

## PRESSURE REDUCING VALVE RP45 – (ANSI)

### DESCRIPTION

The ADCA RP45 series pressure reducing valves are single seat bellows sealed controllers, operating without auxiliary energy, designed for use on steam, compressed air, industrial inert gases and liquids compatible with the construction.

They are particularly suitable for reducing steam pressure in all energy and process systems where pressures should be kept constant.

### OPERATION

Pressure reduction is achieved by means of variable throttling of the inlet flow at the valve seat by variation of the flow area between seat and disc. The outlet pressure which is transmitted through the feed-back line to the diaphragm or piston chamber counteracts the spring force acting on the valve spindle and controls 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 friction less plug stem.

Robust construction (fit-and-forget).

Suitable for use with high pressure turndowns.

Interchangeable actuators

**OPTIONS:** Soft sealing for steam  
Nitrile rubber soft seated version for air and gas applications where tight shut-off is required.  
Low-noise flow divider

**USE:** Steam, compressed air and other gases and liquids 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 non-ferrous metal or in St.Steel.).

Suffix T : Soft seated with PTFE/GR

Suffix N : soft seated with nitrile rubber

**SIZES:** ½" to 4"

**CONNECTIONS** Flanged ANSI B16.5 150# and 300#

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



CE MARKING (PED - European Directive 97/23/EC)		
ANSI 150	ANSI 300	Category
1/2" - 2" (DN15-50)	1" (DN25)	SEP - art. 3, paragraph3
3"-4" (DN80-100)	1 1/2"-4" (DN40-100)	1 (CE Marked)

Note: classification for gases - Group 2, for others see IMI

**LIMITING CONDITIONS**

	RP45S	RP45S	RP45I	RP45ST	RP45ST	RP45IT	RP45SN*	RP45SN *	RP45IN *
Body design conditions	150 #	300 #	300 #	150 #	300 #	300 #	150 #	300 #	300 #
Max.upstream pressure	13 bar	25 bar	25 bar	13 bar	25 bar	25 bar	13 bar	25 bar	25 bar
Max.downstream pressure **	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	220 °C	220 °C	90 °C	90 °C	90 °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.hyd. factory valve body test	24 bar	60 bar	60 bar	24 bar	60 bar	60 bar	24 bar	60 bar	60 bar

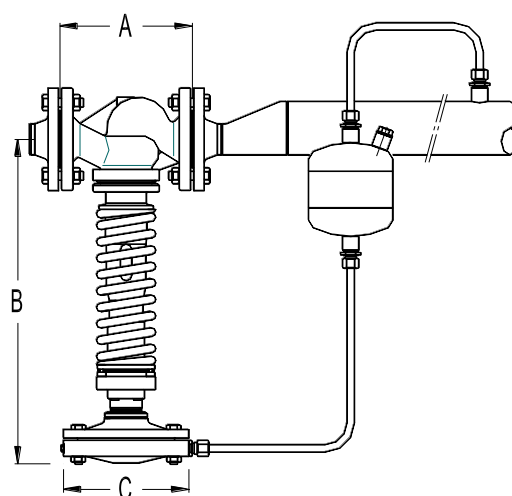
\*Suffix N : - a maximum turndown ratio 10:1 should be observed. Other soft materials on request.

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

**DIMENSIONS (mm)**

VALVE			ACTUATOR			
SIZE	A* ANSI 300	B	WGT. Kgs	TYPE	C	WGT. Kgs
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			

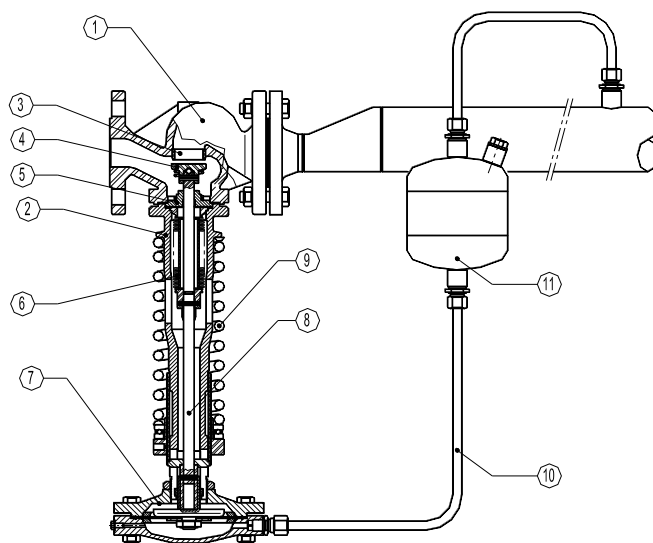
\* ANSI 150 is drilled with the same lenght.


