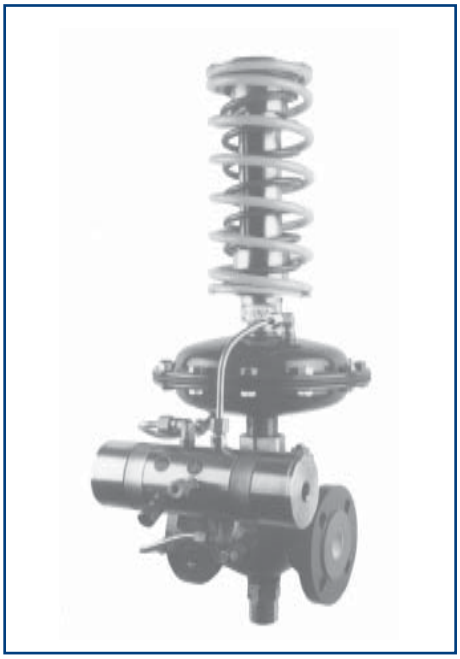
SELF-ACTUATING DIFFERENTIAL PRESSURE AND FLOW REGULATORS **TYPE ZSN9**

APPLICATION AREA:

Regulators ZSN9 are used to control preset pressure difference and control 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 water, steam, air and non-flammable gases. Using with other media subject to consulting with manufacturer.

DESIGN:

Regulator comprises four, temporarily connected, main units: valve (01), actuator (02), adjuster (03), and flip-flop (04). 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; 320 cm^2), with bolted housing.
Controlled pressure difference value adjuster fixed coaxially with valve and actuator.
Impulse, pressure difference and flow rate flip-flop of slider-piston type, where comparison of controlled pressure difference and controlled flow rate impulses is held.



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 corrosion-proofness of actuator components:
- standard (ZSN 8.1) - carbon steel with protection coatings,
- special (ZSN 8.2) - stainless steel.

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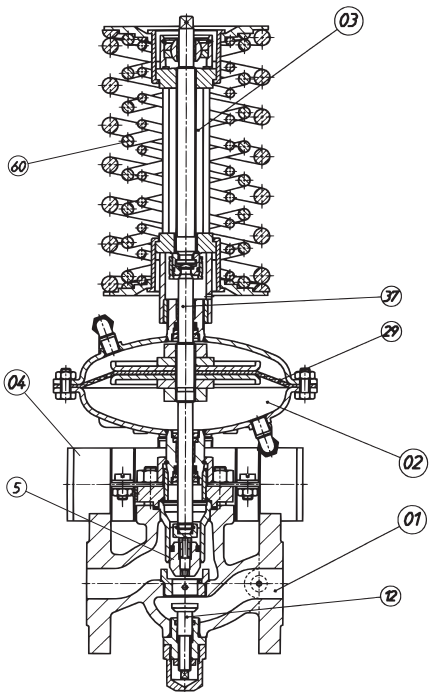
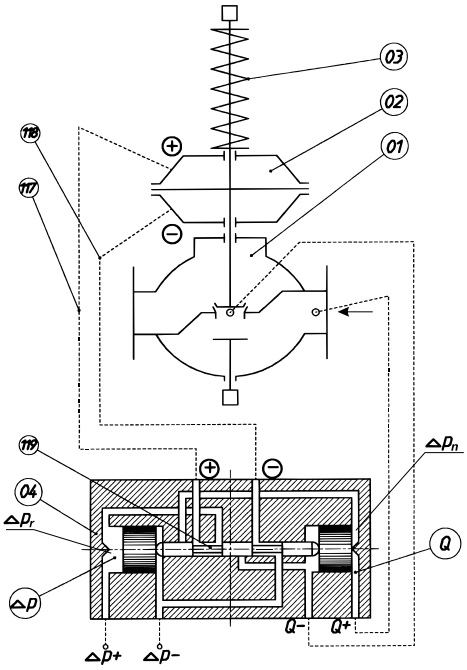


OPERATING PRINCIPLE:

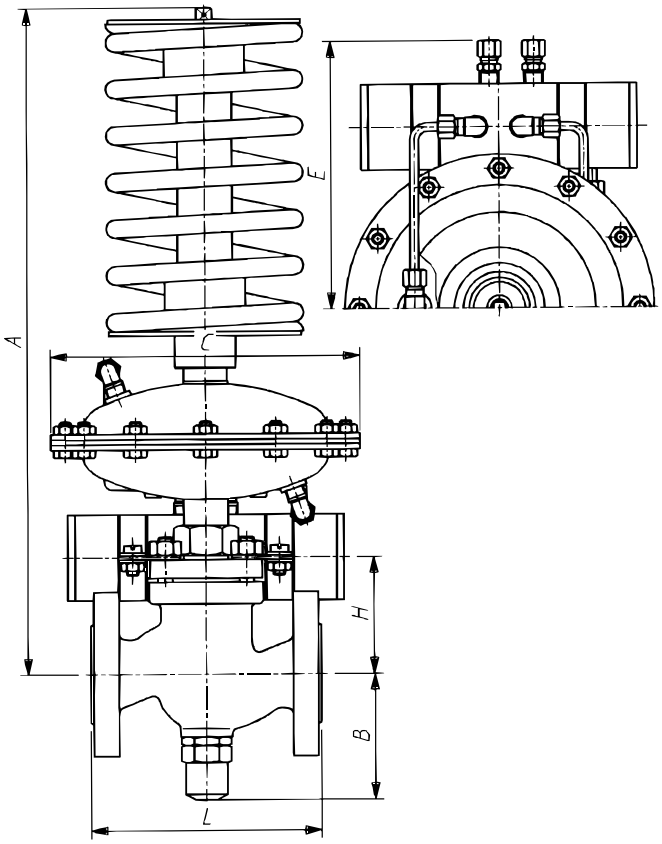


Regulator valve is open when no supply. Regulator operation consists in positioning of packing gland (12) and transferring pressure difference Δpn impulses resulting from flow to Q chamber of flip-flop.

Control of pressure difference is effected by transferring controlled pressure difference impulses to chamber Δpr of flip-flop. Regulator operates in accordance with selection of higher controlled value principle. Selected value shall cause resetting of slider (119) of flip-flop (04) and transmission of impulses, in that value, via impulse ducts (117)"+" and (118)"-". To chambers of actuator (02); pressure "+" of controlled value above diaphragm (29), and pressure "-" under diaphragm. Transferred impulses in higher controlled value shall cause deflection of diaphragm (29), movement of actuator (02) stem (37) and closure of valve plug (5), until controlled value reaches the value preset on packing gland (12) or spring (60) of adjuster (03). To ensure reliable operation it is critical that pressure difference values of packing gland Δpn is the same as controlled pressure difference Δpr. Regulator requires only impulse tubes for connection to controlled pressure difference. Total pressure drop in valve comprises pressure drop on packing gland and pressure drop on valve plug.

$$\Delta p_r = \Delta p_n \qquad \Delta p = \Delta p_n + (\frac{10 \cdot G}{Kv})^2 \qquad \Delta p_g = (\frac{10 \cdot G}{Kv})^2$$

DIMENSIONS AND WEIGHTS



DN	A	B	E	H	L	Weight of valve (01) and flip-flop
	[mm]					[kg]
15	415	90	176	80	130	8,3
20					150	9,4
25					160	10
32	430	98	185	95	180	13
40	435	110	190	100	200	15,3
50	440	120		105	230	19,5
65	480	142	195	145	290	28,5
80		151	210		310	36
100	490	185	220	150	350	51,5

Spring range [kPa]	C [mm]	Weight [kg]		
		Actuator (02)	Adjuster (03)	
			DN15...50	DN65...100
10...40	282	9,1	2,4	2,8
20...80			3,2	3,6
40...160	215	4,4	5,0	6,3
80...320				

TECHNICAL SPECIFICATIONS

DN		15	20	25	32	40	50	65	80	100
K_{VS} [1] [m³/h]	Full flow	3,2	5	8	12,5	20	32	50	80	125
	Reduced flow	1 1,6 2,5	1,6 2,5 3,2	2,5 3,2 5	5	8	12,5	20	32	50
Noise coefficient Z		0,65	0,6	0,55		0,45	0,4		0,35	
Control characteristics		proportional								
Spring range (kPa)[2]		40...160								
Allowed pressure drop in valve [bar]		20								
Minimum pressure drop in valve [bar]		12						10		
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)		water, steam						150		
		gases						80		

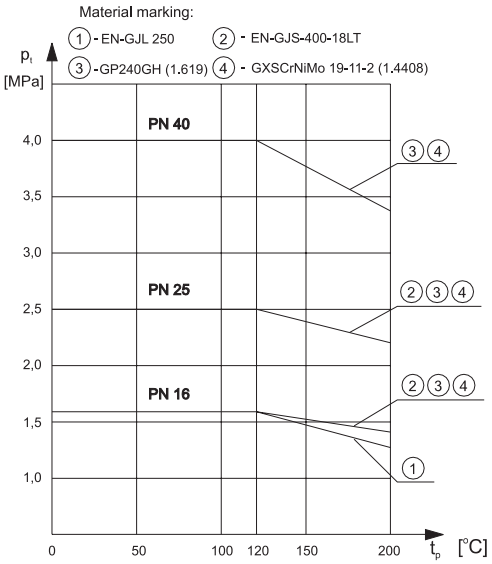
[1] other K_{VS} ratios subjecto to order specification.
[2] other ranges subject to order specification.

