

# control valve type BR 12a



**strong**  
**arguments**  
of modern technology

# Globe control valve

## Application

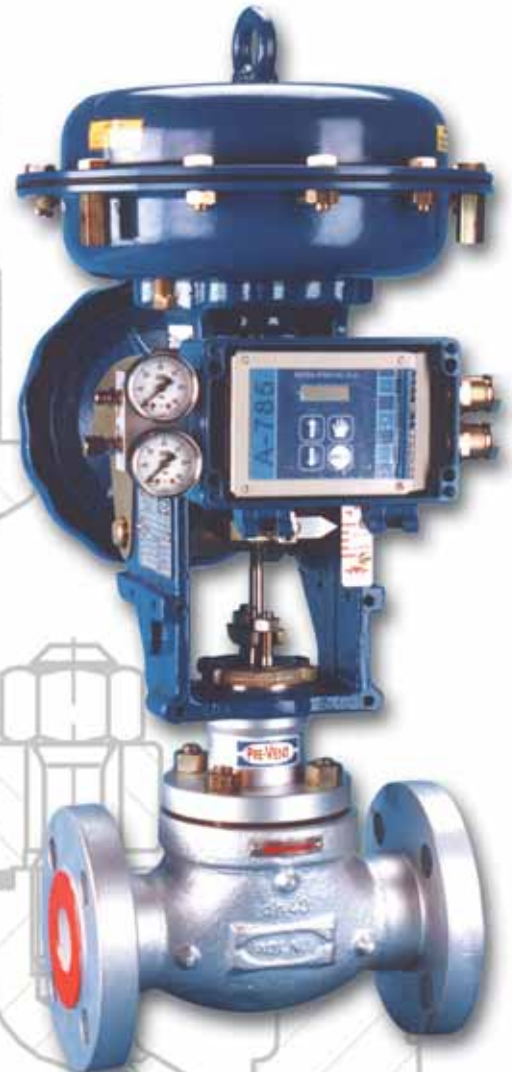
They are used as an executing element in the instrumentation and remote control systems to control the liquids, vapours and gas flow.

The wide range of material versions, advantageous operating pressures and temperatures, numerous design variations matched to the process requirements are a reason the valves shall be used at the most heavy-duty conditions in power and heat engineering, petrochemical and chemical industry, metallurgy, etc.

## Characteristics

- Various material versions of the valve cast and internal parts, matched to the specific operating conditions
- Designs reducing the generated noise level, increasing the cavitations and flashing resistance, eliminating choked flow
- A wide range of pressure ratings from PN 10 through PN 420, as well as of the flow coefficients and of the control characteristics
- Reduced emission of aggressive and toxic fluids into the environment due to the bellows seal or compression gland corresponding to TA-LUFT regulations being observed
- Easy disassembly and installation of the valve internal components for the purpose of inspection and service
- Long life and operating reliability due to high quality materials being used and to the surface improvement techniques (burnishing, stellite, heat treatment, CrN coatings)
- An ability to cooperate with multi-spring actuators P1/R1 (cast yoke) and P/R (column) of totally reversible operation, as well as a possibility to vary the spring range - with no extra parts (the number of springs unchanged)
- A possibility to fit the actuators with a lateral (P1/R1) or a top (P/R) manual drive
- Diagnostic possibilities for the „valve-actuator“ system due to the intelligent electro pneumatic positioners being used
- A wide range of electric drives
- Special versions available
  - for oxygen
  - for liquid and gas fuels
  - for low temperature fluids (liquid oxygen, nitrogen)
  - or acid H<sub>2</sub>S-containing gasses
  - with a heating jacket
  - service at flammable conditions acc. to directive 94/9/EG - ATEX
- The product designing and manufacture are in compliance with the specifications of the quality management system ISO 9001, of the directive 97/23/EG and of AD 2000 Merkblatt regulations

## type BR 12a



# Construction and technical specification

**Body (1)** Single seat, cast

**Nominal dimension** DN 15; 20; 40; 50; 80; 100; 150; 200; 250

**Pressure rating designation**

PN 10; 16; 25; 40 and PN 20; 50; 110; 150; 260; 420 to PN - ISO 7005-1: 1996

PN 63; 100; 160; 250; 320; 400 to PN - H - 74307: 1985; PN - H - 74306: 1985

**Divided as follows**

DN 15 ... 100; PN 10 ... 420

DN 25 ... 150; PN 10 ... 150; 160

DN 200; 250; PN 10 ... 110

**Connections**

Flanged: to table 1

Butt welding ends, BW type; to tables 11 and 12

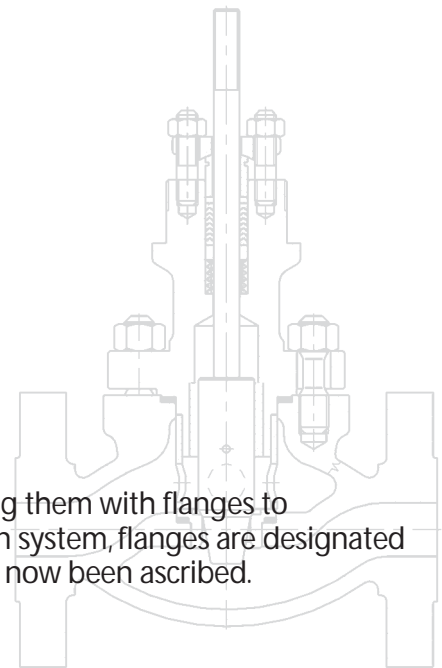
Socket welding ends ; SW type; to table 13

The design of steel flanges PN 20; 50; 110; 150; 260; 420 enables assembling them with flanges to American standards ANSI/ASME B16.5 and MSS SP 44. Under the American system, flanges are designated with rated values in „Classes“; to the said values pressure ratings (PN) have now been ascribed.

The equipment pressure designations are as follows:

Class 150: PN 20      Class 300: PN 50      Class 600: PN 110

Class 900: PN 150      Class 1500: PN 260      Class 2500: PN 420



**Tab. 1: Flanged connections**

Pressure rating	Connection type			
	Face	Groove	Key	Groove to the ring
	Designation			
PN 10; 16; 25; 40; 63; 100; 160; 250; 320; 400	B	D**	F**	-
PN 20; 50	B1	D1	F1	J
PN 110; 150; 260; 420	B2	D1	F1	J
ANSI 150; 300; 600; 900; 1500; 2500	RF	GF	FF	RTJ

## Construction length

- flanged valves to PN-EN 60534-3-1; PN-M-74005; ISA S75.16-1993, fig. 5; tables 9;10
- valves with welding terminals; fig. 5; table 11
- to PN\_EN 60534-3-3:
  - for PN 10...110 and PN 20...110
- like flanged valves PN 160:
  - for PN 160 and PN 150
- like flanged valves PN 400:
  - or PN 250 ... 400 and PN 260 ... 420

**Materials** to table 2

## Bonnet (2)

**Standard** Temperature range -46° C to +300° C

**Extension** Temperature range -198° C bis +650° C

**Bellows** Temperature range -100° C bis +400° C

## Plug (3)

Shaft guided, metal seat

Versions: contoured plug; perforated plug

Flow characteristics: equal percentage P, linear L

quick opening - S (only for profile plug)

## Rangeability

50 : 1

## Seat (4)

Fitted and sealed to the body, hard; (airtight seat when so agreed with the manufacturer)

## Stem (5)

Burnished and polished on the sealing surface

## Hold down sleeve (6a)

An element to lock the seat in the body

## Throttling sleeve (6b, 6c)

Multi-opening sleeve to lock the seat and to reduce the pressure drop between the seat and the plug.

## Gaskets of the body (7) and of the seat (8)

Spiral „graphite + 1.4571“ over the entire manufacturing range

## Stem sealing (10)

- sealing packing PTFE- V-held down by a helical spring (17)
- ring gaskets formed from woven packing cords (PTFE + GRAPHITE)
- graphite sets (expanded and silky graphite) or gaskets from woven graphite cords
- TA-Luft seal with PTFE-V sealing package or a graphite set, seal designs to figs. 1 and 2 use range to table 3

