

FUKUI

PSL-MD Series

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◆ Features

The PSL-MD series is a pilot-operated pressure relief valve developed for low-pressure tanks. The main valve adopts a diaphragm structure.

It is mainly used for liquefied gas storage tanks (LNG etc.) and liquefied gas carrying vessels. We have obtained type approval certificates from various classification societies.

- ◆ Large throat area

The valve has the largest possible throat area relative to the inlet diameter, making it possible to minimize the pressure relief valve size.

- ◆ High seat airtightness performance

This pilot-operated type offers high nozzle airtightness performance even in environments such as gas carrying vessels where vibration is expected. In addition, a membrane seat made of Teflon resin is used as the main valve seat.

- ◆ Multi-set capability

In the case of multi-cargo such as gas carrying vessels, the required set pressure varies depending on the cargo. Because the PSL-MD has multi-set capability, the set pressure can be changed easily.

◆ Certification

Classification society	MD()2		MD()3		MD()2 & MD()3
	Size	Pressure	Size	Pressure	
NK		1–10 kPa		1–250 kPa	-196 (Min.)
LRS	2*2	1–350 kPa		1–350 kPa	-196–205°C
BV	3*3	1–350 kPa	2*3, 3*4	1–350 kPa	196–125°C
DNV	4*4	250 kPa (Max.)	4*6, 6*8	250 kPa (Max.)	-196–125°C
KR	6*6		8*10, 10*12		
ABS	8*8	1–350 kPa	12*16, 14*18	1–350 kPa	-196–230°C
RS	10*10	1–350 kPa		1–350 kPa	-196–205°C
		1–350 kPa		1–350 kPa	-196–205°C

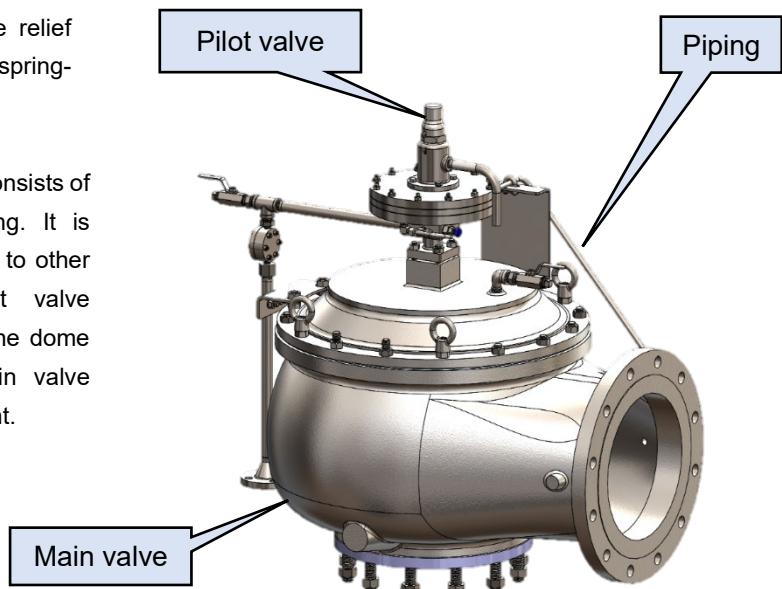
* Certifications are updated as needed. The latest certification range may differ.

* There are cases where products exceeding this pressure–temperature ratings can also be manufactured.

◆ Configuration of Pilot-Operated Pressure Relief Valve

The PSL-MD series is a pilot-operated pressure relief valve. The pilot-operated pressure relief valves offer more advantages than the spring-loaded pressure relief valve.

The pilot-operated pressure relief valve consists of the main valve, pilot valve, and piping. It is possible to install options corresponding to other specification requirements. The pilot valve actuates the main valve by controlling the dome pressure of the main valve. The main valve discharges the required discharge amount.

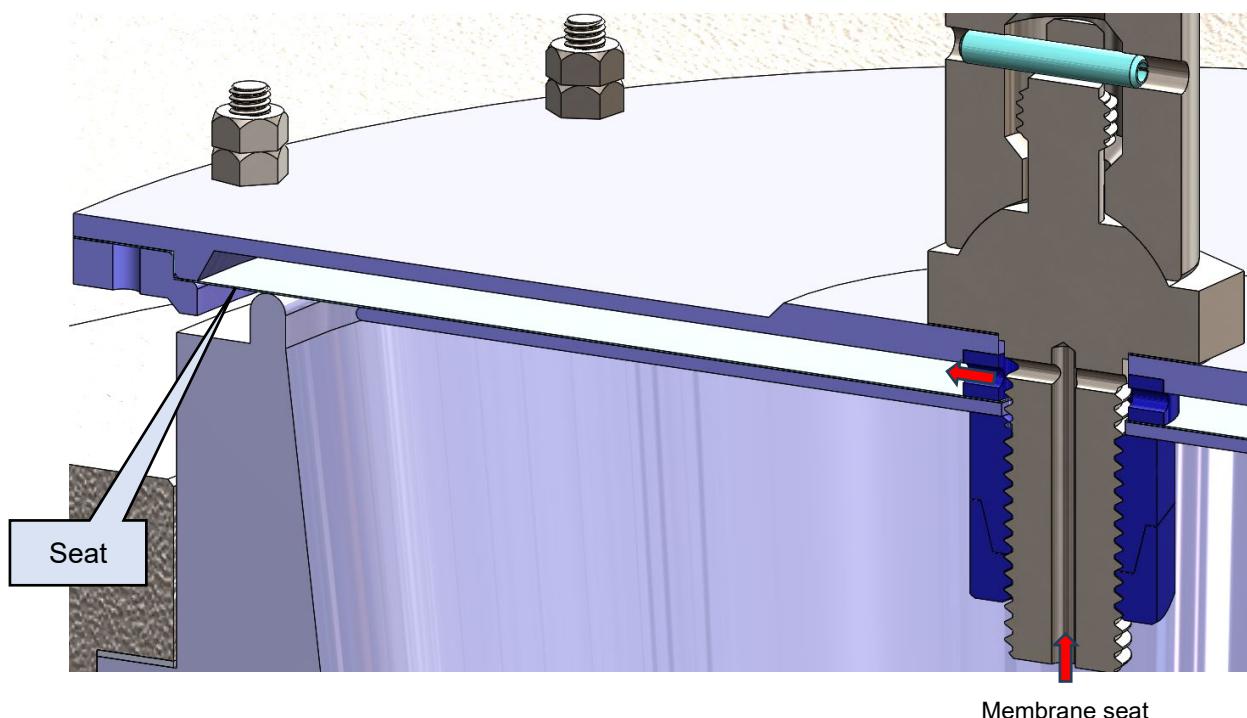


◆ Structure of Main Valve

The main valve adopts a membrane seat and diaphragm structure.

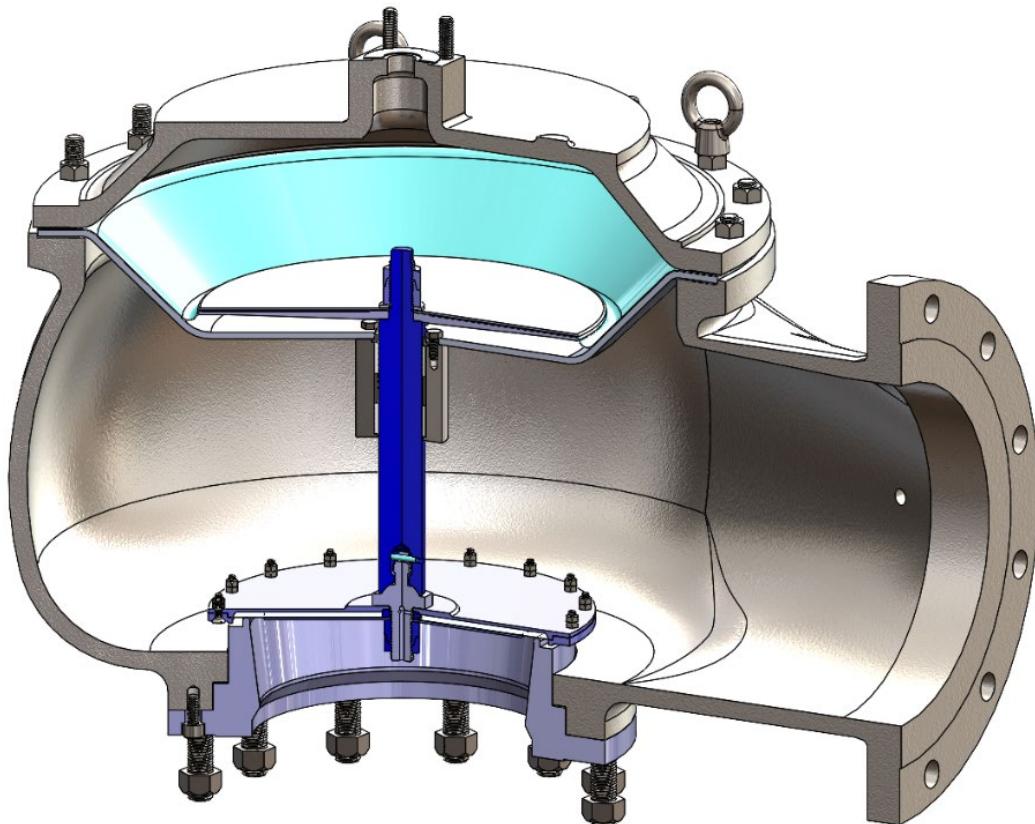
- ◆ Membrane seat

A membrane seat is adopted, introducing the system pressure to the back of the seat. By utilizing the seat pressure for nozzle air sealing, high airtightness is achieved.



◆ Diaphragm

A diaphragm structure that hardly causes friction loss is adopted to ensure reliable operation at low pressure. In addition, a large lift is used to achieve a high flow coefficient.



◆ Types of Pilot Valves

◆ Type of pilot valve

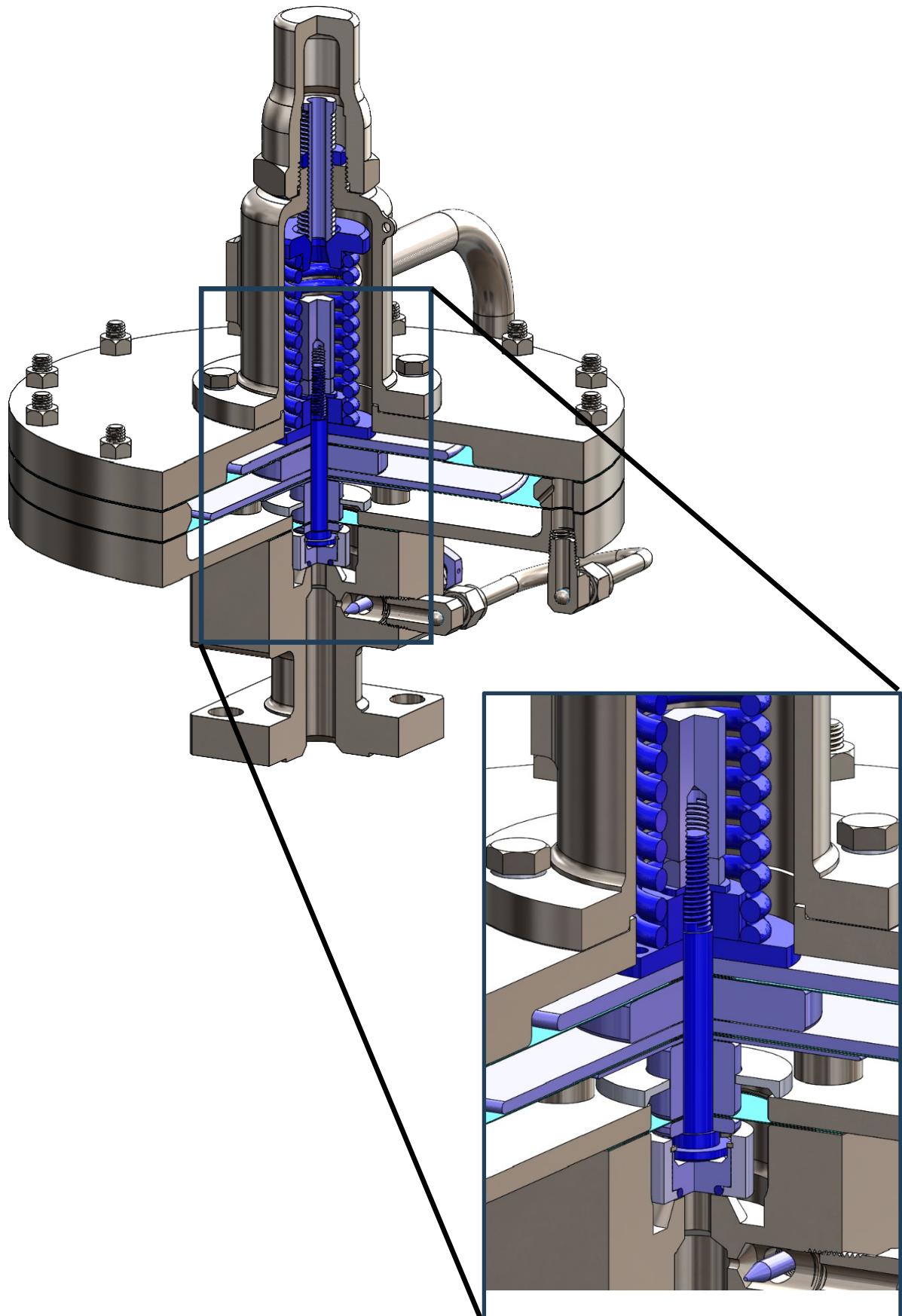
The pilot valve is of the pop action type that performs full lift without excessive pressure and of the flowing type that discharges fluid from the pilot valve during operation.

Various types are available according to positive pressure, differential pressure, ultra-low pressure, etc.

Pilot valve	Type	Pressure range	Remarks
P260STD	Standard type	3–350 kPa	This type covers a wide pressure range, which can be used for both positive and negative pressure. An O-ring seat is used.
P260ULP	Ultra-low-pressure type	1–3 kPa	This type uses a membrane seat to cope with ultra-low pressure.
P260DIFF	Differential pressure type	3–350 kPa	This type adopts a structure that accommodates differential pressure operation.

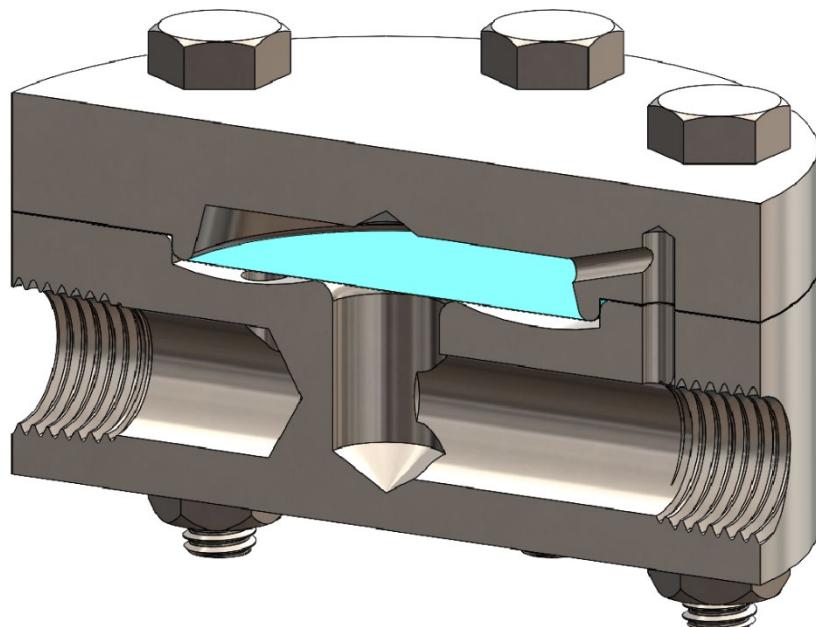
◆ Structure of Pilot Valve

P260STD

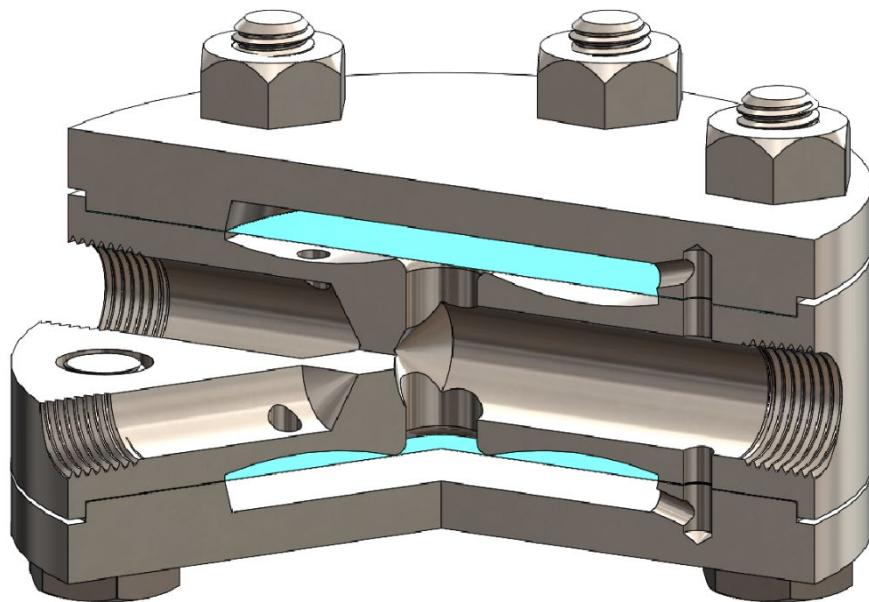


◆ Structure of Check Valve

This is a check valve developed exclusively for the PSL-MD series. It uses a membrane seat to minimize the cracking pressure and resealing pressure as much as possible. 2-port and 3-port types are available.



2-port type



3-port type

◆ Positive Pressure Operating Principle

◆ Symbol description

Symbol	Description	Symbol	Description
P_T	System pressure	A_T	Main valve disc pressure-receiving area
P_D	Dome pressure	A_D	Main valve diaphragm pressure-receiving area
P_S	Sense pressure	A_S	Sense diaphragm pressure-receiving area
P_B	Boost pressure	A_B	Boost diaphragm pressure-receiving area
F	Spring load (initial load)	ΔF	Increase in spring load due to pilot valve lift
N	Adjusting needle	O	Fixed orifice

◆ Pressure flow

The pressure flow is connected directly from the system pressure sensing line to the boost chamber, through the adjusting needle N to the sense chamber, and through the fixed orifice O to the main valve dome chamber. In addition, the pilot valve outlet and the bonnet vent section are open to the atmosphere.

