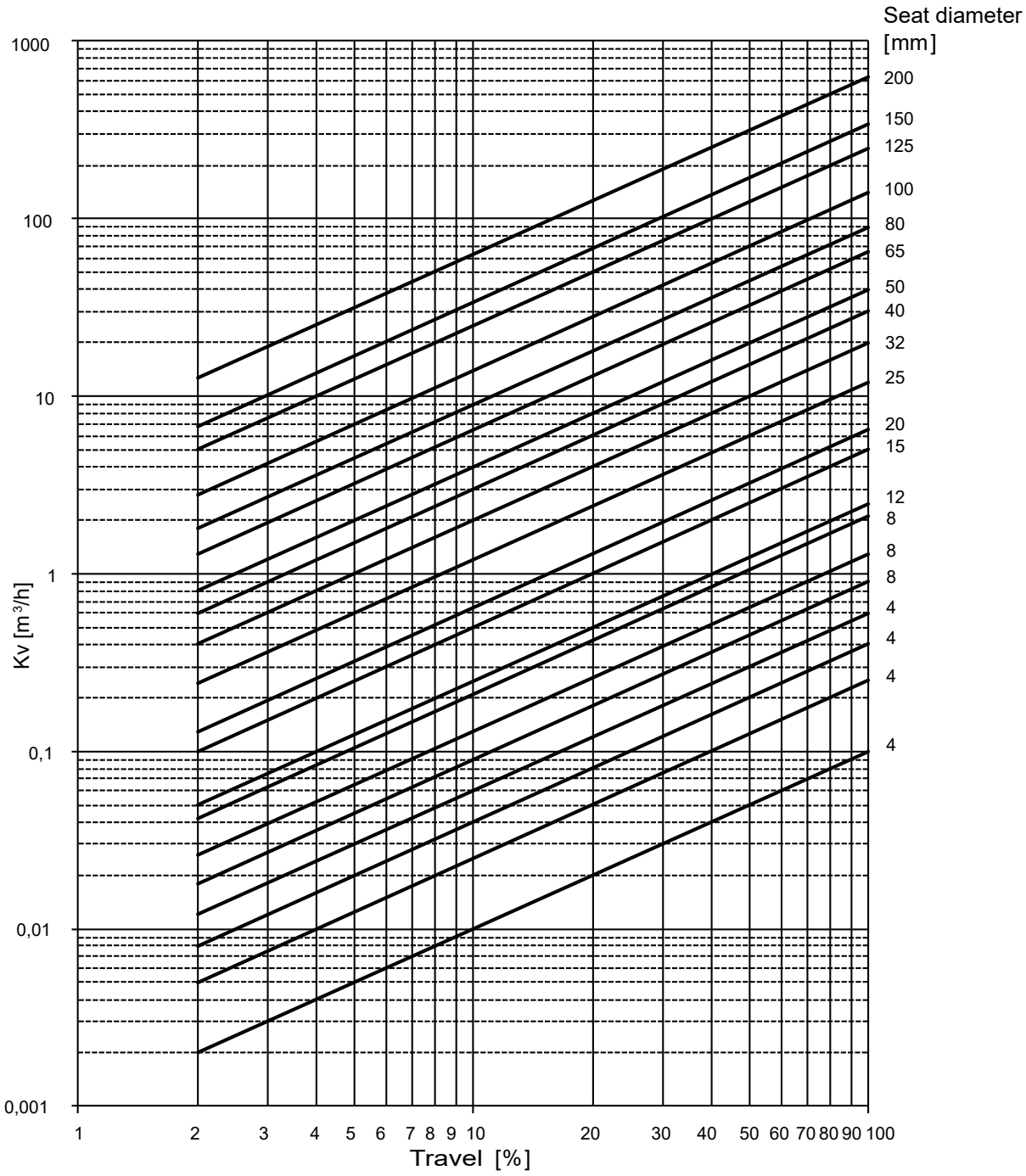

Table 14: Flow coefficients

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

Values valid for parabolic plug; values for anti-cavitation design (perforated plug) always 1 seat diameter smaller e.g. seat 200 corresponds to Kvs value 340 m3/h.

