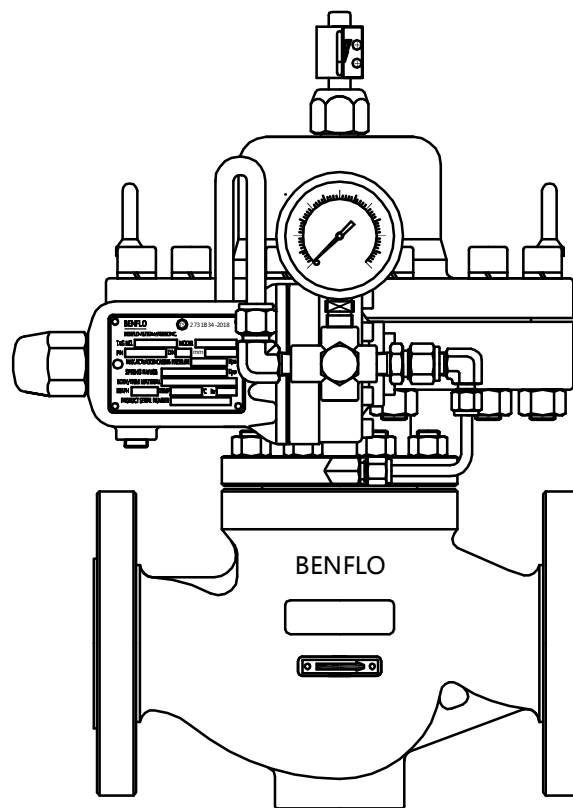


Internal-Setting Pilot Pressure reducing Valve (High Precision)

## Type SP100H



**Ben**FLO  
Automation

BENFLO AUTOMATION INC.

(Partner Of SaiLing Automation Equipment Co.,Ltd.)

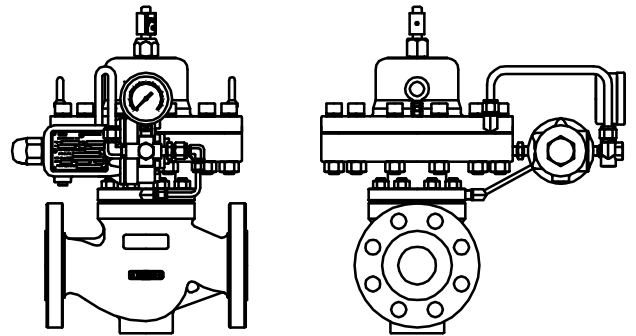
SP100H Internal-Setting Pressure Regulating Valve(hereafter called as pressure regulating valve)

#### Caution

Due to the installation, operation or maintenance performed by non-professional persons may cause equipment damages or injuries. The work must be performed by professional persons.

#### Product Overview

SP100H Self-operated Pressure Regulator is a Internal-setting direct-operated pressure regulator. It can be use for downstream pressure control. The lowest control pressure is 500 KPa and the highest control pressure is 8000 KPa. The lowest operating temperature is -48°C and the highest operating temperature is 120°C.



#### Product Feature

- Compact Structure---The embedded spring structure makes the pressure regulating valve more compact and well protected.
- Easy Pressure Regulation---The screw regulation device can realize easy, convenient and quick pressure regulation.
- High Precision---SP100H pressure regulating valve applicalbe to the high pressure control, fixed net difference spring action to produce the equivalent of the control pressure is very small. The pressure regulating valve has high control precision.
- Withstand Pressure Difference---The balance main valve plug can make the pressure regulating valve withstand higher pressure difference.
- Soft Sealing Seal---The valve plug is designed as software sealing structure and can easily cut off the flow.
- Stability Control---The setting regulator and main control valve are mutually independent control, do not interfere with each other, to make the control more stable.
- Overload Safety---The safety shall be ensured under any circumstances. The self-operated regulator allows medium to enter the actuator, so the overload of the system usually badly damaged the regulator. The overload design mechanism of SP100H regulator can safely bear the overload pressure one or few dozens times higher than the upper limit pressure of the regulation range. The overload pressure can reach the nominal pressure of the valve in most configurations.

