



PRESSURE REGULATOR

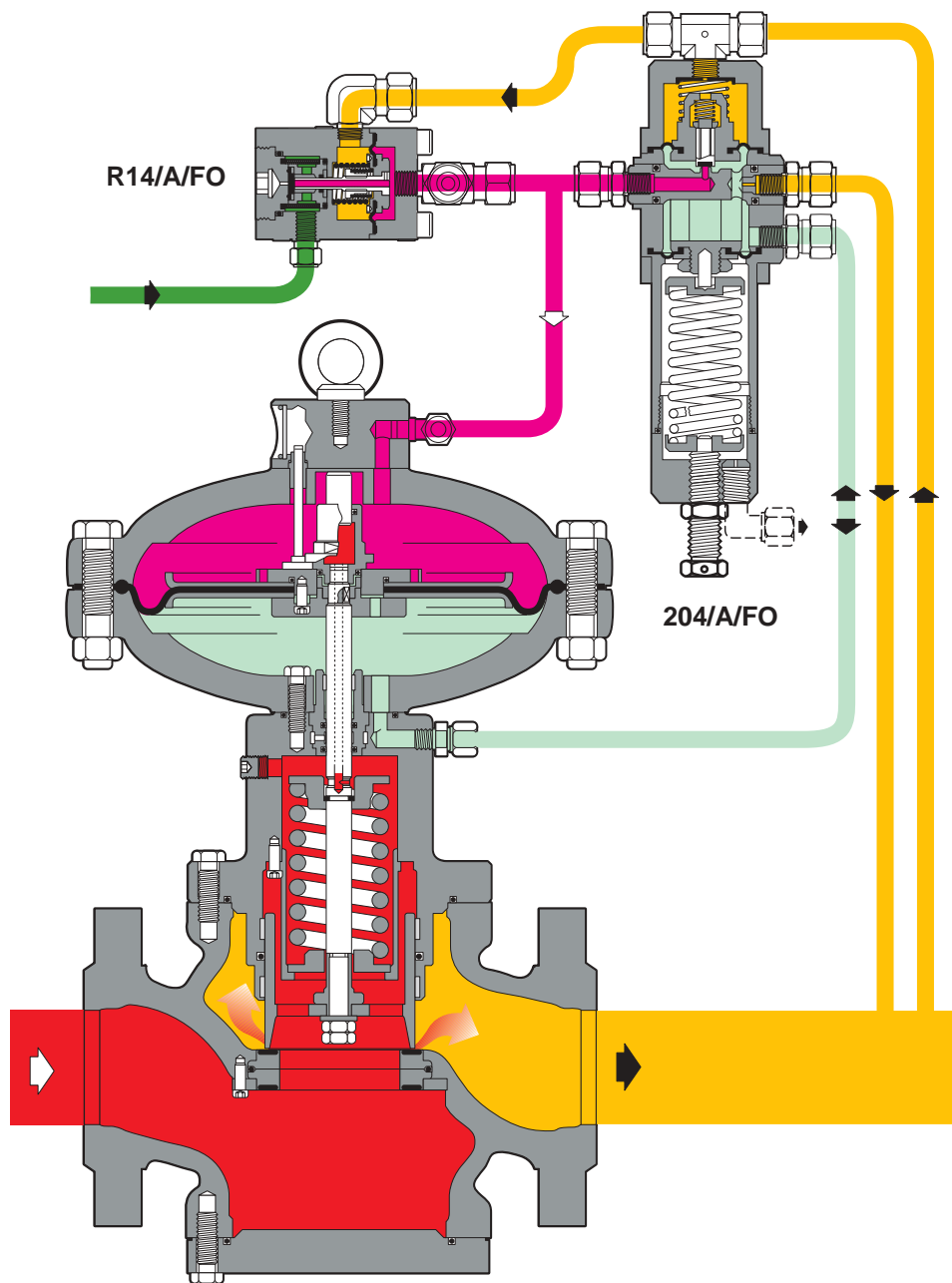
REFLUX 819/FO



TECHNICAL MANUAL MT103

INSTALLATION, COMMISSIONING AND MAINTENANCE INSTRUCTIONS

REFLUX 819/FO



 *Inlet pressure.*

 *Feed pilot.*

 *Motorisation.*

 *Outlet pressure.*

 *Inlet pressure.*

DECLARATION OF CONFORMITY

The **PIETRO FIORENTINI SPA** with registered office in Milan (Italy) – via Rosellini, 1, declares under its sole responsibility that the apparatus 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).
In this report both the versions incorporating the safety shut-off devices series SB/82 or HB/97 when controlling overpressure and the monitor PM/819, 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 de System de Qualité N° **CE-PED-D-FI0001-02-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 and, only for the safety device HB/97, also according to the procedure given by prEN 14382. 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 **Reflux 819/FO** is classified as fail open regulator according to the standard EN 334 therefore it is categorized as **pressure accessory** according to directive 97/23/EC (PED).

The incorporated safety device monitor PM/819 (as well as the in-line monitor **REFLUX 819**) being classified as fail close regulators according to the standard EN 334 is categorized as **safety accessory** according PED, therefore it can be used both as pressure accessory and safety accessory to PED. The regulator **REFLUX 819/FO** when incorporating slam shut valve SB/82 or HB/97 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 and CE marking of pressure regulator and relevant accessory 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 essential information for the, commissioning, disassembly, re-assembly and maintenance of the REFLUX 819/FO regulator.

At the same time we consider it appropriate to provide a brief illustration of the main features of the regulator and its accessories.

1.1 MAIN SPECIFICATIONS

The REFLUX 819/FO pressure regulator is a regulator for medium and high pressures.

The REFLUX 819/FO as a fail open regulator and it opens in following conditions:

- rupture of the main diaphragm;
- rupture of the pilot diaphragm;
- no feed in the pilot circuit.

The main specifications of this regulator are:

- Design pressure: up to 100 bar;
- Working temperature range: -20 °C to +60 °C;
- Ambient temperature: -20 °C to + 60 °C;
- Inlet pressure range bpe: 3 to 85 bar
- Regulating range possible Wh: 1 to 74 bar (depending on the pilot installed);
- Minimum differential pressure: 2 bar;
- Precision class RG: up to 1;
- Closing pressure class SG: up to 3.

1.2 OPERATION (FIG. 1)

In the absence of pressure, the obturator 5 is maintained in the open position by the spring 54 (fig. 1). The upstream pressure, even if variable, does not change this position as the obturator is completely balanced and is therefore subject to equal pressures, even if the sections are different.

The rod 6 is also between two equal pressures as the pressure upstream is also conveyed to the chamber C through the hole A.

The obturator is controlled by the diaphragm 50 on which the following forces act:

- upwards: the load of the spring 54 and the thrust deriving from the motorisation pressure P_m in the chamber E, supplied by the pilot;
- downwards: the weight of the mobile assembly and the thrust deriving from the regulated pressure P_{ep} in the chamber D.

The motorisation pressure is obtained by drawing gas from gas the regulator at the upstream pressure. The gas is filtered through the filter 13 and is subjected to initial decompression in the preregulator R14/A/FO (fig. 2) composed essentially of an obturator 5, a spring 12 and a diaphragm 10 to a value, P_{ep} , which depends on the pressure set-point of the regulator. The pressure, P_{ep} , then passes from the chamber G through the hole F in the 204/A/FO pilot which adjusts it by means of the obturator 17 until the inlet value, P_m , in the head of the regulator. The regulation of P_m is obtained by the comparison of the force exerted by the setting spring 22 of the pilot and the action of the regulated pressure, P_a , acting in the chamber B on the diaphragm 16.

The set-point can be changed by turning the adjustment screw 10; clockwise rotation increases P_m and therefore the regulated pressure, P_a ; the opposite occurs when the ring is turned anticlockwise. If, for example, the downstream pressure, P_a , drops during operation (because of an increase in the requested flow rate or a drop in the upstream pressure) an imbalance occurs in the mobile assembly 15 of the pilot, which is displaced to increase the opening of the obturator 17.

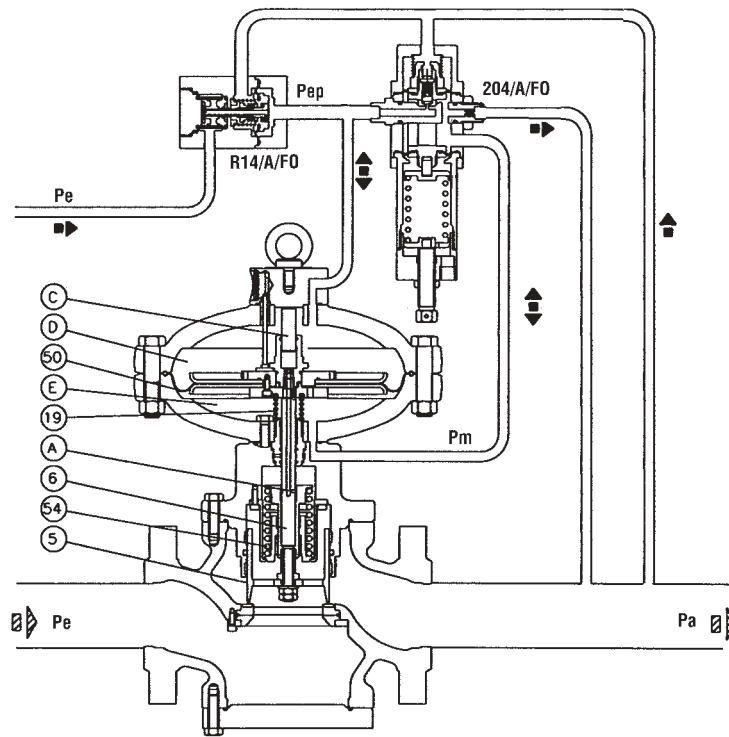


Fig. 1

As a result, the motorisation pressure value, P_m , increases and, by acting in the chamber E under the diaphragm 50 (fig. 1), causes the obturator 5 to move upwards and therefore an increase in the opening of the regulator until the set-point of the regulated pressure is restored.

Vice versa, when the regulated pressure begins to increase, the force it exerts on the diaphragm 16 of the pilot moves the mobile assembly 15 displacing the obturator 17, towards the closed position. The pressure, P_m , then drops because of the transfer through the orifice 21, and the force exerted by pressure P_{ep} causes the downward displacement of the obturator 5, to restore the regulated pressure to the set-point. In normal working conditions, the obturator 17 of the pilot positions itself so that the motorisation pressure value, P_m , is such as to maintain the downstream pressure value, P_a , around the set-point.

