

## PRESSURE REDUCING VALVE RP45 (ANSI)

### 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:** RP45S and RP45ST or N – 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:** 1/2" to 4".

**CONNECTIONS:** Flanged ANSI B16.5 150 lb and 300 lb.

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



**CE MARKING – GROUP 2 (PED – European Directive)**

ANSI 150 lb	ANSI 300 lb	Category
1/2" to 2"	1/2" to 1"	SEP
3" to 4"	1 1/2" to 4"	1 (CE Marked)

**LIMITING CONDITIONS**

Valve model	RP45S	RP45S	RP45I	RP45ST	RP45ST	RP45IT	RP45SN*	RP45SN*	RP45IN*
Body design conditions	150 lb	300 lb	300 lb	150 lb	300 lb	300 lb	150 lb	300 lb	300 lb
Max. upstream pressure	13 bar	25 bar	25 bar	13 bar	25 bar	25 bar	13 bar	25 bar	25 bar
Max. downstream press. **	13 bar	13 bar	13 bar	13 bar	13 bar	13 bar	13 bar	13 bar	13 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

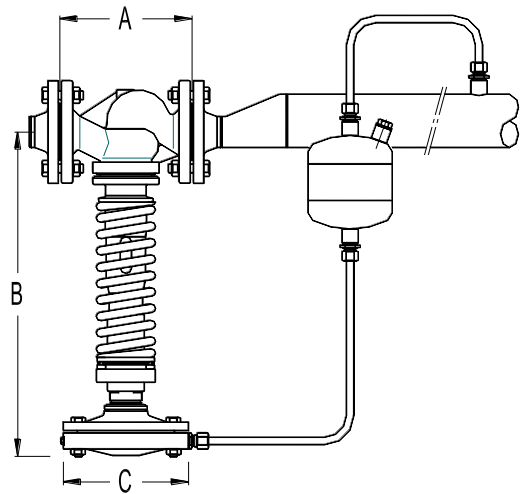
\* Suffix N: a maximum turndown ratio 10:1 should be observed. Other soft materials on request.

\*\* Others on request, with bellows or piston actuator.

**DIMENSIONS (mm)**

SIZE	VALVE			ACTUATOR		
	A * ANSI 300 lb	B	WGT. (kg)	TYPE	C	WGT. (kg)
1/2"	190	440	12,7	A1	172	4,3
3/4"	194	440	12,7	A11	172	4,3
1"	197	440	13,7	A2	220	7,3
1 1/2"	235	445	17,7	A21	220	7,3
2"	267	540	25,7	A3	282	11,3
3"	317	610	36,7	A4	340	16,3
4"	368	650	53,7	-	-	-

\* ANSI 150 lb is drilled with the same lenght.

