



PRESSURE REGULATOR

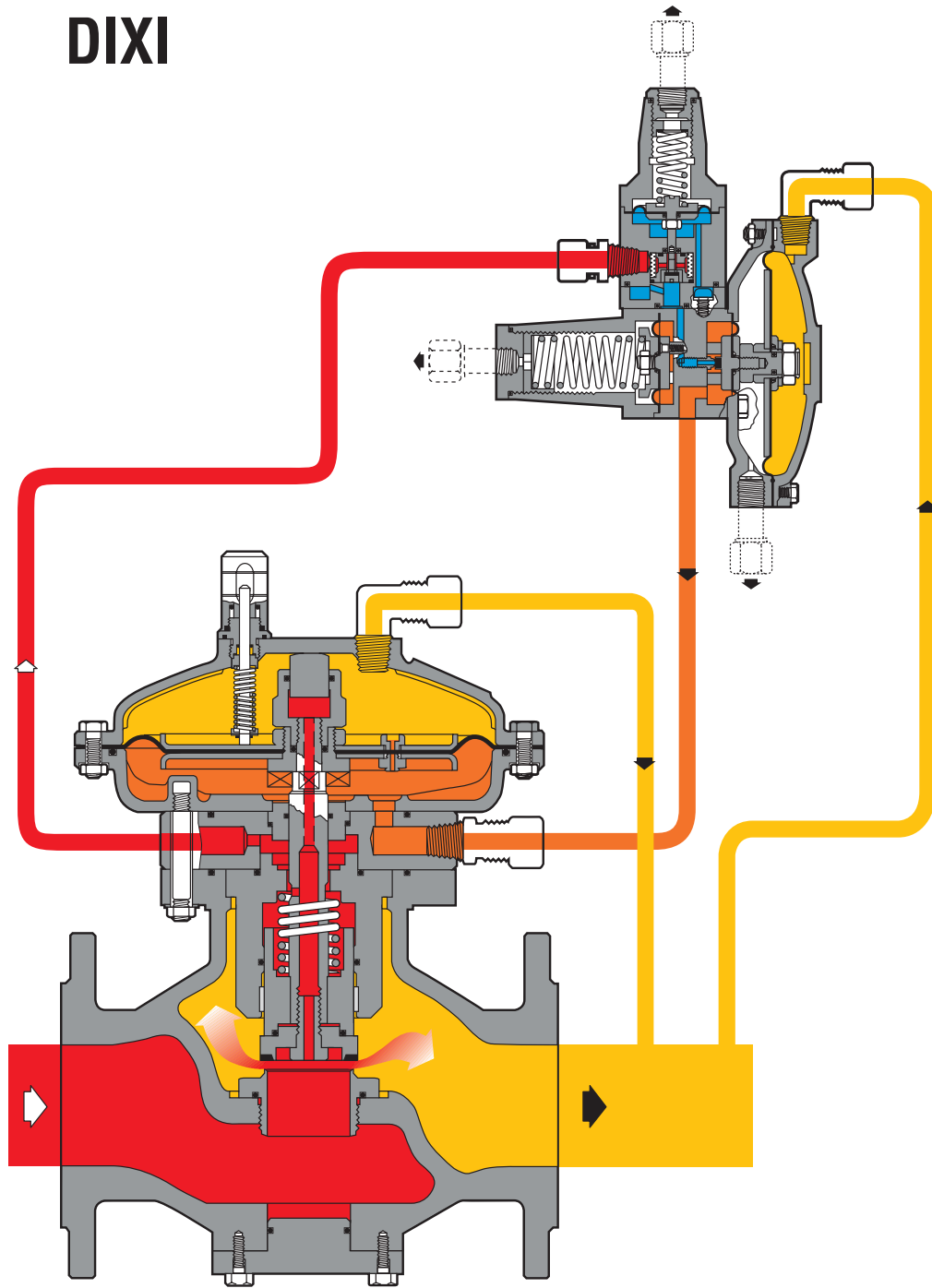
DIXI



TECHNICAL MANUAL MT035

INSTALLATION, COMMISSIONING AND MAINTENANCE ISTRUCTIONS

DIXI



 INLET PRESSURE

 OUTLET PRESSURE

 PILOT FEED

 MOTORIZATION

DECLARATION OF CONFORMITY

The **PIETRO FIORENTINI SPA** with registered office in Milan (Italy) – via Rosellini, 1, declares under its sole responsibility that the apparatus series Dixi bearing the CE marking showed in this manual are designed, manufactured, tested and inspected in accordance with the provisions of Pressure Equipment Directive 97/23/EC (PED).

Following conformity assessment procedure has been carried out:

- EC type-examination (module B) by DVGW (ID n° 0085) – report **02/232/4301/855 issued 09th July 2002**. In this report all versions are classified as safety accessories according to clause 2.1.3 of art. 1 of PED.
- Production quality assurance (module D) by BUREAU VERITAS (ID n° 0062) – Attestation d'Approbation du Système Qualité N° **CE-PED-D-FIO001-02-ITA issued 15th May 2002**.

Further it declares that the classification of the performances characteristics has been verified by DVGW according to the procedures given by European standard EN 334 and/or by standard DIN 3381. The classification is detailed in the aforesaid DVGW report.

Arcugnano 25/9/2002

The Pietro Fiorentini SpA

PRECAUTIONS

GENERAL PRECAUTIONS

- The apparatus described in this manual is a device subject to pressure installed in systems under pressure;
- the apparatus in question is normally installed in systems for transporting flammable gases (natural gas, for example).

PRECAUTIONS FOR THE OPERATORS

Before proceeding with installation, commissioning or maintenance, operators must:

- examine the **safety provisions** applicable to the installation in which they must work;
- obtain the **authorisations** necessary for working when so required;
- use the necessary means of **individual protection** (helmet, goggles, etc.);
- ensure that the area in which they operate is fitted with the means of **collective protection** envisaged and with the necessary **safety indications**.

HANDLING

The handling of the apparatus and of its components must only be carried out after ensuring that the lifting gear is adequate for the **loads to lift** (lifting capacity and functionality). The apparatus must be handled using the **lifting points** provided on the apparatus itself.

Motorised means must only be used by the persons in charge of them.

PACKING

The packing for transportation of equipment and of relevant spare parts are designed and shaped to avoid damage to any part during transportation, warehousing and handling activities. Therefore the equipment and spare parts shall be kept into their packing until their installation in the final site. After packing is open, check that no damage occurred to any goods. If damage occurred inform the supplier and keep packing for any verification.

INSTALLATION

If the installation of the apparatus requires the application of **compression fittings** in the field, these must be installed following the **instructions of the manufacturer** of the fittings themselves. The choice of the fitting must be compatible with the use specified for the apparatus and with the specifications of the system when envisaged.

COMMISSIONING

Commissioning must be carried out by adequately trained personnel.

During the commissioning activities, the personnel not strictly necessary must be ordered away and the no-go area must be properly signalled (signs, barriers, etc.).

Check that the settings of the apparatus are those requested; if necessary, reset them to the required values in accordance with the procedures indicated in the manual.

When commissioning, the risks associated with any discharges into the atmosphere of flammable or noxious gases must be assessed.

In installations in natural gas distribution networks, the risk of the formation of explosive mixtures (gas/air) inside the piping must be considered.

CONFORMITY TO DIRECTIVE 97/23/EC (PED)

Pressure regulator Dixi is classified as fail close regulator according to the standard EN 334 therefore it is categorized as **safety accessory** according to directive 97/23/EC (PED).

The regulator Dixi when incorporating slam shut valve LA/... with pressure switches for overpressure is categorized as **safety accessory** according to PED, therefore it can be used both as pressure accessory and **safety accessory** to PED.

Conformity with Directive 97/23/EC of pressure regulator and relevant accessory bearing the CE marking require installation in the system with minimum requirements according to EN 12286.

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1.0 INTRODUCTION

The scope of this manual is to provide the essential information for the installation, commissioning, disassembly, reassembly and maintenance of Dixi regulators.

A brief illustration of the main features of the regulator and its accessories is also provided.

1.1 MAIN SPECIFICATIONS

The DIXI pressure regulator is a regulator of the piloted type for medium and high pressures.

The Dixi is a fail close type regulator and therefore closed in the event of:

- rupture of the main diaphragm;
- rupture of the pilot diaphragm/s;
- pilot circuit supply failure.

It permits the down-line pressure to be maintained constant with variations in the up-line pressure or the requested flow.

The main features of this regulator are:

- use of non-corrosive gases, previously filtered;
- design pressure: 16 bar;
- design temperature: -10 °C to +50 °C;
- ambient temperature: -20°C to +60 °C;
- inlet pressure range bpe: 0.5 to 16 bar;
- possible regulation range Wh: 0.02 to 6 bar (depending on the pilot installed);
- minimum pressure differential: 0.5 bar;
- class of accuracy RG: up to 5;
- closing pressure class SG: up to 20.

1.2 OPERATION (FIG. 1)

If there is no pressure, the obturator 3 is maintained in the closed position by the spring 43 and rests on the valve seat 2. The upstream pressure, even if variable, does not modify this position as the obturator, because of the hole A, finds itself between two equal pressures acting on equal surface areas. The rod 9 is also between two equal pressures as the upstream pressure is also brought to the chamber C through the hole A.

The obturator is controlled by the diaphragm 15 on which the following forces are exerted:

- downwards: the load of the spring 43, the thrust deriving from the regulated pressure Pa in the chamber D and the weight of the mobile assembly;
- upwards: the thrust from the motorization pressure Pm in the chamber E, supplied by the pilot.

The motorization pressure is obtained by taking gas from the regulator at the upstream pressure.

----- Connections to be made by the customer

----- Internal regulator connections

□ Ref. No. for the connections

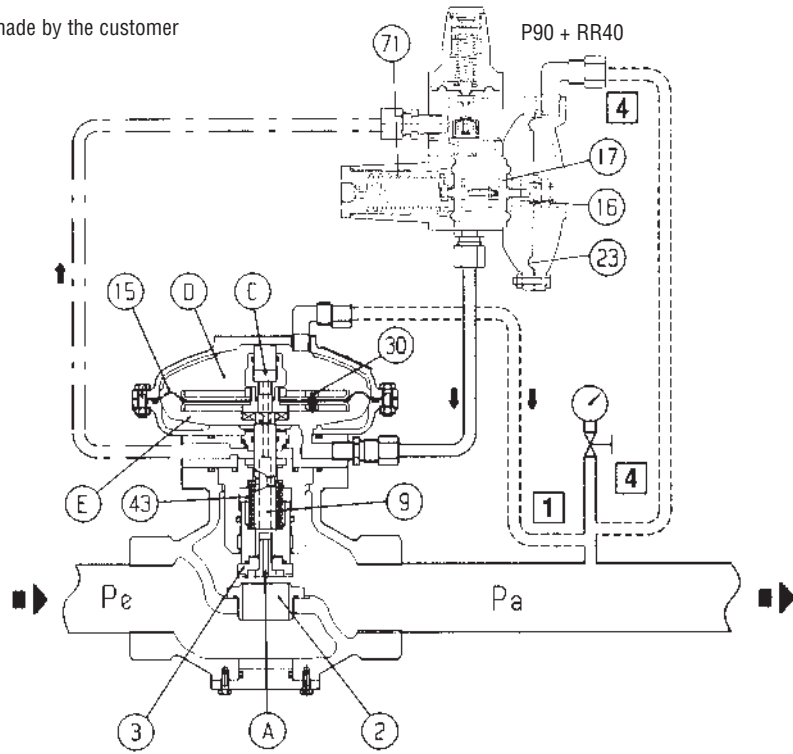


Fig. 1

The gas is filtered through filter 28 and undergoes an initial decompression in the adjustable pre-regulator RR40 (fig. 2), composed essentially of an obturator 31, a spring 40 and a diaphragm 25, to a value P_{ep} which depends on the setting of the regulator.

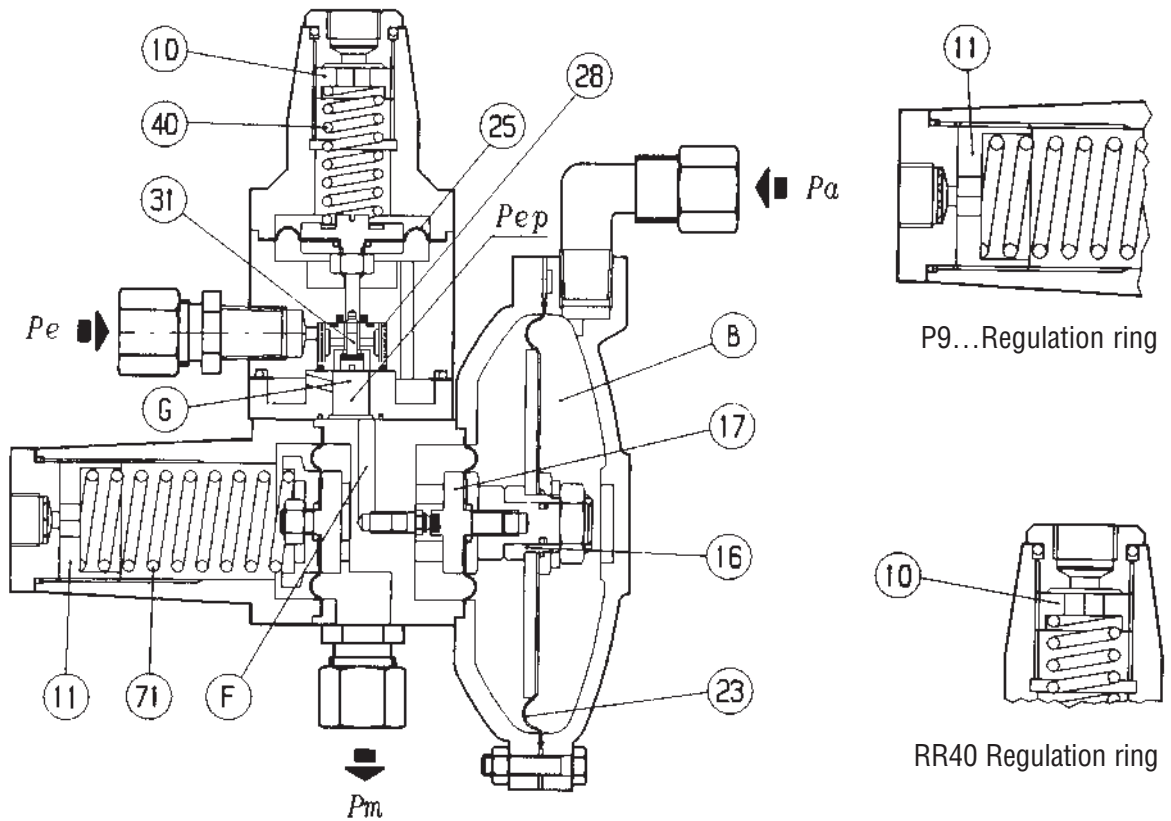


Fig. 2
P90 + RR40 Pilot

The adjustment of P_{ep} is made by turning the ring 10 (clockwise to increase it and anticlockwise to reduce it), and its value can be read on the pressure gauge installed directly on the body of the pre-regulator. From the chamber G the pressure P_{ep} then passes through the hole F in the incorporated pilot P9.. which regulates it by means of the obturator 17 up to the regulator head inlet value P_m .

