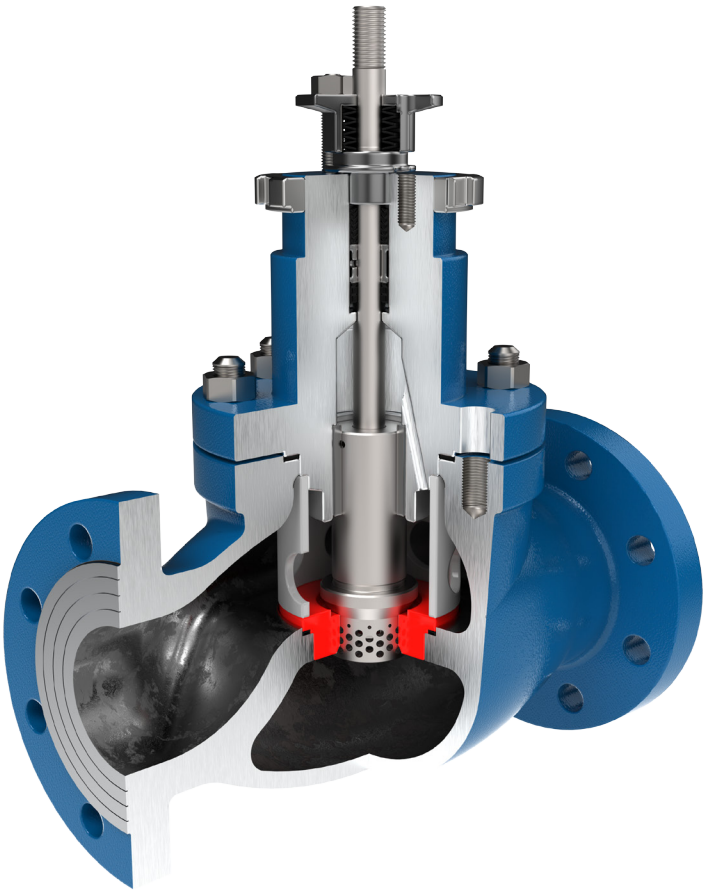
Control Valve

Type VA2012.A

Single-ported globe control valves type **VA2012.A** are used in automatic and remote control installations as flow control elements to adjust flow of liquids, steam and gases. Wide range of material and design versions makes the valves applicable in most demanding working conditions in power generation, petroleum chemistry, heating, chemical industry, metallurgy, etc.



TECHNICAL PARAMETERS

Nominal Dimensions	DN 15 - DN 250 1/2" - 10"
Nominal Pressure	PN 10 - 400 Class 150, Class 2500
Construction	• single seat valve with option of perforated plug guided in cage • metal or soft seat
Working Temperature Range	-180°C až +400°C
Flow Characteristic, Kvs Value	linear, equipercentage or on/off 0,01 - 630 [m^3/h]

Tightness Class (IEC 60534 - 4)	class IV - standard, metal seat class V - optional for metal seat class VI - optional with soft seat
Body Material	grey cast iron, ductile iron, carbon steel, stainless steel according to EN, DIN or ASTM
Plug And Seat Material	• stainless steel • stellit or plasma nitridation possibility
Connection	flanged welding
Actuator Types	pneumatic with diaphragm electro-hydraulic electric hydraulic manual operated

FEATURES

- Various materials of valve body and internal parts, adapted to specific working conditions.
- Design provides noise reduction, enhanced resistance to cavitation and flashing, and elimination of choked flow.
- Wide range of nominal dimensions in from DN15 to DN250, for nominal pressures, PN10 to CL2500.
- Wide flow ratio range and various control characteristics.
- Reduction in aggressive and toxic media emissions to environment by application of bellow seal bonnets or bonnet packings meeting requirements of TA - LUFT.
- Easy assembly and dismantling of valve internal parts for maintenance and service.
- High durability and reliability due to application of top-class materials and surface improvement processes (burnishing, stelliting, heat treatment, CrN coating).
- Possibility of mating with reverse action LP0 (column) and LP1(cast yoke) multi-spring actuators, and changing the spring range without any extra parts (keeping the number of springs).
- Possibility of fitting actuators with side-mounted (LP1) or top-mounted (LP0) handwheel.
- Possibility of performing diagnostics of "valve - actuator" due to application of smart electro-pneumatic positioners.
- Wide range of electric actuators.
- Special designs option:
  - for oxygen
  - for liquid and gaseous fuels
  - for low temperature fluids (liquid oxygen, nitrogen etc.)
  - for acid gases containing H2S
  - with heating jacket
  - for potentially explosive atmospheres as per ATEX Directive 94/9/EC - ATEX
- Design and production process meet the requirements of Quality Management System ISO 9001 and Directive 97/23/EC, and regulations of AD2000 Merkblatt, designated for installation on pipelines.

VA2012.A® – is a trademark registered by Patent Office.

DESIGN AND TECHNICAL SPECIFIACTION

Valve body (1)

- single-ported, cast

Nominal size

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

Nominal pressure

- PN10; 16; 25; 40; 63; 100; 160; 250; 320; 400 as per 1092-1:2010
- CL150; CL300; CL600; CL900; CL1500; CL2500 as per 1759-1:2005

Divided as follows:

- DN15...250 PN10...110; CL150...CL600
- DN15...150 CL900; PN160
- DN15...100 PN250...400; CL1500...CL2500

End connections

- flanged: as per Table 1
- butt welding ends BW, as per Table 12 and 13
- socket welding ends SW, as per Table14

Steel flanges CL150; CL300; CL600; CL900; CL1500; CL2500 are so designed that they can be assembled with flanges as per American standards ANSI/ASME B16.5 and MSS SP44. In American standards flanges are identified with nominal values in "Classes", to which nominal pressure (PN) values as per EN-ISO 7005-1:2002 correspond.

Equivalent identifications as per PN are:

- CL150: PN 20 CL300: PN 50 CL600: PN 110
- CL900: PN 150 CL1500: PN 260 CL2500: PN 420

TABLE 1. - FLANGED END CONNECTIONS

Nominal pressure	Facing of flange types			
	Raised face	Groove	Recess	Ring - joint
	Identification			
PN10; 16; 25; 40; 63; 100; 160; 250; 320; 400	B[3]	D[1]	F[1]	–
CL150, 300	B[3]	DL (D1[2])	F (F1[1])	J (RTJ)
CL600; 900; 1500; 2500	B[3] (RF)	DL (GF)	F (FF)	J (RTJ)
[1] - up to PN 160 [2] - only for CL300 [3] - B1, Ra=12,5µm, concentric surface structure "C"), B2 – (Ra as agreed with the customer) (xxx) - identification of connections as per ASME B16.5				
Possible execution of flanges per specification and indicated standards.				

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
- as per EN 60534-3-3: for PN 10...100 and CL150...600
- as for flanged valves PN 160: for PN 160 and CL900
- as for flanged valves PN 400: for PN 250...400 and CL1500...2500

Materials

- as per Table 2; Relationship between working pressure and temperature as per Table 3.1 - 3.7

Bonnet (2)

- standard
- extended
- bellows

Plug (3)

- type: - piston,
  - sleeve guided, hard
- variants:- contoured
  - piston - perforated (multi-hole)
- flow characteristics:
  - equal percentage - P
  - linear - L
  - uick opening - S (only for contoured valve plugs)
- rangeability: 50:1

Seat (4)

- fitted-in and sealed with body, hard (tight seat after consulting the manufacturer)

Plug stem (5)

- burnished, polished sealing face

Pressing cage (6A)

- valve seat to body fixture

Choke cage (6B)

- perforated (multihole) valve seat fixture, causing reduction in pressure drop between seat and plug

Body gasket (7) and seat gasket (8)

- spiral, graphite+1.4404 in all versions

Stem packing (9)

- PTFE-V packing, compressed with spring bolt (18)
- ring gaskets formed in braided packing cords (PTFE +GRAPHITE)
- graphite kits (expanded and silky graphite) or gaskets formed in braided graphite cords
- TA-LUFT sealing with PTFE-V packing kit or graphite kit; packing structure as per Figs. 1 and 2, application range as per Table 4

Leakage class (as per PN-EN 60534-4)

- basic: - (class IV) less than 0,01% Kvs
- enhanced: - (class V) $3 \cdot 10\text{-}4 \cdot D \cdot \Delta p$ [cm³/min]

where D (mm) - is seat diameter as per Table 10, Δp [bar] - actual pressure drop in closed valve.

