

PRESSURE REDUCING VALVE RP45 (EN)

DESCRIPTION

The ADCA RP45 series 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. They are particularly suitable for reducing steam pressure in all energy and process systems where pressures must be kept under control.

OPERATION

Pressure reduction is achieved by variable throttling of the inlet flow, by variation of the flow area between seat and disc. The outlet pressure, which is transmitted through the feedback line to the diaphragm chamber, counteracts the spring force acting on the valve spindle, controlling the valve aperture corresponding to the spring setting, and thus, to the required outlet pressure.

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.

OPTIONS: Soft sealing version in PTFE/GR for use with steam.
Nitrile rubber soft sealing version for air and gas applications, where tight shut-off is required.
Low-noise flow divider.

USE: Steam, compressed air and other gases compatible with the construction.

AVAILABLE MODELS: RP45G and RP45GT or N – PN16 SG iron.
RP45S and RP45ST or N – PN16 cast steel.
RP45S and RP45ST or N – PN40 cast steel.
RP45I and RP45IT or N – stainless Steel.
(All wetted parts free of ferrous metal or in stainless steel.)

Suffix T: soft seated with PTFE/GR.
Suffix N: soft seated with nitrile rubber.

SIZES: DN 15 to DN 150.

CONNECTIONS: RP45G Flanged EN 1092-2 PN16.
RP45S or I Flanged EN 1092-1 PN16 - PN40.

INSTALLATION: Horizontal installation.
An “Y” strainer, a humidity separator and a steam trap should be installed upstream the valve.
See IMI – Installation and maintenance instructions.

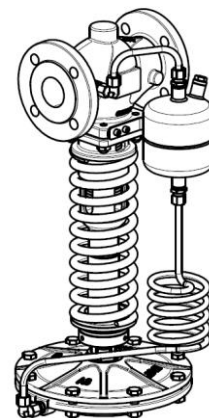


RP45
DN 15 – DN 100

RP45I
DN 15 – DN 100



RP45
DN 125 – DN 150



RP45
With control line
on body

CE MARKING – GROUP 2 (PED – European Directive)

PN16	PN40	Category
DN 15 to DN 50	DN 15 to DN 32	SEP
DN 65 to DN 150	DN 40 to DN 100	1 (CE Marked)
–	DN 125 to DN 150	2 (CE Marked)

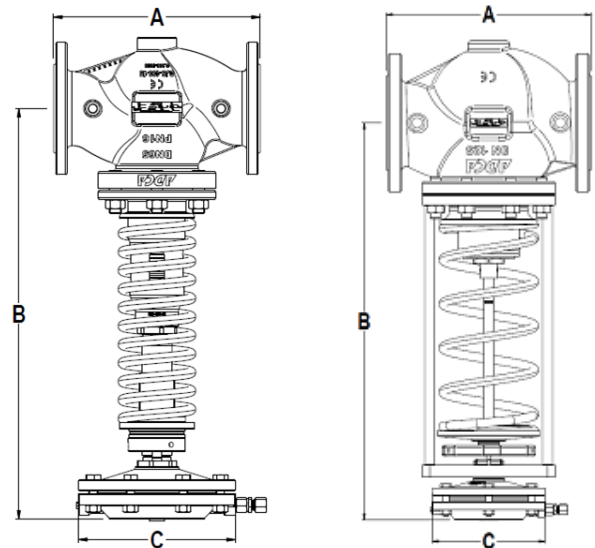
LIMITING CONDITIONS

Valve model	RP45G RP45S	RP45S	RP45I	RP45GT RP45ST	RP45ST	RP45IT	RP45GN* RP45SN*	RP45SN*	RP45IN*
Body design conditions	PN16	PN40	PN40	PN16	PN40	PN40	PN16	PN40	PN40
Max. upstream pressure	13 bar	25 bar	25 bar	13 bar	25 bar	25 bar	13 bar	25 bar	25 bar
Max. downstream press. DN 15-100	13 bar	18 bar	18 bar	13 bar	18 bar	13 bar	13 bar	18 bar	18 bar
Max. downstream press. DN 125-150	12 bar	16,5 bar	16,5 bar	12 bar	16,5 bar	16,5 bar	12 bar	16,5 bar	16,5 bar
Min. downstream pressure	0,15 bar	0,15 bar	0,15 bar	0,15 bar	0,15 bar	0,15 bar	0,15 bar	0,15 bar	0,15 bar
Max. operating temperature	200 °C	250 °C	250 °C	200 °C	200 °C	200 °C	80 °C	80 °C	80 °C
Max. reducing ratio	25:1	25:1	25:1	25:1	25:1	25:1	10:1	10:1	10:1
Rangeability	10:1	10:1	10:1	10:1	10:1	10:1	10:1	10:1	10:1
Max. cold hydraulic test	24 bar	25 bar	25 bar	24 bar	25 bar	25 bar	24 bar	25 bar	25 bar
Max. hydraul. factory valve body test	24 bar	60 bar	60 bar	24 bar	60 bar	60 bar	24 bar	60 bar	60 bar

* Suffix N: a maximum turndown ratio 10:1 should be observed. Other soft materials on request.