The regulation of P_m is obtained by means of the contrast between the force exerted by the setting spring 71 of the pilot and by the action of the regulated pressure P_a acting in the chamber B on the diaphragm 23. The setting is modified by turning the setting ring 11; the pressure P_m , and therefore the regulated pressure P_a are increased by turning clockwise; vice-versa by turning anticlockwise.

If during operation, for example, there is a drop in the downstream pressure P_a (because of an increase in the flow rate demand, or a drop in the upstream pressure) there is an imbalance in the mobile assembly 16 of the pilot which moves and increases the opening of the obturator 17. As a result, the value of the motorization pressure P_m also increases and, acting on the chamber E below the diaphragm 15 (fig. 1) causes the obturator 3 to move upwards and therefore an increase in the opening of the regulator until the regulated pressure set point is restored. Vice-versa, when the regulated pressure begins to increase, the force exerted on the diaphragm 23 shifts the mobile assembly 16 and moves the obturator 17 towards the closed position. The pressure P_m then drops, due to the transfer between chambers E and D through orifice 30, and the force exerted by spring 43 causes the obturator 3 to move downwards, thereby returning the regulated pressure to the set point.

In normal working conditions, the obturator 17 positions itself so that the value of the motorization pressure P_m is such as to maintain the downstream pressure P_a around the preset value.

The Dixi regulator uses the P90, P92 and P94 pilots with the RR40 pre-regulator incorporated.

Tables 1 and 2 show the fields of regulation of the pre-regulator and of the various pilots.

1.3 SETTING SPRINGS

Tab. 1 RR40 Pre-regulator setting springs								
	Code	Colour	De	Lo	d	i	it	Setting range in bar
1	2700338	WHITE	15	40	1,3	8,75	10,75	0,11 ÷ 0,22
2	2700375	YELLOW			1,5	5,25	6,75	0,22 ÷ 0,58
3	2700464	ORANGE			1,7	8,5	10,5	0,5 ÷ 0,86
4	2700510	RED		35	2	5,25	7,25	0,85 ÷ 2
5	2700745	GREEN			2,5	5,25	7,25	1,95 ÷ 4,7
6	2700980	BLACK			3	6	8	4,6 ÷ 8,2

N.B.: Recommended set-point: $P_{ep} = P_a + (0.15 \div 0.2)$ bar

Tab. 2 Pilots P90-92-94 setting springs								
PILOT P90								
	Code	Colour	De	Lo	d	i	it	Setting range in mbar
1	2700400	WHITE	25	55	1,5	7	9	6 ÷ 15
2	2700545	YELLOW			2	7,5	9,5	14 ÷ 50
3	2700790	ORANGE			2,5	8	10	49 ÷ 120
4	2701010	RED			3	7	9	110 ÷ 270
PILOT P92								
1	2701010	RED	25	55	3	7	9	260 ÷ 660
2	2701225	GREEN			3,5	6	8	650 ÷ 1110
PILOT P94								
1	2701010	RED	25	55	3	7	9	1000 ÷ 2100
2	2701225	GREEN			3,5	6	8	2000 ÷ 5000
3	2701475	BLACK			4	6	8	4900 ÷ 6000

De = Ø external diameter **d** = Ø wire diameter **i** = active coils **Lo** = Length **it** = total coils

2.0 INSTALLATION

2.1 GENERAL

Pressure regulator does not require any supplementary upstream safety accessory for protection against overpressure compared with its design pressure PS, when upstream reducing station is sized for a max downstream incidental pressure $MIPd \leq 1,1 PS$.

Before installing the regulator it is necessary to ensure that:

- the regulator can be inserted in the space provided and that subsequent maintenance operations will be sufficiently practicable;
- the upstream and downstream piping is at the same level and capable of supporting the weight of the regulator;
- the inlet/outlet flanges of the piping are parallel;
- the inlet/outlet flanges of the regulator are clean and the regulator itself has not been subject to damage during transport;
- the piping upstream has been cleaned to expel residual impurities such as welding scale, sand, paint residues, water, etc.

The normally recommended set-up is:

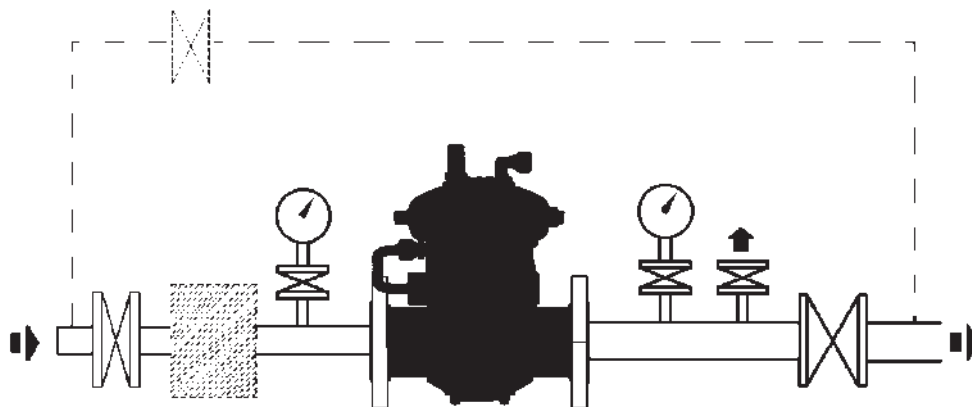
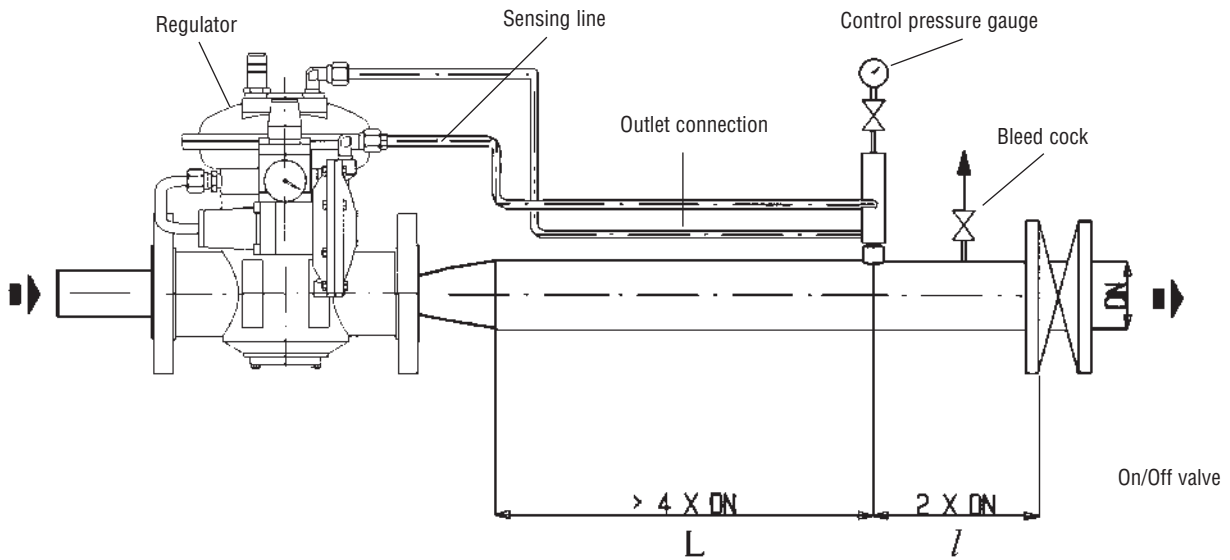


Fig. 3 (Standard regulator)

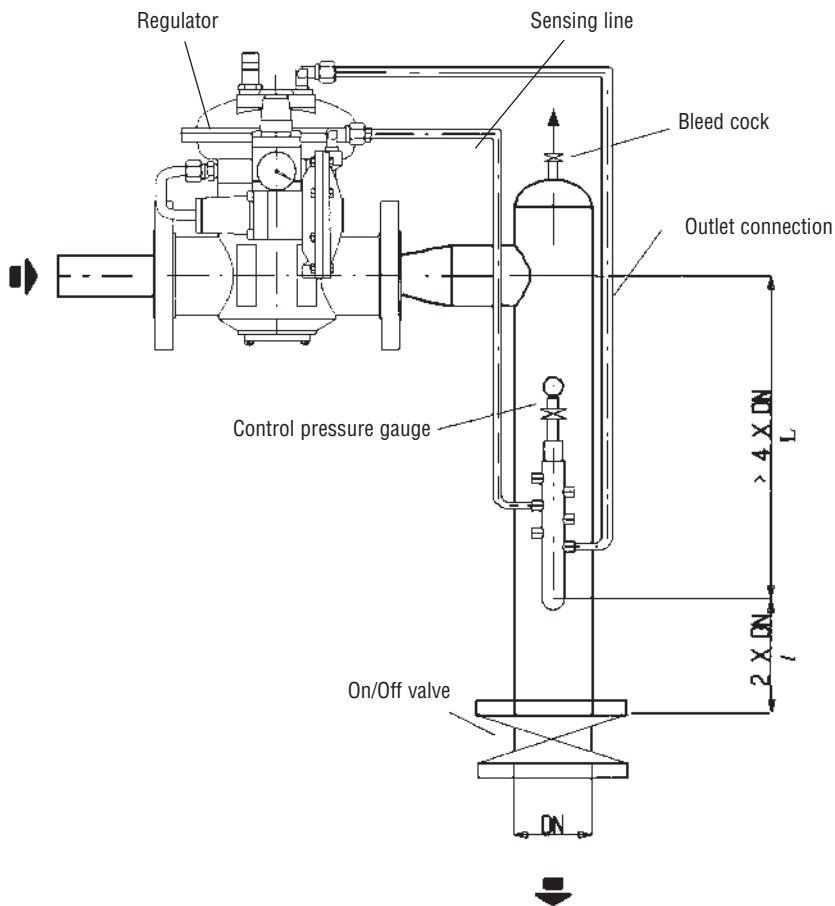
Tab. 3 CONNECTING THE APPARATUSES

The connections between the apparatus and the main piping must be made using stainless steel or copper pipe with minimum internal diameter of 8 mm.

IN-LINE INSTALLATION

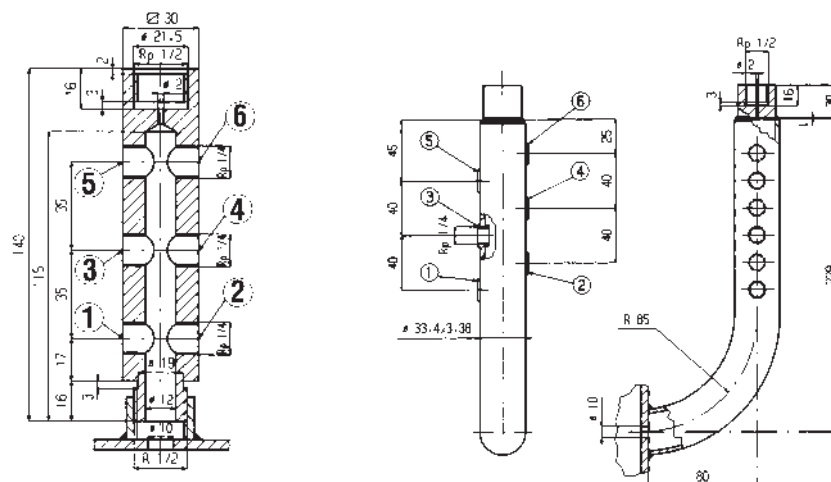


INSTALLATION AT RIGHT ANGLES



Tab. 4 DETAIL OF MULTIPLE TAKE - OFF WITH OF THE IMPULSE TAKE - OFF REFERENCE NUMBERS

- 1 and 2 Connect to regulators heads
- 3 and 4 Connect to pilots
- 5 and 6 Connect accelerator and slam-shut



The regulator must be installed in the line **with the arrow on the body pointing in the gas flow direction**. It is indispensable for good regulation for the position of the downstream pressure take-offs and the speed of the gas at the take-off point to respect the values given in tables 3 and 4 (positioning) and 5 (speed).

The pressure regulator, when installed on a reducing station, shall be installed at least according to the requirements of standard EN 12186.

All venting connections shall be connected as required by above mentioned standard.

The following is recommended so as to prevent the accumulation of impurities and condensate in the lines of the pressure take-offs:

- a) the lines themselves must slope down towards the downstream piping with a slope of about 5-10%;
- b) the connectors on the piping must always be welded on the top of the piping itself and there must be no burr or inward protrusions in the hole in the piping.

NB. WE RECOMMEND NOT TO PUT ON/OFF VALVES ON THE IMPULSE TAKE-OFFS.

Tab. 5

The speed of the gas must not exceed the following values in the piping downstream from the regulator:

- $V_{max} = 30 \text{ m/s}$ for $P_a > 5 \text{ bar}$
- $V_{max} = 25 \text{ m/s}$ for $0,5 < P_a < 5 \text{ bar}$
- $V_{max} = 15 \text{ m/s}$ for $P_a < 0,5 \text{ bar}$

3.0 ACCESSORIES

3.1 RELIEF VALVE

The relief valve is a safety device which releases a certain quantity of gas to the exterior when the pressure at the control point exceeds the set-point as a result of shortlasting events such as, for example, the very fast closing of the on/off valves and/or overheating of the gas with zero flow rate demand. The release of the gas to the exterior can, for example, delay or block the intervention of the slam-shut valve for transitory reasons deriving from damage to the regulator.

Obviously the quantity of gas released depends on the extent of the overpressure with respect to the set-point. The different models of relief valves available are all based on the same operating principle which is illustrated below with reference to the valve VS/AM 55 (fig. 4).

It is based on the contrast between the thrust on the diaphragm 24 deriving from the pressure of the gas to control and the thrust from the setting spring 20. The weight of the mobile assembly, the static thrust and the residual dynamic thrust on the obturator 4 also contribute to this contrast.

When the thrust deriving from the pressure of the gas exceeds that of the setting spring, the obturator 4 is raised and a certain quantity of gas is released as a result.

As soon as the pressure drops below the set-point, the obturator returns to the closed position. Proceed as indicated below to control and adjust intervention of the relief valve.

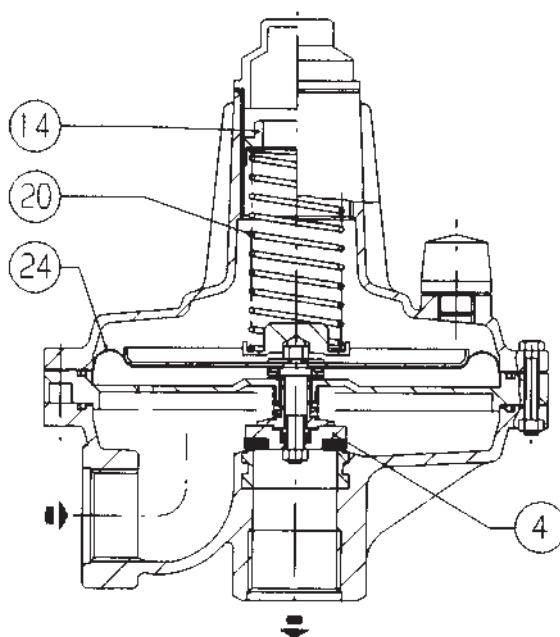


Fig. 4

3.1.1 DIRECT INSTALLATION IN THE LINE (FIG. 5)

When the relief valve is fitted directly in the line, that is without inserting an on/off valve, proceed as follows:

- 1) Ensure that the downstream on/off valve V2 and the bleed cock 6 are closed;
- 2) Increase the pressure in the downstream section up to the value envisaged for intervention in one of the following ways:
 - if the spring fitted on the pilot permits it (see tables 1-2), increase the setting of the pilot itself until the desired value is obtained;
 - connect a controlled auxiliary pressure to the cock 6 and stabilize it at the desired value;
- 3) Check the intervention of the relief valve and adjust it necessary by turning the internal adjustment ring 14 appropriately (clockwise to increase and anticlockwise to decrease).