Fluid flow direction

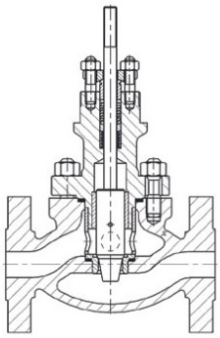
- to valve plug

Flow coefficients

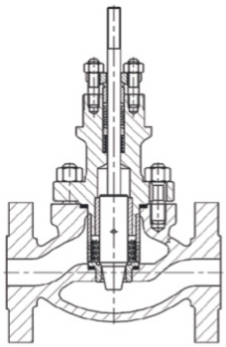
- as per Table 5

FIG. 1 - VALVE VA2012.A

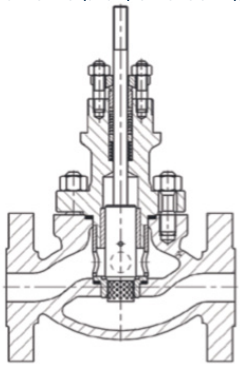
1A - contoured valve plug and compression cage



1B - contoured valve plug and choke cage



1C - perforated valve plug and compression cage



1D - perforated valve plug and choke cage

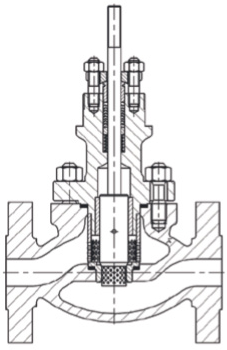


FIG. 1E -CONTROL VALVE

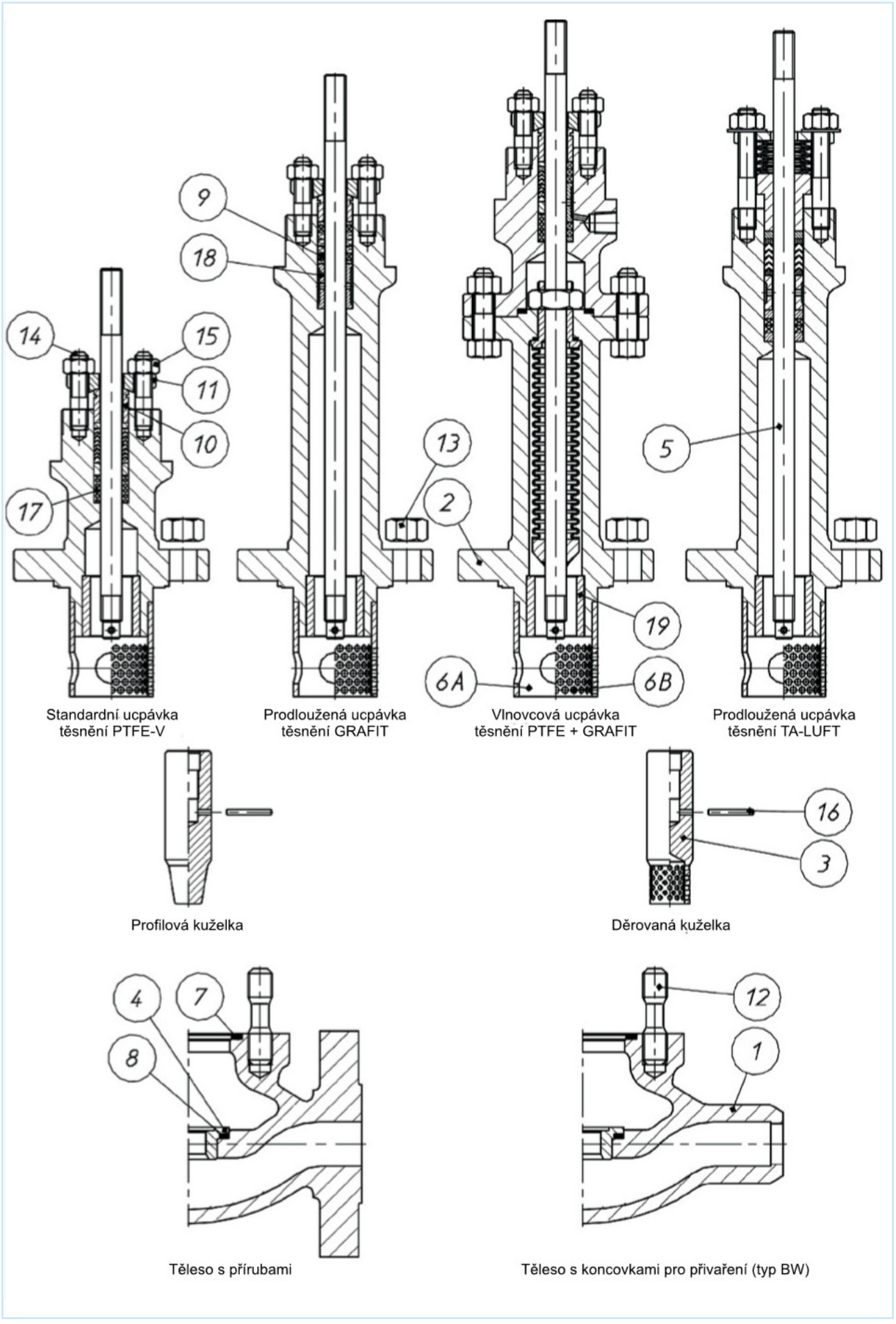


TABLE 2. PART LIST WITH MATERIALS

Item	Part name		Material			
1	Body		GP 240 GH ; (1.0619) WCB	G17CrMo 9-10 ; (1.7379) WC9	G20Mn5 ; (1.6220)	GX5CrNiMo 19-11-2 ; (1.4408) CF8M
2	Bonnet	DN15...50	S 355 J2G3 (1.0570)	13CrMo4-4 ; (1.7335)	P355NL2 ; (1.1106)	X6CrNiMoTi 17-12-2 ; (1.4571)
		DN80...250	GP 240 GH ; (1.0619) WCB	G17CrMo 9-10 ; (1.7379) WC9	G20Mn5 ; (1.6220)	
3	Plug		X6CrNiMoTi 17-12-2; (1.4571) X6CrNiMoTi 17-12-2; (1.4571) + stellite + CrN X17CrNi 16-2 ; (1.4057) + heat treatment			
4	Seat		X6CrNiMoTi 17–12–2; (1.4571) X6CrNiMoTi 17–12–2; (1.4571) + stellite X17CrNi 16–2; (1.4057) + heat treatment			
5	Stem		X6CrNiMoTi 17–12–2; (1.4571) X6CrNiMoTi 17–12–2; (1.4571) + stellite + CrN X17CrNi 16–2 ; (1.4057) + heat treatment			
6A	Pressing cage		X6CrNiMoTi 17-12-2; (1.4571) X17CrNi 16-2; (1.4057) + heat treatment			
6B	Throttling cage					
7	Body gasket		Graphite (98%) + 1.4404 (spiral)			
8	Seat gasket					
9	Sealing packing		PTFE + GRAFIT			
			PTFE "V" (rings)			
			GRAFIT			
10	Pressing sleeve		X6CrNiMoTi 17-12-2; (1.4571)			
11	Pressing lever		S 355 J2G3 ; (1.0570)			
12	Body screw	PN10...CL300	8.8	A4 - 70 *)		
		PN63...CL2500	42CrMo4 (1.7225)	21CrMoV5-7 (1.7709)	X6NiCrTiMoVB 25-15-2 (1.4980)	
13	Body nut	PN10...CL300	8.8	A4 - 70 *)		
		PN63...CL2500	42CrMo4 (1.7225)	21CrMoV5-7 (1.7709)	X6NiCrTiMoVB 25-15-2 (1.4980)	
14	Bonnet screw		8.8	A4 - 70 *)		
15	Bonnet nut		8.8	A4 - 70 *)		
16	Notched pin		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) + stellite + CrN X17CrNi 16-2 ; (1.4057) + heat treatment			

Material standards			
Material			Std No
GP 240 GH ; (1.0619)	G17CrMo 9-10 ; (1.7379)		EN 10213-2
WCB			ASTM A 216
G20Mn5 ; (1.6220)			EN 10213-3
WC9			ASTM A 217
GX5CrNiMo 19-11-2 ; (1.4408)			EN 10213-4
CF8M			ASTM A 351
S 355 J2G3 ; (1.0570)			EN 10025
P355 NL2 ; (1.1106)			EN 10028-3
13CrMo4-4; (1.7335)			EN 10028
X6CrNiMoTi 17-12-2 ; (1.4571)	X17CrNi 16-2 ; (1.4057)	X30Cr13 (1.4028)	EN 10088
C45 (1.0503)			EN 10083-1
8.8			EN 20898-1
A4-70 *)			EN ISO 3506-2
42CrMo4 (1.7225)	21CrMoV5-7 (1.7709)	X6NiCrTiMoVB 25-15-2 (1.4980)	EN 10269

Note: *) to be applied for nominal pressures PN10...CL600

Pro vytvrzování vnitřních součástí ventilu se používá:

a) stelliting – padding of surfaces with stellite: ~ 40HRC

b) CrN coating – introducing chromium nitride to external layer of detail, to the depth of ca. 0,1mm; ~950HV

c) heat treatment: valve plug (~45HRC), valve seat (~35HRC), guide sleeve (~45HRC)

TABLES 3.1 - 3.7, MAX ALLOWABLE WORKING OVERPRESSURE FOR MATERIALS AT PROPER TEMPERATURES

TABLE 3.1

Material: GP240GH (1.0619) as per EN 10213-2								
PN/CL	Standard	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
PN63	EN 1092-1	63	58,5	55,5	52,5	48	43,5	40,5	37,5
PN100		100	92,8	88	83,3	76,1	69	64,2	59,5
CL600	EN 1759-1	90,5	80,2	76,1	72	65,8	59,7	55,5	51,4
CL900		136	120	114	108	98,7	89,5	83,3	77,1
PN160	EN 1092-1	160	148,5	140,9	133,3	121,9	110,4	102,8	95,2
PN250		250	232,1	220,2	208,3	190,4	172,6	160,7	148,8
CL1500	EN 1759-1	226	201	190	180	165	149	139	129
PN320	EN 1092-1	320	297,1	281,9	266,6	243,8	220,9	205,7	190,4
PN400		400	371,4	352,3	333,3	304,7	276,1	257,1	238
CL2500	EN 1759-1	377	334	317	300	274	249	231	214

