

PRESSURE REDUCING VALVES RP45 (ASME)

DESCRIPTION

The ADCA RP45 series of pressure reducing valves are single seated, bellows sealed controllers that operate without auxiliary energy. Designed for use with steam, compressed air, and other gases compatible with the construction.

These valves are particularly suitable for reducing steam pressure in all energy and process systems where pressures must be kept under control.

MAIN FEATURES

Specially designed high durability bellows, providing pressure balancing and frictionless plug stem.

Robust construction (fit-and-forget).

Suitable for use with high pressure turndowns.

Interchangeable actuators and adjustment springs.

OPTIONS:

- Soft sealing in PTFE/GR for use with steam.
- Soft sealing in nitrile rubber for use with air and gases.
- Low-noise flow divider.
- Sensing line connection on body.

USE:

Steam, compressed air and other gases compatible with the construction. Limited use with liquids. Consult manufacturer before installing the valve with liquids.

AVAILABLE MODELS:

- RP45S – carbon steel.
- RP45i – stainless steel (only available from 1/2" to 4").

SIZES: 1/2" to 6".

CONNECTIONS: Flanged ASME B16.5 Class 150 or 300.

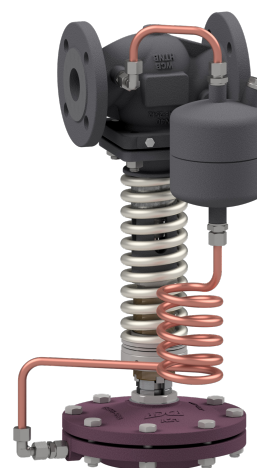
AVAILABLE ACTUATORS:

- A1, A10, A11, A12, A3, A4, B1, B3, B4 and C11 – carbon steel.
- A2, A21, B2 and B21 – SG iron or carbon steel.
- A1i, A10i, A11i, A12i, A2i, A21i, A3i and A4i – stainless steel.

INSTALLATION:

See IMI – Installation and maintenance instructions.

In steam applications, a "Y" strainer, humidity separator, and steam trap should be installed upstream of the valve.



CE MARKING – GROUP 2 (PED – European Directive)		
CLASS 150	CLASS 300	CATEGORY
1/2" to 2"	1/2" to 1"	SEP
2 1/2" to 4"	1 1/2" to 4"	1 (CE marked)
6"	6"	2 (CE marked)

LIMITING CONDITIONS – VALVE

MODEL	RP45S and RP45i	
Body design conditions	Class 150	Class 300
Maximum upstream pressure	13 bar	25 bar
Maximum downstream pressure (1/2" to 4")	13 bar	18 bar
Maximum downstream pressure (6")	12 bar	16,5 bar
Minimum downstream pressure	0,15 bar	0,15 bar
Maximum operating temperature *	200 °C	250 °C
Maximum reducing ratio *	25:1	25:1
Rangeability	10:1	10:1
Maximum hydraulic factory valve body test	24 bar	60 bar

* See "Ordering Codes" table for restrictions.

LIMITING CONDITIONS – ACTUATOR

ACTUATOR MODEL	A1 A1i	A10 A10i	A11 A11i	A12 A12i	A2 A2i	A21 A21i	A3 A3i	A4 A4i	B1	B2	B21	B3	B4	C11
Maximum operating pressure (bar)	25	25	25	25	12	18	2,5	1,5	25	13	18	2,5	1,5	25
Maximum operating temperature	90 °C *													

* See "Sensing Line Connection Options" table.

FLOW RATE COEFFICIENTS (m³/h)

SIZE	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	6"
Kvs	4,8	6,9	9,1	14,4	26,5	51,5	79,5	129,5	204

SATURATED STEAM CAPACITY TABLE (kg/h)

INLET (barg)	SIZE								
	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	6"
0,5	51	68	90	186	300	460	800	1250	1800
0,75	63	84	112	230	360	580	1000	1550	2350
1	75	100	133	280	430	700	1200	1850	3200
1,5	100	133	175	360	590	910	1600	2500	4000
2	126	170	230	450	730	1160	2000	3050	4700
2,5	150	200	260	550	880	1390	2400	3600	6500
3	175	240	310	640	1010	1600	2700	4300	8500
4	220	290	390	800	1300	2000	3400	5400	10000
5	260	350	480	1000	1600	2500	4200	6500	12000
6	330	440	580	1220	1930	3000	5100	8000	14000
7	400	520	700	1430	2300	3600	6100	9500	16000
8	450	600	800	1670	2700	4100	7100	11000	18000
9	500	670	880	1800	2900	4600	7800	12000	20000
10	560	750	980	2000	3200	5100	8500	13500	22000
12	680	900	1180	2500	4000	6100	10500	16300	25000
14	800	1050	1400	2900	4700	7200	12600	19000	29000
16	920	1230	1630	3400	5500	8300	14600	22000	33000
18	1040	1400	1860	3800	6200	9500	16600	25000	38000
20	1170	1540	2100	4200	7000	10800	18600	28000	42000
22	1330	1780	2350	4900	7800	12200	21000	32000	45000
24	1500	2000	2600	5400	8700	13700	23500	36000	48000
25	1600	2150	2800	5700	9200	14500	25500	38000	50000