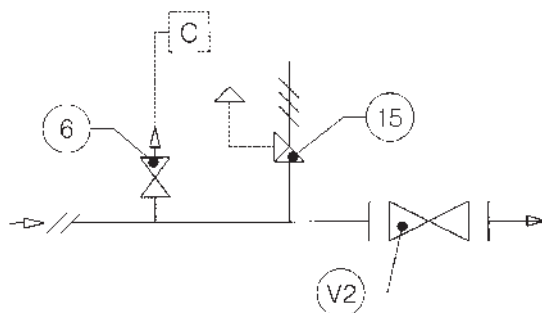


Fig. 5

3.1.2 INSTALLATION WITH ON/OFF VALVE (FIG. 6)

- 1) Close the on-off valve 16.
- 2) Connect a controlled auxiliary pressure to the nipple 17 and increase it slowly up to the value envisaged for intervention.
- 3) Check the intervention of the relief valve and adjust it necessary by turning the internal adjustment ring 14 appropriately (clockwise to increase and anticlockwise to decrease).

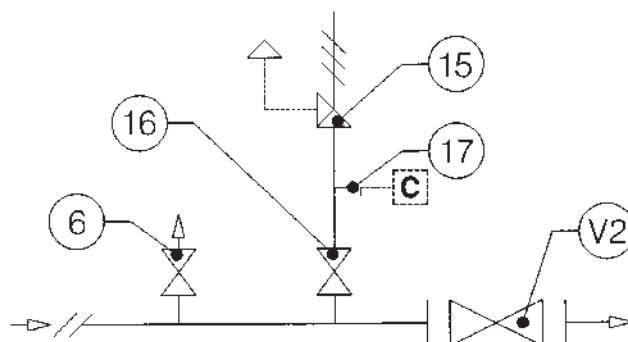


Fig. 6

4.0 MODULARITY

The modular-type conception of DIXI series regulators means that it is also possible to fit the slam-shut incorporated with the body itself even after the installation of the regulator.

Furthermore, the regulator can be adapted for operation as with in-line monitor by installing a special device.

4.1 LA/... INCORPORATED SLAM-SHUT

This is a device (fig. 7-8) which immediately blocks the gas flow if, because of some failure, the downstream pressure reaches the point set for its intervention, or if it is actuated manually.

With the Dixi pressure regulator, the slam-shut can be incorporated on both the service regulator or on the in-line monitor. Three versions (LA/BP, LA/MP and LA/TR) are available depending on the intervention pressure ranges.

The main features of the slam-shut device are as follows:

- cover design pressure: 16 bar;
- intervention for pressure increase and/or decrease;
- accuracy AG: $\pm 5\%$ of the set point for pressure increases; $\pm 15\%$ of the set point for pressure drops;
- internal by-pass device;
- manual button-operated actuating device.

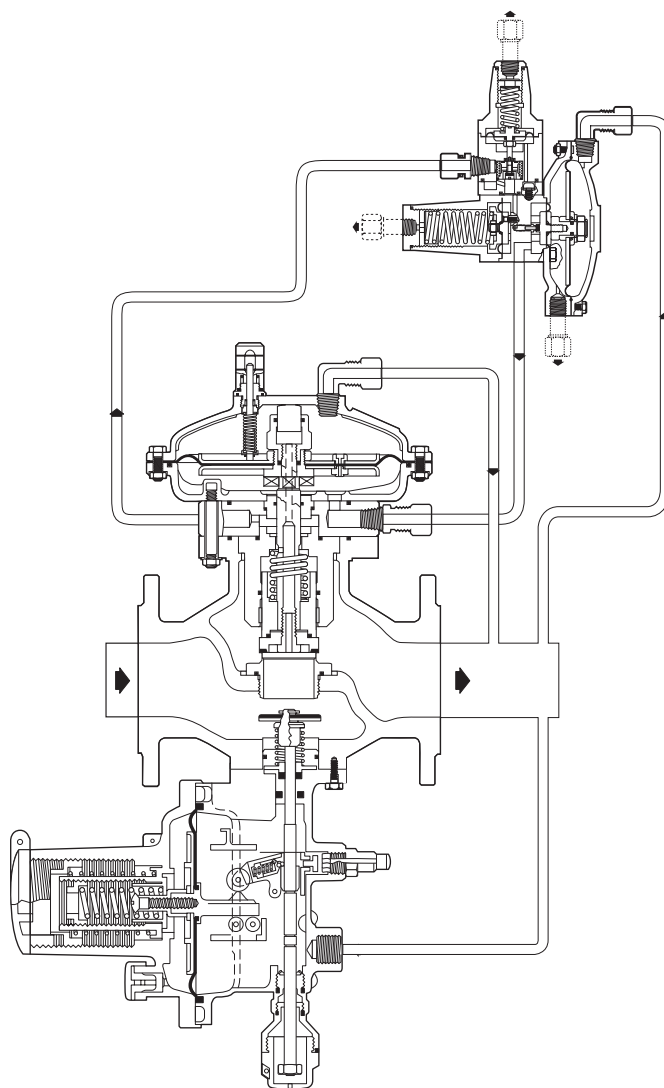
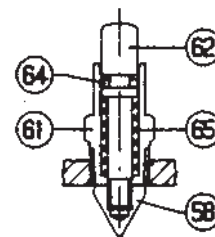
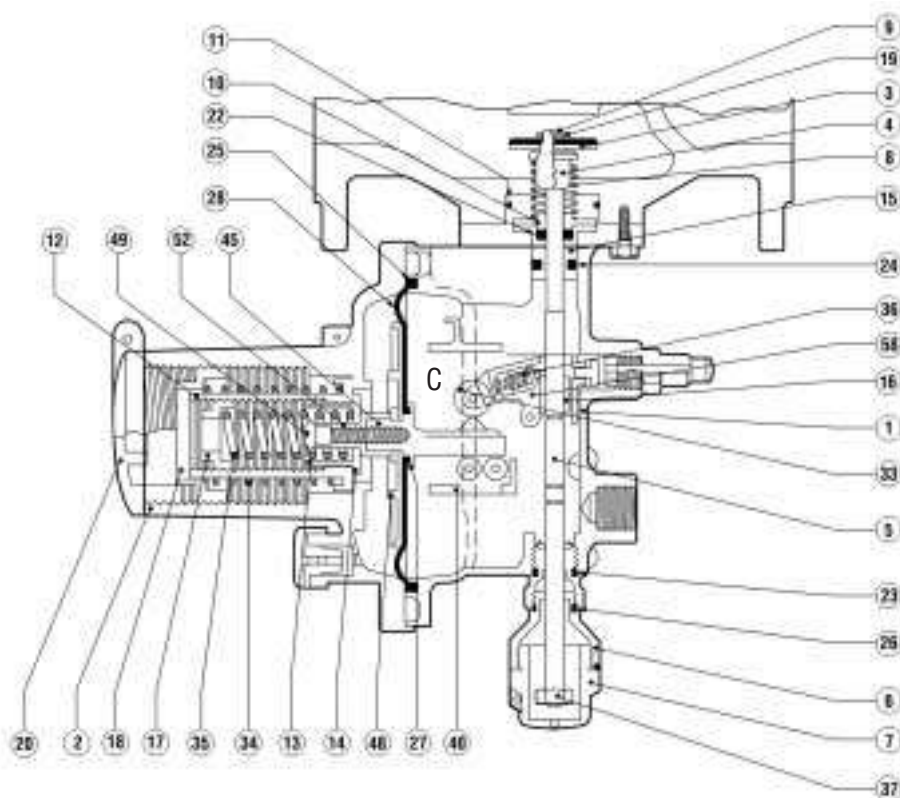


Fig. 7
17



Detail of manual button operated actuating device

Note: the O-ring 25 is used for particular versions

LA/BP Slam-shut
Fig. 8

The slam-shut valve LA/. consists essentially of an obturator (fig. 8) fitted on a rod, a releasing lever system, a control head and a manual resetting system.

The pressure to control P_a , in chamber C of the control head, acts on the diaphragm 28 which is integral with the cam shaft 16.

The load of the pressure P_a on the diaphragm is countered by the springs 34 and 35 which respectively determine intervention for pressure increase or decrease.

The device is set by turning the rings 17 and 18. Turning the rings clockwise increases the intervention value; turning anticlockwise decreases it.

Intervention as a result of a pressure increase occurs as follows: when the pressure P_a exceeds the setting valve, the load on the diaphragm 28 increases until it overcomes the resistance of the spring 34. This causes the shaft to translate towards the left so that the cam shifts the feeler 33. In this way, the rod 5 with the obturator 19 is freed and closed by the spring 8.

On the other hand, intervention as a result of a pressure decrease occurs as follows: as long as the pressure P_a stays above the load of the spring 35, the spring support rests on the support 12. If the pressure P_a drops below the setting, the spring 35 translates the support to the right and with it the shaft. The cam shifts the feeler 33 and trips the lever mechanism 29.

The slam-shut is reset by unscrewing the threaded bushing 7 and pulling it downwards until the lever mechanism 29 is reset. During the first phase of the operation, it will be necessary to wait until the upstream pressure, through the internal by-pass, passes downstream from the obturator to rebalance it. After resetting, the bushing 7 must be screwed back to its seat. It is possible to see from the outside whether the slam-shut is open or closed by observing the position of the nut 37 through the aperture in the bushing 7, as shown in figure 8.

Table 6 shows the field of intervention for the pressure switches available.

4.1.1 Tab.6 LA/... SLAM-SHUT SETTING SPRINGS

Springs characteristics								LA/BP/MP SLAM-SHUT	
Code	Colour	De	Lo	d	i	it	SETTING RANGE in mbar		
								Intervention for max pressure	
1	2700632	WHITE	34	43	2,2	5,5	7,5	30	÷ 60
2	2700912	YELLOW		46	2,8	5	7	60	÷ 180
								Intervention for min pressure	
4	2700327	WHITE	15	45	1,3	6,5	8,5	6	÷ 60
								Intervention for max pressure	
5	2701143	ORANGE	34	40	3,2	4,5	6,5	180	÷ 280
6	2701139	RED		50	3,2	4,5	6,5	280	÷ 450
								Intervention for min pressure	
7	2700514	YELLOW	15	40	2	6,75	8,75	60	÷ 240

								LA/TR SLAM-SHUT	
								Intervention for max pressure	
11	2701143	ORANGE	34	40	3,2	4,5	6,5	250	÷ 550
12	2701139	RED		50	3,2	4,5	6,5	550	÷ 850
13	2701246	BLACK		50	3,5	5	7	850	÷ 1500
14	2701522	BLUE		50	4	4	6	1500	÷ 2500
15	2701775	VIOLET		50	4,5	4,5	6,5	2500	÷ 4000
16	2702064	SKY-BLUE		50	5	4	6	4000	÷ 5500
								Intervention for min pressure	
17	2700514	YELLOW	15	40	2	6,75	8,75	100	÷ 600
18	2700989	ORANGE		40	3	6,5	8,5	600	÷ 2000
19	2701185	RED		43	3,2	7,5	9,5	2000	÷ 3500

De = Ø external diameter

d = Ø wire diameter

i = active coils

Lo = Length

it = total coils

4.2 MONITOR

The monitor is an emergency regulator which comes into operation to replace the service regulator if, for any reason, the latter permits the downstream pressure to rise up to the value set for its intervention.

The in-line monitor solution is available on the Dixi regulator (fig. 10). In this configuration, the monitor regulator is identical in every way to a standard regulator while there is a constructive variant in the service regulator, as illustrated in fig. 9.

This variant is necessary because the pressure which feeds the service regulator pilot is taken off upstream from the monitor from its intermediate flange, and then brought by an external connection to the intermediate flange of the service regulator. This pressure must therefore be isolated from the pressure which arrives from the zone upstream from the service regulator itself through the hole in the rod.

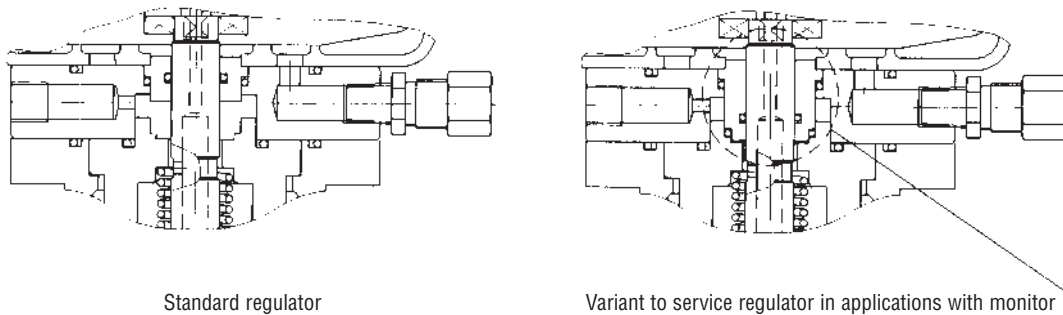


Fig. 9

4.2.1 IN-LINE MONITOR

With this kind of application, the emergency regulator is installed upstream from the service one (fig. 10).