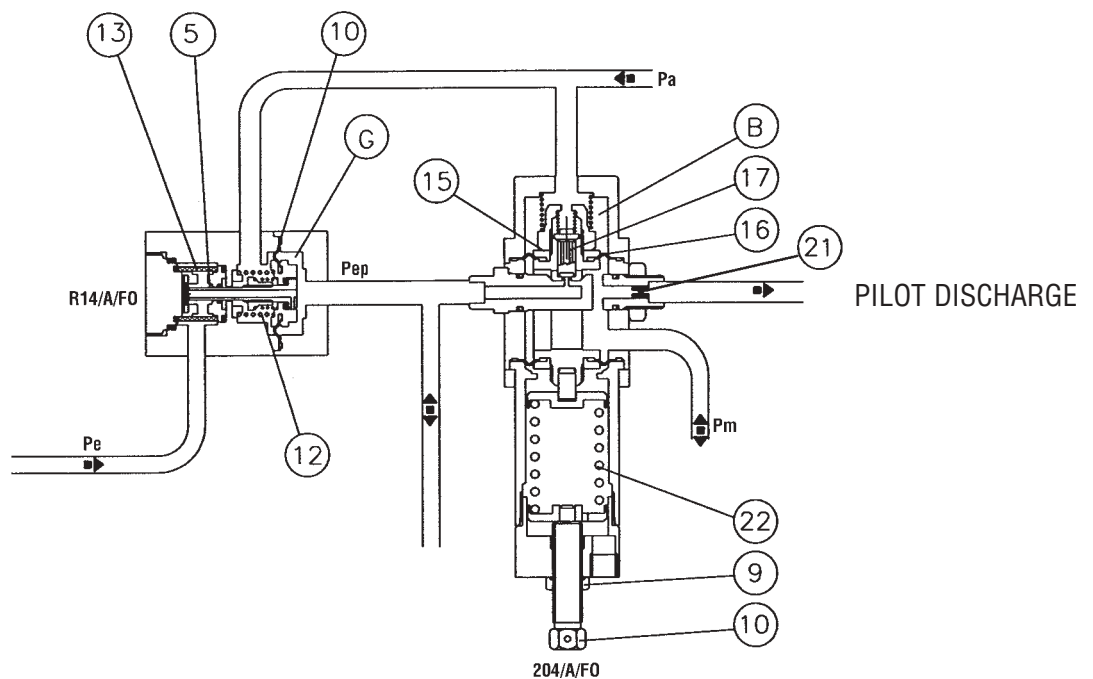


Fig. 2

204/A/FO PILOT

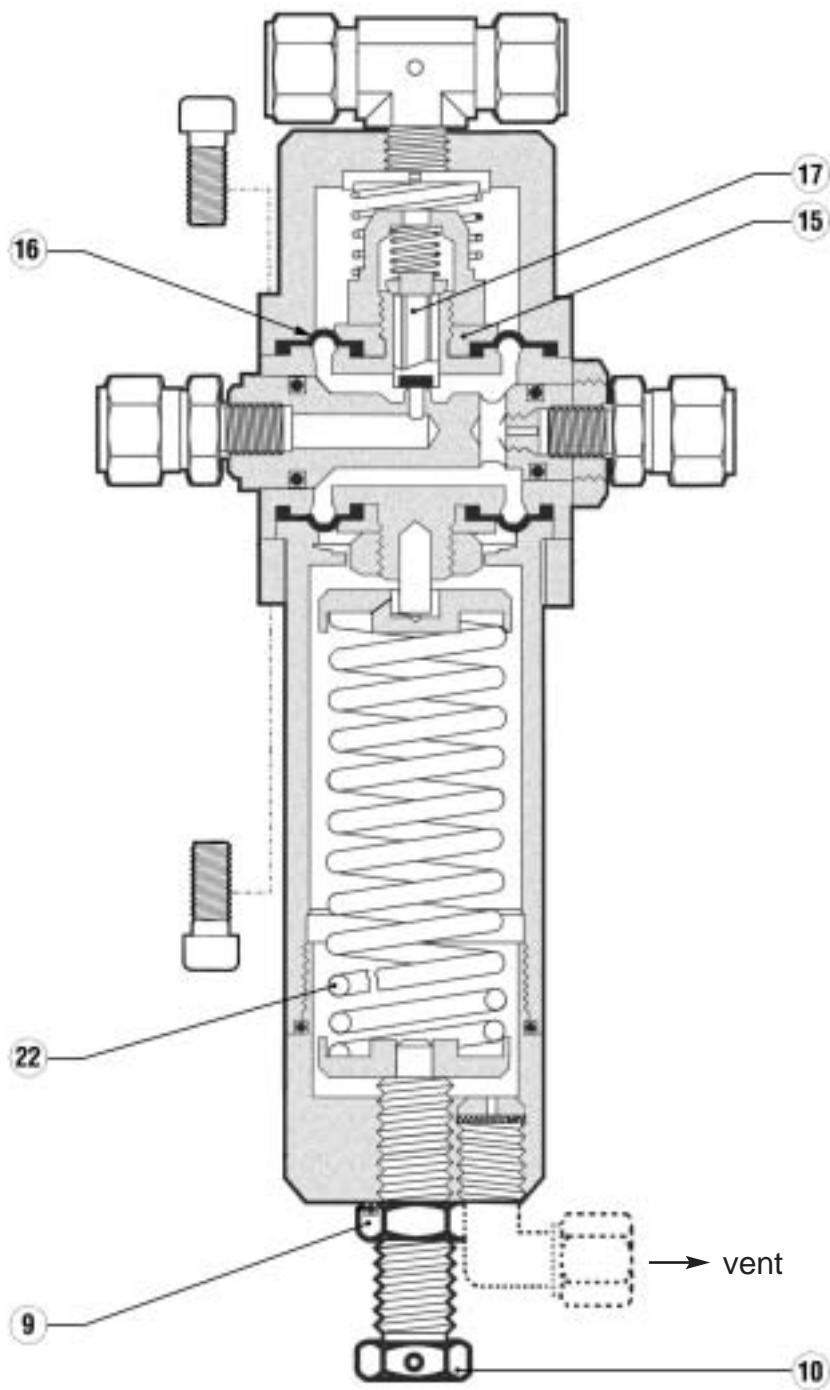


Fig. 2A

1.3 Tab. 1 SETTING SPRINGS

The REFLUX 819/FO regulator uses the 204/A/FO and 205/A/FO and 207/A/FO pilots. The regulation range of the different pilots is given in the tables below.

204/A/FO Pilot setting springs							
Code	Colour	De	Lo	d	i	it	Setting range in bar
2701541	WHITE	35	100	4	7.75	9.75	1 ÷ 3.2
2701800	YELLOW			4.5	8.25	10.25	3.2 ÷ 5.2
2702080	ORANGE			5	8.75	10.75	5.2 ÷ 8.2
2702290	RED			5.5	8.5	10.5	8.5 ÷ 17
2702460	GREEN			6	8.25	10.25	12 ÷ 25
2702660	BLACK			6.5	8.25	10.25	17 ÷ 26
2702820	BLUE			7	7	9	25 ÷ 33

205/A/FO Pilot setting springs							
Code	Colour	De	Lo	d	i	it	Setting range in bar
2703045	BROWN	35	100	7.5	7.5	9.5	30 ÷ 44
2703224	GREY			8	7.5	9.5	44 ÷ 60

207/A/FO Pilot setting springs							
Code	Colour	De	Lo	d	i	it	Setting range in bar
2703224	GREY	35	100	8	7.5	9.5	41 ÷ 74

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

The operating principle of the pilot has already been briefly illustrated in par. 1.2. Variation of the setting is obtained by turning the adjustment screw 10 (fig. 2). Clockwise rotation leads to an increase in the regulated pressure while anticlockwise rotation leads to a decrease. When the desired setting has been reached, the adjustment screw can be blocked by means of the provided nut 9.

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:

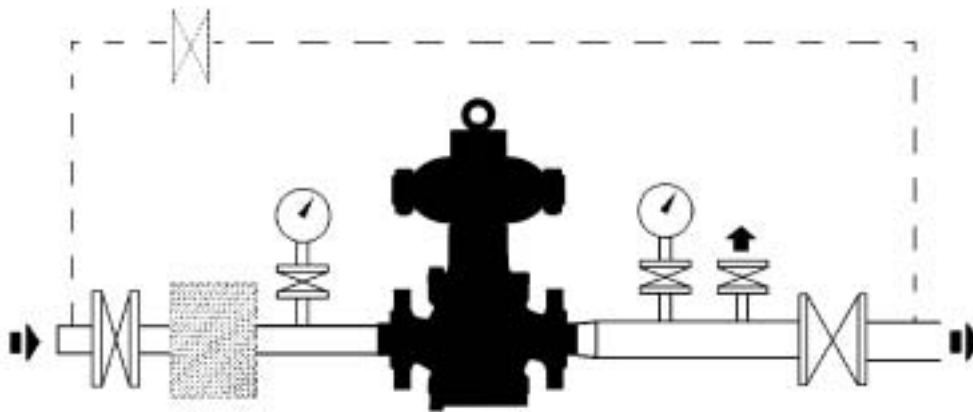
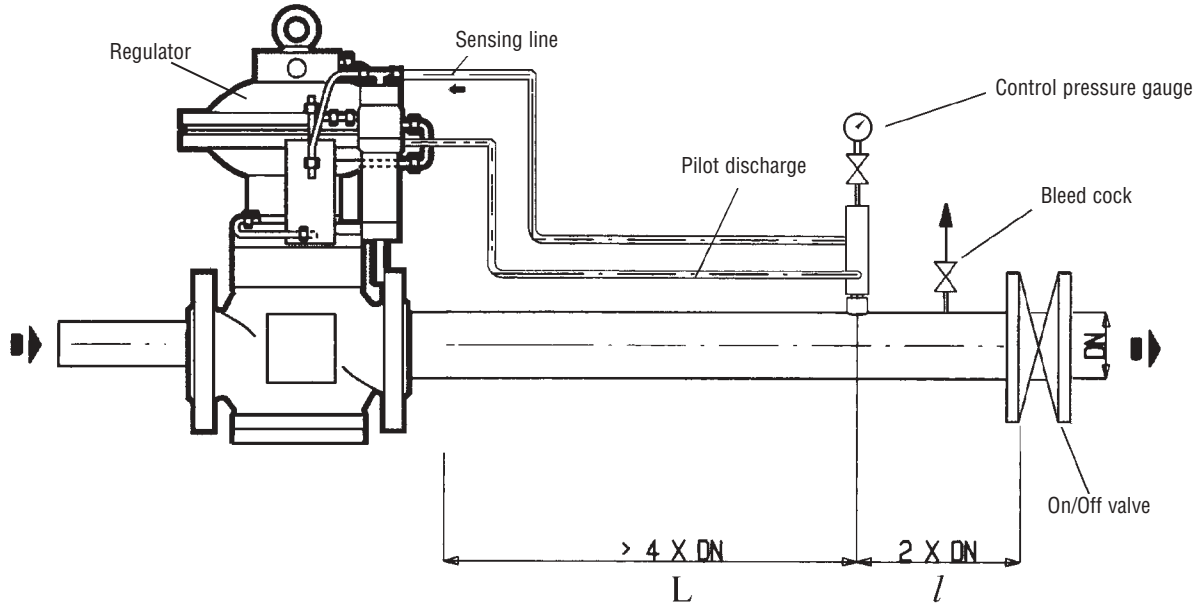


Fig. 3 (Standard regulator)

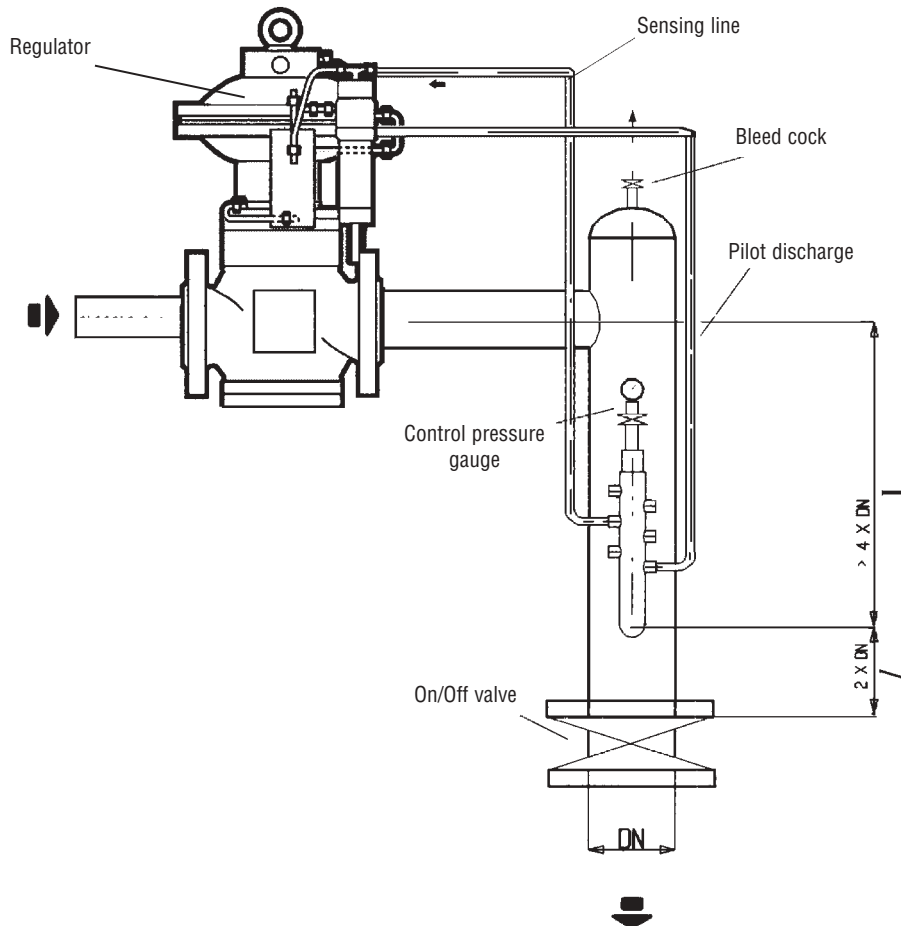
Tab. 2 CONNECTING THE APPARATUSES

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

IN-LINE INSTALLATION

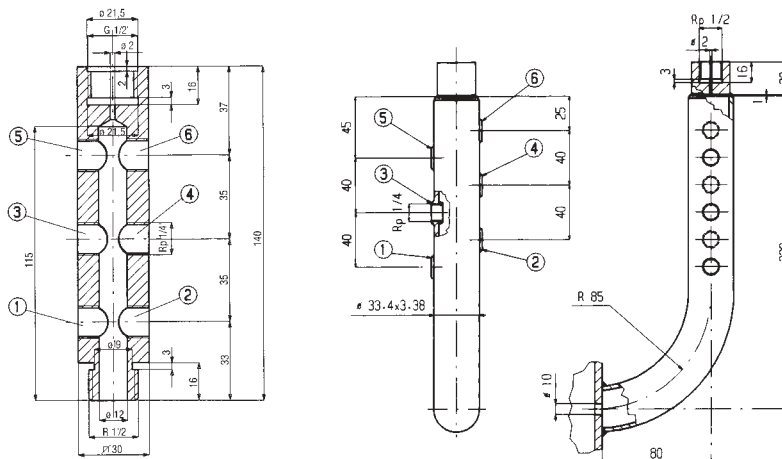


INSTALLATION AT RIGHT ANGLES



Tab. 3 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 to 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 that the position of the downstream pressure take-offs and the speed of the gas at the take-off point respect the values given in tables 2 and 3 (positioning) and 4 (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 connectors 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. 4

<p>The speed of the gas must not exceed the following values in the piping downstream from the regulator:</p> <p>$V_{max} = 30 \text{ m/s for } P_a > 5 \text{ bar}$ $V_{max} = 25 \text{ m/s for } 1 < P_a < 5 \text{ bar}$</p>

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 short-lasting 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 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 valve available are all based on the same operating principle which is illustrated below with reference to the valve VS/AM 56 (fig. 4).

