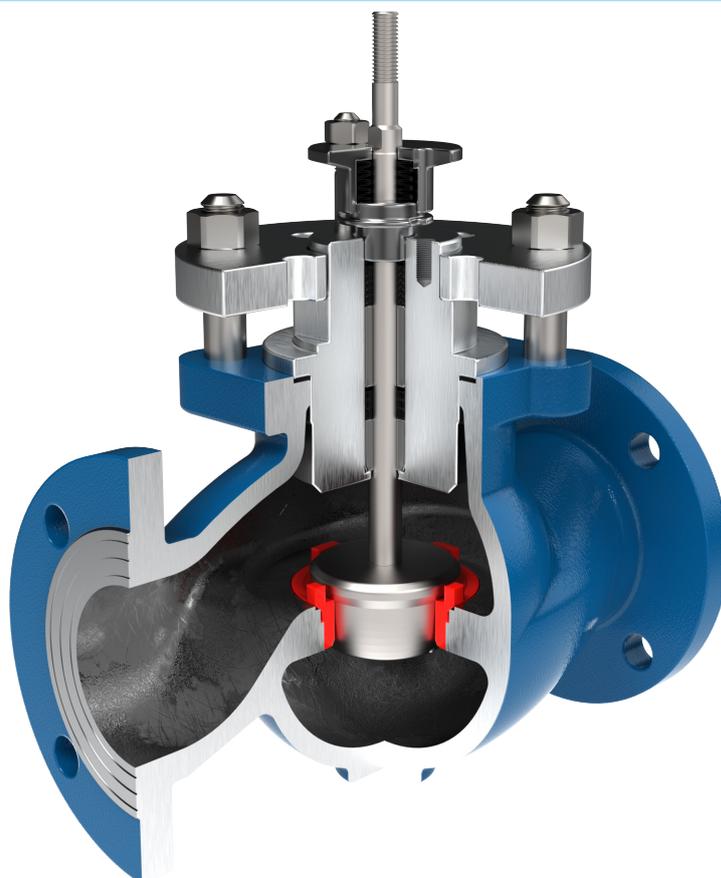


Control Valve

Type VA2011

Single-ported globe control valves type **VA2011** are used in automatic and remote control systems to control flow of gases and liquids. Wide range of material and design versions make the valves widely sought-after in chemical industry, heat and power generation industry, paper industry, food industry, metallurgy and coal mining, etc.



TECHNICAL PARAMETERS

Nominal dimension	DN 15 - DN 250 1/2" - 10"	Tightness class (IEC 60534 - 4)	class IV - standard, metal seat class V - optional for metal seat class VI - optional with soft seat
Nominal pressure	PN 10 - 40 Class 150, Class 300	Body material	grey cast iron, ductile iron, carbon steel, stainless steel according to EN, DIN or ASTM
Construction	<ul style="list-style-type: none"> • single seat valve with balanced plug option • metal or soft seat 	Plug and seat material	stainless steel stellite or plasma nitridation possibility
Working temperature range	-180°C až +400°C	End connection	flange
Flow characteristic, Kvs value	linear, equipercantage or on/off 0,01 - 630 [m ³ /h]	Actuators	pneumatic with diaphragm electro-hydraulic electric hydraulic manual operated

CHARAKTERISTIC

- Range of nominal sizes from DN15 to DN250 for pressures up to PN50 (ANSI300).
- Wide range of flow ratios and control characteristics.
- High level of valve tightness due to use of soft seal (with PTFE seal) in whole range of flow and control characteristic for balanced and unbalanced plug.
- Identical flow ratio and control characteristic for "hard" seats (metal-to-metal) and "soft" seats (metal-PTFE), for balanced and unbalanced plug.
- High durability and reliability due to application of top-class materials and surface treatment processes (burnishing, stelling, heat treatment, CrN coatings).
- Reliable actuator-stem and valve seat-body connection.
- Reduced acting force due to use of balanced plug for valves DN 40 to DN 250.
- Top class flat seals and bonnet packings.
- Assembly with pneumatic actuator, series LP0 with reverse operation and possibility of spring range change - without need of and additional parts (keeping the number of springs).
- Possibility of special designs:
 - for Oxygen
 - for liquid or gas fuels
 - for low temperature media (liquid Oxygen, Nitrogen etc.).
- Competitive prices - due to simple and functional design of valves and actuators and applied materials.

VA2011® - Product trademark registered at the Patent Office

DESIGN AND TECHNICAL SPECIFICATION

Valve body (1)

- flanged, single-ported, casting in cast iron or cast steel

Nominal sizes

- DN15; 20; 25; 32; 40; 50; 65; 80; 100; 150; 200; 250

Nominal pressure and connection depends on material design

- according to EN 1092-1; EN 1092-2; ANSI B16.5
- during temporary period the flanges may be made according to ISO 7005-1

Body length

- according to EN 60534-3-1; 2000y. - fig. 7; table 13 and 14.

Bonnet (2)

- **bonnet body** - rolled steel connected to valve body by assembling plate (fig. 1.a)
- **cast (fig. 1.b)**
 - standard
 - extende
 - bellows

TABLE 1

Material		Pressure	Connection			
			Raised face	Groove	Recess	Ring joint
		Identification				
Iron	Grey Cast	PN10; 16	B	-	-	-
	Ductile	PN10; 16; 25; 40		-	-	-
Cast Steel		PN10; 16; 25; 40	B	D	F	-
		PN20 *)	B1	-	-	J
		PN50 *)		D1	F1	

