

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 pipe 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 and RP45ST or N – carbon steel.
Suffix T: soft sealed with PTFE/GR.
Suffix N: soft sealed with nitrile rubber.

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.

INSTALLATION: See IMI – Installation and maintenance instructions.



RP45
1/2" to 4"

RP45
6"



RP45
1/2" to 4"
with sensing pipe on body

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 (mm)

MODEL	RP45S	RP45S	RP45ST	RP45ST	RP45SN	RP45SN
Body design conditions	Class 150	Class 300	Class 150	Class 300	Class 150	Class 300
Maximum upstream pressure	13 bar	25 bar	13 bar	25 bar	13 bar	25 bar
Maximum downstream pressure (1/2" to 4")	13 bar	18 bar	13 bar	18 bar	13 bar	18 bar
Maximum downstream pressure (6")	12 bar	16,5 bar	12 bar	16,5 bar	12 bar	16,5 bar
Minimum downstream pressure	0,15 bar	0,15 bar	0,15 bar	0,15 bar	0,15 bar	0,15 bar
Maximum operating temperature	200 °C	250 °C	200 °C	200 °C	80 °C	80 °C
Maximum reducing ratio	25:1	25:1	25:1	25:1	10:1	10:1
Rangeability	10:1	10:1	10:1	10:1	10:1	10:1
Maximum hydraulic factory valve body test	24 bar	60 bar	24 bar	60 bar	24 bar	60 bar

Remark: Other soft materials and temperature limits on request.

LIMITING CONDITIONS – ACTUATOR (mm)

ACTUATOR MODEL	A1	A10	A11	A12	A2	A21	A3	A4	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 *													

* The water seal pot must be installed in the sensing pipe when operating with steam or liquids at higher temperatures.

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)

Superheated steam:

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

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

ACTUATOR AND SPRING SELECTION TABLE																	
SIZE		A4		A3	A2	A21	A1		A10	A11	A12	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 N°	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 N°	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 N°	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 N°	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 N°	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 N°	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 N°	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 N°	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	8 to 16,5
	Spring N°	—	—	—	—	—	—	—	—	—	—	70	70	70	70	70	70

HOW TO SIZE (USING STEAM TABLE)

Example

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

Solution:

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

Then multiply 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 11/2", with a capacity of 640 kg/h.

On the actuator and spring selection table, for a downstream pressure of 2 bar, the recommended actuator is the A2, and the regulating spring is N° 60.

Remarks: Never size the valve according to the pipe diameter in which it has to be fitted, but according to the actual flow required. Pipe sizing must also respect the maximum recommended flow velocities, according to the medium.

HOW TO SIZE (USING Kvs)

Please consult formulas on IS PV10.00 E or consult manufacturer.

HOW TO ORDER

RP45S 11/2" Class 150 valve complete with spring N° 60, A2 actuator, condensate vessel and copper sensing pipe.

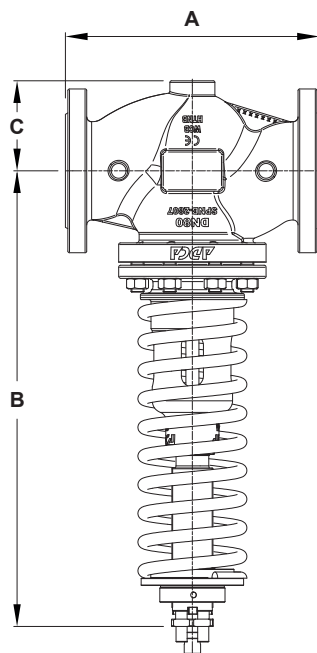
INSTALLATION

Horizontal installation with the actuator vertically, pointing downwards.

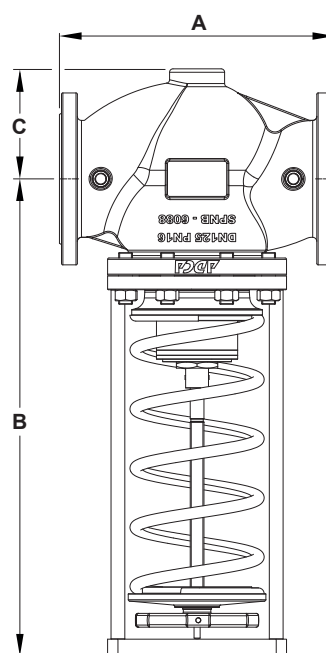
Installation with the actuator pointing upwards is possible only when the medium temperature is below 90 °C.

