DOUBLE-PORTED CONTROL GLOBE VALVES **TYPE 10000 DG**

APPLICATION AREA:

The valves type 10000 with pressure balanced plug are used as final flow control units for automatic and remote control systems. They can be applied to adjust flow of fluids in various industries, such as chemical plants, steelworks, shipyards, etc. The offer includes valves with or without driving units, where pneumatic actuators with spring membranes, type 37/38 are used as standard driving appliances.

CONSTRUCTION:

The valves units that are combined with actuators of 37/38 type incorporate the following major components:
Flanges with plain mating surfaces, with a groove or a tongue to PN-H-74306:1985, ISO 2084-1974, PN-H-74307:1985, ISO 2441-1975, as well as with the RF plain flange or with the RTJ groove to ANSI B16.10-1986, for welding to PN 160.
Nominal diameters:
DN: 20; 25; 32; 40; 50; 65; 80; 100; 150; 200; 250; 300.
Rated values of nominal pressure PN are 16; 25; 40; 63; 100; 160 or CL150; 300; 600. In case of possible solidification of the flowing fluid or crystalline precipitation, which may lead to jamming the valve plug, the cast steel body can be fitted with a heat jacket, made from piping or die-pressed sheets that are joint together by welding.
The valve bodies with heating jackets are manufactured for valves DN20… 40 and DN 150 … 200 for the rated pressures PN16…100 as well as for valves DN 50 … 100 for the rated pressures PN16 … 100. The valves employ steam or hot oil with working temperature <200°C as a heating agent. The following flange sized are used to connect the appliance to heating pipelines: DN 15 PN16 to PN-H-74731:1987; for DN20...80, DN25 PN16 to PN-H-74731:1987; for DN 100...200.