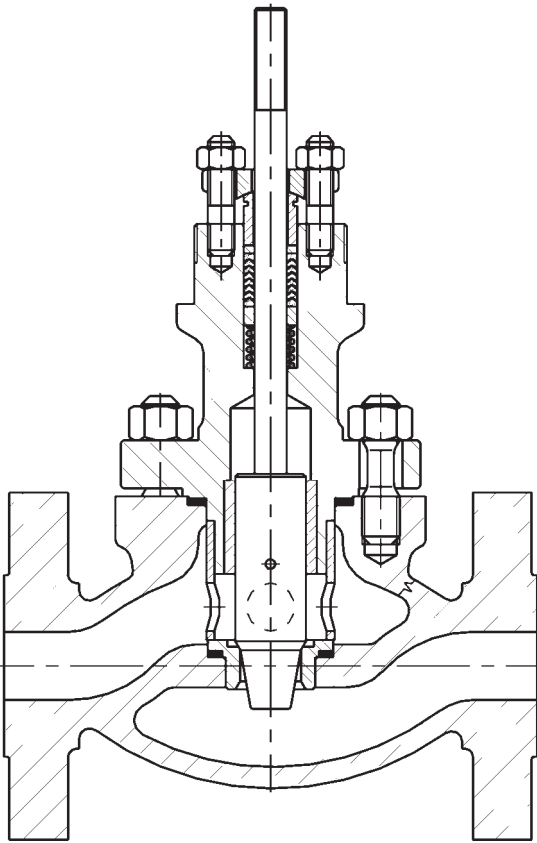
## Seat leakage

Standard: below 0.01% Kvs

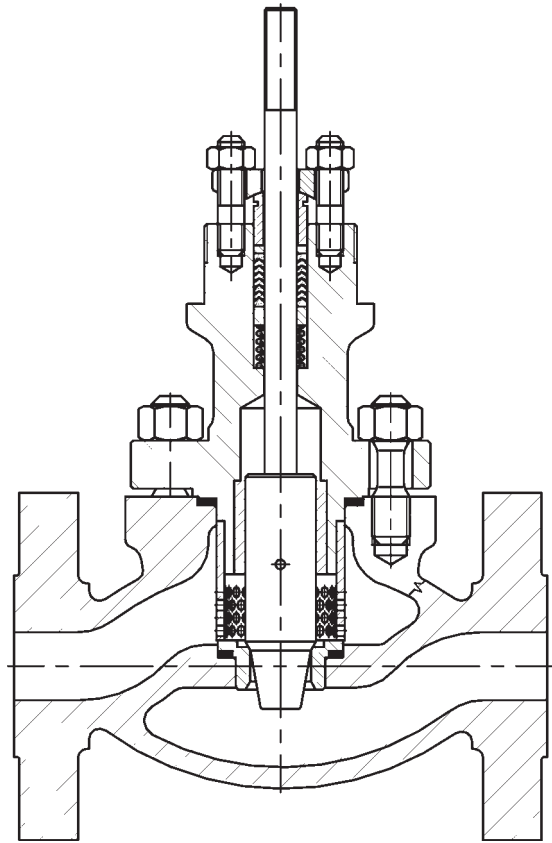
(Class IV to PN- IEC 60534-4)

Increased: 3-10-3D-Δp [cm3min]

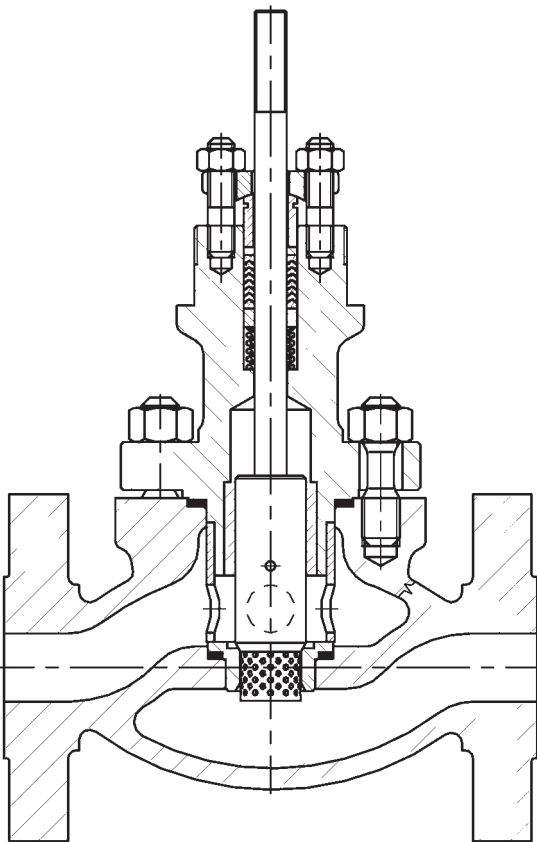
(Class V to PN-IEC 60534-4)



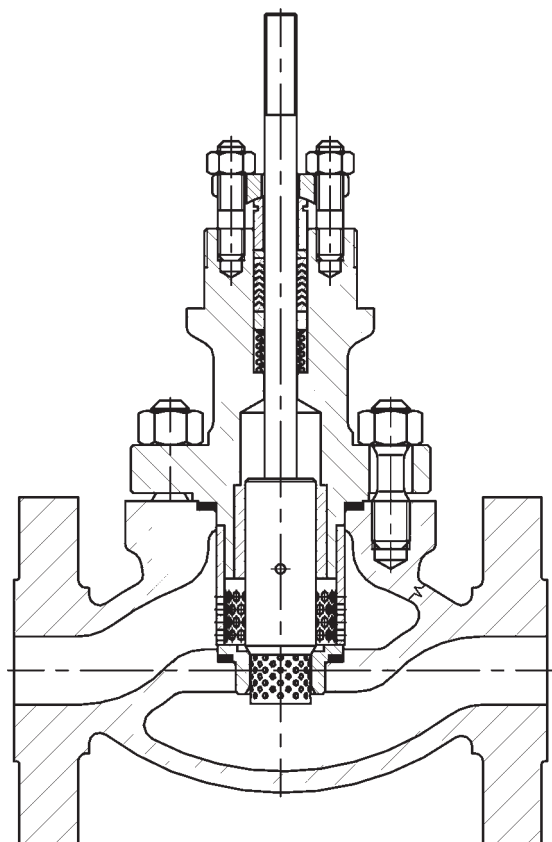
**Fig. 1a**  
Valve BR 12a - contoured plug L; P; S



**Fig. 1b**  
Valve BR 12a - contoured plug  
with throttling cage L; P; S

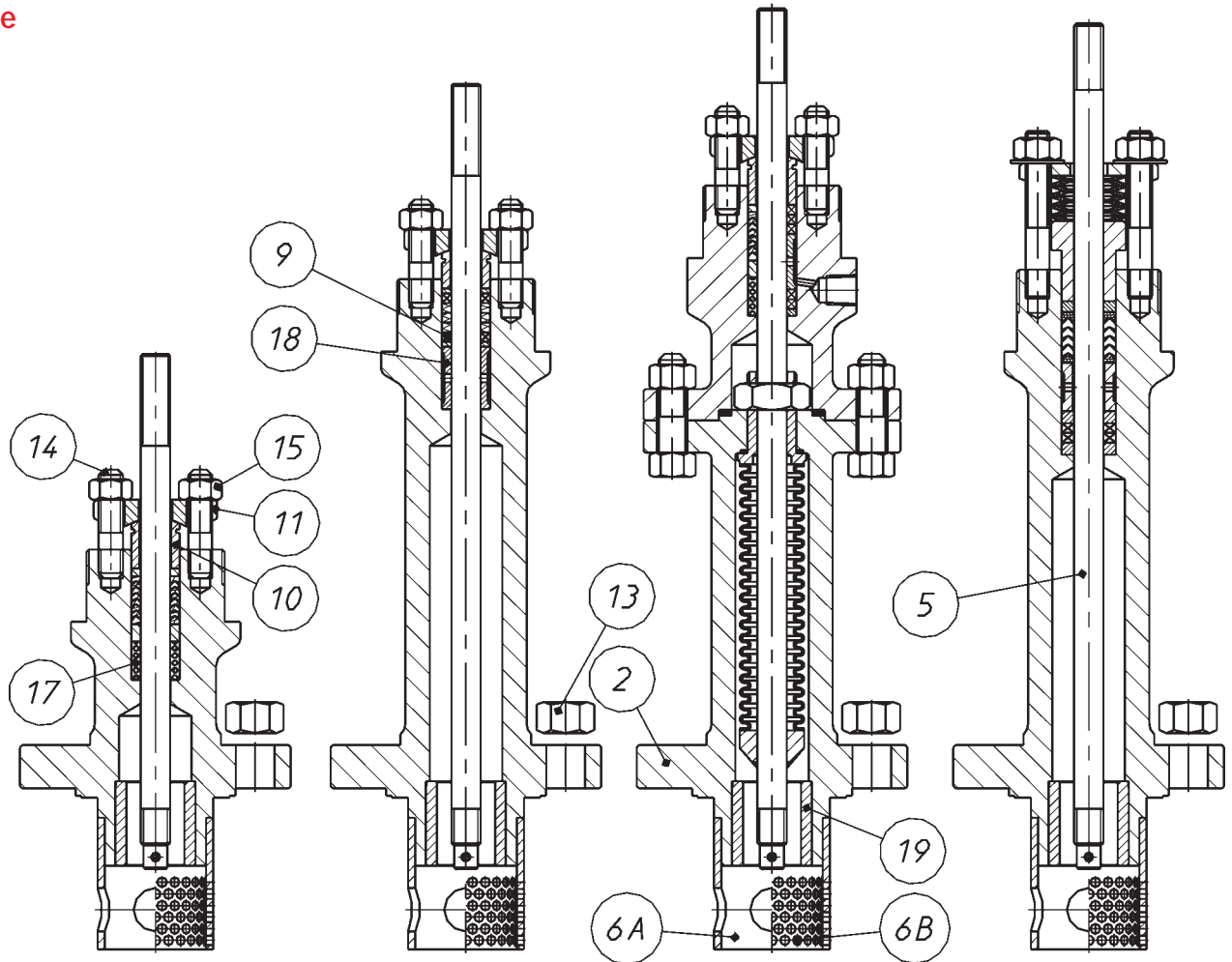


**Fig. 1c**  
Valve BR 12a - perforated plug L; P



**Fig. 1d**  
Valve BR 12a - perforated plug  
with throttling cage L; P

Fig. 1e

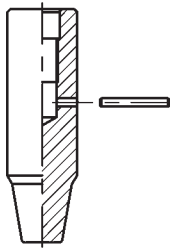


Standard bonnet  
PTFE-V-packing

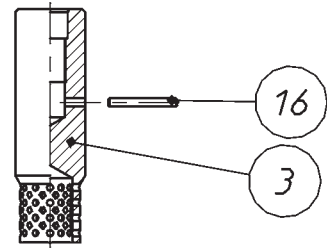
Extended bonnet  
PTFE + graphite-  
packing

