

INSTALLATION AND MAINTENANCE INSTRUCTIONS PRV - PRESSURE REDUCING VALVES PRV47

GENERAL

- These instructions must be carefully read before any work involving products supplied by VALSTEAM ADCA ENGINEERING S.A. is undertaken.
- The installation procedure is a critical stage in a life of a valve and care should be taken to avoid damage to the valve or equipment.
- Reducing valves are designed to give accurate control of down-stream pressures. They give their maximum performance only when the equipment associated with them is correctly sized and installed in accordance with our recommendations.

Warning!

- If malfunction of any other equipment or system operation failure may result in a dangerous overpressure, over temperature or even vacuum condition, a safety device must be included in the system to prevent such situations.
- At start up, the presence of small particles in the fluid (dirt, scale, weld splatters, etc) may cause an imperfect closure of the seat. If this occurs, proceed to an accurate cleaning.
- Do not touch the equipment without appropriate protection during working operation because it may conduct heat if the used fluid is at high temperature.
- Before starting maintenance be sure that the equipment is not pressurized or hot.
- The equipments must be used within the working temperature and pressure limits laid down for them, otherwise they may fail (refer to nameplate and/or IS- Information Sheet).
- Do not remove the nameplate attached to the equipment. Serial number and other useful information is stamped on it.
- The valve is not suitable for oxygen service.

INSTALLATION



- Prior to install check that the product is suitable for the intended application: materials and pressure/temperature ratings.
- Before to install remove plastic covers placed on flanges or connection ends. The equipment has an arrow or Inlet/Outlet designations. Be sure that it will be installed on the appropriate direction.
- Take care with jointing material to ensure that none may be permitted to block or enter the valve.
- Reducing valves are recommended to be fitted with the centre line of the valve in a vertical position to ensure that the best results are obtained.
- An ADCA pipeline strainer should be installed upstream of the valve to protect from dirt which could damage the valve or cause mal-functioning.
- The reducing valve pipework should be properly supported and free from strain and it should not be subjected to undue surges of pressure.

For steam installations we strongly recommend that the reducing valve is positioned where condensation is unable to collect or that, alternatively, separators and steam traps are fitted so that the pipework drains correctly. The start up condition should be considered.

- A balance pipe must be connected downstream at least 1 metre from valve. See AS.PR47.02.

Installation area requirements:

- The installation area should have easy access and provide enough space for maintenance and removing operations.
- The installation area should have the necessary firing system to prevent damage of the equipment due to over temperature/pressure cause by fire.

VERSIONS

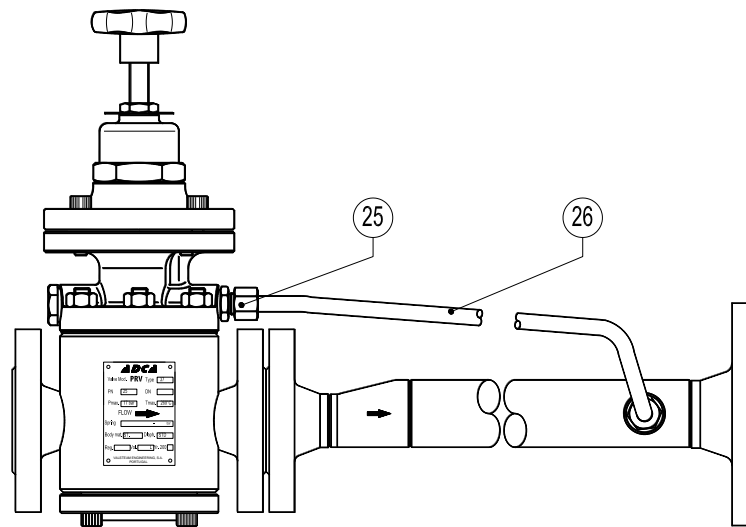


Fig.1

PRV47 DN15-50 standard, for steam, compressed air or gases (Fig.1)

Description of operation: the high pressure upstream fluid is admitted to the valve and pilot valve. By compressing the regulating spring over the diaphragm, the pilot valve opens admitting regulated pressure on the top of the piston, which opens the main valve, allowing the flow. The downstream pressure is then transmitted through the balance pipe, acting below the diaphragm. Any downstream pressure increase deflects the diaphragm, and the pilot valve closes, thus shutting off regulated gas to the piston which in turn closes the main valve. When the correct downstream pressure is achieved, the valve opens again, repeating the process.