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Technical data

Technical data - control valve

Table 15: Technical data of BOA-CVE 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
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 16: Technical data of actuators

Characteristic		Actuator type		
		Continuous-action	3-point (Open/Stop/Closed)	
		EA-C 20 to 250	EA-C 20 to 250, 230 V AC	EA-C 20 to 250, 400 V AC
Power supply	Supply voltage	24 V AC/DC ± 10 % 230 V AC ± 10 % 320 - 575 V AC 3~	230 V AC ± 10 %	400 V AC 3~
	Max. power input	100 VA		
Functional data	Max. actuation force	EA-C 20: 2 kN EA-C 40: 4.5 kN EA-C 80: 8 kN EA-C 140: 14 kN EA-C 200: 20 kN EA-C 250: 25 kN		
	Actuating speed	EA-C 20 to 40: 0.45 - 0.9 mm/s EA-C 80: 0.3 - 0.7 mm/s EA-C 140: 0.65 - 1.3 mm/s EA-C 200: 0.2 - 0.4 mm/s EA-C 250: 0.2 - 0.4 mm/s	EA-C 20 to 40: 0.5 mm/s EA-C 80: 0.65 mm/s EA-C 140: 0.45 mm/s EA-C 200: 1 mm/s EA-C 250: 1 mm/s	EA-C 20 to 40: 1.4 mm/s EA-C 80: 0.65 mm/s EA-C 140: 0.45 mm/s EA-C 200: 1 mm/s EA-C 250: 1 mm/s
Signal inputs	Voltage	0/2 - 10 V DC	-	
	Input resistance	100 kΩ	-	
	Current	4 - 20 mA	-	
	Input resistance	100 kΩ	-	
	Binary input (3-point)	24 V AC	-	
Signal outputs	Voltage	0/2 - 10 V DC	-	
	Current load	≤ 1 mA	-	
	Current	4 - 20 mA	-	
	Limit switches	-	2 nos.	
Enclosure to EN 60529		IP65		
Ambient conditions	Ambient temperature	-20 to +60 °C		
	Storage temperature	-20 to +80 °C		
	Humidity	5 to 95 % rH		
Dimensions	See (⇨ Page 16)			
Electrical connection		Terminal box ≤ 2.5 mm²	Direct connection to printed circuit board ≤ 2.5 mm²	

Process controller

Process controller for continuous-action actuators (EA-C 20 to EA-C 250)

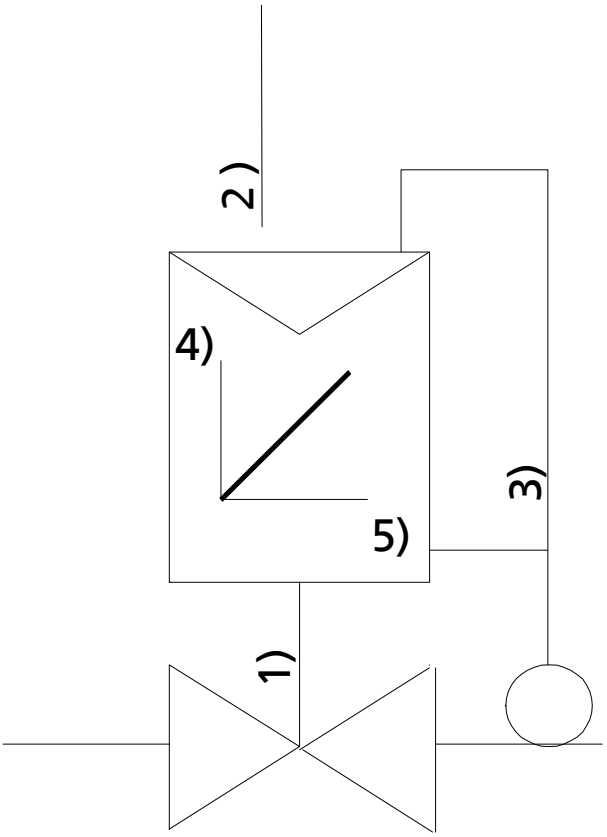

Fig. 2: Functional schematic of process controller

1)	Actuator stroke	2)	Setpoint Y
3)	Volume flow rate Q_{actual}	4)	Q
5)	Y		

The actuator can be equipped with an integrated process controller, which may be used as a constant-variable controller for an independent control loop.