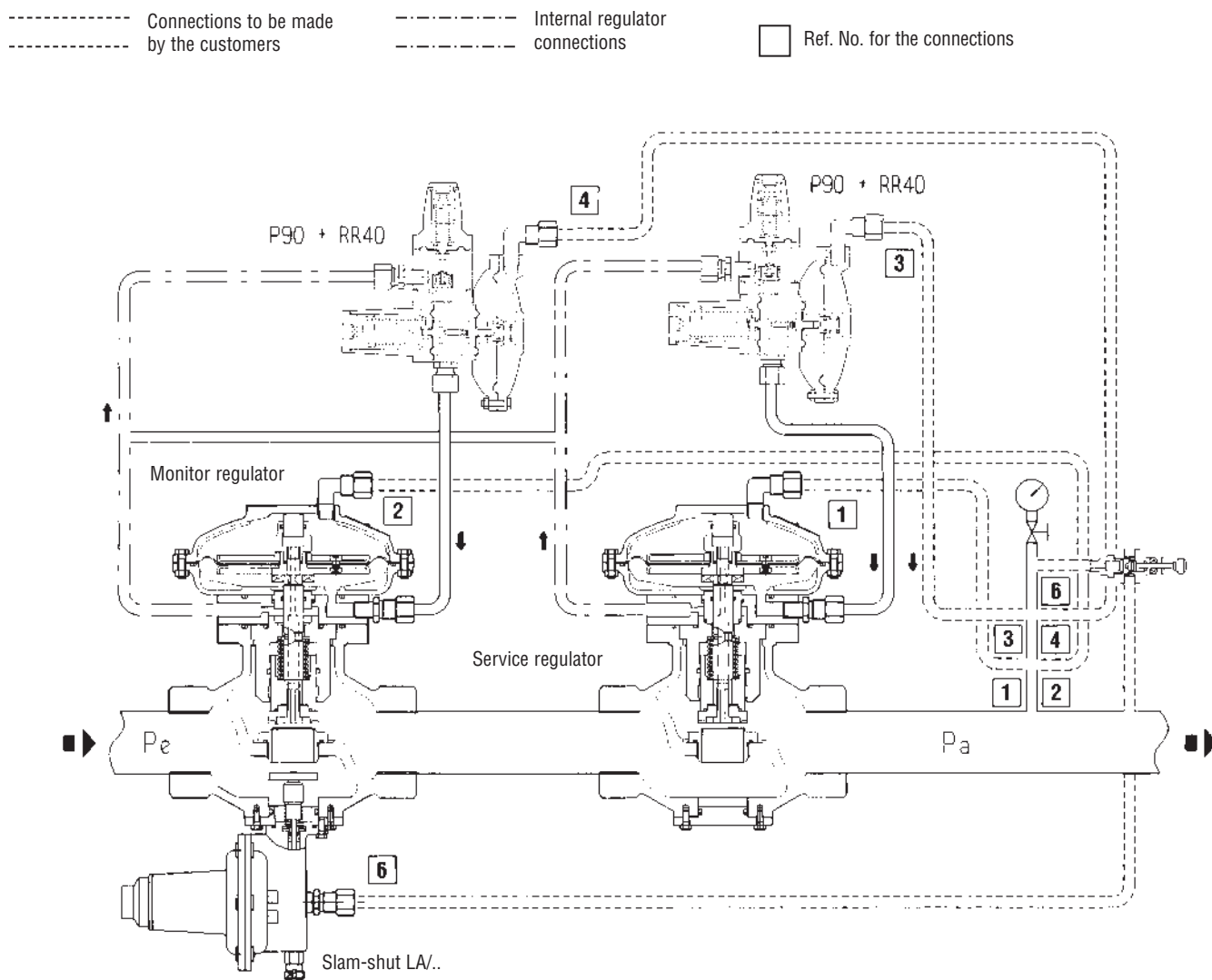


Fig. 10

5.0 START UP

5.1 GENERAL

After installation, check that the inlet/outlet on-off valves, any by-pass, and the bleed cock are closed. Before starting up, checking is recommended to ascertain that the conditions of use are in conformity with the specifications of the equipment. These specifications are recalled with symbols on the plate fitted on every component (fig. 11).

APPARATUS SPECIFICATIONS PLATES

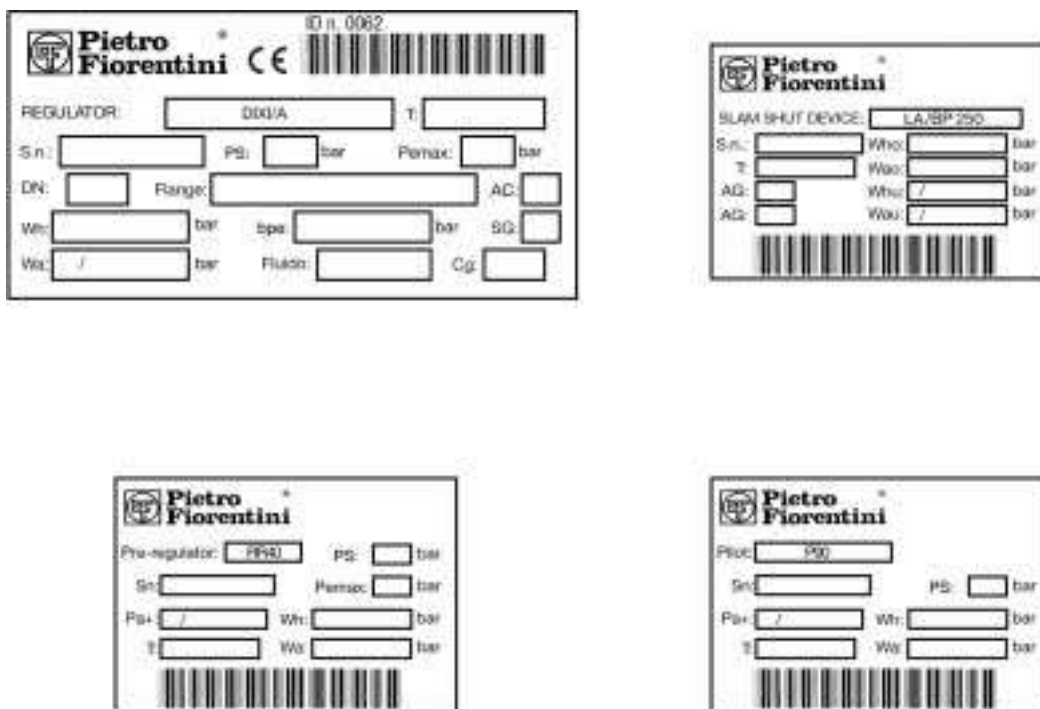


Fig. 11

The list of symbols used and their meanings are listed below:

CE = According to Directive PED

P_{max} = maximum inlet operating pressure of the apparatus

b_{pe} = range of variability of the inlet pressure of the pressure regulator in normal operating conditions

PS = maximum pressure which can be supported by the structure of the body of the apparatus in safety conditions

W_a = range of setting of the pressure regulator/pilot/pre-regulator which can be obtained using the parts and the setting spring fitted at the moment of testing (without changing any components of the apparatus, that is). In piloted regulators, the pilot is considered as a separate apparatus with its own setting range **W_a**

W_h = range of setting of the pressure regulator/pilot/pre-regulator which can be obtained using the setting springs indicated in the associated tables and also by changing some other part of the apparatus (reinforced gasket, diaphragms etc.). In piloted regulators, the pilot is considered as a separate apparatus with its own setting range **W_h**

Q_{maxP_{emin}} = maximum flow rate with minimum pressure at the pressure regulator inlet

Q_{maxP_{max}} = maximum flow rate with maximum pressure at the pressure regulator inlet

C_g = experimental coefficient of critical flow

AC = regulation class

SG = closing pressure class

AG = intervention accuracy

W_{ao} = range of intervention for the over pressure of slam-shut, relief and safety valves and accelerators which can be obtained using the setting spring fitted at the moment of testing. In the piloted safety valves, the pilot is considered as a separate apparatus with its own setting range **W_{ao}**

W_{ho} = range of intervention for the over pressure of slam-shut, relief and safety valves and accelerators which can be obtained using the setting springs indicated in the tables. In piloted safety valves, the pilot is considered as a separate apparatus with its own setting range **W_{ho}**

W_{au} = range of intervention for pressure decrease of slam-shut pressure which can be obtained using the setting spring fitted at the moment of testing

W_{hu} = range of intervention for pressure decrease of slam-shut pressure which can be obtained using the setting springs indicated in the tables.

5.2 GAS INPUT, CONTROL OF EXTERNAL TIGHTNESS AND SETTING

The apparatus pressurization operation must be carried out very slowly. To protect the apparatus from damage, the following operations **must never be carried out**:

- **Pressurization through a valve located downstream from the apparatus itself.**

- **Depressurization through a valve located upstream from the apparatus itself.**

External tightness is guaranteed if no bubbles form when a foam medium is applied on the element under pressure. The regulator and any other apparatuses (slam-shut, monitor) are normally supplied already set for the desired set-point. It is possible for various reasons (e.g., vibration during transport) for the settings to be changed while remaining within the values permitted by the springs used.

We therefore recommend checking the settings using the procedures illustrated below.

Tables 7 and 8 give the recommended set-points for the apparatuses in the various installation arrangements. The figures in these tables can be useful both when checking existing set-points and for modifying them should this become necessary later.

In installations consisting of two lines, we suggest commissioning one line at a time, starting from the one with the lower set-point, known as the "reserve" line. **The set-points of the apparatuses in this line will obviously deviate from those specified in the tables 7 and 8.**

Before commissioning the regulator you must check that all the on/off valves (inlet, outlet, any by-pass) are closed and that the gas is at a temperature which will not lead to malfunction.

5.3 COMMISSIONING THE REGULATOR (FIG.12)

If there is also a relief valve in the line, refer to par. 3.1 to check it.

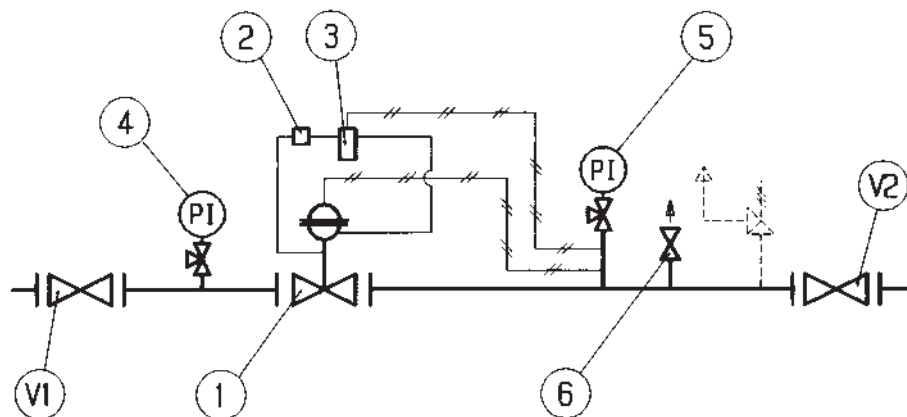


Fig. 12

Proceed as follows:

- 1) Open the vent cock 6.
- 2) Open the inlet on-off valve V1 very slowly.
- 3) On the pressure gauge of the pre-regulator 2, check that its setting falls within the recommended range of settings: $P_{ep} = P_a + (0.15 \div 0.2)$ bar.
- 4) By means of the pressure gauge 5, check that the pressure does not exceed the maximum value permitted by the setting spring fitted in the pilot 3. If necessary suspend the operation, closing V1 and completely reducing the load of the spring by turning the ring 11 (fig. 2) anticlockwise. Then slowly open the valve V1.
- 5) If necessary, adjust the setting by turning the ring 11 as required.
- 6) Close the bleed cock and check that the downstream pressure, after a phase of increase, stabilizes, and at a value slightly higher to the closing set point of the pilot/regulator combination. If it doesn't, eliminate the causes of the internal leakage.
- 7) Using a foam substance, check the tightness of all the joints between the on-off valves V1 and V2.
- 8) Very slowly open the down-line on-off valve V2 to obtain the complete filling of the pipe. If, at the beginning of this operation, the pressure in the pipe is much lower than the set point, the opening of the valve should be choked so as not to go beyond the maximum flow value of the installation.
- 9) If pumping phenomena arise in the normal working conditions it is advisable to reduce the setting of the pre-regulator RR40 by turning the ring 10 anticlockwise (fig. 2), without however dropping below the minimum recommended value. If, on the other hand, there is an excessive drop in the regulated pressure as the flow rate increases, increase the pre-regulator setting by turning the ring 10 clockwise.

5.4 COMMISSIONING THE REGULATOR WITH INCORPORATED SB/82 SLAM-SHUT (FIG. 23)

If there is also a relief valve in the line, refer to par. 3.1 to check it.

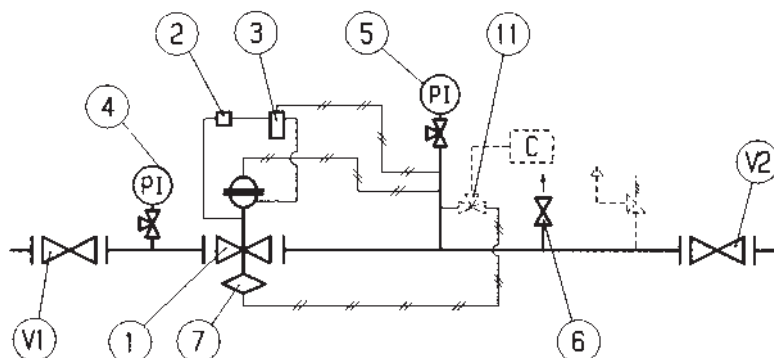
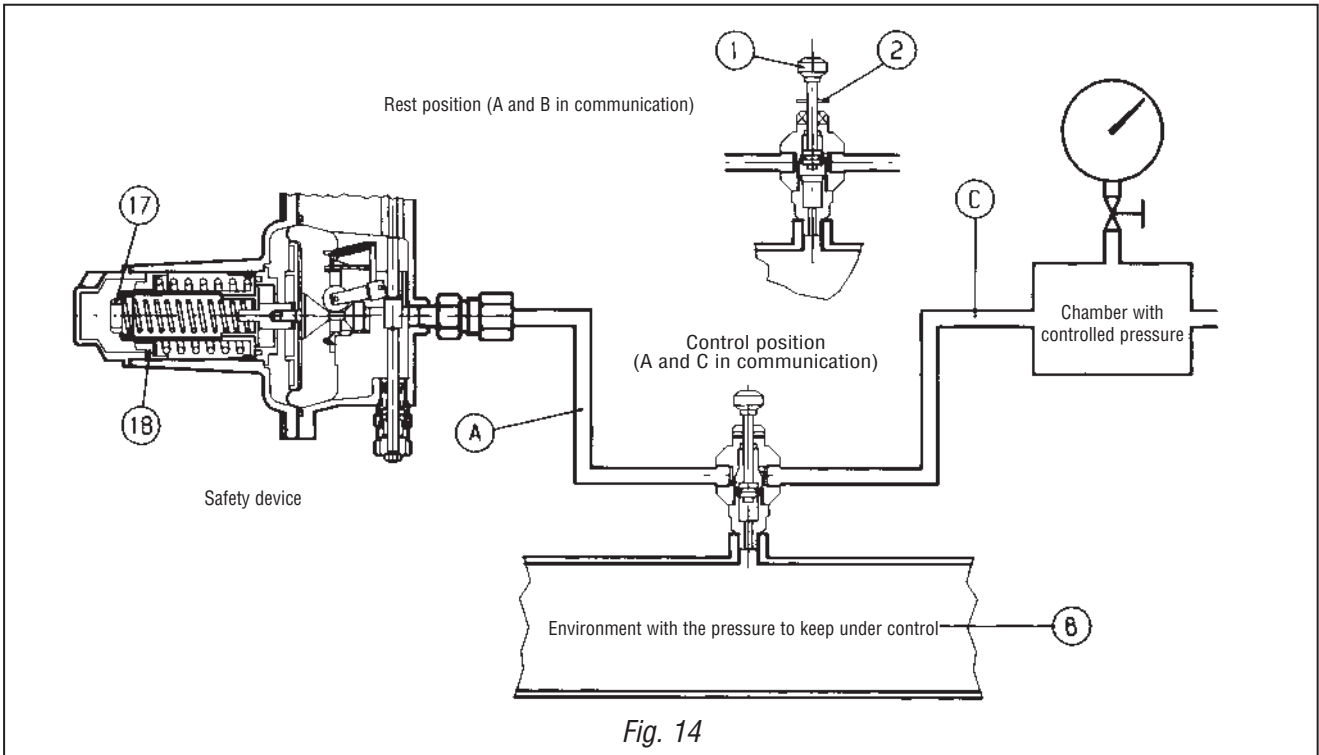