◆ Valve closing condition

When the system pressure is below the popping pressure, all of the system pressure, dome pressure, sense pressure, and boost pressure becomes the same.

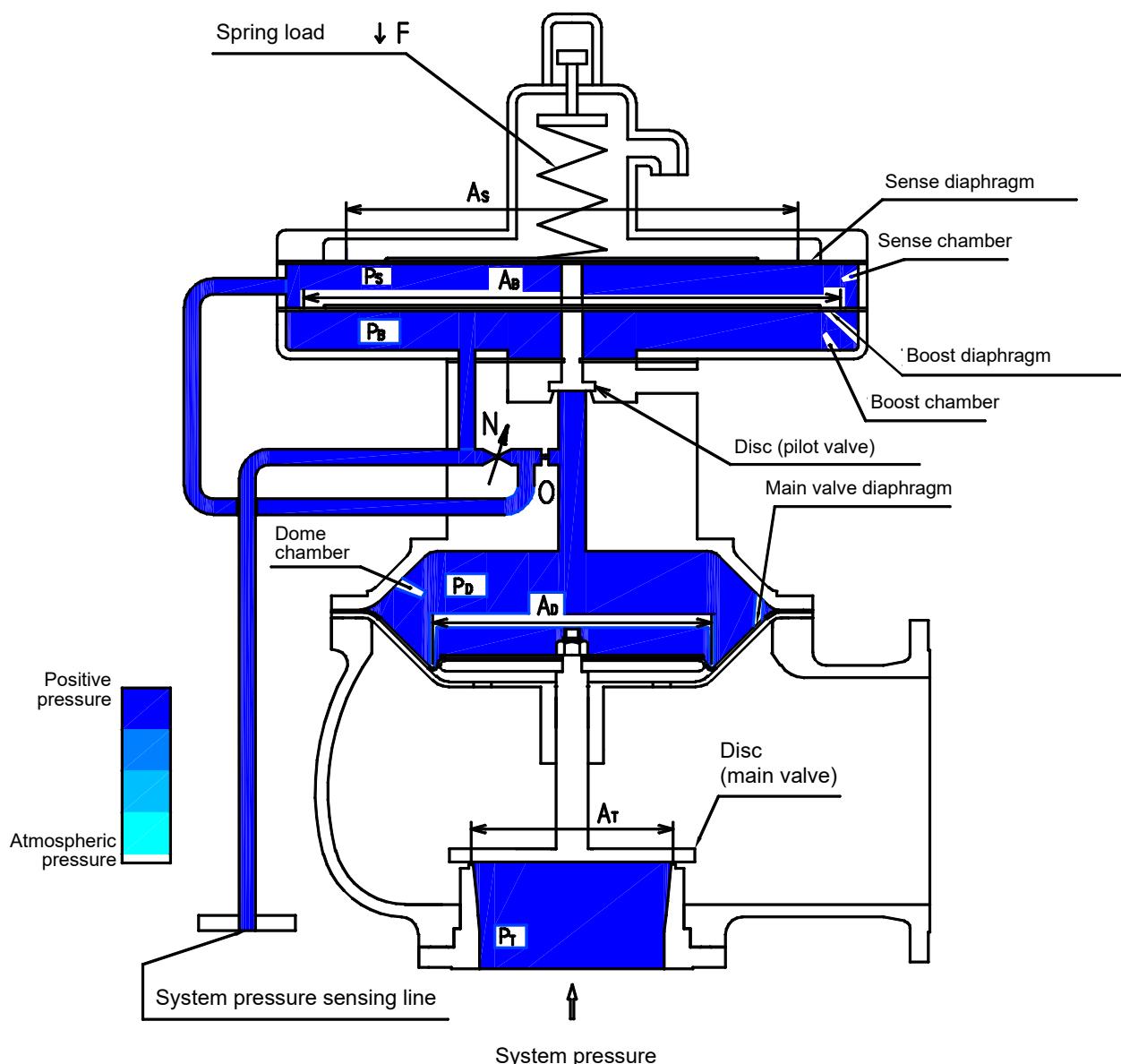
$$P_T = P_B = P_S = P_D$$

Because the main valve diaphragm pressure-receiving area is designed to be larger than the main valve disc pressure-receiving area, the main valve disc is firmly seated on the nozzle.

$$A_D > A_T \quad \therefore \downarrow A_D \times P_D > \uparrow A_T \times P_T$$

In the pilot valve, the sense pressure and boost pressure are balanced, resulting in the following condition.

$$\downarrow F > \uparrow A_S \times P_S$$



◆ Pilot valve operating condition

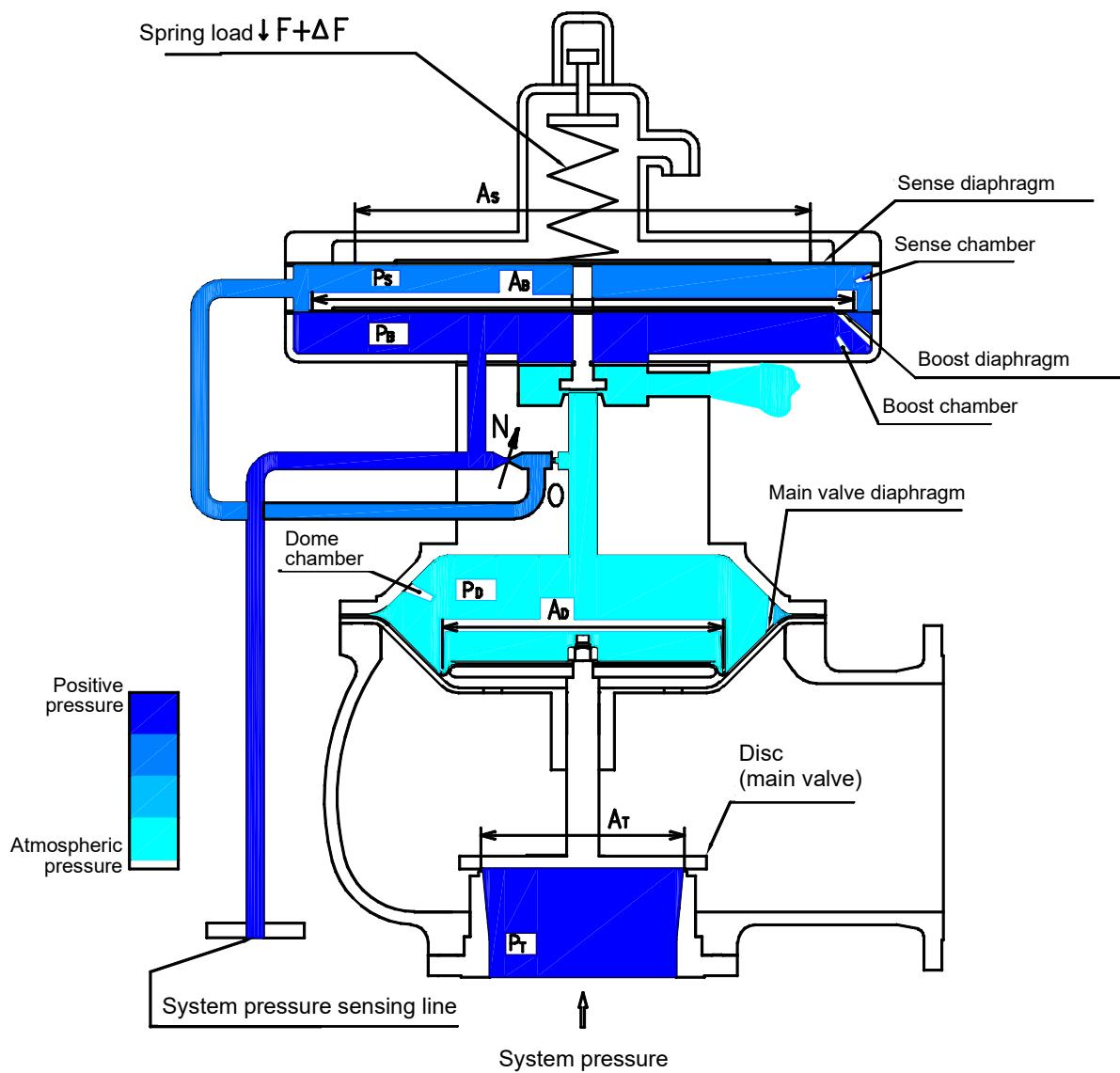
When the system pressure rises to the popping pressure, the following condition results:

$$\downarrow F \approx \uparrow A_s \times P_s$$

As a result, the pilot valve disc opens slightly, creating a flow in the system pressure sensing line. This flow causes a pressure loss at the adjusting needle N and fixed orifice O, resulting in a pressure drop. Due to this pressure drop, the balance between the sense pressure and boost pressure is disrupted and an upward load is generated, causing the pilot valve to perform a pop action.

$$A_B > A_s$$

$$\downarrow F + \Delta F < \uparrow A_s \times P_s + \uparrow A_B (P_B - P_s)$$

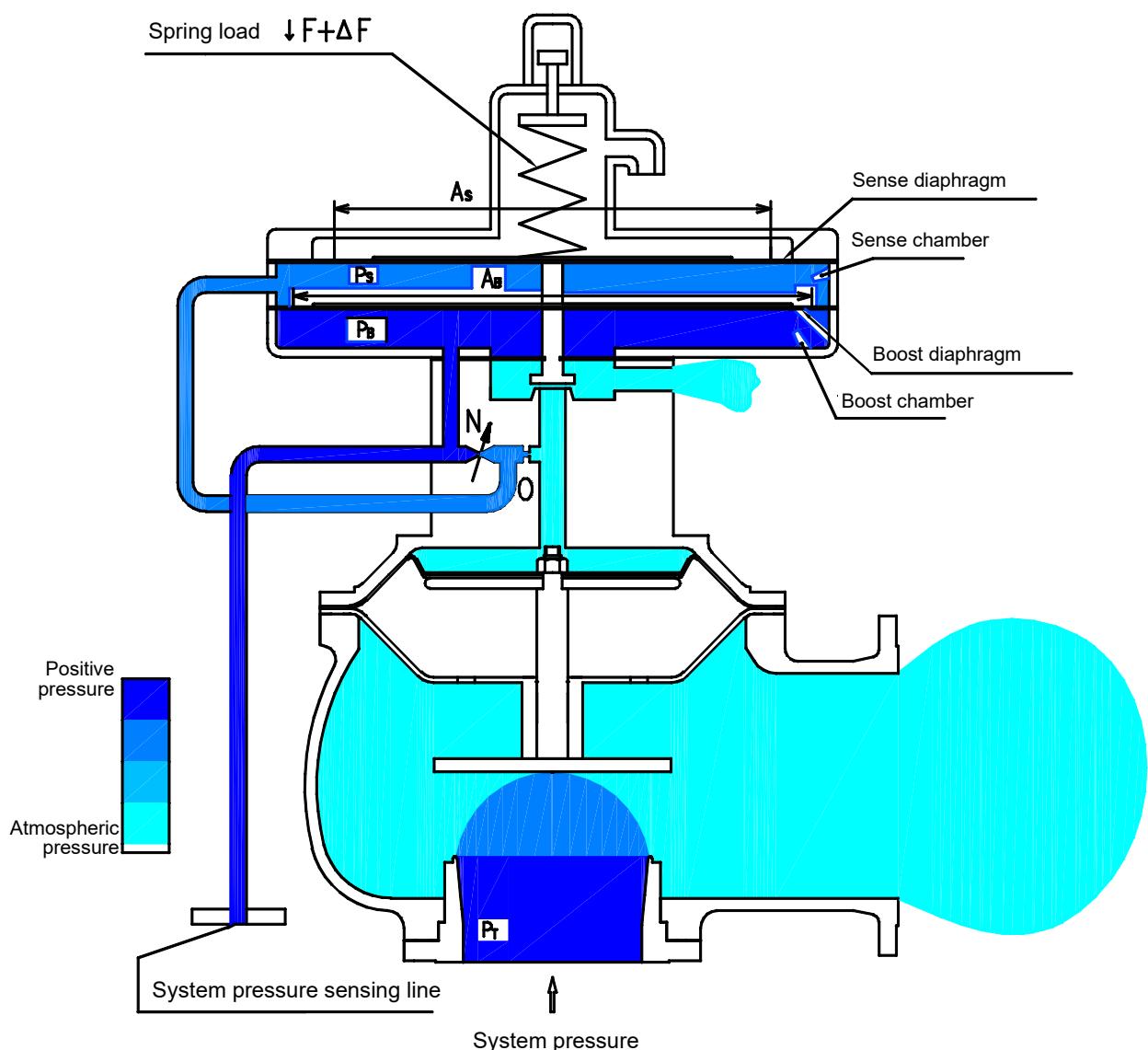


◆ Main valve operating condition

Since the pop action of the pilot valve makes the discharge volume from the pilot valve larger than the inflow volume to the dome chamber through the adjusting needle N and fixed orifice O, the dome chamber pressure drops nearly to the atmospheric pressure. Due to this dome chamber pressure drop, the main valve disc is pushed up by the system pressure, performing full lift at the specified pressure.

$$P_T = P_B > P_S > P_D \approx 0$$

$$\downarrow A_D \times P_D < \uparrow A_T \times P_T$$



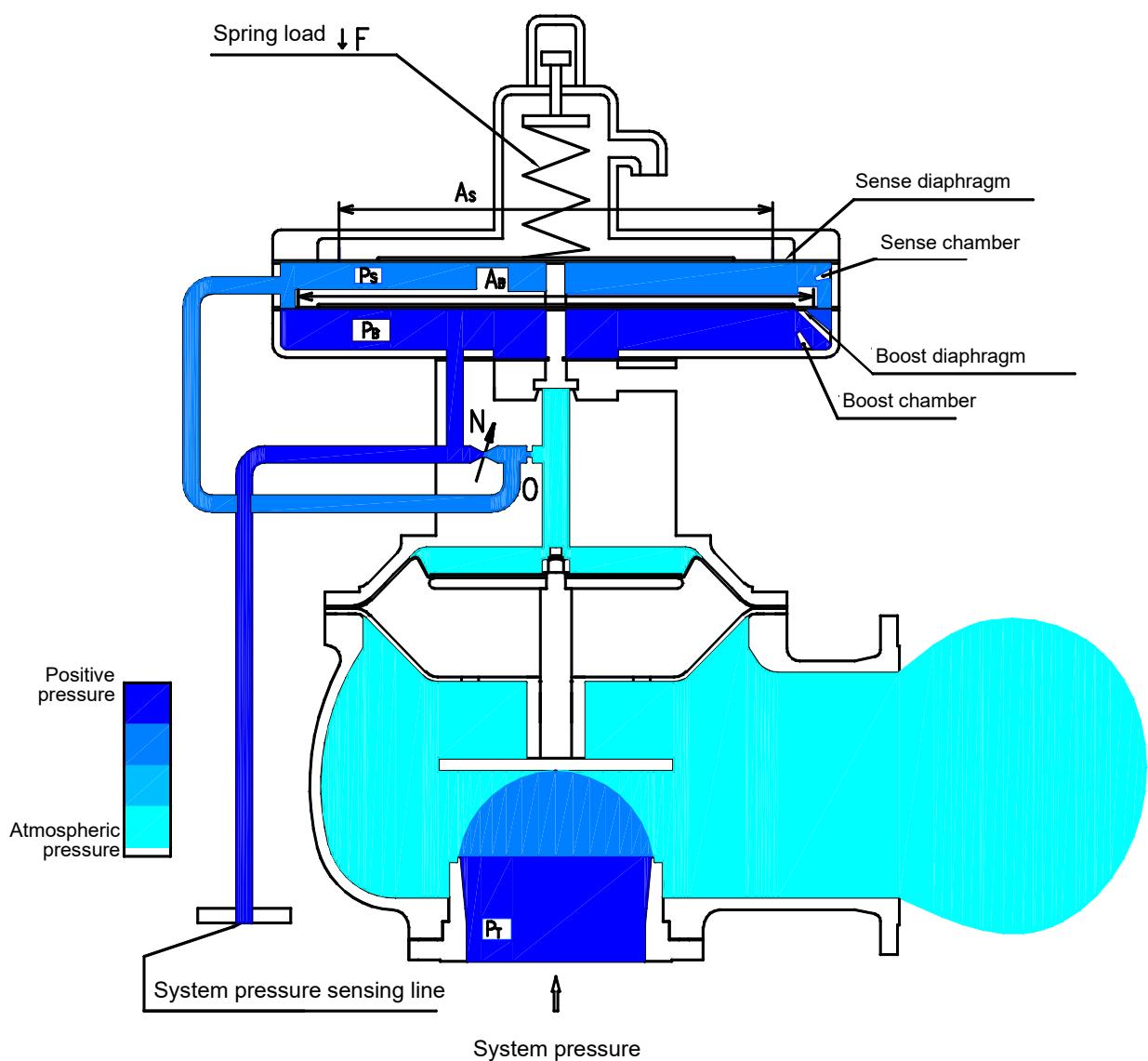
◆ Pilot valve closing condition

When the main valve operates and the system pressure drops to the closing pressure, the lifting force of the pilot valve becomes smaller than the spring load, causing the pilot valve to close. The pressure in the main valve dome chamber rises and the main valve disc closes, resulting in the condition shown in Figure 1.

$$\downarrow F > \uparrow A_s \times P_s + \uparrow A_b (P_b - P_s)$$

$$P_t = P_b > P_s > P_d \rightarrow P_t = P_b = P_s = P_d$$

$$\downarrow A_d \times P_d > \uparrow A_t \times P_t$$



◆ Negative Pressure Operating Principle

◆ Symbol description

Same as the positive pressure operating principle.

◆ Pressure flow

The pressure flow is connected directly from the atmosphere to the boost chamber, through the adjusting needle N to the sense chamber, and through the fixed orifice O to the main valve dome chamber. In addition, the pilot valve outlet and the bonnet vent section are connected to the system through the system pressure sensing line.

◆ Valve closing condition

When the stem pressure is below the suction pressure, the system pressure becomes negative, and the dome pressure, sense pressure, and boost pressure become the atmospheric pressure.

