

## SELF-ACTUATING DIFFERENTIAL PRESSURE AND FLOW REGULATORS TYPE ZSN91; 92

### APPLICATION AREA:

Regulators ZSN91; 92 are used to control preset pressure difference and flow in process installations connected to inlet or outlet of regulator valve. Regulators are applied in heating systems, in industrial processes with cold and hot, steam, air, and non-flammable gases. Using with other media subject to consulting with manufacturer.

### DESIGN:

Regulator comprises three, temporarily connected, main units: valve (01), actuators (02A and 02B), and adjuster (03). Regulator valve single-ported with balanced plug, and flow rate preset value adjuster in the form of gradually adjusted packing gland. Flanged connections of valve body with valve face as per

PN-EN 1092-1:2006 and PN-EN 1092-2:1999 for PN10; 16; 25; 40

PN-EN 1759-1:2005 for CL150; CL300.

Body length as per:

PN-EN 60534-3-1:2000 – Series 1 for PN10; 16; 25; 40;

Series 37 for CL150; Series 38 for CL300

Diaphragm actuator (diaphragm effective area 160/160 cm<sup>2</sup> or 160/320 cm<sup>2</sup>), with bolted housing, where comparison of pressure difference impulses from controlled flow rate and controlled pressure difference is held.

Control pressure value adjuster with combination of three pre-tensioned springs, fixed coaxially with valve and actuator.



### VARIANTS:

By valve leakage class:

- below 0.01%Kvs (class IV as per PN-EN 60534-4) - hard seat
- bubble (class VI as per PN-EN 60534-4) - soft seat - PTFE or VMQ (ECOSIL)

By application:

- on the supply side ZSN 91
- on the return side ZSN 92

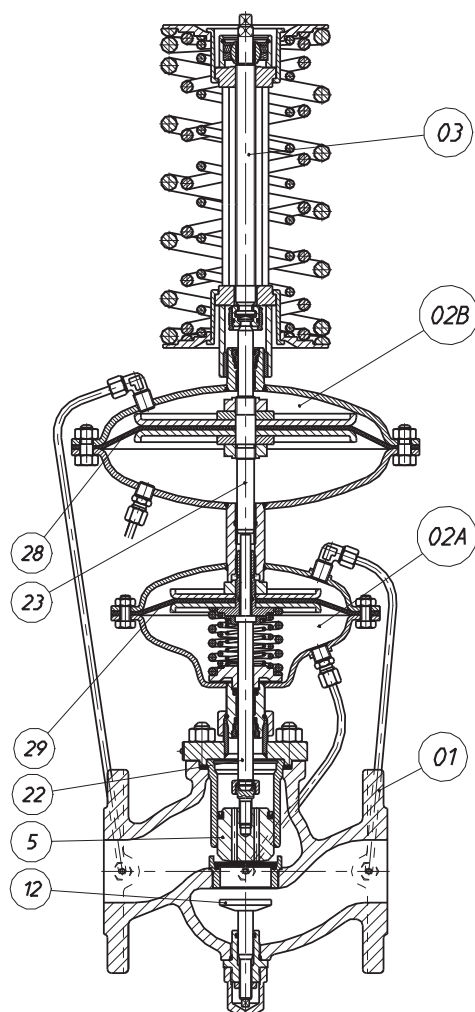
By corrosion-proofness of actuator components:

- standard (ZSN 91.1; ZSN 92.1) - carbon steel with protection coatings,
- special (ZSN 91.2; ZSN 92.2) - stainless steel.

By pressure drop on packing gland:

- $\Delta p_D = 20$  [kPa]
- $\Delta p_D = 50$  [kPa]