Bellows bonnet  
PTFE + graphite-  
packing

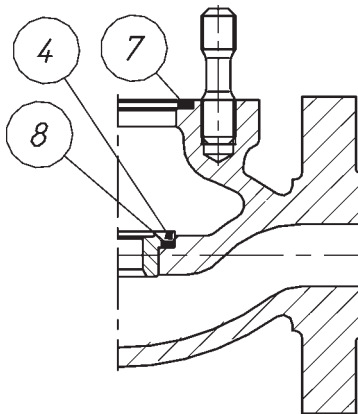
Extended bonnet  
with TA-Luft packing



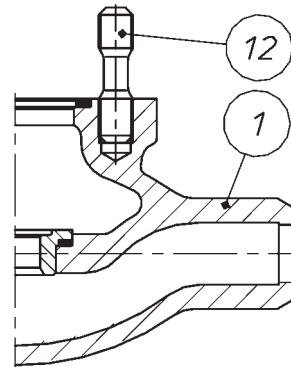
Contoured plug



Perforated plug



Flanged body



Body with welding ends (BW type)

## Tab. 2: List of parts and materials

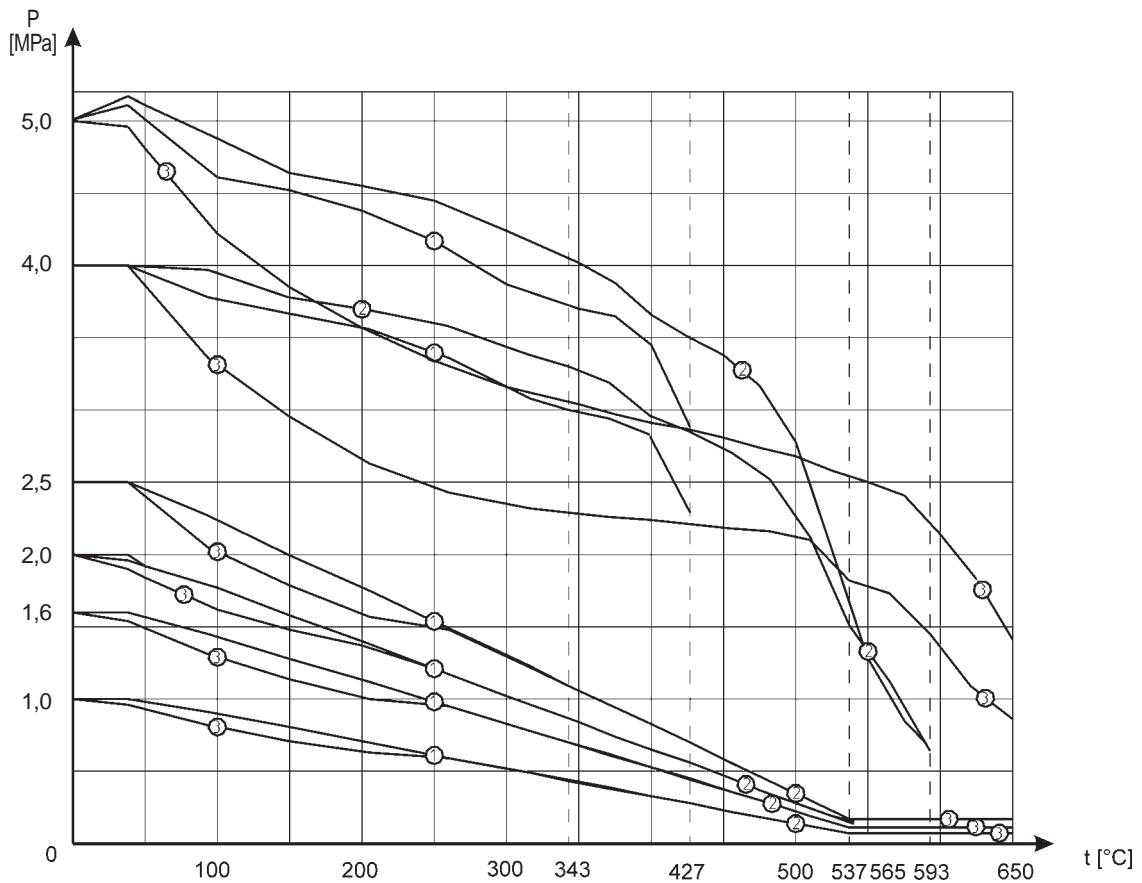
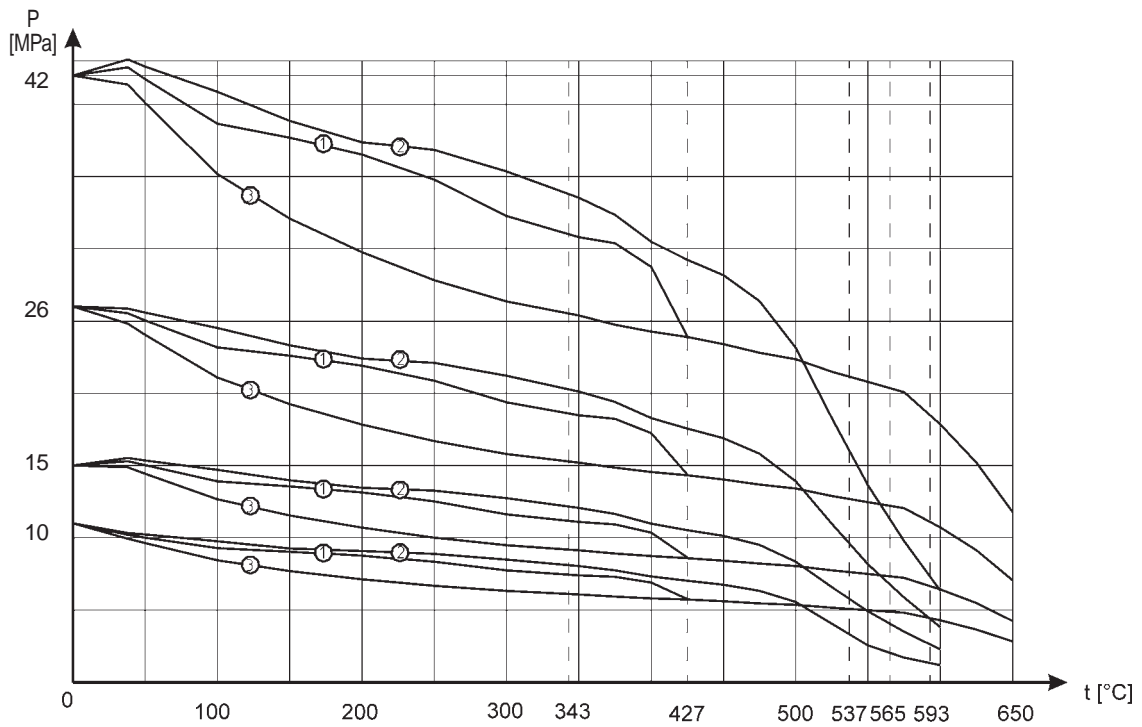
No.	Part		Materials		
1	Body		GP 240 GH ; (1.0619) WCB	G17CrMo 9-10 ; (1.7379) WC9	GX5CrNiMo 19-11-2 ; (1.4408) CF8M
2	Bonnet	DN 25 ... 50	S 355 J2G3 (1.0570)	13CrMo 4-4 ; (1.7335)	X6CrNiMoTi 17-12-2 ; (1.4571)
		DN 80 ... 250	GP 240 GH ; (1.0619) WCB	G17CrMo 9-10 ; (1.7379)	G17CrMo 9-10 ; (1.7379) WC9
3a, b	Perforated unbalanced plug		X6CrNiMoTi 17-12-2 ; (1.4571)		
	Perforated balanced plug		X6CrNiMoTi 17-12-2 ; (1.4571) + Stellite + CrN X17CrNi 16-2 ; (1.4057) + Heat-treating		
4	Seat		X6CrNiMoTi 17-12-2 ; (1.4571)		
			X6CrNiMoTi 17-12-2 ; (1.4571) + Stellite X17CrNi 16-2 ; (1.4057) + Heat-treating		
5	Stem		X6CrNiMoTi 17-12-2 ; (1.4571)		
			X6CrNiMoTi 17-12-2 ; (1.4571) + Stellite + CrN X17CrNi 16-2 ; (1.4057) + Heat-treating		
6a	Pressing cage		X6CrNiMoTi 17-12-2 ; (1.4571)		
6b	Throttling cage II		X17CrNi 16-2 ; (1.4057) + Heat-treating		
6c	Throttling cage I				
7	Body gasket		Graphit 98% + 1.4571 (spiral)		
8	Seat gasket				
9	Bonnet gasket				
10	Stuffing box		PTFE + Graphite		
			PTFE „V“ (Rings)		
			Graphite		
11	Hold down sleeve		X6CrNiMoTi 17-12-2 ; (1.4571)		
12	Screwed bolt (valve body)		S 355 J2G3 ; (1.0570)		
13	Screw nut (valve body)	PN 10 ... 50	8,8	A4 - 70	
		PN 63 ... 420	42CrMo4 (1.7225)	21CrMoV 5-7 (1.7709)	X6NiCrTiMoVB 25-15-2 (1.4980)
14	Dowel pin (bonnet)	PN 10 ... 50	8,8	A4 - 70	
		PN 63 ... 420	42CrMo4 (1.7225)	21CrMoV 5-7 (1.7709)	X6NiCrTiMoVB 25-15-2 (1.4980)
15	Screw nut (bonnet)		8,8	A4 - 70	
16	Cotter		X6CrNiMoTi 17-12-2 ; (1.4571)		
17	Spring		12R10 (SANDVIK)		
18	Distance sleeve		X6CrNiMoTi 17-12-2 ; (1.4571)		
19	Guide bushing		X6CrNiMoTi 17-12-2 ; (1.4571)		
			X6CrNiMoTi 17-12-2 ; (1.4571) + Stellite + CrN		
			X17CrNi 16-2 ; (1.4057) + Heat-treating		

