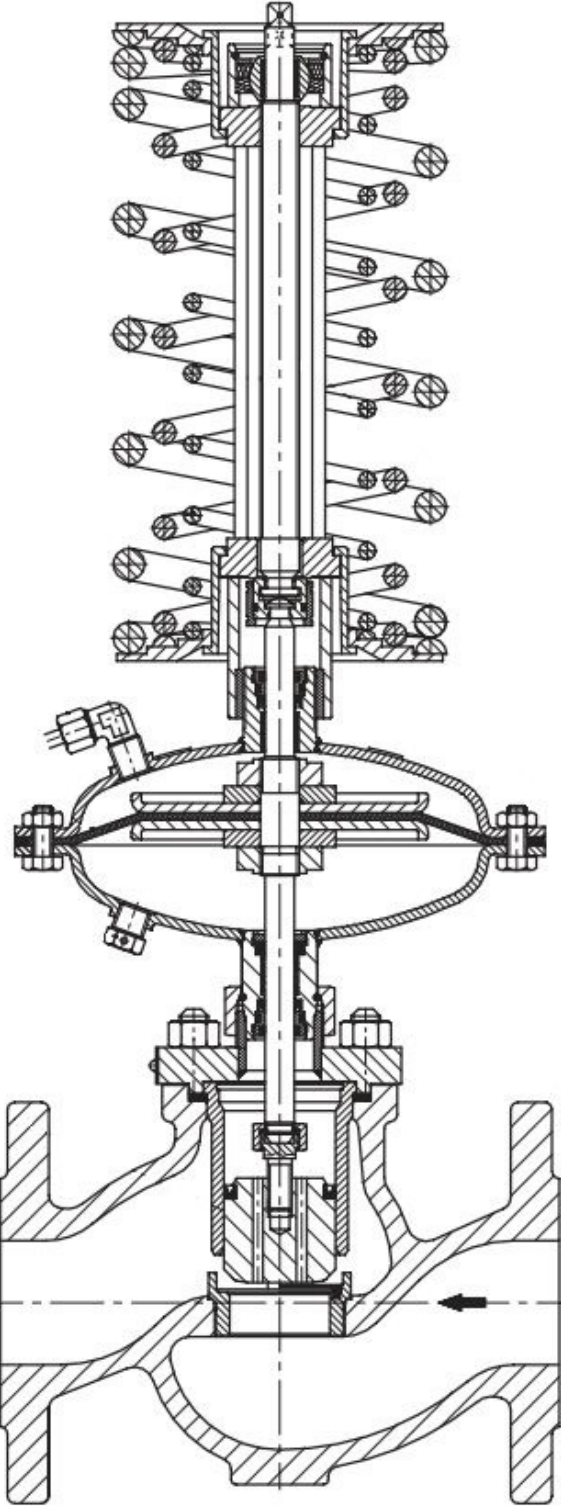



ZSN1 Instruction Manual



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To ensure trouble-free and safe operation of the valve, it is essential to be familiar with the contents of this ZSN1 Instruction Manual, and also with the general instructions for installation and operation, before installing and operating the valve.

Failure to observe or comply with these operating instructions will invalidate the manufacturer's guarantee and liability. The manufacturer's general conditions of sales and terms of delivery shall apply unless otherwise stated.

1. REGULATOR OPERATIONS

The regulator combines three main units: (fig.5) valve (01), actuator (02) and adjuster (03).

The valve of the regulator is single ported valve with balanced plug. Two options the actuator is available: diaphragm spring-loaded actuator (80 cm²) with clamped cases and diaphragm spring-loaded actuator (160 cm²) with cases jointed with bolts.

The adjuster of controlled pressure is mounted axially along with the valve and actuator. The pre-set spring tension is already adjusted (60, 61, 62). The valve of the regulator is of fail-to-open type. The controlled pressure is delivered to the top of actuator's (02) diaphragm through connection pipes and the shut off valve (24). The second chamber of the actuator is vented to atmosphere with venting plug (25). As pressure increases and exceeds the pre-set adjuster's (03) spring tension (60, 61, 62), the diaphragm is pushed down which results in changing the position of stem (37) and closing the valve with plug (5) until the pressure reaches the pre-set level. The control pressure should be sampled downstream from the regulator. The shut off valve (24) enables either choking or shutting off of the control pressure. It also vents the actuator's chamber as well as protects actuator's diaphragm against hydraulic strokes.