DIMENSIONS (mm)

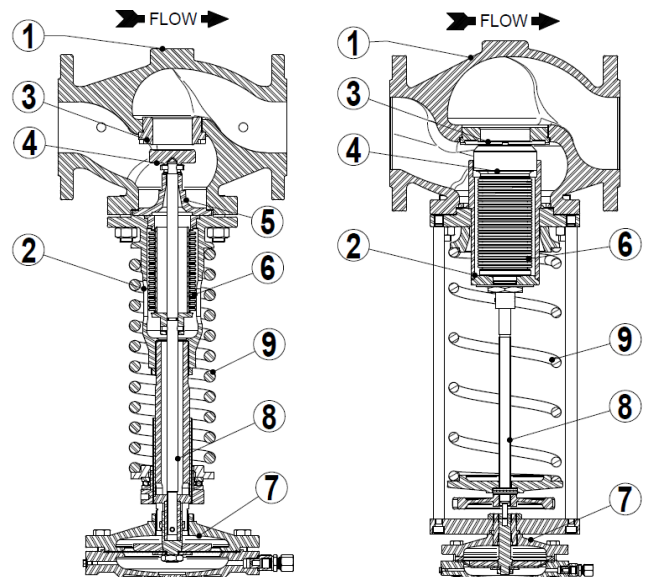
VALVE				ACTUATOR		
SIZE DN	A	B	WGT. (kg)	TYPE	C	WGT. (kg)
15	130	440	12,7	A1	172	4,3
20	150	440	12,7	A1S	172	4,3
25	160	440	13,7	A10S	172	4,3
32	180	445	15,7	A11	172	4,3
40	200	445	17,7	A12S	172	4,3
50	230	540	25,7	A2	220	7,3
65	290	540	29,7	A21	220	7,3
80	310	610	36,7	A3	282	11,3
100	350	650	53,7	A4	340	16,3
125	400	780	101,4	B1	172	4,4
150	480	790	134,5	B2	220	7,4
-	-	-	-	B21	220	7,4
-	-	-	-	B3	283	11,6
-	-	-	-	B4	340	18,6
-	-	-	-	C11S	145	2,3



MATERIALS

POS. N°	DESIGNATION	MATERIAL
1	Valve body RP45G	GJS-400-15 / 0.7040
1	Valve body RP45S	A216WCB / 1.0619
1	Valve body RP45I	CF8M / 1.4408
2	Piston body RP45G and S	GJS-400-15 / 0.7040
2	Piston body RP45I	GJS-400-15 / 0.7040 Nickel plated
3	Valve seat	Stainless steel
4	* Valve disc	Hardened stainless steel
4	* Soft valve disc	AISI 304 / 1.4301; NBR (PTFE/GR, etc.)
5	Guide	Bronze B62 / ASTM B148-97
6	* Bellows	AISI 316 Ti / 1.4571
7	* Diaph. chamber RP45G	GJL-250 / 0.6025
7	* Diaph. chamber RP45S	A216WCB / 1.0619
7	* Diaph. chamber RP45I	CF8M / 1.4408
8	Spindle	AISI 304 / 1.4301
9	Regulating spring	Spring steel

* Available spare parts.



SATURATED STEAM CAPACITY TABLE (kg/h)
(P2 < 0,58 P1)