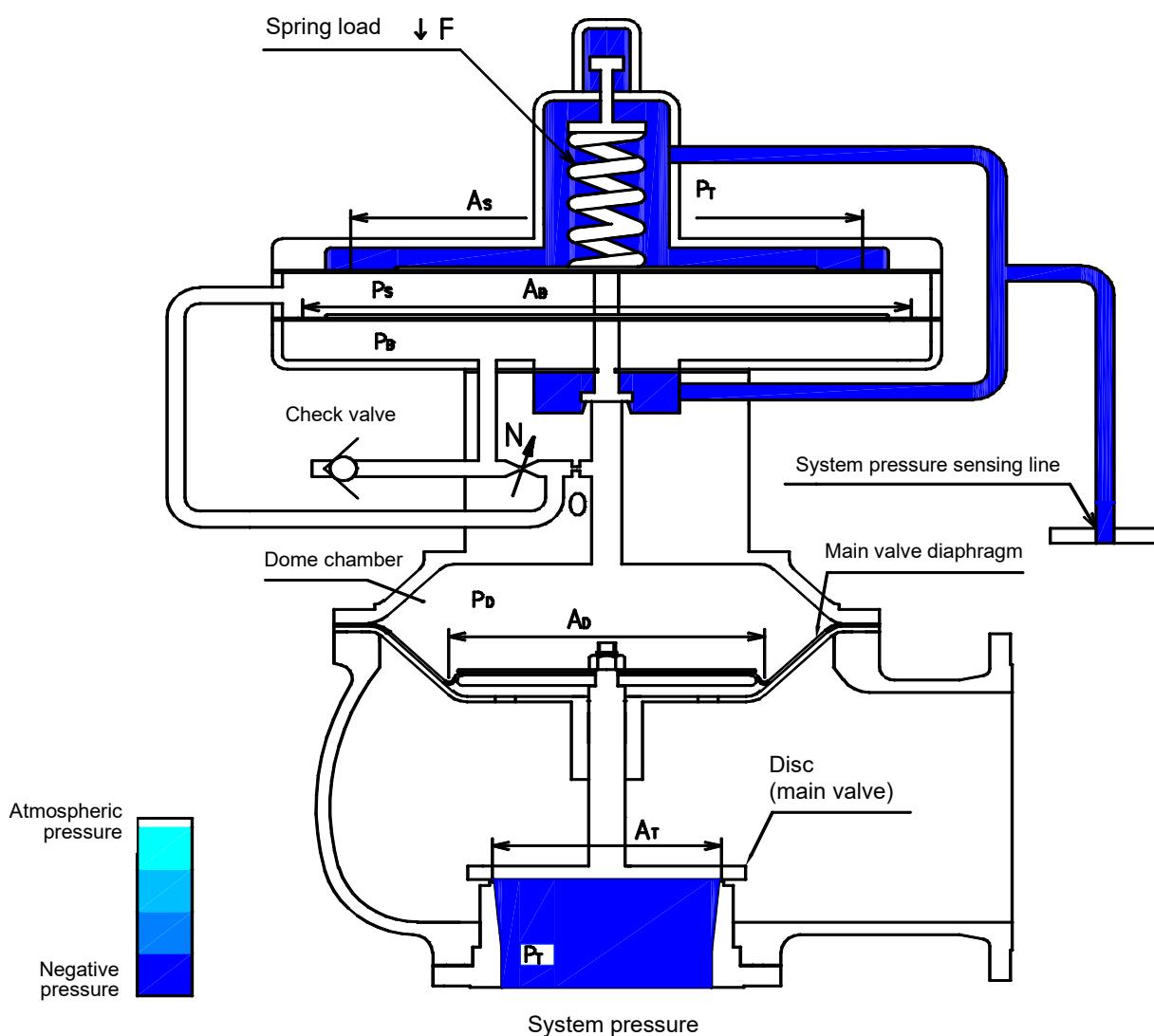
$$P_T < P_D = P_S = P_B = 0$$

At this point, the main valve disc is firmly seated on the valve seat due to the negative system pressure.

$$\downarrow A_T \times P_T$$

In the pilot valve, the sense pressure and boost pressure are balanced, resulting in the following condition.

$$\downarrow F > \uparrow A_S \times P_T$$



◆ Pilot valve operating condition

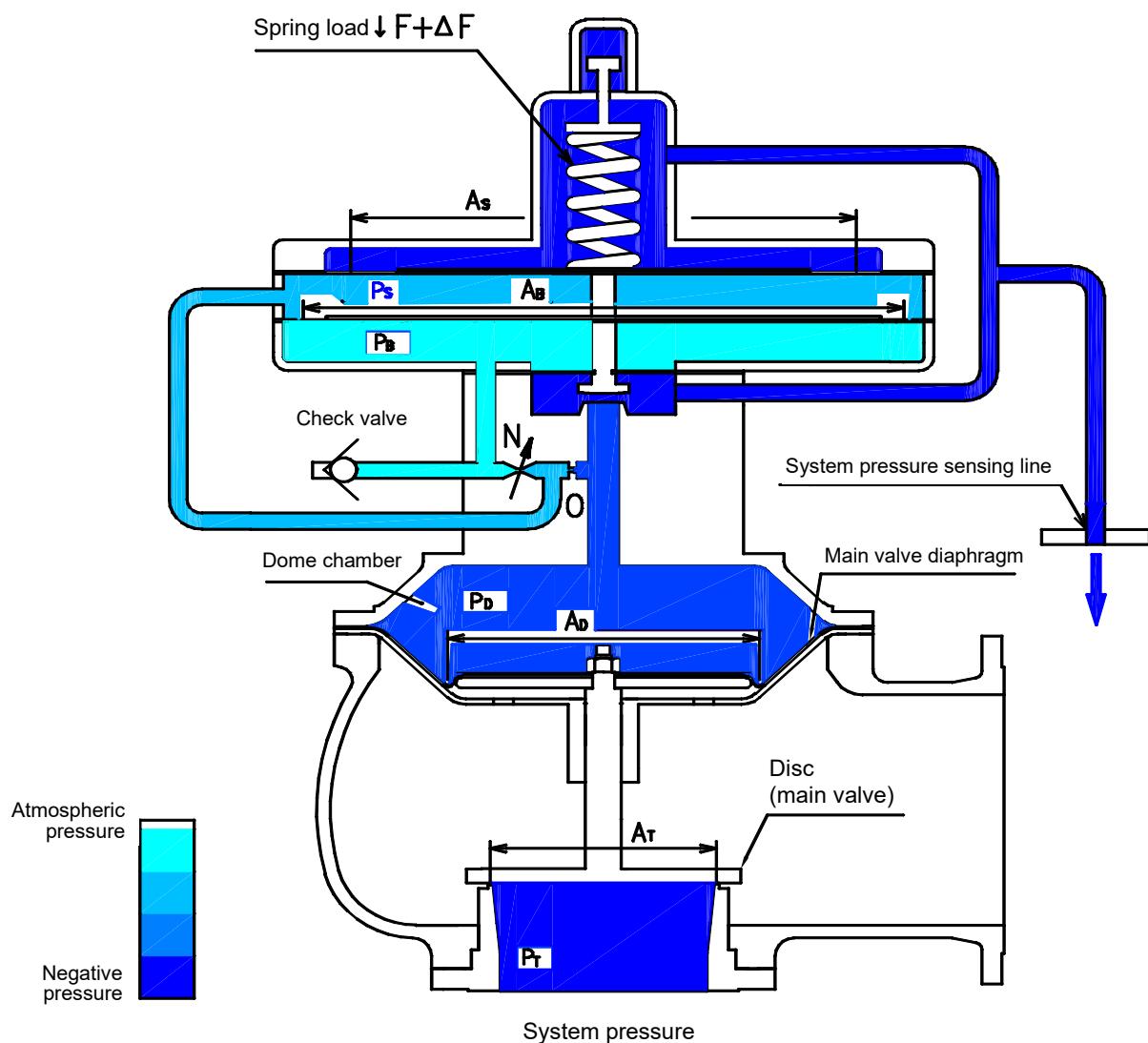
When the system pressure drops to the suction pressure, the following condition results:

$$\downarrow F \approx \uparrow A_s \times P_T$$

As a result, the pilot valve disc opens slightly, creating a flow in the check valve line. This flow causes a pressure loss at the adjusting needle N and fixed orifice O, resulting in a pressure drop. Due to this pressure drop, the balance between the sense pressure and boost pressure is disrupted and an upward load is generated, causing the pilot valve to perform a pop action.

$$A_B > A_s$$

$$\downarrow F + \Delta F < \uparrow A_s \times (P_s - P_T) + \uparrow A_B (P_B - P_s)$$

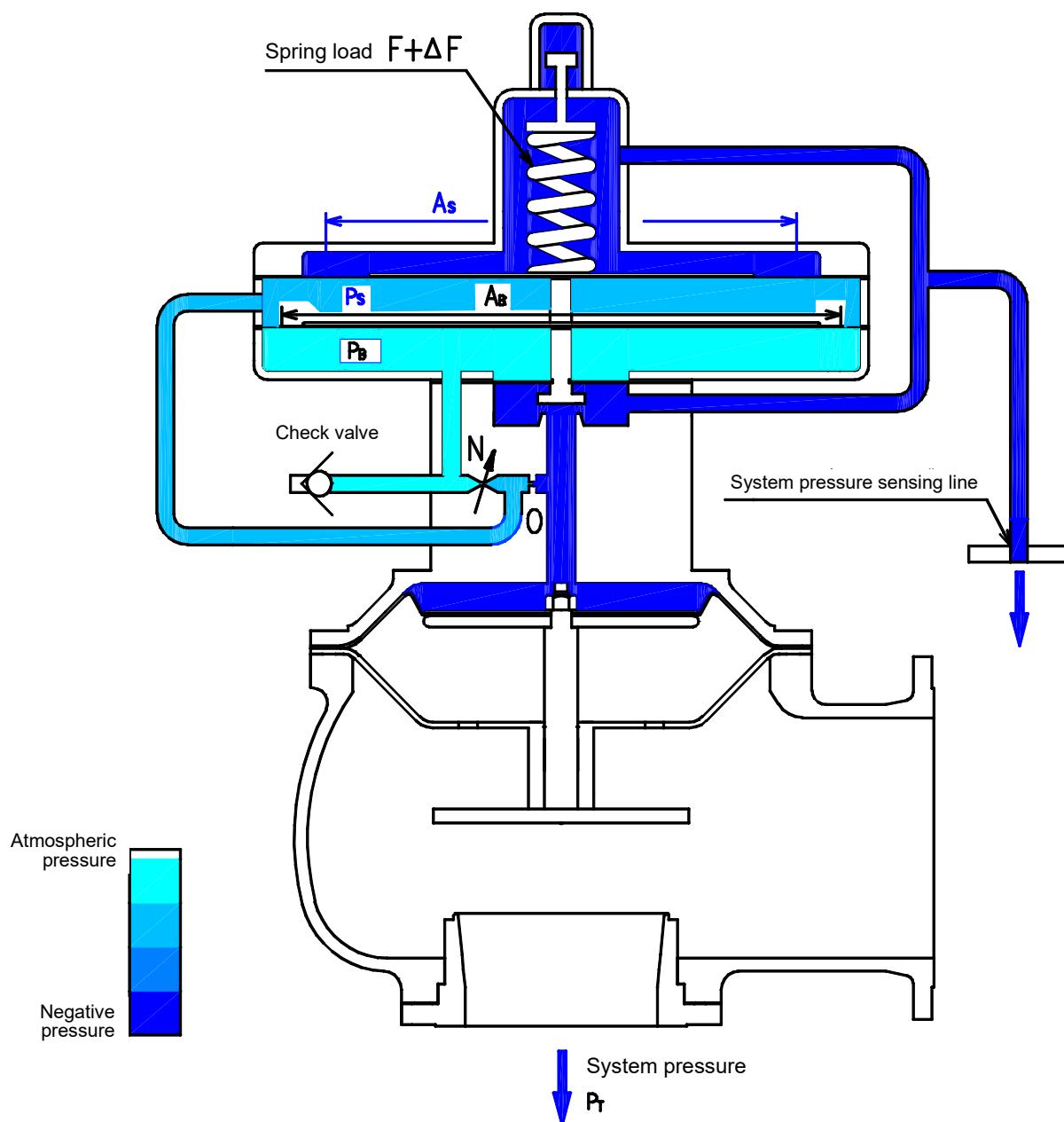


◆ Main valve operating condition

Since the pop action of the pilot valve makes the discharge volume from the pilot valve larger than the inflow volume to the dome chamber through the adjusting needle N and fixed orifice O, the dome chamber pressure drops nearly to the system pressure. This dome chamber pressure drop causes the main valve disc to perform full lift at the specified pressure.

$$P_T = P_D < P_S = < P_B = 0$$

$$\uparrow A_D \times P_D > \downarrow A_T \times P_T$$



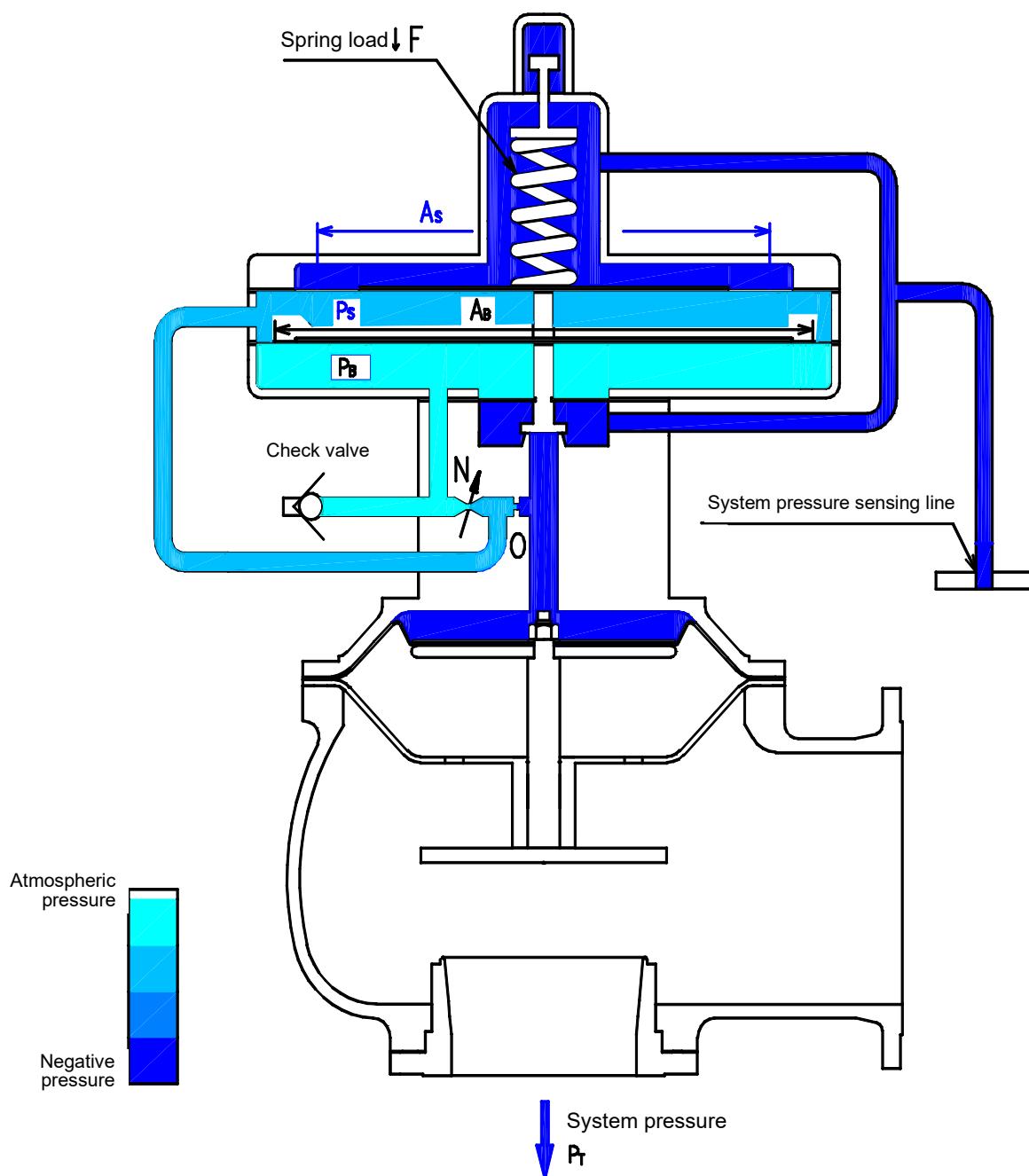
◆ Pilot valve closing condition

When the main valve operates and the system pressure rises to the closing pressure, the lifting force of the pilot valve becomes smaller than the spring load, causing the pilot valve to close. The pressure in the main valve dome chamber rises and the main valve disc closes, resulting in the condition shown in Figure 1.