Possible applications:

- Constant-temperature control
- Volume flow rate control

The control parameters of the PI (proportional-integral) controller can be configured at the site using a parameterisation kit. The setpoint signal and the sensor signal must have the same measuring range.

Table 17: Accessories

Description	Mat. No.
Parameterisation kit	46001269

The sensor used must supply an active signal (e.g. 4 - 20 mA or 0/2 - 10 V). The setpoint can be set externally via an active signal, or the device can be supplied with an internal setpoint as per customer specification.

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Materials

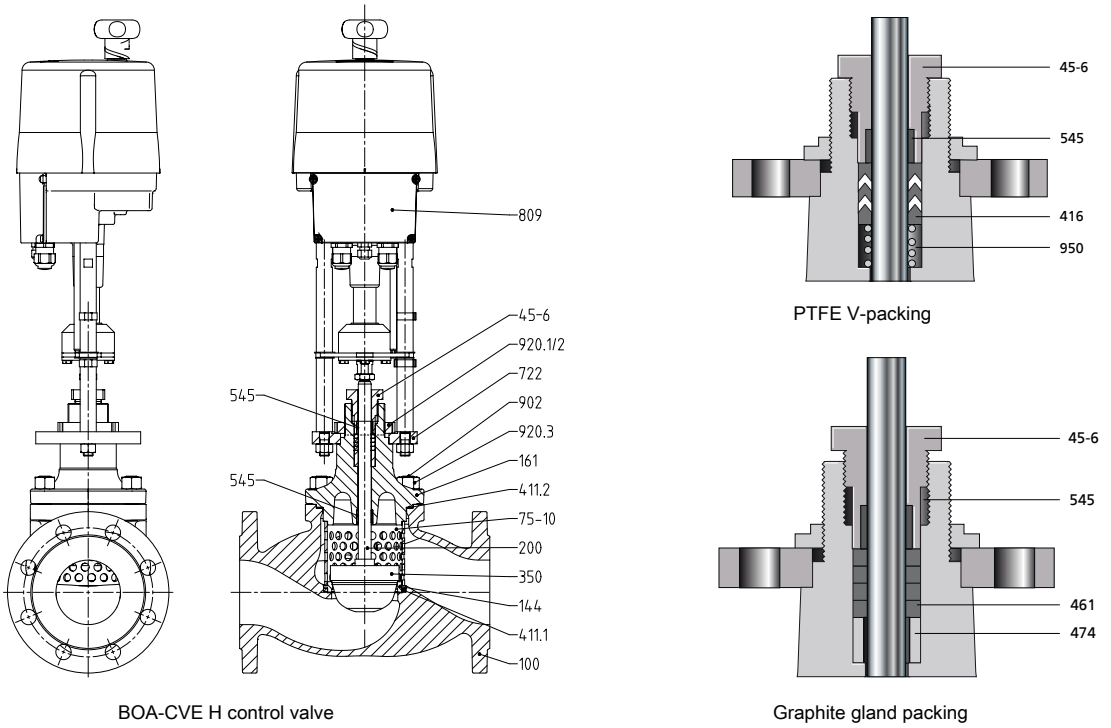
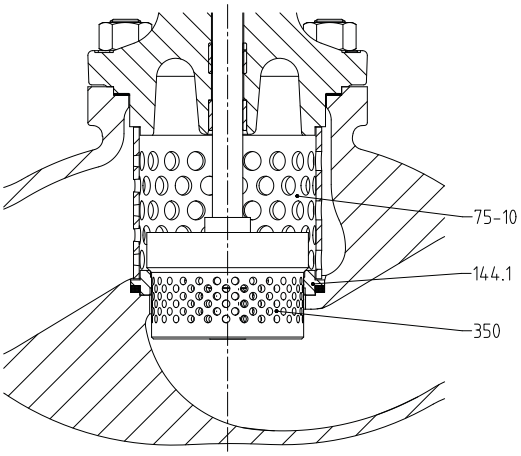