Material	Norm No.
GP 240 GH ; (1.0619)	EN 10213-2
WCB	ASTM A216
G17CrMo 9-10 ; (1.7379)	EN 10213-2
WC9	ASTM A217
GX5CrNiMo 19-11-2 ; (1.4408)	EN 10213-4
CF8M	ASTM A351
S 355 J2G3 ; (1.0570)	EN10025
13CrMo 4-4 ; (1.7335)	EN10028
X6CrNiMoTi 17-12-2 ; (1.4571)	EN10088
X17CrNi 16-2 ; (1.4057)	EN10088
C45 (1.0503)	EN10083-1
X30Cr13 (1.4028)	EN10088
8.8	EN 20898-1
A4 - 70	EN ISO 3506-2
42CrMo4 ; (1.7225)	EN 10269
21CrMoV5-7 ; (1.7709)	EN 10269
X6NiCrTiMoVB 25-15-2 ; (1.4980)	EN 10269

### Note

In order to harden the valves internal components following technology is used:

- Stellite - surface padding with stellite: ~ 40 HRC
- CrN coating - introducing chromium nitride down to ca 0.1 mm into the part external layer, ~ 950 HV
- Heat resistant construction: plug (~ 45 HRC), seat (~ 35 HRC), stem (~ 32 HRC), guide bushing (~ 32 HRC)



**Body-material, nominal pressure, operating pressure and temperatures**

Material	GP 240 GH (1.0619) / A216 WCB	G17CrMo 9-10 (1.7379) / A217 WC9	GX5CrNiMo 19-11-2 (1.4408) / A351 CF8M
Characteristic line (Diagr. 1 and 2)	1	2	3
Temperatur range (°C)	-29 ... +427	-29 ... +537 <sup>1)</sup> ; -29 ... +593 <sup>2)</sup>	-198 ... +537 <sup>1)</sup> ; -198 ... +650 <sup>2)</sup>

- 1) Temperature range for flanged valves
- 2) Temperature range for valves with welding ends

**Diagram 1 and 2 are based on ISO 7005-1:2002**

## Versions

The valve design and material versions are selected according to the service conditions. The basic version of valves for normal operating conditions are 12a valves with a profile plug and a pressing cage.

With the noise level over the one acceptable by the client (most often, 85 dBA), perforated plugs shall be used. As far as their design is concerned, they are interchangeable with profile plugs and enable the noise level to be reduced by ca 10 dBA as compared to the basic version.

Additional noise reduction (by 5 dBA) is achieved by using a throttling cage, due to which the pressure drop between the seat and the plug is lower. The same version is also recommended in case of a choked flow, of cavitation and flashing.

Multi-opening designs give a higher pressure recover coefficient FL, which makes possible the flow to be higher than with the basic version, with Kvs and  $\Delta p$  values remaining unchanged.

For compressible fluids, it is often advantageous to use reduction connections on the outlet (diffusers). When it is necessary (noise, choked flow), the diffusers can be equipped with additional drilled structures, like plates to be fixed between the flanges or welded inside the reducer.

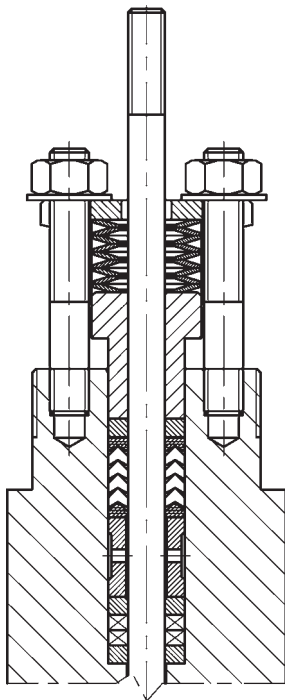
On client's request, as well as when it is demanded by the flow conditions, special versions are proposed as far as materials, flow coefficients, control characteristics, seat leakage, etc. are concerned.

**Tab. 3: Packing and its use**

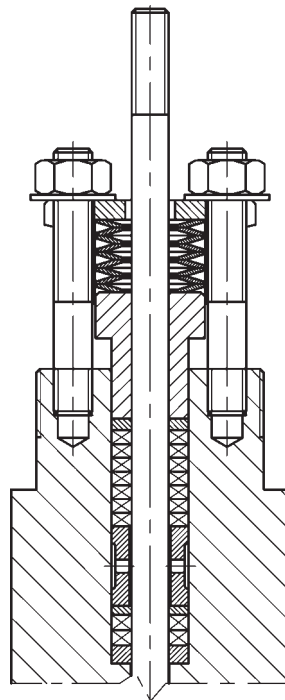
Packing type	PN	Temperature [ °C ]		
		Bonnet type		
		Standard	Extended	Bellows
PTFE-V-Ring	Up to 110)*	-46° C ... +200° C	-198° C ... +300° C	-100° C ... +200° C
PTFE + Graphite				
PTFE-V / TA-Luft				
Graphite	Up to 420)*	Up to +300° C	Up to +537° C , (+650° C)**	bis +400° C
Graphite / TA-Luft				

)\* for bellows bonnet PN 50

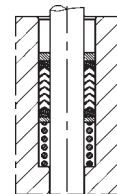
)\*\* for valves with welding ends



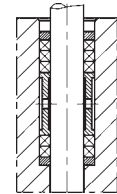
Stuffing box packing according to TA-Luft (PTFE -V-Ring)



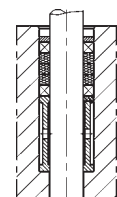
Stuffing box packing according to TA-Luft (Graphite)



Stuffing box (PTFE-V-Ring)



Stuffing box (PTFE + Graphite)



Stuffing box (Graphite)



**Tab. 4: Flow coefficients Kvs (m<sup>3</sup>/h) for contoured- and perforated plugs**

Kvs					Stroke	Diameter valve seat	A	F <sub>D</sub>		Nominal size valve (DN)															
Contoured plug			Perfor. plug					Cl. IV	Cl. V																
L	P	S	L	P	[mm]	[mm]	[cm <sup>2</sup> ]	[kN]		15	20	25	40	50	80	100	150	200	250						
0,1	-	-	-	-	20	6,35	0,3	0,1	0,65																
0,16	-	-	-	-																					
0,25	-	-	-	-																					
0,4	-	-	-	-																					
0,63	-	-	-	-																					
1,0	-	-	-	-																					
1,6	-	-	-	-							9,52	0,7	0,15	1,0											
2,5	-	-	-	-							12,7	1,3	0,2	1,3	•										
4,0	4,8	-	-	-							19,05	2,9	0,3	1,95		•									
6,3	7,6	-	-	-							20,64	3,3	0,33	2,1			•								
10	12	-	6,3	-							25,25	5,0	0,4	2,6											
16	20	-	10	-							31,72	7,9	0,5	3,3				•							
25	30	-	16	-							41,25	13,4	0,7	4,6					•						
40	48	-	25	-							50,8	20,3	0,8	5,2											
63	-	-	40	-	38	66,7	34,9	1,1	7,2						•										
94	115	-	63	-																					
125	-	-	125	94							88,9	62,1	1,4	9,1							•				
160	192	-	180	125	50	107,92	91,5	1,7	11,0																
250	-	-	260	200							126,95	126,6	2,0	13,0											
320	384	-	320	400	63	158,72	197,9	2,5	16,0																
500	600	-	400	500							195,00	298,6	3,1	20,0											
630	-	-	500	630	80	203,2	324,3	3,2	21,0																
800	960	-	630	800																					