TABLE 3.2

Material: G17CrMo 9-10 (1.7379) as per EN 10213-2																		
PN/CL	Standard	Temperature [°C]																
		-10.50	100	150	200	250	300	350	400	425	450	475	500	510	520	530	540	550
		Maximum working pressure [bar]																
PN10	EN 1092-1	10	10	10	10	10	10	9,7	9,2	9	8,8	7,6	6,4	5,6	4,9	4,2	3,7	3,2
PN16		16	16	16	16	16	16	15,6	14,8	14,4	14	12,1	10,2	8,9	7,8	6,8	5,9	5,1
CL150	EN 1759-1	19,5	17,7	15,8	14	12,1	10,2	8,4	6,5	5,6	4,7	3,7	2,8	2,4	2	1,7	1,4	-
PN25	EN 1092-1	25	25	25	25	25	25	24,4	23,2	22,6	22	19	16	14	12,2	10,7	9,2	8
PN40		40	40	40	40	40	40	39	37,1	36,1	35,2	30,4	25,7	22,4	19,6	17,1	14,8	12,9
CL300	EN 1759-1	51,7	51,5	50,2	48,3	46,3	42,8	40,2	36,6	35,1	33,8	31,7	28,2	26,6	23,5	20,6	17,8	15,5
PN63	EN 1092-1	63	63	63	63	63	63	61,5	58,5	57	55,5	48	40,5	35,4	30,9	27	23,4	20,4
PN100		100	100	100	100	100	100	97,6	92,8	90,4	88	76,1	64,2	56,1	49	42,8	37,1	32,3
CL600	EN 1759-1	103	103	100	96,7	92,6	85,7	80,4	73,1	70,2	67,6	63,3	56,4	53,3	47,1	41,1	35,7	31,1
CL900		155	155	151	145	139	129	121	110	105	101	95	84,6	79,9	70,6	61,7	53,5	46,6
PN160	EN 1092-1	160	160	160	160	160	160	156,1	148,5	144,7	140,9	121,8	102,8	88,9	78,4	68,5	59,4	51,8
PN250		250	250	250	250	250	250	244	232,1	226,1	220,2	190,4	160,7	140,4	122,6	107,1	92,8	80,9
CL1500	EN 1759-1	259	258	251	242	232	214	201	183	175	169	158	141	133	118	103	89,1	77,7
PN320	EN 1092-1	320	320	320	320	320	320	312,3	297,1	289,5	281,9	243,7	205,7	179,8	156,9	137,1	118,8	103,6
PN400		400	400	400	400	400	400	390,4	371,4	361,8	352,3	304,7	257,1	224,7	196,1	171,4	148,5	129,5
CL2500	EN 1759-1	431	429	418	403	386	357	335	305	292	282	264	235	222	196	171	149	130

TABLE 3.3

Material: GX5CrNiMo 19-11-2 (1.4408) as per PN-EN 10213-4																		
PN/CL	Standard	Temperature [°C]																
		-10..50	100	150	200	250	300	350	400	425	450	475	500	510	520	530	540	550	600
		Maximum working pressure [bar]																
PN10	EN 1092-1	10	10	9	8,4	7,9	7,4	7,1	6,8	-	6,7	-	6,6	-	-	-	-	6,5	5,6
PN16		16	16	14,5	13,4	12,7	11,8	11,4	10,9	-	10,7	-	10,5	-	-	-	-	10,4	8,9
CL150	EN 1759-1	17,9	16,3	14,9	13,5	12,1	10,2	8,4	6,5	5,6	4,7	3,7	2,8	2,4	2	1,7	1,4	-	-
PN25	EN 1092-1	25	25	22,7	21	19,8	18,5	17,8	17,1	-	16,8	-	16,5	-	-	-	-	16,3	14
PN40		40	40	36,3	33,7	31,8	29,7	28,5	27,4	-	26,9	-	26,4	-	-	-	-	26	22,4
CL300	EN 1759-1	63	63	57,3	53,1	50,1	46,8	45	43,2	-	42,4	-	41,7	-	-	-	-	41,1	35,4
PN100	100	100	100	90,9	84,2	79,5	74,2	71,4	68,5	-	67,3	-	66,1	-	-	-	-	65,2	56,1
CL600	EN 1759-1	93,4	85	77,8	70,6	65,8	61	57,6	55,2	54,5	53,8	53,3	52,8	52,6	44,9	44,8	44,6	44,4	-
CL900		140	127	117	106	98,6	91,4	86,4	82,8	81,7	80,6	79,9	79,2	78,9	67,4	67,1	66,9	66,7	-
PN160	EN 1092-1	160	160	145,5	134,8	127,2	118,8	114,2	109,7	-	107,8	-	105,9	-	-	-	-	104,3	89,9
PN250		250	250	227,3	210,7	198,8	185,7	178,5	171,4	-	168,4	-	165,4	-	-	-	-	163	140,4
CL1500	EN 1759-1	233	212	194	176	164	152	144	138	136	134	133	132	132	112	112	111	111	-
PN320	EN 1092-1	320	320	291	269,7	254,4	237,7	228,5	219,4	-	215,6	-	211,8	-	-	-	-	208,7	179,8
PN400		400	400	363,8	337,1	318	297,1	285,7	274,2	-	269,5	-	264,7	-	-	-	-	260,9	224,7
CL2500	EN 1759-1	389	354	324	294	274	254	240	230	227	224	222	220	219	187	187	186	185	-

TABLE 3.4

Material: G20Mn5 (1.6220) as per PN-EN 10213-3							
PN/CL	Standard	Temperature [°C]					
		10...50	100	150	200	250	600
		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
PN 63		63	59	58	55	53	51
PN100		100	95	92	87	85	82
PN160		160	152	148	140	136	132

TABLE 3.5

Material: WCB as per ASTM A216									
PN/CL	Standard	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
PN63	EN 1092-1	63	63	61,5	59,6	56,8	52,7	50,3	49	42,5
PN100		100	100	97,7	94,7	90,1	83,6	79,8	77,8	67,5
CL600	EN 1759-1	100,1	92,8	90,6	87,8	83,6	77,5	74	72,9	69,1
CL900		150,1	139,2	135,7	131,4	125,1	116,1	110,8	109,5	103,4
PN160		159,2	147,6	143,9	139,4	132,7	123,1	117,5	116,1	109,7
PN250		241,4	223,5	217,8	211,2	201,1	186,6	178,1	175,8	166,2
CL1500		250,5	231,9	226	219,2	208,7	193,6	184,8	182,4	172,5
PN320		313	289,9	282,6	273,9	260,8	242	231	227,9	215,6
PN400		396,4	367,3	358	346,9	330,3	306,6	292,6	288,6	273,1
CL2500		417,2	386,6	376,9	365,1	347,7	322,7	308	303,8	287,5

TABLE 3.6

Material: WC9 as per ASTM A217																				
PN/CL	Standard	Temperature [°C]																		
		-10..50	100	150	200	250	300	350	375	400	425	450	475	500	510	520	525	530	540	550
		Maximum working pressure [bar]																		
PN10	EN 1092-1	10	10	10	10	10	10	10	10	9,9	9,7	9,5	7,3	5,5	5	4,4	-	3,9	3,4	2,9
PN16		16	16	16	16	16	16	16	16	15,9	15,6	15,3	11,7	8,9	8	7,1	-	6,2	5,4	4,7
CL150	EN 1759-1	19,5	17,7	15,8	14	12,1	10,2	8,4	7,4	6,5	5,6	4,6	3,7	2,8	-	-	1,9	-	1,3	-
PN25	EN 1092-1	25	25	25	25	25	25	25	25	24,8	24,4	23,9	18,3	14	12,6	11,2	-	9,8	8,5	7,4
PN40		40	40	40	40	40	40	40	40	39,7	39	38,3	29,2	22,3	20,2	18	-	15,7	13,6	12
CL300	EN 1759-1	51,7	51,5	50,3	48,7	46,3	42,9	40,4	38,9	36,5	35,2	33,7	31,7	27,7	-	-	21,6	-	-	15,3
PN63	EN 1092-1	63	63	63	63	63	63	63	63	62,5	61,5	60,3	46	35,2	31,9	28,3	-	24,8	21,4	18,8
PN100		100	100	100	100	100	100	100	100	99,2	97,6	95,6	73,1	55,9	50,6	44,9	-	39,3	34	29,9
CL600	EN 1759-1	103,4	103,1	100,3	97,5	92,7	85,7	80,4	77,6	73,3	70,2	67,7	63,4	55,7	-	-	43,3	-	-	30,7
CL900		155,1	154,6	150,6	146,2	139	128,6	120,7	116,5	109,8	105,4	101,4	95,1	83,4	-	-	64,9	-	-	46
PN16		164,5	163,9	159,5	154,7	147,4	136,4	128	123,6	116,5	111,8	107,6	100,8	87,3	-	-	68,9	-	-	48,8
PN250		249,2	248,1	239,8	231,2	222,6	206,6	193,8	187	176,4	169,2	162,9	152,5	122,2	-	-	104,4	-	-	74,1
CL1500		258,6	257,7	250,8	244	231,8	214,4	201,1	194,1	183,1	175,6	169,1	158,2	138,9	-	-	108,4	-	-	76,9
PN320		323,2	321,9	312,3	302,3	289,2	268	251,4	242,5	228,8	219,4	211,4	197,8	165,7	-	-	135,4	-	-	96
PN400		409,4	408	397,1	385,7	366,8	339,4	318,5	307,1	289,7	277,9	267,7	250,7	218,5	-	-	171,5	-	-	121,5
CL2500		430,9	429,5	418,3	406,5	386,2	357,2	335,3	323,2	304,9	292,5	281,8	263,9	231,7	-	-	180,5	-	-	127,9