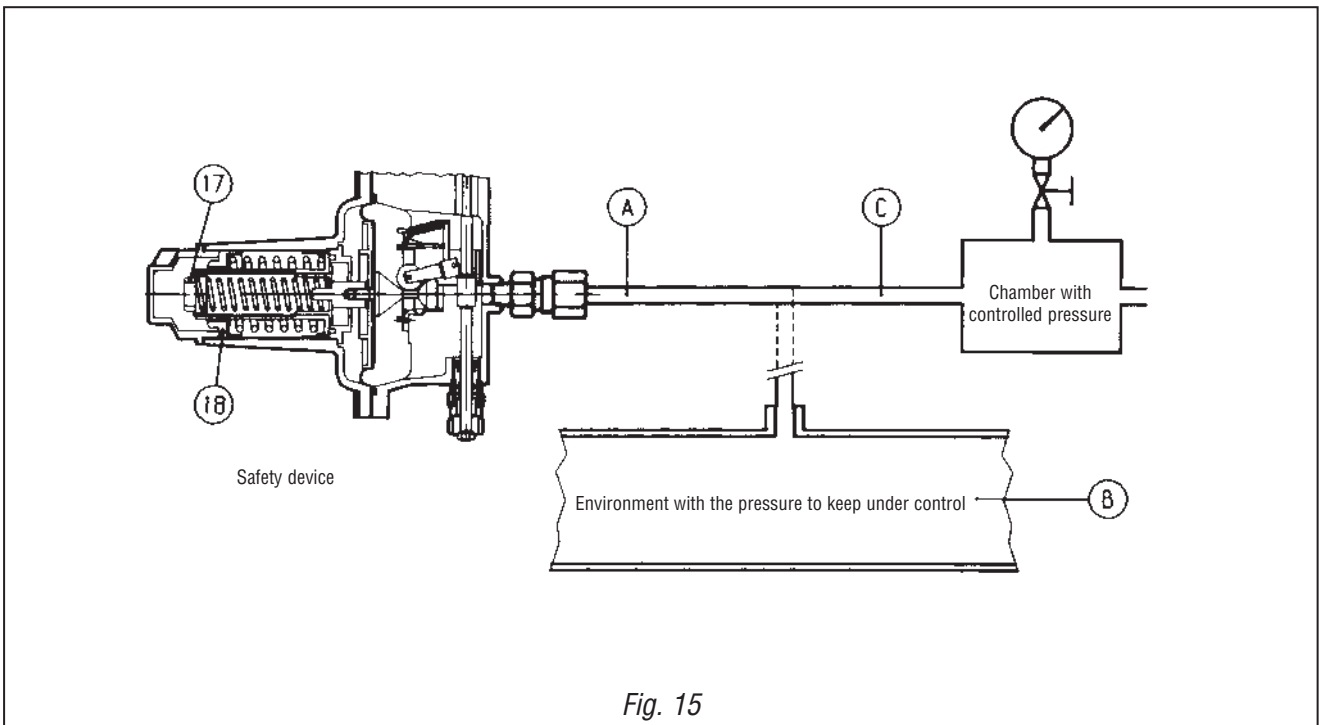
Fig. 13

Check and adjust the intervention of the slam-shut 7 as follows:

- A) For slam-shuts connected to the downstream piping by a three-way deviator push valve 11, proceed as follows (fig. 14):
- connect a controlled auxiliary pressure to C;
 - stabilise this pressure at the set-point established for the regulator;
 - insert the reference pin 2 in the notch, pressing the knob 1 completely;
 - reset the slam-shut device by means of the provided bushing;
 - keep the knob 1 pressed:
 - for safety devices which intervention for maximum pressure: slowly increase the auxiliary pressure and check the intervention value. If necessary, increase the intervention value by turning the adjustment ring 18 clockwise, or anticlockwise to reduce the intervention value.
 - for safety devices for pressure increase and reduction: slowly increase the auxiliary pressure and record the intervention value. Restore the pressure to the set-point established for the regulator, and carry out the slam-shut reset operation. Check intervention for pressure reduction by slowly reducing the auxiliary pressure.
 - If necessary increase the intervention values for pressure increase or decrease by respectively turning the rings 18 or 17 clockwise and vice-versa to reduce the intervention values.
 - check proper operation by repeating the operations at least 2-3 times.



B) On devices without the "push" valve (fig. 15) we recommend separately connecting the control head to a controlled auxiliary pressure and repeat the operations described above.



ATTENTION

At the end of the operation, reconnect the control head to the downstream pressure take-off.

N.B.: The intervention tests should be repeated at least every 6 months.

At the end of the slam-shut check, proceed as follows:

- 1) Check that the slam-shut is in the closed position.
- 2) Very slowly open the inlet on/off valve V1.
- 3) Very slowly open the slam-shut by pulling the associated threaded bushing.
- 4) Open the downstream bleed cock 6.
- 5) Check on the pressure gauge of the pre-regulator 2 that its pressure set-point is within the recommended range of values $P_{ep}=P_a+(0.15 \div 0.2)$ bar.
- 6) Check on the pressure gauge 5 that the pressure does not exceed the maximum value permitted by the setting spring fitted in the pilot 3. If necessary, suspend the operation by closing V1 and completely reducing the load on the spring by turning the ring 11 anticlockwise. Then slowly reopen the valve V1.
- 7) If necessary, adjust the setting appropriately turning the ring nut.
- 8) Close the bleed cock 6 and check that the downstream pressure, after a period of increase, stabilizes and at a value slightly higher than that of closure of the pilot/regulator assembly. Otherwise eliminate the causes of the internal leakage.
- 9) Using a foam substance, check the tightness of all the joints between the on-off valves V1 and V2.
- 10) Very slowly open the downstream on-off valve V2 to obtain the complete filling of the pipe. If at the beginning of this operation the pressure in the pipe is much lower than the set point, the opening of this valve should be choked so as not to go beyond the maximum flow value for the installation.
- 11) If pumping occurs in normal working conditions, you are advised to reduce the setting of the pre-regulator RR40 by turning the ring 10 anticlockwise without, however, dropping below the minimum recommended value. If, on the other hand, there is an excessive reduction in the regulated pressure with the increase of the flow rate, you should increase the setting of the pre-regulator by turning the ring clockwise.
- 12) It is recommended check that when you operate the slam-shut manually, the flow in the line stops.

Tab. 7:	Setting the apparatuses in a plant consisting of regulator Dixi + Slam-shut + Relief valve		
Regulator set-point (Pas) mbar	Set-point RELIEF VALVE	Set-point SLAM-SHUT Max	Set-point SLAM-SHUT Min
6<Pas≤12	20 mbar	25 mbar	Slam-shut not available
12<Pas≤15			
15<Pas≤19	Pas x 1.6		10 mbar
19<Pas≤24		Pas + 20 mbar	Pas -10 mbar
24<Pas≤30	Pas x 1.4		
30<Pas≤60		Pas + 35 mbar	Pas -20 mbar
60<Pas≤80			
80<Pas≤140		Pas + 50 mbar	Pas -40 mbar
140<Pas≤200	Pas x 1.25	Pas + 70 mbar	Pas x 0.6
200<Pas≤500			Pas x 0.625
500<Pas≤800		Pas x 1.46	Pas x 0.65
800<Pas≤1000			
1000<Pas≤2500	Pas x 1.15	Pas x 1.5	Pas x 0.7
2500<Pas≤5000		Pas x 1.2	
5000<Pas≤6000	Pas x 1.1	6800 mbar	

5.5 COMMISSIONING THE REGULATOR PLUS DIXI IN-LINE MONITOR WITH INCORPORATED SLAM-SHUT VALVE (FIG. 16)

If there is also a relief valve in the line, refer to par. 3.1 to check it.

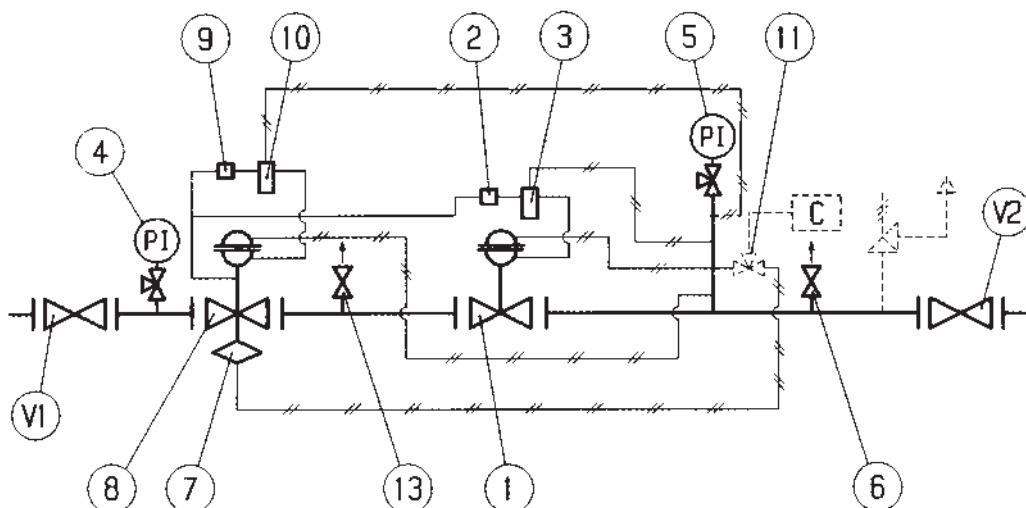


Fig. 16

Check and adjust the intervention of the slam-shut 7 as follows:

A) For slam-shuts connected to the downstream piping by a three-way deviator push valve 11, proceed as follows (fig. 14):

- connect a controlled auxiliary pressure to C;
- stabilise this pressure at the set-point established for the regulator;
- insert a reference pin 2 in the notch, pressing the knob 1 completely;
- reset the slam-shut device by means of the provided threaded busching;
- keep the knob 1 pressed and:
 - for safety devices which intervene for maximum pressure: slowly increase the auxiliary pressure and check the intervention value. If necessary, increase the intervention value by turning the adjustment ring 18 clockwise, or anticlockwise to reduce the intervention value.
 - for safety devices which intervene for pressure increase and reduction: slowly increase the auxiliary pressure and record the intervention value. Restore the pressure to the set-point established for the regulator, and carry out the slam-shut reset operation.
- Check intervention for pressure reduction by slowly reducing the auxiliary pressure.
- If necessary increase the intervention values for pressure increase or decrease by respectively turning the rings 18 or 17 clockwise and vice-versa to reduce the intervention values.
- check proper operation by repeating the operations at least 2-3 times.

B) On devices without the "push" valve (fig. 15) we recommend connecting the control head separately to a controlled auxiliary pressure and repeat the operations described above.

ATTENTION

At the end of the operation, reconnect the control head to the downstream pressure take-off.

N.B.: The intervention tests should be repeated at least every 6 months.

At the end of the slam-shut check, proceed as follows:

- 1) Partially open the vent cock 6.
- 2) Very slowly open the inlet on-off valve V1.
- 3) Very slowly reset the slam-shut by pulling the associated threaded bushing. With safety devices for maximum pressure only, the slam-shut will remain spontaneously in the open position at the end of the operation. With safety devices for both pressure increase and decrease, keep the bushing pulled and raise the outlet pressure up to the desired regulator setting. At this point the bushing can be released and the slam-shut will remain in the open position.
- 4) Check on the pressure gauges of the pre-regulators 2 and 9 that their settings are within the recommended range $P_{ep} = P_a + (0.15 \div 0.2)$ bar.
- 5) Completely increase the setting of pilot 3 by turning the ring 11 clockwise without exceeding the setting of the slam-shut and, if necessary, reduce the setting of the pilot 10 of the monitor. Ensure that the monitor 7 goes to the working position and that the regulator 1 reaches the maximum opening by checking the position of the stroke indicators through the ports (fig. 17).
- 6) Check that the setting of the pilot 10 corresponds to the setting of the monitor and, if necessary, adjust it to the desired value.
- 7) Reduce the setting of the pilot 3 to the selected working value for the service regulator.
- 8) Check that the maonitor goes to the fully open position and that the regulator goes to the working position by controlling the position of the stroke indicators through the ports (fig. 17).
- 9) Close the vent cock 6 and check that, after increasing for a period, downstream pressure stabilizes at a value slightly higher than or equal to the closing pressure of the pilot/monitor assembly. If it does not, eliminate the causes of the internal leakage.
- 10) Using foam, check the tightness of all the junctions between the on-off valves V1 and V2.
- 11) Very slowly open the downstream on-off valve V2 until the pipeline is completely filled. If, at the beginning of this operation, the pressure in the pipeline is much lower than the set point, the opening of the valve should be partialized so as not to exceed the maximum flow rate of the plant.
- 12) If pumping phenomena arise in the normal working conditions it is advisable to reduce the setting of the pre-regulator RR40 by turning the ring 10 anticlockwise (fig. 2), without however dropping below the minimum recommended value. If, on the other hand, there is an excessive drop in the regulated pressure as the flow rate increases, increase the pre-regulator setting by turning the ring 10 clockwise.
- 13) It is recommended check that when you operate the slam-shut manually, the flow in the line stops.

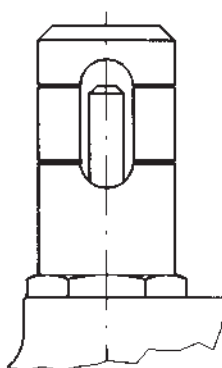


Fig. 17

Tab. 8:	Settingapparatuses in a plant consisting of regulator Dixi + Monitor + Slam-shut + Relief valve			
Set-point Regulator	Set-point MONITOR	Set-point RELIEF-VALVE	Set-point SLAM-SHUT Max	Set-point SLAM-SHUT Min
6<Pas≤12	↑	28 mbar	30 mbar	Slam-shut not available
12<Pas≤15		Pas x 1.6	Pas + 20 mbar	10 mbar
15<Pas≤19		Pas x 1.55	Pas + 35 mbar	Pas - 10 mbar
19<Pas≤24	Pas + 5 mbar	Pas x 1.4	Pas + 50 mbar	Pas - 20 mbar
24<Pas≤30	↓	Pas x 1.3	Pas x 1.41	Pas - 40 mbar
30<Pas≤60		Pas x 1.45	Pas x 1.4	Pas x 0.6
60<Pas≤80		Pas x 1.3	Pas x 1.4	Pas x 0.625
80<Pas≤110	Pas x 1.15	↓	Pas x 1.4	Pas x 0.65
110<Pas≤200	Pas x 1.12		Pas x 1.3	Pas x 0.7
200<Pas≤400	Pas x 1.12		Pas x 1.25	
400<Pas≤800	Pas x 1.12	Pas x 1.15	Pas x 1.3	
800<Pas≤1000	Pas x 1.05	Pas x 1.15	Pas x 1.25	
1000<Pas≤2500	Pas x 1.05	Pas x 1.15	Pas x 1.25	
2500<Pas≤5000	Pas x 1.05	Pas x 1.15	Pas x 1.25	
5000<Pas≤6000	↓	↓	↓	↓

6.0 TROUBLE-SHOOTING

The problems of various kinds which could arise over time are highlighted below.

They derive from phenomena associated with the conditions of the gas as well, of course, as with the natural ageing and wear of the materials.