2. TECHNICAL SPECIFICATION

DN		15	20	25	32	40	50	65	80	100	
KV _s ¹⁾ (m ³ /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	
Sound level Z		0,65	0,6	0,55		0,45	0,4		0,35		
Control characteristic		linear									
Setting range (kPa) ²⁾		40...160; 100...400; 200...800; 280...1120									
Max. pressure in the actuator chamber (MPa)		2,0									
Max. allowable pressure drop on valve (MPa)		1,2					1,0				
Valve pressure rating		valve body of grey cast iron					PN 16				
		valve body of ductile iron					PN 16; PN 25				
		valve body of carbon steel or stainless steel					PN 16; PN 25; PN 40				
Max. fluid temperature (°C)		steam					200				
		water					150				
		gas					80				

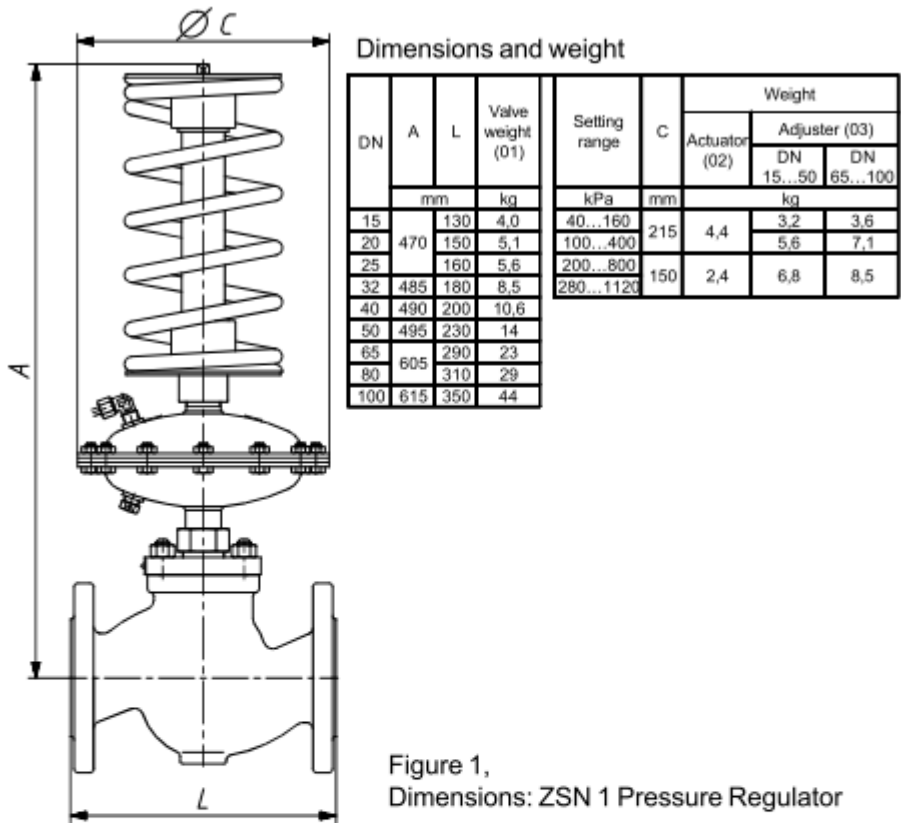


Figure 1,
Dimensions: ZSN 1 Pressure Regulator

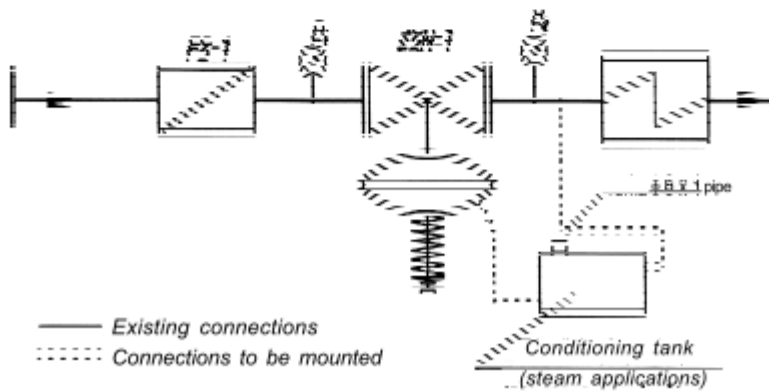


Figure 2
Application of ZSN 1 Pressure Regulator

3. SERVICE CONDITIONS

Following requirements must be met to provide reliable pressure regulator operation:

Prior to mounting the valve to the piping, the pipe should be thoroughly cleaned from dirt, rust, rolling and welding scale and other foreign bodies.

Fit a FS 1 strainer upstream of the regulator

Don't fit the product which appears to be damaged while shipped or stored.

Damages should be repaired and the product should be inspected prior to start-up.