Fig. 3: Sectional drawings of control valve with electric actuator

Table 18: Parts list

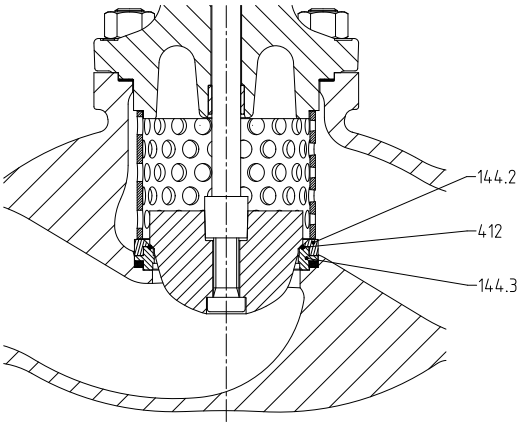
Part No.	Description	Material	Material number	Note
100	Body	EN-GJS-400-18-LT	5.3103	DN 20-150
		GP 240 GH	1.0619	DN 15-200
144	Seat	X6CrNiMoTi17-12-2	1.4571	-
161	Body bonnet	EN-GJS-400-18-LT	5.3103	DN 20-150
		GP 240 GH	1.0619	DN 15-200
200	Stem	X6CrNiMoTi17-12-2	1.4571	-
350	Valve disc	X6CrNiMoTi17-12-2	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	Actuator 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	-

Variants



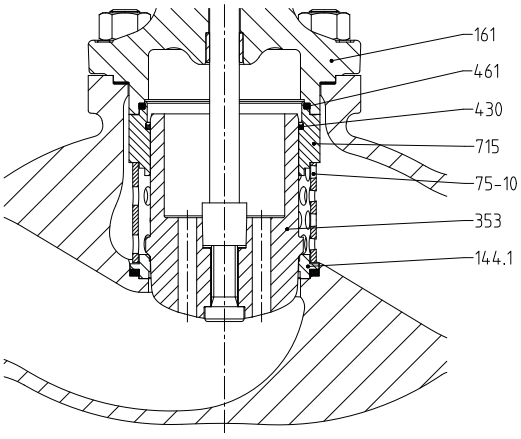
Anti-cavitation design

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.



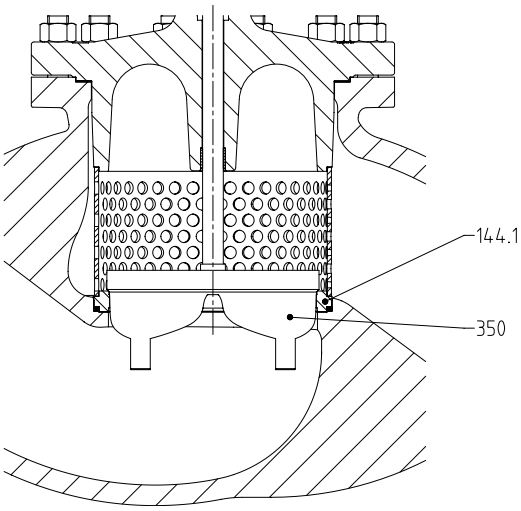
Seat with PTFE ring

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.



Balanced plug design

A balanced plug 353 is required if the differential closing pressures (⇨ Page 6) 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.



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.

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Dimensions and weights

Dimensions and weights of BOA-CVE H control valve

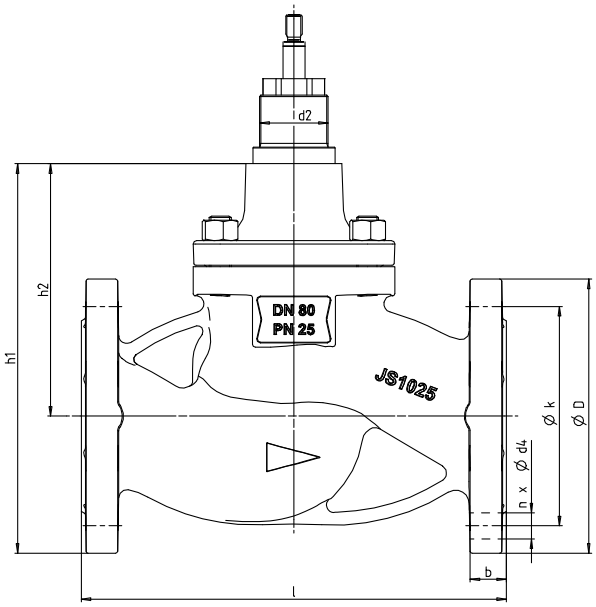

Fig. 4: BOA-CVE H without actuator

Table 19: 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
	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 electric actuator types EA-C 20 to EA-C 250