Calculation factors  
 Contoured plug: F<sub>t</sub> = 0,9; X<sub>t</sub> = 0,72; F<sub>d</sub> = 0,46; xF<sub>z</sub> = 0,65  
 Perforated plug: F<sub>t</sub> = 0,95; X<sub>t</sub> = 0,78; F<sub>d</sub> = 0,1; xF<sub>z</sub> = 0,75

**Note**

- - not possible for PN 250 ... 420
- On/off-plug (S) only maximal Kvs per nominal diameter



Throttling sleeve (cage)

**Tab. 5: driving force [kN] of pneumatic actuators**

Actuator size	Direct action (type P ; P1)			Reverse action (type R ; R1)					
	Supply pressure [kPa]			Diaphragm pressure span [kPa]					
	1,4	2,5	4,0	0,2 - 1,0	0,4 - 1,2; 0,4 - 2,0	0,6 - 1,4	0,8 - 2,4	1,2 - 2,8	1,8 - 3,8
250	1,0	3,8	7,5	0,5	1,0	1,5	2,0	3,0	-
400	1,6	6,0	12,0	0,8	1,6	2,4	3,2	4,8	-
630	2,5	9,5	18,9	1,3	2,5	3,8	5,0	7,6	11,3
1000	4,0	15,0	30,0	2,0	4,0	6,0	8,0	12,0	18,0
1500	6,0	22,5	45,0	3,0	6,0	9,0	12,0	18,0	27,0
3000	12,0	45,0	90,0	6,0	12,0	18,0	24,0	36,0	54,0

**Note**

- For direct action actuators, the spring range of 20-100 kPa has been provided.
- For the interpretation of electrically and other actuators the values of table 4 and 5 can be used.

**Tab. 6: Pressure drops  $\Delta p$  [MPa] for valves with pneumatic actuators seat leakage class IV an V**

Diameter valve seat [mm]	Nominal size valve [DN]	Stroke [mm]	Actuator size	Increase control pressure „close valve“			Increase control pressure „open valve“		
				Sup. pressure [kPa]	$\Delta P$ [MPa]		Spring range [kPa]	$\Delta P$ [MPa]	
					Cl. IV	Cl. V		Cl. IV	Cl. V
bis 12,7	15; 20; 25; 40; 50	20	250	140	6,1	-	20 - 100	2,3	-
				250	27,3	18,8	40 - 120	6,1	-
			400	28,0	28,0	60 - 140	10,0	1,5	
						80 - 240	13,8	5,4	
				120 - 280	21,5	13,0			
400			140	2,4	2,3	20 - 100	4,6	-	
				250	28,0	28,0	40 - 120	10,7	2,3
			400	-	-	60 - 140	16,9	8,4	
						80 - 240	23,0	14,6	
						120 - 280	28,0	26,9	
19,1	20; 25; 40; 50		250	140	2,4	-	20 - 100	0,7	-
				250	11,8	6,2	40 - 120	2,4	-
		400	24,0	19,0	60 - 140	4,1	-		
					80 - 240	5,8	-		
			120 - 280	9,3	3,6				
400		140	4,5	-	20 - 100	1,7	-		
			250	19,6	14,0	40 - 120	4,5	-	
		400	28,0	28,0	60 - 140	7,2	1,5		
					80 - 240	10,0	4,3		
					120 - 280	15,5	9,8		
20,64	25; 40; 50	250	140	2,0	-	20 - 100	0,5	-	
			250	10,0	4,8	40 - 120	2,0	-	
		400	21,0	15,9	60 - 140	3,4	-		
					80 - 240	4,9	-		
			120 - 280	7,8	2,6				
400		140	3,7	-	20 - 100	1,4	-		
			250	16,6	11,5	40 - 120	3,7	-	
		400	28,0	28,0	60 - 140	6,0	0,9		
					80 - 240	8,4	3,2		
					120 - 280	13,1	7,9		
25,25	40; 50	250	140	1,2	-	20 - 100	0,2	-	
			250	6,7	2,3	40 - 120	1,2	-	
		400	14,2	9,8	60 - 140	2,2	-		
					80 - 240	3,2	-		
			120 - 280	5,2	0,8				
400		140	2,4	-	20 - 100	0,8	-		
			250	11,2	6,8	40 - 120	2,4	-	
		400	23,2	18,8	60 - 140	4,0	-		
					80 - 240	5,6	1,2		
					120 - 280	8,8	4,4		
31,72	40; 50; 80	400	140	1,4	-	20 - 100	0,4	-	
			250	7,0	3,4	40 - 120	1,4	-	
		400	14,5	11,0	60 - 140	2,4	-		
					80 - 240	3,4	-		
			120 - 280	5,4	1,9				
630		140	2,5	-	20 - 100	1,0	-		
			250	11,3	7,8	40 - 120	2,5	-	
		400	23,2	19,7	60 - 140	4,1	0,6		
					80 - 240	5,7	2,1		
					120 - 280	9,0	5,4		
					180 - 380	13,7	10,1		
41,25	50; 80; 100	400	140	0,6	-	20 - 100	-	-	
			250	3,8	1,0	40 - 120	0,6	-	
		400	8,1	5,3	60 - 140	1,2	-		
					80 - 240	1,8	-		
			120 - 280	2,9	0,15				
630		140	1,3	-	20 - 100	0,4	-		
			250	6,3	3,5	40 - 120	1,3	-	
		400	13,0	10,2	60 - 140	2,2	-		
					80 - 240	3,1	0,3		
					120 - 280	4,9	2,1		
					180 - 380	7,5	4,8		

Tab. 6: Continued

Diameter valve seat [mm]	Nominal size valve [DN]	Stroke [mm]	Actuator size	Increase control pressure „close valve“			Increase control pressure „open valve“		
				Sup. pressure [kPa]	ΔP [MPa]		Spring range [kPa]	ΔP [MPa]	
					Cl. IV	Cl. V		Cl. IV	Cl. V
50,8	80; 100; 150	38	630	140	0,9	-	20 - 100	0,25	-
				250	4,3	21	40 - 120	0,9	-
				400	9,0	6,9	60 - 140	1,5	-
							80 - 240	2,1	-
							120 - 280	3,4	1,2
							180 - 380	5,3	3,0
			1000	140	1,6	-	20 - 100	0,6	-
				250	7,1	4,9	40 - 120	1,6	-
				400	14,6	12,4	60 - 140	2,6	0,4
							80 - 240	3,6	1,4
							120 - 280	5,6	3,4
							180 - 380	8,6	6,4
66,7	80; 100; 150	38	630	140	0,4	-	20 - 100	-	-
				250	2,4	0,6	40 - 120	0,4	-
				400	5,0	3,3	60 - 140	0,8	-
					80 - 240	1,1	-		
					120 - 280	1,8	-		
					180 - 380	2,9	1,1		
	80; 100; 150; 200	38	1000	140	0,8	-	20 - 100	0,3	-
250				4,0	2,2	40 - 120	0,8	-	
400				8,3	6,5	60 - 140	1,4	-	
							80 - 240	2,0	0,2
							120 - 280	3,1	1,4
							180 - 380	4,8	3,0
	1500	38	1500	140	1,4	-	20 - 100	0,5	-
250				6,1	4,4	40 - 120	1,4	-	
400				12,5	10,8	60 - 140	2,3	0,5	
							80 - 240	3,1	1,4
							120 - 280	4,8	3,0
							180 - 380	7,4	5,6
88,9	100; 150	38	630	140	0,2	-	20 - 100	-	-
				250	1,3	-	40 - 120	0,2	-
				400	2,8	1,6	60 - 140	0,4	-
					80 - 240	0,6	-		
					120 - 280	1,0	-		
					180 - 380	1,6	0,3		
	100; 150 200; 250	38	1000	140	0,4	-	20 - 100	0,1	-
250				2,2	1,0	40 - 120	0,4	-	
400				4,6	3,4	60 - 140	0,7	-	
							80 - 240	1,1	-
							120 - 280	1,7	0,5
							180 - 380	2,7	1,4
	1500	38	1500	140	0,7	-	20 - 100	0,3	-
250				3,4	2,1	40 - 120	0,7	-	
400				7,0	5,8	60 - 140	1,2	-	
							80 - 240	1,7	0,5
							120 - 280	2,7	1,4
							180 - 380	4,1	2,9
107,92	150; 200; 250	50	1000	140	0,3	-	20 - 100	-	-
				250	1,4	0,4	40 - 120	0,3	-
				400	3,0	2,0	60 - 140	0,5	-
						80 - 240	0,7	-	
						120 - 280	1,1	0,1	
						180 - 380	1,8	0,8	
	1500	50	1500	140	0,5	-	20 - 100	0,1	-
250				2,3	1,3	40 - 120	0,5	-	
400				4,7	3,7	60 - 140	0,8	-	
							80 - 240	1,1	0,1
							120 - 280	1,8	0,8
							180 - 380	2,8	1,7
	3000	50	3000	140	1,1	0,1	20 - 100	0,5	-
250				4,8	3,7	40 - 120	1,1	0,1	
400				9,6	8,6	60 - 140	1,8	0,8	
							80 - 240	2,4	1,4
							120 - 280	3,7	2,7
							180 - 380	5,7	4,7