The sensing pipe, if not fitted on the valve body, must be installed downstream of the valve at a minimum of 1 meter away or 15 pipe diameters.

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



1/2" to 4"

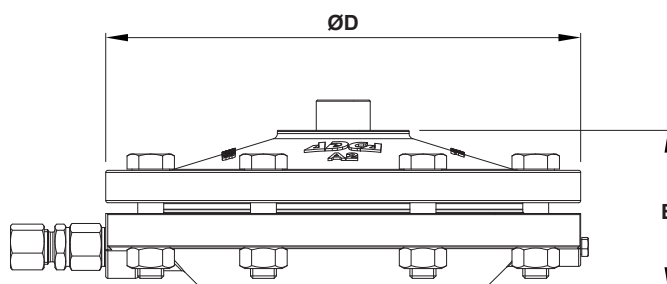


6"

DIMENSIONS – VALVE (mm)

DIMENSION		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
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

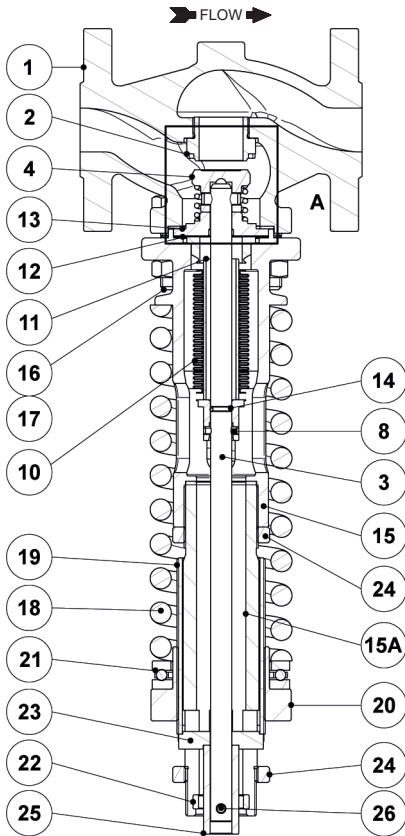
Remarks: In the beginning of year 2022 new face to face dimensions have been defined for some Class 150 valves. Valves may still be supplied with the previous face to face dimensions under request. Consult the manufacturer.



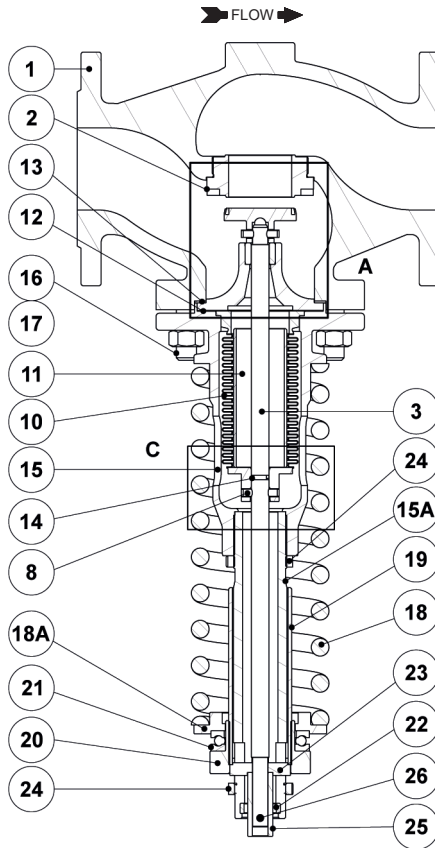
DIMENSIONS – ACTUATOR (mm)

DIMENSION	A1	A10	A11	A12	A2	A21	A3	A4	B1	B2	B21	B3	B4	C11
ØD	172	172	172	172	220	220	282	340	172	220	220	283	340	145
E	67	67	67	67	74	74	71	81	80	86	86	88	98	93
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