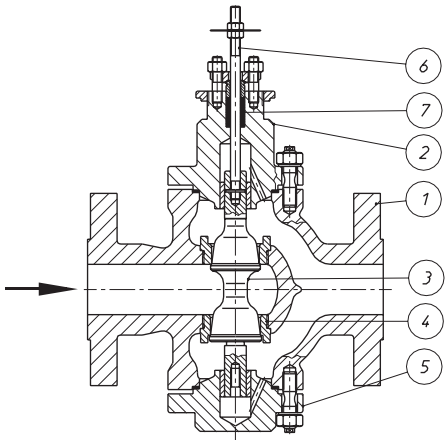
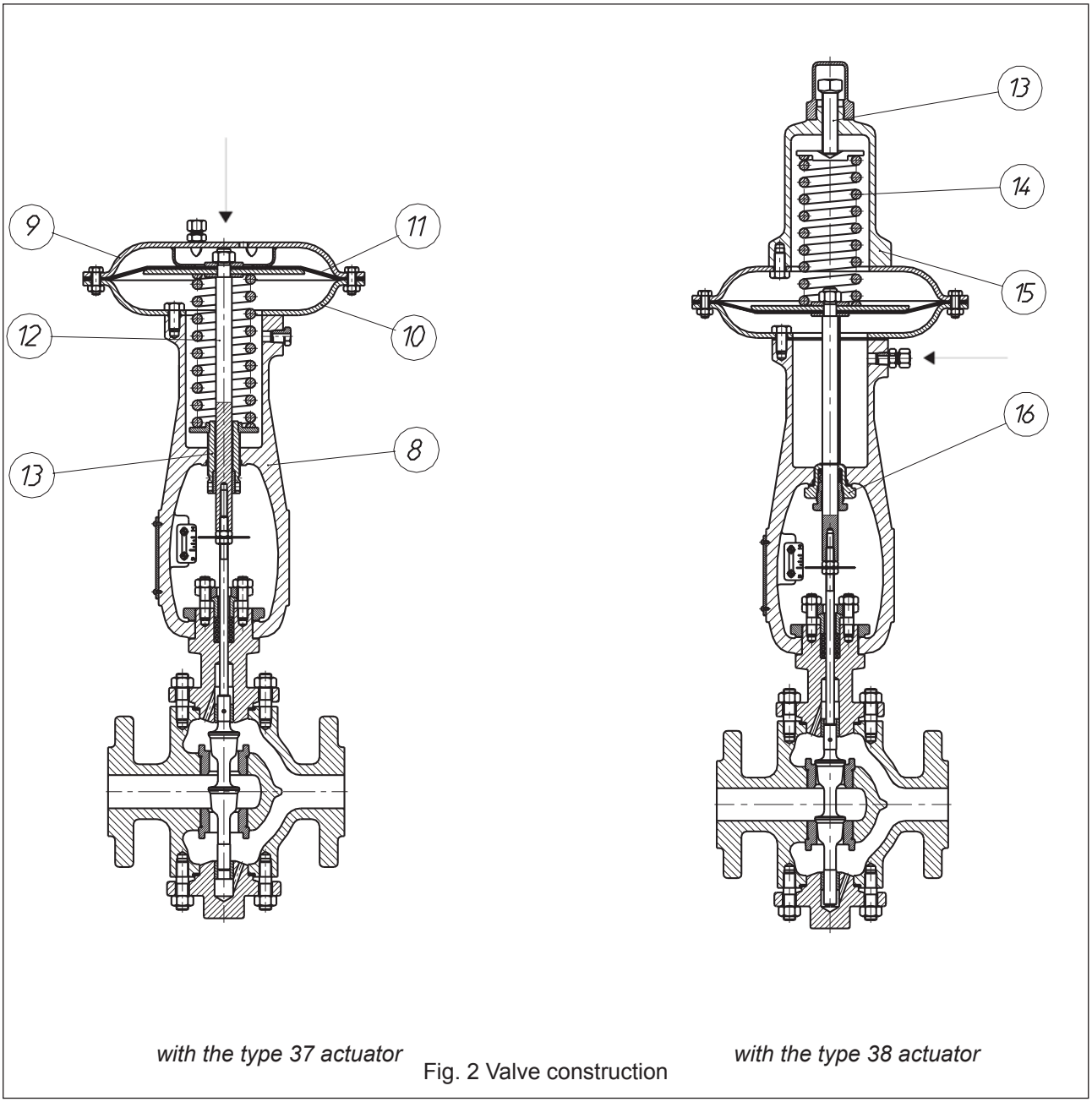


Fig. 1 Valve with a standard bonnet

37-700 Przemyśl, 23 Obozowa St.
tel. +48 16 678 66 01, fax +48 16 678 65 24
marketing@polna.com.pl, www.polna.com.pl



with the type 37 actuator *with the type 38 actuator*

Fig. 2 Valve construction

Standard bonnet (2) - is made of the same material as the valve body and can be of the following design options:

– standard - for the fluid temperature -20...260°C,
– finned AB - for the fluid temperature 260...650°C,
– extended EB - for the fluid temperature -180...-20°C.
– bellow-type DM - for the fluid temperature up to 300°C for the valves DN 20 … 100 with rated ressure PN16 … 25 as well as for the valves DN150 with rated pressure PN16.

Bellow-type bonnets are used for toxic, explosive and flammable agents.