- With Pressure Gauge---The pressure gauge is standard configuration of the pressure regulating valve. It makes the installation and commissioning more convenient.
- Easy Maintenance---The selection criteria of the every structure of the SP100H regulator is to make sure the most convenient installation and maintenance while ensuring the performance requirements are met.  
The top-mounted push-down installation method allows you to inspect and maintain the internal parts without any special tools before disassembling the regulator.  
The bonnet central alignment method is adopted to avoid all unnecessary repeat matching operation. The internal parts have sufficient clearance to make sure they can be easily taken out or put in.
- Universal Parts---SP100H regulator has extremely high parts universality with the whole self-operated products series manufactured by our company. It helps to reduce the inventory of spare parts.

Specification Series and Performance Indicator

- Body Size(Flanged connection)  
DN20(3/4"),DN40(1 1/2"),DN50(2"),DN65(2 1/2")  
DN80(3"),DN100(4"),DN150(6"),DN200(8")
- Pressure Rating  
PN16,40,64 ANSI 150LB,300LB,600LB  
Can also be customized
- Feedback Interface  
ZG1/4" 10mm card set of connector is provided in the plant, 10mm weld-end connector will be provided if the control pressure is over 4.0MPa.
- Closing Class  
<6% of upper limit of regulation range
- Flow Characteristics  
L (Normal)  
EQ%(Special processing )
- P1MAX: 9.0MPa  
P2MAX: 8.0MPa

● Flow Factor

Valve size	20	25	40	50	65	80	100	150	200
KV	6	8	22	35	58	90	140	350	450

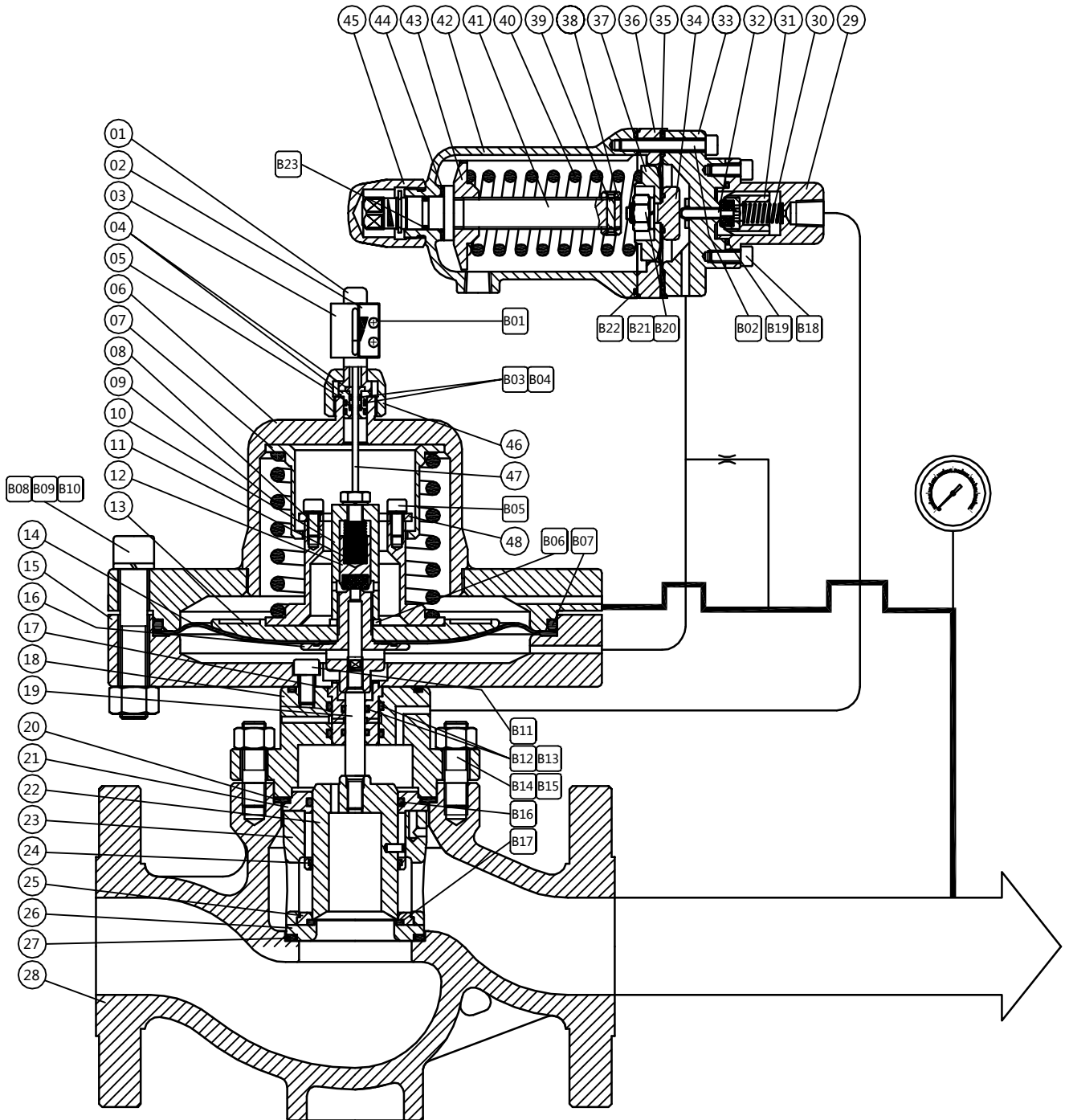
Note: Diameters listed in above table are standard diameters. The valves can also be made with reduced diameters.