It is based on the contrast between the thrust on the diaphragm 24 deriving from the pressure of the gas to be controlled 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.

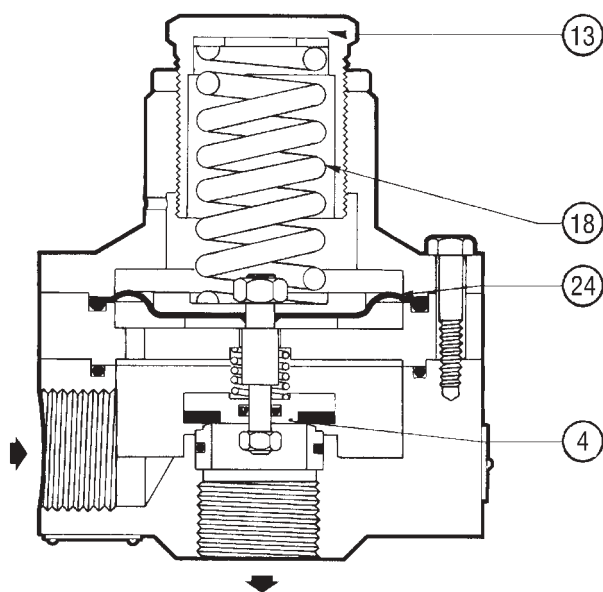


Fig. 4

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 table 1), 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 if necessary by turning the adjustment plug 13 appropriately (clockwise to increase and anticlockwise to decrease).

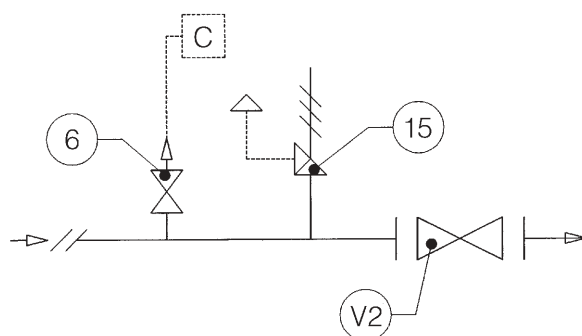


Fig. 5

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 if necessary by turning the adjustment plug 13 appropriately (clockwise to increase and anticlockwise to decrease).

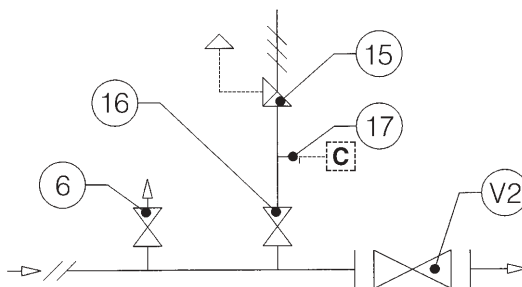


Fig. 6

3.2 ACCELERATOR

An accelerator (fig. 7) is installed on the PM/819 incorporated monitor and on the REFLUX 819 regulator (use as in-line monitor) to speed up their intervention in the event of failure of the active regulator (recommended when used safety accessory according to Directive 97/23/EC "PED").

On the basis of a pressure signal from downstream this device discharges the gas into the monitor's motorization chamber into the atmosphere, thereby permitting rapid intervention. The set point of the accelerator must obviously be higher than that of the monitor.

Setting is made by turning the adjustment screw 17, clockwise to increase the value, anticlockwise to reduce it.
M/A range of intervention Who: 0,3 to 43 bar

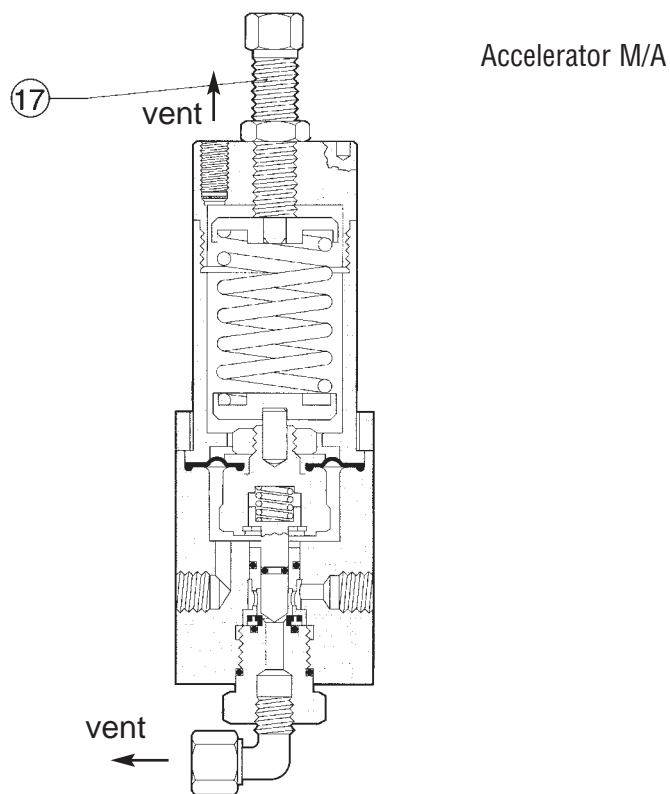


Fig. 7

4.0 MODULARITY

The modular-type design of REFLUX 819/FO series regulators means that it is also possible to feature the emergency monitor regulator PM/819 or to have the slam-shut incorporated with the body itself even after the installation of the regulator without any modifications.

4.1 INCORPORATED SLAM-SHUT VALVE

When closing the slam shut incorporated into pressure regulator to be considered as safety accessory according to Directive PED, cuts off the feeding of gas both to pressure regulator and to its pilot.

4.2 INCORPORATED SB/82 SLAM-SHUT VALVE

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

On the REFLUX 819/FO regulator, it is possible to have the SB/82 slam-shut incorporated both with the service regulator and on the one functioning as in-line monitor.

The main characteristics of the slam-shut device are:

- intervention with pressure increase and/or decrease;
- design pressure: 100 bar for all the components;
- intervention accuracy (AG): $\pm 1\%$ of the pressure set-point for pressure increases; $\pm 5\%$ for pressure drops;
- manual resetting with internal by-pass operated by the resetting lever.

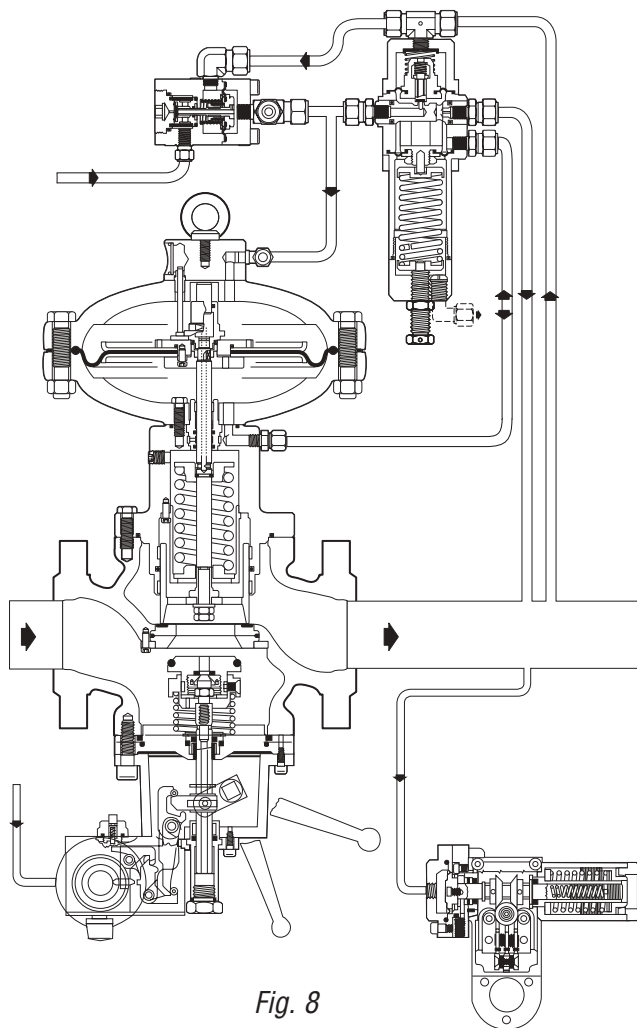


Fig. 8

4.2.1 SB/82 SLAM-SHUT OPERATION

The SB/82 slam-shut device (see fig. 9) consists of an obturator A, a releasing lever system, a control head B and a resetting system which is controlled manually by the lever C. The pressure in the circuit to control acts on the diaphragm in the control head B. This diaphragm, which is integral with a control rod D, receives a counter-force by means of the minimum pressure springs 17 and the maximum pressure springs 11, set at the preset values. The translation movement of this rod provokes the displacement of the lever L which controls the release of the entire mobile system and frees the obturator which is closed by the action of the spring 48.

To reset the device, operate the lever C. This opens an internal by-pass in the first part of its stroke. This leads to the filling of the downstream zone and balances the pressure on the obturator. Then, complete resetting of the entire mobile system is obtained in the second part of the stroke of the lever C. Releasing can also be carried out manually by means of the button 101.

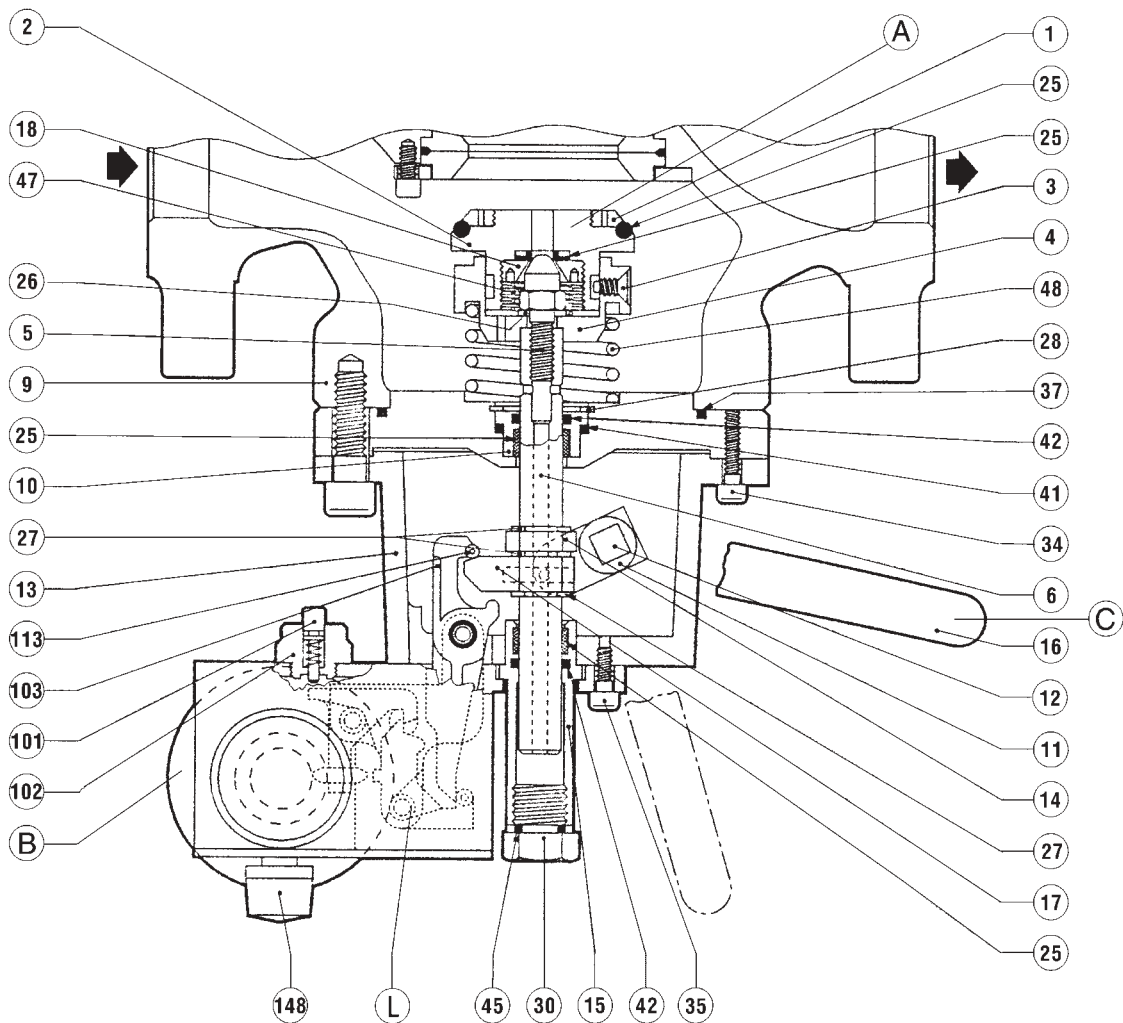
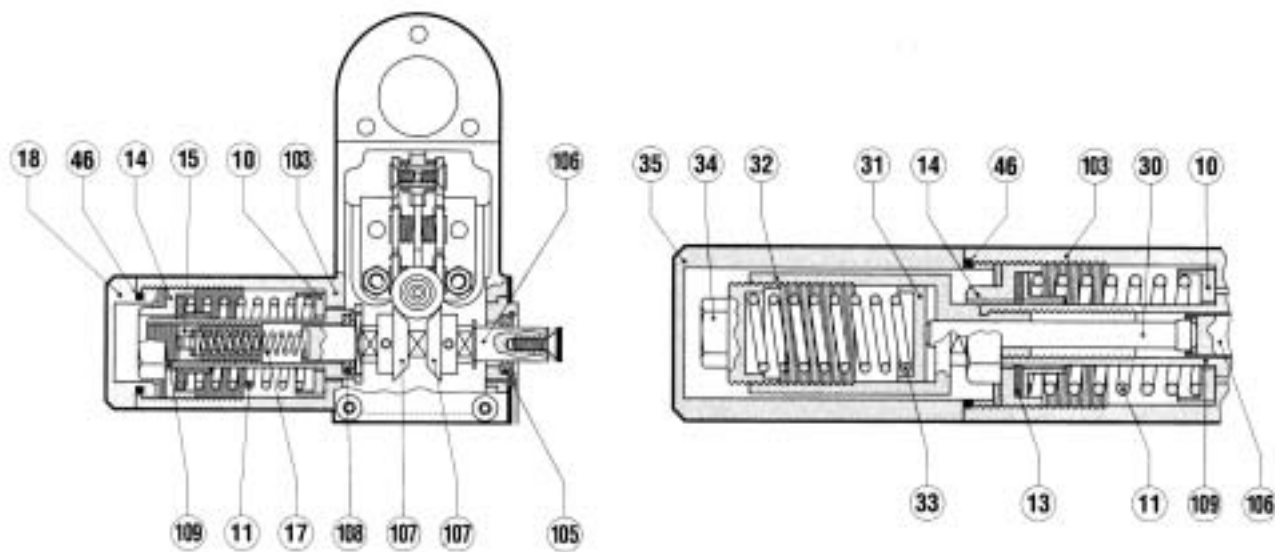