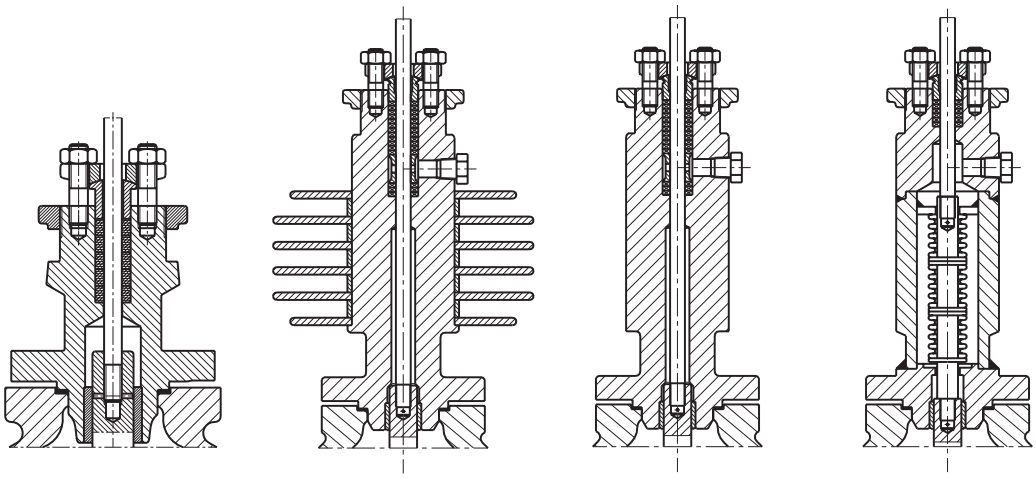
The valves with a bellow-type bonnet are irreversible, i.e. changeover of the valve operation from “air-to-open” to “air-to-close” is achieved by substitution of the type 37 actuator with the type 38 actuator.

Plug (3) and Seat (4) - are made of stainless steel.

When handing fluids with abrasive properties the hardfacing techniques can be applied, e.g. stelliting of mating surfaces on plugs and valve seats for the full range of valve diameters DN…300, stelliting the entire contour of plugs and seats for the valves DN20 … 100 or plasma nitriding.

Depending on the desired characteristic curve the following plug types are used:

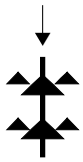
– equal percentage, contoured,
– quick opening, poppet type – for on/off control,
– linear, contoured.



a) standard b) finned AB c) extended EB d) bellow-type DM

Fig. 3. Bonnet types

Table 1. Types of plugs and product codes for valves

Plug type and characteristic curve	Plug symbol	Valve symbol and product code	
		rise of the control air pressure (pneumatic signal)	
			
		opens	closes
Equal percentage (contoured)	122 124	37-10122	37-10124
Quick opening (poppet type)	162 164	37-10162	37-10164
Linear, contoured	172 174	37-10172	37-10174

Plug type and characteristic curve (for valves with tight shut off or a bellow-type bonnet)	Plug symbol	Valve symbol and product code	
		rise of the control air pressure (pneumatic signal)	
			
		opens	closes
Equal percentage (contoured) Quick opening (poppet type)	122 162	37-10122 37-10162	38-10122 38-10162

Hard plugs are manufactured for full passage via the valve seat as well as for volumetric flow reduced to 40% of the rated valve capacity and for flow coefficients as per Table 3.

Moreover, for the range of rated pressure PN10 … 100,size range DN50 … 300 and working temperatures -180°C … 180°C some other types of plugs are available, including equal percentage contoured plugs 122 and quick opening poppet plugs 162 with soft sealing – PTFE gaskets, for full flow via the seat, where tight shutoff in the “closed” position is guaranteed. Valves with soft gaskets are irreversible, i.e. changeover of the valve operation from “air-to-open” to “air-to-close” is achieved by substitution of the type 37 actuator with the type 38 actuator.

Draining plug (5) - is made of the same material as the valve body. Beside its principal function, which consists in sealing the bottom part of the valve body and guiding the valve plug, it can also be used for easy draining of dirt that is trapped in the valve sump during valve operation, with no need do dismantle the bonnet and actuator.