*) Connection marking according to ISO 7005-1

FIG. 1.A BONNETS DN 15 ... DN 100

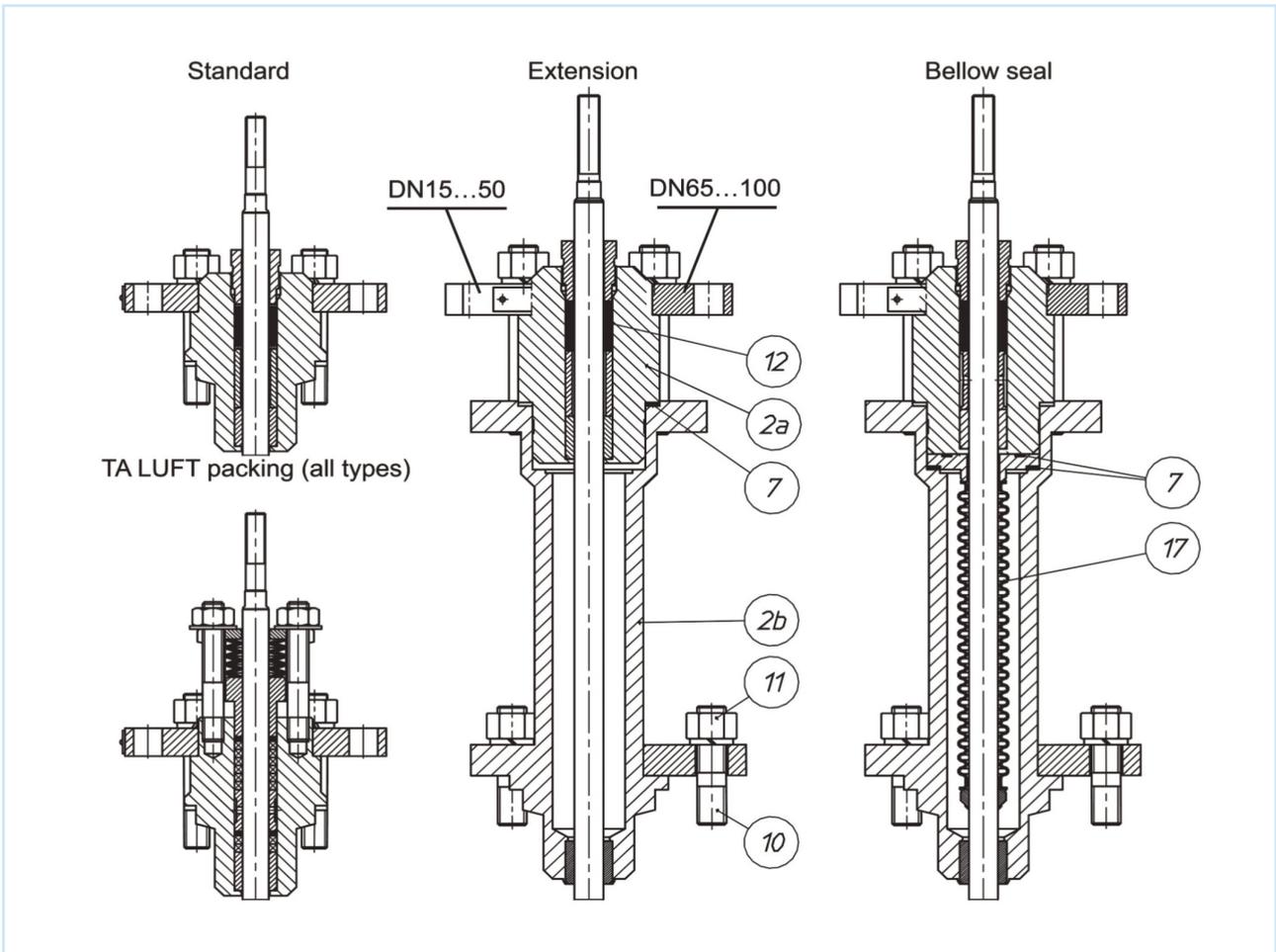
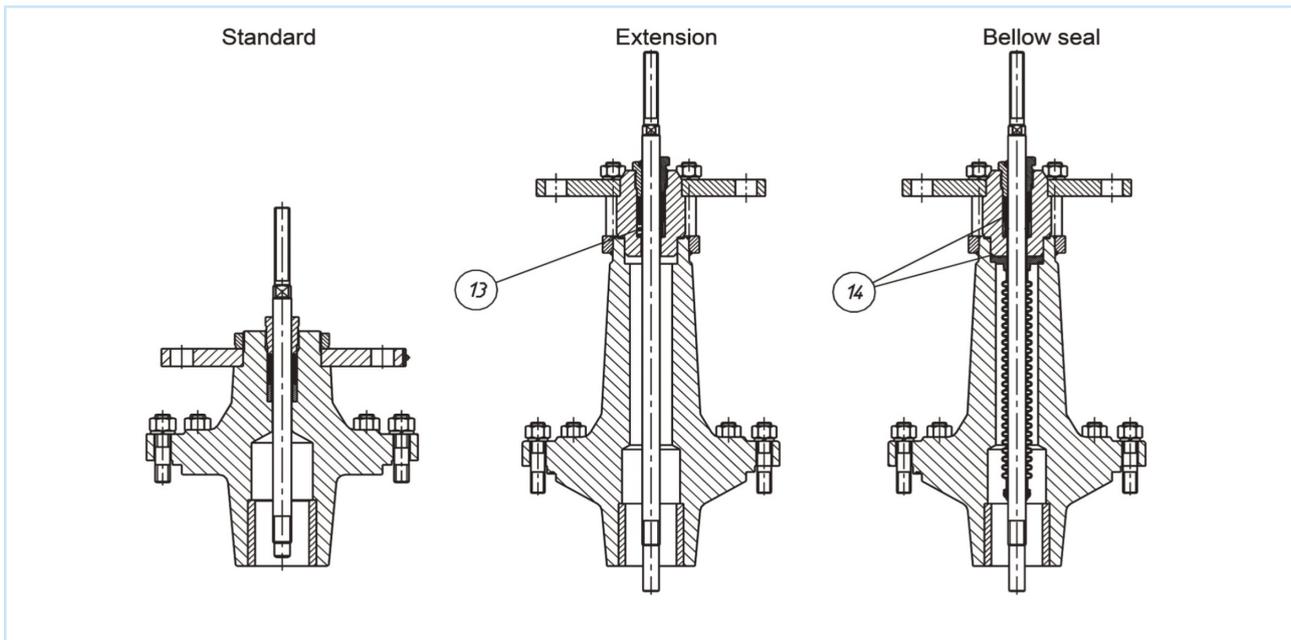


FIG. 1.B1 BONNETS DN 150 ... DN 250



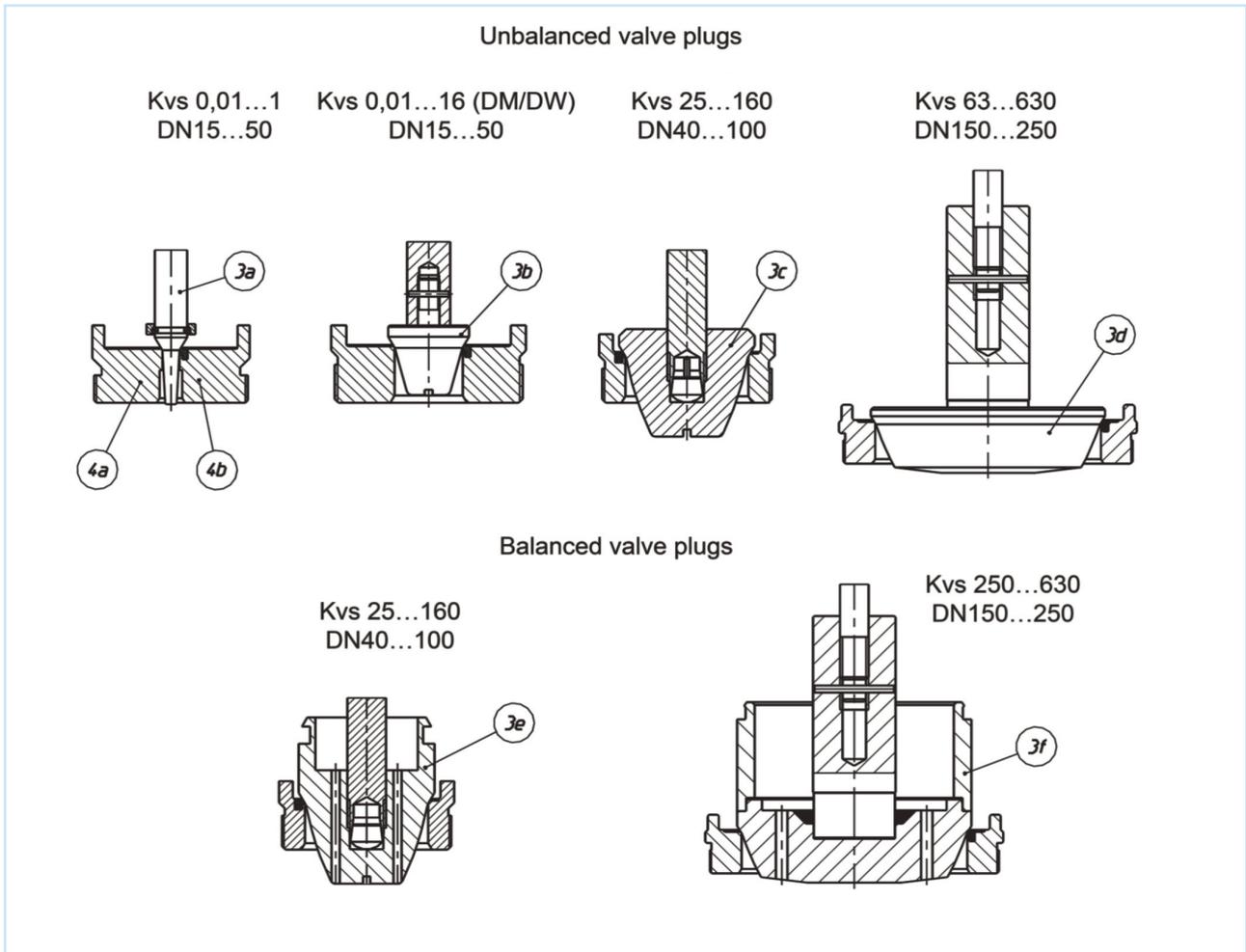
Valve Plug (3)

- contoured, balanced or unbalanced
- control characteristic:
 - linear (L)
 - equipercentage (P)
 - quick opening (S)

• rangeability

- 50:1

FIG. 2 VALVE PLUGS



Valve seat (4)

- screwed, with centering cone and sealing.
- With unscrewing locking:
 - hard
 - soft (with PTFE sealing), see table 4

Stem (5)

- burnished or quenched and tempered, polished sealing contact surface

Zátka (6)

- steel or stainless steel: allows cleaning of body interior (delivered on request).