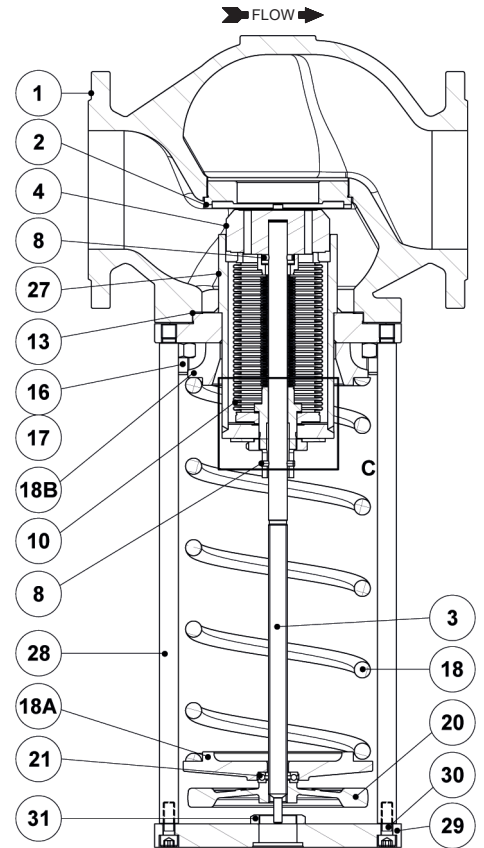
MATERIALS



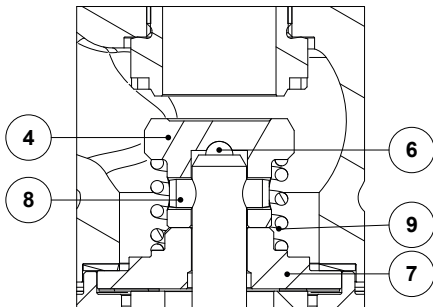
1/2" to 2"



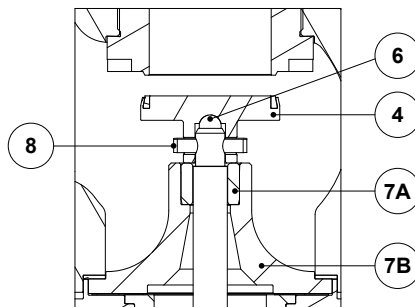
2 1/2" to 4"



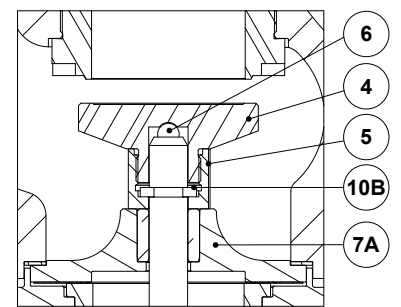
6"



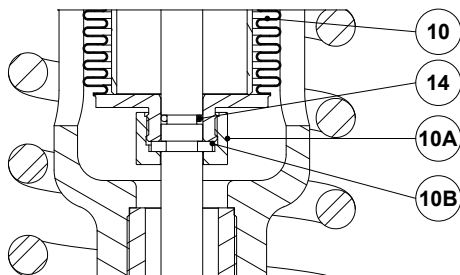
Detail A
(1/2" to 1 1/2")



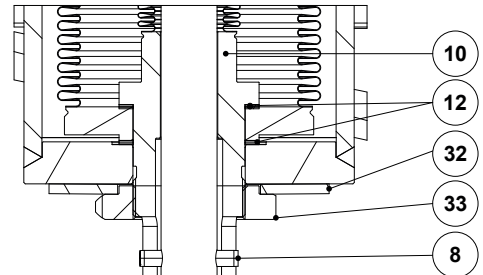
Detail A
(2" and 2 1/2")



Detail A
(3" and 4")



Detail B
(3" and 4")

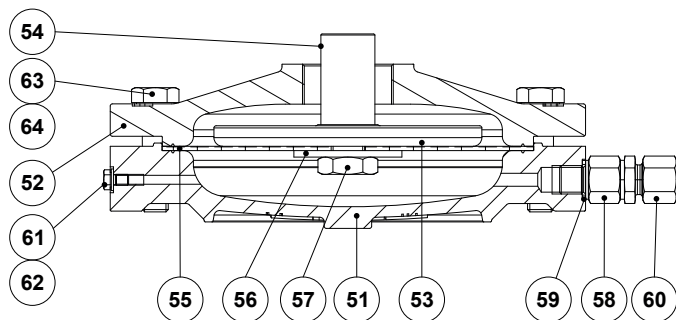


Detail C
(6")