Remark: For pressure ratios where $P_2 > 0,7 P_1$ and/or when the operating medium is superheated steam, a correction factor must be applied. See next page.

CORRECTION FACTORS

Pressure ratio:

The capacities given in the "Saturated steam capacity table" are applicable in scenarios where $P_2 < 0,7 P_1$.

In the remaining scenarios a correction factor must be applied.

PRESSURE RATIO * P_2 / P_1	CORRECTION FACTOR f
$\geq 0,7$	1,25
$\geq 0,8$	1,6
$\geq 0,9$	2,25

* Pressure ratio in bar abs (barg + 1)

Example

Required saturated steam capacity: 500 kg/h; Upstream pressure: 3 bar; Required downstream pressure: 2 bar.

Solution:

First determine the correction factor for pressure ratio: $(2+1) / (3+1) = 0,75 \rightarrow f = 1,25$

Then multiply by the given capacity: $500 \times 1,25 = 625 \text{ kg/h}$

Afterwards, refer to the cell with the number "3" in the column "INLET" of the saturated steam capacity table. In that line, the values for selection of the pressure reducing valve size can be found. In this particular scenario, a value equal to or higher than 625 kg/h is required, and the right selection would be a 1 1/2", with a capacity of 640 kg/h.

In the actuator and spring selection table, for a downstream pressure of 2 bar, the recommended actuator is the A2, with a regulating spring No. 60.

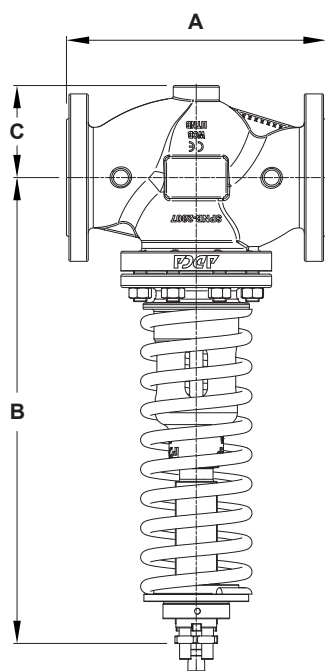
Superheated steam:

When the medium is superheated steam, instead of saturated steam, a correction factor must be applied. The required mass flow must be multiplied by the following factor:

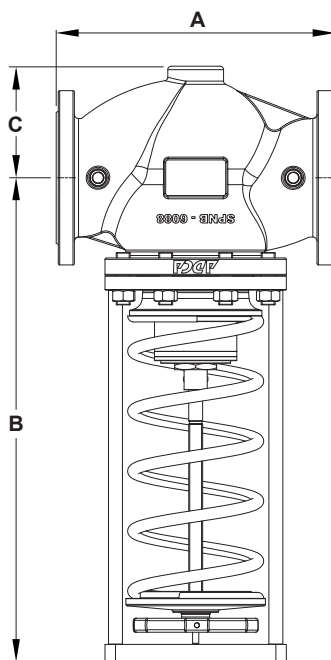
$$\frac{V_h}{V_s}, \text{ where } V_h = \text{specific volume of superheated steam, and} \\ V_s = \text{specific volume of saturated steam.}$$