- Pressure Measuring Method  
Measured at outside of the valve or valve flange.
- Leakage Class  
Soft-sealing VI
- Operation Temperature  
For the soft sealing valve, the temperature depends on the material of the sealing part and diaphragm.  
NBR -29-82°C  
FKM -8-120°C  
SR -48-85°C  
EPDM -38-115°C

Spring Range, The Actuator Configuration, Difference Pressure and Precision

Actuator number	Drive DP	Spring range	Theoretical Precision	Difference Pressure MPa									Max actuator pressure
				Valve Size									
				20	25	40	50	65	80	100	150	200	
Z08.01.00	50KPa	300-1200KPa	5%	5.0	5.0	5.0	5.0	/	/	/	/	/	8.5MPa
		1000-3600KPa	4%	5.0	5.0	5.0	5.0	/	/	/	/	/	
		2500-8000KPa	3%	5.0	5.0	5.0	5.0	/	/	/	/	/	
	100KPa	300-1200KPa	5%	8.0	8.0	8.0	8.0	/	/	/	/	/	
		1000-3600KPa	4%	8.0	8.0	8.0	8.0	/	/	/	/	/	
		2500-8000KPa	3%	8.0	8.0	8.0	8.0	/	/	/	/	/	
Z08.02.00	50KPa	300-1200KPa	5%	/	/	/	/	5.0	5.0	5.0	/	/	
		1000-3600KPa	4%	/	/	/	/	5.0	5.0	5.0	/	/	
		2500-8000KPa	3%	/	/	/	/	5.0	5.0	5.0	/	/	
	100KPa	300-1200KPa	5%	/	/	/	/	8.0	8.0	8.0	/	/	
		1000-3600KPa	4%	/	/	/	/	8.0	8.0	8.0	/	/	
		2500-8000KPa	3%	/	/	/	/	8.0	8.0	8.0	/	/	
Z08.03.00	50KPa	300-1200KPa	5%	/	/	/	/	/	/	/	4.8	4.8	
		1000-3600KPa	4%	/	/	/	/	/	/	/	4.8	4.8	
		2500-8000KPa	3%	/	/	/	/	/	/	/	4.8	4.8	
	100KPa	300-1200KPa	5%	/	/	/	/	/	/	/	8.0	8.0	
		1000-3600KPa	4%	/	/	/	/	/	/	/	8.0	8.0	
		2500-8000KPa	3%	/	/	/	/	/	/	/	8.0	8.0	
Travel mm				12			22			32			