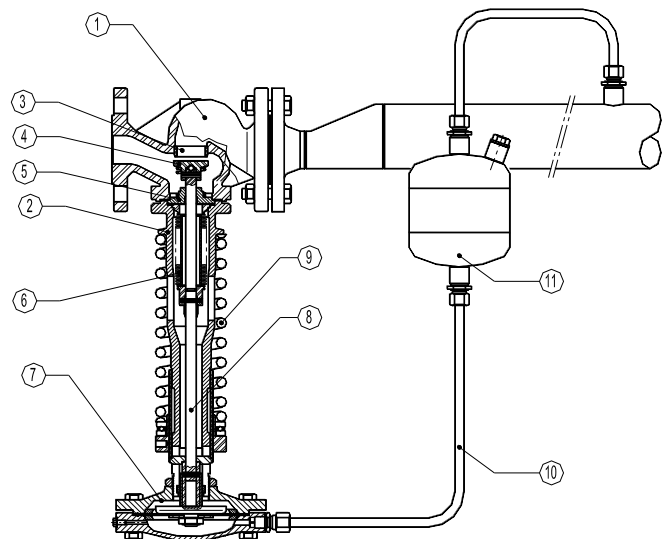


**MATERIALS**

POS. N°	DESIGNATION	MATERIAL
1	Valve body RP45S	A216WCB / 1.0619
1	Valve body RP45I	CF8M / 1.4408
2	Piston body RP45S	GJS-400-15 / 0.7040
2	Piston body RP45I	GJS-400-15 / 0.7040 nickel plated
3	Valve seat	Hardened stainless steel
4	* Valve disc	Hardened stainless steel
4	* Soft valve disc	AISI 304 / 1.4301 ; NBR (PTFE/GR, etc.)
5	Guide	AISI 304 / 1.4301
6	* Bellows	AISI 316 Ti / 1.4571
7	* Diaph. chamber RP45S	GJL-250 / 0.6025
7	* Diaph. chamber RP45I	CF8M / 1.4408
8	Spindle	AISI 304 / 1.4301
9	Regulating spring	Spring steel
10	* Impulse line RP45S	Copper
10	* Impulse line RP45I	AISI 316 / 1.4401
11	** Water seal pot RP45S	S235JRG2 / 1.0038
11	** Water seal pot RP45I	AISI 316 / 1.4401

\* Available spare parts.

\*\* Unecessary when operating with low temperatures. For detailed information, consult IS POT.10 E.



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

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

**ACTUATOR AND SPRING SELECTION TABLE**

VALVE SIZE	Kvs (m³/h)	CV (US)	ACTUATOR							
				A - 4	A - 4	A - 3	A - 2	A - 21	A - 1	A - 11
1/2"	4,8	5,6	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
			Spring N°	66	60	60	60	60	60	60
3/4"	6,9	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
			Spring N°	66	60	60	60	60	60	60
1"	9,1	10,6	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
			Spring N°	66	60	60	60	60	60	60
1 1/2"	14,4	16,8	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
			Spring N°	66	60	60	60	60	60	60
2"	26,5	31	Outlet (bar)	0,15-0,49	0,5-0,99	1,0-1,9	2-4,2	4,3-6,9	7-8,5	8,6-13
			Spring N°	67	61	61	61	61	64	64
3"	79,5	93	Outlet (bar)	0,15-0,45	0,46-0,99	1,0-1,9	2-5	5,1-8,9	9-13	/
			Spring N°	68	62	62	62	62	65	/
4"	129,5	151,5	Outlet (bar)	0,15-0,45	0,46-0,99	1,0-1,9	2-6	6,1-13	/	/
			Spring N°	69	63	63	63	63	/	/

**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:

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

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

\* 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: 500 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 required capacity by the correction factor determined:  $500 \times 1.25 = 625 \text{ Kg/h}$

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 625 kg/h is required, and the right selection would be 1 1/2", 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 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 1 1/2" 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.

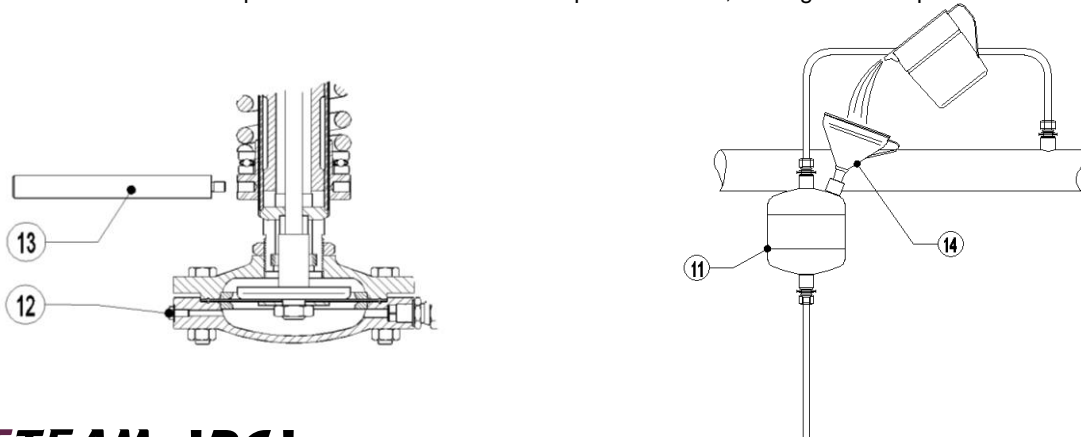
**Service conditions with temperatures under 100 °C (water seal pot unnecessary):** For operation with gases, the valve is ready to work. If the valve is to be used with liquids, please consult factory.