Valve stem (6) - made of stainless steel, enables sturdy connection of the valve plug with the actuator shaft.
Bonnet sealing (7) - can be made of the following items
– PTFE – braided,
– PTFE – V-shaped rings,
– graphite – braided,
– balanced graphite – rings

Table 2. Type and options for bonnet sealing

Type and options of sealing	Maximum allowable pressure		Fluid temperature [°C]		
	fluid and gases	steam	standard	finned	extended
PTFE – braided	160	25	-20...260	260...350	-180...-20
PTFE – V-shaped rings					
graphite – braided		160	260...350	350...650	
balanced graphite – rings					

To select type of sealing it is necessary to take account for character of the handled fluid, its temperature and working pressure.
Actuator yoke (8) - made of grey iron
Upper and lower actuator housings (9, 10) - made of steel sheet and make up together the actuator pressure chamber,
Membrane (11) - made of neoprene with a reinforcing central plate,
Stem (12) - made of stainless steel with further thermal treatment (quenching)
Adjusting bolt (13) - used for pre-tensioning of the spring
Spring (14) - made of spring steel.
Spring enclosure (15) - made of grey iron (for the type 38 actuator only)
Gland (16) - made of carbon steel (for the type 38 actuator only)

OPERATION PRINCIPLE:
Due to the impact of the air pressure the actuator membrane acts onto the membrane plate against the spring force and moves the actuator shaft along with the valve stem as they are mechanically bound together. Linear displacement of the valve stem, connected to the valve plug, result in change of the flow orifice active area. Consequently, flow intensity of the handled fluid varies in accordance to valve plug position. The full rated stroke of the valve plug is achieved when air pressure changes within the range that correspond to normal pneumatic signal 20 … 100 kPa or increased signal 40 … 200 kPa.
The valves are field reversible, i.e. valve design enables changeover of the valve function from “air-to-close” to “air-to-close” by simple repositioning of the valve body and plug by 180° with respect to the pipeline axis with no need to change type of the actuator or use any extra components of the valve. The only valves that are irreversible are the ones with tight plugs or bellow-type bonnets.
TECHNICAL PARAMETERS:

Characteristic curves of flow	equal percentage, linear, quick opening.
Hysteresis deviation	
without the adjuster	4% of rated stroke range
with the adjuster	1% of the rated stroke range
Total performance error	
without the adjuster	±4% of rated stroke range
with the adjuster	±1.5% of the rated stroke range
Dead zone	
without the adjuster	2% of output signal change range,
with the adjuster	0,5% of input signal change rate.
Pneumatic control signal	
normal	20...100 kPa.
increased	40...200 kPa.
Maximum supply pressure	240 kPa
Temperature range for fluids	-180...650 °C
Range of rated pressures	PN10...160, CL150…600,
Range of nominal diameters DN	20...300
Leakage class of the valve	- below 0.5% K_{VS} (II class to PN-EN 60534-4) – for hard plugs - bubble tightness (VI class to PN-EN 60534-4) – for plugs with soft sealing

Table 3. Flow coefficients K_{VS}(m^3/h)

Nominal diameter DN	Actuator size 37 /38	Stroke [mm]	Full flow		Reduced flow 0.4	
			Plug symbol			
			122,172 124,174	162 164	122, 172 124, 174	162 164
20	9	12,7	6,8	8,6	4	5
25	9	12,7	10,3	12,8	4	5
32	9	19,1	15,4	20,5	6	8,2
40	9	19,1	24	28,3	9,4	11,3
50	11	25,4	41	51,4	16,3	20,5
65	11	25,4	62	77	25	31
80	13	38,1	94	120	37,6	48
100	13	38,1	167	215	67	86
150	15	50,8	385	464	154	185
200	18	63,5	640	840	256	336
250	18	63,5	1000	1330	395	532
300	18L	88,9	1390	1930	560	772