Fig. 9

CONTROL DEVICE

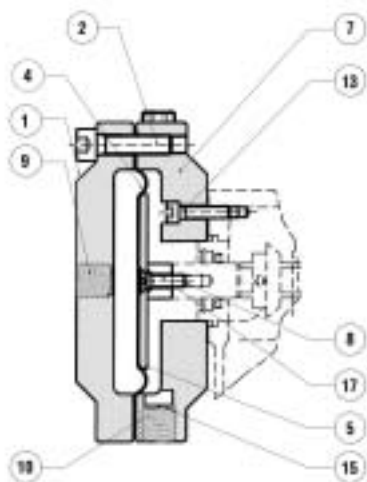


Mod. 102 - 103 - 104 - 105

Mod. 106 - 107 - 108 - 109

Fig. 10

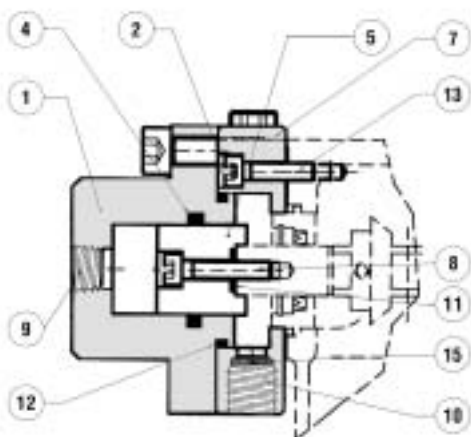
SLAM-SHUT CONTROL HEADS



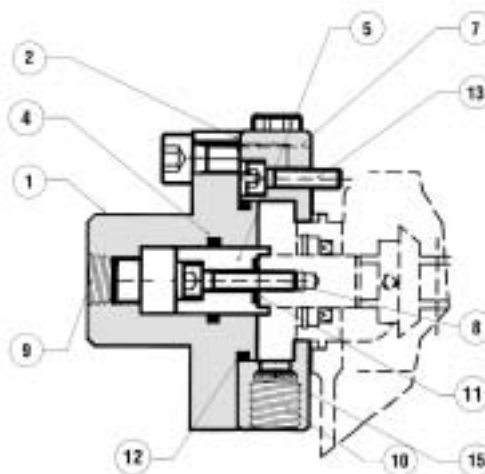
MOD. 102 - 106



MOD. 103 - 106



MOD. 104 - 107



MOD. 105-108 - 109

Fig. 11

4.2.2 Tab. 5 SB/82 SLAM-SHUT SETTING SPRINGS

Spring characteristics								SETTING RANGE in bar													
								102	106	102	106	103	107	103	107	104	108	104-108	105	109	105-109
								bar/min	bar/max	bar/min	bar/max	bar/min	bar/max	bar/min	bar/max	bar/min	bar/max	bar/min	bar/max	bar/min	bar/max
1	2700565	WHITE	10	40	1	12	14														
2	2700675	YELLOW			1,3	13	15	0,04÷0,1			0,2÷0,5										
3	2700820	ORANGE			1,5	11	13	0,07÷0,2			0,4÷1,2										
4	2700910	RED			1,7	11	13	0,15÷0,3			0,8÷2			1,6÷4		3,2÷8					
5	2701035	GREEN			2	11	13	0,25÷0,45			1,4÷2,7			2,8÷5,4		5,6÷10,8					
6	2701140	BLACK			2,3	10	12	0,40÷0,7			2,3÷4			4,6÷8		9,2÷16					

7	2700790	ORANGE	25	55	2,5	8	10		0,1÷0,25										
8	2701010	RED			3	7	9		0,2÷0,6		1÷3								
9	2701225	GREEN			3,5	6	8		0,5÷1		2÷5								
10	2701475	BLACK			4	6	8		0,7÷1,6		3,5÷8			7÷15		14÷30			
11	2701740	VIOLET			4,5	6	8		1,3÷2,15		6÷10			12÷20		24÷30			
12	2702015	AZURE			5	6	8		2÷3,25		9÷14			18÷28		36÷56			
13	2702245	GREY			5,5	6	8		3,5÷5		13÷22			26÷44		52÷88			

14	2700680	BROWN	35	60	2,3	6	8												
15	2700830	RED/BLACK			2,5	5,5	7,5												
16	2700920	WHITE/YEL.			2,7	5,5	7,5												
17	2701040	WHI./ORAN.			3	5,5	7,5												
18	2701260	WHITE			3,5	5,5	7,5			0,2÷0,5	0,2÷0,5								
19	2701530	YELLOW			4	5	7			0,45÷1,1	0,45÷1,1		2÷5	2÷5					
20	2701790	YEL./BLACK			4,5	4,5	6,5			0,7÷1,7	0,7÷1,7		3,5÷8,5	3,5÷8,5					
21	2702070	ORANHE			5	5	7			0,9÷2	0,9÷2		5÷10,5	5÷10,5					
22	2702280	WHI./RED			5,5	5	6,5			1,5÷3	1,5÷3		7,5÷15	7,5÷15		15÷30		30÷60	
23	2702450	RED			6	5	7			2,2÷3,5	2,2÷3,5		10,5÷16,5	10,5÷16,5		21÷33		42÷66	
24	2702650	GREEN			6,5	5	7			3,5÷5	3,5÷5		15÷22	15÷22		30÷44		60÷88	

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

4.3 INCORPORATED HB/97 SLAM-SHUT VALVE

This is a device (fig.12) which immediately blocks the gas flow if, following some kind of failure, the downstream pressure reaches the set-point for its intervention, or is operated manually.

On the Reflux 819/FO regulator, it is possible to have the HB/97 slam-shut incorporated both with the service regulator or on the one functioning as in-line monitor.

The main characteristics of the slam-shut device are:

- balance valve obturator;
- indirect, self-fed, pneumatic actuation;
- local close button;
- intervention with pressure increase and/or decrease;
- design pressure: 100 bar for all the components;
- precision (AG): $\pm 1\%$ of the pressure set-point for pressure increases; $\pm 5\%$ for pressure drops;
- incorporated by-pass;
- manual reset only;

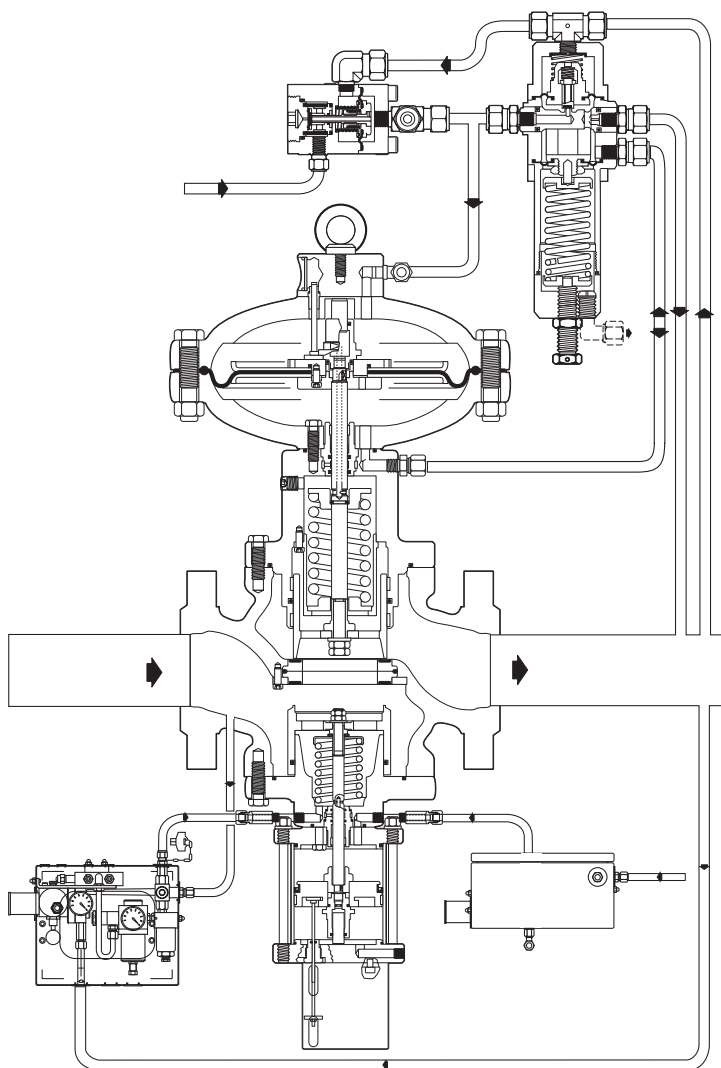


Fig. 12

4.3.1 HB/97 OPERATION (FIG. 13)

The cut-off device consist principally of the following parts:

- on/off valve (pos. 12);
- single action pneumatic actuator (pos. 11);
- line-off device (from pos.1 until pos. 10);

When there is no pressure, the valve obturator is held in the closed position by the spring, (pos. 13), and rests on the valve seat. The control pressure is obtained by taking off gas at pressure P_e directly upstream from the valve. The gas passes through the valve (1) (which can deviate pressure towards the downstream piping through a bypass line) and, appropriately filtered by the filter (2), enters the pressure regulator (4), the purpose of which is to stabilize the control pressure to the valve 3/2 (8) and then passes to the actuator (11). When the actuator is filled, the valve opens.