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

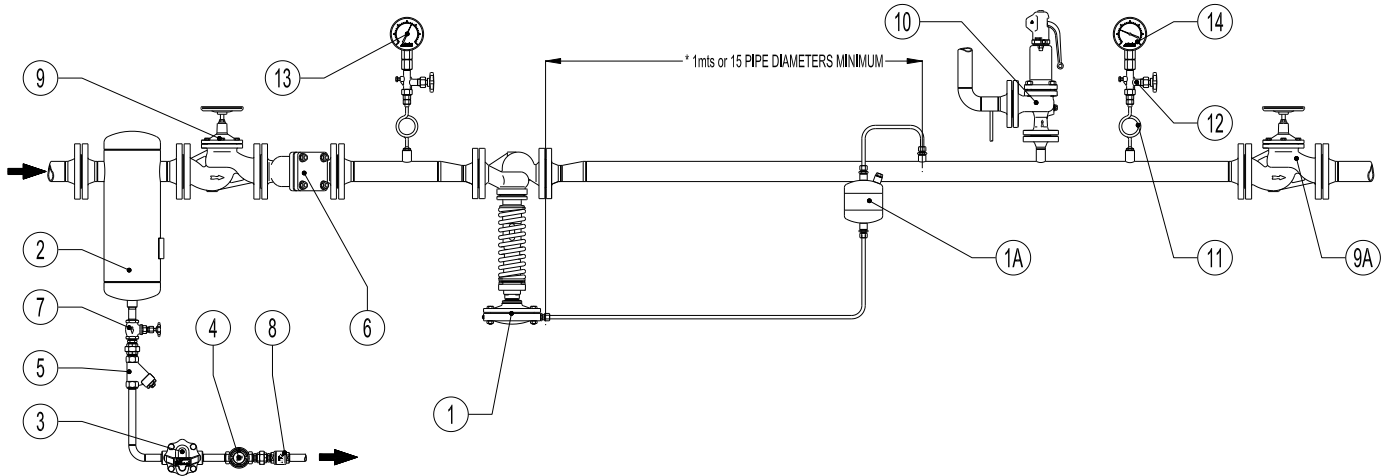
**Service conditions with temperatures above 100 °C:** Fill the seal pot (11) using a funnel (14), until the water emerges from the actuator vent (12) without bubbles. Close the actuator vent screw (12) and proceed to fill the pot until the water reaches the top, then close it with the plug. The valve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

The valve must be installed with the actuator pointing downwards.

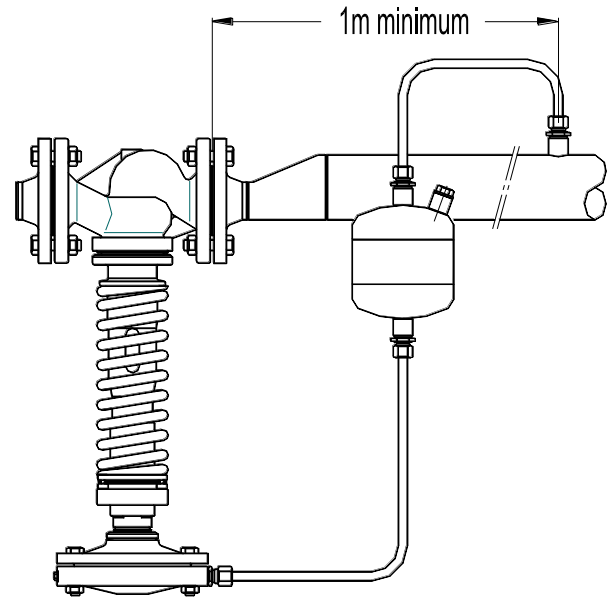
Downstream set pressure should be adjusted with the key (13). By compressing the spring, its force increases and, consequently, so does the downstream set pressure. By relaxing the spring, its force decreases and so does the downstream pressure. The valve moves towards closed position when the downstream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



## TYPICAL INSTALLATION



ELEMENTS		
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 IS16
6	Y strainer	ADCA IS16F
7	Stop valve	ADCA GV32B
8	Check valve	ADCA RT25
9	Stop valve	ADCA VF16
9A	Stop valve	ADCA VF16
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



**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.