**MATERIALS**

POS.	DESIGNATION	MATERIAL
1	Valve body RP45S	A 216 WCB / 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 ST.STEEL
4	* Valve disc	HARDENED ST.STEEL
4	* Soft valve disc	AISI304/1.4301 ;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	* Cond. vessel a) RP45S	S235JRG2 / 1.0038
11	* Cond. vessel a) RP45I	AISI 316 / 1.4401

\* Available spare parts.

a) Not necessary when in operation with low temperature compressed air or water.



**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 - 6,0	6,1 - 13	/	/
			Spring N°.	69	63	63	63	63	/	/

**Correction factors:**

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

No correction factor should be used for smaller pressure ratios than 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 superheated steam is to be reduced instead of saturated steam a correction factor has to be applied as well, the required mass flow must be multiplied by the following factor:

$$\frac{V_h}{V_s}$$

where V<sub>h</sub> = specific volume of superheated steam and V<sub>s</sub> = specific volume of saturated steam .

**HOW TO SIZE ( using table for steam )**

**Example (valve selection) :** Saturated steam capacity: 500Kg/h; Upstream pressure: 3 bar; Downstream pressure required: 2bar.

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

Then multiply the given capacity:  $500 \times 1.25 = 625 \text{ Kg/h}$

Go to 3 bar in the column "bar" of the capacity table. By following the horizontal line you can find out the values for selection of pressure reducing valve. Looking for an equal or higher value than 625 Kg/h. In this case it will be 640 Kg/h. Now, go to the top of the table and read off the nominal size: DN11/2"

On the actuator and spring selection table, for downstream pressure of 2 bar we may see that the recommended actuator is type A-2, considering the valve supplied with spring Nr.60.

**How to order:** RP45G DN11/2" PN16 valve complete with spring Nr.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 RECOMMENDATIONS**

RP45 is designed primarily for steam, compressed air and non inflammable gases. It has limited use for neutral liquids since the plug close in the same direction of the fluid flow, which can produce vibrations and water hammer when used at less than 20% of capacity. To avoid this, valve can be installed with the fluid direction against the plug under certain conditions. Please consult the factory.

At service conditions where the temperature is more than 100°C it is necessary to protect the diaphragm against overheating by using a seal pot.

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

**INSTALLATION**

**Service conditions less than 100°C:** with gases the valve is ready to work. In case of liquids the actuator must be filled completely with liquid, so, the vent screw (12) should be open till the water flow without bubbles.

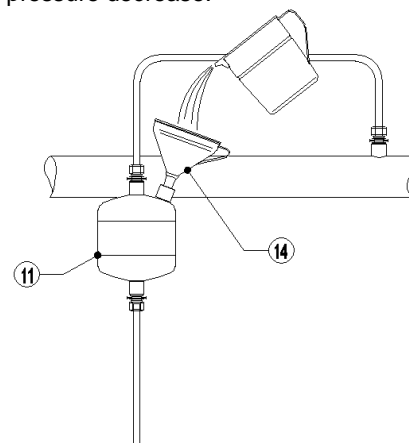
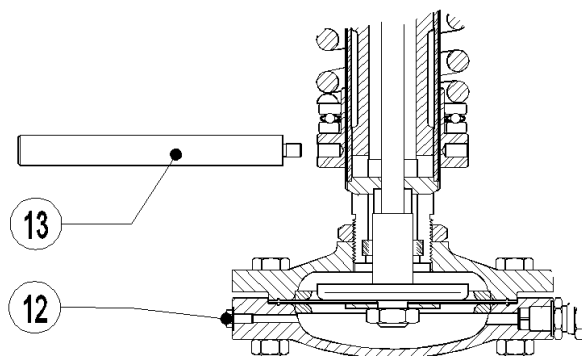
The valve can be installed with the diaphragm pointing upwards or downwards.

**Service conditions more than 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 filling the pot until the water reaches the top and close it with the plug. The valve is now ready to work.