ACTUATOR AND SPRING SELECTION TABLE

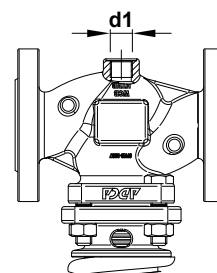
SIZE		A4 A4i	A3 A3i	A2 A2i	A21 A21i	A1 A1i	A10 A10i	A11 A11i	A12 A12i	B4	B3	B2	B21	B1	C11
1/2"	Regulating range (bar)	0,15 to 0,49	0,5 to 0,99	1,0 to 1,6	1,7 to 3,8	3,9 to 5,5	5,6 to 8,2	—	—	8,3 to 13	10 to 18	—	—	—	—
	Spring No.	66	60	60	60	60	60	—	—	60	60.1	—	—	—	—
3/4"	Regulating range (bar)	0,15 to 0,49	0,5 to 0,99	1 to 1,6	1,7 to 3,8	3,9 to 5,5	5,6 to 8,2	—	—	8,3 to 13	10 to 18	—	—	—	—
	Spring No.	66	60	60	60	60	60	—	—	60	60.1	—	—	—	—
1"	Regulating range (bar)	0,15 to 0,49	0,5 to 0,99	1 to 1,6	1,7 to 3,8	3,9 to 5,5	5,6 to 8,2	—	—	8,3 to 13	10 to 18	—	—	—	—
	Spring No.	66	60	60	60	60	60	—	—	60	60.1	—	—	—	—
1 1/2"	Regulating range (bar)	0,15 to 0,49	0,5 to 0,99	1 to 1,6	1,7 to 3,8	3,9 to 5,5	5,6 to 8,2	—	—	8,3 to 13	10 to 18	—	—	—	—
	Spring No.	66	60	60	60	60	60	—	—	60	60.1	—	—	—	—
2"	Regulating range (bar)	0,15 to 0,49	0,5 to 0,99	1 to 1,9	2 to 4,2	4,3 to 6,9	7 to 8,5	—	10 to 18	8,6 to 13	—	—	—	—	—
	Spring No.	67	61	61	61	61	64	—	61	64	—	—	—	—	—
2 1/2"	Regulating range (bar)	0,15 to 0,49	0,5 to 0,99	1 to 1,9	2 to 4,2	4,3 to 6,9	7 to 8,5	—	10 to 18	8,6 to 13	—	—	—	—	—
	Spring No.	67	61	61	61	61	64	—	61	64	—	—	—	—	—
3"	Regulating range (bar)	0,15 to 0,45	0,46 to 0,99	1 to 1,9	2 to 5	5,1 to 8,9	9 to 13	11 to 18	—	—	—	—	—	—	—
	Spring No.	68	62	62	62	62	65	62	—	—	—	—	—	—	—
4"	Regulating range (bar)	0,15 to 0,45	0,46 to 0,99	1 to 1,9	2 to 6,0	6,1 to 13	—	11 to 18	—	—	—	—	—	—	—
	Spring No.	69	63	63	63	63	—	63	—	—	—	—	—	—	—
6"	Regulating range (bar)	—	—	—	—	—	—	—	—	—	0,5 to 1,5	1,1 to 2,5	1,5 to 5,5	4 to 8,5	6 to 12
	Spring No.	—	—	—	—	—	—	—	—	—	70	70	70	70	70



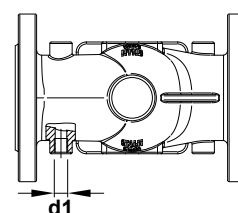
1/2" to 4"



6"



Optional sensing line connection
on body (1/2" to 1")

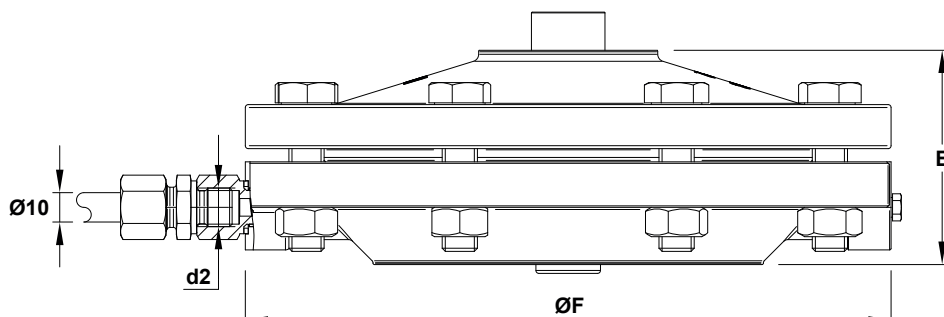


Optional sensing line connection
on body (1 1/2" to 6")

DIMENSIONS – VALVE (mm)

DIMENSION		SIZE								
		1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	6"
A	CLASS 150	184	184	184	222	254	276	298	352	451
	CLASS 300	190	194	197	235	267	292	318	368	473
B	CLASS 150	366	366	371	384	470	495	556	597	710
	CLASS 300	366	366	371	384	470	495	556	597	710
C	CLASS 150	44,5	49	54	65	85	100	110	130	180
	CLASS 300	47,5	58,5	62	78	85	100	110	130	180
d1		3/8"	3/8"	3/8"	1/4"	1/4"	1/4"	1/4"	1/4"	3/8"
WGT. (kg)	CLASS 150	8,9	9,2	10,4	14	20,5	29,9	42,2	55	113
	CLASS 300	9,3	10,2	11,8	16,8	22,8	33	47,5	62,9	129,4

At the beginning of 2022, new face-to-face dimensions were defined for certain Class 150 valves. Valves may still be supplied with the previous face-to-face dimensions upon request. Please consult the manufacturer.