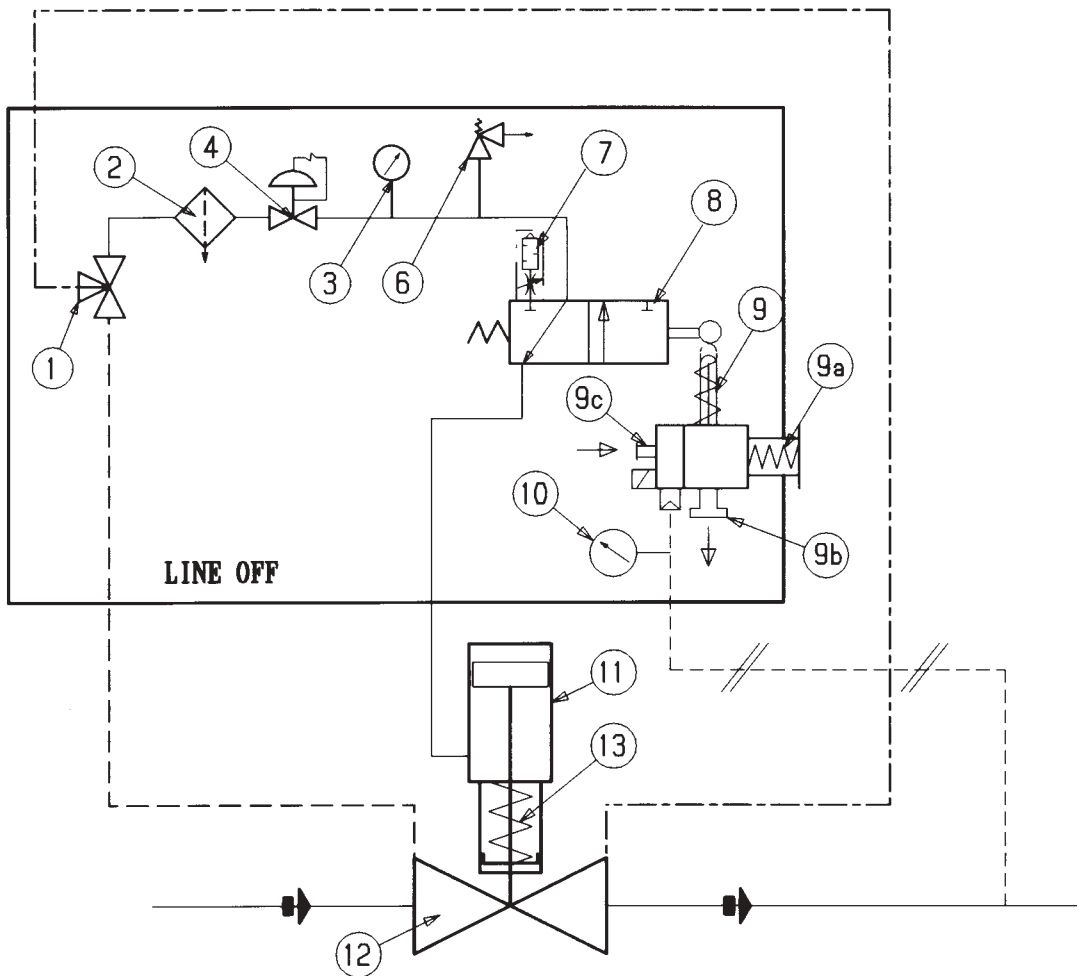
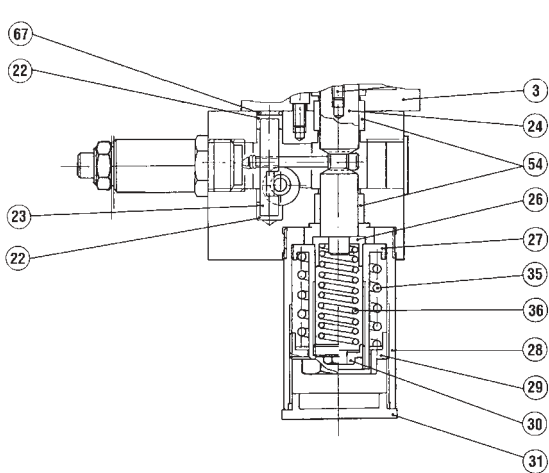
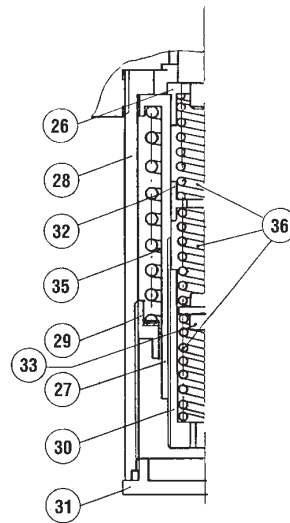


Fig. 13

CONTROL DEVICE



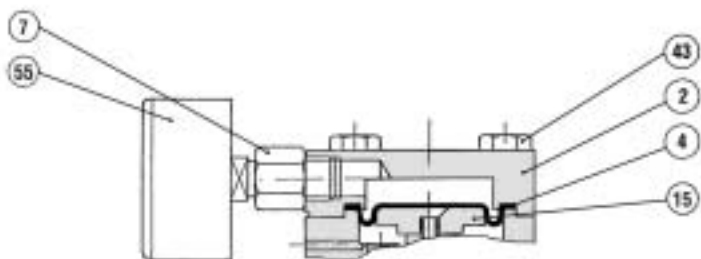
Mod. 103 - 104 - 105



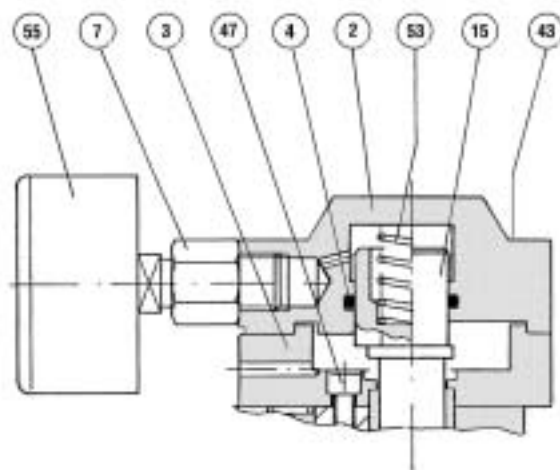
Mod. 105/92

Fig. 14

SLAM-SHUT CONTROL HEADS



Mod. 103



Mod. 104 - 105

Fig. 15

4.3.2 Tab. 6 HB/97 SLAM-SHUT SETTING SPRINGS

		SETTING RANGE in bar													
		Spring characteristics						SH1190/103		SH1190/104		SH1190/105		SH1190/105/92	
Code	Colour	De	Lo	d	i	it	bar/min	bar/max	bar/min	bar/max	bar/min	bar/max	bar/min	bar/max	
1	2700513	RED	15	40	2	8.5	10.5	0.4 ÷ 1							
2	2700713	GREEN			2.3	8.5	10.5	1 ÷ 1.9							
3	2700750	BLACK			2.5	4.25	8.25	1.8 ÷ 2.8		4.7 ÷ 6.8		11 ÷ 16.5			
4	2700985	YELLOW			3	6.5	8.5	2.7 ÷ 5		6.8 ÷ 20.6		16.5 ÷ 50			
5	2701182	BLUE			3.5	6	8							45 ÷ 75	

		SETTING RANGE in bar													
		Spring characteristics						SH1190/103		SH1190/104		SH1190/105		SH1190/105/92	
Code	Colour	De	Lo	d	i	it	bar/min	bar/max	bar/min	bar/max	bar/min	bar/max	bar/min	bar/max	
6	2701260	WHITE	35	60	3.5	5.5	7.5		1.3 ÷ 2.1						
7	2701530	YELLOW			4	5	7		2 ÷ 3.7						
8	2701790	YEL./BLACK			4.5	4.5	6.5		3.6 ÷ 6.8		10 ÷ 17		25 ÷ 41		
9	2702070	ORANGE			5	5	7		5 ÷ 7.8		14 ÷ 19		34 ÷ 48		
10	2702280	WHI./RED.			5.5	5	6.5		7.2 ÷ 11		17.2 ÷ 31.5		43 ÷ 76		
11	2702290	BLUE			6	5.5	7								58 ÷ 85

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

4.4 MONITOR

The monitor is an emergency regulator which takes over from the active regulator if for any reason the latter permits the downstream pressure to rise up to the value set for its intervention.

When pressure regulator Reflux 819 or incorporated monitor PM/819 are used as monitor, to increase response time an accelerator is installed.

Installation of accelerator is recommended for use as safety accessory according to Directive 97/23/EC (PED).

Two alternative solutions are offered for this safety device associated to Reflux 819/FO regulators: incorporated monitor or in-line monitor.

4.4.1 PM/819 INCORPORATED MONITOR

This emergency device (fig. 16) is fixed directly on the body of the service regulator. In this way, the two pressure regulators use the same valve body but:

- they are governed by two distinct pilots and two independent servomotors;
- they work on independent valve seats.

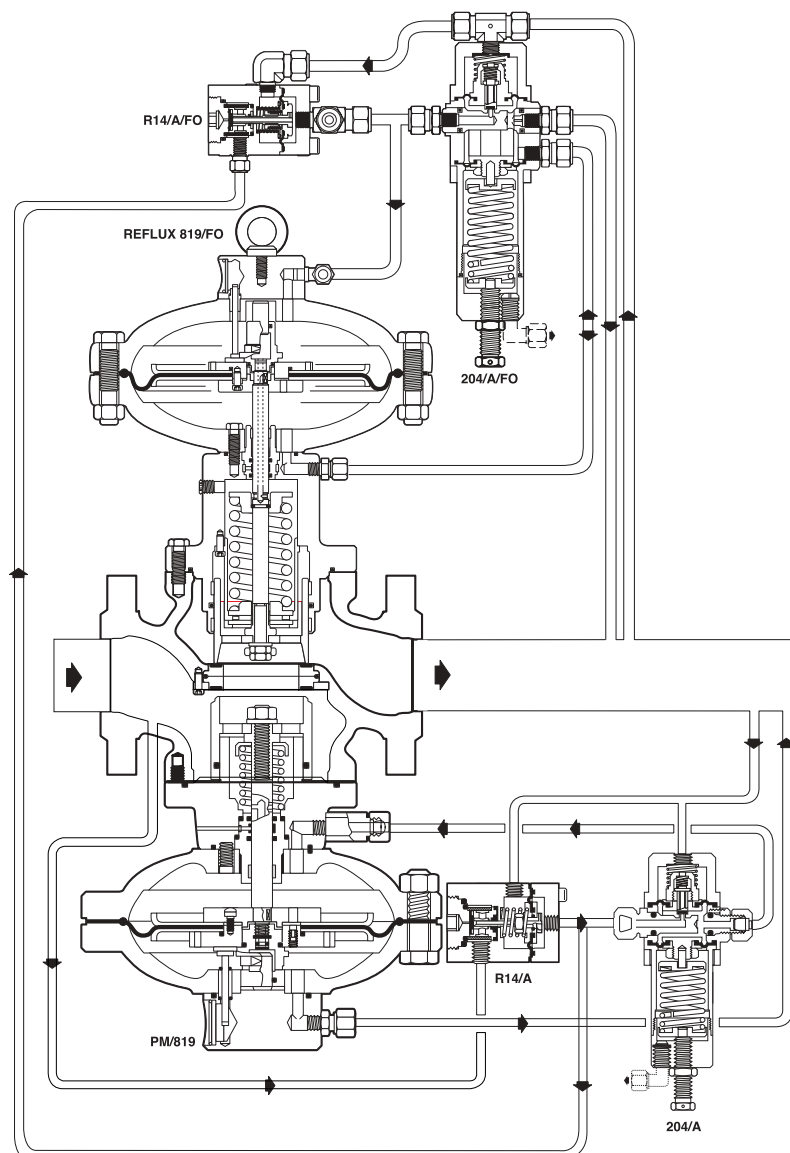


Fig. 16

4.4.2 IN-LINE MONITOR

With this kind of application, the emergency regulator is installed upstream from the service one (Fig. 17).

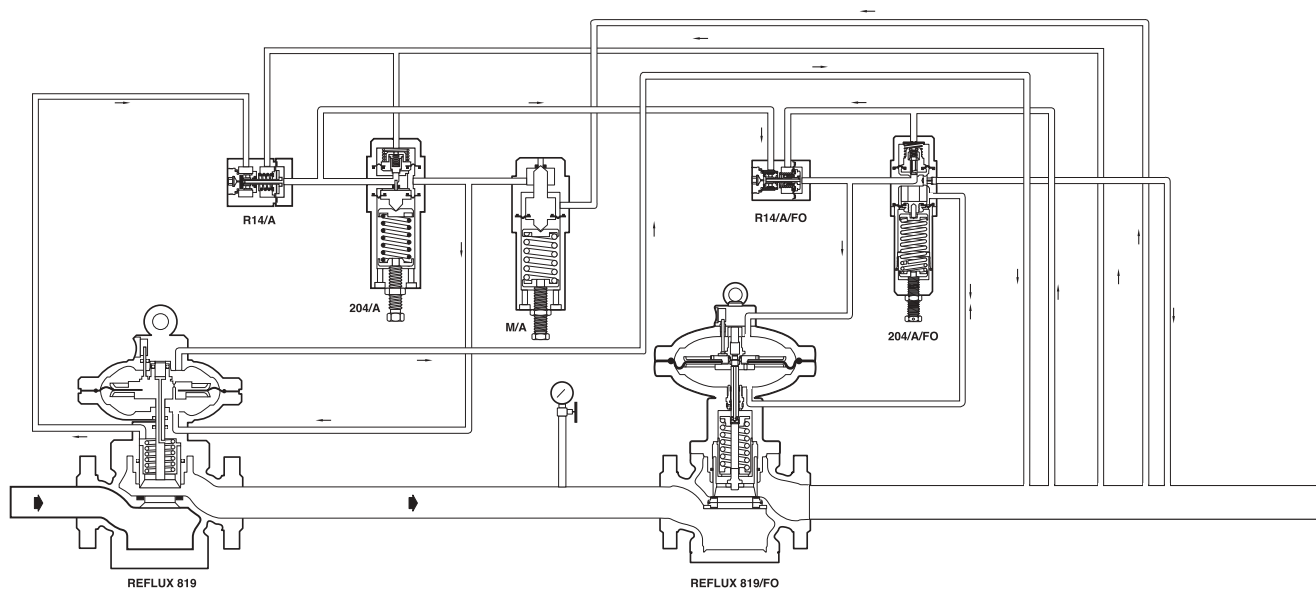


Fig. 17

4.4.3 Tab. 7 SETTING SPRINGS

The REFLUX 819 regulator and the monitor PM/819 uses the 204/A, 205/A and 207/A pilots. The regulation range of the different pilots is given in the tables below.