It must be remembered that all operations on the apparatuses must be carried out by highly qualified personnel with appropriate knowledge of the subject. Tampering with the apparatuses by unsuitable personnel relieves us from all responsibility of any kind.

You must therefore train your maintenance personnel or avail yourself of the service centres officially authorised by us.

6.1 Tab. 9 DIXI REGULATOR (FIG. 18 e 21)

PROBLEM	POSSIBLE CAUSES	APPARATUS	REMEDY
Tightness failure a Q= 0	Valve seat 2 damaged	REGULATOR (Fig. 18)	Replace
	Obturator 3 damaged		Replace
	O-ring 63 damaged		Replace
	O-ring 65 damaged		Replace
	O-ring 66 damaged		Replace
	O-ring 67 damaged		Replace
	O-ring 70 damaged		Replace
	O-ring 71 damaged		Replace
	O-ring 74 damaged		Replace
	Dirt or foreign bodies in the sealing zone		Clean
	Obturator 17 damaged	Replace	
	Valve seat 31 damaged	PILOT P9..(Fig. 21)	Replace
Slow closing	Anomalous friction of the rod/obturator assembly	REGULATOR (Fig. 18)	Clean and, if necessary replace sealing and/or guide elements
Pumping	Setting too high	PRE-REGULATOR RR40 (Fig. 21)	Reduce setting
Pa reduc. with incr. in Q	Setting too low	PRE-REGULATOR RR40 (Fig. 22)	Increase setting
Pa increase with Q>0	Diaphragm 12 breakage	PILOT P9.. (Fig. 21)	Replace

6.2 Tab. 10 LA/... SLAM-SHUT (FIG. 20)

PROBLEM	POSSIBLE CAUSES	REMEDY
Slam-shut obturator does not close	Control diaphragm [28] ruptured	Change the diaphragm
Leakage from slam-shut obtured	Obturator gasket [3] deteriorated	Change the diaphragm
	O. R. [74] worn	Change
	Obturator seat [2] eroded or pitted	Change the seat
Incorrect intervention pressure	Wrong setting of maximum and/or minimum spring	Make the setting again using the rings [12] and/or [13]
	Friction in lever system	Change the box containing the whole assembly
Lever system broken or chipped	Persistence of the cause which led to press increase or decrease downstream	Decrease or downstream pressure
	Lever system broken or chipped	Change the standard box containing the assembly outside the regulator

N.B. If the slam-shut has intervened, close the inlet and outlet valve (**V1** and **V2**) on the line and discharge the pressure before carrying out any operation.
Eliminate the causes which gave rise to intervention before reactivating it.

In the event of operating problems when personnel qualified for a specific operation are not available, call the service centre nearest you. For further information contact our SATRI service at our Arcugnano (Vicenza) works.

7.0 MAINTENANCE

7.1 GENERAL


Periodical inspection and maintenance shall be carried out according to the regulations in force (kind and frequencies). Before carrying out any operation it is important to ascertain that the regulator has been cut off both upstream the regulator and the on/off valves.

The maintenance operations are closely associated with the quality of the gas transported (impurities, humidity, gasoline, corrosive substances) and with the efficiency of the filtering.

Preventive maintenance should be carried out at intervals which, if not established by regulations in force, depend on:

- the quality of the gas transported;
- the cleanliness and conservation of the piping upstream from the regulator: in general, for example, when starting the equipment for the first time, more frequent maintenance is required because of the precarious state of cleanliness inside the piping;
- the level of reliability required from the regulation system.

Before starting the disassembly operations on the apparatus you should check that:

- a set of recommended spares is available. The spares must be original **Fiorentini**  ones, bearing in mind that the more important ones such as diaphragms are marked
- A set of wrenches is available as specified in table 11.

For a proper maintenance the recommended spare parts are unequivocally identified by labels indicating:

- The No of assembly drawing SR of the apparatus for which the spare parts are suitable,
- The position showed in the assembly drawing SR of the apparatus

N.B. The use of non-original spare parts relieves us of all responsibilities.

In the maintenance is carried out by your own authorized personnel, we recommend putting reference markings, before the disassembly, on those parts which could have directional or reciprocal positioning problems when reassembling. Finally, we would remind you that O-Rings and sliding mechanical components (rods, etc.) must be lubricated, before the re-assembly, with a fine **layer** of silicone grease. Before recommissioning of equipment after maintenance, external tightness shall be verified at a proper to assure no external leakage. When equipment is used as safety accessory to PED, internal sealing at the maximum expected operating pressure. Both verifications are essential to assure safe use at foreseen operating conditions; they have, anyhow, to comply with the national regulations in force.

7.2 Procedure for disassembling, completely changing the spare parts, and reassembling of DIXI pressure regulator with P90 + RR40 pilot (PREVENTATIVE PROGRAMMED MAINTENANCE)

PRELIMINARY OPERATIONS

- A. Put the regulator into conditions of safety;
- B. Ensure that the upstream and downstream pressures are 0.

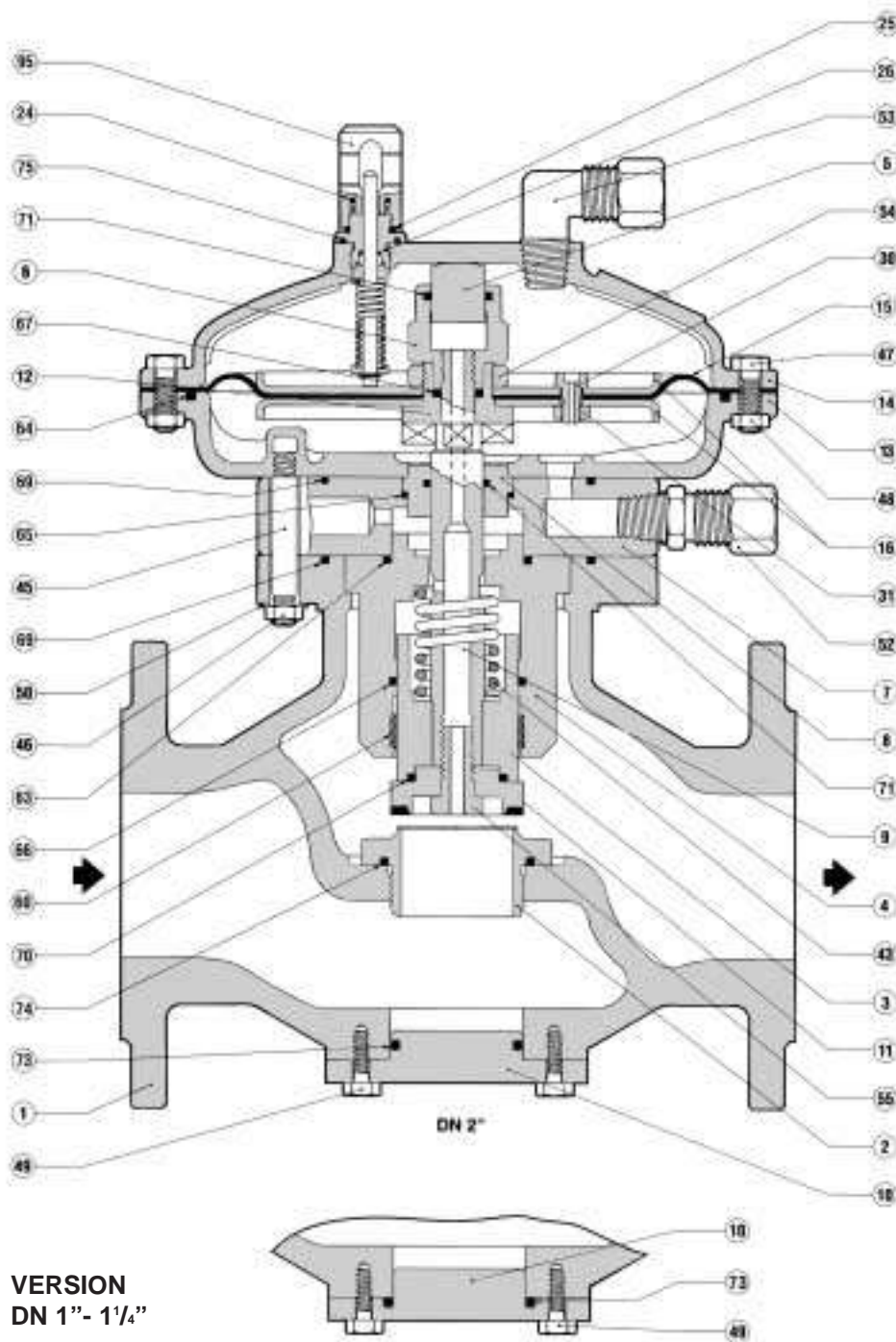


Fig. 18

INITIAL OPERATIONS

- 1) Disconnect all the feed and sensing line connectors from the pilot and regulator by unscrewing the taper seal fittings.
- 2) Slacken the fixing nut of the bracket supporting the pilot on the regulator.
- 3) Remove the P90+RR40 pilot assembly from the regulator.

DISASSEMBLY

- 4) Disconnect the connections between the pilot and the regulator and those of the down-line pressure take-off.
- 5) Separate the pilot pre-regulator assy. from the regulator by slackening the fitting (68) (fig. 21).
- 6) Disassemble the stroke indicator (95) by unscrewing the rod guide (20) (fig. 19). Then remove the screws (47) and raise the cover (14).
- 7) Slacken the piston guide (6) from the rod (9), exploiting the faces of the nut (54).
- 8) Raise the diaphragm-protective disc assy. to separate the various parts, unscrew the nut (31) from the nozzle (30) and the nut (54) from the support (12).
- 9) Remove the nuts (46) and raise the cover (13) with the screw studs (45).
- 10) Raise the intermediate flange (7) with the rod guide (8).
- 11) Remove the assembly made up of the rod (9), the obturator guide (4) and the parts 3, 11, 43 and 55.
- 12) Slacken the screw (55) using the flat faces on rod (9) and then remove the obturator (11), and the obturator support (3).
- 13) Unscrew the valve seat (2), taking a lot of care not to damage the sealing edges.
- 14) Remove the screws (49) and the blank flange (10).

To reassemble the regulator carry out the disassembly operations in the inverse order. Before reinstalling the sealing components (O-rings, diaphragms, etc.) it is necessary to control their integrity and replace them if necessary.

Important: the maximum care must be taken when handling the valve seat 2 so as not to damage its sealing profiles.

STROKE INDICATOR (FIG. 19)

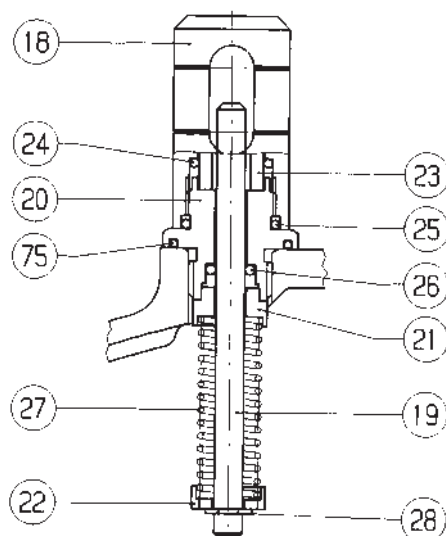
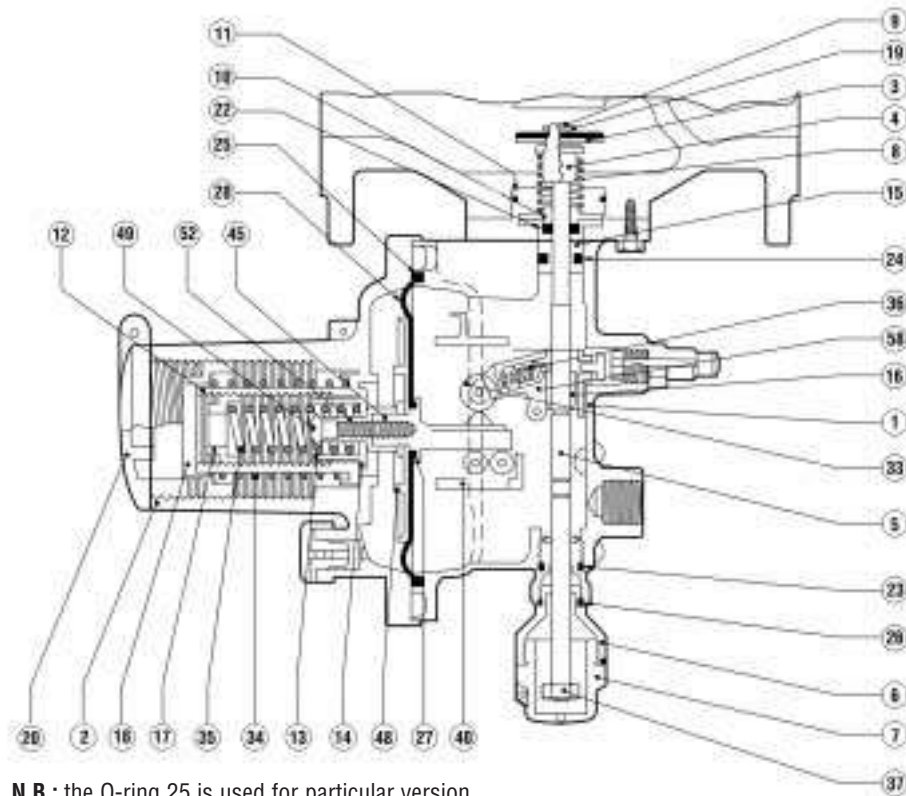


Fig. 19

- 1) Remove the indicator (19) with the spring (27) and the supports (21) and (22) from the rod guide (20).
- 2) Unscrew the rod guide from the plug (18) and remove the protective glass (23).