$$\downarrow F > \uparrow A_s \times (P_s - P_t) + \uparrow A_b (P_b - P_s)$$

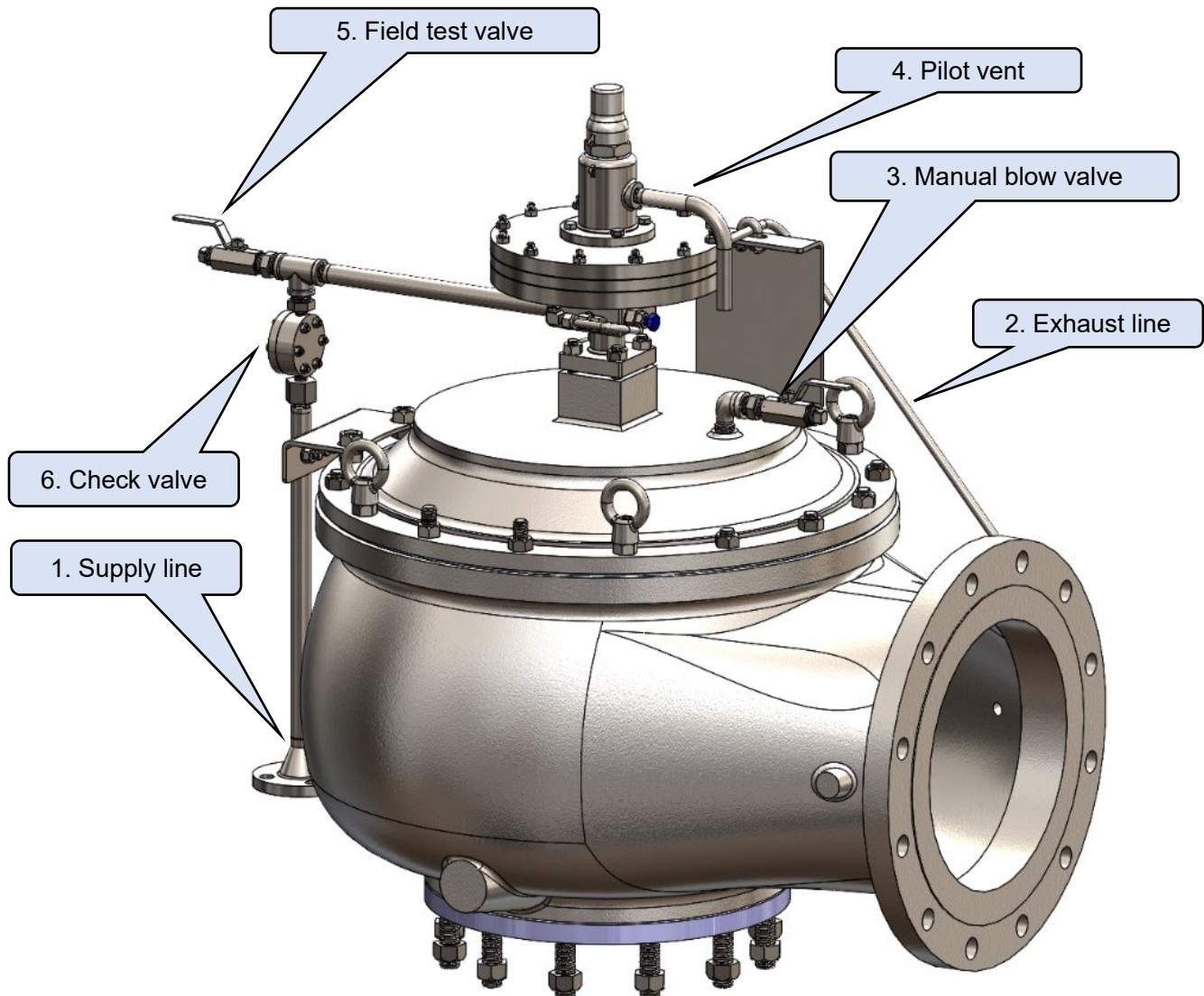
$$P_t = P_d < P_s = P_b = 0 \rightarrow P_t < P_d = P_s = P_b = 0$$

$$\downarrow A_t \times P_t$$



◆ Piping System Diagram

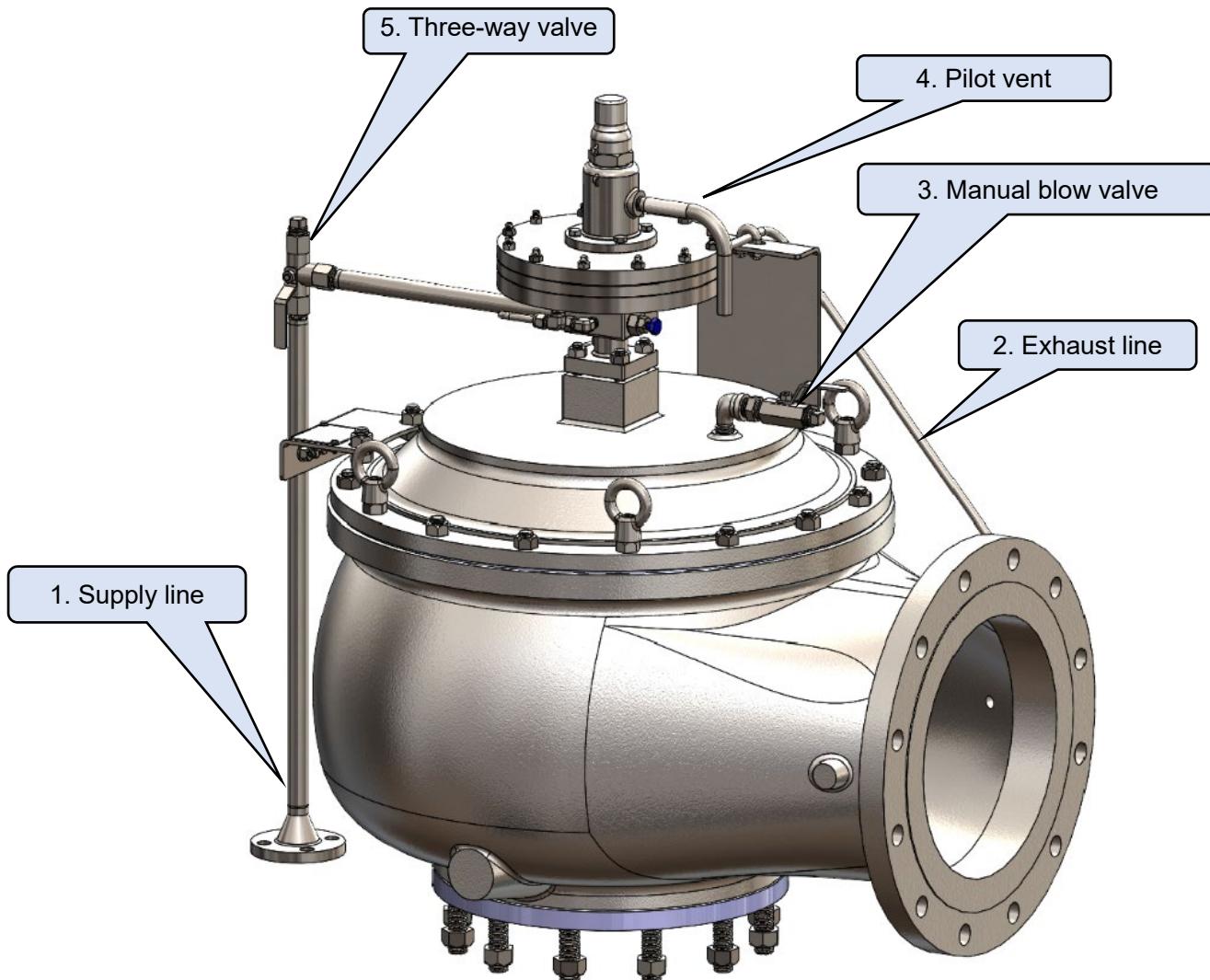
- ◆ Positive pressure operation type



No.	Name	Description
1	Supply line	This is the pressure detection (supply) piping of the pilot valve.
2	Exhaust line	This is the exhaust line of the pilot valve. It is normally connected to the main valve outlet.
3	Manual blow valve	This is used to manually operate the pressure relief valve. (Optional accessory)
4	Pilot vent	This is the line for the pilot valve to detect atmospheric pressure. No fluid is discharged from this line.
5	Field test valve	Pressure is applied through this valve during a field test.
6	Check valve	This is used to prevent inflow to the system side during a field test.

A piping system diagram of a typical specification is shown. This piping layout varies depending on the specification.

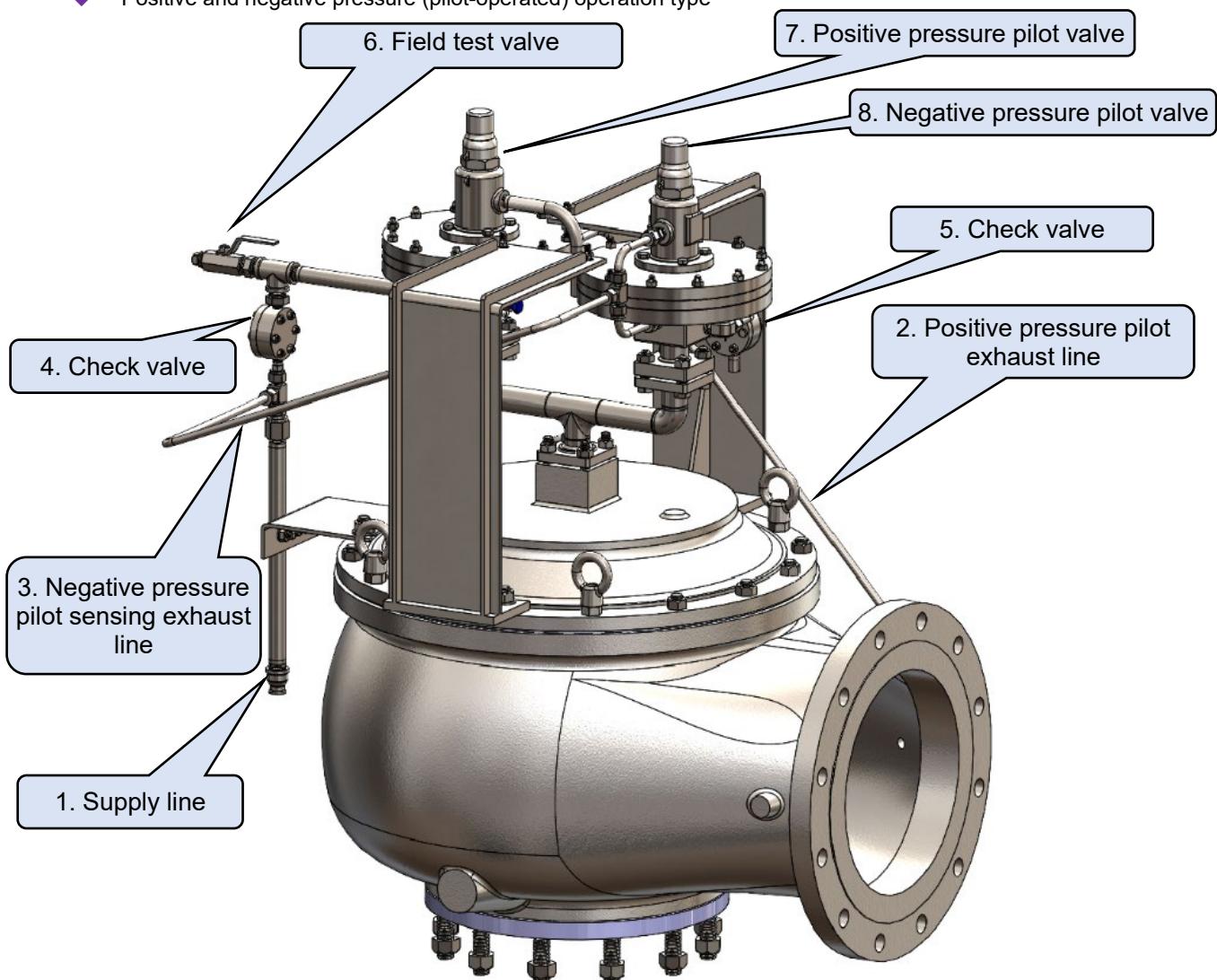
- ◆ Positive pressure and negative pressure (weight type) operation type



No.	Name	Description
1	Supply line	This is the pressure detection (supply) piping of the pilot valve.
2	Exhaust line	This is the exhaust line of the pilot valve. It is normally connected to the main valve outlet.
3	Manual blow valve	This is used to manually operate the pressure relief valve. (Optional accessory)
4	Pilot vent	This is the line for the pilot valve to detect atmospheric pressure. No fluid is discharged from this line.
5	Three-way valve	This three-way valve is adopted since the check valve for field testing cannot be used due to negative pressure operation. It is switched between operation and field testing. A lock is used to lock the operating condition.

A piping system diagram of a typical specification is shown. This piping layout varies depending on the specification.

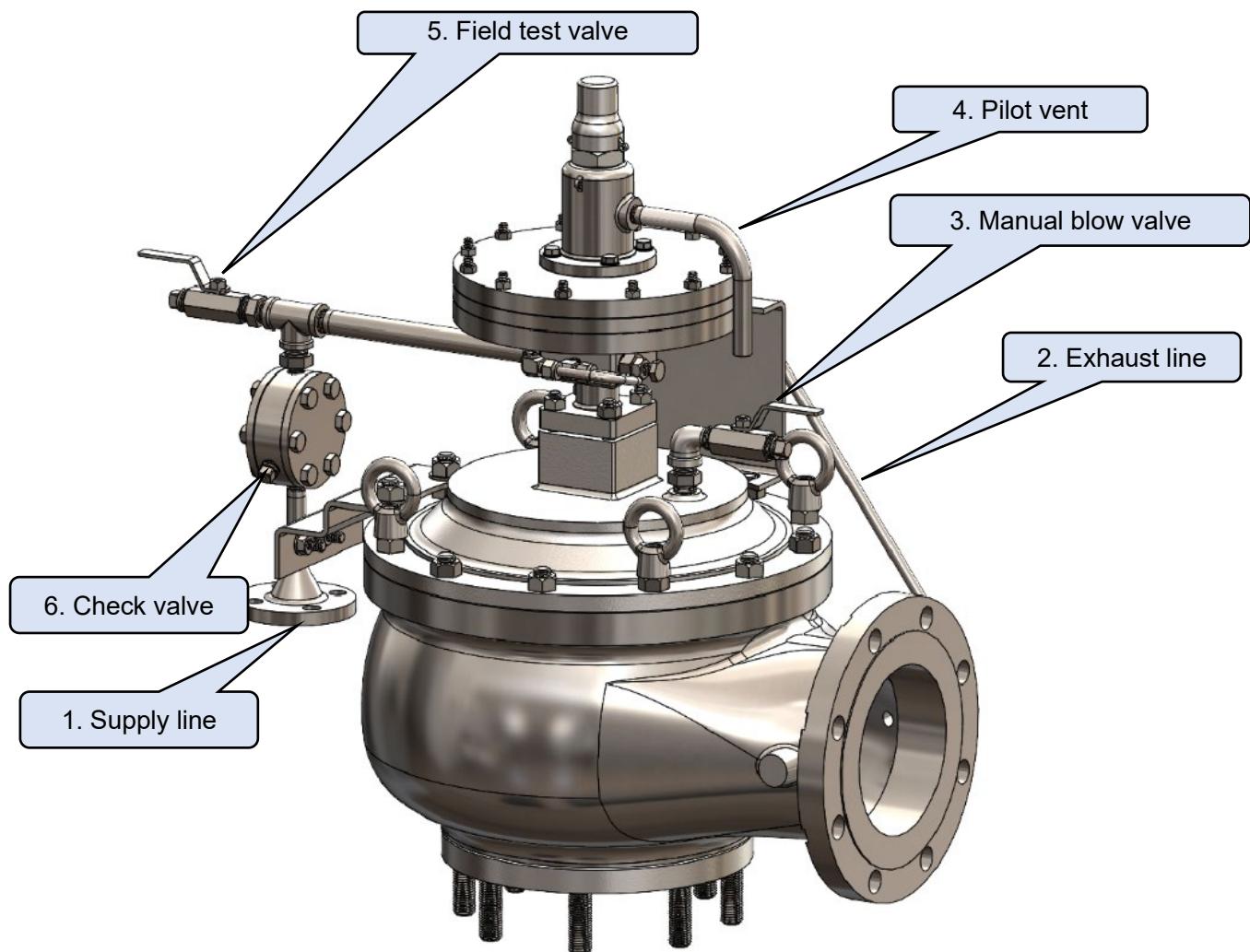
- ◆ Positive and negative pressure (pilot-operated) operation type



No.	Name	Description
1	Supply line	Pressure detection (supply) piping for the positive pressure pilot valve
2	Positive pressure pilot exhaust line	This is the exhaust line of the pilot valve. It is normally connected to the main valve outlet.
3	Negative pressure pilot sensing exhaust line	Pressure detection (supply) piping for the negative pressure pilot valve
4	Check valve	For field testing of the positive pressure pilot valve
5	Check valve	For the atmosphere supply line of the negative pressure pilot valve
6	Field test valve (Positive pressure pilot)	Pressure is applied through this valve during a field test.
7	Positive pressure pilot	For positive pressure operation
8	Negative pressure pilot	For negative pressure operation

A piping system diagram of a typical specification is shown. This piping layout varies depending on the specification.

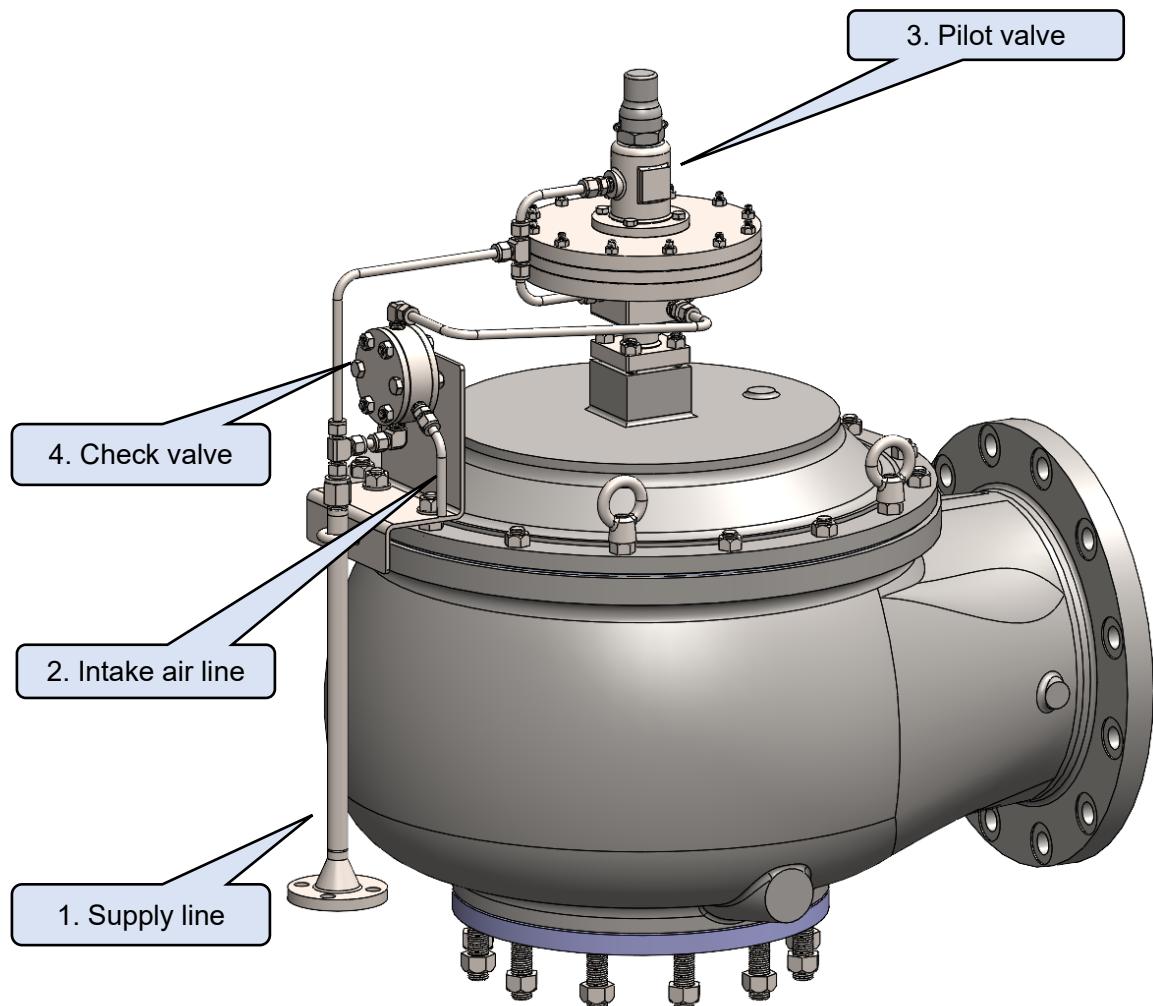
- ◆ Positive and negative pressure block operation type



No.	Name	Description
1	Supply line	This is the pressure detection (supply) piping of the pilot valve.
2	Exhaust line	This is the exhaust line of the pilot valve. It is normally connected to the main valve outlet.
3	Manual blow valve	This is used to manually operate the pressure relief valve. (Optional accessory)
4	Pilot vent	This is the line for the pilot valve to detect the atmospheric pressure. No fluid is discharged from this line.
5	Field test valve	Pressure is applied through this valve during a field test.
6	Check valve	This is the 3-port type check valve that keeps the pressure in main valve dome larger than the atmospheric pressure except during operation.