Body gasket (7)

- asbestos-free, see table 2:
 - flat
 - aramid and hardened graphite(1.4571); in metallic casing (1.4571), multiple edges
 - bonnet
 - packing formed from various materials (PTFE-V; PTFE+graphite; expanded graphite; braided graphite)
 - with TA Luft compression springs (PTFE-V; graphite)

TABLE 2 – PACKING TYPES AND APPLICATION RANGES

Packing type	PN	Temperature °C		
		Bonnet type		
		Standard	Extended	Bellows
PVTFE-V	10 ... 50	-46 ... +200	-198 ... -46	-100 ... +200
PVTFE + Graphite			+200 ... +300	
PVTFE-V / TA-LUFT		+200 ... +300	+300 ... +450	+200 ... +400
Graphite				
Graphite / TA-LUFT				

Leakage class:

- basic: class IV according to IEC 60534-4 – hard seat
- bubble-tight: class VI according to IEC 60534-4 – soft seat

TABLE 3 - COMPONENT LIST WITH MATERIAL SPECIFICATION

Item	Part name		Material				
1	Body		EN-GJL 250 (EN-JL 1040)	EN-GJS 400-18 LT (EN-JS 1025)	GP 240 GH (1.0619)	WCB	GX5CrNiMo 19-11-2 (1.4408)
2	Bonnet	DN15...100	S 355 J2G3 (1.0570)				X6CrNiMoTi 17-12-2 (1.4571)
		DN15...250	EN-GJL 250 (EN-JL 1040)	EN-GJS 400-18 LT (EN-JS 1025)	GP 240 GH (1.0619)	WCB	GX5CrNiMo 19-11-2 (1.4408)
3	Plug		X6CrNiMoTi 17-12-2 (1.4571) X6CrNiMoTi 17-12-2 (1.4571) + stellit + CrN X17CrNi 16-2; (1.4057) + heat treatment				
4	Seat		X6CrNiMoTi 17-12-2 (1.4571) X6CrNiMoTi 17-12-2 (1.4571) + stellit X6CrNiMoTi 17-12-2 (1.4571) + PTFE X17CrNi 16-2; (1.4057) + heat treatment				
5	Stem		X6CrNiMoTi 17-12-2 (1.4571) X6CrNiMoTi 17-12-2 (1.4571) + stellit + CrN X17CrNi 16-2; (1.4057) + heat treatment				
6	Drain plug		S 355 J2G3 (1.0570)			X6CrNiMoTi 17-12-2 (1.4571)	
7	Body gasket		With metal housing X6CrNiMoTi 17-12-2 (1.4571); NOVATEC PREMIUM; SIGRAFLEX HOCHDRUCK; NWK-50 SPETOMET				
8	Guiding sleeve		X6CrNiMoTi 17-12-2 (1.4571) X6CrNiMoTi 17-12-2 (1.4571) + stellit + CrN X17CrNi 16-2; (1.4057) + heat treatment				
9	Compression plate		C45 (1.0503); X30Cr13 (1.4028); X6CrNiMoTi 17-12-2 (1.4571)				
10	Bolt		8.8			A4 - 70	
11	Nut		8			A4 - 70	
12	Packing		PTFE + GRAFIT; PTFE - "V"; GRAFIT				
13	Spring		12R10 (SANDVIK)				
14	„O“ ring		Fluorine rubber (FKM)				
15	Guiding sleeve		X6CrNiMoTi 17-12-2 (1.4571) X6CrNiMoTi 17-12-2 (1.4571) + stellit + CrN X17CrNi 16-2; (1.4057) + heat treatment				
16	Seal ring		KEFLOY 25				
17	Bellow		X6CrNiMoTi 17-12-2 (1.4571)				
Material norms							
Material			Norm nr.				
EN-GJL 250; (EN-JL 1040)			EN 1561				
EN-GJS 400-18 LT; (EN-JS 1025)			EN 1563				
GP 240 GH; (1.0619)			EN 10213-2				
G20Mn5; (1.6220)			EN 10213-3				
WCB			ASTM A 216				
GX5CrNiMo 19-11-2; (1.4408)			EN10213-4				
CF8M			ASTM A 351				
S 355 J2G3 (1.0570)			EN 10025				
P355 NL2; (1.1106)			EN 10028-3				
X6CrNiMoTi 17-12-2 (1.4571)			EN 10088				
X17CrNi 16-2; (1.4057)			EN 10088				
C45; (1.0503)			EN 10083-1				
X30Cr13; (1.4028)			EN 10088				

Note:

Hardening method used for hardening of valve internal parts comprises:

- a) stellinging – padding of surfaces with stellite: ~40HRC
- b) CrN coating – introducing chromium nitride to external layer of detail, to the depth of ca.0.1 mm;~950HV
- c) heat treatment: plug (~45HRC), seat (~35HRC), stem (~35HRC), guide sleeve (~45HRC)
- d) max operating temperature -200..+250°C (for material KEFLOY 25), higher temperatures should be discussed with manufacturer.

TABLE 4 - OPERATION PARAMETERS FOR SPECIAL DESIGN VALVES

Material norms	Material norms		Max working pressure [Mpa]
	Min.	Max.	
with balanced plug	-50	+200	4
with soft seat (PTPE)	-100		3,5
with bellows bonnet	-100	+400	3,5