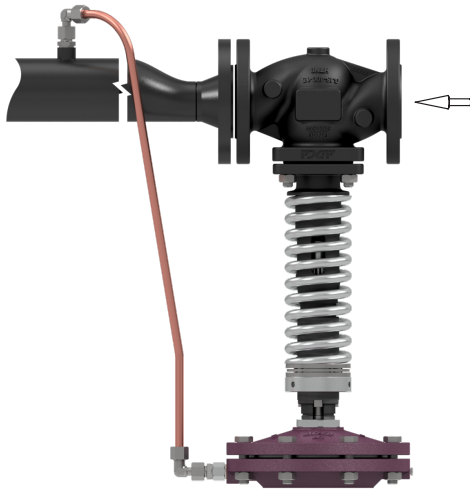


DIMENSIONS – ACTUATOR (mm)

DIMENSION	A1 A1i	A10 A10i	A11 A11i	A12 A12i	A2 A2i	A21 A21i	A3 A3i	A4 A4i	B1	B2	B21	B3	B4	C11
d2	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"
E	67	67	67	67	74	74	71	81	80	86	86	88	98	93
ØF	172	172	172	172	220	220	282	340	172	220	220	283	340	145
WEIGHT (kg)	4,3	4,3	4,3	4,3	7,3	7,3	11,3	16,3	4,4	7,4	7,4	11,6	18,6	2,3

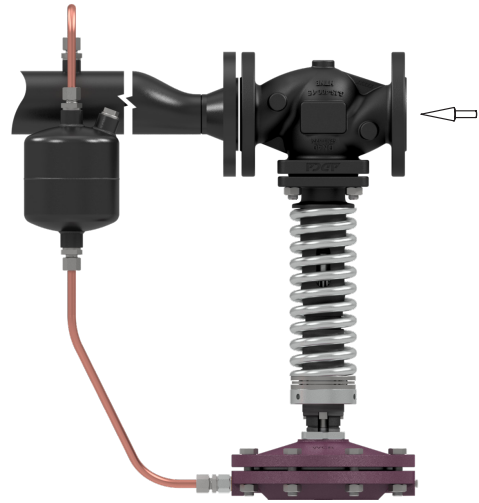
SENSING LINE CONNECTION OPTIONS

EXTERNAL SENSING LINE



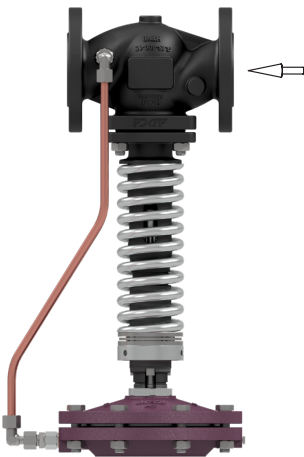
For use with gases below 90 °C. For gases between 90 °C and 130 °C, please consult the manufacturer.
Installation with the actuator oriented upwards is also acceptable.
The sensing line should be connected at least 1 meter downstream of the valve outlet.

EXTERNAL SENSING LINE WITH POT *



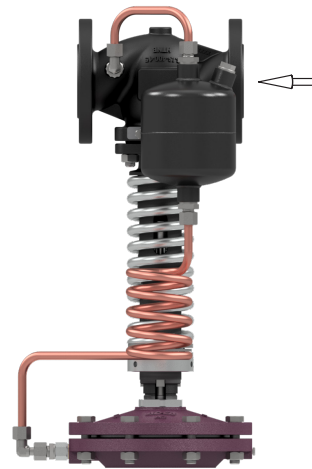
Applicable for steam.
The sensing tube and seal POT are ordered and supplied separately.
Installation must be carried out with the actuator oriented downward.
The sensing line should be connected at least 1 meter downstream of the valve outlet.

SENSING LINE CONNECTION ON BODY



For use with gases below 90 °C. For gases between 90 °C and 130 °C, please consult the manufacturer.
Installation with the actuator oriented upwards is also acceptable.
The valve can be supplied with the sensing tube factory-installed. If not supplied installed, the connection at the body is delivered closed with a plug.
The image shows the connection and sensing tube positioned on the left side relative to the flow direction. If installation constraints require, the connection may also be made on the right side. For valves up to DN 25, the sensing connection is located at the cast boss on the bottom of the valve body.