Important: the balance pipe (n° 26) must always be connected, unless the valve was supplied with the balance connection inside the valve body. However, the fitting of the balance pipe is still highly recommended when:

- The reduced pressure is below 55% of the inlet pressure (mandatory for pressure reductions greater than 10:1);
- Instability of reduced pressure occurs;
- When a low pressure top assembly is fitted.
- When difficult outlet pipe work conditions occur.

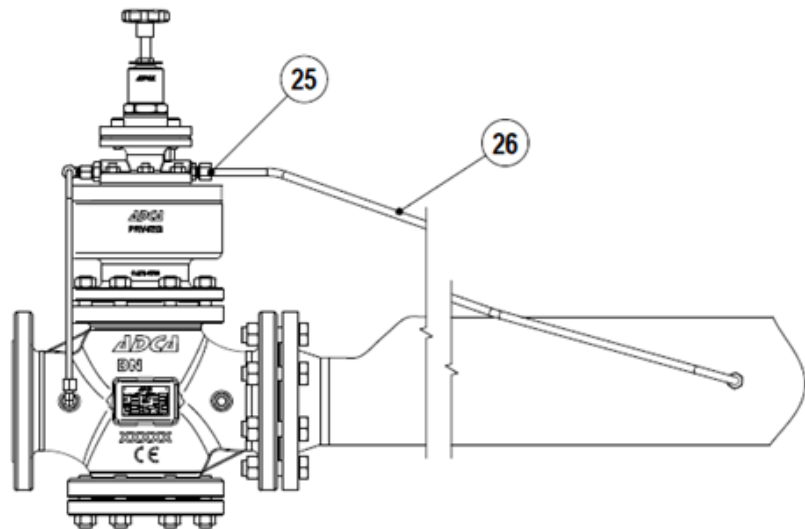


Fig.2

PRV47/2 Standard for steam, compressed air or gases (Fig.2)

Description of operation: the high pressure upstream fluid is admitted to the valve and pilot valve. By compressing the regulating spring over the diaphragm, the pilot valve opens, admitting regulated pressure on the top of the piston, which opens the main valve, allowing the flow. The downstream pressure is then transmitted through the balance pipe, acting below the diaphragm. Any downstream pressure increase deflects the diaphragm, and the pilot valve closes, thus shutting off regulated gas to the piston which in turn closes the main valve. When the correct downstream pressure is achieved, the valve opens again, repeating the process.

Important: the balance pipe (n° 26) must always be connected, unless the valve was supplied with the balance pipe connected to the valve body. However, the fitting of the balance pipe is still highly recommended when:

- The reduced pressure is below 55% of the inlet pressure (mandatory for pressure reductions greater than 10:1);
- Instability of reduced pressure occurs;
- When a low pressure top assembly is fitted.
- When difficult outlet pipe work conditions occur.

MAINTENANCE

- We recommend that the pressure reducing valves to be serviced as necessary. Pressure reducing valves should be checked periodically (at least yearly), to verify that they are operating correctly and to clean the internal parts and screen (if any).
- When reassembling make sure that all gasket faces are clean and always use a new gasket. Tighten cover bolts uniformly in a diagonal sequence.
- Valves in store for long periods should have their adjusting spring relaxed.
- For further information refer to the relevant PRV brochure or consult our Sales Office.