FIG. 3 - CONTROL VALVE DN15-100

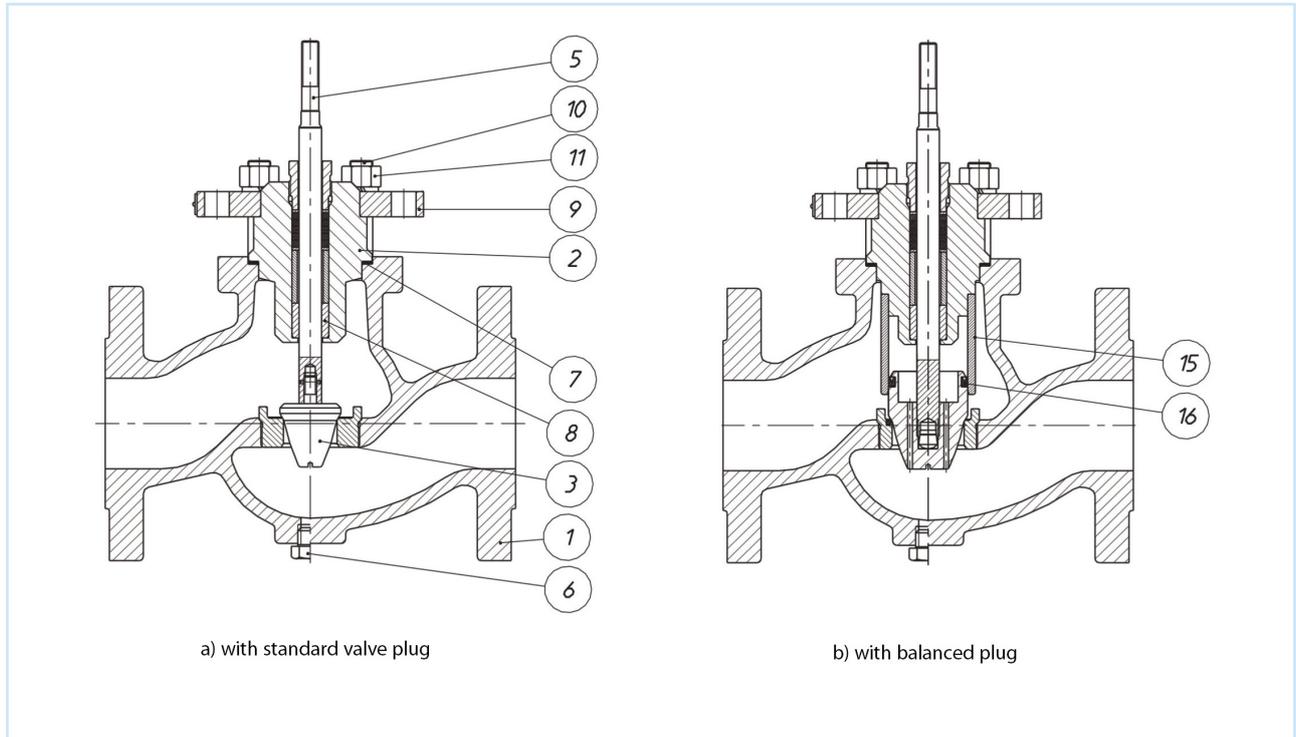


FIG. 4 - CONTROL VALVE DN150-250

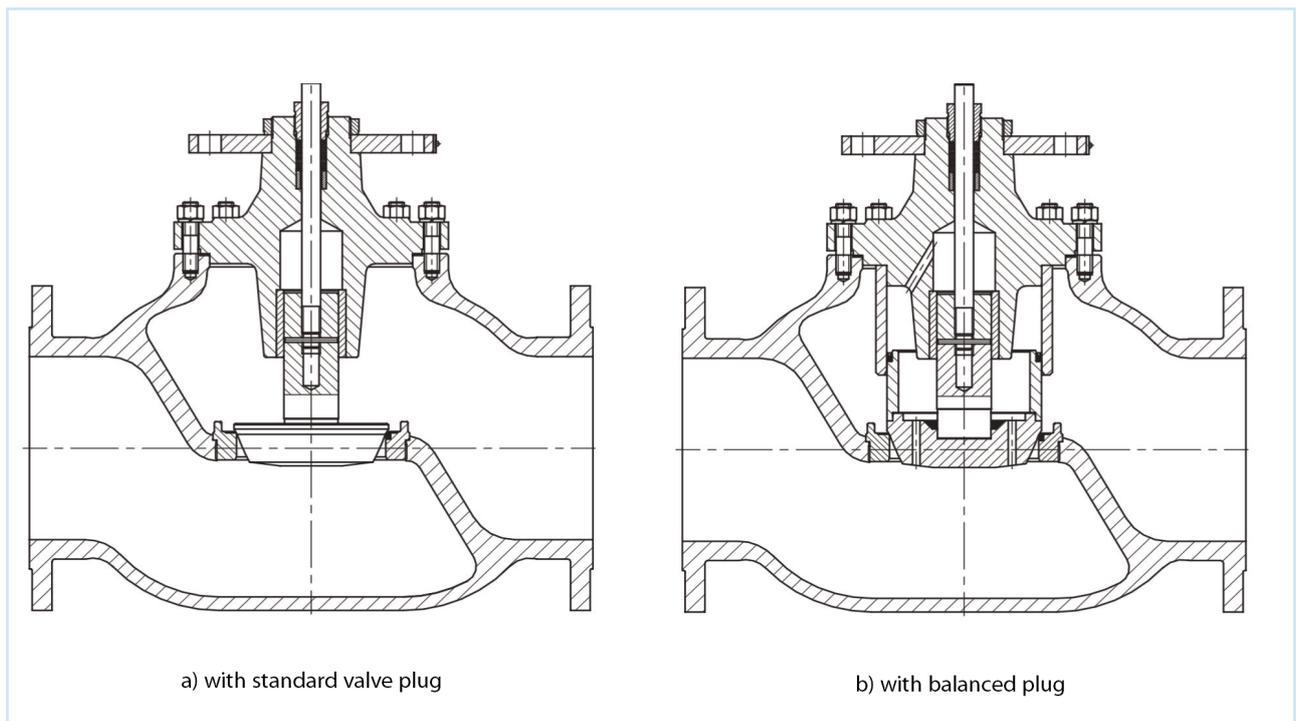


TABLE 4.1

GP 240 GH (1.0619) / A216 WCB								
PN	Norm	Temperature [°C]						
		-10...120	150	180	200	230	250	300
Maximum working pressure [bar]								
PN10	EN 1092-2	10	9	8,4	8	7,4	7	6
PN16		16	14,4	13,4	12,8	11,8	11,2	9,6

TABLE 4.2

Material: EN-GJS 400-18 LT according to EN 1563							
PN	Norm	Temperature [°C]					
		-10...120	150	200	250	300	350
Maximum working pressure [bar]							
PN10	EN 1092-2	10	9,7	9,2	8,7	8	7
PN16		16	15,5	14,7	13,9	12,8	11,2
PN25		25	24,3	23	21,8	20	17,5
PN40		40	38,8	36,8	34,8	32	28

TABLE 4.3

Material: GP240GH (1.0619) podle EN 10213-2									
PN/CL	Norm	Temperature [°C]							
		-10...50	100	150	200	250	300	350	400
Maximum working pressure [bar]									
PN10	EN 1092-1	10	9,2	8,8	8,3	7,6	6,9	6,4	5,9
PN16		16	14,8	14	13,3	12,1	11	10,2	9,5
CL150	EN 1759-1	17,3	15,4	14,6	13,8	12,1	10,2	8,4	6,5
PN25	EN 1092-1	25	23,2	22	20,8	19	17,2	16	14,8
PN40		40	37,1	35,2	33,3	30,4	27,6	25,7	23,8
CL300	EN 1759-1	45,3	40,1	38,1	36	32,9	29,8	27,7	25,7

TABLE 4.4

Material: GX5CrNiMo (1.4408) according to EN 10213-4											
PN/CL	Norma	Temperature [°C]									
		10...50	100	150	200	250	300	350	400	425	450
Maximum working pressure [bar]											
PN10	EN 1092-1	10	10	9	8,4	7,9	7,4	7,1	6,8	-	6,7
PN16		16	16	14,5	13,4	12,7	11,8	11,4	10,9	-	10,7
CL150	EN 1759-1	17,9	16,3	14,9	13,5	12,1	10,2	8,4	6,5	5,6	4,7
PN25	EN1092-1	25	25	22,7	21	19,8	18,5	17,8	17,1	-	16,8
PN40		40	40	36,3	33,7	31,8	29,7	28,5	27,4	-	26,9
CL300	EN 1759-1	46,7	42,5	38,9	35,3	32,9	30,5	28,8	27,6	27,2	26,9

TABLE 4.5

Material: G20Mn5 (1.6220) according to EN 10213-3							
PN	Norm	Temperature [°C]					
		-40	100	150	200	250	300
Maximum working pressure [bar]							
PN10	-	6	6	3,8	3,6	3,48	3,4
PN16		16	16	10,1	9,6	9,28	9,07
PN25		25	25	15,8	15	14,5	14,2
PN40		40	28	28	27	26	25