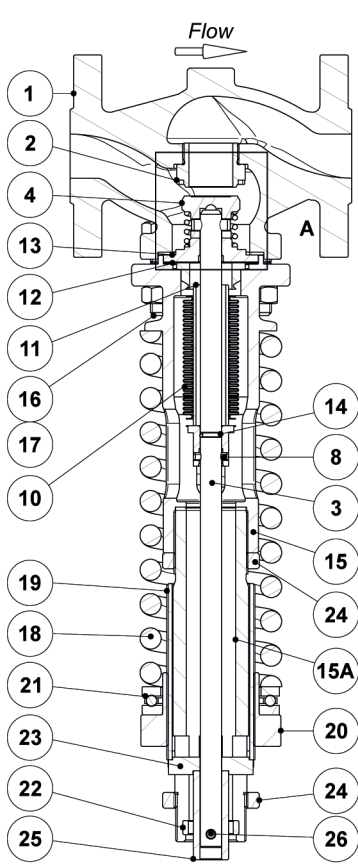
SENSING LINE CONNECTION ON BODY WITH POT *



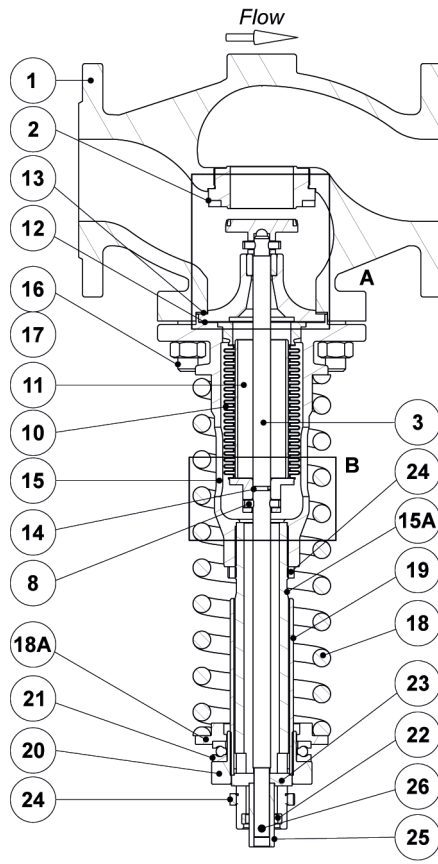
Applicable for steam.
Installation must be carried out with the actuator oriented downward.
The valve can be supplied with the sensing tube and seal POT factory-installed. If these components are not supplied installed, the connection at the body is delivered closed with a plug.
The image shows the connection, sensing tube, and POT positioned on the left side relative to the flow direction. If installation constraints require, the connection may also be made on the right side. For valves up to DN 25, the sensing connection is located at the cast boss on the bottom of the valve body.

* For more information, please consult IS POT.010 – Water seal pots.

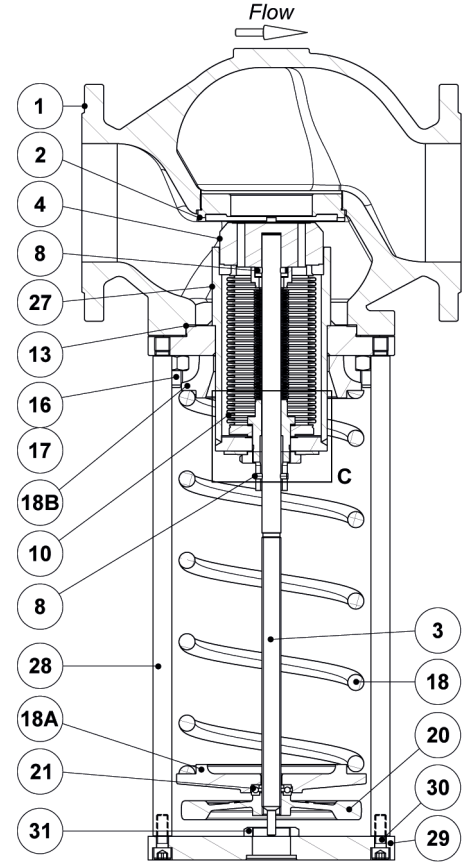
MATERIALS



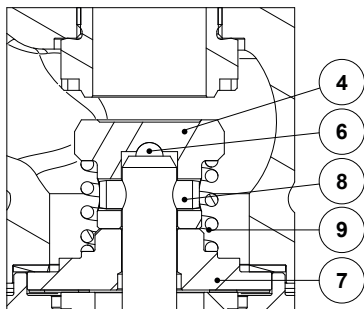
1/2" to 11/2"