Pilot 204/A, 204/A/1							
Code	Colour	De	Lo	d	i	it	Setting range in bar
2701260	WHITE	35	60	3.5	7.5	7.5	0.3 ÷ 1.2
2701530	YELLOW			4	7	7	0.7 ÷ 2.8
2702070	ORANGE			5	7	7	1.5 ÷ 7
2702450	RED			6	7	7	4 ÷ 14
2702815	GREEN			7	7	7	8 ÷ 20
2703220	BLACK			8	6	6	15 ÷ 33
2703420	BLUE			8.5	6	6	22 ÷ 43

Pilot 205/A							
Code	Colour	De	Lo	d	i	it	Setting range in bar
2702820	BLUE	35	100	7	7	9	20 ÷ 35
2703045	BROWN			7.5	7.5	9.5	30 ÷ 43
2703224	GREY			8	7.5	9.5	40 ÷ 60

Pilot 207/A							
Code	Colour	De	Lo	d	i	it	Setting range in bar
2703224	GREY	35	100	8	7.5	9.5	41 ÷ 74

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

5.0 START UP

5.1 GENERAL

After installation, check that the inlet/output 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 the symbols on the plate fitted on every component (fig. 18).

APPARATUS SPECIFICATION PLATES

The figure displays six examples of apparatus specification plates from Pietro Fiorentini. Each plate includes the company logo, a barcode, and various technical data fields. The fields are as follows:

- Plate 1 (Top Left):** REGULATOR: REFLUX 819/FO; T: /; S.n.: /; PS: / bar; Pemax: / bar; DN: /; Flange: /; AC: /; Wh: / bar; bpe: / bar; SG: /; Wa: / bar; Fluido: /; Cg: /.
- Plate 2 (Top Right):** Pilot: 204/A/FO; bpe: / bar; S.n.: /; Pemax: / bar; Wh: /; PS: / bar; T: /; Wa: / bar.
- Plate 3 (Middle Left):** REGULATOR: .../PM 819; T: /; S.n.: /; PS: / bar; Pemax: / bar; DN: /; Flange: /; AC: /; Wh: / bar; bpe: / bar; SG: /; Wa: / bar; Fluido: /; Cg: /.
- Plate 4 (Middle Right):** Type: .../DB 819; PS: / bar; S.n.: /; T: /.
- Plate 5 (Bottom Left):** Pre-regulator: R14/A; PS: / bar; S.n.: /; Pemax: / bar; Pa+: /; Wh: / bar; T: /; Wa: / bar.
- Plate 6 (Bottom Middle):** Pilot: 204/A; S.n.: /; PS: / bar; Pa+: /; Wh: / bar; T: /; Wa: / bar.
- Plate 7 (Bottom Right):** Accelerator: M/A; PS: / bar; S.n.: /; Pemax: / bar; Who: /; Wao: / bar; T: /.

Fig. 18

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 8 and 9 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 8 and 9.**

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.

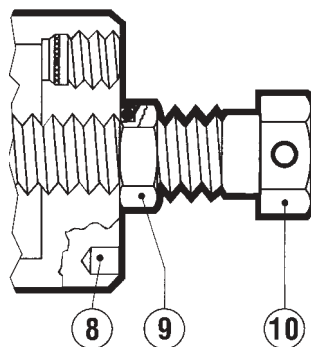


Fig. 19...Pilot adjustment screw

5.3 COMMISSIONING THE REGULATOR WITH INCORPORATED SB/82 SLAM-SHUT (FIG. 20)

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

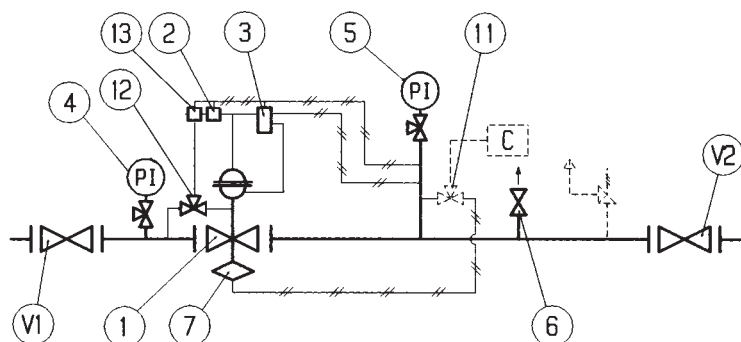


Fig. 20

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. 21):

- connect a controlled auxiliary pressure to path 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 lever;
- 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 14 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 14 or 15 clockwise and vice versa to reduce the intervention values.

-check proper operation by repeating the operations at least 2-3 times.

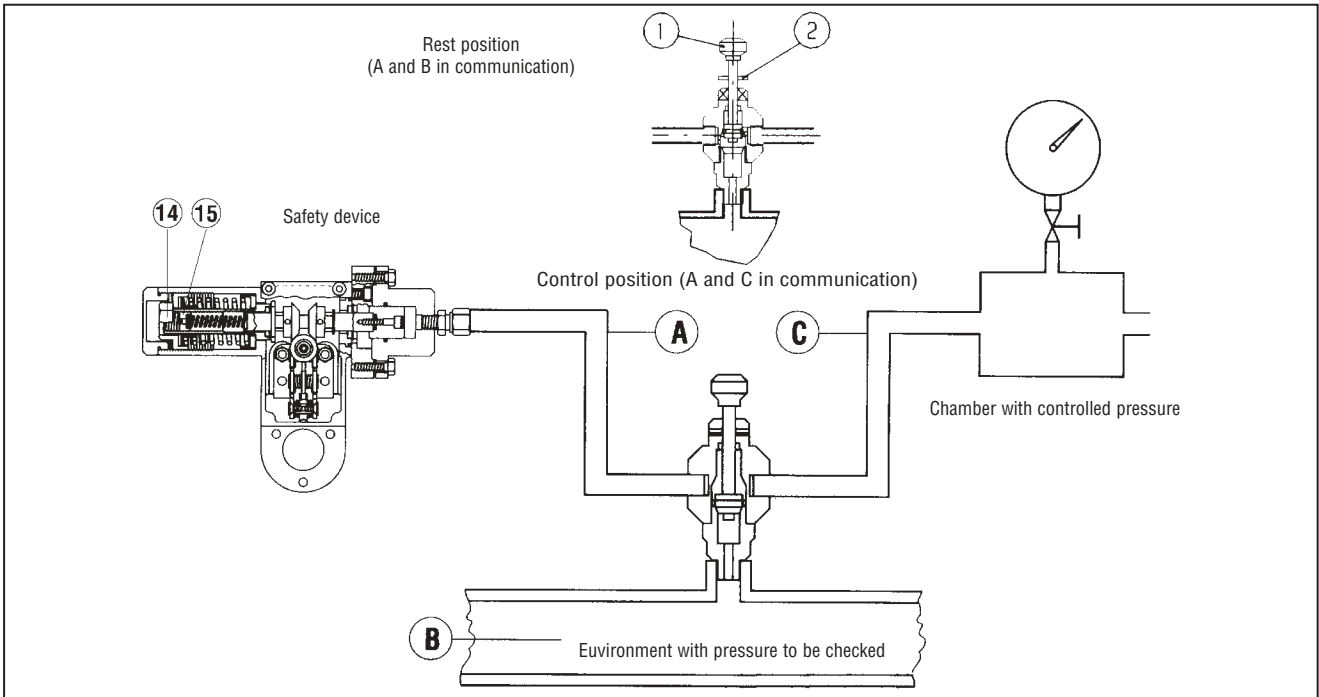


Fig. 21

B) On devices without the "push" valve (fig. 22) we recommend separately connecting the control head to a controlled auxiliary pressure and repeat the operations described above.

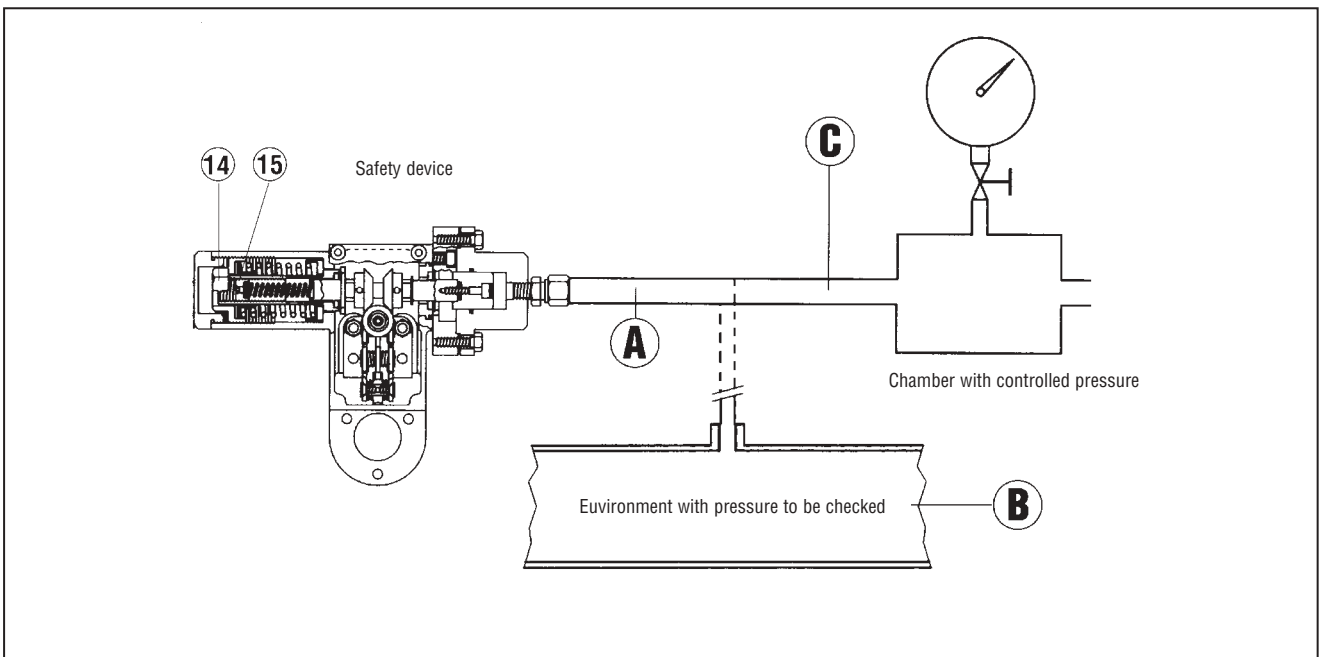


Fig. 22

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) Put the three ways valve 12 in start-up position (connecting the upstream pipe with the pilot).
- 3) Very slowly open the inlet on/off valve V1.
- 4) Very slowly open the slam-shut by turning the provided lever.
- 5) Put the three ways valve 12 in working position (connecting the pressure regulator with the pilot).
- 6) Open the downstream bleed cock 6.
- 7) 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 adjustment screw 10 anticlockwise. Then slowly reopen the valve V1.
- 8) If necessary, adjust the setting by appropriately turning the adjustment screw 10.
- 9) Close the vent cock 6 and check that the down-line pressure, after a period of increase, stabilizes and at a lower value than that of closure of the pilot/regulator combination. Otherwise eliminate the causes of the internal leakage.
- 10) Using a foam substance, check the tightness of all the joints between the on-off valves V1 and V2.
- 11) 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 rate value for the installation.
- 12) It is recommended check that the flow of the line stops when the slam-shut is tripped manually.