Tab. 6: Continued

Diameter valve seat [mm]	Nominal size valve [DN]	Stroke [mm]	Actuator size	Increase control pressure „close valve“			Increase control pressure „open valve“		
				Sup. pressure [kPa]	ΔP [MPa]		Spring range [kPa]	ΔP [MPa]	
					Cl. IV	Cl. V		Cl. IV	Cl. V
126,95	150; 200; 250	50	1000	140	0,15	-	20 - 100	-	-
				250	1,0	0,16	40 - 120	0,15	-
				400	2,2	1,3	60 - 140	0,3	-
			1500	140	0,3	-	80 - 240	0,45	-
				250	1,6	0,8	120 - 280	0,8	-
				400	3,4	2,5	180 - 380	1,25	0,4
			3000	140	0,8	-	20 - 100	-	-
				250	3,4	2,5	40 - 120	0,3	-
				400	7,0	6,1	60 - 140	0,6	-
158,72	200; 250	63	1000	140	-	-	80 - 240	0,8	-
				250	0,6	-	60 - 140	1,3	0,4
				400	1,4	0,7	120 - 280	2,7	1,8
			1500	140	0,2	-	180 - 380	4,1	3,3
				250	1,0	0,3	20 - 100	0,3	-
				400	2,1	1,4	40 - 120	0,8	-
			3000	140	0,5	-	60 - 140	1,3	0,4
				250	2,1	1,4	80 - 240	1,7	0,9
				400	4,4	3,7	120 - 280	2,7	1,8
195	250	63	1500	140	0,1	-	180 - 380	4,1	3,3
				250	0,7	-	20 - 100	0,3	-
				400	1,4	0,8	40 - 120	0,8	-
			3000	140	0,3	-	60 - 140	1,3	0,4
				250	1,4	0,8	80 - 240	1,7	0,9
				400	2,9	2,3	120 - 280	2,7	1,8
203,2	250	80	1500	140	-	-	180 - 380	4,1	3,3
				250	0,6	-	20 - 100	0,3	-
				400	1,3	0,7	40 - 120	0,8	-
			3000	140	0,3	-	60 - 140	1,3	0,4
				250	1,3	0,7	80 - 240	1,7	0,9
				400	2,7	2,1	120 - 280	2,7	1,8

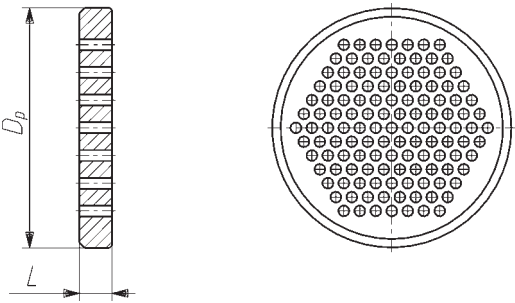
Note

1. Valves operating „control pressure increase - the valve opens“, an actuator with the spring range of 40-120 kPa can be replaced with an actuator with 40-200 MPa spring range, with the same pressure drops.
2. For reversed operation actuators (R or R1 type), the supply pressure shall exceed the spring higher range by 40 kPa minimum.

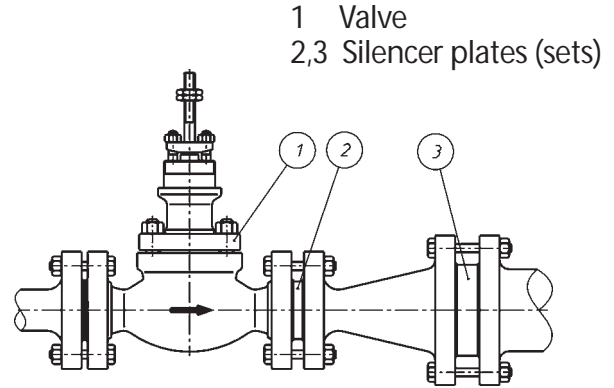
# Noise reduction

The noise generated by valve operation caused by cavitations or by aerodynamic effects exceeds the level acceptable by the client, it shall be reduced by means of the following solutions:

1. Perforated plugs (fig. 1 and table 4)
2. Silencer plates on the valve outlet and/or inside the reduction joint (figs. 3, 4 and table 7)
3. Reduction joints (diffusers) (fig. 4)



**Fig. 3**  
Silencer plate



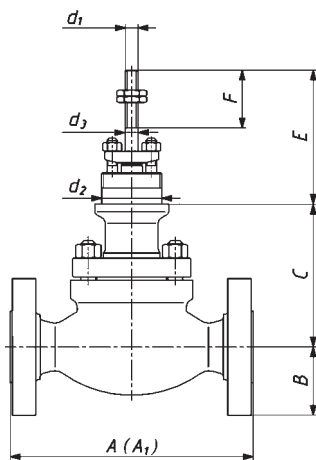
**Fig. 4**  
Installation of silencer plates or a diffuser

**Tabelle 7: Dimensions and flow coefficients of silencer plates**

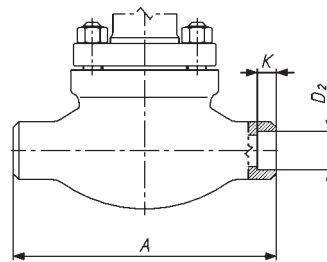
DN	15	20	25	40	50	80	100	150	200	250	300	350
Kvs	4	6,3	10	25	40	94	160	320	500	800	1000	1500
	3,6	5,7	9	22,5	36	84	144	288	450	720	900	1350
	3,2	5	8	20	32	75	128	256	400	640	800	1200
	2,8	4,4	7	17,5	28	66	112	224	350	560	700	1050
L [mm]	5			6			10		15		20	
Dp [mm]	45	58	68	88	102	138	162	218	285	345	410	465

Multi-plate silencer sets are designed to the individual process requirements.

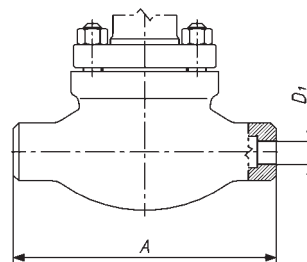
## Dimensions and weight



Valve with flanged connection  
Dimension E for the valve position  
valve closed \*E = 180 mm  
while assembled with P/R 1000



Valve with welding ends SW type (DN 15 ... 50)



Valve with welding ends BW type (DN 15 ... 50)

**Tab. 8: Connection dimensions of control valve**

DN	15 ... 25						40						50					
PN	10 ... 50	63 ... 110	150; 160	250; 260	320	400; 420	10 ... 50	63 ... 110	150; 160	250; 260	320	400; 420	10 ... 50	63 ... 110	150; 160	250; 260	320	400; 420
B max	63	70	75		80	90	78	85	93		98	110	83	98	108		105	118
C	ST*	135		149	193		145		172	214			155		175	237		
	V	306		320	364		306		348	385			326		345	402		
	FB	254	-	-	-	-	-	254	-	-	-	-	-	270	-	-	-	-
Weight [kg]	8	8,5		9,5		15,5	17,5	19	20	22	23	22	25	28	31	33	34	

DN	80						100						150		
PN	10 ... 50	63 ... 110	150; 160	250; 260	320	400; 420	10 ... 50	63 ... 110	150; 160	250; 260	320	400; 420	10 ... 50	63 ... 110	150; 160
B max	105	115	120	133	138	153	128	138	145	155	168	185	160	178	190
C	ST*	206		233	257		217		252	329			287		365
	V	375		402	447		407		442	498			426		483
	FB	405	-	-	-	-	-	405	-	-	-	-	470	-	-
Weight [kg]	40	43	44	50	51	52	65	72	75	86	89	95	132	147	156

DN	200			250			
PN	10 ... 50		63 ... 110	10 ... 50		10 ... 50 (kv 800)	63 ... 110
B max	190		215	225		255	
C	ST*	439			458		
	V	539			558		
	FB	580	-		580	660	-
Weight [kg]	195		220	320	330	360	

**Note**  
**Weight of the control valve with standard bonnet, no actuator**  
 \* ST = Standard bonnet  
 V = Exended construction  
 FB = Bellows seals

**Tab. 8b: Connection dimensions of control valve**

DN	15 ... 50	40 ... 50	80; 100	80 ... 100	100	150	200	200; 250	250				
Kvs <sup>1)</sup>	0,1 ... 16	25 ... 40		63; 94	125; 160	63 ... 160	250; 320	94	125; 160	250; 320	500	630	800
Stroke	20			38			50	38	50	63	80		
d <sub>1</sub>	M12 x 1,25			M16 x 1,5			M20 x 1,5	M16 x 1,5	M20 x 1,5	M24 x 1,5			
d <sub>2</sub> <sup>2)</sup>	57,15 / 2 1/4"-16UN2A					84,15 / 3 5/16"-18NS2A		95,25 / 3 3/4"-12UN2A					
d <sub>3</sub>	12		16		20			24					
Actuator	250	400		630			1000	1000		1000		1500	
	400	630		1000			1500	1500		1500		3000	
				1500			3000	1500		3000		3000	

1) Kvs values for profile plug L and P. For other plug Kvs value to table 4 for the same seat size.