Component Structure, Parts List and Parts Material of Pressure-Regulating Valve



SN	Name of Part	Material	SN	Name of Part	Material
01	End Cover	304SS	35	Diaphragm	NBR,FKM,SR , EPDM
02	Scale	304SS	36	Press Ring	304SS , 316L
03	Scale Seat	304SS	37	Diaphragm Plate	304SS
04	Guide Bush	H62	38	Block Ring	304SS
05	Guide Bush	PTFE	39	Pin	304SS
06	Diaphragm Case	304SS,316L	40	Spring	304SS , 60Si2MnA
07	Spring Seat	20#,304SS,316L	41	Screw	304SS
08	Spring Seat	20#,304SS,316L	42	Spring Cover	CF8
09	Spring	60Si2MnA,304SS	43	Nut	Hpb59-1
10	Nut	304SS , 316L	44	Washer	PTFE
11	Spring	304SS	45	Protective Cover	304SS
12	Plug	304SS , 316L	46	Nut	304SS
13	Diaphragm Plate	20#,304SS,316L	47	Poniter	304SS,316L
14	Diaphragm	NBR,FKM,SR , EPDM	48	Press Ring	304SS , 316L
15	Diaphragm Case	304SS,316L			
16	Connecting Set	304SS , 316L			
17	Guide Bush	H62			
18	Bonnet	WCB,CF8,CF3M			
19	Valve Stem	304SS , 316L	B01	Screw	304SS
20	Sealing Ring of Bonnet	316SS+Graphite	B02	Socket Head Screw	304SS
21	Guide Bush	304SS , 316L	B03	O-ring	NBR;FKM;SR
22	Plug	304SS , 316L	B04	O-ring	NBR;FKM;SR
23	Cage	CF8,CF3M,304SS,316L	B05	Socket Head Screw	304SS , 316L
24	Guide Bush	PTFE	B06	Spring Washer	304SS
25	Press Ring	304SS , 316L	B07	O-ring	NBR;FKM;SR
26	Valve Seat	304SS , 316L	B08	Hex Nut	304SS
27	Sealing Ring of Seat	316SS+Graphite	B09	Spring Washer	304SS
28	Body	WCB,CF8,CF3M	B10	Socket Head Screw	304SS
29	End Cover	304SS,316L	B11	Socket Head Screw	304SS
30	Spring	304SS	B12	O-ring	NBR;FKM;SR
31	Plug	304SS , 316L	B13	O-ring	NBR;FKM;SR
32	Push Rod	304SS , 316L	B14	Stud	45#;304SS
33	Body	304SS , 316L	B15	Hex Nut	45#;304SS
34		304SS , 316L			

SN	Name of Part	Material
B16	O-ring	NBR;FKM;SR
B17	O-ring	NBR;FKM;SR
B18	Socket Head Screw	304SS
B19	O-ring	NBR;FKM;SR
B20	Hex Nut	304SS
B21	Spring Washer	304SS
B22	O-ring	NBR
B23	O-ring	NBR

### Operational Principle

All fluid input the Main Control Valve, the pressure before the valve be guide to setting Regulator, stable and regulate the pressure before the valve by the setting Regulator, then input to the Main Control Valve's bottom diaphragm cavity, Generate thrust with the force of the spring balance remove the plug of the Main Control Valve. Air fluid output to the Main Control Valve, meanwhile the pressure be guide to top diaphragm cavity, until the thrust (with the force of the spring) be balanced with the thrust of the bottom diaphragm cavity, then the plug of the Main Control Valve stabled on the correct position of the setting flow or pressure. When the setting flow or pressure has be changed, then the top & bottom diaphragm cavity thrusts balance breakdown, below the valve's reduced, plug opening, before the valve's pressure increase, the plug closing. So, the below the valve's pressure still be controlled in the setting extent, whatever the process condition changed.

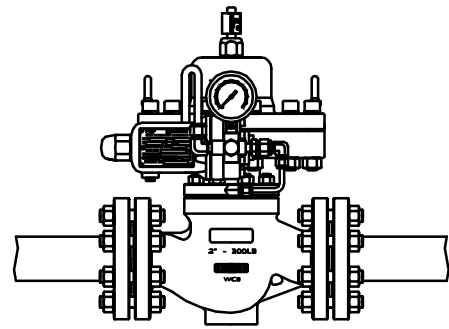
Throttle hold the difference pressure of the top & bottom diaphragm cavity in the dynamics, to control the plug remove. When the piping shutoff below the valve, flow is zero, the throttle defunct, two diaphragm cavity's pressure tends to be equal, plug will be closed by the spring thrust, at last, when the pressure be hold, regulator closed, the pressure will be hold below the valve.