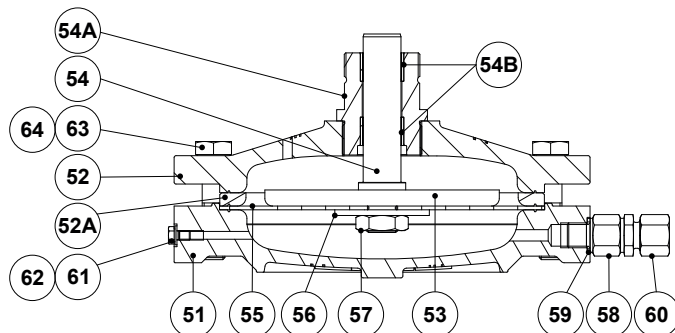
MATERIALS – VALVE

POS. N°	DESIGNATION	1/2" to 4"	6"
1	Valve body	A216 WCB / 1.0619	A216 WCB / 1.0619
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	A216 WCB / 1.0619	–
15A	Piston body extension	P355T1 / 1.0421	–
16	Stud	Steel 8.8; EN 10269 steel	Steel 8.8; EN 10269 steel
17	Nut	Steel 8.8; EN 10269 steel	Steel 8.8; EN 10269 steel
18	* Adjustment spring	Spring steel	Spring steel
18A	Lower spring plate	C45E / 1.1191	A216 WCB / 1.0619
18B	Upper spring plate	–	S235JG2R / 1.0038
19	Threaded tube	CuZn39Pb3	–
20	Spring adjusting nut	C45E / 1.1191	A216 WCB / 1.0619
21	Ball bearing	Zinc plated steel	Zinc plated steel
22	Spacer	S355JR / 1.0045	–
23	Pressure star	S235JR / 1.0038	–
24	Lock nut	C45E / 1.1191	–
25	Pressure tube	C45E / 1.1191	–
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

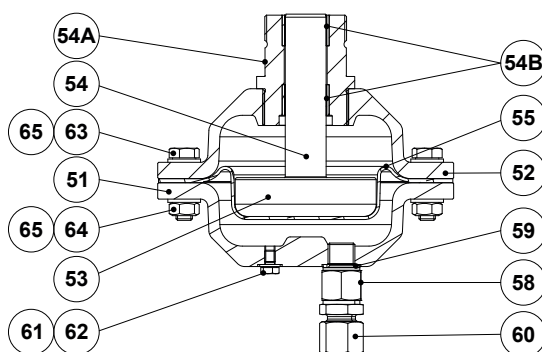
* Available spare parts.



A series



B series



C series

MATERIALS – ACTUATOR

POS. N°	DESIGNATION	A1, A10, A11, A12, A3 and A4	A2 and A21	B1, B3 and B4	B2 and B21	C11
51	Lower diaphragm chamber	A216 WCB / 1.0619	GJS-400-15 / 0.7040 A216 WCB / 1.0619	A216 WCB / 1.0619	GJS-400-15 / 0.7040 A216 WCB / 1.0619	S235JR / 1.0038
52	Upper diaphragm chamber	A216 WCB / 1.0619	GJS-400-15 / 0.7040 A216 WCB / 1.0619	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	S355JR / 1.0045	S355JR / 1.0045	C45E / 1.1191
54	Diaphragm plate spindle	A216 WCB / 1.0619	GJS-400-15 / 0.7040	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	Neoprene reinforced polyamide	Neoprene reinforced polyamide	Neoprene reinforced polyamide	Neoprene reinforced polyamide	Reinforced NBR
56	Washer	Copper	Copper	Copper	Copper	–
57	Hex nut	CuZn39Pb3	CuZn39Pb3	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
59	Gasket	Copper	Copper	Copper	Copper	Copper
60	Compression fitting	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	Zinc plated steel	Zinc plated steel	Zinc plated steel
62	Washer	Copper	Copper	Copper	Copper	Copper
63	Bolt	Zinc plated steel	Zinc plated steel	Zinc plated steel	Zinc plated steel	Zinc plated steel
64	Nut	Zinc plated steel	Zinc plated steel	Zinc plated steel	Zinc plated steel	Zinc plated steel
65	Washer	–	–	–	–	Zinc plated steel

* Available spare parts.