INLET (barg)	VALVE SIZE										
	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150
0,5	51	68	90	118	186	300	460	800	1250	1500	1800
0,75	63	84	112	146	230	360	580	1000	1550	1750	2350
1	75	100	133	175	280	430	700	1200	1850	2250	3200
1,5	100	133	175	240	360	590	910	1600	2500	3000	4000
2	126	170	230	290	450	730	1160	2000	3050	3500	4700
2,5	150	200	260	350	550	880	1390	2400	3600	4500	6500
3	175	240	310	400	640	1010	1600	2700	4300	5500	8500
4	220	290	390	510	800	1300	2000	3400	5400	7000	10000
5	260	350	480	620	1000	1600	2500	4200	6500	8000	12000
6	330	440	580	760	1220	1930	3000	5100	8000	9500	14000
7	400	520	700	910	1430	2300	3600	6100	9500	11500	16000
8	450	600	800	1040	1670	2700	4100	7100	11000	13000	18000
9	500	670	880	1180	1800	2900	4600	7800	12000	15000	20000
10	560	750	980	1300	2000	3200	5100	8500	13500	17000	22000
12	680	900	1180	1540	2500	4000	6100	10500	16300	20000	25000
14	800	1050	1400	1850	2900	4700	7200	12600	19000	23000	29000
16	920	1230	1630	2150	3400	5500	8300	14600	22000	26000	33000
18	1040	1400	1860	2450	3800	6200	9500	16600	25000	30000	38000
20	1170	1540	2100	2700	4200	7000	10800	18600	28000	33000	42000
22	1330	1780	2350	3050	4900	7800	12200	21000	32000	36000	45000
24	1500	2000	2600	3400	5400	8700	13700	23500	36000	40000	48000
25	1600	2150	2800	3600	5700	9200	14500	25500	38000	42000	50000

ACTUATOR AND SPRING SELECTION TABLE

DN	Kvs m ³ /h	ACTUATOR																
			A-4	A-4	A-3	A-2	A-21	A-1	A-1S	A-11	A-12S	A-10S	B-4	B-3	B-2	B-21	B-1	C-11S
15	4,8	Outlet (bar)	0,15-0,49	0,5-0,99	1,0-1,6	1,7-3,8	3,9-5,5	5,6-8,2	/	8,3-13	10-18	/	/	/	/	/	/	/
		Spring N°	66	60	60	60	60	60	/	60	60.1	/	/	/	/	/	/	/
20	6,9	Outlet (bar)	0,15-0,49	0,5-0,99	1,0-1,6	1,7-3,8	3,9-5,5	5,6-8,2	/	8,3-13	10-18	/	/	/	/	/	/	/
		Spring N°	66	60	60	60	60	60	/	60	60.1	/	/	/	/	/	/	/
25	9,1	Outlet (bar)	0,15-0,49	0,5-0,99	1,0-1,6	1,7-3,8	3,9-5,5	5,6-8,2	/	8,3-13	10-18	/	/	/	/	/	/	/
		Spring N°	66	60	60	60	60	60	/	60	60.1	/	/	/	/	/	/	/
32	11,8	Outlet (bar)	0,15-0,49	0,5-0,99	1,0-1,6	1,7-3,8	3,9-5,5	5,6-8,2	/	8,3-13	10-18	/	/	/	/	/	/	/
		Spring N°	66	60	60	60	60	60	/	60	60.1	/	/	/	/	/	/	/
40	14,4	Outlet (bar)	0,15-0,49	0,5-0,99	1,0-1,6	1,7-3,8	3,9-5,5	5,6-8,2	/	8,3-13	10-18	/	/	/	/	/	/	/
		Spring N°	66	60	60	60	60	60	/	60	60.1	/	/	/	/	/	/	/
50	26,5	Outlet (bar)	0,15-0,49	0,5-0,99	1,0-1,9	2,0-4,2	4,3-6,9	7-8,5	/	8,6-13	/	10-18	/	/	/	/	/	/
		Spring N°	67	61	61	61	61	64	/	64	/	61	/	/	/	/	/	/
65	51,5	Outlet (bar)	0,15-0,49	0,5-0,99	1,0-1,9	2,0-4,2	4,3-6,9	7-8,5	/	8,6-13	/	10-18	/	/	/	/	/	/
		Spring N°	67	61	61	61	61	64	/	64	/	61	/	/	/	/	/	/
80	79,5	Outlet (bar)	0,15-0,45	0,46-0,99	1,0-1,9	2,0-5,0	5,1-8,9	9-13	11-18	/	/	/	/	/	/	/	/	/
		Spring N°	68	62	62	62	62	65	62	/	/	/	/	/	/	/	/	/
100	129,5	Outlet (bar)	0,15-0,45	0,46-0,99	1,0-1,9	2,0-6,0	6,1-13,0	/	11-18	/	/	/	/	/	/	/	/	/
		Spring N°	69	63	63	63	63	/	63	/	/	/	/	/	/	/	/	/
125	150	Outlet (bar)	/	/	/	/	/	/	/	/	/	0,5-1,5	1,1-2,5	1,5-5,5	4-8,5	6-12	8-16,5	
		Spring N°	/	/	/	/	/	/	/	/	/	/	70	70	70	70	70	70
150	204	Outlet (bar)	/	/	/	/	/	/	/	/	/	0,5-1,5	1,1-2,5	1,5-5,5	4-8,5	6-12	8-16,5	
		Spring N°	/	/	/	/	/	/	/	/	/	/	70	70	70	70	70	70

Actuator reference without suffix refers to actuator fabricated in cast iron, with suffix S: in cast steel, with suffix SS: in stainless steel.