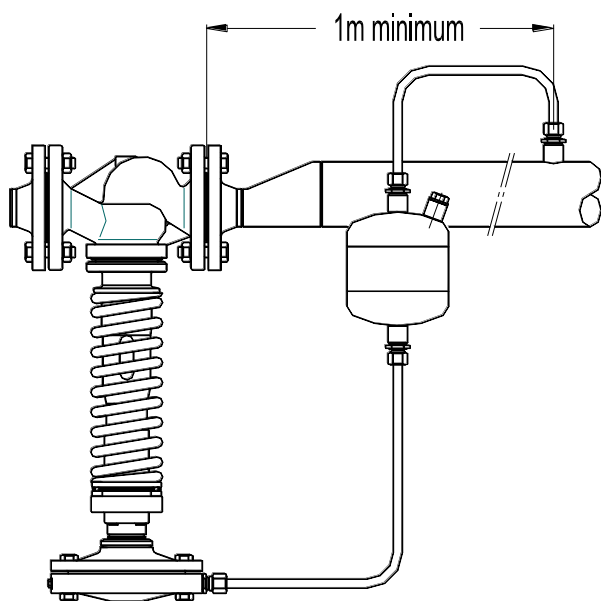
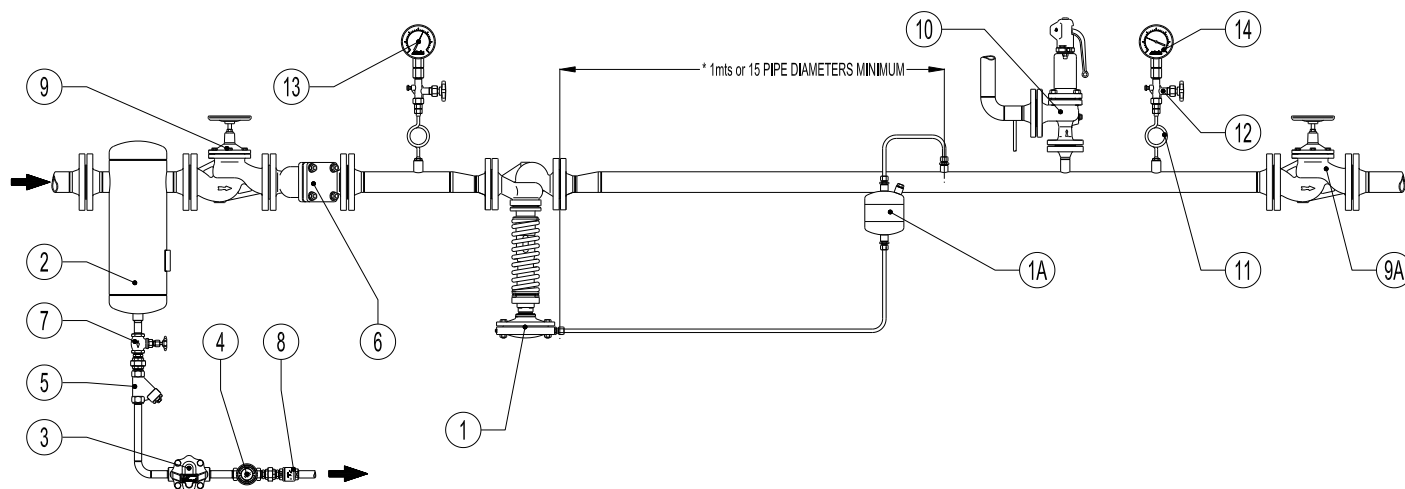
The valve must be installed with the diaphragm pointing downwards.

Downstream pressure should be adjusted with the key (13). Compressing the spring, spring force increase and downstream pressure increase. Relaxing the spring, spring force decrease and downstream pressure decrease.

The valve closes when the downstream pressure rises.



### Typical Installation



MATERIALS		
POS.	DESIGNATION	MODEL
1	Pressure reducing valve	ADCA RP45
1A	Water seal pot	POT
2	Humidity separator	ADCA S 25
3	Steam trap	ADCA FLT series
4	Sight glass	ADCA SW 12
5	Y Strainer	ADCA IS 16
6	Y Strainer	ADCA IS16F
7	Stop valve	ADCA GV32B
8	Check valve	ADCA RT
9	Stop valve	ADCA VF16
9A	Stop valve	ADCA VF16
10	Safety valve	-
11	Coil	ADCA GSC-40
12	Gauge cock	ADCA GC-400
13	Upsteam pressure gauge	ADCA MAN-100
14	Downstream pressure gauge	ADCA MAN-100

**Remarks:**

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

PN ratings and materials according to the operating pressures.

\* The balance pipe connection is recommended to enter downstream pipe at a minimum of 1 meter from valve. Installation instructions are available (IMI-RP45) and typical assembling drawing.

Special assembling designs may be produced on request.