A piping system diagram of a typical specification is shown. This piping layout varies depending on the specification.

- ◆ Negative pressure operation type



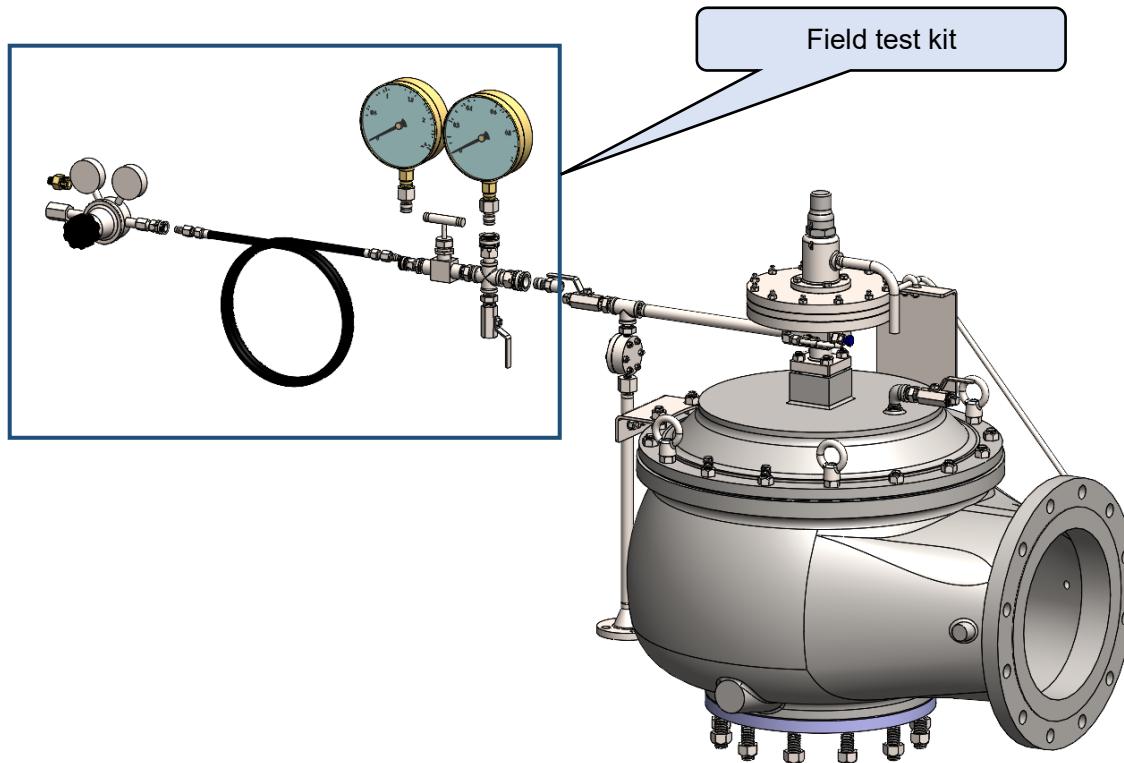
No.	Name	Description
1	Supply line	This is the pressure detection (supply) piping of the pilot valve. It also serves as the exhaust line.
2	Intake air line	Line that sucks atmospheric air during operation
3	Pilot valve	Pilot valve for negative pressure setting
4	Check valve	This is the 3-port type check valve that keeps the pressure in main valve dome larger than the atmospheric pressure except during operation.

A piping system diagram of a typical specification is shown. This piping layout varies depending on the specification.

◆ Accessories

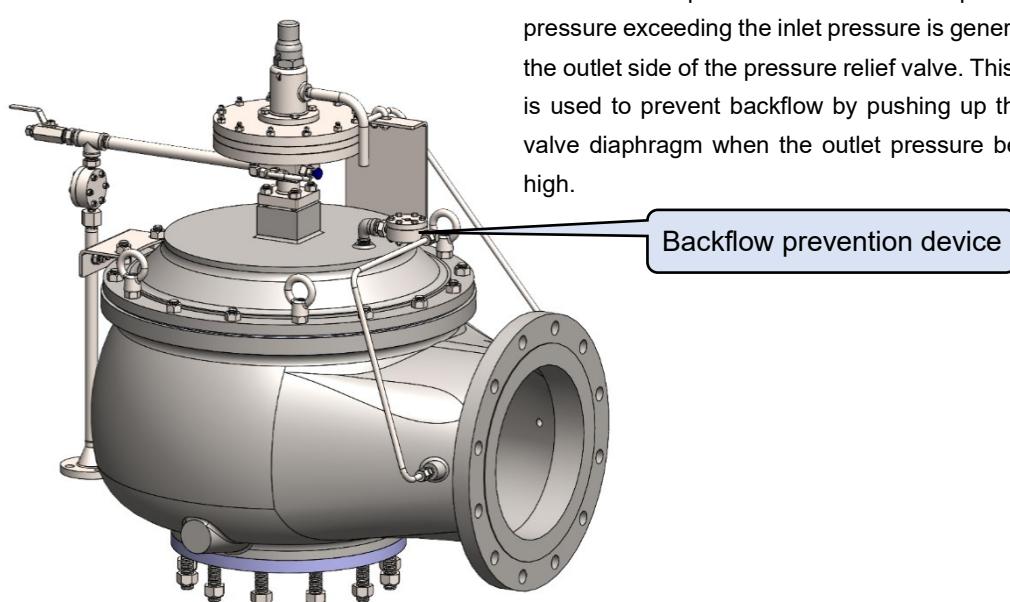
◆ Field test kit

This kit is used to verify the set pressure with the pressure relief valve installed. In this field test, a nitrogen cylinder is generally used as the pressure supply source. Normally, the field test is carried out with no pressure in the main valve. For details on how to confirm the operation, refer to the instruction manual etc.



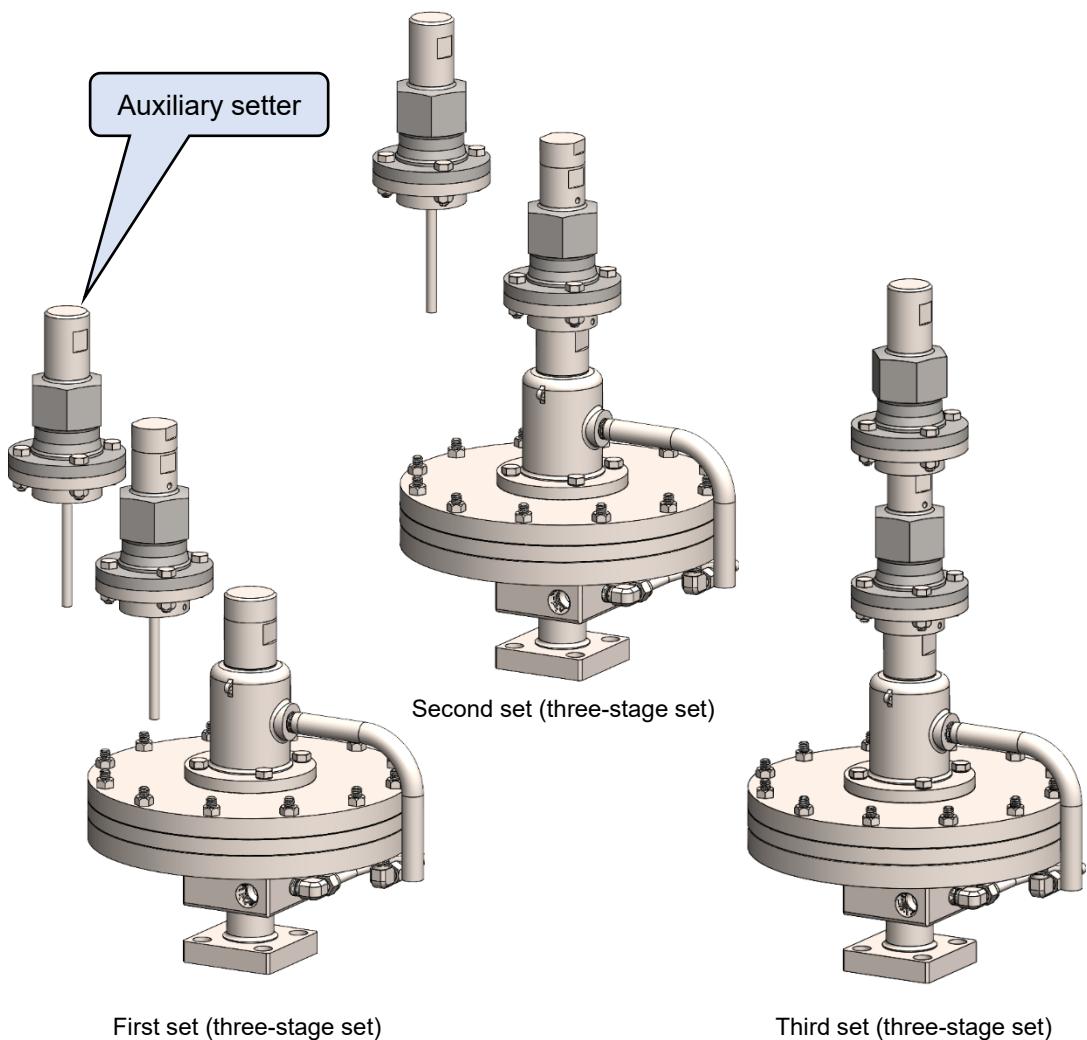
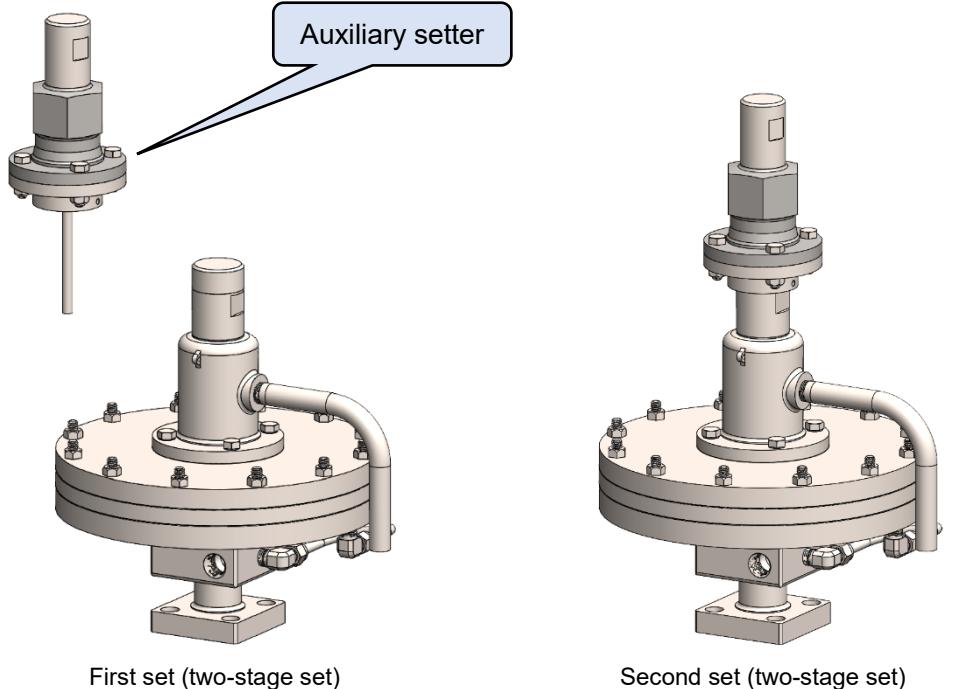
◆ Backflow prevention device

The backflow prevention device is required when pressure exceeding the inlet pressure is generated on the outlet side of the pressure relief valve. This device is used to prevent backflow by pushing up the main valve diaphragm when the outlet pressure becomes high.



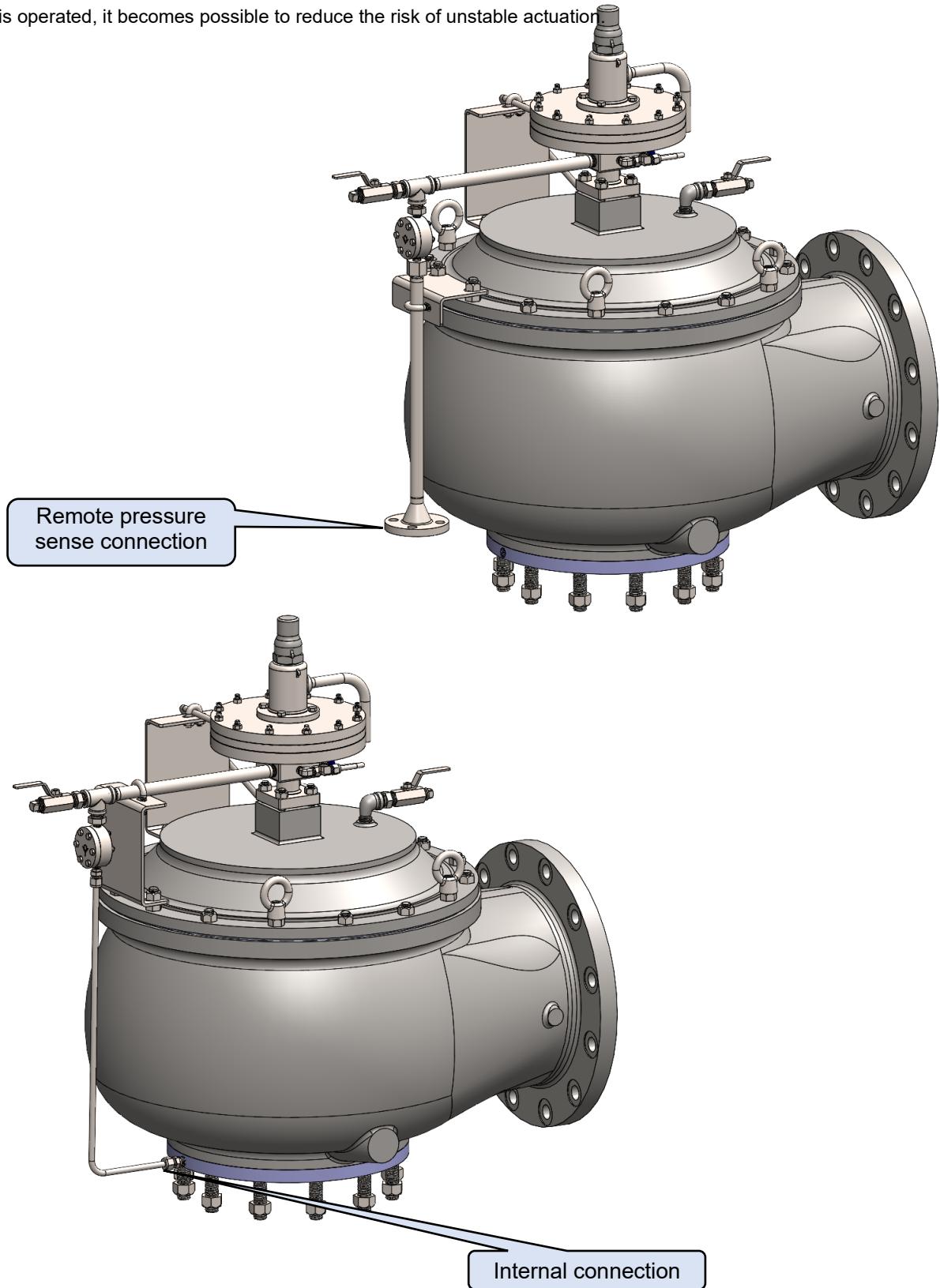
◆ Auxiliary Setter

By using an auxiliary setter, it becomes possible to change the set pressure easily without breaking the pressure relief valve seal. The set pressure is available in two-stage and three-stage sets.