Remove shipping plugs, make sure that the valve is free of dirt and foreign bodies inside.

Make sure that the ambient temperature range is from -25 to 80°C

Clean the filter pack periodically.

Inspect the regulator at least once a year and remove internal impurities if necessary.

4. INSTALLATION

The regulator is designed to be fitted with flange connection. The adjuster should be in vertical position. Acceptable angle deviation is 30°. It is necessary to direct the adjuster downward if the fluid temperature exceeds 100°C. If it is necessary to fit the regulator in horizontal position, additional mounting bracket will be required.

The regulator should be fitted into the pipeline together FS-1 strainer, which should be mounted by the regulator's inlet flange according to marking indicated at bodies of valve and strainer.

The minimal straight pipeline section should be at least five times longer downstream and upstream than the regulator's valve diameter.

Both regulator and strainer should be protected against welding scale

The 6x1 copper connection pipe should be connected to actuator's chamber through shut off valve. Using connectors, fittings and pipes of extensive length should be avoided due to their resisting features.

A pressure gauge should be mounted next to pressure sampling point.

It is necessary to mount a conditioning tank (fig. 4) for steam application at 150-200°C. Both tank and actuator's chamber should be filled with water. Otherwise the diaphragm and actuators sealing would be damaged.

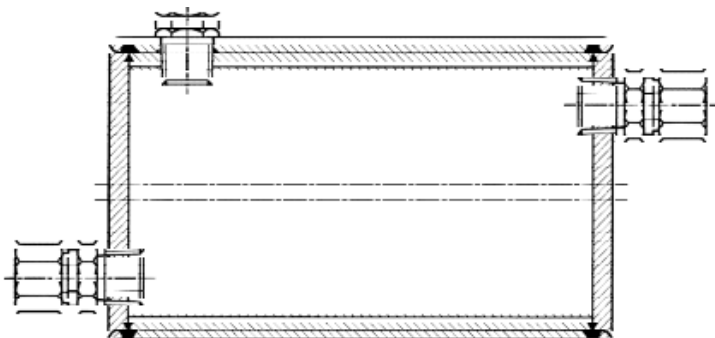


Figure 4, Conditioning tank

5. STARTING UP

During the mounting of the regulator, the shut off valve (24) should be closed tightly by the right turning the stem (see fig. 3 item. 2).

The pre-set adjuster (03) spring tension should be the smallest. As the connecting pipe is connected, open the shut off valve so the fluid supply actuator's chamber.

Close the pressure shut off and loosen the screw plug (32) to vent the chamber. Tighten the screw plug until leakage stops and open the shut off. According to the pressure level indicated on gauge set the desired pressure level tuning the adjuster's (03) springs tension with screw (68). As the tension setting is verified, affix a seal to screw (68) using the appropriate openings. The dynamic performance of the regulator is changed by controlling the flow of shut off valve (24).

6. HANDLING

On completing a start-up and adjusting no further service is necessary except periodical cleaning of the strainers pack.

7. MAINTANANCE AND REPAIR

As long as the warranty is not expired it is admissible only to adjust the springs' tension and eliminate diaphragm leakages (29) by tightening actuator's (02) housing bolts.

Repair and maintenance service include:

- replacing the soft seat (2b)
- replacing the plug gasket (7)
- replacing the actuator's diaphragm (29) and stem sealing (33, 35).

7.1 REPLACING THE SOFT SEAT.

If the soft seat occurs to be leaky, proceed as follows:

- a) shut off the fluid flow
- b) close the shut off valve (24) and remove the connection pipe from the actuator unit
- c) remove nuts (11) that fasten the pressing plate (3) and valve body (1)
- d) Remove the actuator with the adjuster, the pressing plate (3) and the plug (5)
- e) Remove the guiding sleeve (4) from the valve body (1)
- f) Unscrew the seat using special seat wrench. Clean thoroughly the thread and areas where valve body contacts the seat.
- g) Sealing/antiseizing compound (e.g. LOCTITE 767) should be applied to the threads prior to screwing the seat.

To reassemble, proceed in the reverse order. It is necessary to replace the bodygasket (9).

7.2 REPLACING THE BALANCED PLUG GASKET (7)

If it is necessary to replace the gasket of balanced plug, proceed as follows:

- a) Follow the 7.1 a,b,c,d,e
- b) Lift the connector (6) with plug until perpendicularly to the stem (37). Split stem and connector.
- c) Unscrew the plug (5) form the connector (6).
- d) Remove plug gasket (7) and put a new one.

