

## DOUBLE-PORTED CONTROL GLOBE VALVES TYPE Z<sup>®</sup>10

### APPLICATION AREA:

The valves type Z10 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, production of POLNA are used as standard driving appliances.

### CONSTRUCTION:

The valves units incorporate the following major components:

#### Body (1):

Flanges with plain mating surfaces, with a groove or a tongue to: PN-H-74306:1985, PN-H-74307:1985, ISO 2084-1974, 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:

20; 25; 32; 40; 50; 65; 80; 100; 150; 200; 250; 300.

#### Nominal pressures:

16; 25; 40; 63; 100; 160 or CL150; CL300; CL600.

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 i DN150...200 for the rated pressures PN 16...40,
- DN50...100 for the rated pressures PN16...100.

The valves employ steam or hot oil with working temperature < 200°C.

• The following flange sized are used to connect the appliance to heating pipelines:

- DN15 PN16 acc. to PN-H-74731:1987 for DN20...80,
- DN25 PN16 acc. to PN-H-74731:1987 for DN100...200.

**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.
  - bellows-type DM - for the fluid temperature up to +300°C for the valves DN 20 ... 100 with rated pressure PN16 ... 25 as well as for the valves DN150 with rated pressure PN16.
- Bellows-type bonnets are used for toxic, explosive and flammable agents.



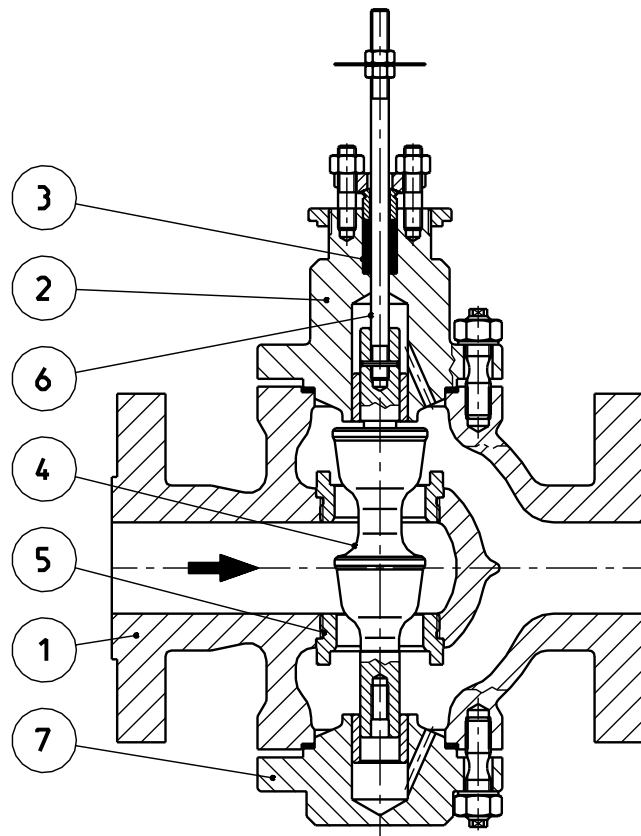
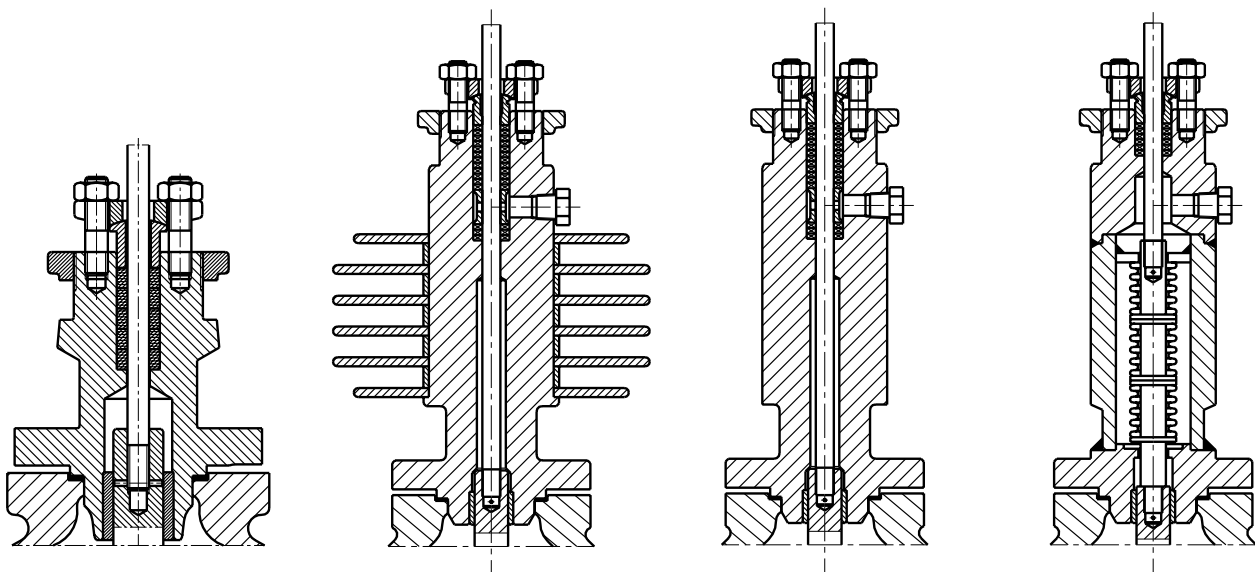