Correction factors:

The given capacities apply to pressure reducing valves at critical pressure drop (downstream pressure is about 58% of the upstream pressure or lower). In case of non-critical pressure drop a correction factor must be used, as shown in the following table:

No correction factor should be used for pressure ratios under 0,7.

PRESSURE RATIO * P2 / P1	CORRECTION FACTOR f
≥ 0,7	1,25
≥ 0,8	1,6
≥ 0,9	2,25

* Pressure ratio in bar abs (barg + 1)

Superheated steam:

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

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

HOW TO SIZE (using steam table)

Example scenario:

Required saturated steam capacity: 300 kg/h; Upstream pressure: 3 bar; Required downstream pressure: 2 bar.

Solving: First determine correction factor for pressure ratio: $\frac{2+1}{3+1} = 0.75 \rightarrow f = 1.25$

Then multiply the given capacity: $300 \times 1.25 = 375 \text{ Kg/h}$

Afterwards, refer to the cell "3 barg" in the column "INLET" of the steam 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 375 kg/h is required, and the right selection would be DN 32, with a capacity of 400 kg/h.

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

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 ORDER

RP45G DN 32 PN16 valve complete with spring N° 60, type A-2 actuator, condensate vessel and copper tube impulse line.

HOW TO SIZE (using Kvs)

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

INSTALLATION

The RP45 is designed primarily for steam, compressed air and non inflammable gases. It has limitations when operating with liquids, since the plug closes in the same direction as the fluid flow, which can produce vibrations and water hammer. Please consult the factory for more details.

At service conditions where the temperatures are higher than 100 °C it is necessary to protect the diaphragm against overheating, by using a seal pot.

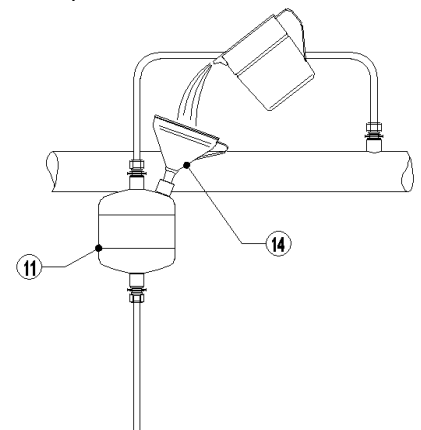
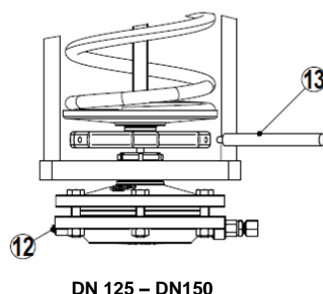
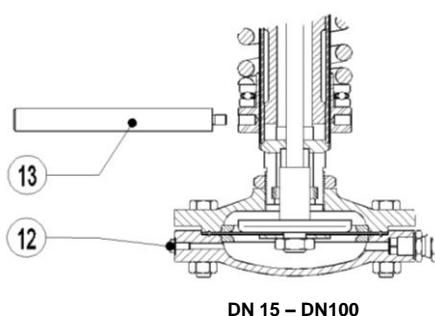
Service conditions with temperatures under 100 °C (water seal pot unnecessary): For operation with gases, the valve is ready to work. If the valve is to be used with liquids, please consult factory.

The valve can be installed with the actuator pointing upwards or downwards.