## OPERATING PRINCIPLE:



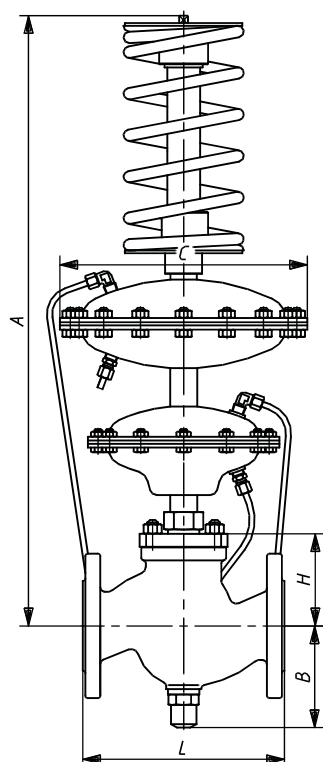
Regulator valve is open when no supply. Regulator controls flow comparing it with preset packing gland (12) value, and pressure difference, comparing it to preset adjuster (03) value. Both control systems – flow and pressure difference – operate independently. Plug position is determined by the value which deviates more from preset value. Flow control consists in presetting constant pressure difference of  $\Delta p_D = 20$  kPa or  $\Delta p_D = 50$  kPa, corresponding to desired flow, in packing gland (12), and transferring this pressure difference via impulse ducts to actuator (02A). Each change in flow rate exceeding desired value shall cause change in pressure difference regarding packing gland value and pro rata change in plug position, until flow rate reaches desired value.

Control of pressure difference  $\Delta p_R$  is achieved by presetting desired value of controlled pressure difference in adjuster (03) and transferring it via impulse ducts from measurement point to actuator (02B).

Each deviation from flow rate regarding adjuster value shall cause pro rata change in plug position, until controlled pressure difference reaches preset value.

Regulator only requires impulse tube for connection to lower or higher pressure, regarding installation method on supply or return pipeline, as per the diagram illustrating application examples hereinafter.

## DIMENSIONS AND WEIGHTS



DN	Actuator type (02A and 02B)	A	B	C	H	L	Valve weight(01)
		[mm]					[kg]
15	160-160	655	90	215	80	130	4,2
20						150	5,3
25						160	5,9
32					95	180	8,9
40						200	11,2
50	160-320	675	110	282	100	230	15,4
65						290	24,4
80						310	31,9
100					145	350	47,7

Spring range [kPa]	Actuator (02A - 02B) Diaphragm effective area[cm <sup>2</sup> ]	Weight		
		Actuator (02A - 02B)	Adjuster (03)	
			DN 15...50	DN 65...100
40...160	160-160	10	3,2	3,6
80...320			5,0	6,3
120...480			7,4	9
10...40	160-320	15	2,4	2,8
20...80			3,2	3,6

## TECHNICAL SPECIFICATIONS

DN		15	20	25	32	40	50	65	80	100
K <sub>VS</sub> <sup>1)</sup> [m³/h]	full flow	3,2	5	8	12,5	20	32	50	80	125
Skok [mm]		6			8			12		14
Noise coefficient Z		0,65	0,6	0,55		0,45	0,4		0,35	
Control characteristics		proportional								
Spring range [kPa] <sup>2)</sup>		10...40;		20...80;		40...160;		80...320,		120...480
Flow values for pressure drop in packing gland [bar]		12						10		
Seeting ranges for flow rates by pressure drop in packing gland	Δp <sub>0</sub> = 20 [kPa]	4...45% K <sub>VS</sub>								
	Δp <sub>0</sub> = 50 [kPa]	7...75% K <sub>VS</sub>								
Valve nominal pressure		valve body in grey iron						PN 16		
		valve body in spheroidal iron						PN 16; PN 25; PN 40		
		valve body in carbon steel and stainless steel						PN 16; PN 25; PN 40		
Maximum medium temperature [°C]		steam, water						150		
		gases						80		
Minimum pressure drop in valve		$\Delta p_z = \Delta p_D + (\frac{Q^2}{K_V^2})$								

<sup>1)</sup> other  $K_{vs}$  ratios subject to order specification.

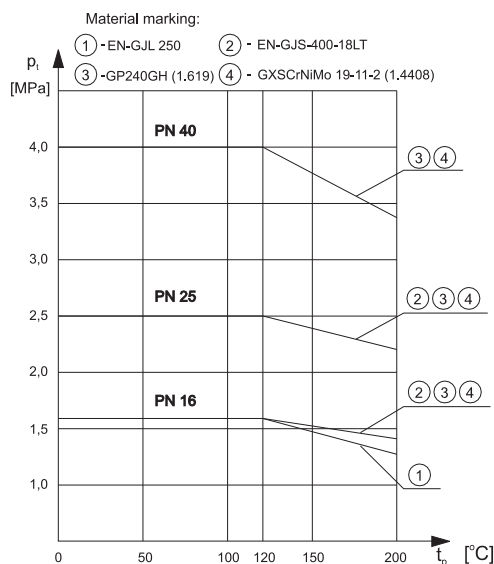
<sup>2)</sup> other ranges subject to order specification.