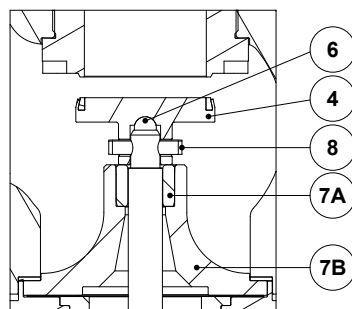
2" to 4"



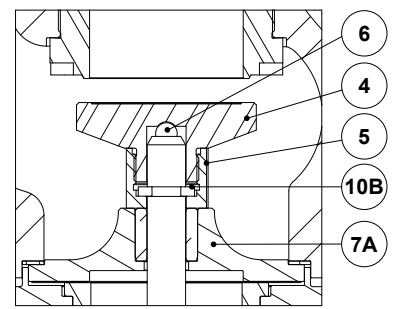
6"



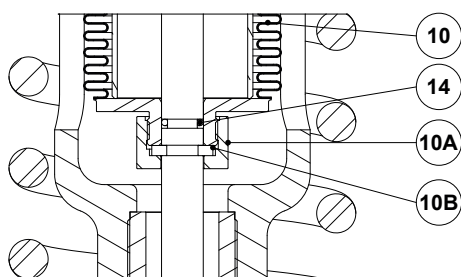
Detail A
(1/2" to 11/2")



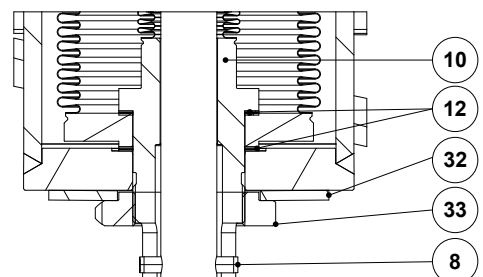
Detail A
(2" and 21/2")



Detail A
(3" and 4")



Detail B
(3" and 4")

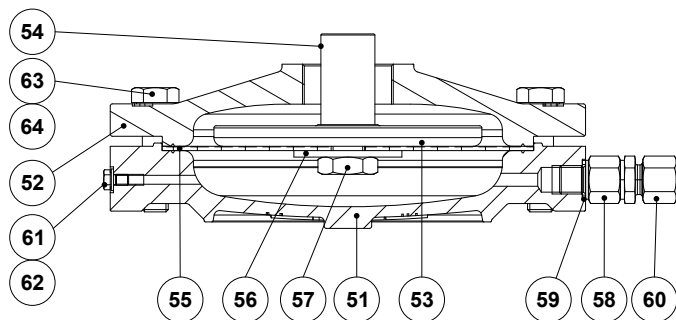


Detail C
(6")