TABLE 3.7

Material: CF8M as per ASTMA351																								
PN/CL	Standard	Temperature [°C]																						
		-10.50	100	150	200	250	300	350	375	400	425	450	475	500	510	520	525	540	540	550	575	600	625	649
		Maximum working pressure [bar]																						
PN10	EN 1092-1	8,9e	7,8	7,1	6,6	6,1	5,8	5,6	5,5	5,4	5,4	5,3	5,3	5,2	5,2	5,2	-	5,2	5,1	5,1	4,7	3,8	-	-
PN16		14,3	12,5	11,4	10,6	9,8	9,3	9	8,8	8,7	8,6	8,5	8,5	8,4	8,3	8,3	-	8,3	8,3	8,2	7,6	6,1	-	-
CL150	EN 1759-1	18,4	16	14,8	13,6	12	10,2	8,4	7,4	6,5	5,6	4,6	3,7	2,8	-	-	1,9	-	1,4	-	-	-	-	-
PN25	EN 1092-1	22,3	19,5	17,8	16,5	15,5	14,6	14,1	13,8	13,6	13,5	13,4	13,3	13,2	13,1	13,1	-	13	13	12,9	12	9,6	-	-
PN40		35,6	31,3	28,5	26,4	24,7	23,4	22,6	22,1	21,8	21,6	21,4	21,2	21	21	20,9	-	20,8	20,8	20,7	19,1	15,5	-	-
CL300	EN 1759-1	48,1	42,3	38,6	35,8	33,5	31,6	30,4	29,6	29,3	29	29	28,7	27,3	-	-	25,2	-	-	24	22,9	19,9	15,7	12,8
PN63	EN 1092-1	56,1	49,2	44,9	41,6	38,9	36,9	35,5	34,9	34,4	34	33,7	33,5	33,2	33	32,9	-	32,8	32,7	32,6	30,2	24,4	-	-
PN100		89,1	78,1	71,3	66	61,8	58,5	56,4	55,3	54,5	54	53,4	53,1	52,6	52,4	52,2	-	52,1	51,9	51,7	47,9	38,7	-	-
CL600	EN 1759-1	96,3	84,5	77,1	71,2	66,7	63,1	61	59,8	58,9	58,3	57,7	57,3	54,8	-	-	50,6	-	-	47,8	45,5	39,8	31,7	25,5
CL900		144,4	126,8	115,6	107	100,2	95	91,3	89,7	88,2	87,3	86,6	86	82,1	-	-	75,9	-	-	71,8	68,3	59,7	47,5	38,3
PN16		153,1	134,4	122,6	113,5	106,3	100,7	96,8	95,1	93,6	92,6	91,8	91,2	87,1	-	-	80,5	-	-	76,2	72,5	63,3	50,4	40,3
PN250		231,9	203,3	185,4	171,9	160,9	152,4	146,7	143,9	141,7	140,3	139,1	138,1	131,7	-	-	121,8	-	-	115,4	109,8	95,9	76,3	61
CL1500		240,6	210,9	192,4	178,4	167	158,1	152,2	149,3	147,1	145,6	144,3	143,3	136,7	-	-	126,4	-	-	119,8	114	99,5	79,2	63,8
PN320		300,8	263,7	240,6	223	208,7	197,6	190,3	186,7	184	182,1	180,3	179,2	170,9	-	-	158	-	-	149,7	142,5	124,4	98,9	79,2
PN400		381	334,1	304,8	282,4	264,2	250,3	241,1	236,5	233,1	230,7	228,4	227	216,6	-	-	200,2	-	-	189,5	180,5	157,7	125,1	100,4
CL2500		401	351,7	320,8	297,2	278,1	263,5	253,8	249	245,4	242,9	240,4	238,9	228	-	-	210,7	-	-	199,5	190	166	131,7	106,5

DESIGN

Design and material options are to be selected to suit working conditions. The basic version of valve for normal operating conditions are VA2012.A 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 reducing 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 chocked flow, of cavitations and flashing. Multi-opening designs give the higher pressure recovery coefficient FL, which makes possible the flow to be higher than with the basic version, with Kvs and Δp values remaining unchanged. For compressible fluids, it is often advantageous to use reduction connections on the valve outlet (diffusers). Selection of a design solution is based on the computer calculations of the flow coefficient, the noise level, the fluid state, the effect of such activities being dependent on the accuracy of the information submitted by the client. 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 the client's request, as well as when it demanded by the flow conditions, special versions are proposed as far as materials, flow coefficients, control characteristics, seat leakage, etc. are concerned.

TABLE 4 – - PACKING TYPES WITH APPLICATION RANGES

Packing type	PN	Temperature [°C]		
		Bonnet type		
		Standard	Extended	Bellows
PTFE-V	up to CL600)*	-46 ... +200	-198 ... -46 +200 ... +300	-100 ... +200
PTFE + Graphite				
PTFE-V / TA-LUFT				
Graphite	up to CL2500)*	+200 ... +300	+300...+537 ,(+650)**	+200 ... +400
Graphite / TA-LUFT				