Calculation coefficients: F_L^2=0,9, X_T=0,75, Fd=0,34, xF_z=0,58

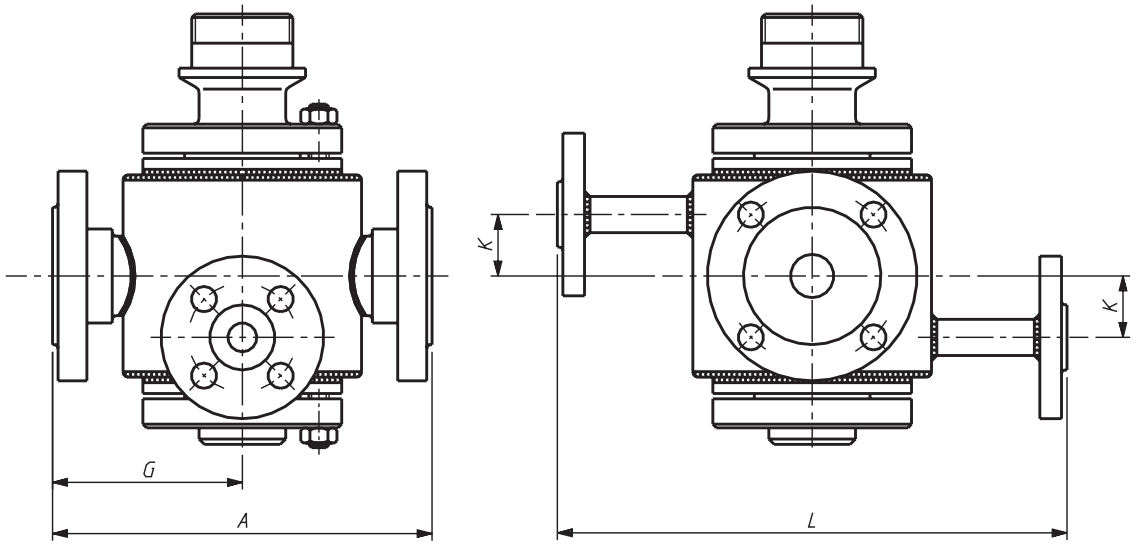


Fig. 4. Overall dimensions of the valve body with a heating jacket

Table 4. Dimensions of the valve with a heating jacket – weight of heating jackets

Nominal diameter DN	A	G	K	L	Weight of the heating jacket
[mm]					[kg]
20	230	115	33	258	3,5
25	230	115	33	258	3,5
32	260	130	39	258	3,5
40	260	125	55	277	4,5
50	300	145	54	299	6,0
65	340	158	64	316	7,5
80	380	180	78	343	9,0
100	430	200	100	408	15,0
150	550	245	153	503	37,0
200	600	270	198	550	48,0