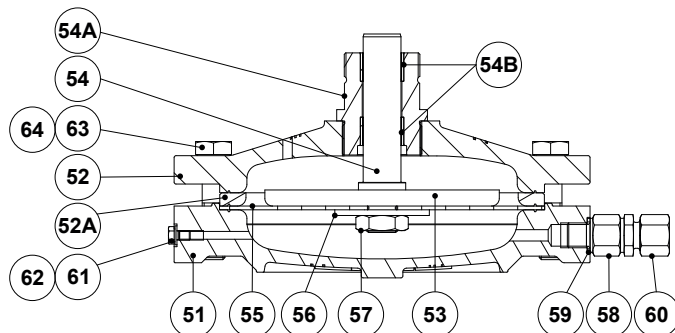
MATERIALS – VALVE

POS. No.	DESIGNATION	1/2" to 4"	6"
1	Valve body (RP45S)	A216 WCB / 1.0619	A216 WCB / 1.0619
	Valve body (RP45i)	A351 CF8M / 1.4408	A351 CF8M / 1.4408
2	* Seat	AISI 316 / 4.4401	AISI 316 / 4.4401
3	* Stem	AISI 304 / 1.4301	AISI 304 / 1.4301
4	* Valve plug	AISI 420 / 1.4021	AISI 316 / 4.4401
5	Nut	AISI 316 / 1.4401	AISI 316 / 4.4401
6	* Ball	AISI 440C / 1.4125	–
7	Stem guide	AISI 304 / 1.4301	–
7A	Stem guide	AISI 304 / 1.4301	–
7B	Rod guide bushing	–	Bronze CB1
8	* Pin	AISI 301 / 1.4310	AISI 304 / 1.4301
9	Compensating spring	AISI 302 / 1.4300	–
10	* Bellows	AISI 316Ti / 1.4571	AISI 316 / 1.4401
10A	Nut	AISI 316 / 1.4401	–
10B	Split ring	AISI 316 / 1.4401	–
11	Guide tube	CuZn39Pb3	–
12	* Bellows gasket	Stainless steel / Graphite	Stainless steel / Graphite
13	* Body gasket	Stainless steel / Graphite	Stainless steel / Graphite
14	* O-ring	** EPDM	–
15	Piston body (RP45S)	A216 WCB / 1.0619	–
	Piston body (RP45i)	A351 CF8M / 1.4408	–
15A	Piston body extension (RP45S)	P355T1 / 1.0421	–
	Piston body extension (RP45i)	AISI 304 / 1.4301	–
16	Stud (RP45S)	Steel 8.8; EN 10269 steel	Steel 8.8; EN 10269 steel
	Stud (RP45i)	Stainless steel A2-70	–
17	Nut (RP45S)	Steel 8.8; EN 10269 steel	Steel 8.8; EN 10269 steel
	Nut (RP45i)	Stainless steel A2-70	–
18	* Adjustment spring	Spring steel	Spring steel
18A	Lower spring plate (RP45S)	C45E / 1.1191	A216 WCB / 1.0619
	Lower spring plate (RP45i)	AISI 304 / 1.4301	–
18B	Upper spring plate	–	S235JG2R / 1.0038
19	Threaded tube	CuZn39Pb3	–
20	Spring adjusting nut	AISI 304 / 1.4301	–
21	Ball bearing	Zinc plated steel	Zinc plated steel
22	Spacer (RP45S)	S355JR / 1.0045	–
	Spacer (RP45i)	AISI 304 / 1.4301	–
23	Pressure star (RP45S)	S235JR / 1.0038	–
	Pressure star (RP45i)	AISI 304 / 1.4301	–
24	Lock nut	AISI 303 / 1.4305	–
25	Pressure tube (RP45S)	C45E / 1.1191	–
	Pressure tube (RP45i)	AISI 304 / 1.4301	–
26	Pin	AISI 303 / 1.4305	–
27	Bellows housing	–	S355JR / 1.0045
28	Pillar	–	C45E / 1.1191
29	Pillar flange	–	C45E / 1.1191
30	Bolt	–	Zinc plated steel
31	Stem nut	–	A351 CF8 / 1.4308
32	Belleville washer	–	P235GH / 1.0345
33	Tightening nut	–	S235JR / 1.0038

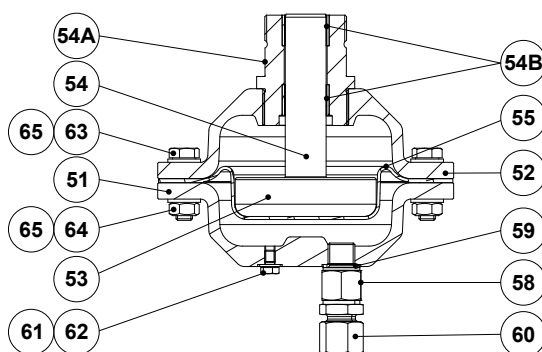
* Available spare parts. ** Others on request.