To reassemble, proceed in the reverse order. Keep the same connection length for connector (6) and plug (5) as it was before disassembling. Replace the body gasket (9).

7.3 REPLACING ACTUATOR'S DIAPHRAGM AND STEM SEALING.

If it is necessary to replace actuator's diaphragm (29) or/and stem sealing (33,35)of the actuator's stem (37), proceed as follows:

- a) Shut off the fluid flow remove the connection pipe.
- b) Unfasten the adjuster's (03) screw, spring tension should be set at minimal level.
- c) Unscrew both spring unit (60, 61, 62) and the screw (68) simultaneously to remove adjuster unit (03).
- d) To separate actuator's stem (37) and screw (68) move sleeve (59) towards actuator and disconnect connector (58) and ring (63).
- e) Unscrew nut (31)
- f) Unscrew nuts (11) and remove actuator unit (02) with all housing and plug (5) from the valve (01)
- g) Lift the connector (6) with plug until perpendicularly to the stem (37). Split stem and connector.
- h) Unscrew nuts (39) and disassemble bottom (18) and top actuator's housing.
- i) Unscrew nut (26) and remove diaphragm plate (28) and used diaphragm (29).
- j) Unbolt screw plug (32) and renew stem sealing (33, 35).

To reassemble, proceed in the reverse order. Renew gasket (9). Apply threadlocker (e.g. LOCTITE 243) to threaded connection between adjuster and actuator units. Apply silicon based sealing compound UNISILIKON L50/ 2 to actuator's stem, plug and guiding face of regulating screw. Apply antiseize LOCTITE 767 compound to thread of regulating screw.

8. TROUBLESHOOTING

- a) Diaphragm housing (19) leakage:
 - fasten the housing bolting,
 - Replace the diaphragm (29) with a new one,
- b) Stem or body gasket (9) leakage:
 - Install new gaskets,
- c) soft seat leakage:
 - remove foreign matter from the inside of valve body,
 - Install a new seat,
- d) The regulator's erratic control
 - inspect control pipes and shut off valve for clogging and clean them if necessary
 - Install new diaphragm if damaged
 - Inspect the lock connector (6, 8) for correct connection.

The stem (37) will relock as pressure is applied to diaphragm from the adjustor (03) side.

9. SAFETY CONDITIONS

Observe following rules for safe regulator service:

- Prior to removal the regulator from the pipeline or dismantling parts contacting the process fluid, make sure the parts are not pressurized with the process fluid.
- Adjuster's springs are initially tensioned. The design of actuator protects them from full extension. For safety reasons protect springs while they are being removed.
- If the conditioning tank is applied, it should be periodically inspected and refilled with water. The regulator should be vertically oriented with the adjuster directed downward. The conditioning tank should be installed higher than actuator's chamber to prevent the installation from aeration of and water outflow.