)* PN50 - for bellows bonnet
)** - for welding ends valves

FIG. 2 - BONNET PACKINGS

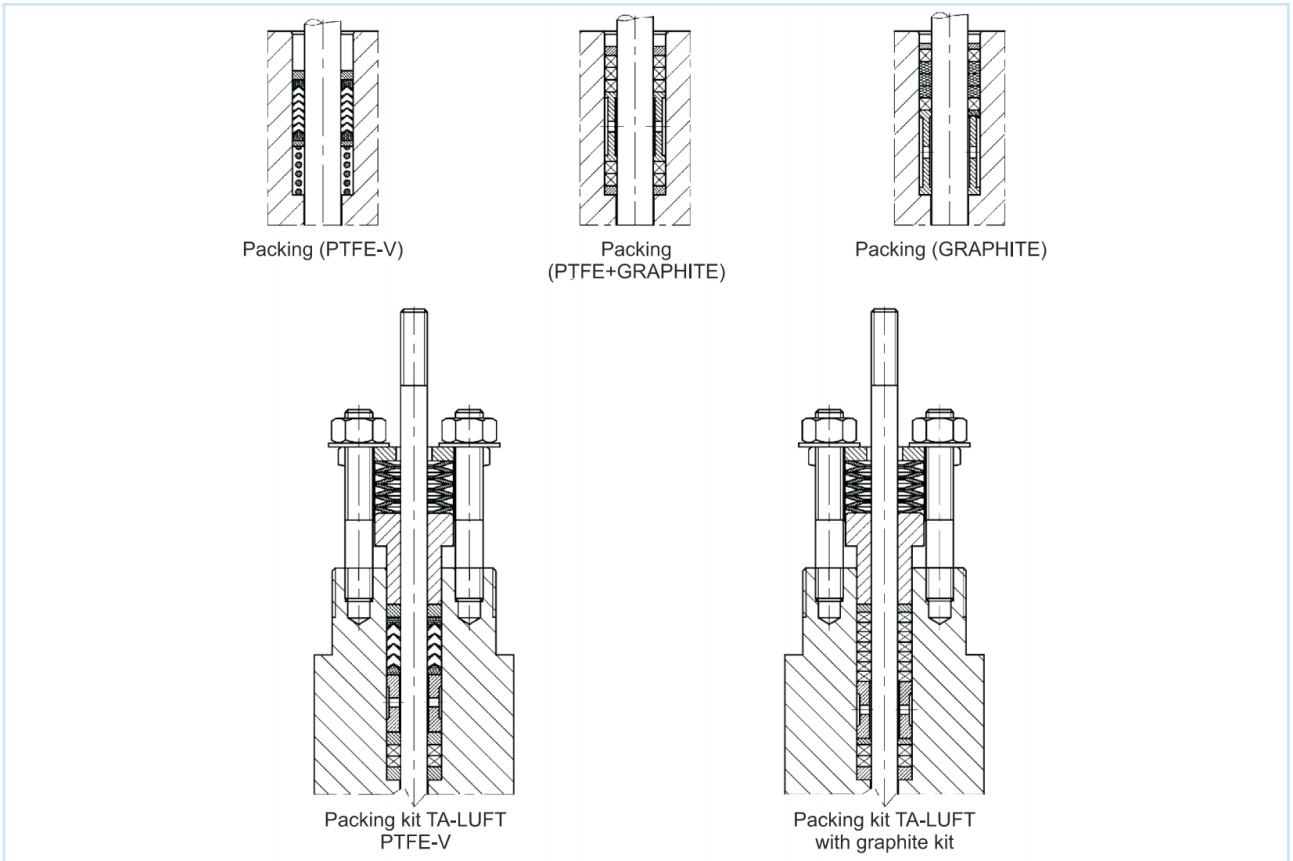


TABLE 5 - FLOW RATIOS KVS [m³/h] – FOR PROFILE AND PERFORATED PLUGS

Kvs [m³/h]					Stroke [mm]	Seat size D [mm]	A [cm³]	F_D [kN]		Nominal size of valve DN									
Profile plugs			Perforated plugs					CL IV Hard seat	CL V Soft seat	15	20	25	40	50	80	100	150	200	250
L	P	S	L	P															
0,10	-	-	-	-	20	6,35	0,3	0,1	0,65										
0,16	-	-	-	-															
0,25		-	-	-															
0,40		-	-	-															
0,63		-	-	-															
1,00		-	-	-															
1,60		-	-	-		9,52	0,7	0,15	1,0	200									
2,50		-	-	-		12,7	1,3	0,2	1,3	250									
4,00		4,8	-	-						•									
6,30		7,6	-	-		19,05	2,9	0,3	1,95		•								
10		12	6,3			20,64	3,3	0,33	2,1			•							
16		20	10			25,25	5,0	0,4	2,6										
25		30	16			31,72	7,9	0,5	3,3				•						
40		48	25			41,25	13,4	0,7	4,6					•					
63		-	40		38	50,8	20,3	0,8	5,2										
94		115	63			66,7	34,9	1,1	7,2						•				
125		-	125	94		88,9	62,1	1,4	9,1										
160		192														•			
250		-	180	125	50	107,92	91,5	1,7	11										
320		384	260	200		126,95	126,6	2,0	13										
500		600	425	320	63	158,72	197,9	2,5	16										
630		-	630	400		195	298,6	3,1	20										
800		960	720	500	80	203,2	324,3	3,2	21										
Calculation coefficients:																			
Profile plugs: F_L=0,9; X_T=0,72; Fd=0,46; xFz=0,65 Perforated plugs: F_L=0,95; X_T=0,78; Fd=0,1; xFz=0,75																			

Note:
1. • - no version for PN250...420
2. Plugs of quick opening characteristics (S) – only for maximum Kvs values for individual size DN.

ALLOWABLE PRESSURE DROPS ΔP.

Pressure drops Δp [bar] apply to closed valve and they are calculated with account for the valve drive performance. Actual pressure drops should not exceed 70% of allowable working pressure for given nominal pressure, material execution and working temperature, as per tables 3.1 to 3.7.

where: Δp [MPa] – calculated pressure drop
Fs [kN] – actuator available force (tab. 6)
F_D [kN] – valve plug to valve seat pressure (tab. 5)
A – surface coefficient of seat diameter D [cm²];
D – seat diameter [mm] (tab. 5)

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

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

TABLE 6 - AVAILABLE FORCE F_S [KN] OF PNEUMATIC ACTUATORS

Actuator size	Actuator with direct action P			Actuator with reverse action R					
	Supply pressure [kPa]			Spring range					
	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
R-630T	-	-	-	2,6	5,0	7,6	10,0	15,2	22,6
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
1500T	12,0	45,0	90,0	6,0	12,0	18,0	24,0	36,0	54,0

Note:
1. For direct action actuators P, P1 adopted spring range is 20 - 100kPa.
2. For electric and other actuators, Δp value can be calculated from the above equation and from the data in tables 5 and 6 with the available force FS provided to be the actuator capacity rating to its catalogue card.

TABLE 7 - PRESSURE DROPS ΔP [MPa] FOR VALVES WITH PNEUMATIC ACTUATORS, SEAT LEAKAGE CLASS IV AND V

Seat diameter [mm]	Actuator size	Air-to-close, actuators P/P1 Spring range 20…100 kPa						Air-to-open, actuators R/R1												
		Class IV			Class V			Class IV							Class V					
		Supply pressure [kPa]						Spring range [kPa]							Spring range [kPa]					
		140	250	400	140	250	400	20…100	40…120	40…200	60…140	80…240	120…280	180…380	20…100	40…120	40…200	60…140	80…240	120…280	180…380
		Δp [bar]																			
do 12,7	160	24	173	280	-	85	274	9	34	60	85	135	-	-	-	-	-	-	47	-
	250	61	273	280	-	188	280	23	61	100	138	215	-	-	-	-	15	54	130	-
	400	107	280	-	23	280	-	47	110	173	236	280	-	-	-	22	85	148	274	-
19,05	160	11	73	157	-	14	99	-	11	23	34	56	-	-	-	-	-	-	-	-
	250	24	118	240	-	62	190	7	24	41	58	93	-	-	-	-	-	-	36	
	400	45	196	280	-	14	280	17	45	72	100	155	-	-	-	-	15	43	98	
20,64	160	9	62	133	-	7	79	-	9	19	28	47	-	-	-	-	-	-	-	-
	250	20	100	210	-	48	159	5	20	34	49	78	-	-	-	-	-	-	26	-
	400	37	166	280	-	115	280	14	37	60	84	131	-	-	-	-	9	32	79	-
	630	65	272	280	11	218	280	27	65	103	140	216	280	-	-	11	49	86	162	274
	R-630T	-	-	-	-	-	-	65	140	216	280	280	280	11	86	162	237	280	280	
25,25	160	4	40	87	-	-	43	-	4	11	17	30	-	-	-	-	-	-	-	-
	250	12	67	142	-	23	98	2	12	22	32	52	-	-	-	-	-	-	8	-
	400	24	112	232	-	68	188	8	24	40	56	88	-	-	-	-	-	12	44	-
	630	42	180	280	-	136	280	17	42	67	92	143	218	-	-	23	48	98	174	
	R-630T	-	-	-	-	-	-	42	92	143	193	280	280	-	48	98	149	249	280	
31,72	160	1,5	24	54	-	-	19	-	1	5	9	17	-	-	-	-	-	-	-	-
	250	6	41	88	-	5	53	-	6	12	19	31	-	-	-	-	-	-	-	-
	400	14	70	145	-	34	110	4	14	24	34	54	-	-	-	-	-	-	19	-
	630	25	113	232	-	78	197	10	25	41	57	90	137	-	-	6	21	54	101	
	R-630T	-	-	-	-	-	-	25	57	89	121	185	280	-	22	54	85	149	245	
41,25	160	-	13	31	-	-	3	-	-	2	4	9	-	-	-	-	-	-	-	-
	250	2	23	51	-	-	24	-	2	6	10	17	-	-	-	-	-	-	-	-
	400	7	40	84	-	12	57	1	7	13	19	31	-	-	-	-	-	-	3	-
	630	13	63	130	-	35	102	4	13	22	31	49	75	-	-	-	3	21	48	
	R-630T	-	-	-	-	-	-	14	32	51	70	108	164	-	5	24	43	81	137	
50,8	630	9	43	90	-	21	69	2,5	9	15	21	34	53	-	-	-	-	12	30	
	1000	16	71	146	-	49	124	6	16	26	36	56	86	-	-	4	14	34	64	
	1500	25	107	218	3	85	196	10	25	40	55	84	129	-	3	18	33	62	107	
66,7	630	4	24	50	-	6	33	-	4	8	11	18	29	-	-	-	-	-	11	
	1000	8	40	83	-	22	65	3	8	14	20	31	48	-	-	-	2	14	30	
	1500	14	61	125	-	44	108	5	14	23	31	48	74	-	-	5	14	30	56	
88,9	630	1,5	12	28	-	-	15	-	1	3	5	9	16	-	-	-	-	-	3	
	1000	4	22	46	-	10	34	1	4	7	11	17	27	-	-	-	-	5	14	
	1500	7	34	70	-	21	58	3	7	12	17	27	41	-	-	-	5	14	29	
107,92	1000	3	14	30	-	4	20	-	3	5	7	11	18	-	-	-	-	1	8	
	1500	5	23	47	-	13	37	1	5	8	11	18	28	-	-	-	1	8	17	
	1500T	11	48	96	1	37	86	5	11	18	24	37	57	-	1	8	14	27	47	
126,95	1000	1,5	10	22	-	1	13	-	1	3	4	7	12	-	-	-	-	-	3	
	1500	3	16	34	-	8	25	-	3	6	8	13	20	-	-	-	-	4	11	
	1500T	8	34	70	-	25	61	3	8	13	17	27	41	-	-	4	9	18	33	
158,72	1000	0,5	6	13	-	-	6	-	-	1	2	4	7	-	-	-	-	-	-	
	1500	2	10	21	-	3	14	-	2	3	5	8	12	-	-	-	-	1	6	
	1500T	5	21	44	-	14	37	2	5	8	10	17	26	-	-	1	4	10	19	
195	1500	-	7	14	-	-	8	-	1	2	3	5	8	-	-	-	-	-	2	
	1500T	3	14	29	-	8	23	1	3	5	7	11	17	-	-	-	1	5	11	
203,2	1500	-	6	13	-	-	7	-	-	2	3	4,5	7	-	-	-	-	-	2	
	1500T	3	13	27	-	7	21	-	3	4,5	6	10	16	-	-	-	-	5	10	

Note:

1. 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.
2. For valves with function "rising control pressure - valve opens" the actuator with springs ranged 40-120 kPa can be replaced with an actuato ranged 40-200 kPa, with the same pressure drops.
3. For reverse-working actuators (type R or R1), supply pressure should be higher than the upper spring range by at least 40kPa.