TABLE 4.6

Material: WCB according to ASTM A216										
PN/CL	Norm	Temperature [°C]								
		-10...50	100	150	200	250	300	350	375	400
Maximum working pressure [bar]										
PN10	EN 1092-1	10	10	9,7	9,4	9	8,3	7,9	7,7	6,7
PN16		16	16	15,6	15,1	14,4	13,4	12,8	12,4	10,8
CL150	EN 1759-1	19,3	17,7	15,8	14	12,1	10,2	8,4	7,4	6,5
PN25	EN1092-1	25	25	24,4	23,7	22,5	20,9	20	19,4	16,9
PN40		40	40	39,1	37,9	36	33,5	31,9	31,1	27
CL300	EN 1759-1	50	46,4	45,1	43,9	41,8	38,9	36,9	36,6	34,6

TABLE 4.7

Material: CF8M according to ASTM a351												
PN/CL	Norm	Temperature [°C]										
		-10...50	100	150	200	250	300	350	375	400	425	450
Maximum working pressure [bar]												
PN10	EN 1092-1	8,9	7,8	7,1	6,6	6,1	5,8	5,6	5,5	5,4	5,4	5,3
PN16		14,3	12,5	11,4	10,6	9,8	9,3	9	8,8	8,7	8,6	8,5
CL150	EN 1759-1	18,4	16	14,8	13,6	12	10,2	8,4	7,4	6,5	5,6	4,6
PN25	EN1092-1	22,3	19,5	17,8	16,5	15,5	14,6	14,1	13,8	13,6	13,5	13,4
PN40		35,6	31,3	28,5	26,4	24,7	23,4	22,6	22,1	21,8	21,6	21,4
CL300	EN 1759-1	48,1	42,3	38,6	35,8	33,5	31,6	30,4	29,6	29,3	29	29

TABLE 5 - FLOW RATIO Kvs [m³/h] – FOR UNBALANCED PLUGS

Kvs [m³/h]	Stroke [mm]	Seat diam.	A [cm³]	F _D [kN]		nominal valve size DN											Characteristic									
				Hard seat	Soft seat	15	20	25	32	40	50	65	80	100	150	200	250	L	P	S						
0,010	20	6,35	0,3	0,1	0,16																					
0,016																										
0,025																										
0,040																										
0,063																										
0,10																										
0,16																										
0,25																										
0,40																										
0,63																										
1,0																										
1,6							9,52	0,7	0,15	0,25																
2,5							12,70	1,3	0,2	0,3																
4,0							19,05	2,9	0,3	0,5																
6,3							20,64	3,3	0,35	0,5																
10							25,25	5,0	0,4	0,6																
16							31,72	7,9	0,5	0,8																
25							41,25	13,4	0,7	1,0																
40		50,80	20,3	0,8	1,3																					
63	38	66,70	34,9	1,1	1,7																					
94		88,90	62,1	1,4	2,2																					
125																										
160																										
250	50	107,92	91,5	1,7	2,7																					
320		126,95	126,6	2,0	3,2																					
500	63	158,72	197,9	2,5	4,0																					
630		195,00	198,6	3,1	4,9																					

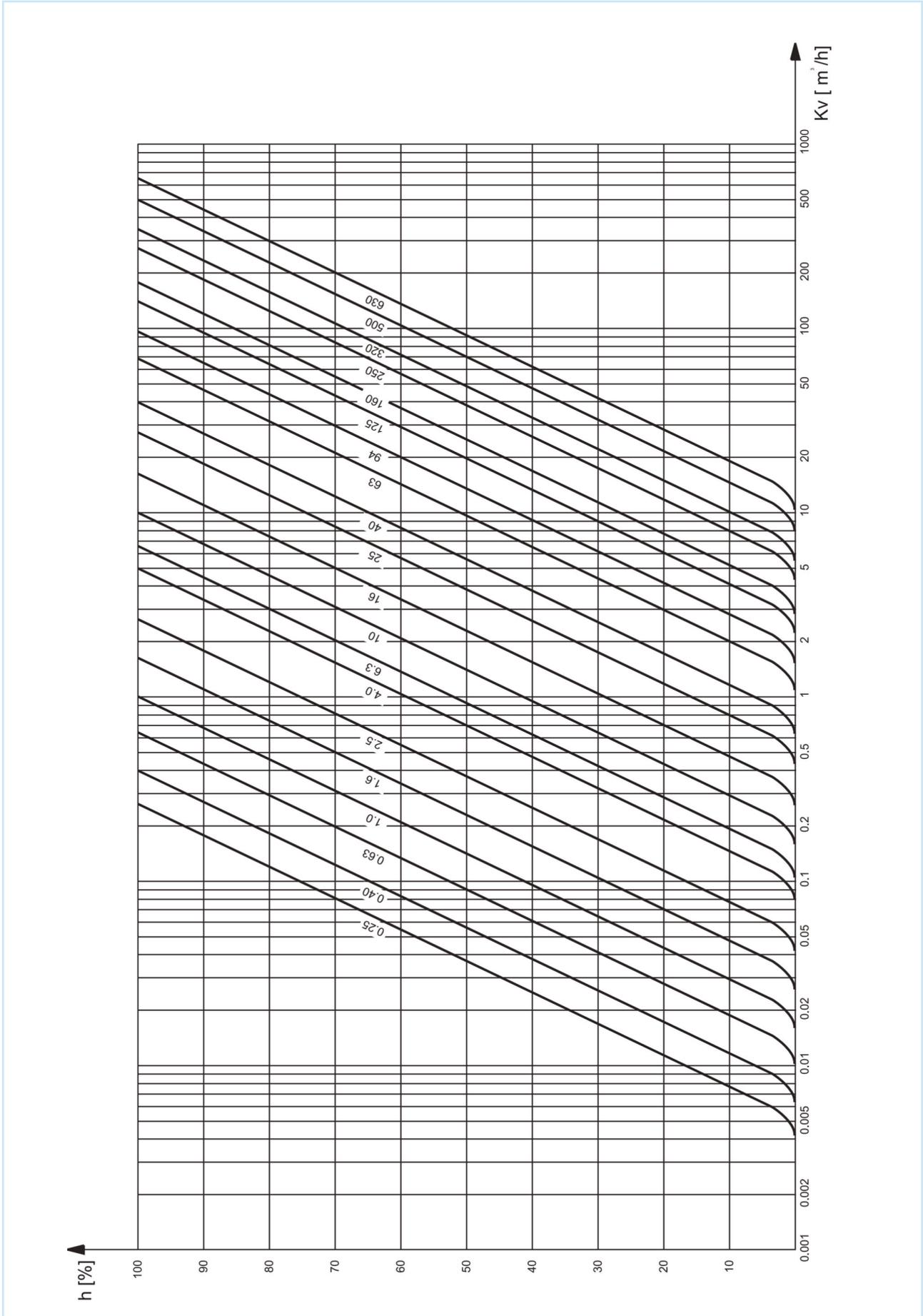
Calculated ratios: F_L=0,9; X_T=0,72; F_D=0,46; xF_Z=0,65

TABLE 5 - FLOW RATIO Kvs [m³/h] – FOR BALANCED PLUGS

Kvs [m³/h]	Stroke [mm]	Nominal valve size DN								Charakteristic			
		40	50	65	80	100	150	200	250	L	P	S	
25	20												
40													
63	38												
94													
125													
160													
250	50												
320													
500	63												
630													

Note:
Valve seat diameter for balanced valve plug flow ratio Kvs 250 is 126.95 mm.

DIAGRAM 1 - EQUIPERCENTAGE FLOW CHARACTERISTIC OF CONTROL VALVES $Kvs=0,25...630 \text{ m}^3/\text{h}$



ALLOWED PRESSURE DROP Δp .