2) For DN 80 an 100 valves with TA-Luft packing, dimension d<sub>2</sub> = 84,15

**Tab. 9: Construction lengths of control valves with flanged connection**

DN	Dimension A [mm]										
	PN; DN; ISO					ISO					
	10; 16; 25; 40	63 - 100	160	250 - 320	400	20	50	110	150	260	420
15	130	230*	230*	260*	300*	184	190	203	236	273	308
20	150	230	230	260	300		194	206	241		
25	160						197	210	248		
40	200	260	260	300	350	222	235	251	270	311	359
50	230	300	300	350	400	254	267	286	311	340	400
80	310	380	380	450	500	298	317	336	387	460	498
100	350	430	430	520	580	353	368	394	464	530	575
150	480	550	550	-	-	451	473	508	556	-	-
200	600	650	-	-	-	543	568	610	-	-	-
250	730	775	-	-	-	673	708	752	-	-	-

\*Note: For DN 15 (acc. PN) body length is the same like DN 20 (with exception PN 10; 16; 25; 40)

**Note**  
 The construction length dimensions „A“ tabulated in table 9 for PN 20 (ANSI 150); PN 50 (ANSI 300); PN 110 (ANSI 600); PN 150 (ANSI 900); PN 200 (ANSI 1500); PN 420 (ANSI 2500) are for valve bodies with end connection B1 (RF) or B2 (RF).

**Tab. 10: Construction lengths of control valves with welding ends**

DN	Dimension A [mm]		
	Pressure rating		
	PN 10 ... 110	PN 150 ... 160	PN 250 ... 420
15; 20; 25	210	230	300
40	251	260	350
50	286	300	400
80	337	380	500
100	394	430	580
150	508	550	-
200	610	-	-
250	752	-	-

**Tab. 11: Butt welding ends type BW PN 10 ... 110**

DN	Pipe		Pressure rating			Valve end connection	
	D <sub>z</sub> [mm]	t [mm]	PN ≤ 40	PN 63	PN 100	D <sub>1</sub> [mm]	Norm
15	21,3	2	x	x	x	17	DIN 3239
20	26,9	2,3	x	x	x	21	
25	33,7	2,6	x	x	x	28,2	
40	48,3	2,6	x	x	x	42,8	
50	60,3	3,2	x	x	x	53,6	
80	88,9	4,0	x	x	x	80,6	
100	114,3	5,0	x	x		104	
150	168,3	5,6	x	x	x	156,8	
		7,1			x	153,8	
200	219,1	7,1	x	x		204,6	
		10,0			x	198,8	
250	273	8,0	x			256,7	
		8,8		x		255	
		12,5			x	247,7	

DN	Pipe			Pressure rating			Valve end connection	
	Schedule	D <sub>z</sub> [mm]	t [mm]	PN 20	PN 50	PN 110	D <sub>1</sub> [mm]	Norm
15	40	21,3	2,76	x	x	x	15,5	ANSI B16-25
		26,9	2,87	x	x	x	21	
20		26,9	2,87	x	x	x	21	
25		33,7	3,37	x	x	x	26,7	
40		48,3	3,68	x	x	x	40,7	
50		60,3	3,91	x	x	x	52,2	
80		88,9	5,48	x	x	x	77,7	
100		114,3	6,02	x	x	x	102	
150		168,3	7,1	x	x	x	153,8	
200		30	219,1	7,03	x	x		
	40	8,18			x		202,5	
	60	10,3				x	198	
250	30	273	7,79	x	x		257	
	40		9,27		x		254	
	60		12,7			x	247,2	

**Tab.12: Butt welding ends BW type BW PN 150 ... 240**

DN	Pipe		Pressure rating				Valve end connection	
	D <sub>2</sub> [mm]	t [mm]	PN 160	PN 250	PN 320	PN 400	D <sub>1</sub> [mm]	Norm
15 20 25	33,7	3,2	x				27	DIN 3239
		3,6		x			26,2	
		5,0				x		
40	42,4	7,1				x	19,5	
		3,8	x				40,5	
		5,0		x			38	
50	60,3	6,3				x	35,5	
		11,0				x	38	
		4,0	x				52	
80	88,9	8,0		x			44	
		8,8				x	58,3	
		14,2				x	47,5	
100	114,3	6,3	x				76	
		11,0		x			92	
		14,2				x	85,7	
150	168,3	17,5				x	79	
		8,0	x				98	
		12,5		x			114,5	
200	139,7	16,0				x	107,5	
		20,0				x	99,5	
		12,5	x				143	

DN	Pipe			Pressure rating			Valve end connection	
	Schedule	D <sub>2</sub> [mm]	t [mm]	PN 150	PN 250	PN 420	D <sub>1</sub> [mm]	Norm
15 20 25	80	337	4,54	x	x		24,4	ANSI B16-25
	160		6,35		x	x	20,7	
	XXS		9,1			x		
40	80	48,3	5,08	x			38	
	160		7,13		x	x	33,7	
	XXS		10,16			x		
50	80	60,3	5,53	x			49	
	160		8,73		x		42,5	
	XXS		11,07			x		
80	80	88,9	7,62	x			73,4	
	160		11,12		x	x	66,5	
	XXS		15,24			x		
100	80	114,3	8,55	x			97	
	120		11,12		x		91,7	
	160		13,48			x	87	
	XXS		17,11			x	79,8	
150	80	168,3	10,9	x			146,2	
	120		14,27	x			139,5	

**Info:**

D<sub>2</sub> [mm] - Pipe outside diameter

C [mm] - Pipe wall thickness

**Tab.13: socked welding ends SW type**

DN	D <sub>2</sub>	K
15	21,7	9,7
20	27	13
25	34	
40	48,7	
50	61	16



# Valve drive

**Pneumatic:** Pneumatic multispring diaphragm actuator (Tab. 14)

**Variants**

- P1/R2 - With cast yoke, no manual drive
- P1B/R1B - With cast yoke, lateral manual drive
- P/R - Column, no manual drive
- PN/RN - Column, top manual drive

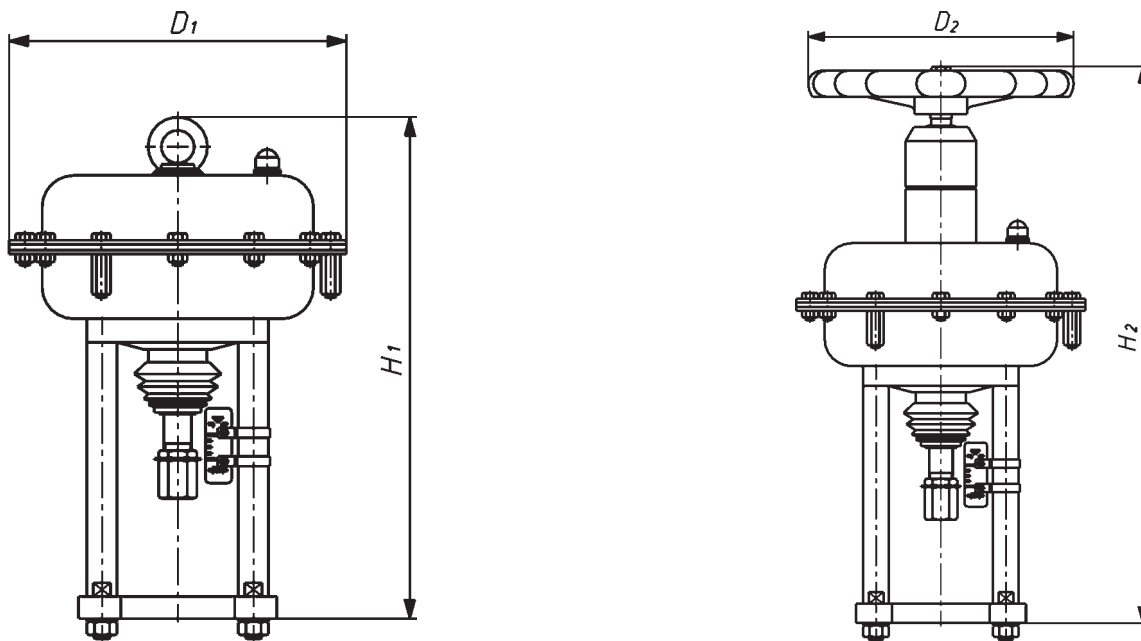
**Info:** P - Straight operation; by control pressure increase the valve is closed  
 R - Reverse operation; by control pressure increase the valve is opened