A series actuators



B series actuators



C series actuators

MATERIALS – ACTUATOR

POS. No.	DESIGN.	A1, A10, A11, A12, A3 and A4	A2 and A21	A1i, A10i, A11i, A12i, A2i, A21i, A3i and A4i	B1, B3 and B4	B2 and B21	C11
51	Lower diaph. chamber	A216 WCB / 1.0619	GJS-400-15 / 0.7040; A216 WCB / 1.0619	A351 CF8M / 1.4408	A216 WCB / 1.0619	GJS-400-15 / 0.7040; A216 WCB / 1.0619	S235JR / 1.0038
52	Upper diaph. chamber	A216 WCB / 1.0619	GJS-400-15 / 0.7040; A216 WCB / 1.0619	A351 CF8M / 1.4408	A216 WCB / 1.0619	GJS-400-15 / 0.7040; A216 WCB / 1.0619	S235JR / 1.0038
52A	Spacer ring	–	–	–	S355JR / 1.0045	S355JR / 1.0045	–
53	Pressure plate	A216 WCB / 1.0619	GJS-400-15 / 0.7040	A351 CF8M / 1.4408; AISI 304 / 1.4301	S355JR / 1.0045	S355JR / 1.0045	C45E / 1.1191
54	Diaphragm plate spindle	A216 WCB / 1.0619	GJS-400-15 / 0.7040	A351 CF8M / 1.4408; AISI 304 / 1.4301	AISI 420 / 1.4021	AISI 420 / 1.4021	AISI 420 / 1.4021
54A	Guide	–	–	–	C45E / 1.1191	C45E / 1.1191	C45E / 1.1191
54B	* Plain bearing	–	–	–	Bronze	Bronze	Bronze
55	* Diaphragm	Neo. reinforced polyamide	Neo. reinforced polyamide	Neo. reinforced polyamide	Neo. reinforced polyamide	Neo. reinforced polyamide	Reinforced NBR
56	Washer	Copper	Copper	AISI 304 / 1.4301	Copper	Copper	–
57	Hex nut	CuZn39Pb3	CuZn39Pb3	AISI 304 / 1.4301	CuZn39Pb3	CuZn39Pb3	–
58	Flow restrictor	AISI 303 / 1.4305	AISI 303 / 1.4305	AISI 303 / 1.4305	AISI 303 / 1.4305	AISI 303 / 1.4305	AISI 303 / 1.4305
59	Gasket	Copper	Copper	Copper	Copper	Copper	Copper
60	Comp. fitting	AISI 316Ti / 1.4571	AISI 316Ti / 1.4571	AISI 316Ti / 1.4571	AISI 316Ti / 1.4571	AISI 316Ti / 1.4571	AISI 316Ti / 1.4571
61	Vent screw	Zinc plated steel	Zinc plated steel	AISI 304 / 1.4301	Zinc plated steel	Zinc plated steel	Zinc plated steel
62	Washer	Copper	Copper	AISI 304 / 1.4301	Copper	Copper	Copper
63	Bolt	Zinc plated steel	Zinc plated steel	AISI 304 / 1.4301	Zinc plated steel	Zinc plated steel	Zinc plated steel
64	Nut	Zinc plated steel	Zinc plated steel	AISI 304 / 1.4301	Zinc plated steel	Zinc plated steel	Zinc plated steel
65	Washer	–	–	–	–	–	Zinc plated steel

* Available spare parts.

ORDERING CODES RP45

VALVE MODEL	RP45	1	S	60	M	0	XX	X	U	15
RP45 – Pressure reducing valve	RP45									
VALVE SERIES										
Series 1		1								
BODY MATERIAL										
A216 WCB / 1.0619 carbon steel			S							
A351 CF8M / 1.4408 stainless steel			I							
SPRING No.										
60 (1/2" to 11/2")				60						
60.1 (1/2" to 11/2")				6A						
61 (2" and 21/2")				61						
62 (3")				62						
63 (4")				63						
64 (2" and 21/2")				64						
65 (3")				65						
66 (1/2" to 11/2")				66						
67 (2" and 21/2")				67						
68 (3")				68						
69 (4")				69						
70 (6")				70						
VALVE SEALING										
Metal to metal					M					
Soft sealed with PTFE/GR – Tmax 200 °C					G					
Soft sealed with NBR – Tmax 80 °C; Maximum reducing ratio 10:1					N					
SENSING LINE CONNECTION ON BODY (a)										
Without sensing line connection on body						0				
Threaded connection on the bottom (1/2" to 1")						V				
Threaded connection on the left side, relative to flow direction (11/2" to 6")						W				
Threaded connection on the right side, relative to flow direction (11/2" to 6"; non-standard construction)						Y				
Threaded connection on both sides (11/2" to 6"; non-standard construction)						Z				
OPTIONS										
Standard valve							XX			
Valve with carbon steel piston body (only for RP45i)							XS			
SPECIAL FEATURES										
None								X		
PIPE CONNECTIONS										
Flanged ASME B16.5 Class 150									U	
Flanged ASME B16.5 Class 300									V	
SIZE										
1/2"										15
3/4"										20
...										
SPECIAL CONSTRUCTION / ADDITIONAL OPTIONS										
Full description or additional codes have to be added in case of non-standard combination										E

(a) Connections are closed with plugs in case the valve is not supplied with the tube pre-assembled from factory.

HOW TO ORDER

Indicate the complete valve ordering code together with the required actuator size. If the valve is to be supplied with factory-installed sensing tube, it must be stated in the order. In that case, also specify wheather a seal POT is to be installed.
Example: RP451S60MWXXXU40 fitted with A2 actuator and sensing line connection on body with POT-4S.