Pressure drops Δp [MPa] are valid for closed valve and are calculated related to actuator parameters. Real pressure drops should not exceed 70% of allowable working pressures for given nominal pressure, material design and working temperature according to tables 4.1 to 4.7.

where: Δp [MPa] – calculated pressure drop
 F_s [kN] – actuator available force (tab. 7)
 F_D [kN] – valve plug to valve seat pressure (tab. 5)
 A – seat area ratio for seat with diameter D [cm²]
 D – valve seat diameter [mm] (tab. 5)

$$\Delta p = \frac{10 (F_s - F_D)}{A}$$

$$A = \frac{\pi D^2}{400} \text{ [cm}^2\text{]}$$

TABLE 7 - AVAILABLE FORCE F_s [kN] OF PNEUMATIC ACTUATORS

Actuator size	Direct function actuator P			Reverse function actuator R					
	Supply pressure [kPa]			Spring range [kPa]					
	140	250	400	20 - 100	40 - 120; 40 - 200	60 - 140	80 - 240	120 - 280	180 - 380
160	0,64	2,4	4,8	0,32	0,64	0,96	1,28	1,92	-
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

Note:

1. For direct actuators P adopted spring range is 20 – 100 kPa.
2. For electric and other actuators Δp value can be calculated using above formula, available actuator force taken from the actuator datasheet.
3. For balanced valve plugs available force F_s at least equal to F_D value for soft valve seats in Table 5 should be adopted.

TABLE 8 - ALLOWABLE PRESSURE DROPS Δp [bar] FOR VALVES WITH UNBALANCED PLUGS AND HARD SEATS, WITH PNEUMATIC ACTUATORS

Flow ratio Kvs [m ³ /h]	Nominal valve size DN	Stroke [mm]	Control pressure increase – Air to Close					Control pressure increase – Air to Open			
			Actuator		Δp [MPa]			Actuator		Δp [bar]	
			Size	Spring range [kPa]	Supply pressure [kPa]			Spring rang	Spring range [kPa]		
					140	250	400				
up to 4	15; 20; 25; 32; 40; 50	20	160	20 - 100	34	-	-	160	20 - 100 40 - 200	9 34	
6,3	20; 25; 32; 40; 50				11	40	-		20 - 100 40 - 200 60 - 140	7 11 23	
10	25; 32; 40; 50				9	40	-		20 - 100 40 - 200 60 - 140 80 - 240	0,7 9 19 28	
16	32; 40; 50				4	40	-		20 - 100 40 - 200 60 - 140 80 - 240 120 - 280	- 4 11 17 30	
up to 4	15; 20; 25; 32; 40; 50		250		250	40	-	-	250	20 - 100 40 - 200	23 40
6,3	20; 25; 32; 40; 50					24	40	-		20 - 100 40 - 200 60 - 140	7 24 40
10	25; 32; 40; 50					20	40	-		20 - 100 40 - 200 60 - 140 80 - 240	5 20 34 40
16	32; 40; 50					12	40	-		20 - 100 40 - 200 60 - 140 80 - 240 120 - 280	2 12 22 32 40
	65		400		400	24	40	-	400	20 - 100 40 - 200 60 - 140	8 24 40
25	40; 50; 65; 80					14	40	-		20 - 100 40 - 200 60 - 140 80 - 240 120 - 280	4 14 24 34 40
40	50; 65; 80; 100					6,5	38	40		40 - 200 60 - 140 80 - 240 120 - 280	6 12 18 29
63	65; 80; 100					8,5	40	-		40 - 200 60 - 140 80 - 240 120 - 280 180 - 380	9 15 21 34 40
	150		1000		1000	16	40	-	1000	40 - 200 80 - 240 120 - 280	16 36 40
94	80; 100		38		630	4	24	40	630	40 - 200 60 - 140 80 - 240 120 - 280 180 - 380	4 8 11 18 29
	150; 200				1000	8	32	40	1000	40 - 200 80 - 240 120 - 280 180 - 380	8 20 31 40
125; 160	100		50		630	2	13	28	630	40 - 200 60 - 140 80 - 240 120 - 280 180 - 380	2 4 6 10 16
	150; 200; 250	1000		4	22	40	1000	40 - 200 80 - 240 120 - 280 180 - 380	4 10 17 26		
250	150; 200; 250	63	1000	2,5	14	30	1000	40 - 200 80 - 240 120 - 280 180 - 380	2,5 6,5 11 17,5		
320	150; 200; 250			1,5	10	22		40 - 200 80 - 240 120 - 280 180 - 380	1,5 4,5 8 12,5		
500	200; 250			-	6	14		40 - 200 80 - 240 120 - 280 180 - 380	- 2,5 5 7,5		
630	250			-	4	9		40 - 200 80 - 240 120 - 280 180 - 380	- 1,5 3 5		

Note:

- In the table theoretical acceptable pressure drops are included. Actual pressure drops with consideration of tolerance of spring manufacture and friction of internal parts of the actuator are lower than those given by 20%. Pressure drops chosen that way guarantee internal tightness of closing of the valves.
- In valves with balanced valve plugs and hard seats for pressure drops up to $\Delta p=40$ [bar], actuators are to be selected as below:
 - for air-to-close action: spring range 20-100 [kPa], supply pressure 140 [kPa]
 - for air-to-open action: spring range 40-120 [kPa], or 40-200 [kPa]

ALLOWABLE PRESSURE DROPS Δp [bar] FOR VALVES WITH UNBALANCED PLUGS AND SOFT SEATS, WITH PNEUMATIC ACTUATORS

Flow ratio Kvs [m ³ /h]	Nominal valve size DN	Stroke [mm]	Control pressure increase – Air to Close					Control pressure increase – Air to Open			
			Actuator		Δp [MPa]			Actuator		Δp [bar]	
			Size	Spring range [kPa]	Supply pressure [kPa]			Spring rang	Spring range [kPa]		
					140	250	400				
up to 4	15; 20; 25; 32; 40; 50	20	160	20 - 100	25	-	-	160	20 - 100 40 - 200	- 25	
6,3	20; 25; 32; 40; 50				5	35	-		40 - 200 60 - 140	5 16	
10	25; 32; 40; 50				3	35	-		40 - 200 60 - 140 80 - 240	3 13 22	
16	32; 40; 50				-	35	-		40 - 200 60 - 140 80 - 240 120 - 280	- 6 12 25	
up to 4	15; 20; 25; 32; 40; 50		250		35	-	-	250	20 - 100 40 - 200	15 35	
6,3	20; 25; 32; 40; 50				17	35	-		40 - 200 60 - 140	17 35	
10	25; 32; 40; 50				12	35	-		40 - 200 60 - 140 80 - 240	12 26 35	
16	32; 40; 50				6	35	-		40 - 200 60 - 140 80 - 240 120 - 280	6 16 26 35	
	65		400		18	35	-	400	40 - 200 60 - 140 80 - 240	18 34 35	
25	40; 50; 65; 80				10	35	-		40 - 200 60 - 140 80 - 240 120 - 280	10 20 30 35	
40	50; 65; 80; 100				3,5	35	-		40 - 200 60 - 140 80 - 240 120 - 280	3,5 9 15 26	
63	65; 80; 100				630	6	35		-	630	40 - 200 60 - 140 80 - 240 120 - 280 180 - 380
	150		1000		13	35	-	1000	40 - 200 80 - 240 120 - 280	13 33 35	
94	80; 100		630		3	23	35	630	40 - 200 60 - 140 80 - 240 120 - 280 180 - 380	3 7 10 18 28	
	150; 200		1000		7	35	-	1000	40 - 200 80 - 240 120 - 280 180 - 380	7 19 30 35	
125; 160	100		630		-	11	26	630	40 - 200 60 - 140 80 - 240 120 - 280 180 - 380	- 2 4 8 14	
	150; 200; 250	50	2,5	20	35	1000	40 - 200 80 - 240 120 - 280 180 - 380	2 9 15 25			
250	1,2		13	29	40 - 200 80 - 240 120 - 280 180 - 380		1 5 10 16				
320	-		9	21	40 - 200 80 - 240 120 - 280 180 - 380		- 3,5 6,5 11,5				
500	200; 250		-	5	8		40 - 200 80 - 240 120 - 280 180 - 380	- 2 4 7			
630	250	63	-	3	8	40 - 200 80 - 240 120 - 280 180 - 380	- 1 2 4				