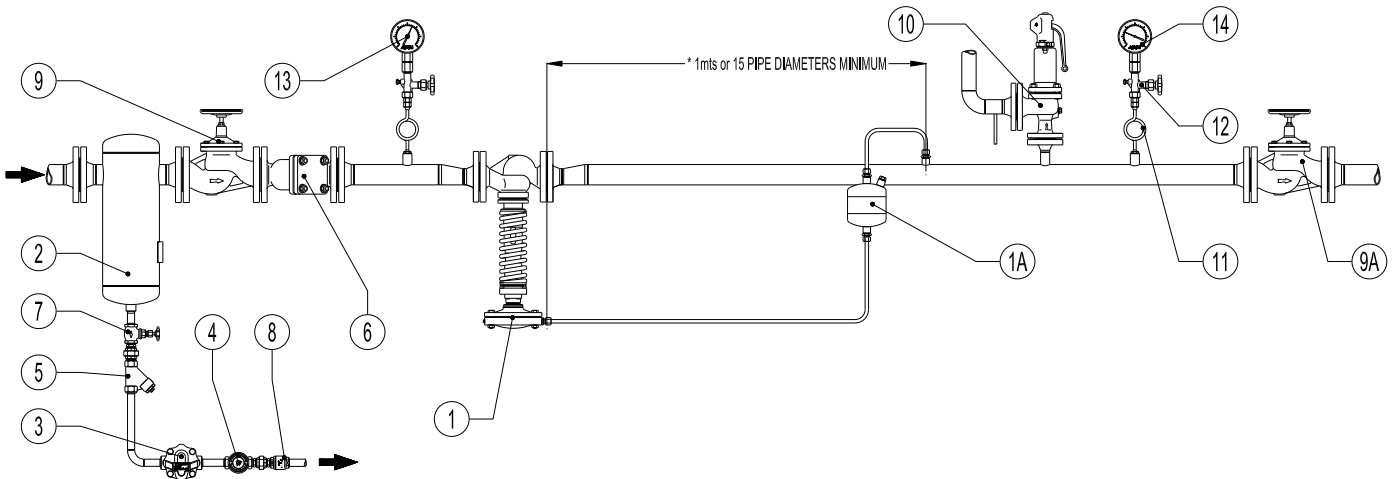
Service conditions with temperatures above 100 °C: Fill the seal pot (11) using a funnel (14), until the water emerges from the actuator vent (12) without bubbles. Close the actuator vent screw (12) and proceed to fill the pot until the water reaches the top, then close it with the plug. The valve is now ready to work.

The valve must be installed with the actuator pointing downwards.

Downstream set pressure should be adjusted with the key (13). By compressing the spring, its force increases and, consequently, so does the downstream set pressure. By relaxing the spring, its force decreases and so does the downstream pressure. The valve moves towards closed position when the downstream pressure rises, closing if the set pressure is exceeded.

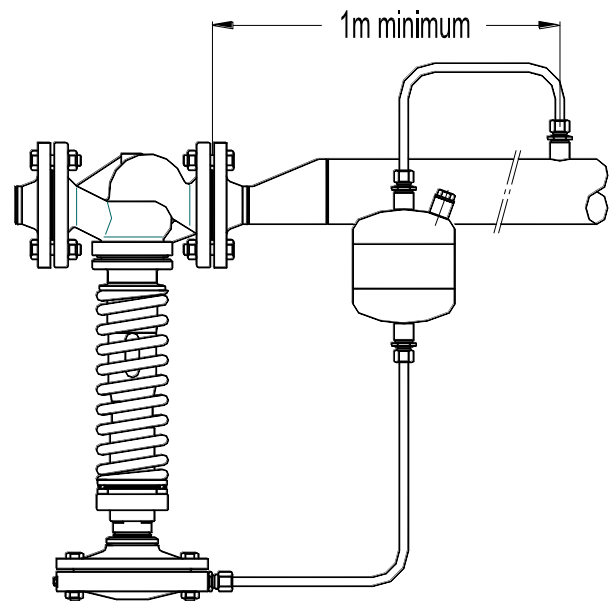


TYPICAL INSTALLATION



MATERIALS		
POS. N°	DESIGNATION	MODEL
1	Pressure reducing valve	ADCA RP45
1A *	Water seal pot	POT
2	Humidity separator	ADCA S25
3	Steam trap	ADCA FLT series
4	Sight glass	ADCA SW12
5	Y strainer	ADCA IS140
6	Y strainer	ADCA IS16F
7	Stop valve	ADCA GV32B
8	Check valve	ADCA RT25
9	Stop valve	ADCA VF20
9A	Stop valve	ADCA VF20
10	Safety valve	ADCA SRV series
11	Coil	ADCA GSC-40
12	Gauge cock	ADCA GC-400
13	Upstream pressure gauge	ADCA MAN-100
14	Downstream pressure gauge	ADCA MAN-100

* Unnecessary when operating with low temperature compressed air or water. For detailed information, consult IS POT.10 E.



By-pass: if overpressure can not be accepted, the use of a by-pass is not recommended. In alternative, for critical processes, two pressure reducing stations should be installed in parallel.

Remarks: PN ratings and materials according to the operating pressures.

* The balance pipe is recommended to be connected in the downstream pipe at a minimum of 1 meter away from the valve. Installation instructions (IMI-RP45) are available, as well as typical assembly drawings. Special assembly designs may be elaborated on request.