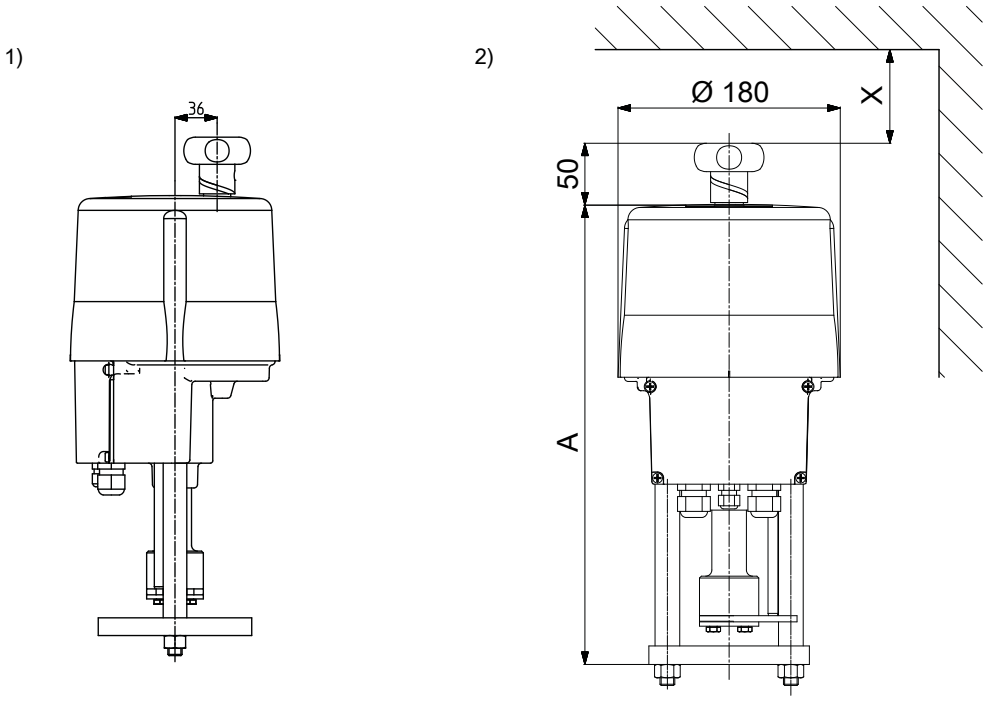

Fig. 5: 1) Actuator, side view; 2) Actuator with clearance for removal

Table 20: Dimensions and weights

Actuator	Actuating force [N]	A	X	Continuous-action		3-point (Open/Stop/Closed)	
				24 V AC/DC	230 V AC	230 V AC	400 V AC
		[mm]	[mm]	[kg]			
EA-C 20	2000	443	120	8,0	8,0	4,5	4,5
EA-C 40	4500	443	120	8,0	8,0	4,5	4,5
EA-C 80	8000	475	120	10,0	10,0	7,2	7,2
EA-C 140	14000	542	120	12,0	12,0	8,0	8,0
EA-C 200	20000	740	250	23,0	23,0	23,0	23,0
EA-C 250	25000	740	250	23,0	23,0	23,0	23,0

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.