Setting pressure according to the setting regulator, setting regulator's output pressure according the spring thrust. So adjust the setting regulator's spring thrust control the output pressure of the whole regulate system. Rotate the adjustment screw of the setting regulator, easy to adjust pressure of the control valve.

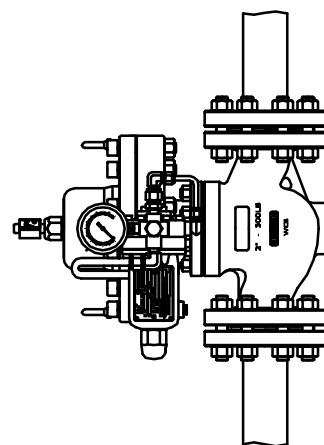
**Installation**

- The medium flow direction should be consistent with the arrow direction when installing the pressure relief valve. The relief valve should be installed on the tube as horizontal.

- When the piping will be pressure tested after the installation of the regulator, the global valve or ball valve on the pressure introduction pipe should be closed.



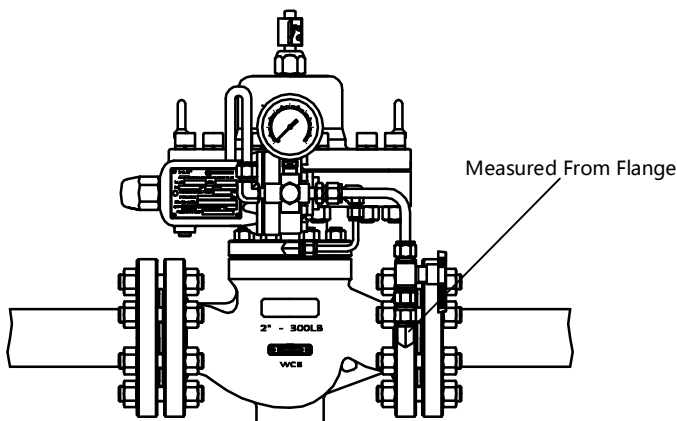
Right



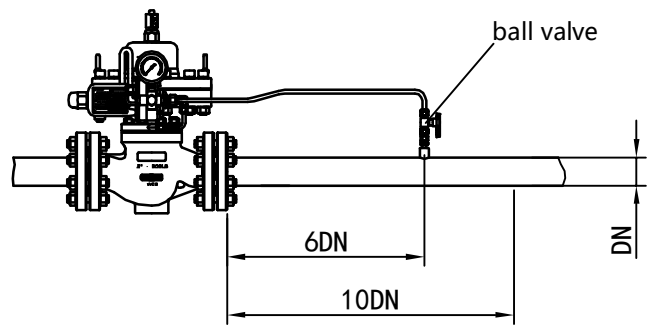
Error



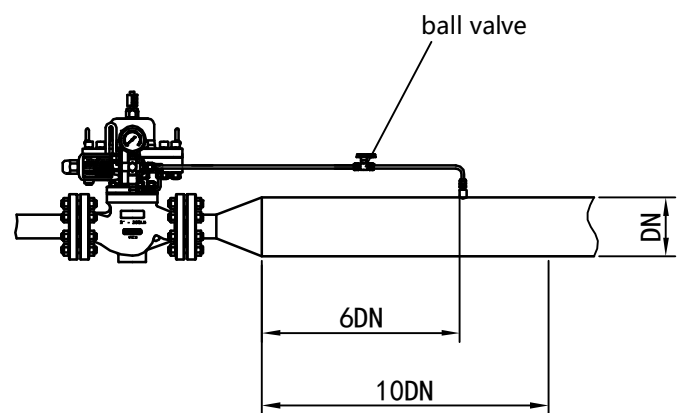
- Shut-off valves should be installed either at the upstream and downstream of the regulator for inspection and maintenance. The by-pass valve should be installed for emergency in important applications.
- The piping should be flushed or purged before the installation of the regulator to remove any particulates or welding slag.
- The regulator with pressure measured from the valve flange can be directly installed on the piping.



- The pressure regulating valve is external measured pressure. The pipe should be installed with the pressure guide pipe. The pressure guide pipe should be installed with of the ball valve or globe valve. The 10DN straight pipe should be installed after the valve. The pressure measured point should be located at 6DN. If the diameter expansion pipe is behind the valve, refer to the diameter of the expanded pipe.