LIMITING CONDITIONS	PRV 47	
	PN 16	PN 40
Maximum upstream pressure (steam)	13 bar	28 bar
Maximum upstream pressure (air)	13 bar	31 bar
Maximum downstream pressure	13 bar	17 bar
Minimum downstream pressure	0,35 bar*	0,35 bar*
Minimum operating temperature	-10 °C	-10 °C
Maximum operating temperature	260 ° C	260 °C
Maximum cold hydraulic test:	24 bar	60 bar

* 0,07 bar with low pressure top (limited at 7bar inlet).

PRESSURE RANGES IN bar				
SPRING COLOUR	GREEN W/1 Diaphragm	BLUE W/1 Diaphragm	RED W/2 Diaphragms	BLACK W/2 Diaphragms
Red. Pressure	0,07 to 0,5 bar *	1,5 to 5,5 bar **	3,5 to 8,5 bar **	7 to 17 bar **
Red. Pressure	0,35 to 2 bar **	/	/	/

* With low pressure top; **Standard diaphragm.

It is preferable to select a range spring where the desired reduced pressure is at upper end of range.

USEFUL NOTES ON VALVE AND PIPE SIZING

A special low pressure top assembly should be fitted for outlet pressures from 0,07 up to 0,5bar.

Two diaphragms must be fitted when reduced pressure range is 3.5 to 8.5bar and 7 to 17 bar.

Two regulators in parallel should be used on larger systems where minimum flow is less than 10% of maximum.

If the flow is unknown it's possible to estimate it based on pipe size or equipment heat requirement - please consult.

CE MARKING (PED - European Directive)		
PN 16	PN 40	Category
---	DN15 to DN 32	SEP
DN65 to DN100	DN40 to DN100	1 (CE Marked)

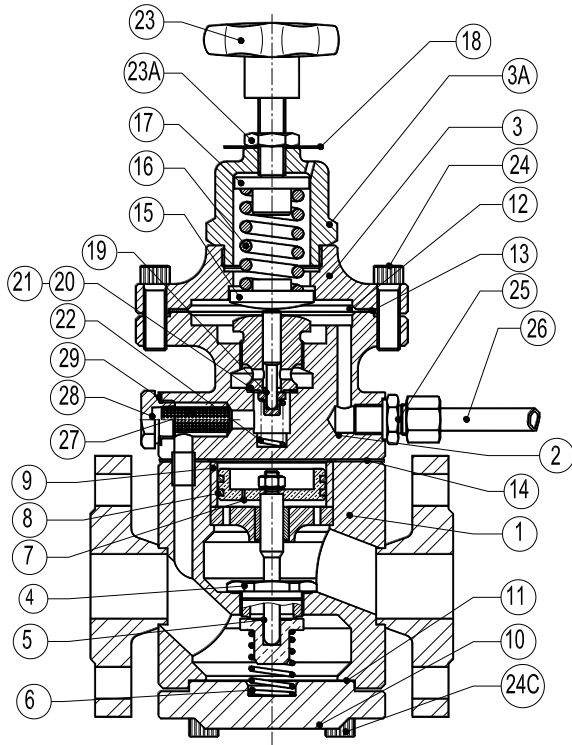
PARTS LIST FOR PRV47:

CODE	DESIGNATION	VALVE SIZE DN	POS.NR.	QTY.
VR.9570.002	Regulating spring 0,35 - 4 bar	All	16	1
VR.9570.005	Regulating spring 2 - 17 bar	All	16	1
VR.9571.001	Diaphragm & gasket	All	12, 13	1 set
VR.9574.001	Pilot valve, spring & gasket	All	19, 20, 21, 22	1 set
VR.9574.005	Strainer screen & gasket	All	27	1 set
VR.9575.015	Piston rings & gasket	15	8, 14	1 set
VR.9575.025	Piston rings & gasket	20-25	8, 14	1 set
VR.9575.032	Piston rings & gasket	32	8, 14	1 set
VR.9575.040	Piston rings & gasket	40	8, 14	1 set
VR.9575.050	Piston rings & gasket	50	8, 14, 14A	1 set
VR.9575.065	Piston rings & gasket	65	8, 14, 14A	1 set
VR.9575.080	Piston rings & gasket	80	8, 14, 14A	1 set
VR.9575.100	Piston rings & gasket	100	8, 14, 14A	1 set
VR.9576.015	Main valve, seat & gaskets	15	4, 5, 11	1 set
VR.9576.020	Main valve, seat & gaskets	20	4, 5, 11	1 set
VR.9576.025	Main valve, seat & gaskets	25	4, 5, 11	1 set
VR.9576.032	Main valve, seat & gaskets	32	4, 5, 11	1 set
VR.9576.040	Main valve, seat & gaskets	40	4, 5, 11	1 set
VR.9576.050	Main valve, seat & gaskets	50	4, 5, 11	1 set
VR.9576.065	Main valve, seat & gaskets	65	4, 5, 11	1 set
VR.9576.080	Main valve, seat & gaskets	80	4, 5, 11	1 set
VR.9576.100	Main valve, seat & gaskets	100	4, 5, 11	1 set

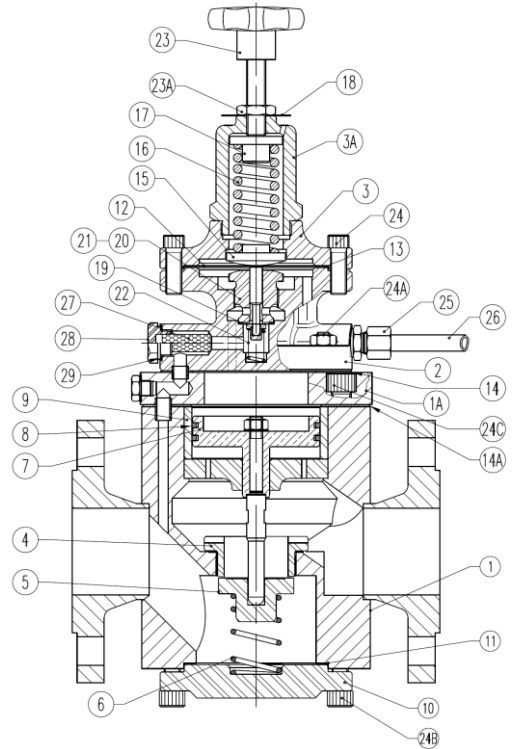
Recommended tightening torques:

POS.NR.	VALVE SIZE DN	Nm
19	ALL	250

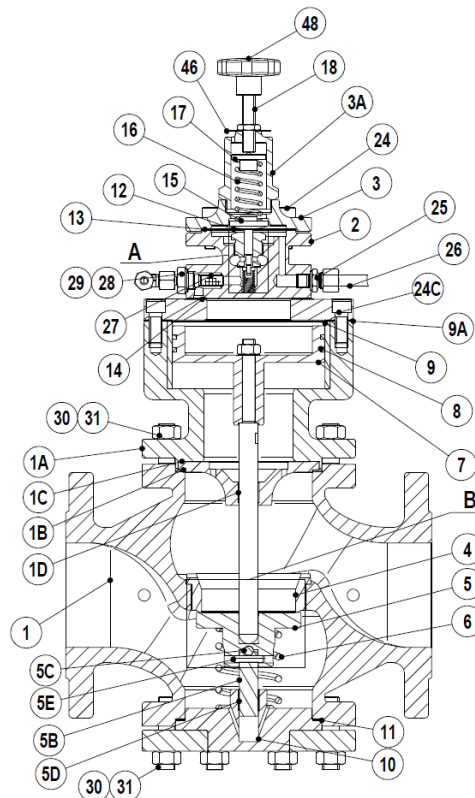
Remarks: tighten cover bolts uniformly



DN 15 – DN 40

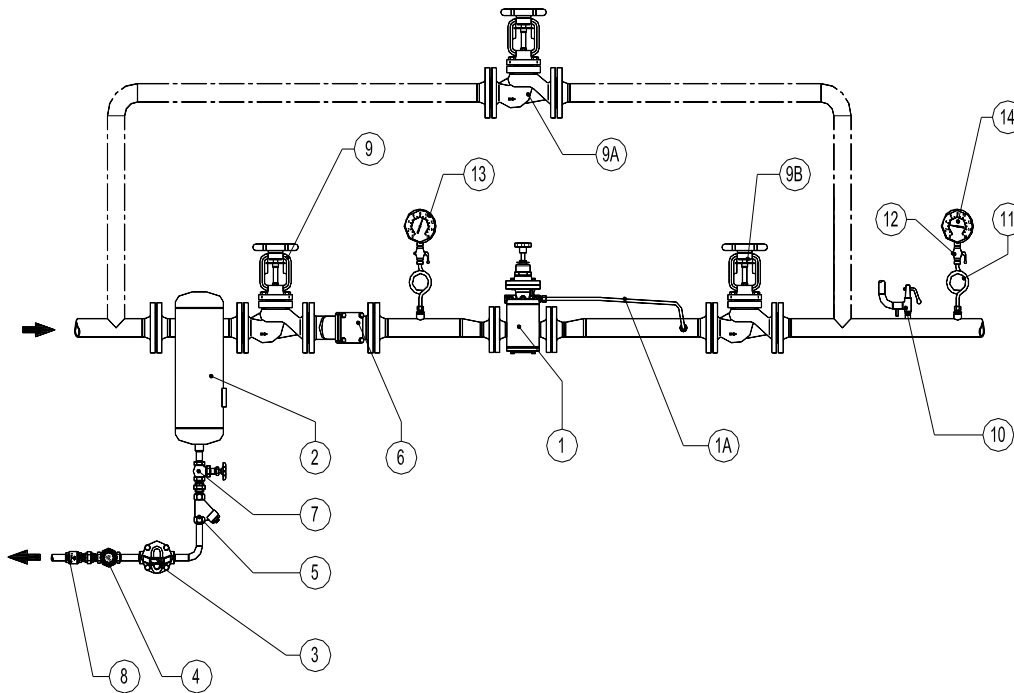


DN 50



DN 65 – DN 100

TYPICAL INSTALLATION



MATERIALS PRV 47		
POS.	DESIGNATION	MODEL
1	Pressure reducing valve	PRV 47
1A	Sensing pipe	COPPER
2	Humidity separator	S 25
3	Steam trap	FLT SERIES
4	Sigh glass	SW 12
5	Strainer	IS 16
6	Strainer	IS 16F
7	Stop valve	Globe Type
8	Check valve	Globe Type
9	Stop valve	Globe or Gate Type
9A*	By-pass valve	Globe Type
9B	Stop valve	Globe or Gate Type
10	Safety valve	---
11	Coil	GSC-40
12	Gauge cock	GC-400
13	Upstream pressure gauge	MAN-100
14	Downstream pressure gauge	MAN-100

Remarks:

* By-pass is optional. In case the by-pass is not allowed than stop valve 9B should be placed after pressure gauge 14 allowing the isolation of safety valve.

PN classes and materials according to the operating pressures.

The balance pipe connection is recommended to enter downstream pipe at a minimum of 1m from valve.

Installation instructions are available (IMI – PRV47) and typical assembling drawing. Special assembling designs may be produced on request.

PRODUCTS RETURNING



ATTENTION

- Information regarding any hazards and precautions to be considered because of contaminating fluids and residues or mechanical damage that may represent a health, safety or environmental risk, must be provided in writing by the distributors and costumers when returning products to Valsteam ADCA engineering.
- Health and safety data sheets regarding substances identified as hazardous or potentially hazardous must be provided with the information mention above.