LA/.. SLAM-SHUT (FIG. 20)



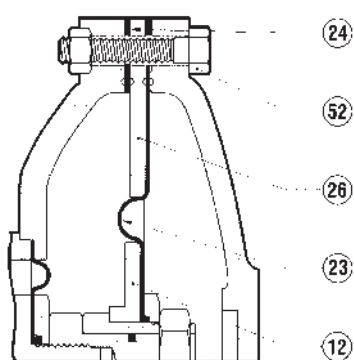
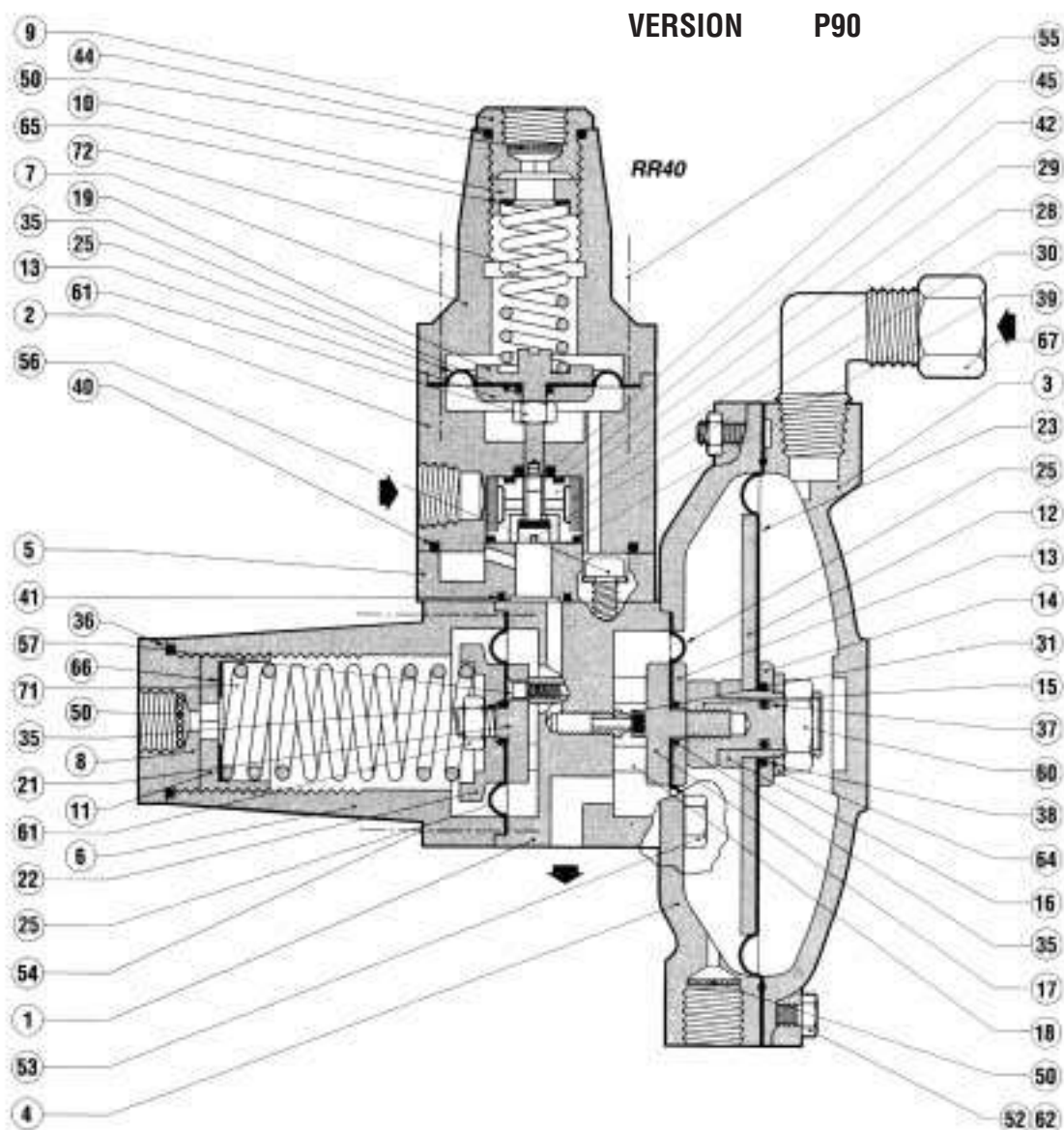
N.B.: the O-ring 25 is used for particular version

Fig. 20

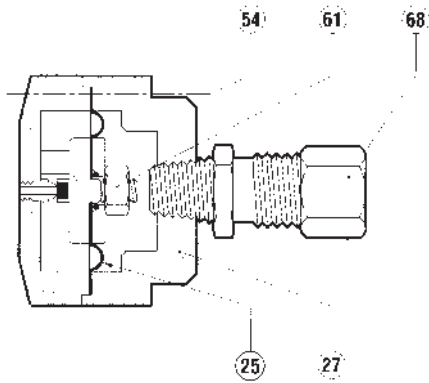
- 1) Ensure that the slam-shut is in the closed position.
- 2) Disconnect the connection pipe from the fitting (47).
- 3) Remove the screws which secure the slam-shut device to the body.
- 4) Completely unscrew the plug (20) and the adjusting rings (17) and (18), and then remove the setting springs and (34) and (35) the spring supports (12) and (13).
- 5) Remove the screws (41) and disassemble the cover (2) with the ring (14).
- 6) Remove the diaphragm assembly composed of parts 45, 28, 48 and 49 from the body (1); to separate them, unscrew the pin (45) from the fixing nut (49).
- 7) Remove the nut (37) and completely unscrew the ring (6) and the threaded bushing (7).
- 8) From the top, remove the shaft assy. composed of the parts 9, 66, 19, 4 and 8, the bushings (22) and (23) and the shaft (5). Then, from the shaft (5), unscrew the obturator support (4) and remove the retaining ring washer (9) to disassemble the obturator (19).
- 9) Remove the screws (40) and disassemble the anchoring assy. composed of the parts 29, 30, 33, 36, 38, 39 and 43.
- 10) Remove the screws (53) and disassemble the flange (51).
- 11) Finally, to disassemble the button actuation assy., unscrew the nut (61) and then unscrew part (58) from the pin (62).

To reassemble the slam-shut it is possible to carry out the disassembly operations in the inverse order. Before reassembling the sealing elements (O-rings, diaphragms, etc.), check their integrity and replace them if necessary.

PILOT P...+ PRE-REGULATOR RR40 (FIG. 21)



VERSION P92



VERSION P94

Fig. 21

DISASSEMBLING THE P90 PILOT

- 1) Remove the pilot plug, pos. (8).
- 2) Slacken the adjustment ring, pos. (11), by turning it anticlockwise until it comes off the sleeve, pos. (6).
- 3) Remove the clutch plate, pos. (6), and the spring, pos. (66), from the sleeve, pos. (71).
- 4) Slacken the screws, pos. (54), and remove the sleeve, pos. (6), and the pilot bracket, from the pilot body, pos. (1).
- 5) Unscrew the lock nut, pos. (61), and remove the protection disc, pos. (21), the O-ring, pos. (22), and the bottom diaphragm, pos. (35) from the diaphragm support, pos. (25).
- 6) Slacken the screws, pos. (52), and remove the pilot cover, pos. (3).
- 7) Remove the diaphragm assembly from the support cover, pos. (4).
- 8) Disassemble the sensing diaphragm.
- 9) Unscrew the top diaphragm support, pos. (15), and remove it along with the disc, pos. (13), the O-ring, pos. (35), and the top diaphragm, pos. (25).
- 10) Slacken the screws, pos. (57), and remove the pilot obturator, pos. (17), from the mobile assembly.
- 11) Clean and carefully check the state of the valve seat, pos. (31).
- 12) **Replace all the parts from the spare parts kit.**

REASSEMBLING THE P90 PILOT

- 13) Screw in the screws, pos. (57), and fix the pilot obturator, pos. (17), to the mobile assembly.
- 14) Reassemble the top diaphragm, pos. (25), the O-ring, pos. (35), and the disc, pos. (13), and fix the diaphragm support, pos. (15).
- 15) Reassemble the diaphragm support and fit it back on the support cover, pos. (4).
- 16) Reassemble the pilot cover, pos. (3), and fix the screws, pos. (52).
- 17) Reassemble the bottom diaphragm, pos. (25), the O-ring, pos. (35), and the protection disc, pos. (22), on the diaphragm support, pos. (21), and fix the whole assembly by means of the lock nut, pos. (61).
- 18) Reassemble the sleeve, pos. (6), and the bracket, on the pilot body, pos. (1), and fix the screws, pos. (54).

DIASSEMBLY OF THE RR40 PRE-REGULATOR

- 1) Remove the pre-regulator plug, pos. (9). Turn the regulation ring, pos. (10) anticlockwise until it comes off the sleeve, pos. (7).
- 2) Remove the clutch disc, pos. (65), and the spring, pos. (72), from the sleeve.
- 3) Slacken the screws, pos. (55), and remove the sleeve, pos. (7), the pre-regulator body, pos. (2), the filter, pos. (28) and the valve seat pos. (29).
- 4) Slacken the screws, pos. (56), and remove the intermediate flange, pos. (5).
- 5) Slacken the obturator, pos. (30).
- 6) Disassemble the diaphragm assembly by operating on the diaphragm support and on the nut of the shaft.
- 7) Clean and carefully check the state of the valve seat, pos. (29).
- 8) **Replace all the parts from the spare parts kit.**

REASSEMBLING THE RR40 PRE-REGULATOR

- 9) Reassemble the diaphragm assembly.
- 10) Refit the diaphragm assembly and the valve seat, pos. (29), on the pre-regulator body, pos. (29), and fix the obturator, pos. (30).
- 11) Reassemble the intermediate flange, pos. (56), and fix the screws, pos. (5).
- 12) Reassemble the bushing, pos. (28), the pre-regulator body, pos. (2), the sleeve, pos. (7), and the screws, pos. (55).

8.0 FINAL OPERATIONS

- 1) Refit the P90 + RR40 pilot assembly onto the regulator.
- 2) Fix the pilot the regulator screwing the fitting (68).
- 3) Reconnect all the feed and sensing line connectors on the pilot and regulator, screwing in the taper seal fittings.






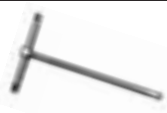







8.1 TIGHTNESS AND SETTINGS CONTROL

- 1) Very slowly open the on/off valve upstream from the regulator and using a foaming agent or the like, check:
 - the tightness of the outside surfaces of the regulator and of the pilot;
 - the tightness of the inside surfaces of the regulator and of the pilot;
 - the tightness of the connection fittings.
- 2) Open a bleed cock downstream from the regulator to create a small gas flow.
- 3) Reassemble the spring, pos. (65), and the clutch disc, pos. (7) onto the sleeve of the pre-regulator, pos. (72).
- 4) Turn the adjustment ring, pos. (10), clockwise until you reach the recommended set-point of the pre-regulator, $P_{ep} = P_a + (0.15 \div 0.2)$ bar, and check it on the pressure gauge, pos. (73).
- 5) Reassemble the spring, pos. (66), and the clutch disc, pos. (71), onto the pilot, pos. (6).
- 6) Turn the adjustment ring, pos. (11), clockwise until you reach the desired set-point.
- 7) Close the bleed cock to the atmosphere.

8.2 START UP

- 1) Very slowly open the downstream on/off valve and, if necessary, adjust the regulator setting by means of the adjustment ring on the pilot. Obtain the correct pressure pattern by adjusting the adjustment ring on the pre-regulator.
- 2) Reassemble the pilot plug, pos. (8), and the pre-regulator plug, pos. (9).

Tab. 11 MAINTENANCE WRENCHES FOR DIXI WITH PILOT P90 + RR40

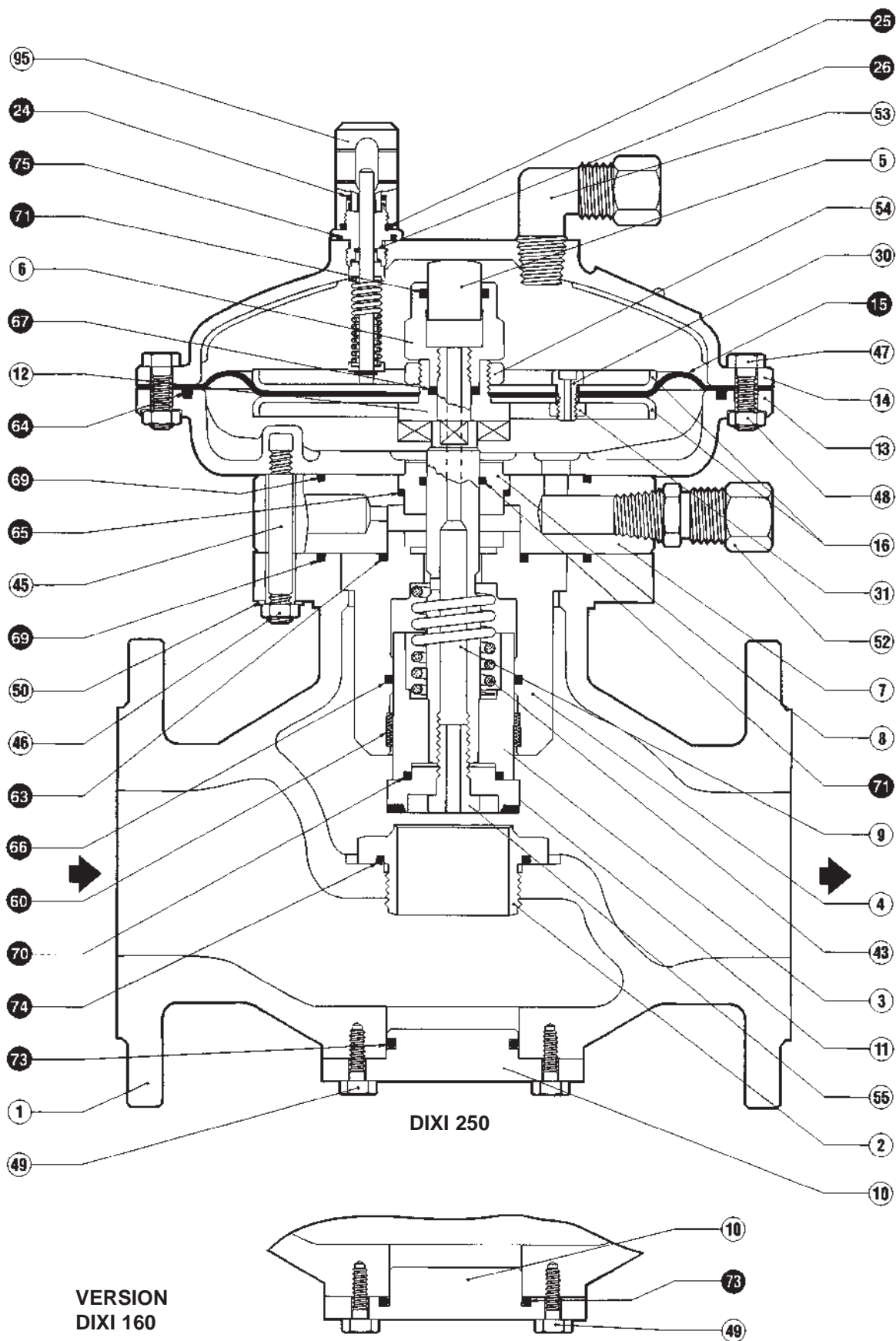
 (A) Combination spanner	 (B) Adjustable spanner	 (C) Compass pin wrench
 (D) Box spanner	 (E) Hexagon or allen key	 (F) Hexagonal T key
 (G) Hexagonal socket T wrench	 (H) Phillips screwdriver	 (I) Flat head screwdriver
 (L) O-Ring extraction tool	 (M) Circlip pliers	 (N) Fiorentini special socket
 (O) Fiorentini special tool		

Type	DN	1"	1" 1/4	1" 1/2	2"	
DIXI	A	Ch. 8-10-13-17 19-21-27 30	8-10-13-17 19-21-27 30	8-10-13-17 19-21 27-30	8-10-13-17 19-21 27-30	
	B	L.	300			
	D	Ch.	6-13-40	6-13-40	6-13-40	6-13-50
	E	Ch.	8	8	8	8
	F	Ch.	2-4-5	2-4-5	2-4-5	2-4-5
	I	L.	65x100	65x100	65x100	65x100
	L	Cod.	7999099			

Type	DN	1"	1" 1/4	1" 1/2	2"	
DIXI + LA	A	Ch. 8-10-13-14 17-19-21 27-30	8-10-13-14 17-19-21 27-30	8-10-13-14 17-19-21 27-30	8-10-13-14 17-19-21 27-30	
	B	L.	300			
	D	Ch.	6-13-27-40	6-13-27-40	6-13-27-40	6-13-2750
	E	Ch.	8	8	8	8
	F	Ch.	2-4-5	2-4-5	2-4-5	2-4-5
	I	L.	65x100	65x100	65x100	65x100
	L	Cod.	7999099			

9.0 LIST OF RECOMMENDED SPARE PARTS

DIXI REGULATOR



VARSION

Master regulator version for in-line monitor application.