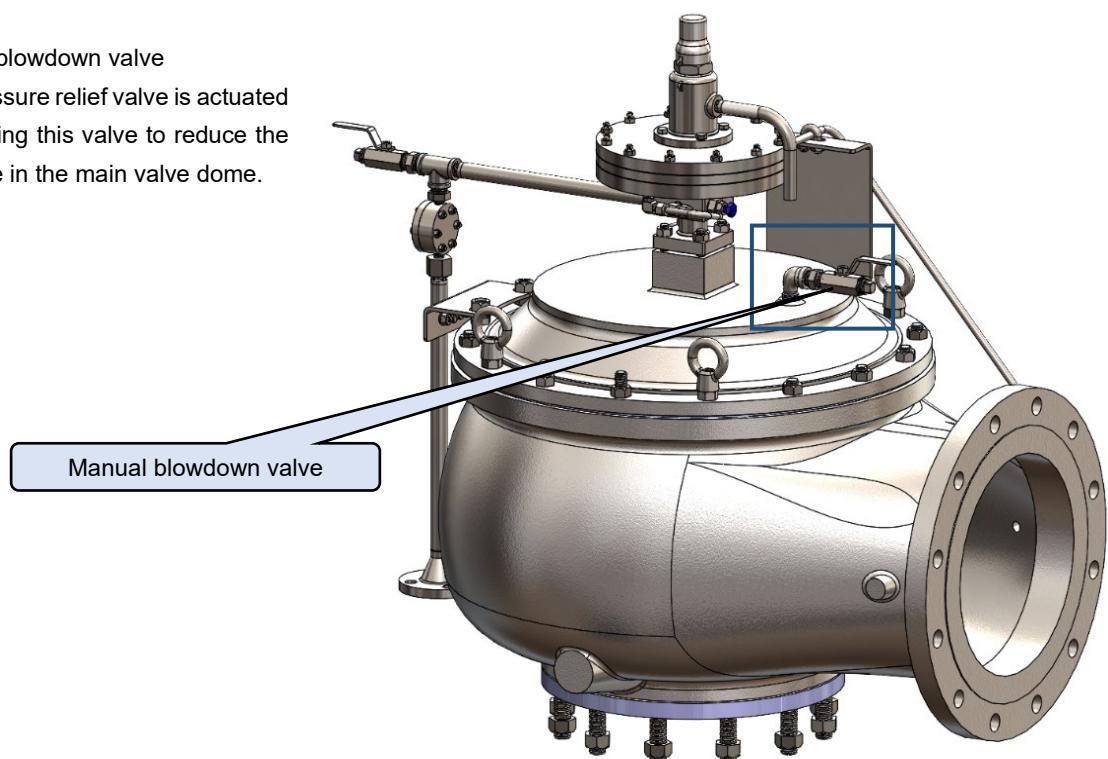
- ◆ Remote pressure sense connection

When the pressure relief valve operates, a pressure loss occurs in the inlet piping. In the case of an internal connection where a pressure loss of more than 3% occurs, the detected pressure in the pilot valve apparently becomes lower after operation. Therefore, there is a risk of unstable actuation after operation. By connecting to a location where the pressure in the pilot valve can be detected more accurately even after the pressure relief valve is operated, it becomes possible to reduce the risk of unstable actuation.



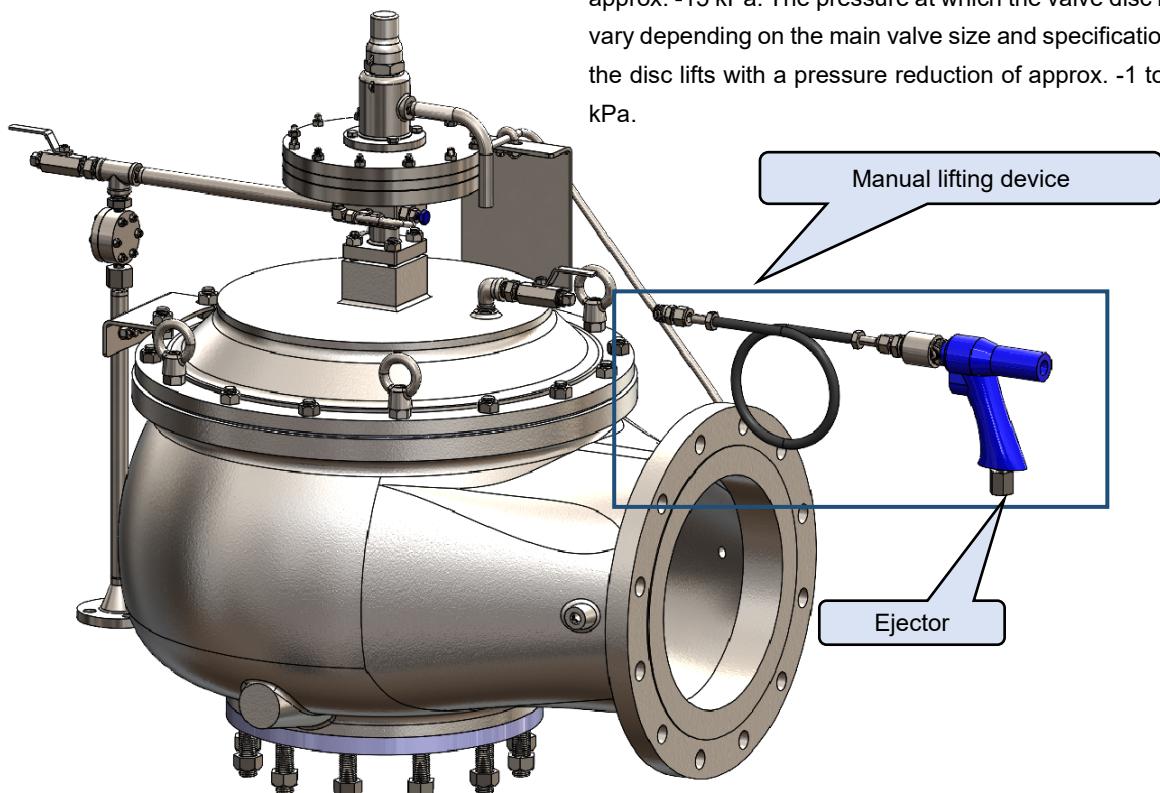
◆ Manual blowdown valve

The pressure relief valve is actuated by opening this valve to reduce the pressure in the main valve dome.



◆ Manual lifting device

This device is used to check whether the main valve disc lifts. By supplying pressure to the ejector to vacuumize the inside of the main valve dome, the valve disc is lifted. The maximum supply pressure is 0.7 MPa, at which the pressure inside the main valve dome can be reduced to approx. -15 kPa. The pressure at which the valve disc lifts vary depending on the main valve size and specifications: the disc lifts with a pressure reduction of approx. -1 to -3 kPa.

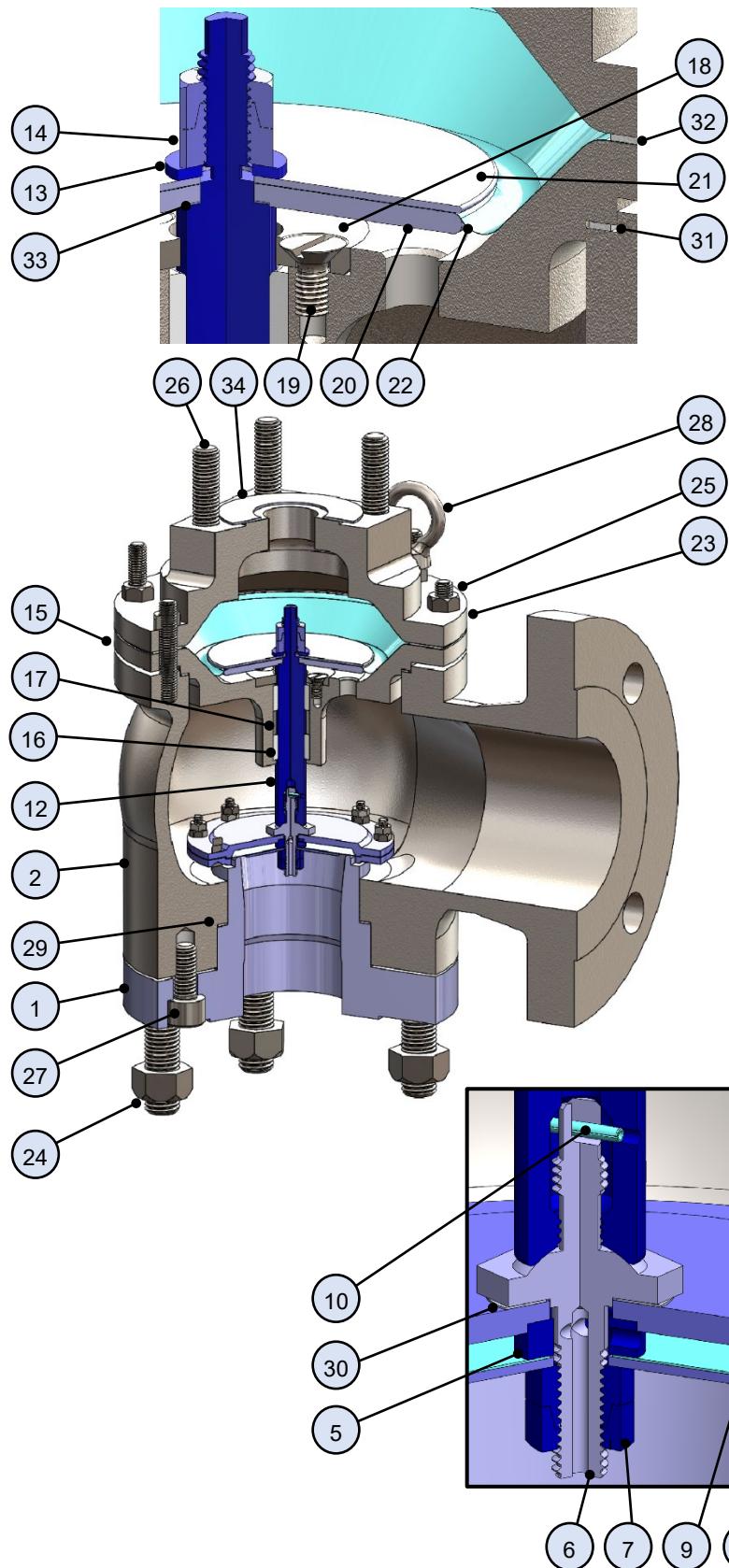


 Type code

PSL-MD13-	1	6	1-	N	S1	(B)	
						Cap code	
						(A)	Sealed screwed
						(B)	Sealed screwed + Test gag
Material code (See the table below.)							
			Blank	A216-WCB (SCPH2)	E	SA105M	
			C5	A352-LCB (SCPL1)	E5	LF2	
			S	A351-CF8 (SCS13A)	G	SUSF304	
			S1	A351-CF8M (SCS14A)	G1	SUSF316	
			S2	A351-CF3 (SCS19A)	G2	SUSF304L	
			S3	A351-CF3M (SCS16A)	G3	SUSF316L	
Supplementary symbol							
			Blank	Guide Cast	X	For ATEX explosion protection & Guide Cast	
			N	Guide Plate material	NX	For ATEX explosion protection & Guide Plate material	
			D	Shield for LNGC	W	Double pilot specification	
			T	Internal lightweight type	—	—	
Connection code							
			1-	ASME Flange	2-	JPI Flange	4- JIS Flange
Temperature class code (determined by discharge temperature) Unit: °C (°F)							
			3	-196 (-320) ≤ T < -101 (-150)	5	-101(-150) ≤ T < -29 (-20)	6 -29(-20) ≤ T < 128 (262)
Pressure class code							
			1	Class 150 or JIS 10K	2	JIS 20K	3 Class 300 or JIS 30K
Type code [1] + [2] + [3]							
[1]	[2]				[3]		
PSL-MD	1	Single pilot & Single set			2	Without diaphragm support	
	2	Single pilot & Multi set			3	Reverse flange & With diaphragm support	
	3	Dual pilot & Single set			4	Flange type & With diaphragm support	
	4	Dual pilot & Multi set			—	—	
	6	Vacuum pilot & Single set			—	—	

◆ Cross-sectional View of Main Valve

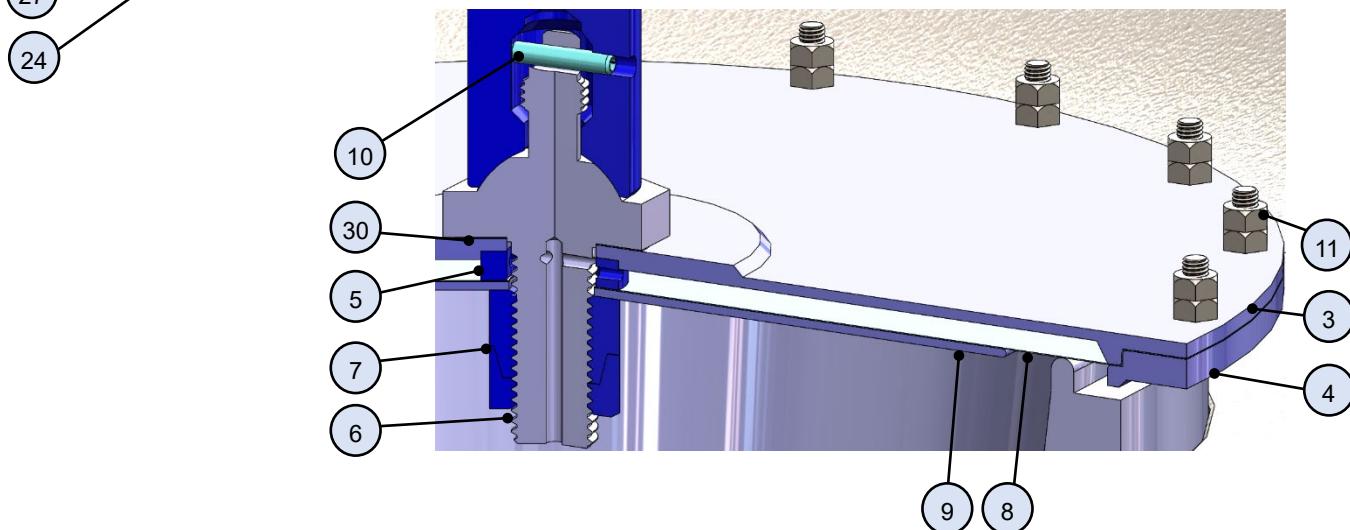
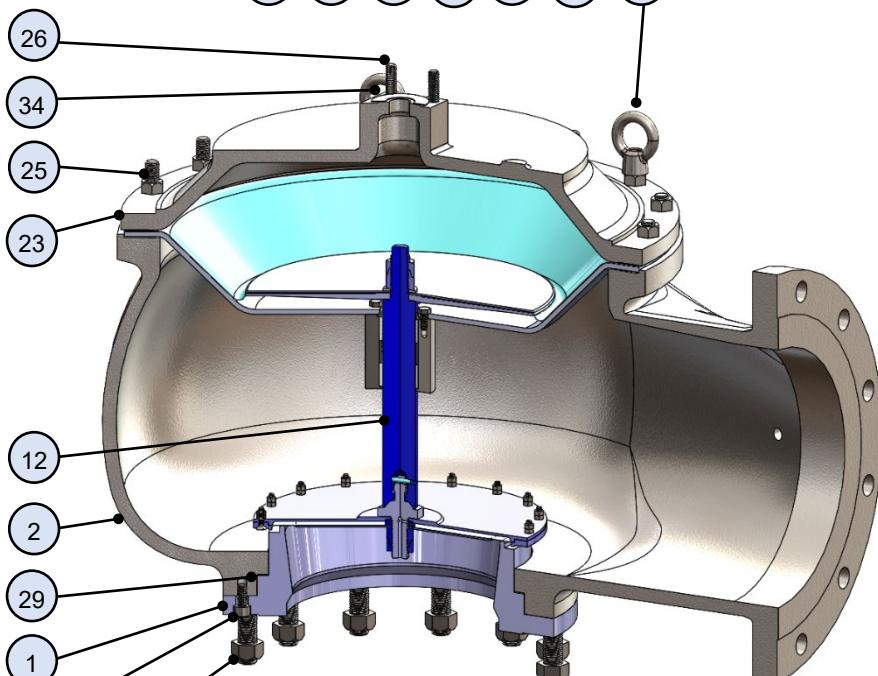
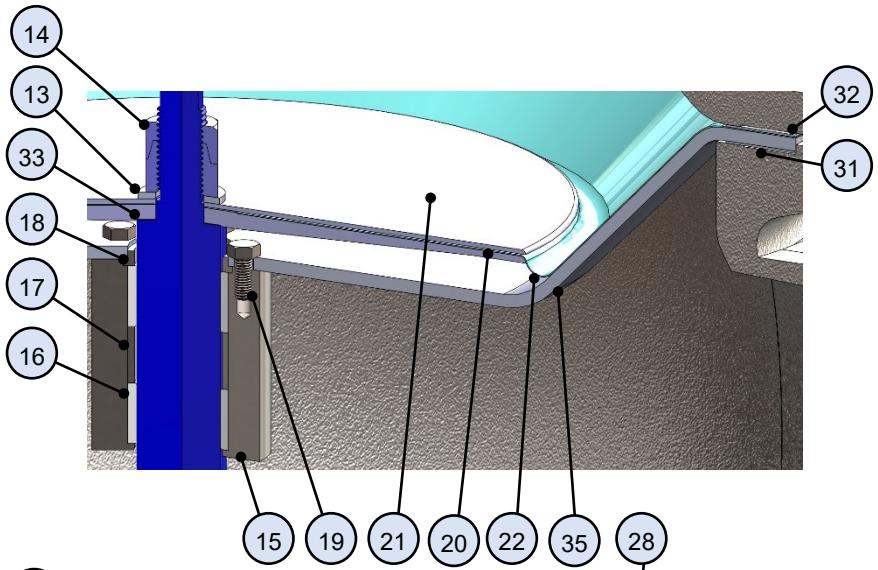
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No.	Part name
1	Nozzle
2	Body
3	Disc
4	Disc retainer
5	Disc spacer
6	Disc center
7	Center nut
8	Seat
9	Seat cover
10	Spring pin
11	Retainer bolt, nut
12	Spindle
13	Washer
14	Spindle nut
15	Guide
16	Sleeve
17	Sleeve spacer
18	Sleeve plate
19	Set screw
20	Diaphragm receiver
21	Diaphragm retainer
22	Diaphragm
23	Cover
24	Stud bolt, nut
25	Stud bolt, nut
26	Stud bolt, nut
27	Hexagon socket head cap screw
28	Eye bolt
29	Gasket
30	Gasket
31	Gasket
32	Gasket
33	Gasket
34	Gasket

* This shows a general structure. The structure varies depending on the seat type or size.