ATTENTION

- **LOSS OF WARRANTY:** Total or partial disregard of above instructions involves loss of any right to warranty.

PRV 47 - PRESSURE REDUCING VALVE Installation and Maintenance

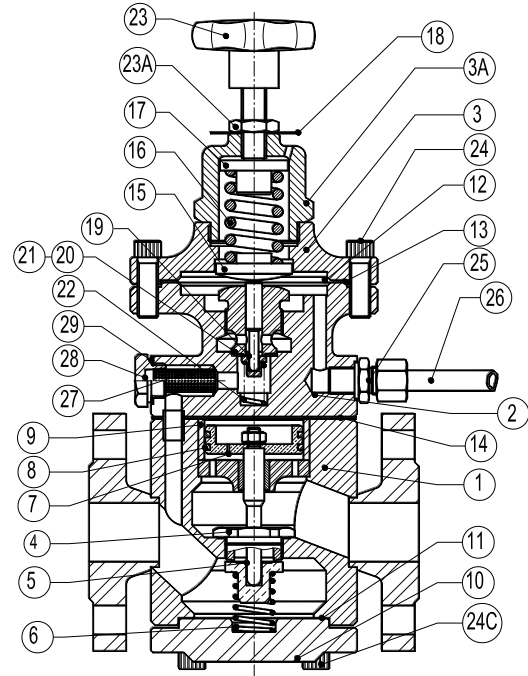
The PRV 47 is a pilot operated pressure reducing valve and to achieve long and trouble free service it is necessary that it should be properly installed and regularly inspected and maintained.

OPERATION

The reduced pressure is regulated by the lift (or opening) of the main valve 5 which controls the flow. This main valve is opened by steam (or another gas) supplied to the piston 7 which comes from the pilot valve 19, 20 and closed by the main valve spring 6.

The pilot valve opening (and hence the piston pressure) is determined by the combination of the reduced pressure on the underside of the diaphragm 12 (connected by balance pipe 26) and the adjusting spring load 16.

The reduced pressure is therefore accurately maintained despite variations of inlet pressure or capacity.



Regulators occasionally give trouble (particularly on new installations) due to dirt and other foreign matter fouling the internals. In this event, the trouble can often be quickly eliminated by applying the following first aid treatment:

1. With pressure "off", remove pilot valve top assembly complete (removing the 4 screws 24 on the top) and check by pushing down that the piston and main valve are moving freely and that the main valve returns smartly to it's seat.

Unscrew bottom cover screws 24C, remove cover 10 and withdraw main valve. Clean all parts and re-seat main valve if necessary, reassemble and test.

Warning: when replacing the main valve, be sure that the stem is properly introduced in the plug. Wrong positioning will damage valve and piston.

2. Remove top cap, adjusting screw, spring top cover and diaphragm 3, 12, 24 and check the spring, diaphragm and gasket. Turn on steam or air supply and close outlet stop valve (after the balancing pipe connection). Leakage from the low pressure orifice (adjacent to the pilot valve) may originate at the pilot valve 19, 20 and or main valve 4, 5. The leakage on the pilot valve can sometimes be stopped by lightly tapping the valve end of the stem (19) with a soft hammer while under pressure.

Warning: there will be a discharge upwards from the low pressure orifice.

3. With pressure off, unscrew pilot valve (19, 20) and check the pilot valve seat, valve and spring. Clean and re-seat if necessary. It is important to check also the pilot valve copper gasket. Reassemble and test.

The valve is now mechanically correct but if it's still not working well, consult our Trouble Shooting Chart. If you have any doubt about the installation please send us a sketch of the layout, including the following information:

- 1- Inlet pressure and limits of variation
- 2- Outlet pressure (minimum and maximum)
- 3- Maximum flow (steam or compressed air)
- 4- Minimum operating flow
- 5- Whether dead-tight shut-off is being obtained under no-flow conditions.
- 6- How long has the valve been in service.
- 7- Installation diagram including pipe sizes, valves, strainers, steam traps, etc.
- 8- A complete description of the faulty symptoms.