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Installation positions:

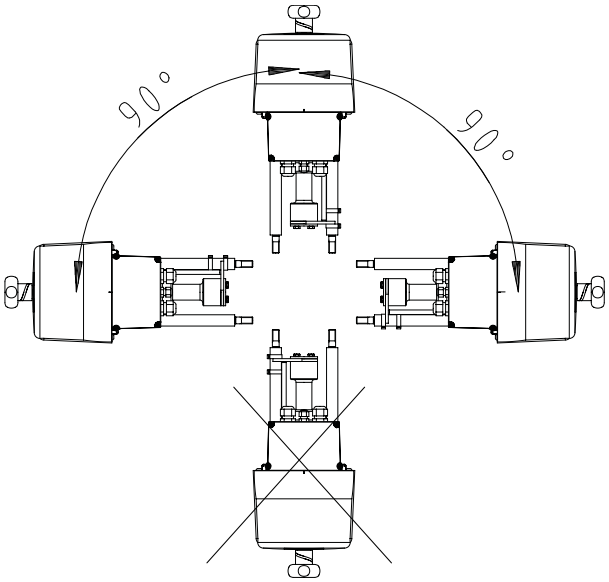

Fig. 6: Actuator installation positions

Wiring diagrams

Terminal configuration for continuous-action actuation

Continuous-action actuation 24 V AC and 230 V AC

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			RJ-45 TTL	Push-button
↑	↑	↑	↓	↓	↓	↑↓	↑↓	↑	↑	↑	↑	↑	↓	↑	↑	↑	↑↓	↑↓	↑↓	↑↓	↑	↑				
+0(2) - 10 V	+0(4) - 20 mA	GND	+0(2) - 10 V	+0(4) - 20 mA	GND		Max. load 100 mA at 24 VDC	L OPEN	N	L CLOSE	L (24 V AC/DC)	N (24 V AC/DC)	21-40 V DC / 100 mA	+0(2) - 10 V	+0(4) - 20 mA	GND	(Optional)	(Optional)	(Optional)	(Optional)	L (see name plate)	N (see name plate)	PE	(Optional)		
								24 V AC/DC □																		
								115 V AC □																		
								230 V AC □																		
Ⓐ			Ⓑ			Ⓒ		Ⓓ			Ⓔ		Ⓕ	Ⓖ			Ⓗ		Ⓘ		Ⓙ			Ⓚ	Ⓛ	Ⓜ
Ⓝ													Ⓞ				Ⓟ									

In continuous-action configuration, only the terminals in columns Ⓐ, Ⓑ and Ⓙ are active!

Continuous-action actuation 400 V AC

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	L1	L2	L3	PE
↑	↑	↑	↓	↓	↓	↑↓	↑↓	↑	↑	↑	↑	↑	↓	↑	↑	↑	↑↓	↑↓	↑↓	↑↓	↑	↑	↑	
+0(2) - 10 V	+0(4) - 20 mA	GND	+0(2) - 10 V	+0(4) - 20 mA	GND		Max. load 100 mA at 24 VDC	L OPEN	N	L CLOSE	L (24 V AC/DC)	N (24 V AC/DC)	21-40 V DC / 100 mA	+0(2) - 10 V	+0(4) - 20 mA	GND	(Optional)	(Optional)	(Optional)	(Optional)	400 V AC	400 V AC	400 V AC	Earth conductor
								24 V AC/DC □																
								115 V AC □																
								230 V AC □																
Ⓐ			Ⓑ			Ⓒ		Ⓓ			Ⓔ		Ⓕ	Ⓖ			Ⓗ		Ⓘ		Ⓙ			
Ⓝ													Ⓞ				Ⓟ							

Ⓐ	Setpoint input	Ⓘ	Open
Ⓑ	Active actual-position feedback	Ⓙ	Power supply
Ⓒ	Volt-free fault message (optional)	Ⓚ	Field bus connection
Ⓓ	Binary control (standard 24 V AC/DC)	Ⓛ	Communication with PC
Ⓔ	Power failure signal	Ⓜ	Commissioning
Ⓕ	Supply (unregulated, 21 - 40 V DC)	Ⓝ	Galvanically isolated 1 kV
Ⓖ	Actual value	Ⓞ	Process sensor
Ⓗ	Closed	Ⓟ	Limit switch, volt-free contact

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Terminal configuration for 3-point actuation