## MATERIALS as per PN

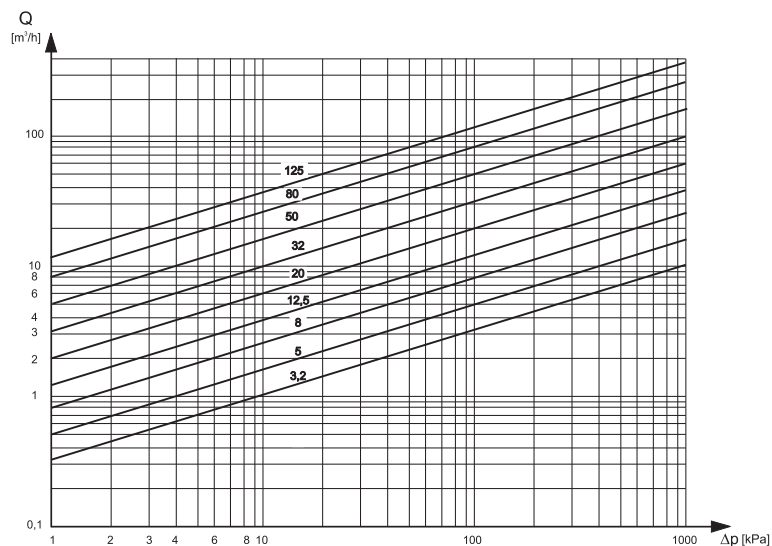
Regulator	ZSN 91	ZSN 92
VALVE (01)		
Body	grey iron EN-GJL-250 spheroidal iron EN-GJS-400-178LT carbon steel GP240GH (1.0619) stainless steel GX5CrNiMo 19-11-2 (1.4408)	
Plug and seat	X6CrNiMoTi 17-12-2 (1.4571)	
Guide sleeve		
Packings	EPDM <sup>3)</sup>	
ACTUATOR (02)		
Housing	carbon steel S235JRG2C (1.0122)	stainless steel X6CrNiTi 18-10 (1.4541)
Stem	X17CrNi 16-2 (1.4057)	
Diaphragm	EPDM + polyester fabric <sup>3)</sup>	
Packing	EPDM <sup>3)</sup>	
Adjuster (03)		
Adjuster components	Carbon steel C45 (1.0503)	
Springs	Spring steel 60Si7	

<sup>3)</sup> other materials, subject to medium type.

## NOMINAL PRESSURE, WORKING TEMPERATURE AND WORKING PRESSURE

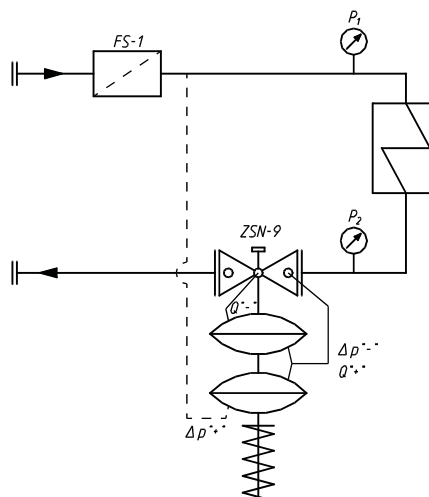


## FLOW DIAGRAM FOR WATER



Regulator is to be installed on horizontal pipeline. Medium flow direction is to conform to arrow on body. At medium temperature lower than 100°C regulator position is optional, at higher temperatures it is recommended to install regulator with adjuster unit (03) down. To ensure reliable operation of regulator apply strainer FS1 upstream.

Monitoring  $\Delta p = p_1 - p_2$  and V restriction  
RETURN SIDE



- nut and cutting ring for impulse tube,

- strainer FS1,
- straight connection pipe  $\varnothing 6 \times 1$ ,
- elbow connection pipe  $\varnothing 6 \times 1$ ,
- connection stub NPT 1/4",
- impulse tube  $\varnothing 6 \times 1$ ,
- adjustment wrench,

**ZSN91.2 - DN 50; PN 16; Kvs 32; 20 [kPa], spheroidal iron; 40...160 [kPa], tight.**