INSTALLATION



Sizing: The correct sizing and layout of regulators, pipework, stop valves, strainers and other fittings is absolutely important for a good performance (see AS - assembling sheets).

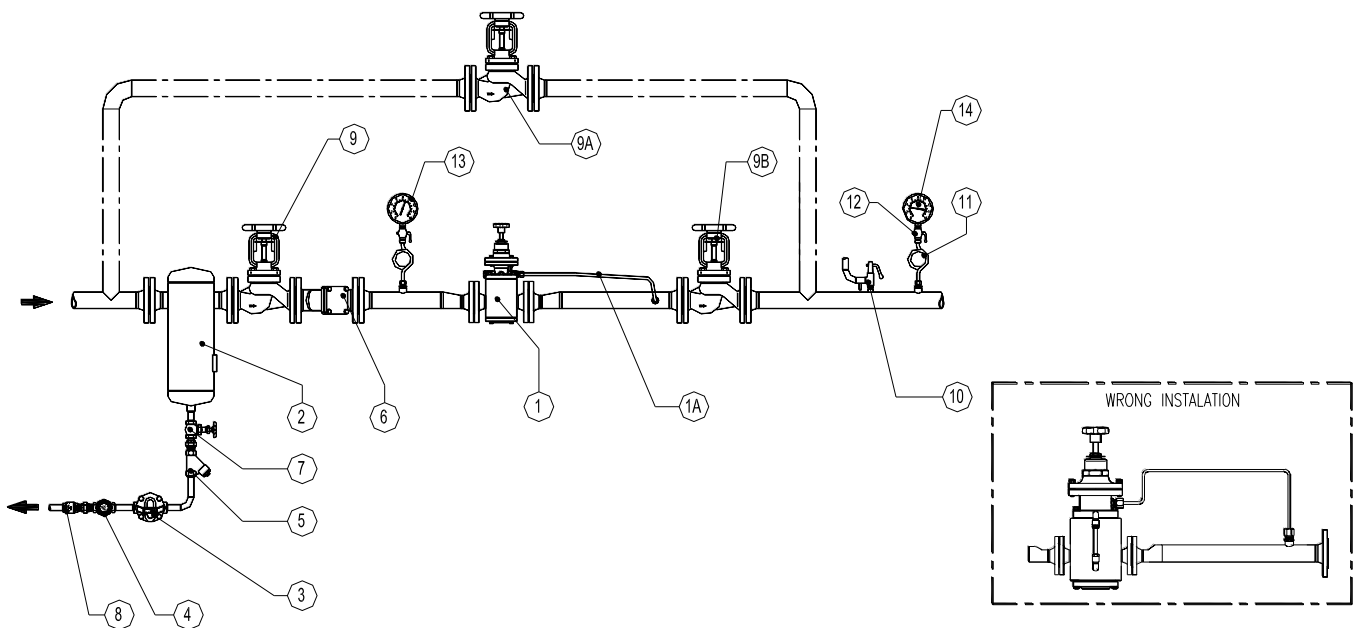
A pipe length equal to 10 pipe diameters should be kept before the valve.

Steam traps: A steam separator and steam trap is necessary before the valve . A second steam trap should be fitted on the outlet of the valve to prevent water logging and weir.

Safety valve: The installation should be protected by a safety valve duly installed and sized.

Balance pipe: The balance pipe must be arranged to drain towards low pressure pipe. It should be connected into the downstream pipe at the point where smooth flow occurs. Where isolation of the regulator is desired a stop valve should be fitted in the balance pipe.

Warning: if a jointing compound is used it should not be allowed to foul the internal ports and working parts of the valve and/or system pipes.





SETTING

Before putting any control valve in service, all pipes should be clean from dirt and pipe scale. We also recommend cleaning the inlet strainer one week after the first starts up. Regular maintenance must clean the strainer at regular intervals.