3-point (Open/Stop/Closed) actuation 24 V AC

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	⏚		RJ-45 TTL	Push-button
↑	↑	↑	↓	↓	↓	↑↓	↑↓	↑	↑	↑	↑	↑	↓	↑	↑	↑	↑↓	↑↓	↑↓	↑↓	↑	↑				
+0(2) - 10 V	+0(4) - 20 mA	GND	+0(2) - 10 V	+0(4) - 20 mA	GND	Max. load 100 mA at 24 V DC		L OPEN	N	L CLOSE	L (24 V AC/DC)	N (24 V AC/DC)	21-40 V DC / 100 mA	+0(2) - 10 V	+0(4) - 20 mA	GND	(Optional)	(Optional)	(Optional)	(Optional)	L (see name plate)	N (see name plate)	PE	(Optional)		
								24 V AC/DC □																		
								115 V AC □																		
								230 V AC □																		
Ⓐ			Ⓑ			Ⓒ		Ⓓ			Ⓔ		Ⓕ	Ⓖ			Ⓗ		Ⓘ		Ⓙ			Ⓚ	Ⓛ	Ⓜ
Ⓝ													Ⓞ				Ⓟ									

In 3-point (Open/Stop/Closed) configuration, only the terminals in columns Ⓑ, Ⓓ and Ⓙ are active!

Ⓐ	Setpoint input	Ⓘ	Open
Ⓑ	Active actual-position feedback	Ⓙ	Power supply
Ⓒ	Volt-free fault message (optional)	Ⓚ	Field bus connection
Ⓓ	Binary control (standard 24 V AC/DC)	Ⓛ	Communication with PC
Ⓔ	Power failure signal	Ⓜ	Commissioning
Ⓕ	Supply (unregulated, 21 - 40 V DC)	Ⓝ	Galvanically isolated 1 kV
Ⓖ	Actual value	Ⓞ	Process sensor
Ⓗ	Closed	Ⓟ	Limit switch, volt-free contact

3-point (Open/Stop/Closed) actuation 230 V AC

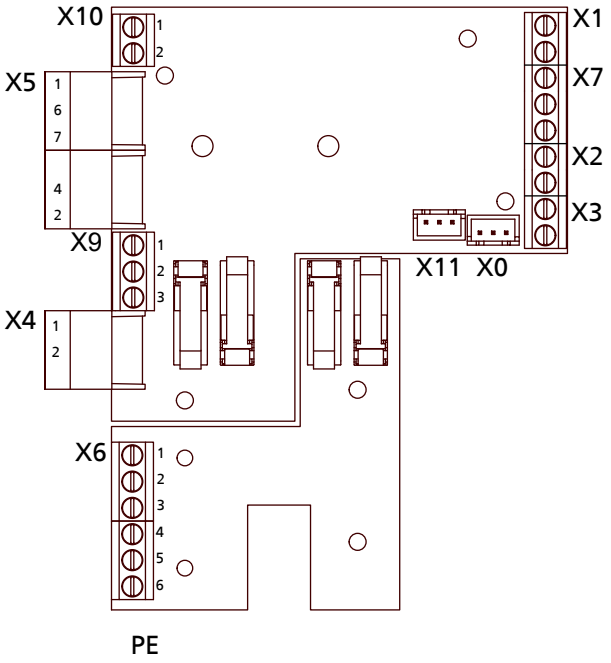
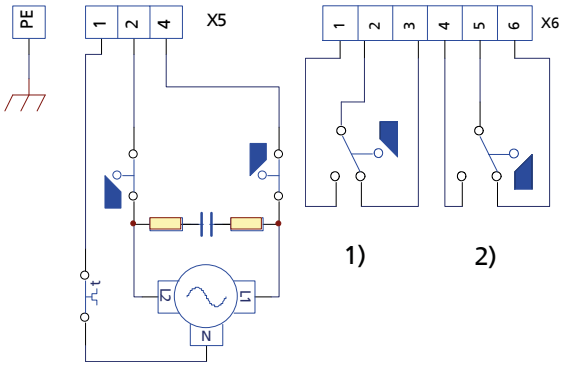


Fig. 7: Terminal configuration on printed circuit board

X1	Internal wiring
X2	Internal wiring
X3	Internal wiring
X4	Potentiometer 1 tap
X5/1	Neutral/Chassis ground
X5/2	Motor phase to open
X5/4	Motor phase to close
X5/6 and X5/7	Thermal circuit breaker as volt-free contact
X6	Additional limit switches
X7	Internal wiring
X9	Potentiometer 2 tap
X10	Normally open contact
X0	Potentiometer 1 connection
X11	Potentiometer 2 connection
PE	Earth connection on housing