**Tab. 14: Types of pneumatic actuators**

Type	Actuator size	Diaphr. act. area (cm <sup>2</sup> )	Stroke [mm]	Number of turns for full stroke
P/R ; PN/PR	250	250	20	5
P1/R1 ; P/R; P1B/R1B ; PN/RN	400	400		
	630	630	20; 38	5; 9
	1000	1000	38; 50; 63	8; 10; 13
P1/R1 ; P1B/R1B	1500	1500	38; 50; 63; 80; 100	8; 10; 13; 16
	3000	2 x 1500		

**Tab. 15: dimensions and weight of pneumatic actuators P/R and PN/RN - fig. 6**

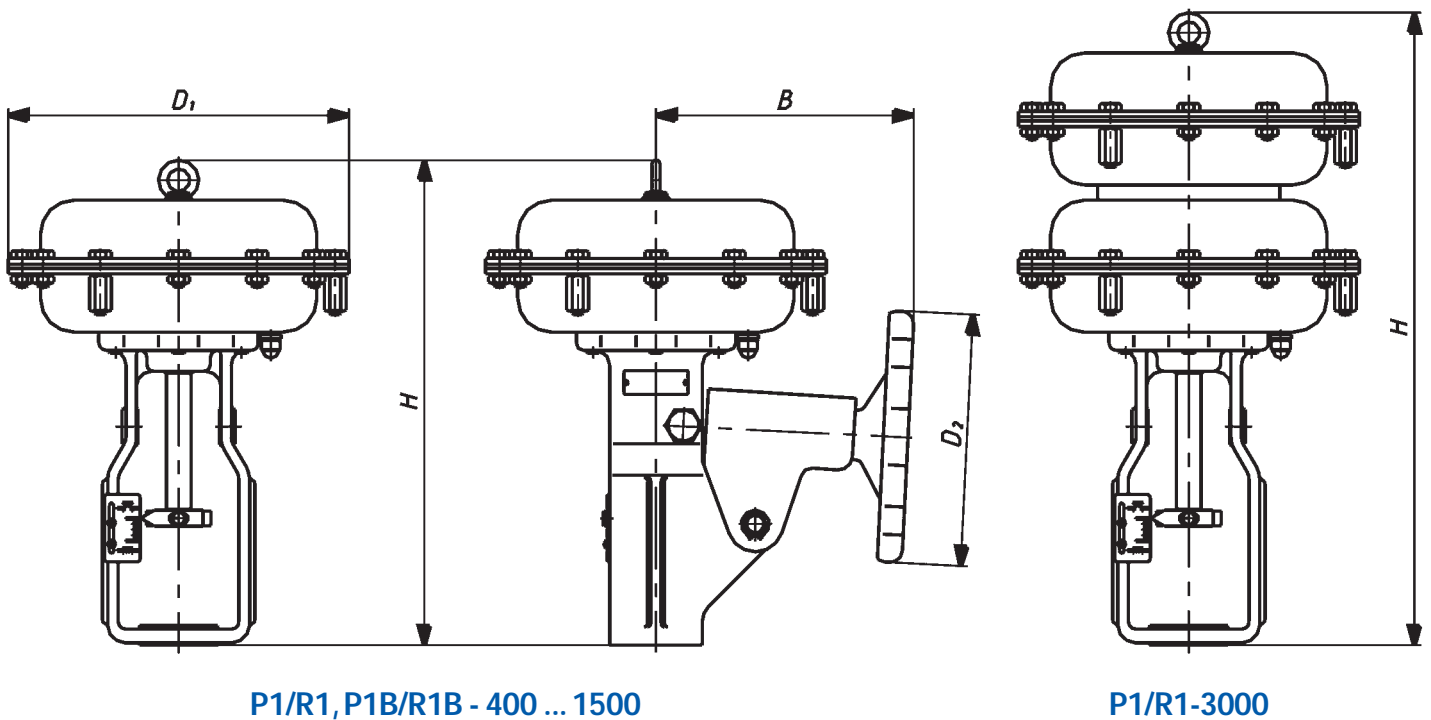
Actuator size	D <sub>1</sub>	D <sub>2</sub>	H <sub>1</sub>	H <sub>2</sub>	Weight [kg]	
	[mm]				P/R	PN/RN
250	240	225	377	474	10	14,5
400	305		387	484	16	20,5
630	375	305	477	574	30	37
1000	477	450	638	815	74	100



**Fig. 6: Pneumatic Actuators type P/R, PN/RN**

**Tab. 16: Dimensions and weight of pneumatic actuators P1/R 1und P1B/R1B - Fig. 7**

Actuator size	B	D1	D2	H	Weight [kg]	
	mm				P1/R1	P1B/R1B
400	255	305	225	453	20	28
630	280	375	305	548	40	50
1000	340	480	450	773	85	105
1500	410	550		833	120	150
3000				1138	225	255



**Fig. 7: Pneumatic actuators type P1/R1 , P1B/R1B**

**Control air connections**

¼" NPT; Rc ½"

**Spring ranges**

20 ... 100 kPa; 40 ... 120 kPa; 60 ... 140 kPa = 3 springs  
 40 ... 200 kPa; 80 ... 240 kPa; 120 ... 180 kPa = 6 springs  
 180 ... 380 kPa = 12 springs

For P1/R1-3000 actuator (tandem) – for each range, the number of springs is twice than above

**Maximum supply pressure**

450 kPa

**Equipment (optional)**

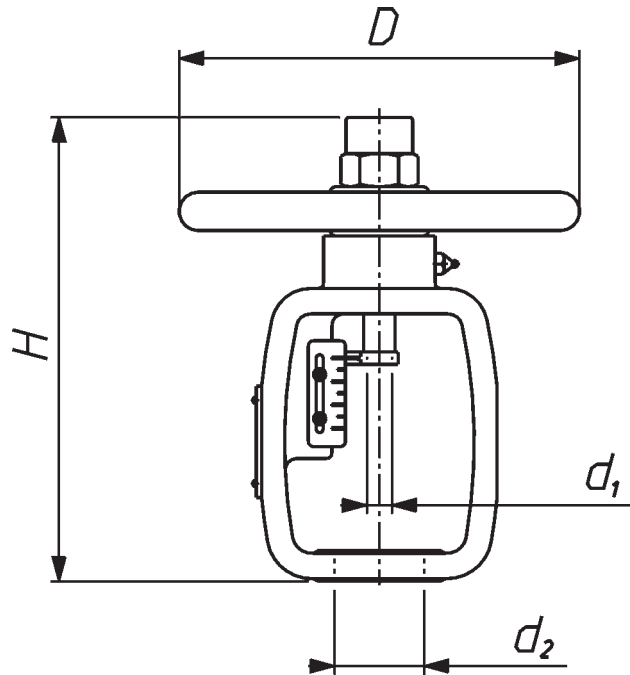
- Manual drive, lateral (P1/R1), or top (P/R)
- Air operated valve positioner
- Electro pneumatic positioner
- Intelligent (digital) electro pneumatic positioner
- Filter regulator
- Three-way solenoid valve
- Shut-off-block
- Position indicator
- Limit switches

Designs with electrical and electro hydraulic actuators are possible.

Various electric actuators from different manufacturers with BR 12a valves can be on customer's request.

**Tab. 17: Types, dimensions and weight of manual drive type 20 Fig. 8**

Type	Stroke [mm]	d <sub>1</sub>	d <sub>2</sub>	H	D	Number of turns with full opening	Weight [kg]
20-20-57-M12	20	M12 x 1,25	57,15	265	228	8	7,5
20-38-57-M16	38	M16 x 1,5			84,15	298	15
20-38-84-M16			95,25				
20-38-95-M16			84,15				
20-50-84-M20	50	M20 x 1,5	95,25	385	457	16	16
20-50-95-M20						20	
20-63-95-M24	63	M24 x 1,5	95,25	533	610	19	24
20-80-95-M24	80					19	



**Fig. 8: Manual drive type 20**

### Special versions:

- **Oxygen valves**  
Proper material selection, mechanical and chemical cleaning, tests and installation guarantees the valve to be prepared for oxygen service
- **Valves for liquid and gaseous fluids**  
Driven by pneumatic actuators with quick closing systems - valve closing time-below 1 sec.
- **Valves for cryogenic service**  
Proper materials and special designs of the seal to prevent the valve drive from being affected by low temperatures. Used for liquid oxygen and nitrogen mainly until -198° C
- **Acid resistant valves**  
Use of special materials for increased acid resistance, according to NACE MR - 1075 Standard
- **Valves with a heating jacket**  
Design and technical parameters-as agreed with the client individually
- **Gas density design**  
When class VI of the valve seat leakage is needed (to  $\Delta P \leq 3,5$  MPa)



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