Equal Diameter



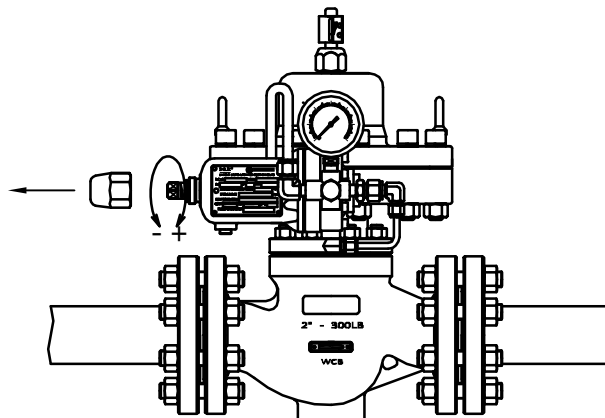
Downstream expanding

**Warning**

- After the pressure regulating valve is delivered to the site, its pressure should be tested. The pressure regulating valve is different from the common valve. The water pressure test is forbidden for the pressure regulating valve. Once the water flows into the control system, it will severely affect the operation of the pressure regulating valve. For pressure test and leakage detection, first use clean air or nitrogen and then use the foam. The leakage detection pressure should not be over the permitted operation pressure of the valve.

Operation

- To make sure the components of the regulator are correctly installed before the regulator is put into operation.
  
- To open the ball valve or globe valve on the pressure on the guide pipe. First close the bypass valve(if provided) and open the downstream globe valve, guarantee that downstream system has certain flow, slowly open the upstream globe valve and watch the pressure gauge, if no exception, you can fully open the upstream globe valve, the pressure regulating valve enters operation state. To change the output pressure, you should open the protection cover on the actuator and rotate the adjusting screw. To rotate clockwise, the pressure will increase. On the contrary, the pressure will reduce.



Mode Establishment

SP 100H ——— □ — □	DN: 20-DN20(3/4") 25-DN25(1") 40-DN40(1 1/2")	50-DN50(2") 65-DN65(2 1/2")	80-DN80(3") 100-DN100(4")
PN:	16-PN16 40-PN40 64-PN64	150-150LB 300-300LB 600-600LB	