NOISE REDUCTION

The noise generated out of 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:

- perforated plugs (fig. 1 and tab. 5)
- silencer plates on the valve outlet and/or inside the reduction joint (fig. 3, 4 and tab. 8)
- reduction joints (diffusers) - (fig.4)

FIG. 3 - SLINCER PLATE

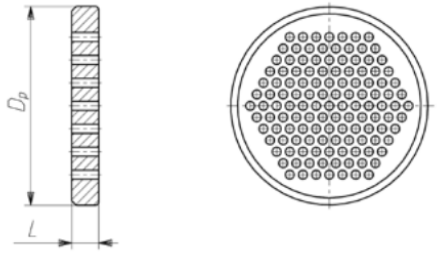
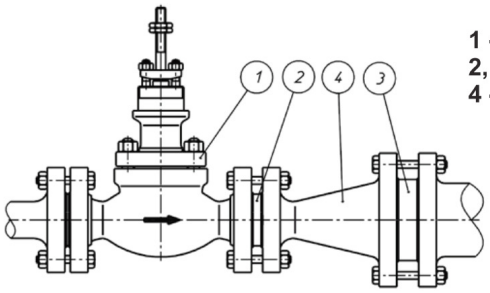


FIG. 4 - INSTALLATION OF SILENCER PLATES OR SETS



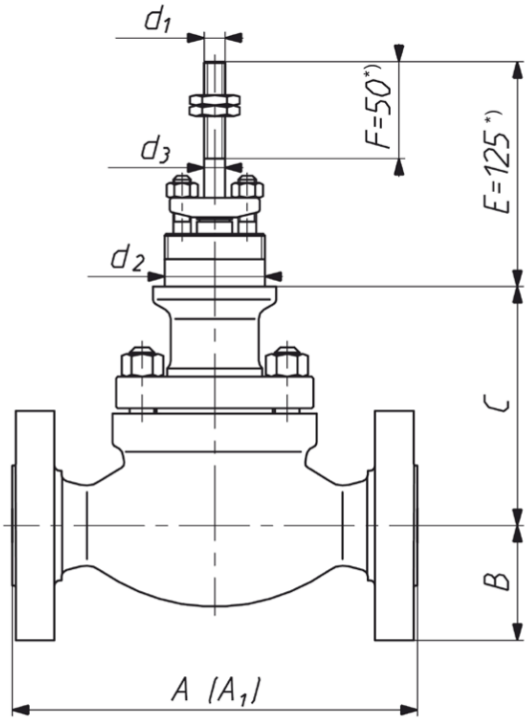
1 - Valve
2, 3 - Silencer plates (sets)
4 - Reduction joint

TABLE 8 - DIMENSIONS AND FLOW RATIOS OF SILENCING PLATES

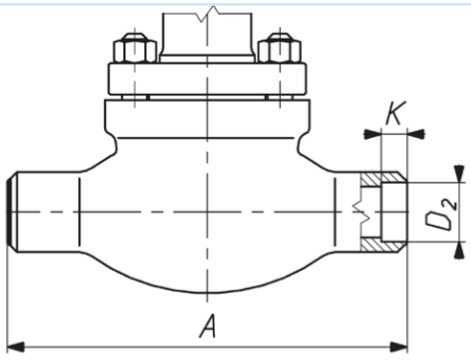
DN	15	20	25	40	50	80	100	150	200	250	300	350
Kvs	4	6,3	10	25	40	94	160	320	500	800	1000	1500
	3,6	5,7	9	22,5	36	84	144	288	450	720	900	1350
	3,2	5	8	20	32	75	128	256	400	640	800	1200
	2,8	4,4	7	17,5	28	66	112	224	350	560	700	1050
L [mm]	5			6		10		15		20		
Dp [mm]	45	58	68	88	102	138	162	218	285	345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

Multi-plate silence kits are custom-built for requirements of individual processes.

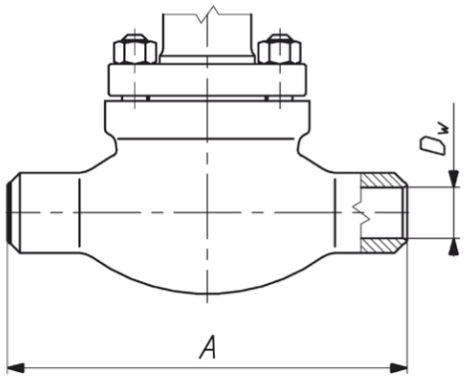
FIG. 5 - CONNECTION DIMENBSIONS OF THE VALVE



Dimension E - valve plug location - valve closed
*) Connection with LP0-1000 actuator: E=195 mm and F=115 mm



Valve with welding ends SW type (DN15…50)



Ventil s koncovkami pro přivařeni typ BW

TABLE 9A - CONNECTION DIMENSIONS OF CONTROL VALVES

DN		15..25						40						50					
PN		PN10... CL300	PN63... CL600	CL900; PN160	PN250; CL1500	PN320	PN400; CL2500	PN10... CL300	PN63... CL600	CL900; PN160	PN250; CL1500	PN320	PN400; CL2500	PN10... CL300	PN63... CL600	CL900; PN160	PN250; CL1500	PN320	PN400; CL2500
B max		63	70	75		80	90	75	85	93		98	110	83	98	108		105	118
C	DS	135		149	193			145		172	214			155		175	237		
	DW	306		320	364			306		348	385			326		345	402		
	DM	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		PN10... CL300	PN63... CL600	CL900; PN160	PN250; CL1500	PN320	PN400; CL2500	PN10... CL300	PN63... CL600	CL900; PN160	PN250; CL1500	PN320	PN400; CL2500	PN10... CL300	PN63... CL600	CL900; PN160	PN250; CL1500	PN320	PN400; CL2500
B max		105	145	120	133	138	153	128	138	145	155	168	185	160		178		190	
C	DS	206		233	257			217		252	329			287				365	
	DW	375		402	447			407		442	498			426				483	
	DM	405	-	-	-	-	-	405	-	-	-	-	-	470		-		-	
Weight [kg]		40	43	44	50	51	52	65	72	75	86	89	95	132		147		156	

DN		200		250		
PN		PN10..CL300	PN63..CL600	PN10..CL300	PN10...CL300 (kv800)	PN63...CL600
B max		190	235	258		255
C	DS	439		458		
	DW	539		558		
	DM	580	-	580	660	-
Weight [kg]		195	220	320	330	360

Note:
Weight of the control valve with standard bonnet, without the actuator

TABLE 9B - CONNECTION DIMENSIONS OF CONTROL VALVES

DN	15..50	40..50	80..100	80; 100	100	150		200	200; 250			250	
Kvs [1]	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
d1	M12x1,25			M16x1,5			M20x1,5	M16x1,5		M20x1,5	M24x1,5		
d2 [2]	57,15 / 2 1/4"-16UN2A					84,15 / 3 5/16"-16NS2A		95,25 / 3 3/4"-12UN2A					
d3	12		16			20		24					
Pohon	160 250 400 630 R-630T			630 1000 1500			1000 1500 1500T	1000 1500		1000 1500 1500T		1500 1500T	

Note:
[1]) Kvs values for profile plugs L and P. For other plugs Kvs value as per Table 5 for the same seat size.
[2]) For DN 80 and 100 valves with TA-LUFT packing, dimension d_2 = 84,15

TABLE 10 - CONSTRUCTION LENGTHS OF CONTROL VALVES WITH FLANGED CONNECTION

DN	Dimension A [mm]										
	PN / DIN					CL / ANSI					
	10; 16; 25; 40	63 - 100	160	250 - 320	400	CL150	CL300	CL600	CL900	CL1500	CL2500
15	130	230*	230*	260*	300*	184	190	203	236	273	308
20	150	230	230	260	300		194	106	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	352	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 DN15 (acc. PN) body length is the same like DN20 (with exception PN10; 16; 25; 40).											

Note:

Dimensions „A" as listed in Table 10 for CL150; CL300; Cl600; CL900; CL1500; CL2500 apply to bodies with B seat (RF). For other designs dimension A 1 can be calculated using relations presented in Table 11.