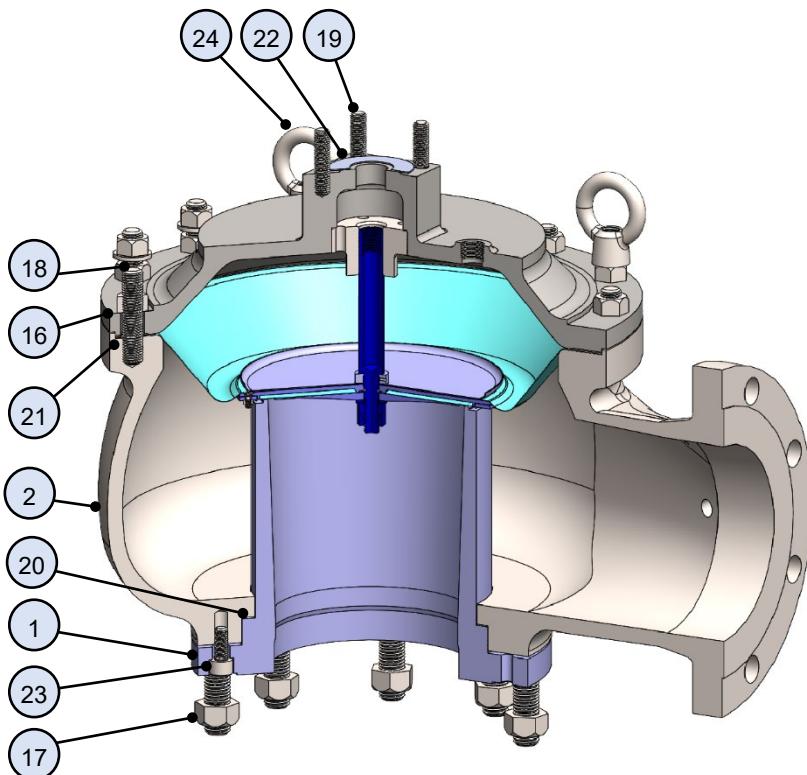
PSL-MD()3-()()()-N



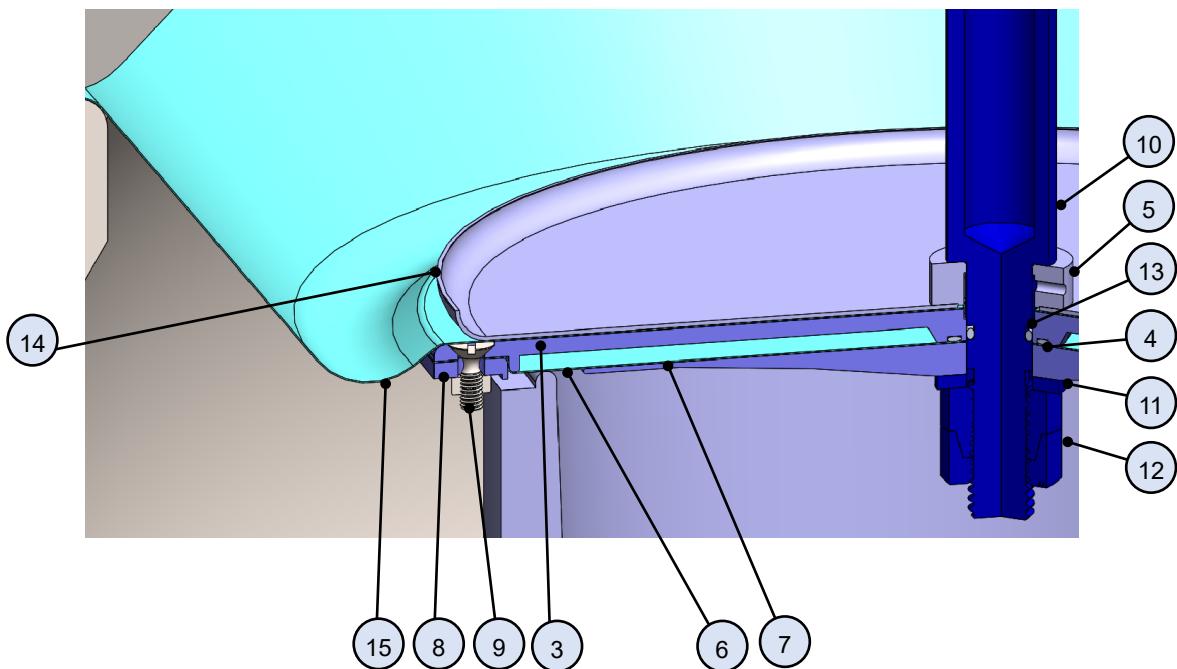
No.	Part name
1	Nozzle
2	Body
3	Disc
4	Disc retainer
5	Disc spacer
6	Disc center
7	Center nut
8	Seat
9	Seat cover
10	Spring pin
11	Retainer bolt, nut
12	Spindle
13	Washer
14	Spindle nut
15	Guide
16	Sleeve
17	Sleeve spacer
18	Sleeve plate
19	Set screw
20	Diaphragm receiver
21	Diaphragm retainer
22	Diaphragm
23	Cover
24	Stud bolt, nut
25	Stud bolt, nut
26	Stud bolt, nut
27	Hexagon socket head cap screw
28	Eye bolt
29	Gasket
30	Gasket
31	Gasket
32	Gasket
33	Gasket
34	Gasket
35	Diaphragm retainer

* This shows a general structure. The structure may vary depending on the specifications.

PSL-MD()2



No.	Part name
1	Nozzle
2	Body
3	Disc
4	Disc seal
5	Disc spacer
6	Seat
7	Seat cover
8	Seat retainer
9	Retainer bolt
10	Spindle
11	Spindle washer
12	Spindle nut
13	Spindle seal
14	Diaphragm retainer
15	Diaphragm
16	Cover
17	Stud bolt, nut
18	Stud bolt, nut
19	Stud bolt, nut
20	Gasket
21	Gasket
22	Gasket
23	Hexagon socket head cap screw



* This shows a general structure. The structure may vary depending on the specifications.

◆ Standard Material of Main Valve

Standard material by temperature PSL-MD()3-()()() & PSL-MD()3-()()()-N

No.	Application temperature range (°C)	-196—46			-46—29			-29—125						
		Material code			C5			Blank						
1	Nozzle	A351-CF8 or SCS13A or SUS304												
2	Body	A351-CF8 or SCS13A		A352-LCB or SCPL1		A216-WCB or SCPH2								
3	Disc	SUS304												
4	Disc retainer	SUS304												
5	Disc spacer	SUS304												
6	Disc center	SUS304												
7	Center nut	SUS304												
8	Seat	PFA												
9	Seat cover	SUS304												
10	Spring pin	SUS420												
11	Retainer bolt, nut	SUS304												
12	Spindle	SUS304												
13	Washer	SUS304												
14	Spindle nut	SUS304												
15	Guide	SUS304 or SCS13A												
16	Sleeve	PTFE												
17	Sleeve spacer	SUS304												
18	Sleeve plate	SUS304												
19	Set screw	SUS304												
20	Diaphragm receiver	SUS304												
21	Diaphragm retainer	SUS304												
22	Diaphragm	PFA												
23	Cover	A351-CF8 or SCS13A		A352-LCB or SCPL1		A216-WCB or SCPH2								
24	Stud bolt, nut	SUS304												
25	Stud bolt, nut	SUS304												
26	Stud bolt, nut	SUS304												
27	Hexagon socket head cap screw	SUS304												
28	Eye bolt	SUS304				SS400								
29	Gasket	V7020												
30	Gasket	PFA												
31	Gasket	V7020												
32	Gasket	V7020												
33	Gasket	PFA												
34	Gasket	V7020												
35	Diaphragm retainer*1	SUS304												

* The minimum operating temperature of SCPH2 varies depending on the applicable regulations.

*1 Applicable only to PSL-MD()3-()()-N

Standard material (main valve) by material code PSL-MD()3-()()() & PSL-MD()3-()()()-N

No.	Material code	S1	S2	S3
1	Nozzle	A351-CF8M or SCS14A or SUS316	A351-CF3 or SCS19A or SUS304L	A351-CF3M or SCS16A or SUS316L
2	Body	A351-CF8M or SCS14A	A351-CF3 or SCS19A	A351-CF3M or SCS16A
3	Disc	SUS316	SUS304L	SUS316L
4	Disc retainer	SUS316	SUS304L	SUS316L
5	Disc spacer	SUS316	SUS304L	SUS316L
6	Disc center	SUS316	SUS304L	SUS316L
7	Center nut	SUS316	SUS304	SUS316
8	Seat	PFA		
9	Seat cover	SUS316	SUS304L	SUS316L
10	Spring pin	SUS420		
11	Retainer bolt, nut	SUS316	SUS304	SUS316
12	Spindle	SUS316	SUS304L	SUS316L
13	Washer	SUS316	SUS304	SUS316
14	Spindle nut	SUS316	SUS304	SUS316
15	Guide	SUS316	SUS304L	SUS316L
16	Sleeve	PTFE		
17	Sleeve spacer	SUS316	SUS304L	SUS316L
18	Sleeve plate	SUS316	SUS304L	SUS316L
19	Set screw	SUS316	SUS304	SUS316
20	Diaphragm receiver	SUS316	SUS304L	SUS316L
21	Diaphragm retainer	SUS316	SUS304L	SUS316L
22	Diaphragm	PFA		
23	Cover	A351-CF8M or SCS14A	A351-CF3 or SCS19A	A351-CF3M or SCS16A
24	Stud bolt, nut	SUS316	SUS304	SUS316
25	Stud bolt, nut	SUS316	SUS304	SUS316
26	Stud bolt, nut	SUS316	SUS304	SUS316
27	Hexagon socket head cap screw	SUS316	SUS304	SUS316
28	Eye bolt	SUS316	SUS304	SUS316
29	Gasket	V7020		
30	Gasket	PFA		
31	Gasket	V7020		
32	Gasket	V7020		
33	Gasket	PFA		
34	Gasket	V7020		
35	Diaphragm retainer ^{*1}	SUS316	SUS304L	SUS316L

*1 Applicable only to PSL-MD()3-()()-N

Standard material by temperature PSL-MD12

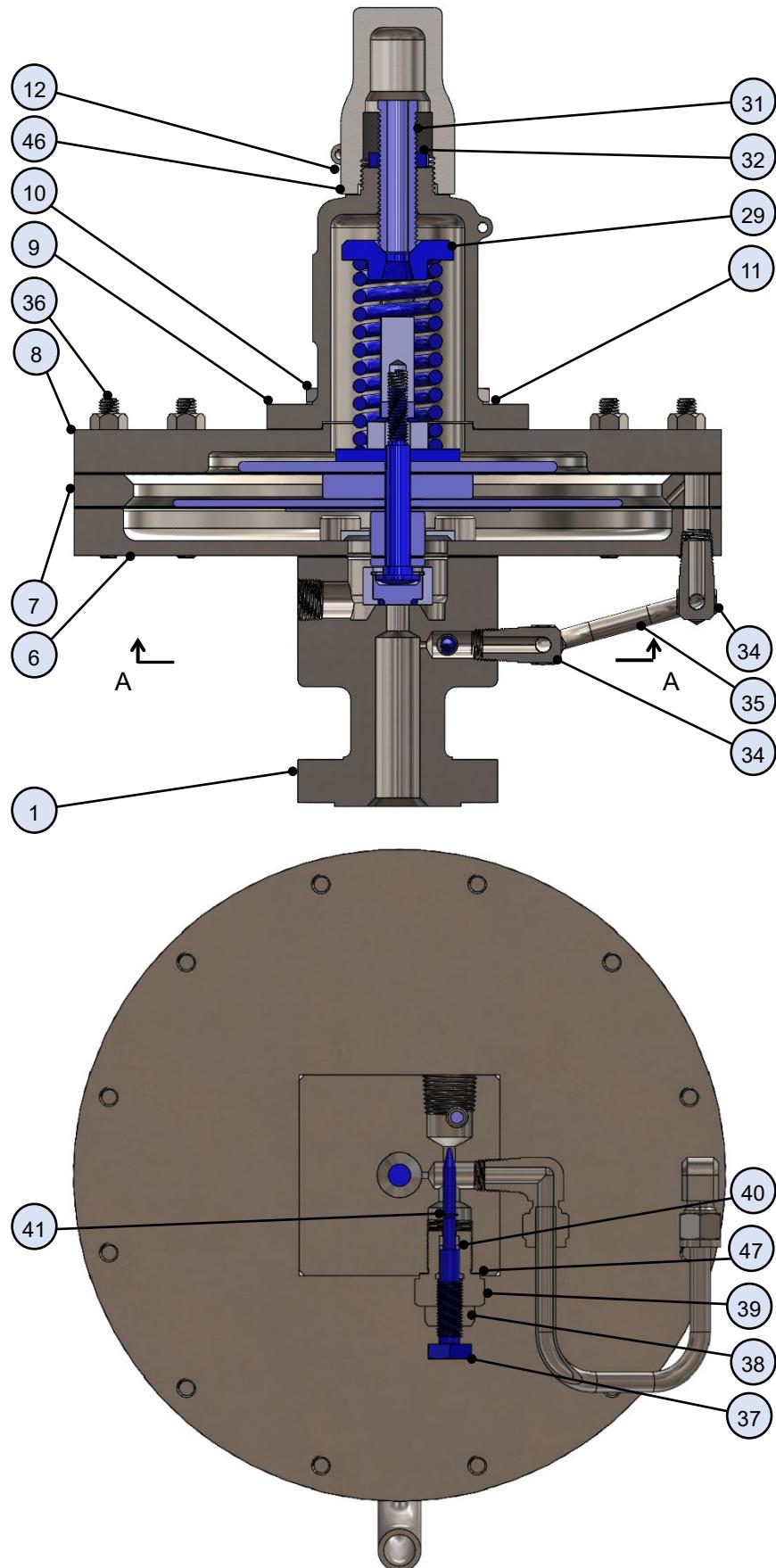
No.	Application temperature range (°C)	-196--46	-46--29	-29--125
	Material code	S	C5	Blank
1	Nozzle	A351-CF8 or SCS13A		
2	Body	A351-CF8 or SCS13A	A352-LCB or SCPL1	A216-WCB or SCPH2
3	Disc	SUS304		
4	Disc seal	NBR		
5	Disc spacer	SUS304		
6	Seat	PFA		
7	Seat cover	SUS304		
8	Seat retainer	SUS304		
9	Retainer bolt	SUS304		
10	Spindle	SUS304		
11	Spindle washer	SUS304		
12	Spindle nut	SUS304		
13	Spindle seal	NBR		
14	Diaphragm retainer	SUS304		
15	Diaphragm	PFA		
16	Cover	A351-CF8 or SCS13A	A352-LCB or SCPL1	A216-WCB or SCPH2
17	Stud bolt, nut	SUS304		
18	Stud bolt, nut	SUS304		
19	Stud bolt, nut	SUS304		
20	Gasket	V7020		
21	Gasket	V7020		
22	Gasket	V7020		
23	Hexagon socket head cap screw	SUS304		
24	Eye nut	SUS304		SS400

Standard material (main valve) by material code PSL-MD()2

No.	Material code	S1	S2	S3
1	Nozzle	A351-CF8M or SCS14A	A351-CF3 or SCS19A	A351-CF3M or SCS16A
2	Body	A351-CF8M or SCS14A	A351-CF3 or SCS19A	A351-CF3M or SCS16A
3	Disc	SUS316	SUS304L	SUS316L
4	Disc seal		NBR	
5	Disc spacer	SUS316	SUS304L	SUS316L
6	Seat		PFA	
7	Seat cover	SUS316	SUS304L	SUS316L
8	Seat retainer	SUS316	SUS304L	SUS316L
9	Retainer bolt	SUS316	SUS304	SUS316
10	Spindle	SUS316	SUS304L	SUS316L
11	Spindle washer	SUS316	SUS304	SUS316
12	Spindle nut	SUS316	SUS304	SUS316
13	Spindle seal		NBR	
14	Diaphragm retainer	SUS316	SUS304L	SUS316L
15	Diaphragm		PFA	
16	Cover	A351-CF8M or SCS14A	A351-CF3 or SCS19A	A351-CF3M or SCS16A
17	Stud bolt, nut	SUS316	SUS304	SUS316
18	Stud bolt, nut	SUS316	SUS304	SUS316
19	Stud bolt, nut	SUS316	SUS304	SUS316
20	Gasket		V7020	
21	Gasket		V7020	
22	Gasket		V7020	
23	Hexagon socket head cap screw	SUS316	SUS304	SUS316
24	Eye nut	SUS316	SUS304	SUS316