Setting under no-flow conditions:

1. Slowly open the inlet stop valve and apply a little tension to the regulating spring by rotating the handwheel 23 clockwise for a few turns. Then slowly open the outlet stop valve just a small percentage of his travel. When the downstream pressure starts to rise, close the inlet valve, remove all tension from the regulating spring and close the downstream stop valve.
2. With the downstream stop valve closed, slowly open the inlet valve and wait about one minute to confirm that the reduced pressure is maintained at zero. This is to check that the regulator gives dead-tight shut-off under no-flow conditions.
3. Slowly raise the reduced pressure by rotating the regulator handwheel clockwise until the desired pressure is obtained (do not forget to set the safety valve if necessary).Then, slowly open the outlet stop valve to a fully open position. Apart from a possible initial fall of the downstream pressure whilst the system is warmed through, the regulator should continue to maintain the downstream pressure just below the set value. The regulator can now be locked with the lock-nut 23A.

Setting on flow:

1. With the inlet and outlet stop valves closed apply a little tension to the regulating spring by rotating the handwheel 23 clockwise for a few turns. Slowly open the inlet and outlet stop valves and wait until all condensate has been removed and the system properly warmed through. Then slowly raise the reduced pressure until the desired value (do not forget to set the safety valve if necessary).
2. If the flow is varying it is necessary to adjust till find the correct setting .The regulator can now be locked with the lock-nut 23A.

TROUBLE SHOOTING CHART

FAULT	POSSIBLE REASON	SOLUTION
Leakage from spring chamber bleed hole.	Broken diaphragm	Replace diaphragm and gasket.
Reduced pressure not maintained as flow varies. Safety valve blows when flow ceases.	Piston stuck due to: 1 – Dirt around piston and piston rings;	Clean and re-assemble. Check the system strainers and clean.
	2 – Broken piston rings;	Replace piston rings
	3 – Scored piston liner.	Replace
	Main valve lid/piston stuck in guides	Free and if necessary replace worn parts.
Reduced pressure not maintained when flow approaches maximum, but is correct at low-flow and no-flow conditions.	Relay port between relay valve diaphragm chamber and main valve outlet blocked	Clear blockage
	Regulator undersized	Replace with a larger valve or consider fitting another valve in parallel (assuming that the pipework is sized for larger capacities)



	Pressure differential across the regulator too small	None, unless inlet or reduced pressure can be adjusted to give increased differential.
	Downstream pipework and fittings undersized	None, unless change the pipework None, this a basic system fault
	Upstream pressure not being maintained	
Reduced pressure correct on large flow and no-flow conditions but is erratic on small flows.	Valve is oversized	Replace with smaller valve. Fit a reduced main valve lid. Check main and pilot valves for erosion and replace as necessary.
Reduced pressure builds up on no-flow conditions but otherwise operates as required.	Main valve lid withdrawn or stuck in guides	Free and grind main valve lid into seat
	Pilot valve lid wiredrawn	Grind pilot valve lid into seat
	Inlet medium leaking past pilot valve seat gasket	Tighten down pilot valve seat. Replace gasket if necessary
	Condensate accumulating in valve	Fit a steam trap to the inlet pipe
Large reduced pressure fluctuations under all flow conditions.	Inlet pipe and/or fittings are undersized.	If undersized replace pipework and/or fittings.
	Inlet flange gasket restricting flow to the valve.	Rectify gasket
	Relay port from main valve inlet to pilot valve to pilot valve is partially blocked.	Clear blockage
	Valve oversized	Fit a smaller valve. Fit a reduced main valve lid.
Reduced pressure oscillates for a short period when starting up after a system shut-down.	Condensate accumulating in the regulator.	Fit steam traps to inlet and outlet pipes.



ATTENTION

- **LOSS OF WARRANTY:** Total or partial disregard of above instructions involves loss of any right to warranty.