MATERIALS as per PN

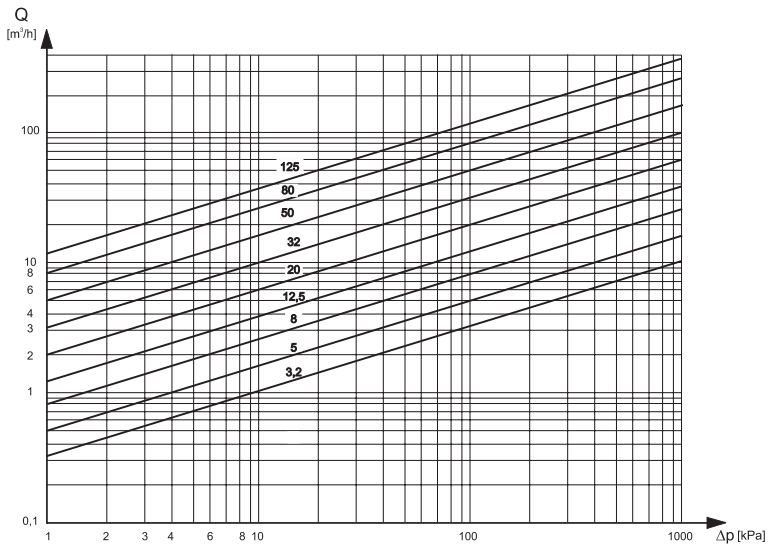
Regulator	ZSN 9.1	ZSN 9.2
VALVE (01)		
Body	grey iron EN-GJL-250 spheroidal iron EN-GJS-400-178LT carbon steel GP240GH (1.0619) stainless steel GX5CrNiMo 19-11-2 (1.4408)	
Plug and seat	X6CrNiMoTi 17-12-2 (1.4571)	
Guide sleeve		
Packings	EPDM[3]	
ACTUATOR (02)		
Housing	carbon steel S235JRG2C (1.0122)	stainless steel X6CrNiTi 18-10 (1.4541)
Stem	X17CrNi 16-2 (1.4057)	
Diaphragm	EPDM + tpolyester fabric[3])	
Packing	EPDM[3]	
Adjuster (03)		
Adjuster components	carbon steel C45 (1.0503)	
Springs	spring steel 60Si7	
FLIP-FLOP (04)		
Flip-flop components	X17CrNi 16-2	
Packings	EPDM[3]	

[3] other materials, subject to medium type.

NOMINAL PRESSURE, WORKING TEMPERATURE AND WORKING PRESSURE



FLOW DIAGRAM FOR WATER



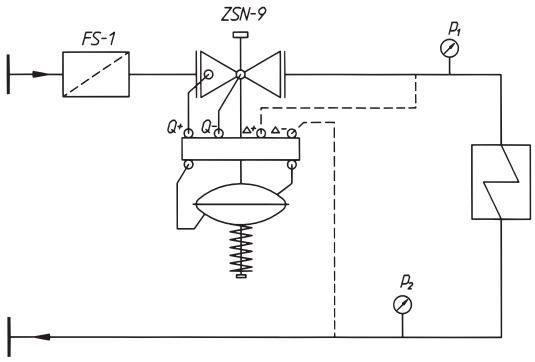
INSTALLATION

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.

EXAMPLES OF APPLICATION

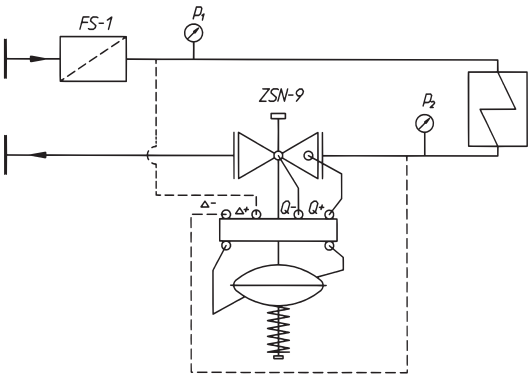
Control $\Delta p = p_1 - p_2$ and reduction of "V"

Supply-mounted



—— existing connections
----- connections to be added (pipe ∅ 6 x1)

Return mounted



—— existing connections
----- connections to be added (pipe ∅ 6 x1)

ACCESSORIES

Delivered:
- nut and cutting ring for impulse tube,

Optional (ordered separately):
- strainer FS1,
- straight connection pipes ∅ 6×1,
- elbow connection pipes ∅ 6×1,
- connection stub NPT 1/4",
- impulse tube ∅ 6×1,
- adjustment wrench.

ORDERING

In your order specify regulator type and marking, ZSN9.1 or ZSN 9.2, DN nominal diameter, PN nominal pressure, flow ratio K_{vs}, body material, spring range, closure type (only for tight executions).

Example of order:

ZSN 9.1 – DN 50; PN 16; Kvs 32; spheroidal iron; 40…160 [kPa], tight.

Revision: ZSN9/08/2007
Valid until the next revision.