OVERALL DIMENSIONS, CONNECTIONS AND WEIGHT OF VALVES

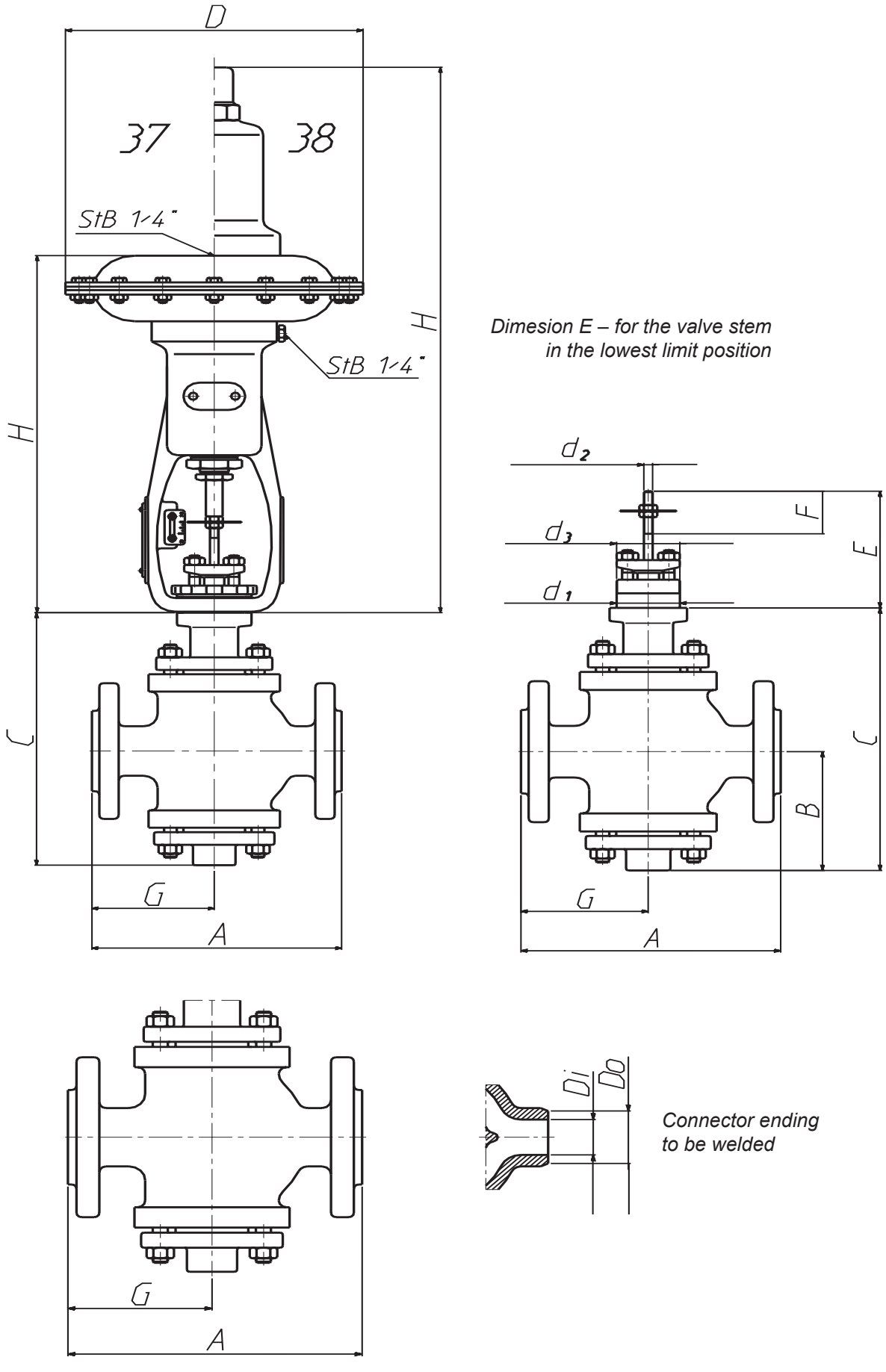


Fig. 5 Overall and connections dimensions

Table 5. Dimensions and weight of valves

Nominal diameter DN	Rated pressure PN	Actuator				Body						B	F	d_1	d_2	d_3	Bonnet						Weight
		Typ 37/38	D	37	38	flanged		for welding									std.	AB;EB	DM	std.	AB;EB	DM	
				H		A	G	A	G	D_0	D_1						C			E			
[mm]	[bar]	—	[mm]												[in]		[mm]						[kg]
20	10 - 16 25 - 40 63 - 160	9	280	395	600	150 150 230	72 72 115	- - -	- - -	- - -	- - -	108	45	57,15	5/16"-24UNF3A	2 1/4"-16UN2A	245	355	445 445 —	115	120	120 120 —	7,0 7,5 8,0
25	10 - 16 25 - 40 63 - 160					160 160 230	77 77 115	- - 230	- - 115	- - 36	- - 26						245	355	445 445 —	115	120	120 120 —	7,5 8,0 8,5
32	10 - 16 25 - 40 63 - 160					180 180 260	87 87 130	- - 260	- - 130	- - 44	- - 32	115					260	370	505 505 —	115	110	110 110 —	10,5 11,0 12,0
40	10 - 16 25 - 40 63 - 100 160					200 200 260 260	95 95 125 125	- - - 260	- - - 125	- - - 52	- - - 38	120 120 130 130					275 275 275 295	390 390 390 400	475 475 — —	110 110 110 115	105 105 105 110	105 105 — —	16,0 16,5 17,0 20,0
50	10 - 16 25 - 40 63 - 100 160	11	330	405	610	230 230 300 300	110 110 145 145	- - - 300	- - - 145	- - - 67	- - - 51	145 145 145 165	50		3/8"-24UNF3A		315 315 315 355	430 430 430 475	590 590 — —	110	110	110 110 — —	23,0 24,0 25,0 30,5
65	10 - 16 25 - 40 63 - 100 160					290 290 340 340	135 135 158 158	- - - 340	- - - 158	- - - 84	- - - 64	160 160 160 195					355 355 355 415	460 460 460 535	615 615 — —	105 105 105 100	110 110 110 100	110 110 — —	30,0 31,0 31,5 40,0
80	10 - 16 25 - 40 63 - 100 160	13	381	500	755	310 310 380 380	145 145 180 180	- - - 380	- - - 180	- - - 100	- - - 76	195 195 195 205	60		1/2"-20UNF3A		430 430 430 450	525 525 525 540	760 760 — —	120	120	120 120 — —	36,0 37,0 38,0 60,5
100	10 - 16 25 - 40 63 - 100 160					350 350 430 430	165 165 200 200	- - - 430	- - - 200	- - - 130	- - - 102	205 205 205 240					445 445 445 515	555 555 555 630	780 780 — —	120	120	120 120 — —	63,0 64,0 65,5 85,0