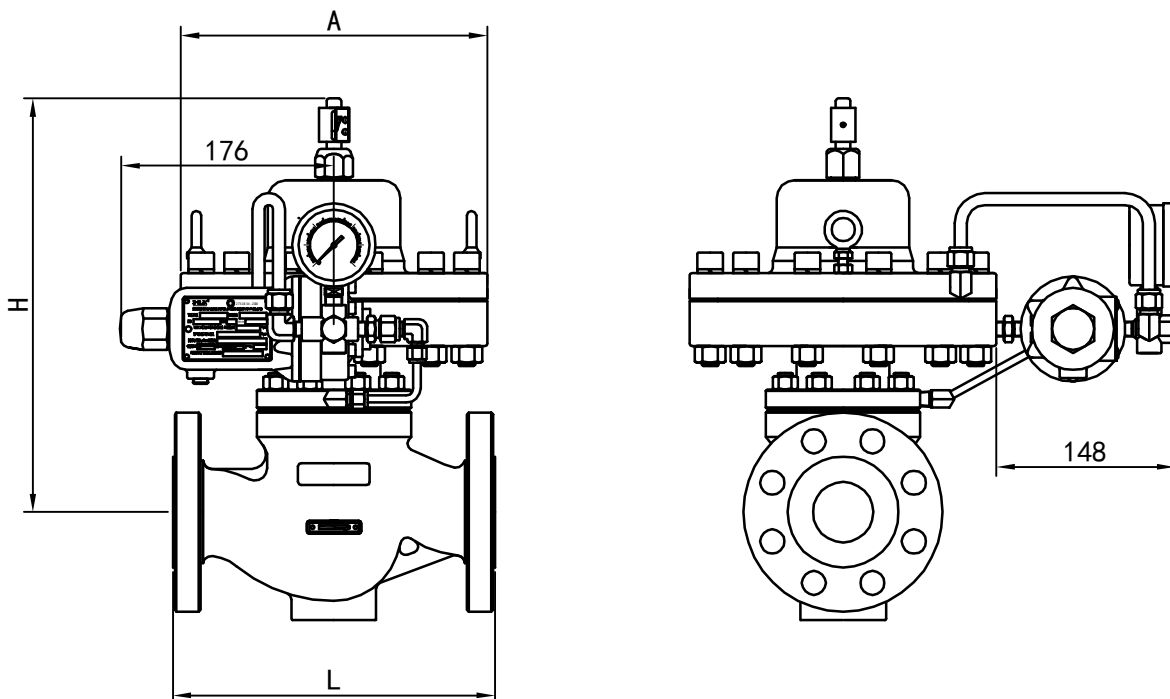
Description on The Nameplate

- |                                   |                                |
|-----------------------------------|--------------------------------|
| ● Type                            | ● Maximum Pressure of Actuator |
| ● Nominal Diameter                | ● Kv Value                     |
| ● Nominal Pressure                | ● Operating Temperature        |
| ● Material of Body/Internal Parts | ● Flange Standard              |
| ● Material of Diaphragm           | ● Serial Number                |
| ● Regulation Range                |                                |

Selection Criteria

- Pipeline Dimensions
- Medium
- Medium Temperature, Ambient Temperature
- Medium Density
- Upstream Pressure, Downstream Pressure
- Flowrate
- Pressure Measuring Method
- Setting Point
- Flange Standard
- Requirements on Material of The Body and Internal parts
- Other Special Requirements

Dimension



		20	25	40	50	65	80	100	150	200
L	PN16(150lb)	181	184	222	254	276	298	352	451	543
	PN40(300lb)	194	197	235	267	292	317	368	473	600
	PN64(600lb)	206	210	251	286	311	337	394	508	610
H		306	315	340	350	390	412	430	580	606
A	Z08.01.00	246								
	Z08.02.00	302								
	Z08.03.00	396								

Experience Sharing

- Dowerstream Safety Device

As for dowerstream pressure regulating valver, the safety of the downstream equipment must be seriously evaluated, the maximum downstream pressure may equal to the upstream pressure in this abnormal condition. The downstream safety valve or other safety-release devices must be installed, the tripping pressure of the safety valve should be higher than the setting pressure with a certain range, this range normally should be about 30%. The discharge capacity of the safety valve should be selected based on the full-opened discharge capacity of the regulator, the maximum flow of the by-pass valve should also be considered whenever necessary.

- The Calculation of The Flow Coefficient and Selection KV Value.

The detailed calculation of the flow cofficient will not be described here because the method is the same with normal valve, it should be noticed that the maximum openness of the valve should be not higher than 70% when the KV value is selected, the suitable range of the openness should be 10-60%.

- Selection of Regulation Range

The regulation range selected must cover the process setting required. There will be a number of regulation ranges can be used for the same setting value. The ranges should be selected to make the setting value is at the middle or uper middle of the range, it is because that the theorretical deviation of every combination of spring and actuator is fixed, the deviation will be smaller when the setting value is closer to the upper limit of the regulation range. Generally, it is suitable to make the setting valve is in the 40-85% of the regulation range.

- Flow Characteristics

The "L" or "EQ%" chscharacteristics can be selected for the pressure regulating valve. "L" characteristics response should be quickly, but it may be unstable under small flow control. "EQ%" can be stably controlled in case of small flow, but the response is relatively slow in the small flow control.

- Selection of Pressure Measuring Method

The pressure measuring methods include field piping measurement and reguator flang measure. The field measurement has a higher accuracy. The flange measurement is easy for installation. Pressure measuring method has small effect on the upstream control regulator. The expansion of the medium should be considered carefully for the measuring method of the downstream control regulator. When the dimater of the regulator is the same with the downstream pipeline, the flange mersuring method should be selected. When the diameter of the downstream pipeline is larger than the regulator's, the filed pipeline measuring method should be selected.

- Selection of Actuator

It must be noticed that the regulator is different with conventional valve. The medium will enter the actuator and make direct contact with the diaphragm. Therefore, we should considere that whether there is any corroison to the diapgram will be caused by the medium or whether the temperature of the medium is higher than the allowed temperature of the diaphragm when we select the suitable material of the diaphragm.

## Type SP100H

### Internal-Setting Pressure Regulating Valve

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