Poznámka:

- In Table, theoretical acceptable pressure drops are included. Actual pressure drops with consideration of tolerance of spring manufacture and friction of internal parts of the actuator are lower than those given by 20%. Pressure drops chosen that way guarantee internal tightness of closing of the valves.
- In air-to-open valves actuator with spring range of 40-200 [kPa] can be replaced with actuator with spring range of 40-120 [kPa], at the same pressure drops.
- In valves with balanced valve plugs and soft valve seats for pressure drops up to $\Delta p=35$ [bar], actuators are to be selected as below:
 - for air-to-close action: spring range 20-100 [kPa], supply pressure 140 [kPa]
 - for air-to-open action: spring range 40-120 [kPa], or 40-200 [kPa]
- For rotary actuators – R, supply pressure is to be 40 kPa higher than upper spring range [kPa].

POHONY VENTILÚ:

- Pneumatic multispring actuators with diaphragm without manual drive series LP0 or with manual drive – according to table 10 and 13.

TABLE 10 - PNEUMATIC ACTUATORS TYPES

Size	Diaphragm effective area [cm ²]	Stroke [mm]	Number of manual actuator-turns for full stroke
160	160	20	5
250	250	20	5
400	400	20	5
630	630	38	9
1000	1000	38; 50; 63	8; 10; 13

CHARACTERISTICS

- complete reversibility of operation allows changing function P (direct action) and R (reverse action) with no additional parts,
- option of changing spring range (tension) with no additional parts,
- option of pre-tensioning of springs,
- option of using fittings with NAMUR connections,
- option of fitting with top-mounted handwheel.

DESIGN AND TECHNICAL SPECIFICATION

- dsee fig. no.: 5

CONSTRUCTION

Actuator diaphragm cases (1) and (2) of steel sheets making pressure chamber

Diaphragm (3) of constant effective area, linear relationship between control actuator pressure and plug movement. Executed in neoprene with polyester spacer.

Diaphragm plate (4) stamped from steel sheet, with spring seats.

Support (6) is used for tightening and operating the stem.

Springs (7) of construction spring steel. There are 3, 6 or 12 springs regarding the required range.

Bushing (8) and **spacers** (9) – used for altering actuator action from direct to reverse and altering spring range.

Warning plates (10) with information on safe disassembly.

PNEUMATIC ACTUATOR TECHNICAL SPECIFICATION

Control air connection: NPT 1/4"

- pipe diameter: \varnothing 6x1 (or \varnothing 8x1 – as per request)
- spring ranges: $\begin{matrix} \text{À } 20\text{...}100 \text{ kPa;} & \text{À } 40\text{...}120 \text{ kPa;} & \text{À } 60\text{...}140 \text{ kPa} & \text{– 3 springs} \\ \text{À } 40\text{...}200 \text{ kPa;} & \text{À } 80\text{...}240 \text{ kPa;} & \text{À } 120\text{...}280 \text{ kPa} & \text{– 6 springs} \\ \text{Æ } 180\text{...}380 \text{ kPa;} & & & \text{– 12 springs, (only for sizes 630...1000).} \end{matrix}$

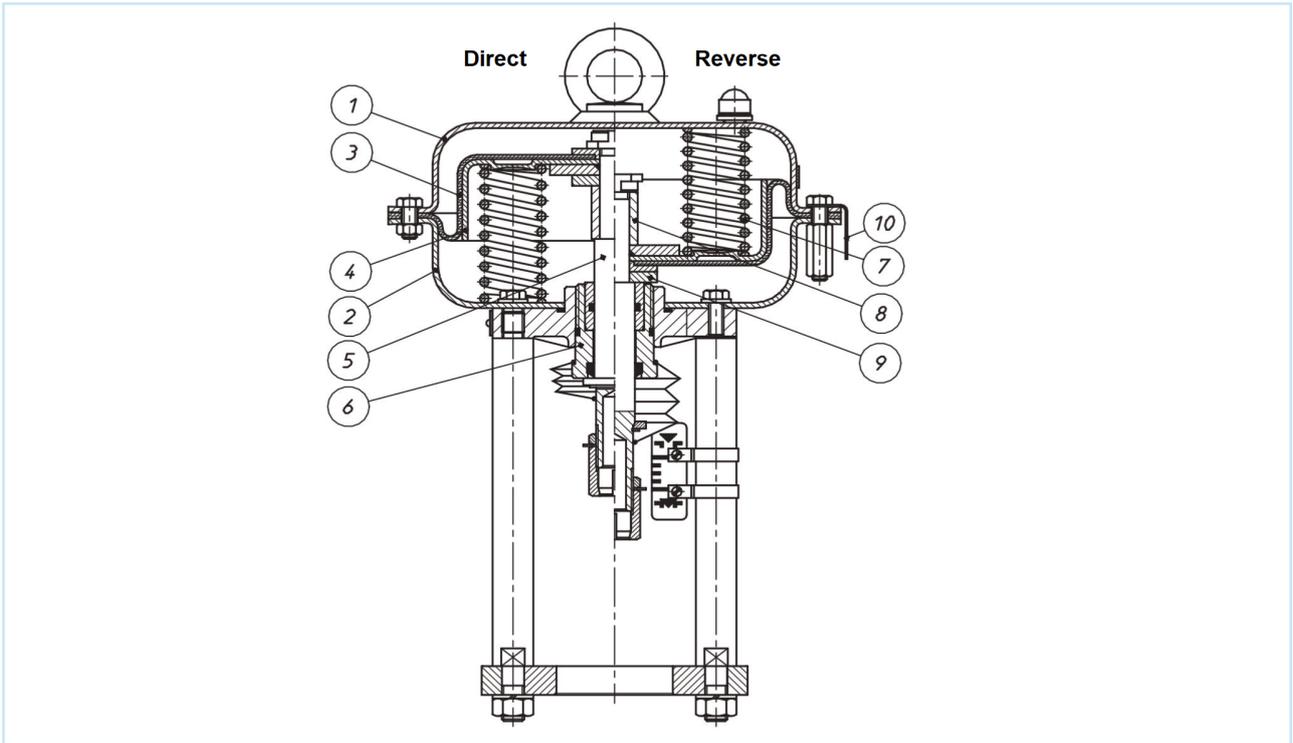
Max supply pressure: actuator size 160...630 - 600 kPa, for actuator size 1000 - 500 kPa.

Actuator ambient temperature range: -40...+80°C.

OPTIONAL ACCESSORIES:

- top-mounted handwheel
- pneumatic positioner
- electro-pneumatic positioner
- air-set
- three-way solenoid valve
- lock-up
- limit switches
- quick exhaust valve

FIG. 5 - LPO MULTISPRING PNEUMATIC ACTUATOR



Electric actuators

There is a possibility of employing any electric or electro-hydraulic actuator following adjustment of connecting elements. Details and technical specifications of electric actuators as per separate catalog charts

MO manual drives

Drives allowing manual operation of valve, adapted to direct assembly on valve (with no extra parts).

TABLE 11 - DRIVE SIZES

Size	Stroke [mm]	Turns for rated stroke
250	20	5
400	20	5
630	38	9
1000	38; 50; 63	8; 10; 13

TABLE 12 - VALVE CONNECTION DIAMETERS [mm].