150	10 - 16 25 - 40 63 - 100 160	15	444	635	900	480 480 550 550	210 210 245 245	- - - 550	- - - 245	- - - 192	- - - 152	280 280 280 290	35	84,15	5/8"-18UNF3A	3 5/16"-16NS2	595 595 595 700	735 735 735 820	905 — — —	135	135	135 — — —	137 138 140 170
200	10 - 16 25 - 40 63 - 100 160	18	527	670	935	600 600 650 650	270 270 295 295	- - - 650	- - - 295	- - - 253	- - - 203	335 335 335 355			3/4"-16UNF3A		705 705 705 790	840 840 840 970	— — — —	130 130 130 125	125	— — — —	201 204 209 252
250	10 - 16 25 - 40 63 - 100 160					730 730 775 775	331 331 350 350	- - - 775	- - - 350	- - - 318	- - - 254	375 375 375 405	35 35 35 60				785 785 785 965	885 885 885 1085	— — — —	130	130	— — — —	350 355 365 425
300	10 - 16 25 - 40 63 - 100 160	18L	527	830	1070	850 850 900 900	346 346 375 375	- - - 900	- - - 375	- - - 336	- - - 264	450 450 450 525	75 75 75 35	95,25		3 3/4"-12UN2A	960 960 960 1175	1140 1140 1140 1340	— — — —	140 140 140 145	140 140 140 145	— — — —	530 535 545 640

Note: Valve weight without actuator, with a standard bonnet

AUXILIARY EQUIPMENT:

Typically, the flow control vales are fitted with pneumatic actuators.
In addition, these units can be equipped with:
- side mounted handwheel,
- top mounted handwheel,
- pneumatic positioner,
- electropneumatic positioner,
- pressure reducer (with a strainer),
- solenoid 3-way valve,
- limit switches for min/max positions,
- shutoff module.

OTHER ACTUATORS:

1. The handwheel type 20 from Zakłady Automatyki POLNA S.A.
2. Other electric or electro-hydraulic actuators

For detailed information and technical parameters of specific actuators please refer to relevant datasheets.

ORDER PLACEMENT:

Orders must contain complete information that is necessary to calculate parameters of the valve in accordance with the technical data questionnaire. To find out the most suitable valves please refer to the staff of the Marketing and Sales Departments and Technical Department for assistance.

Revision: 10000 DG/08/2007
Valid until the next revision.