Terminal configuration of power supply

Terminal configuration of additional limit switches

1)	Closed	2)	Open

3-point actuation 400 V AC

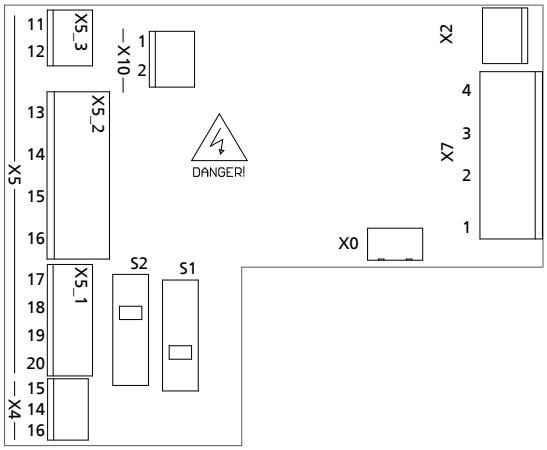


Fig. 8: Terminal configuration on printed circuit board

X5/14-16	3-phase supply voltage
X5/13	Neutral conductor
X5/11+12	Thermal circuit breaker
X5/17+18	Limit switch Closed
X5/19+20	Limit switch Open
X4	Potentiometer 1 tap
X0	Potentiometer 1 connection
X5/6 and X5/7	Thermal circuit breaker as volt-free contact
X2	Internal wiring
X7	Internal wiring
X10	Normally open contact

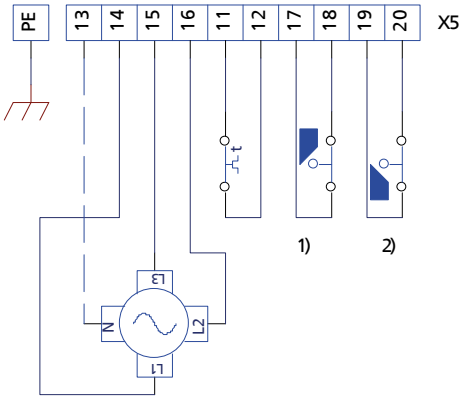


Fig. 9: Terminal configuration of power supply

1)	Closed	2)	Open

Specification Sheet for Valve Selection

Operating data

Point of control	Measuring/control task[5]			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	

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

Actuator data

Δp closes (actuator selection)	[bar]					
Actuator function/Power supply		Continuous 24 V, 230 V or 400 V		3-point 24 V	3-point 230 V[6)]	3-point 400 V[6)]
Actuating time					-	
Position value		Setpoint	Actual	Actual		
	DC 0-10 V					
	DC 2-10 V					
	0-20 mA					
	4-20 mA					

Indicate the data in bold in all RFQs.

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6 Feedback via two integrated limit switches

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 21: 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 22: Chemical resistance chart for water[7)]

Fluids handled	
Brackish water[8)]	✖
Service water[8)]	✓
Fire-fighting water	✓
Chlorinated water (≤ 0.6 mg/kg)	✓
Deionised water (demineralised water)[9)]	○
Distilled water[9)]	○
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[8)]	○
Raw water[8)]	✓
Partly desalinated water[9)]	○
Fully desalinated water[9)]	○
Municipal waste water[8)10)]	✓
Industrial waste water[8)11)]	✓

Table 23: 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[8)]	✓
Jet fuel	✓
Petrol	✓
Kerosene	✓

Table 24: 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 25: Chemical resistance chart for thermal oils

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

Table 26: Chemical resistance chart for acids

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

Table 27: Chemical resistance chart for cleaning agents

Fluids handled	
Lye for bottle rinsers (e.g. P3) ≤ 80 °C[8)]	○
Lye for metal cleaning ≤ 80 °C[8)]	○

Table 28: Chemical resistance chart for steam

Fluids handled	
Saturated steam	✓

Table 29: 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)	✖

7 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.

8 Without solids

9 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.

10 Biologically treated

11 Non-corrosive, non-abrasive

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