Fig. 1 Valve parts



a) standard

b) finned AB

c) extended EB

d) bellows-type DM

Fig. 2. Bonnet types

**Bonnet sealing (3)** - made in form of the rings, can be made of the following materials:

- PTFE – braided,
- PTFE – V-shaped rings,
- graphite – braided,
- balanced graphite – rings

Table 1. 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.

**Plug (4) and Seat (5)**

Are made of stainless steel. X6CrNiMoTi 17-12-2 (1.4571) or stainless steel X17CrNi 16-2 (1.4057) heat processed.

When handling fluids with abrasive properties the hardfacing techniques can be applied, e.g.:

Within the technology of hardening internal elements of valves, the following are used:

- a) stelliteing of mating surfaces: ~ 40HRC (plugs and valve seats for the full range of valve diameters DN 20...300, stelliteing the entire contour of plugs and seats for the valves DN 20...100),
- b) CrN coating – inserting chromium nitride into the external layer of a detail at the depth of approx. 0.1mm; ~950HV
- c) heat processing: plug (~45HRC), seat (~35HRC), stem (~35HRC), sleeve (~45HRC)

Seats with soft inserts (PTFE), only made of acid resistant steel, with retention of the maximum pressure drop to 35 bar and working temperature (-180°C...+180°C).

The following kinds of plugs are manufactured:



- profile,
- perforated.

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.

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 2. Types of plugs and valves function

Plug type and characteristic curve	Plug symbol	The valve function is obtained by means of linear drive rise of the control air pressure (pneumatic signal)	
			
Equal percentage	P	opens valve	closes valve
Quick opening	S		
Linear	L		

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.

Table 3. Flow coefficients  $K_{vs}$  (m<sup>3</sup>/h)

Nominal diameter DN	Stroke [mm]	Full flow		Reduced flow 0.4	
		Plug flow characteristic			
		linear (L) equal percentage (P)	quick opening (S)	linear (L) equal percentage (P)	quick opening (S)
20	12,7	6,8	8,6	4	5
25	12,7	10,3	12,8	4	5
32	19,1	15,4	20,5	6	8,2
40	19,1	24	28,3	9,4	11,3
50	25,4	41	51,4	16,3	20,5
65	25,4	62	77	25	31
80	38,1	94	120	37,6	48
100	38,1	167	215	67	86
150	50,8	385	464	154	185
200	63,5	640	840	256	336
250	63,5	1000	1330	395	532
300	88,9	1390	1930	560	772

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

**Valve stem (6)** - made of stainless steel, X6CrNiMoTi 17-12-2 (1.4571) or X17CrNi 16-2 (1.4057) heat processed. Enables sturdy connection of the valve plug with the actuator shaft.