Tab. 8	<i>Settings of on-line apparatuses consisting of regulator REFLUX 819/FO + Slam shut + Relief valve</i>		
<i>Regulator set-point (Pas) bar</i>	<i>Set-point RELIEF VALVE</i>	<i>Set-point SLAM-SHUT Max</i>	<i>Set-point SLAM-SHUT Min</i>
1<Pas>2.1	Pas x 1.1	Pas x 1.2	Pas - 0.3 bar
2.1<Pas>5	Pas x 1.1	Pas x 1.2	Pas - 0.5 bar
5<Pas>10	Pas x 1.05	Pas x 1.1	Pas - 3 bar
10<Pas>25	Pas x 1.02	Pas x 1.05	Pas - 5 bar
25<Pas>43	Pas x 1.02	Pas x 1.05	Pas - 5 bar
43<Pas>74	Pas x 1.02	Pas x 1.05	Pas - 5 bar

5.4 COMMISSIONING THE REGULATOR WITH INCORPORATED PM/819 MONITOR AND ACCELERATING VALVE (FIG. 23)

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

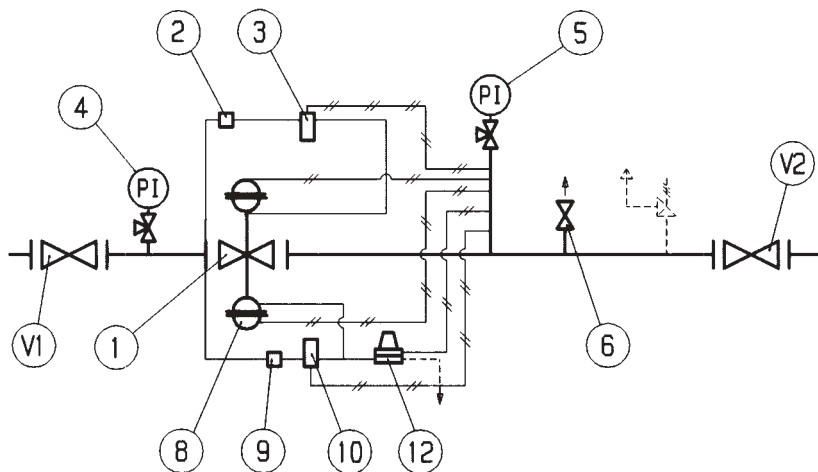


Fig. 23

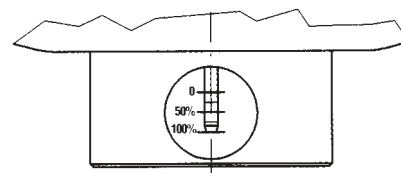


Fig. 23/A

- 1) Partially open the bleed cock 6.
- 2) Very slowly open the inlet on/off valve V1.
- 3) Completely increase the set-point of the pilot 3 of the main regulator by turning the adjustment screw 10 clockwise (fig. 2);
- 4) Completely increase the setting of the accelerating valve by turning the adjustment screw 17 (fig. 7) clockwise;
- 5) Adjust the setting of the monitor pilot 10 to the intervention value established for the accelerating valve 12;
- 6) Reduce the setting of the accelerating valve 12 until, using a foaming agent, gas is seen to be released from the provided vent;
- 7) Reduce the setting of the pilot 10 to the selected working value for the monitor, and ensure that the valve 12 has stopped the release of the gas;
- 8) Adjust the setting of the monitor pilot 10 to the set-point;
- 9) Reduce the setting of the pilot 3 to the selected working value for the service regulator;
- 10) Check that the PM/819 monitor is fully open by controlling the position of the indicator through the window;
- 11) Close the bleed cock 6 and check that the downstream pressure, after increasing, settles at a value slightly higher than that of closure of the pilot/monitor assembly. If it does not, remedy the causes of the internal leakage;
- 12) Using a foaming agent, check the tightness of all the joints between the on/off valves V1 and V2.
- 13) Very slowly open the downstream on/off valve V2 until the line is completely filled. If, at the beginning of this operation, the pressure in the line is much lower than the set-point, the opening of this valve should be choked so as not to exceed the maximum flow rate value of the installation.

5.5 COMMISSIONING THE REGULATOR PLUS REFLUX 819 IN-LINE MONITOR WITH SB/82 SLAM-SHUT VALVE (FIG. 24)

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

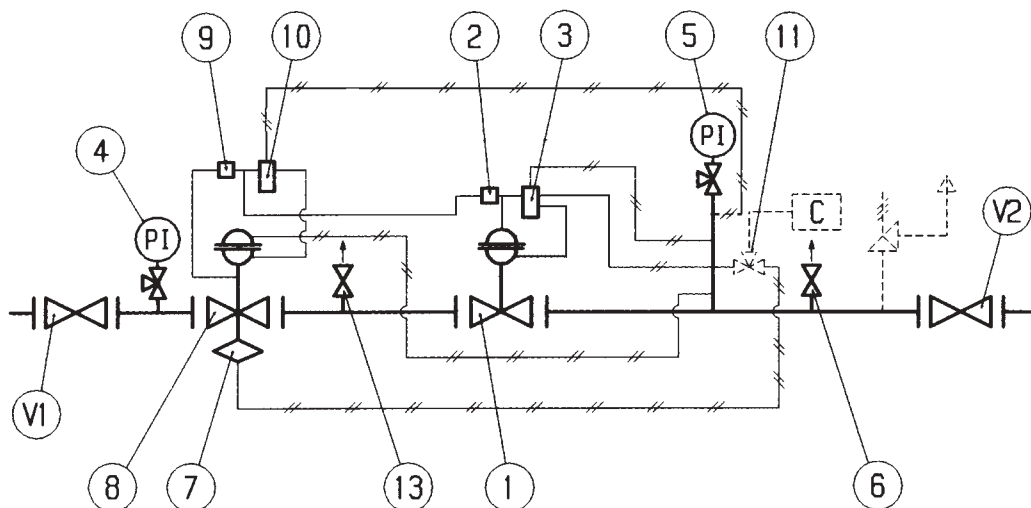


Fig. 24

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. 21):

- 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 lever;
 - keep the knob 1 pressed and:
-) 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 14 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 14 or 15 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. 22) 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) Check that the slam-shut is in the closed position.
- 2) Very slowly open the inlet on/off valve V1.
- 3) Very slowly reset the slam-shut valve by actuating the provided lever. In the case of safety devices for maximum pressure only, the device will stay spontaneously engaged in the open position.
For safety devices which intervene when pressure increases and decreases, keep the lever raised and increase the outlet pressure to the desired regulator set-point. At this point, the lever can be released and the slam-shut will stay in the open position;
- 4) Partially open the bleed cock 6.
- 5) Completely increase the setting of the pilot 3 by tuning the adjustment screw 10 clockwise and ensure that the service regulator 1 is in the fully open position by controlling the position of the stroke indicator through the window.
- 6) Check that the setting of the pilot 10 corresponds to the selected working value for the monitor and adjust it to the desired value if necessary.
- 7) Reduce the setting of the pilot 3 to the selected working value for the service regulator.
- 8) Check that the REFLUX 819 monitor is fully open by controlling the position of the stroke indicator through the window.
- 9) Close the bleed cock 6 and check that the downstream pressure, after increasing, settles at a value slightly higher than that of closure of the pilot/regulator assembly. If it does not, remedy the causes of the internal leakage;
- 10) Using a foaming agent, check the tightness of all the joints between the on/off valves V1 and V2.
- 11) Very slowly open the downstream on/off valve V2 until the line is completely filled. If, at the beginning of this operation, the pressure in the line is much lower than the set-point, the opening of this valve should be choked so as not to exceed the maximum flow rate value of the installation.
- 12) It is recommended check that when you operate the slam-shut manually, the flow in the line stops.

5.6 COMMISSIONING THE REGULATOR PLUS REFLUX 819/FO IN-LINE MONITOR WITH SB/82 SLAM-SHUT VALVE (FIG. 25)

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

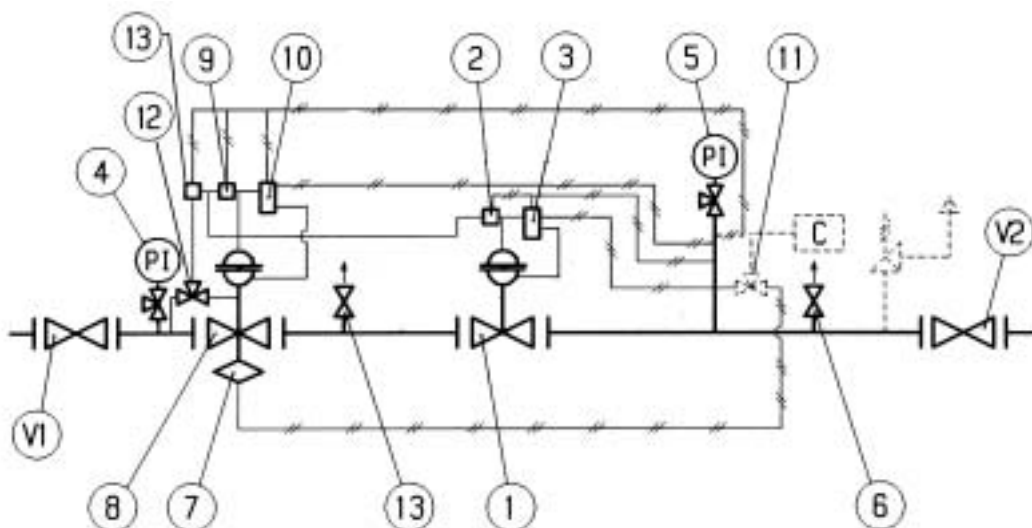


Fig. 25

- insert a reference pin 2 in the notch, pressing the knob 1 completely;
- reset the slam-shut device by means of the provided lever;
- keep the knob 1 pressed and:

-) 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 14 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 14 or 15 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. 22) 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) Check that the slam-shut is in the closed position.
- 2) Put the three ways valve 12 in start-up position (connecting the upstream pipe with the pilot).
- 3) Very slowly open the inlet on/off valve V1.
- 4) Very slowly reset the slam-shut valve by actuating the provided lever. In the case of safety devices for maximum pressure only, the device will stay spontaneously engaged in the open position.
For safety devices which intervene when pressure increases and decreases, keep the lever raised and increase the outlet pressure to the desired regulator set-point. At this point, the lever can be released and the slam-shut will stay in the open position;
- 5) Put the three ways valve 12 in working position (connecting the pressure regulator with the pilot).
- 6) Partially open the bleed cock 6.
- 7) Completely increase the setting of the pilot 3 by tuning the adjustment screw 10 clockwise and ensure that the service regulator 1 is in the fully open position by controlling the position of the stroke indicator through the window.
- 8) Check that the setting of the pilot 10 corresponds to the selected working value for the monitor and adjust it to the desired value if necessary.
- 9) Reduce the setting of the pilot 3 to the selected working value for the service regulator.
- 10) Check that the REFLUX 819/FO monitor is fully open by controlling the position of the stroke indicator through the window.
- 11) Close the bleed cock 6 and check that the downstream pressure, after increasing, settles at a value slightly higher than that of closure of the pilot/regulator assembly. If it does not, remedy the causes of the internal leakage;
- 12) Using a foaming agent, check the tightness of all the joints between the on/off valves V1 and V2.
- 13) Very slowly open the downstream on/off valve V2 until the line is completely filled. If, at the beginning of this operation, the pressure in the line is much lower than the set-point, the opening of this valve should be choked so as not to exceed the maximum flow rate value of the installation.
- 14) It is recommended check that when you operate the slam-shut manually, the flow in the line stops.