DN	d1	d3	E	L	L1	P	R
15...25	M12x1,25	12	44	125	111	12,5	110
32...50				118	102		
65...100				122	104	16,5	132
150...250	M16x1,5	20	95	200	180	20,5	160
			80	138	118	24,5	216

Note:

1. R and $\varnothing P$ can be as per customer request.
2. R=160 - for electrical actuators
3. L and L1 - for valve plug location - valve closed
4. L=138 - for electric actuators

FIG. 6 - VALVE CONNECTION DIMENSIONS

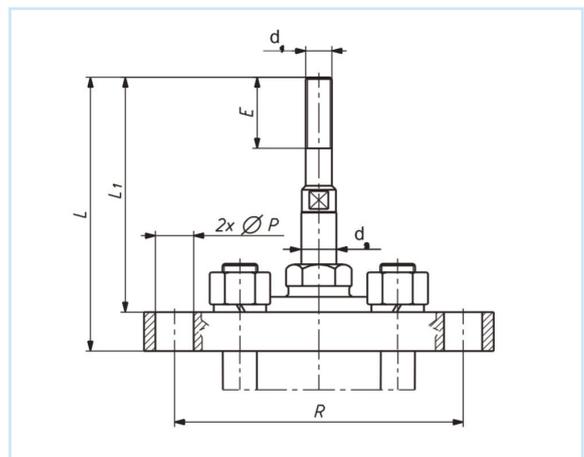


FIG. 7 - VALVE DIMENSIONS

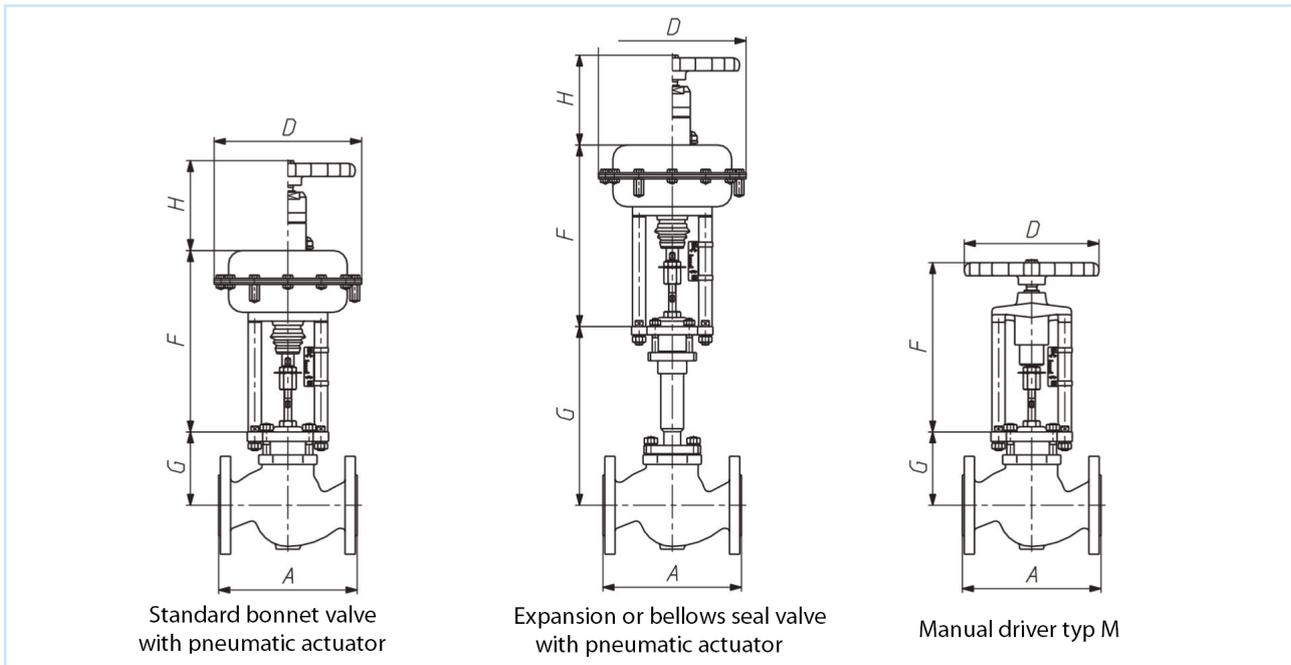


TABLE: 13 - VALVE DIMENSIONS INCL. ACTUATORS [mm].

DN	A			G		D																H		
	PN20 ANSI 150	PN50 ANSI 300	PN 10...40	standard bonnet	extended or bellows bonnet	LP0 160	LP0 250	LP0 400	LP0 630	LP0 1000	MO 250	MO 400	MO 630	MO 1000	LP0 160	LP0 250	LP0 400	LP0 630	LP0 1000	MO 250	MO 400		MO 630	MO 1000
15	184	190	130	107	241	288	306	-	-	-	290	-	-	-	210	240	-	-	-	225	-	-	-	162
20	184	194	150	107	241	288	306	-	-	-	290	-	-	-	210	240	-	-	-	225	-	-	-	162
25	184	197	160	107	241	288	306	-	-	-	290	-	-	-	210	240	-	-	-	225	-	-	-	162
32	200	213	180	114	243	288	306	-	-	-	290	-	-	-	210	240	-	-	-	225	-	-	-	162
40	222	235	200	118	253	288	306	312	-	-	290	290	-	-	210	240	305	-	-	225	225	-	-	162
50	254	267	230	122	257	288	306	312	-	-	290	290	-	-	210	240	305	-	-	225	225	-	-	162
65	276	292	290	166	410	-	-	312	402	-	-	290	308	-	-	-	305	375	-	-	225	305	-	162
80	298	317	310	166	410	-	-	312	402	-	-	290	308	-	-	-	305	375	-	-	225	305	-	162
100	352	368	350	173	417	-	-	312	402	-	-	290	308	-	-	-	305	375	-	-	225	305	-	162
150	451	473	480	305	510	-	-	-	-	585	-	-	-	510	-	-	-	-	477	-	-	-	450	240
200	543	568	600	458	623	-	-	-	-	585	-	-	-	510	-	-	-	-	477	-	-	-	450	240
250	673	708	730	475	623	-	-	-	-	585	-	-	-	510	-	-	-	-	477	-	-	-	450	240

Note:

Dimension A for CL150 and CL300 refers to bodies with valve face B or RF. For other body versions you can calculate A1 dimension using formulas in Table 14.

TABLE 14

Body	Marking		A ₁
	PN	ANSI	
Groove PN50 / ANSI 300	D1	GF	A ₁ = A + 5 x 2
Recess PN50 / ANSI 300	F1	FF	
Ring-joint PN50 / ANSI 300 DN15	J	RTJ	A ₁ = A + 5,5 x 2
Ring-joint PN20 / ANSI 150			A ₁ = A + 6,5 x 2
Ring-joint PN50 / ANSI 300 DN20...40			A ₁ = A + 8 x 2
Ring-joint PN50 / ANSI 300 DN50...250			

TABLE 15- VALVE WEIGHTS W/O DRIVES [kg]

DN	Valve with bonnet	
	Standard	Extended and bellow
15	6	9
20	7	10
25	7,5	11
32	9,5	13
40	11,5	16
50	14,5	20
65	20	28
80	28,5	36,5
100	42	50
150	120	135
200	180	195
250	320	335

TABLE 16 - ACTUATOR WEIGHTS [kg]

Actuator	Weight	
	Standard	w. manual drive
LP0 - 160	9	13,5
LP0 - 250	10	14,5
LP0 - 400	16	20,5
LP0 - 630	30	37
LP0 - 1000	74	100

TABLE 17 - MANUAL DRIVE WEIGHTS [kg]

Drive	Weight
MO - 250	5,5
MO - 400	6,5
MO - 630	8,5
MO - 1000	40

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