**Draining plug (7)** - 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.

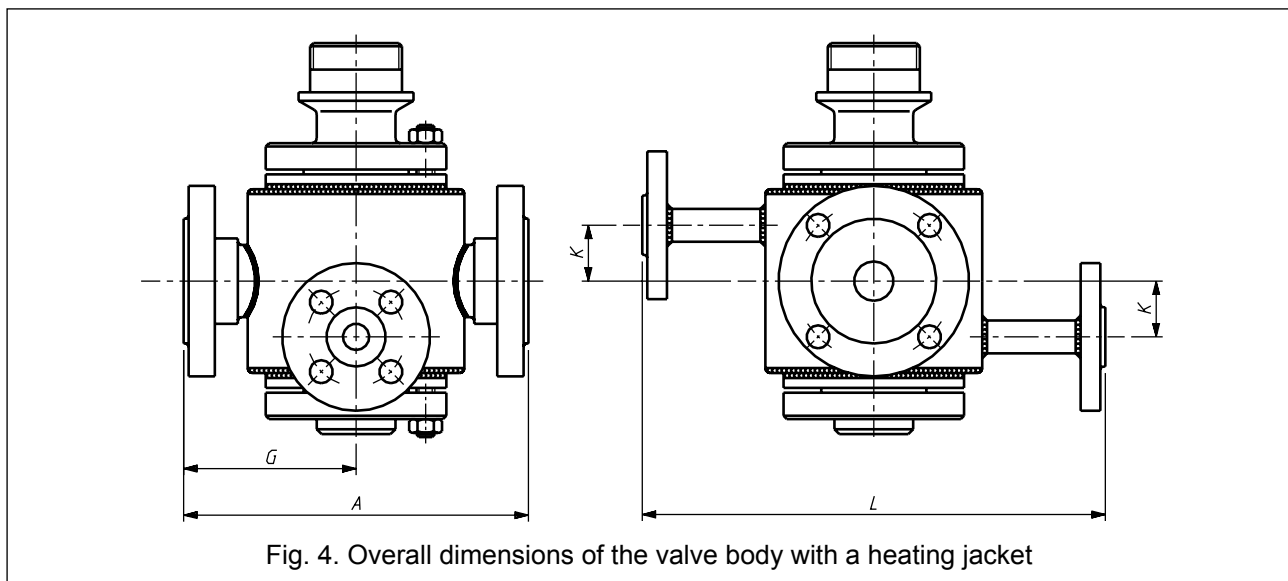


Fig. 4. Overall dimensions of the valve body with a heating jacket

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

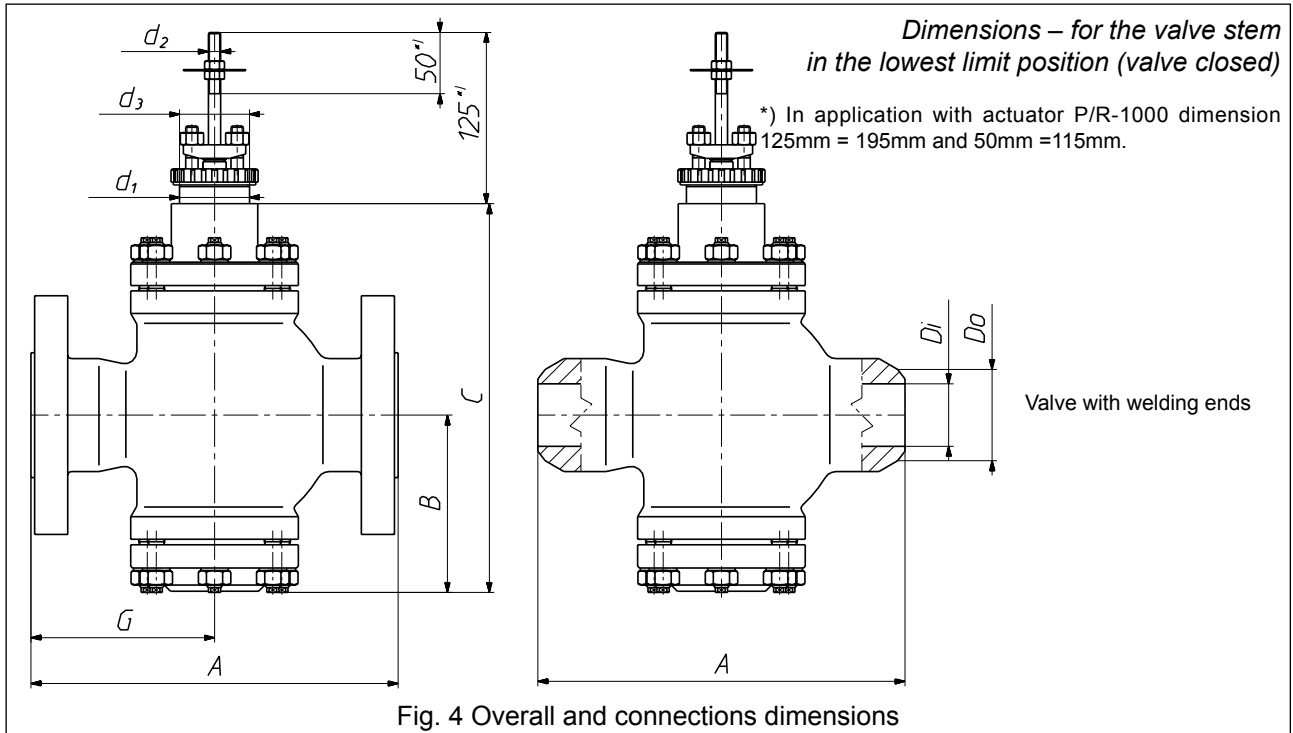


Fig. 4 Overall and connections dimensions

Table 5. Dimensions and weight of valves

Nominal diameter DN	Nominal pressure PN	Body						B	d <sub>1</sub>	d <sub>2</sub> ----- Maximum acceptable stem load [kN]	d <sub>3</sub>	Bonnet			Weight						
		flanged		for welding								std.	AB;EB	DM							
		A	G	A	G	D <sub>0</sub>	D <sub>1</sub>									C					
[mm]	[bar]	[mm]						[in]	[mm]			[kg]									
20	10 - 16	150	72	-	-	-	-	108	57,15	5/16"-24UNF3A ----- [4 kN]	2 1/4"-16UN2A	245	355	445	7,0						
	25 - 40	150	72	-	-	-	-					445	7,5								
	63 - 160	230	115	-	-	-	-					—	8,0								
25	10 - 16	160	77	-	-	-	-					115	5/16"-24UNF3A ----- [4 kN]	2 1/4"-16UN2A	245	355	445	7,5			
	25 - 40	160	77	-	-	-	-								445	8,0					
	63 - 160	230	115	230	115	36	26								—	8,5					
32	10 - 16	180	87	-	-	-	-								120	5/16"-24UNF3A ----- [4 kN]	2 1/4"-16UN2A	260	370	505	10,5
	25 - 40	180	87	-	-	-	-											505	11,0		
	63 - 160	260	130	260	130	44	32											—	12,0		
40	10 - 16	200	95	-	-	-	-											130	5/16"-24UNF3A ----- [4 kN]	2 1/4"-16UN2A	275
	25 - 40	200	95	-	-	-	-	475	16,5												
	63 - 100	260	125	-	-	-	-	390	17,0												
63 - 100	160	260	125	260	125	52	38	130	20,0												
	50	10 - 16	230	110	-	-	-	-	145	3/8"-24UNF3A ----- [6,3 kN]	2 1/4"-16UN2A	315	430	590							23,0
		25 - 40	230	110	-	-	-	-				590	24,0								
63 - 100		300	145	-	-	-	-	430				25,0									