TABLE 11 - ALGORITHMS FOR CALCULATION OF CONTROL VALVE BODY LENGTH FOR VALVES WITH FLANGED END

- with a groove
- with a key (recess)
- with a groove to the ring

Body type and marking PN / ANSI	Pressure PN / ANSI	DN	A_1
with groove D1/GF	PN50 / CL300	15...250	$A_1 = A + 5 \times 2$
with key (recess) F1/FF	PN110 / CL600 PN150 / CL900 PN260 / CL1500 PN420 / CL2500		$A_1 = A - 1,5 \times 2$
with ring-joint J / RTJ	PN50 / CL300	15	$A_1 = A + 5,5 \times 2$
		20...40	$A_1 = A + 6,5 \times 2$
	PN20 / CL150	15...250	
	PN50 / CL300	50...250	$A_1 = A + 8 \times 2$
	PN110 / CL600 PN150 / CL900 PN260 / CL1500	15...40	$A_1 = A$
	PN420 / CL2500	15...25	
	PN110/ CL600	50...250	$A_1 = A + 1,5 \times 2$
	PN150 / CL900 PN260 / CL1500	50...100	
	PN150 / CL900	150	$A_1 = A + 3 \times 2$
	PN420 / CL2500	80	
		100	$A_1 = A + 4,5 \times 2$

TABLE 12 - CONSTRUCTION LENGTHS OF CONTROL VALVES WITH WELDING ENDS

DN	Dimension A [mm]		
	Nominal pressure		
	PN 10...CL600	CL900...PN160	PN250...CL2500
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	-	-

TABLE 13 - BUTT WELDING ENDS BW TYPE PN 10...110

DN	Dz [mm]	t [mm]	Dw [mm]	PN (DIN3239)									
				10	16	25	40	63	100	160	250	320	400
15	21,3	2	17,3 •	x	x	x	x	x	x	x			
		2,6	16,1 •								x		
		3,2	14,9 •									x	
		5	11,3 •										x
20	26,9	2,3	22,3	x	x	x	x	x	x				
25	33,7	2,6	28,5	x	x	x	x	x	x				
		2,9	27,9							x			
		3,6	26,5								x		
		5	23,7									x	
		7,1	19,5 •										x
	42,4		28,2										x
40	48,3	2,6	43,1	x	x	x	x						
		2,9	42,5					x	x				
		3,6	41,1							x			
		5	38,3								x		
		6,3	35,7									x	
		10	28,3										x
50	28,3	2,9	54,5	x	x	x	x	x					
		3,2	53,9						x				
		4	52,3							x			
		6,3	47,7								x		
		8	44,3									x	
		12,5	35,3										x
80	88,9	3,2	82,5	x	x	x	x						
		3,6	81,7 •					x					
		4	80,9 •						x				
		6,3	76,3							x			
		11	66,9								x		
		12,5	63,9									x	
		17,5	53,9 •										x
	114,3		79,3										x
100	114,3	3,6	107,1	x	x	x	x						
		4	106,3					x					
		5	104,3						x				
		8	98,3 •							x			
		14,2	85,9								x		
		16	82,3									x	
		22,2	69,9 •										x
	139,7	20	99,7										x
150	168,3	4,5	159,3	x	x	x	x						
		5,6	157,1•					x					
		7,1	154,1•						x				
		12,5	143,3•							x			
	193,7		168,7							x			
200	219,1	5,9	207,3	x	x								
		6,3	206,5			x	x						
		7,1	204,9					x					
		10	199,1•						x				
	244,5	12,5	219,5						x				
250	273	6,3	260,4	x	x								
		7,1	258,8			x	x						
		8,8	255,4					x					
		12,5	248						x				

DN	Schedule	Dz [mm]	t [mm]	Dw [mm]	ANSI (ASME 36.10 M)					
					63	100	160	250	320	400
1/2"	40	21,3	2,8	15,7 •	x	x	x	x		
	80		3,7	13,9 •					x	
	160		4,8	11,7 •						x
3/4"	40	26,7	2,9	20,9	x	x	x	x		
	80		3,9	18,9 •					x	
	160		5,6	15,5 •						x
1"	40	33,4	3,4	26,6	x	x	x	x		
	80		4,5	24,4	x	x	x	x	x	
	160		6,4	20,6 •					x	
	XXS		9,1	15,2 •						x
2"	40	60,3	3,9	52,5	x	x	x	x		
	80		5,5	49,3 •				x		
	160		8,7	42,9					x	
	XXS		11,1	38,1 •						x
4"	40	114,3	6	102,3	x	x	x			
	80		8,6	97,1 •				x		
	120		11,1	92,1 •					x	
	160		13,5	87,3 •					x	
	XXS		17,1	80,1 •						x
6"	40	168,3	7,1	154,1•	x	x				
	80		11	146,3•			x	x		
	120		14,3	139,7•				x		
	160		18,3	131,7•				x		
8"	20	219,1	6,4	206,3	x	x				
	30		7	205,1		x				
	40		8,2	202,7		x				
	60		10,3	198,5•			x			
	80		12,7	193,7•			x			
10"	20	273	6,4	260,2	x	x				
	30		7,8	257,4		x				
	40		9,3	254,4		x				
	60		12,7	247,6•			x			
	80		15,1	242,8•			x			

Were:
Dz [mm] - pipe external diameter
Dw [mm] - pipe internal diameter
t [mm] - pipe wall thickness

NOTE:
•) - execution with reduction stubs - discuss with technical dep't.

TABLE 14 - SOCKET WELDING ENDS, SW TYPE

DN	D_2	K
15	21,7	9,7
20	27	25
25	34	
40	48,7	
50	61	16

VALVE ACTUATOR

- **Pneumatic** – diaphragm multi-spring actuator as per Table 15 type:

LP1 – with cast yoke, no handwheel
– with cast yoke, side-mounted handwheel
LP0 – column type, no handwheel
– column type, top-mounted handwheel

Note: P – direct action; air-to-close
R – reverse action; air-to-open

TABLE 15 - PNEUMATIC ACTUATOR TYPES

Type	Size	Diaphragm effective area [cm^2]	Stroke [mm]	Number of manual actuator-turns for full stroke
LP0	160	160	20	5
	250	250		
LP0, LP1	400	400		
	630	630	20 ; 38	5 ; 9
	R-630T *)	2 x 630		
	1000	1000	38 ; 50 ; 63	8 ; 10 ; 13
LP0, LP1	1500	1500	38 ; 50 ; 63 ; 80; 100	8 ; 10 ; 13 ; 16; 20
	1500T	2 x 1500		
*) - there is no top mounted handwheel for R-630T				

TABLE 16 - DIMENSIONS AND WEIGHT OF PNEUMATIC ACTUATORS LP0 - FIG. 6

Actuator size	D_1 [mm]	D_2 [mm]	H_1 [mm]	H_2 [mm]	Weight [kg]	
					LP0	swith hand wheel
160	210	225	306	468	9	13,5
250	240		324	486	10	14,5
400	305		332	494	16	20,5
630	375	305	424	586	30	37
R-630T		-	638	-	45	-
1000	477	450	607	847	74	100
1500	550	-	704	-	95	-
1500T		-	1008	-	200	-

FIG. 6 - ACTUATORS TYPE LP0

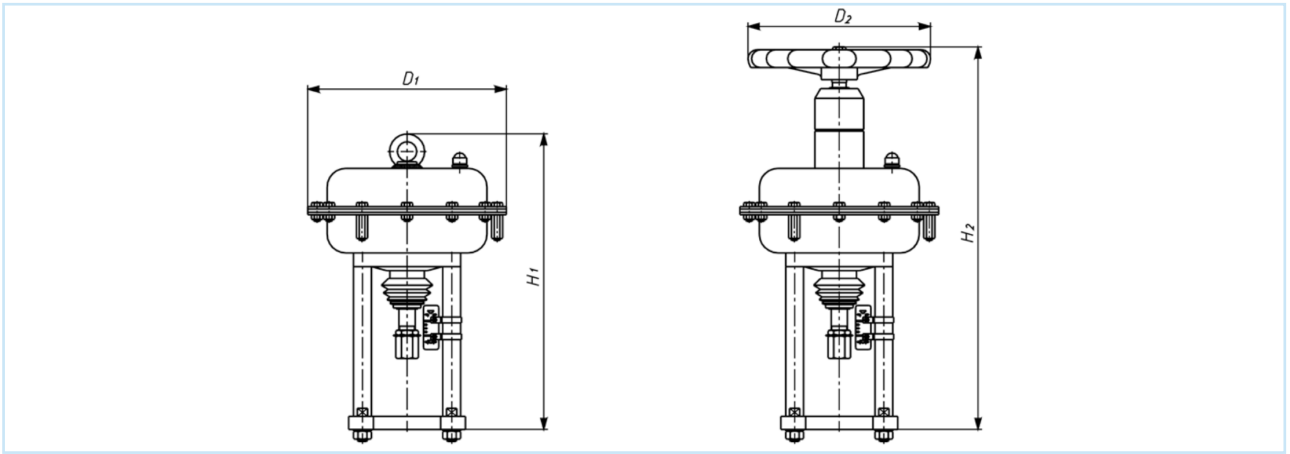
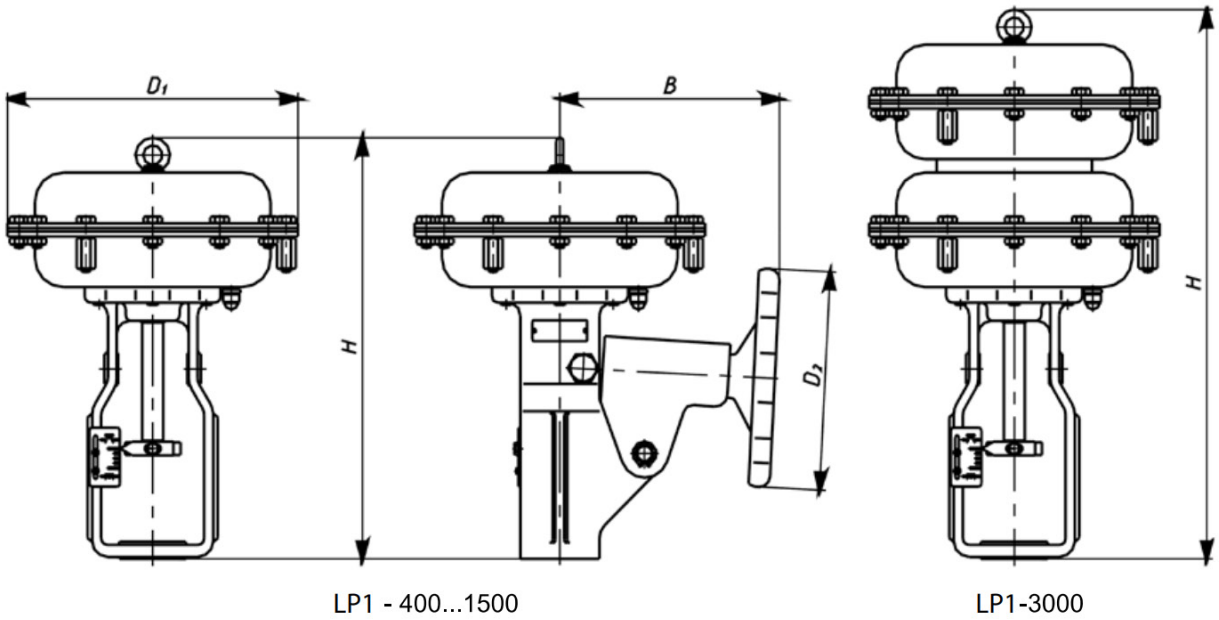