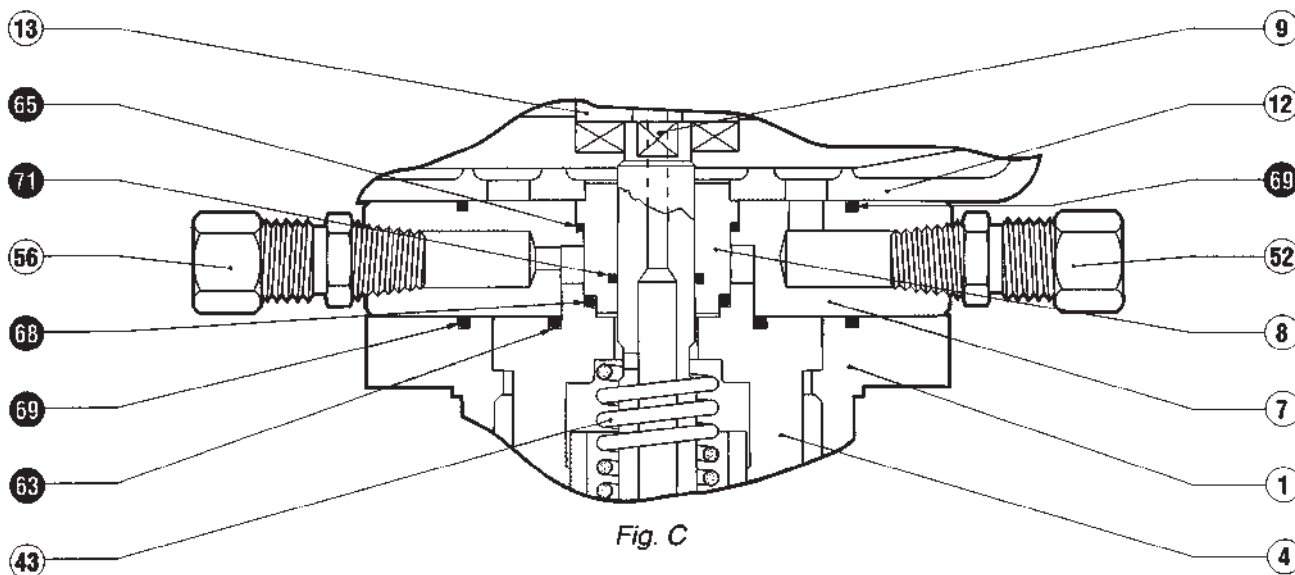
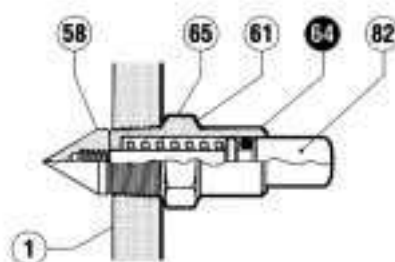
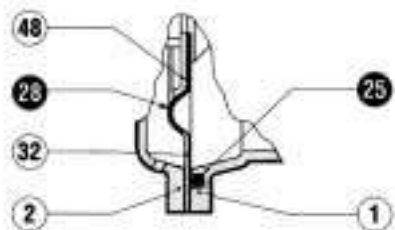
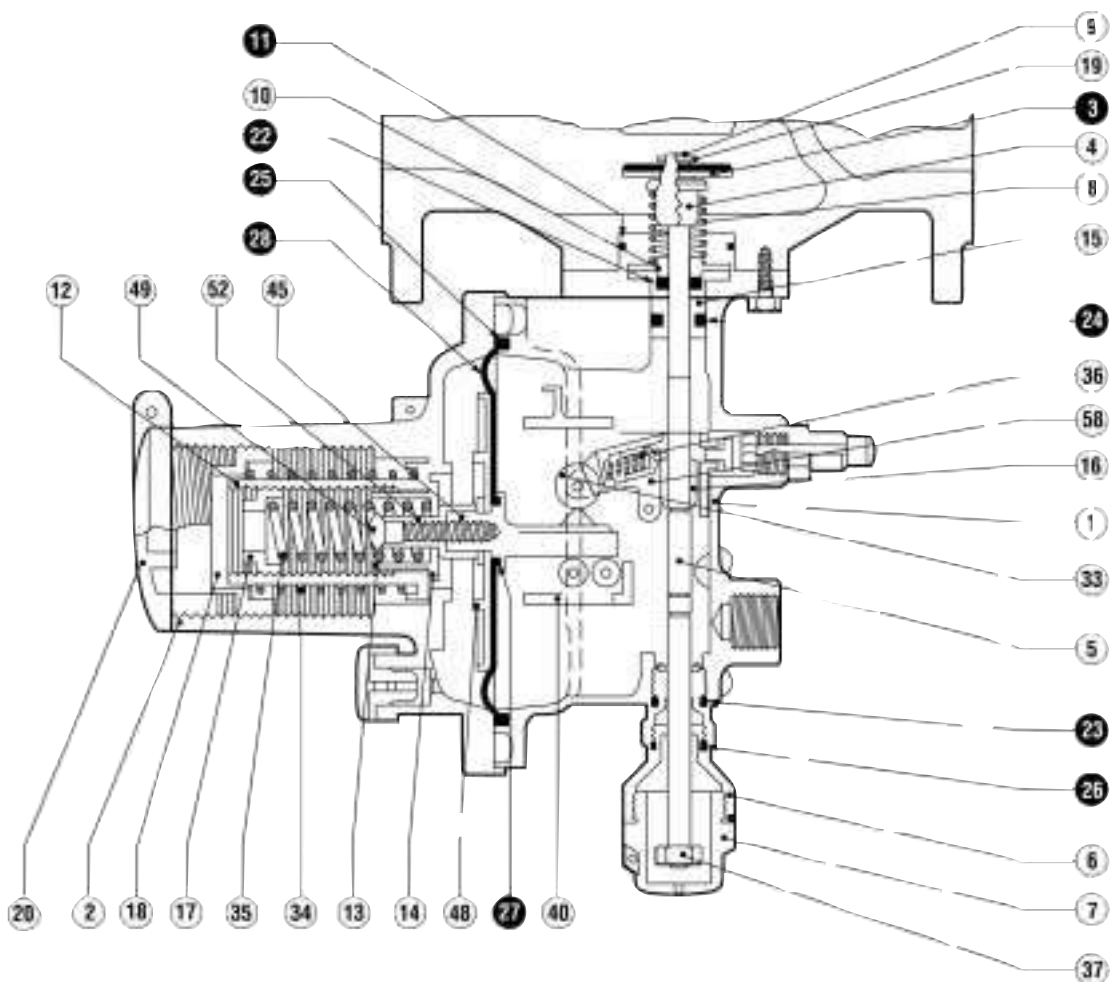
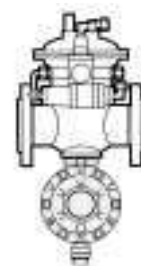


Fig. C

	POS.	DESCRIPTION	N. OF PIECES	
DIXI	11	Obturator	1	
	15	Diaphragm	1	
	24	O. Ring	1	
	25	O. Ring	1	
	26	O. Ring	1	
	60	Guide ring	1	
	63	O. Ring	1	
	64	O. Ring	1	
	65	O. Ring	1	
	66	O. Ring	1	
	67	O. Ring	1	
	68	O. Ring	1	
			(only for version in-line)	
	69	O. Ring	2	
	70	O. Ring	1	
	71	O. Ring	2	
	73	O. Ring	1	
74	O. Ring	1		
75	O. Ring	1		

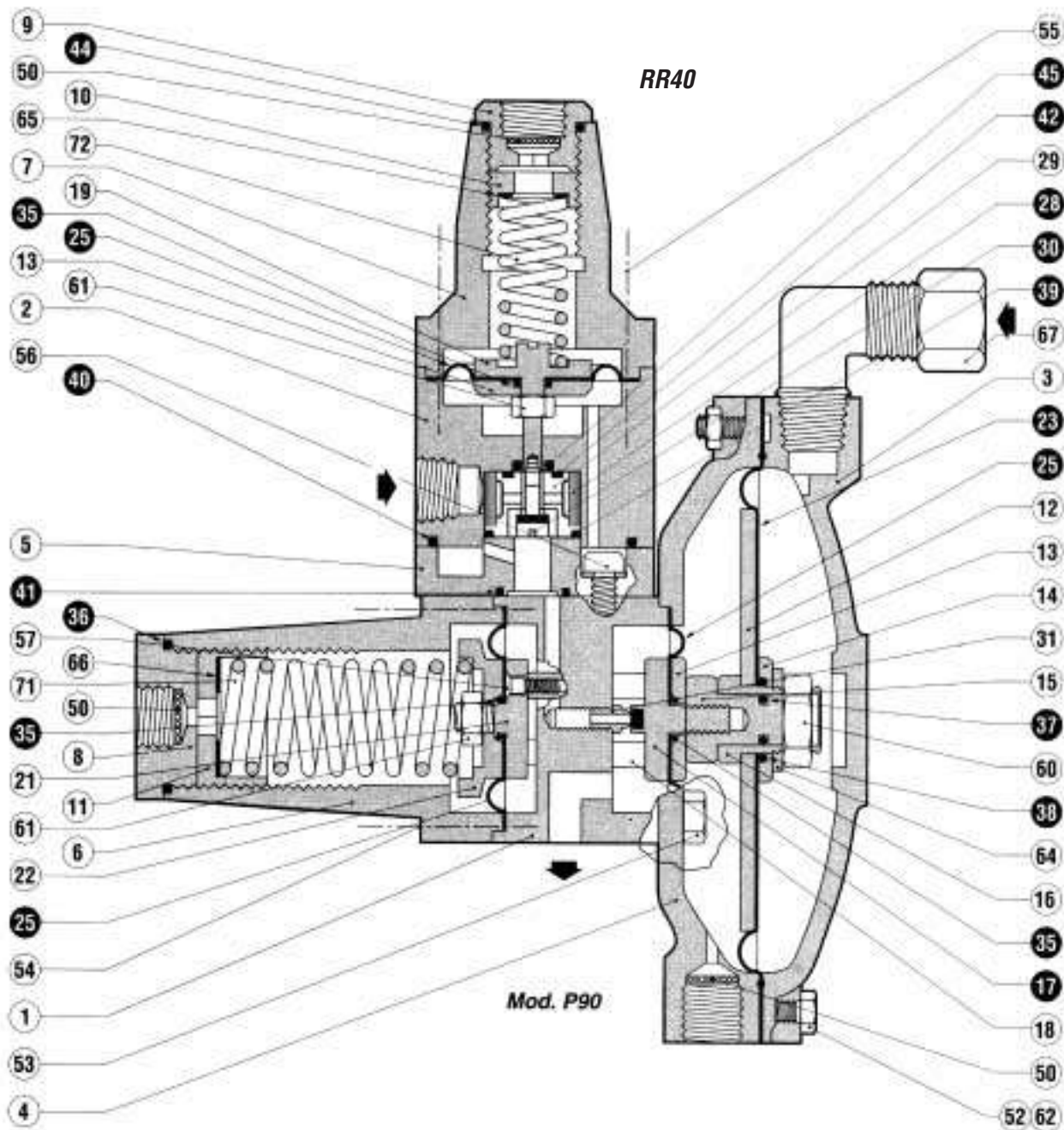
LA/BP -LA/MP-LA/TR SLAM-SHUT DEVICE



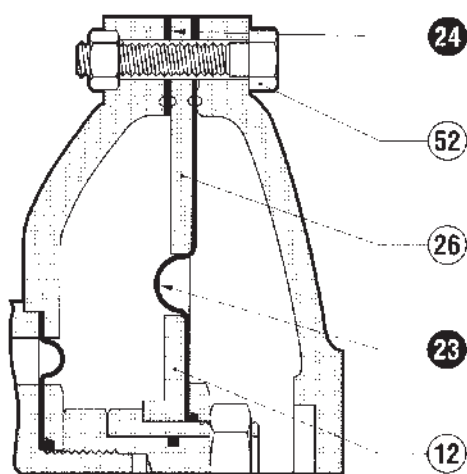
... + LA

POS.	DESCRIPTION	N. OF PIECES
3	Obturator	1
11	O. Ring	1
22	O. Ring	1
23	O. Ring	1
24	O. Ring	1
25	O. Ring	1
26	O. Ring	1
27	O. Ring	1
28	Diaphragm	1
54	O. Ring	1
64	O. Ring	1

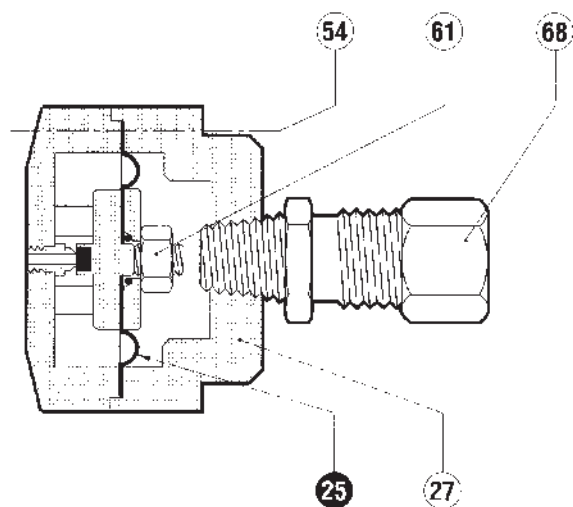
MOD. P90-P92-P94 PILOTS + RR40 PRE-REGULATOR



VERSION



Mod. P92



Mod. P94

		N. OF PIECES			
		DN	P90	P92	P94
POS.	DESCRIPTION				
PILOTS	17	Obturator	1	1	1
	23	Diaphragm	1	1	-
	24	Gasket	-	1	-
	25	Diaphragm	3	3	3
	28	Filter	1	1	1
	30	Obturator	1	1	1
	35	O. Ring	3	3	3
	36	O. Ring	1	1	1
	37	O. Ring	1	1	-
	38	O. Ring	1	1	-
	39	O. Ring	1	1	1
	40	O. Ring	1	1	1
	41	O. Ring	1	1	1
	42	O. Ring	1	1	1
44	O. Ring	1	1	1	
45	O. Ring	1	1	1	

WHEN ORDERING SPARE PARTS, PLEASE SPECIFY:

FOR REGULATOR

Type of regulator

Dne (nominal input diameter)

Pe (inlet pressure)

Pa (outlet pressure)

Works no. (Serial no.)

Year of manufacture

Type of fluid used

Slam-shut (if assembled)

Type of head for slam-shut (LA/BP-LA/MP-LA/TR) (if installed)

The no. of the part (position no.)

Quantity desired

FOR PILOT

Type of pilot

Pe (inlet pressure)

Operating **pression**

Works no. (Serial no.)

Year of manufacture

Type of fluid used

The no. of the part (position no.)

Quantity desired

The data are not binding. We reserve the right to make modifications without prior notice.

Pietro Fiorentini s.p.A.

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