 Cross-sectional View of Pilot Valve

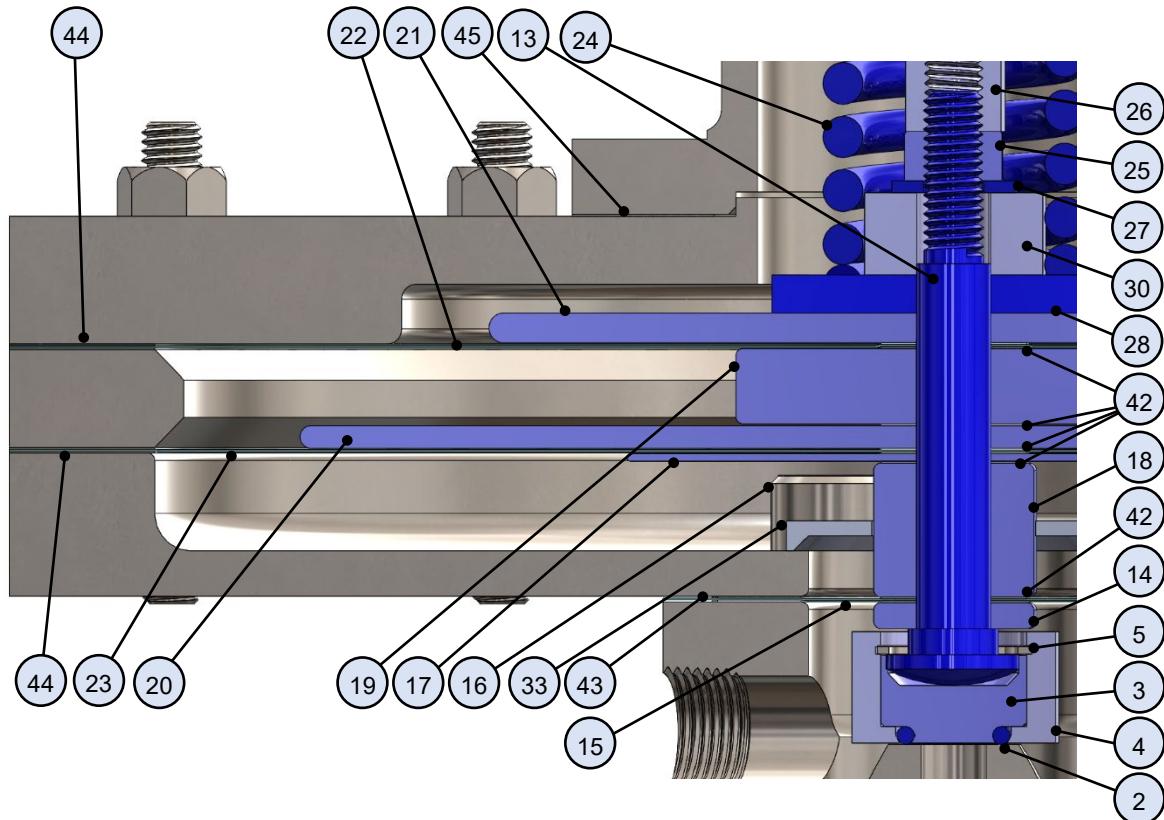
P260STD



Cross-sectional view A-A

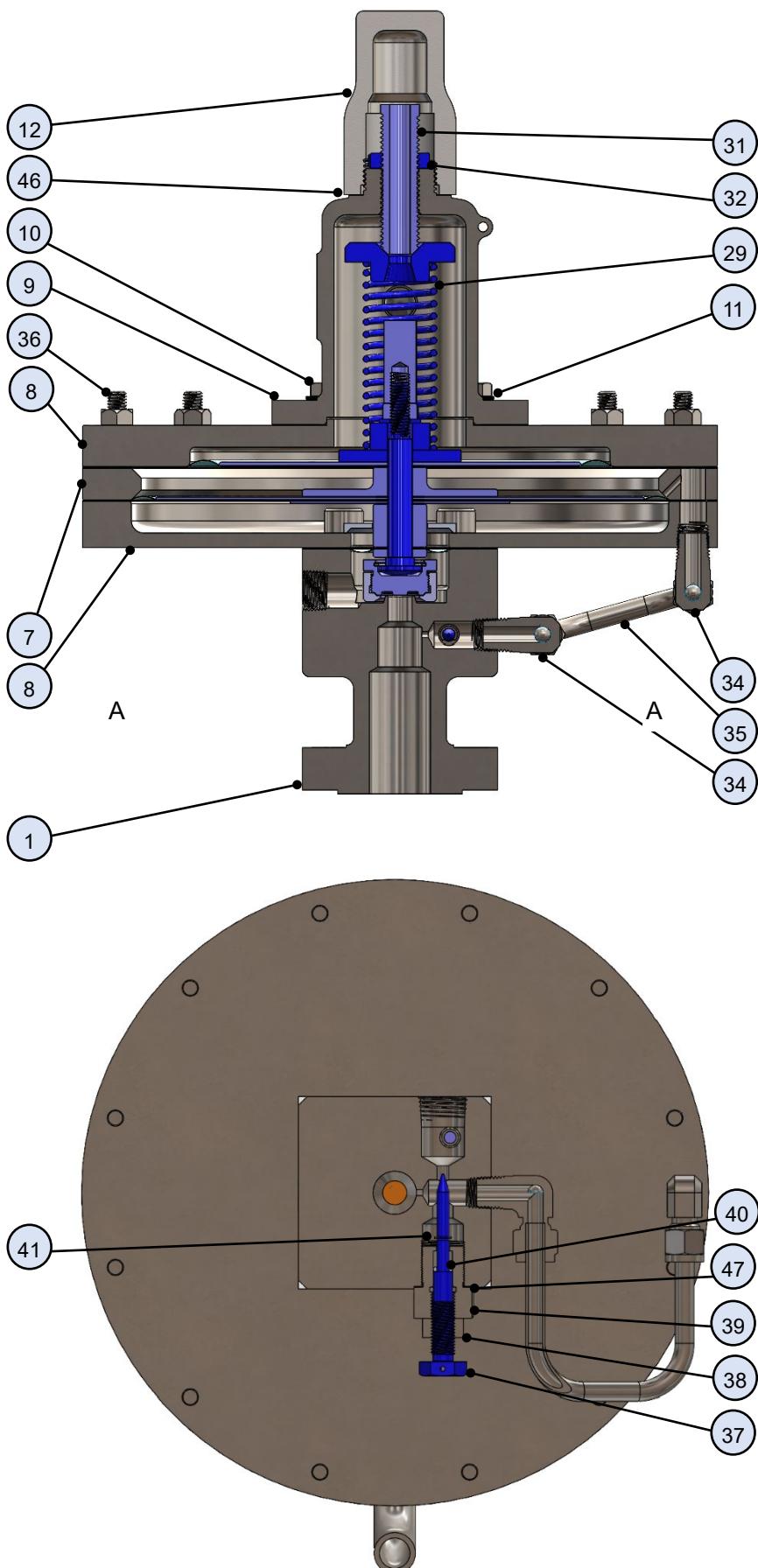
No.	Part name
1	Body
2	Seat
3	Seat base
4	Seat retainer
5	Retainer ring
6	Lower case
7	Diaphragm retainer
8	Upper case
9	Bonnet
10	Bonnet bolt
11	Seal washer
12	Cap
13	Spindle
14	Set plate
15	Spindle diaphragm
16	Spindle bolt
17	Boost diaphragm cover
18	Spacer 1
19	Spacer 2
20	Diaphragm set plate 1
21	Diaphragm set plate 2
22	Sense diaphragm
23	Boost diaphragm
24	Spring
25	Spindle nut 1
26	Spindle nut 2
27	Washer
28	Spring receiver
29	Spring retainer
30	Spring spacer
31	Adjust screw
32	Adjust screw lock nut
33	Check plate
34	Elbow connector
35	Sense pipe
36	Stud bolt, nut
37	Adjust needle
38	Adjust needle lock nut
39	Needle bush
40	O-ring
41	E-ring
42	Gasket
43	Gasket
44	Gasket
45	Gasket
46	Gasket
47	Gasket

Detail view of P260 STD seat

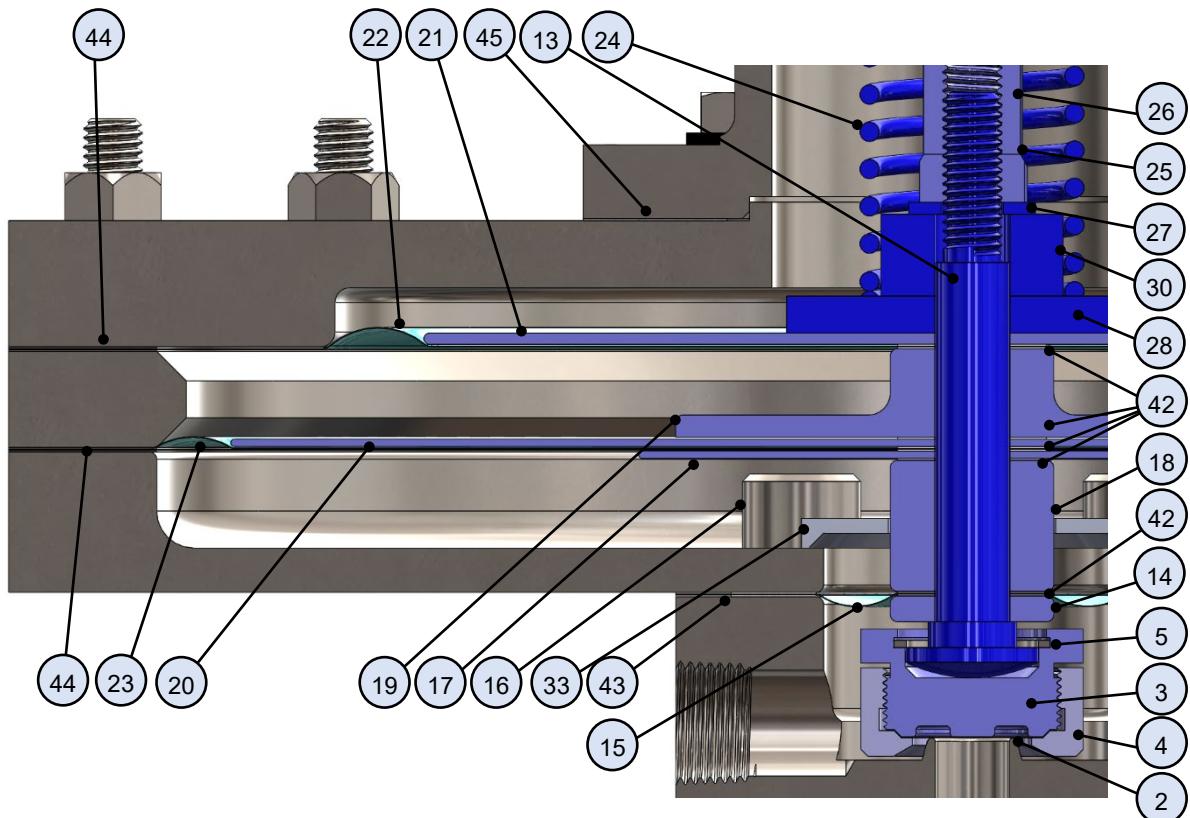


* This shows a general structure. The structure may vary depending on the specifications.

P260ULP



No.	Part name
1	Body
2	Seat
3	Seat base
4	Seat retainer
5	Retainer ring
6	Lower case
7	Diaphragm retainer
8	Upper case
9	Bonnet
10	Bonnet bolt
11	Seal washer
12	Cap
13	Spindle
14	Set plate
15	Spindle diaphragm
16	Spindle bolt
17	Boost diaphragm cover
18	Spacer 1
19	Spacer 2
20	Diaphragm set plate 1
21	Diaphragm set plate 2
22	Sense diaphragm
23	Boost diaphragm
24	Spring
25	Spindle nut 1
26	Spindle nut 2
27	Washer
28	Spring receiver
29	Spring retainer
30	Spring spacer
31	Adjust screw
32	Adjust screw lock nut
33	Check plate
34	Elbow connector
35	Sense pipe
36	Stud bolt, nut
37	Adjust needle
38	Adjust needle lock nut
39	Needle bush
40	O-ring
41	E-ring
42	Gasket
43	Gasket
44	Gasket
45	Gasket
46	Gasket
47	Gasket



 Standard Material of Pilot Valve

No.	Part name	Standard	S1
1	Body	SCS13A	SCS14A
2	Seat	NBR or UPILEX®	
3	Seat base	SUS304	SUS316
4	Seat retainer	SUS304	SUS316
5	Retainer ring	SUS304	SUS316
6	Lower case	SUS304	SUS316
7	Diaphragm retainer	SUS304	SUS316
8	Upper case	SUS304	SUS316
9	Bonnet	SCS13A	SCS14A
10	Bonnet bolt	SUS304	SUS316
11	Seal washer	SUS304 / NBR	
12	Cap	SCS13A	SCS14A
13	Spindle	SUS304	SUS316
14	Set plate	SUS304	SUS316
15	Spindle diaphragm	PFA	
16	Spindle bolt	SUS304	SUS316
17	Boost diaphragm cover	SUS304	SUS316
18	Spacer 1	SUS304	SUS316
19	Spacer 2	SUS304	SUS316
20	Diaphragm set plate 1	SUS304	SUS316
21	Diaphragm set plate 2	SUS304	SUS316
22	Sense diaphragm	PFA	
23	Boost diaphragm	PFA	
24	Spring	SUS304	SUS316
25	Spindle nut 1	SUS304	SUS316
26	Spindle nut 2	SUS304	SUS316
27	Washer	SUS304	SUS316
28	Spring receiver	SUS304	SUS316
29	Spring retainer	SUS304	SUS316
30	Spring spacer	SUS304	SUS316
31	Adjust screw	SUS304	SUS316
32	Adjust screw lock nut	SUS304	SUS316
33	Check plate	PTFE	
34	Elbow connector	SUS316	
35	Sense pipe	SUS304	SUS316
36	Stud bolt, nut	SUS304	SUS316
37	Adjust needle	SUS304	SUS316
38	Adjust needle lock nut	SUS304	SUS316
39	Needle bush	SUS304	SUS316
40	O-ring	NBR	
41	E-ring	SUS304	SUS316
42	Gasket	PFA	
43	Gasket	PFA	
44	Gasket	PFA	
45	Gasket	PFA	
46	Gasket	PFA	
47	Gasket	PFA	

◆ Actual Area

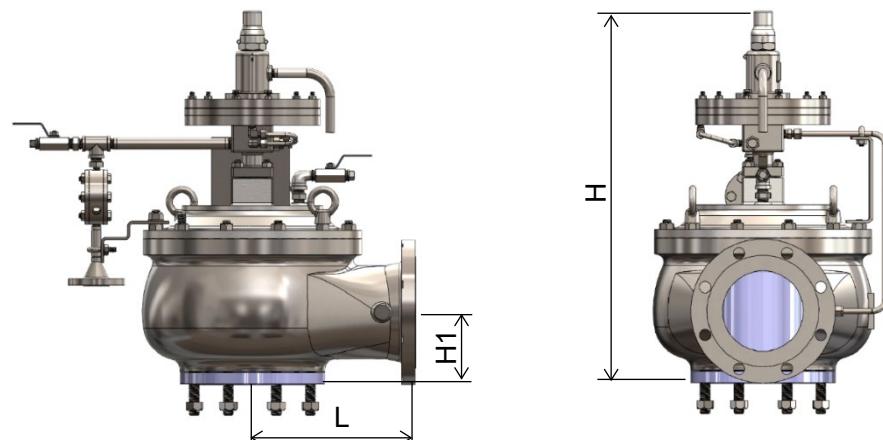
Size	Throat diameter mm	Nominal lift mm	Throat area mm ²
2*3	52.5	29.0	2164.7
3*4	78.0	43.0	4778.3
4*6	102.3	56.5	8219.4
6*8	154.0	85.0	18626.5
8*10	206.4	113.5	33458.7
10*12	247.0 262.0	136.0 144.5	47916.3 53912.8
12*16	311.0	171.0	75964.4
14*18	339.5	187.0	90525.1

◆ Pressure-Temperature Rating

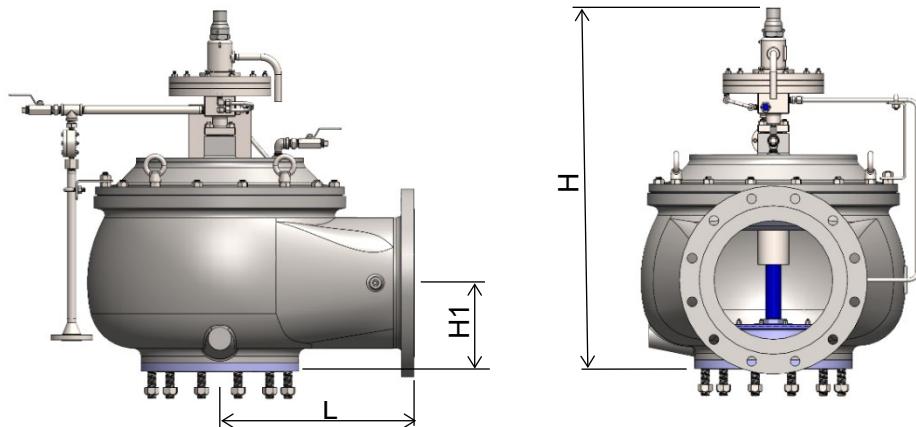
Pressure-Temperature Rating ASME B16.5 Flange						
Type	Material Body Bonnet	Flange class		Pressure Range		
		Inlet	Outlet	Temperature T (°C)	-196 ≤ T < -101	-101 ≤ T < -29
					*1 *2 3	5 6
PSL-MD()3	SCPH2, A216-WCB SCS13A, A351-CF8 SCS14A, A351-CF8M	150	150	1	3–250 kPa (0.03–2.5 bar)	
PSL-MD()2		150	150	1	1–10 kPa (0.01–0.1 bar)	

*1 Indicates the pressure class code. *2 Indicates the temperature code.

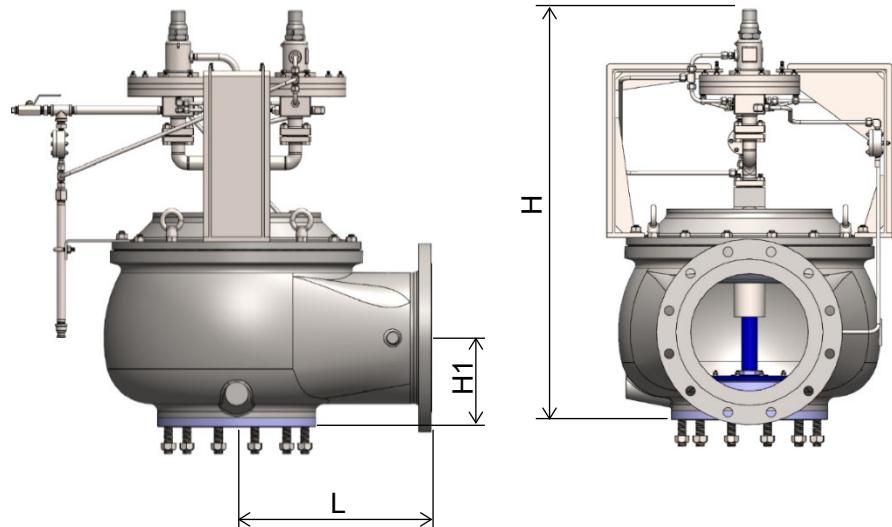
◆ Dimensions and Weight



ASME, JPI Flange Dimensions and Weight					Units: mm, kg		
Type	Size	Flange class		Center-to-face		Overall length H	Approximate weight
		Inlet	Outlet	$H1$	L		
PSL-MD()2	4*4	150	150	140	200	700	100
	6*6			140	315	820	160
	8*8			200	400	900	240
	10*10			230	500	975	380



ASME, JPI Flange Dimensions and Weight					Units: mm, kg		
Type	Size	Flange class		Center-to-face		Overall length H	Approximate weight
		Inlet	Outlet	$H1$	L		
PSL-MD()3-()()	2*3	150	150	105	150	550	50
	3*4			116	180	590	80
PSL-MD()3-()()-N	4*6	150	150	140	200	665	120
	6*8			140	315	780	200
	8*10			201	400	860	280
	10*12			231	500	935	400
	12*16			287	560	1025	600
PSL-MD()3-()()	14*18			300	630	1150	850



ASME, JPI Flange		Dimensions and Weight				Units: mm, kg	
Type	Size	Flange class		Center-to-face		Overall length H	Approximate weight
		Inlet	Outlet	H1	L		
PSL-MD()3-()()()	2*3			105	150	770	80
	3*4			116	180	740	115
PSL-MD()3-()()()-N	4*6	150	150	140	200	815	155
	6*8			140	315	930	235
	8*10			201	400	1010	320
	10*12			231	500	1085	440
	12*16			287	560	1175	645
	14*18			300	630	1300	900



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