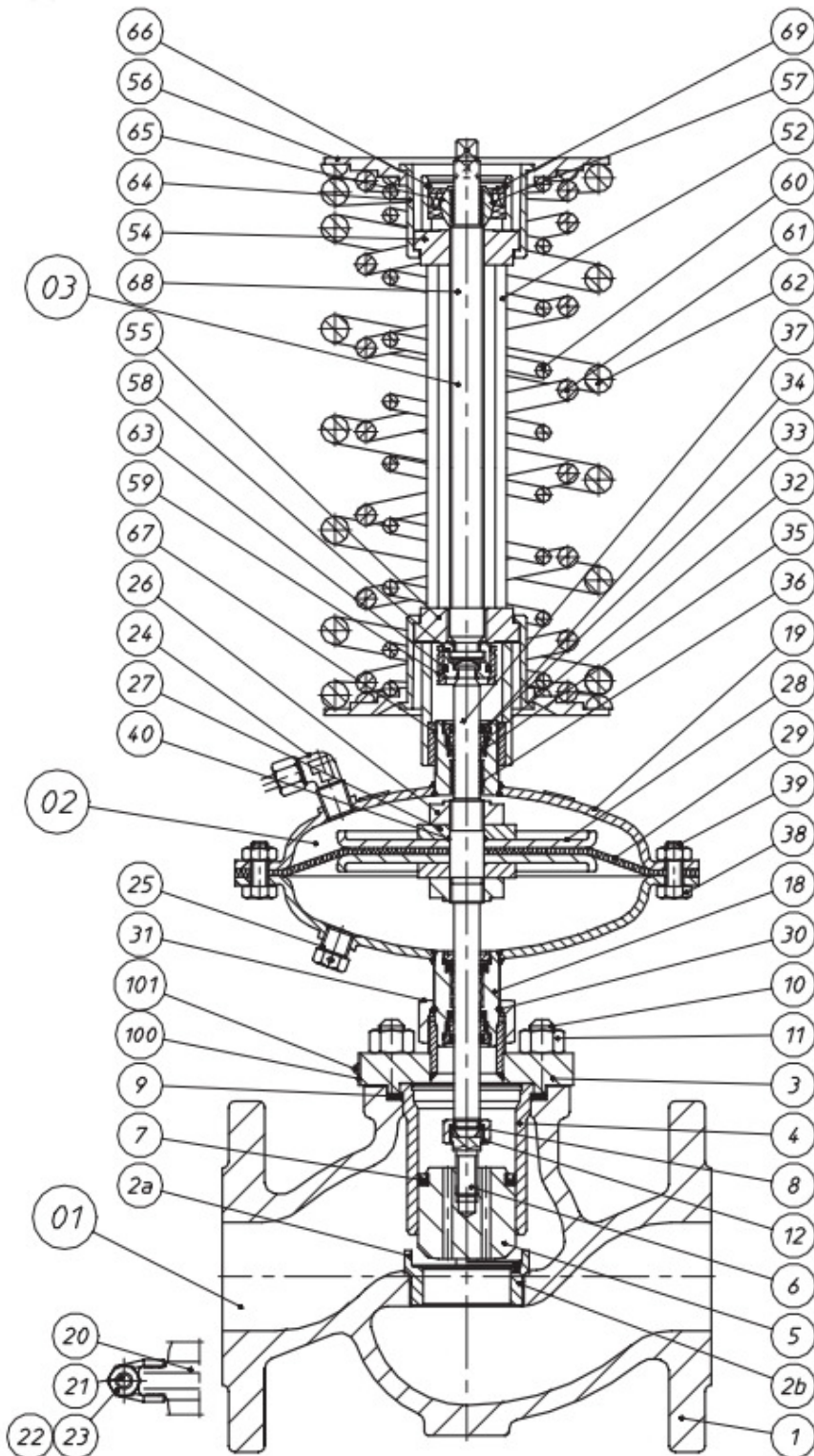
10. UTILIZATION

When the valve life time ends it is necessary to disassembly it. All parts should be segregated according type of material: metal parts (non ferrous metals, stainless steel, carbon steel), rubber (diaphragms, gaskets) and plastics (packing, plastic plugs, cable enters). These materials should be recycled according to rules for this kind of materials. The valve does not contain any materials that are dangerous for the natural environment after the process of utilization.

11. SPARE PARTS

Basic spare parts: diaphragm (29), soft seat (2b), sealing components of plug (7) and stem (33, 35), valve body gasket (9). Other spare parts of regulator are also available for customer request. The request should include regulator's specification: type, size, spring range, Kvs rating and the part's name and number according to fig. 5

12. DRAWINGS



No. at drawings	Parts name	Unit marking
1	Body	Valve 01
2a	Metal seat	
2b	Soft seat	
3	Plate	
4	Plug's guiding sleeve	
5	Plug	
6	Connector	
7	Plug gasket	
8	Elastic ring	
9	Valve body gasket	
10	Screw	
11	Nut	
12	Nut	Actuator 02
18	Bottom actuator housing	
19	Top actuator housing	
20	Bracket unit	
21	Bracket screw	
22	Bracket nut	
23	Bracket washer	
24	Shut off valve	
25	Venting plug	
26	Special nut	
27	Washer	
28	Diaphragm plate	
29	Diaphragm	
30	Elastic ring	
31	Nut	
32	Screw plug	
33	O-ring	
34	O-ring	
35	Sealing ring	
36	Guiding sleeve	
37	Stem	
38	Screw	
39	Nut	
40	O-ring	Adjuster 03
52	Yoke	
54	Tension plate	
55	Resistant plate	
56	Spring's plate	
57	Joint	
58	Connector	
59	Sleeve	
60	Spring I	
61	Spring II	
62	Spring II	
63	Gasket ring	
64	Sleeve	
65	Fence	
66	Elastic ring	
67	Threaded sleeve	
68	Tension screw	
69	Washer	
100	Name plate	
101	Grooved pin	

13. ADDITIONAL ITEMS

Attached items:

- A nut and locking ring for connecting pipe/

Optional items for request:

- FS 1 strainer
- Connector for Ø 6 x 1 pipes
- Threaded fitting 1/4" NTP
- Ø 6 x 1 connection pipe
- Shut off valve
- Calibration wrench
- Seat wrench
- Conditioning tank

14. CONTACTING US

Details / specific information (Operating instructions with spare parts lists) are available for download on our website.

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