160	300	145	300	145	67	51	165	30,5													
	65	10 - 16	290	135	-	-	-	-				160	3/8"-24UNF3A ----- [6,3 kN]	2 1/4"-16UN2A	355	460	615				30,0
		25 - 40	290	135	-	-	-	-							615	31,0					
63 - 100		340	158	-	-	-	-	460							31,5						
160	340	158	340	158	84	64	195	40,0													
	80	10 - 16	310	145	-	-	-	-							195	1/2"-20UNF3A ----- [10 kN]	2 1/4"-16UN2A	430	525	760	36,0
		25 - 40	310	145	-	-	-	-										760	37,0		
63 - 100		380	180	-	-	-	-	525	38,0												
160	380	180	380	180	100	76	205	60,5													
	100	10 - 16	350	165	-	-	-	-	205	1/2"-20UNF3A ----- [10 kN]	2 1/4"-16UN2A							445	555	780	63,0
		25 - 40	350	165	-	-	-	-										780	64,0		
63 - 100		430	200	-	-	-	-	555				65,5									
160	430	200	430	200	130	102	240	85,0													
	150	10 - 16	480	210	-	-	-	-				280	5/8"-18UNF3A ----- [16 kN]	3 5/16"-16NS2A				595	735	905	137
		25 - 40	480	210	-	-	-	-										905	138		
63 - 100		550	245	-	-	-	-	735							140						
160	550	245	550	245	192	152	290	170													
	200	10 - 16	600	270	-	-	-	-							335	3/4"-16UNF3A ----- [25 kN]	3 5/16"-16NS2A	705	840	—	201
		25 - 40	600	270	-	-	-	-										840	204		
63 - 100		650	295	-	-	-	-	840	209												
160	650	295	650	295	253	203	355	252													
	250	10 - 16	730	331	-	-	-	-	375	3/4"-16UNF3A ----- [25 kN]	3 3/4"-12UN2A							785	885	—	350
		25 - 40	730	331	-	-	-	-										885	355		
63 - 100		775	350	-	-	-	-	885				365									
160	775	350	775	350	318	254	405	425													
	300	10 - 16	850	346	-	-	-	-				450	3 3/4"-12UN2A	3 3/4"-12UN2A				960	1140	—	530
		25 - 40	850	346	-	-	-	-										1140	535		
63 - 100		900	375	-	-	-	-	1140							545						
160	900	375	900	375	336	264	525	640													