TABLE 17 - SIZES AND WEIGHTS OF PNEUMATIC ACTUATORS LP1 - FIG. 7

Actuator size	B [mm]	D_1 [mm]	D_2 [mm]	H [mm]	Weight [kg]	
					LP1	with hand wheel
400	255	305	225	453	20	28
630	280	375	305	548	40	50
1000	340	477	450	773	85	105
1500	410	550		833	120	150
1500T				1138	225	255

FIG. 7 - ACTUATORS TYPE LP1



LP1 - 400...1500 LP1-3000

TECHNICAL SPECIFICATION OF PNEUMATIC ACTUATORS

- control air connections: 1/4" NPT ; Rc 1/2"
- tube diameters: 6x1 ; 8x1 ; 12x1
- spring ranges: 20...100 kPa; 40...120 kPa; 60...140 kPa – 3 springs
  40...200 kPa; 80...240 kPa; 120...280 kPa – 6 springs
  180...380 kPa – 12 springs
  (not applicable for actuators LP0; LP1 - 250; 400)

Note: For actuator LP1-3000 (Tandem) – for each range double the above numbers of springs.

maximum supply pressure: actuator size 160...630 - 600 kPa
actuator size 630T and 1000...1500T - 500 kPa

ACCESSORIES (OPTIONAL)

- manual drive side-mounted (LP1) or top-mounted (LP0)
- pneumatic positioner
- electropneumatic positioner
- smart electropneumatic positioner
- pressure air filter-reductor
- 3/2–way solenoid valve
- lock-up valve
- position transmitter
- limit switches

ELECTRIC ACTUATORS

- electrically operated actuators; electrohydraulic, domestic; imported (detailed technical information - as per the catalogue cards of the actuator manufacturers).

MANUAL DRIVES

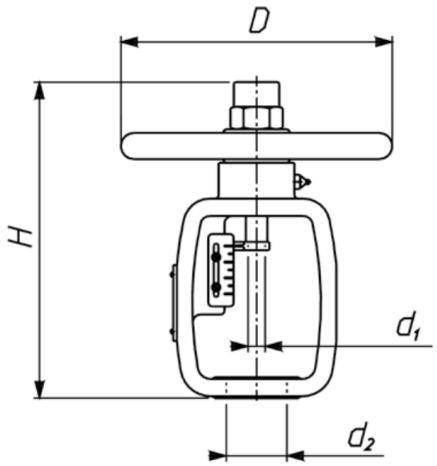
- manual drive, type M, fig.8, tab.18.

TABLE 18 - DIMENSIONS AND WEIGHT OF MANUAL DRIVE TYPE M

Type	Stroke	d_1	d_2	H	D	No of turns for full stroke	Weight [kg]
M-20-57-M12	20	M12x1,25	57,15	265	228	8	7,5
M-20-84-M12			84,15				
M-38-57-M12	38		57,15		298	15	10
M-38-57-M16		M16x1,5					
M-38-84-M16			84,15				
M-38-95-M16			95,25				
M-50-57-M16	50		57,15	385	457	16	16
M-50-84-M16			84,15				
M-50-95-M16			95,25				
M-63-84-M20	63	M20x1,5	84,15			20	
M-63-95-M20			95,25				
M-80-84-M20	80		84,15	533	610	19	24
M-80-95-M20			95,25				
M-100-95-M24	100	M24x1,5					

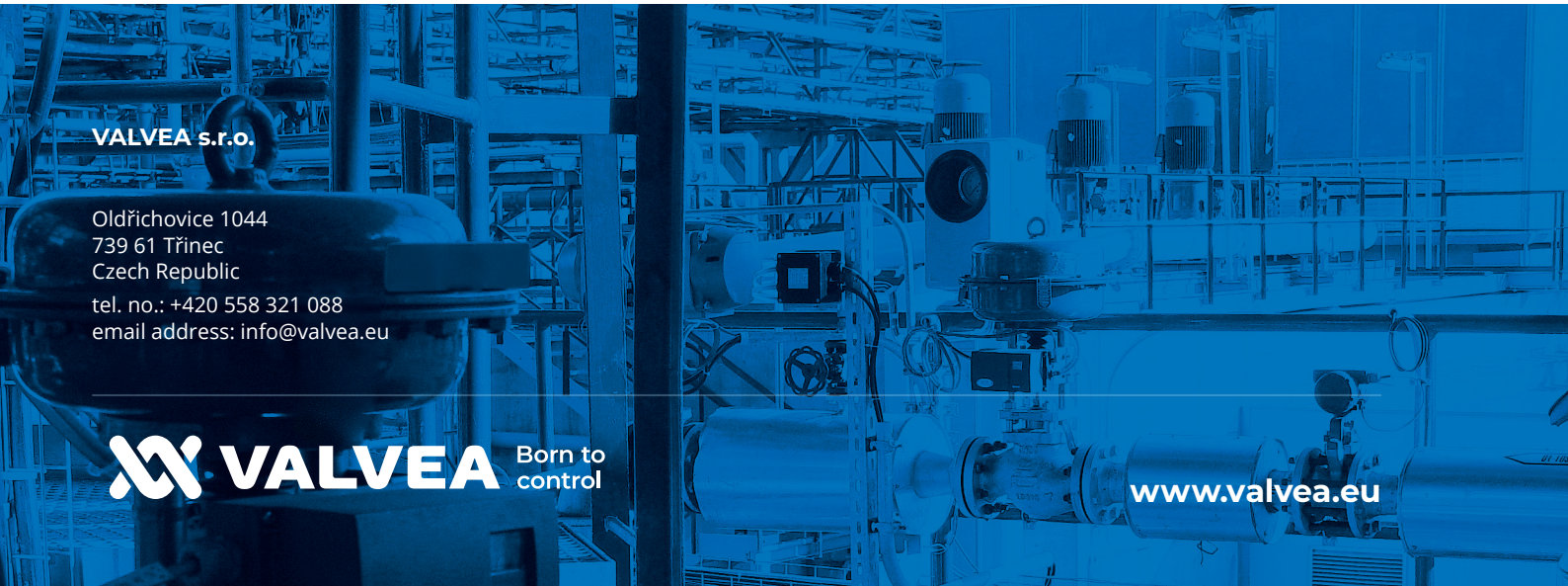
Marking:
Example: M-38-57-M16 – Manual drive type M stroke - 38mm; d2=57,15mm; d1=M16x1,5

FIG. 8 - MANUAL DRIVE, TYPE M



SPECIAL OPTIONS

- **valves for oxygen and hydrogen:**
  Application of adequate materials, mechanical and chemical cleaning, inspections and assembly ensure compatibility with oxygen and hydrogen flows.
- **valves for liquid and gaseous fuels with high speed travel:**
  Driven by pneumatic actuators with quick closing systems - valve closing time-below 1 sec.
- **valves for cryogenic service:**
  Proper materials and special design of the seal to prevent the valve drive from being affected by low temperatures. Used mainly for liquid oxygen and nitrogen.
- **valves for acid gases:**
  Parts of valve can be made of materials and under conditions to enable valve operation with gases of H2S content as per NACE MR-0175.
- **valves with a heating jacket:**
  Design and technical parameters-as agreed with the client individually.
- **valves with airtight seats:**
  When class VI of the valve seat leakage is needed (to $\Delta p \leq 3.5$ MPa) as per IEC 60434-4
- **pilot balanced valves**:
  Design allows to reach the high tightening class for high pressure drops and with lower needed actuating forces of actuators, flow direction over the plug.
- **valves with non-cast bodies:**
  If a special construction of the valve body is needed, it is possible to design a valve for individual customer's needs (angle valves – type L and Z)



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