Note: Valve weight without actuator, with a standard bonnet

VALVE MARKING:



<b>Type and action:</b>	
- pneumatic with direct action:	<b>P ; P1</b>
- pneumatic with reverse action:	<b>R ; R1</b>
- pneumatic with side-mounted handwheel	<b>P1B;R1B</b>
- pneumatic with top-mounted handwheel	<b>PN; RN</b>
- electric:	<b>E</b>
- manual	<b>20</b>

<b>Bonnet:</b>	
- standard:	<b>1</b>
- extension:	<b>2</b>
- bellow seal:	<b>3</b>
- <b>ribbed</b>	<b>4</b>
- other	<b>X</b>

<b>Packing:</b>	
- PTFE, braided	<b>A</b>
- PTFE, V type	<b>B</b>
- graphite, braided	<b>D</b>
- graphite, expanded	<b>E</b>

<b>Leakage class:</b>	
- basic: class II	<b>2</b>
- tight (special) cl. VI	<b>6</b>

<b>Valve plug:</b>	
- balanced	<b>7</b>

<b>Choke cages:</b>	
- no choke cages	<b>0</b>

<b>Plug characteristics and type:</b>	
- linear	<b>L</b>
- equal percentage	<b>P</b>
- quick opening	<b>S</b>
- other	<b>X</b>

<b>Body material:</b>	
- cast iron	<b>1</b>
- carbon steel	<b>3</b>
- stainless steel	<b>5</b>
- other	<b>X</b>

**MARKING EXAMPLE:**

Control valve type Z10 with pneumatic actuator reverse action with top mounted handweel, extension bonnet, packing: graphite: expanded, leakage class VI with equal percentage plug, body material carbon steel:

**RN-Z10-2E680P3**

Marking is shown on valve nameplate.

Additionally, it shows:

- nominal size [DN],
- nominal pressure [PN],
- max working temperature [TS],
- max working pressure [PS],
- test pressure [PT],
- flow ratio [Kvs],
- plug stroke [H],
- plug stroke fluid group [1 or 2],
- serial number and year of manufacture.

**OTHER ACTUATORS:**

1. Pneumatic actuators type P/R or P1/R1 POLNA S.A production.
2. The handwheel type 20 from Zakłady Automatyki POLNA S.A.
3. Other electric or electro-hydraulic actuators

Selection of linear drives should be agreed on with Zakłady Automatyki "POLNA" S.A.

Detailed information and technical data of actuators – according to separate catalogue sheets.

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

**ORDERING:**

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.