Tab. 9: Settings of in-line apparatuses consisting of Regulator REFLUX 819/FO + Monitor + Slam-shut + Relief valve					
Set-point Regulator (Pas) bar	Set-point MONITOR	Set-point ACCELERATING VALVE	Set-point RELIEF-VALVE	Set-point SLAM-SHUT Max	Set-point SLAM-SHUT Min
1<Pas>2.1	Pas x 1.1	Pas x 1.2	Pas x 1.3	Pas x 1.5	Pas - 0.3 bar
2.1<Pas>5	Pas x 1.1	Pas x 1.2	Pas x 1.3	Pas x 1.4	Pas - 0.5 bar
5<Pas>25	Pas x 1.05	Pas x 1.1	Pas x 1.15	Pas x 1.3	Pas - 3 bar
25<Pas>74	Pas x 1.03	Pas x 1.06	Pas x 1.15	Pas x 1.3	Pas - 5 bar

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 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. 10 REFLUX 819/FO REGULATOR (FIG. 26, 27 and 28)

PROBLEM	POSSIBLE CAUSES	APPARATUS	REMEDY
Operating anomalies	Unsuitable feed Worn diaphragm [10] Spring [12] yielded or off level Obturator guide ring [20] worn	R14/A/FO Pre-regulator (Fig. 28)	Change the spring [12] Replace Replace Replace
	Friction in diaphragm holder packet Worn diaphragm [16] Spring [22] yielded or off level	204A/FO Pilot (Fig. 27)	Centre the packet hole movement and shaft Replace diaphragm Replace
	Obturator guide ring [35] worn Friction between the obturator and obturator guide Reinforced gasket [7] off level or worn Friction on balancing rod Spring yielded or off level Service regulator and monitor set-points too close	Regulator (Fig. 26)	Replace Check the guide rings [51] [52] Replace Replace ring [36] Replace spring Distance the two set-points
Tightness failure Q=0	Ring [17] [18] damaged Guide ring [20] damaged Reinforced gasket [9] damaged Ruptured diaphragm [10]	R14/A/FO Pre-regulator (Fig. 28)	Replace Replace Replace Replace diaphragm
	Obturator [17] damaged	204A/FO Pilot (Fig. 27)	Replace

6.1 Tab. 10 REGULATOR (FIG. 26-27 and 28)

PROBLEM	POSSIBLE CAUSES	APPARATUS	REMEDY
Tightness failure Q=0	Reinforced gasket [7] damaged Obturator guide ring [35] damaged Ice formation between the seat and the plug	Regulator (Fig. 26)	Replace Replace Increase the gas inlet temperature to the regulator
Pressure increase with Q>0	Diaphragm [20] ruptured Diaphragm [10] ruptured Occlusion by dirty Reinforced gasket [9] swollen	R14/A/FO Pre-regulator (Fig. 28)	Replace Replace Check cartridge [13] filtering level Replace
	Obturator [17] damaged Obturator [17] stuck in the open position Spring [21] yielded	204/A/FO Pilot (Fig. 27)	Replace Control and clean if necessary Replace
	Reinforced gasket [7] damaged Ice formation between the seat and the plug Dirt between the reinforced gasket and the obturator Obturator blocked Diaphragm fixed incorrectly Diaphragm ruptured (50) Obturator guide ring [35] damaged Diaphragm [50] ruptured	Regulator (Fig. 26)	Replace Increase the gas inlet tem. to the regulator Clean and check gas filtering Clean and check movement Fix Replace Replace Replace
Pressure drop	Feed too low Filter cartridge [13] dirty Occlusion by temperatura Occlusion by dirty Reinforced gasket [9] swollen Pilot feed line broken	R14/A/FO Pre-regulator (Fig. 28)	Replace the spring [12] Replace Increase inlet temp. to the preregulator Check cartridge [13] filtering level Replace Repair
	Diaphragm [16] ruptured Motorisation line to the regulator broken	204/A/FO Pilot (Fig. 27)	Replace Repair
	Obturator blocked Diaphragm [50] ruptured Guide ring [36] damaged No pressure upstream	Regulator (Fig. 26)	Clean and check movement Replace Replace Check cleanliness of line filter cartridges

6.2 Tab. 11 PM/819 MONITOR (FIG. 29 and 30)

PROBLEM	POSSIBLE CAUSES	APPARATUS	REMEDY
Pressure increase with Q>0	Guide ring [20] damaged Diaphragm [10] ruptured	R14/A Pre-regulator (fig. 30)	Replace Replace
	Obturator [17] damaged Obturator [17] stuck in the open position Spring [21] yielded	204/A Pilot (fig. 30)	Replace Control and clean if necessary Replace
	Reinforced gasket [7] damaged Ice formation between the reinforced gasket and the plug Dirt between the reinforced gasket and the obturator Obturator blocked Diaphragm fixed incorrectly Downstream sensing line dirty Occlusion of pressure chamber vent nozzle Obturator guide ring [35] damaged	Regulator (fig. 29)	Replace Increase the gas temperature at the regulator inlet Clean and check gas filtering Clean and check movement Fix Clean Clean Replace
Pressure drop	Feed too low Filter cartridge [13] dirty Occlusion by frost Occlusion by dirty Diaphragm [10] ruptured Reinforced gasket [9] swollen Pilot feed line broken	R14/A Pre-regulator (fig. 30)	Replace the spring [12] Replace Increase temp. at the preregulator inlet Check cartridge [13] filtering level Replace Replace Repair
	Diaphragm [16] ruptured Motorisation line to the regulator broken	204/A Pilot (fig. 30)	Replace Repair
	Obturator blocked Diaphragm [50] ruptured Guide ring [36] damaged Breakage or leakage from vent nozzle calibrated hole screw No pressure upstream	Regulator (fig. 29)	Clean and check movement Replace Replace Repair Check cleanliness of line filter cartridges

6.3 Tab. 12 SB/82 SLAM-SHUT (FIG. 31)

PROBLEM	POSSIBLE CAUSES	REMEDY
Slam-shut obturator does not close	Control head diaphragm [4] broken	Change diaphragm
Leakage from slam-shut obturator	Seal of obturator [40] deteriorated	Change seal
	Seat of obturator deteriorated	Change the seat
	Seal by-pass deteriorated	Change seal
Incorrect intervention pressure	Wrong max. and/or min. spring setting	Make the setting again by means of the rings
	Friction in the lever mechanism	Change the box containing the whole assembly
Resetting not possible	Persistence of the cause of the increase or decrease of the downstream pres.	Decrease or increase the downstream pressure
	Lever mechanism broken or cracked	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 to you. For further information contact our SATRI service centre at our Arcugnano (VI) 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 tables 17 and 18.

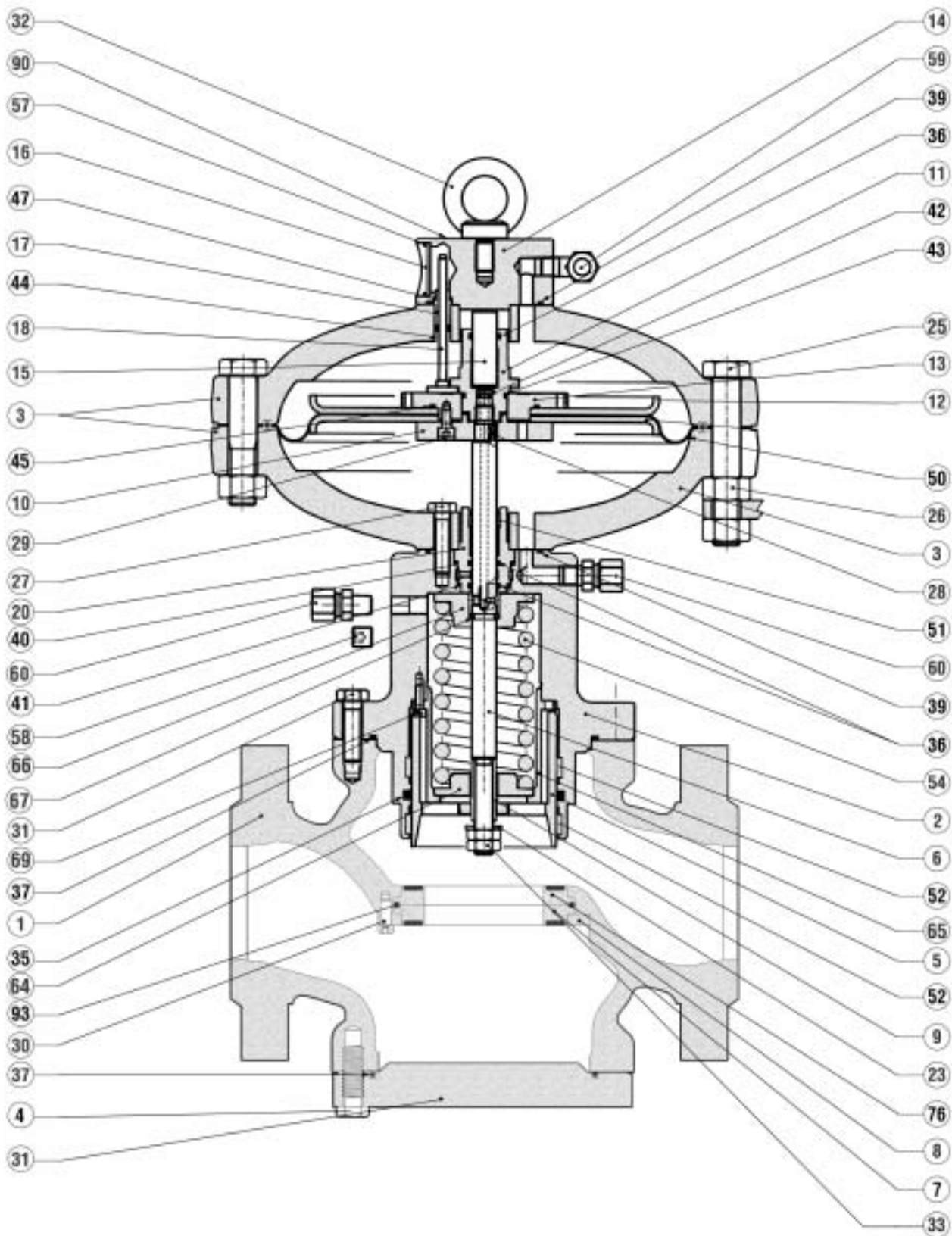
For a proper maintenance the recommended spare parts are unequivocally identified by labels indicating:

- 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 pressure value. If equipment is used as safety accessory to PED, internal tightness shall be verified at a pressure value of 1,1XPS. Both verifications are essential to maintain the validity of the **CE** marking.

7.2 REFLUX 819/FO REGULATOR MAINTENANCE PROCEDURE



DN: 2" - 3"
Fig. 26

204/A/FO - 205/A/FO PILOT

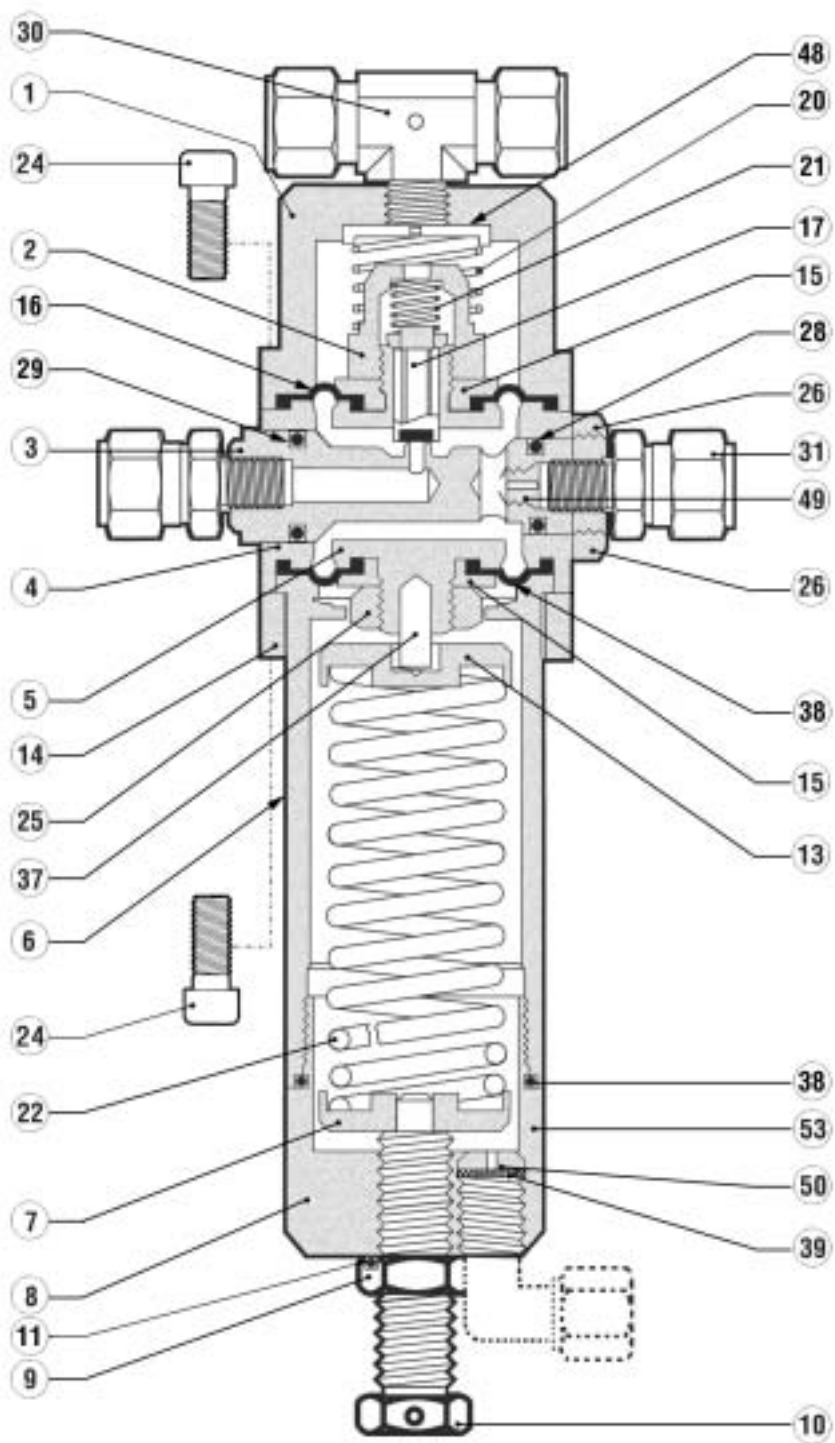


Fig. 27

PRE-REGULATOR R14/A/FO

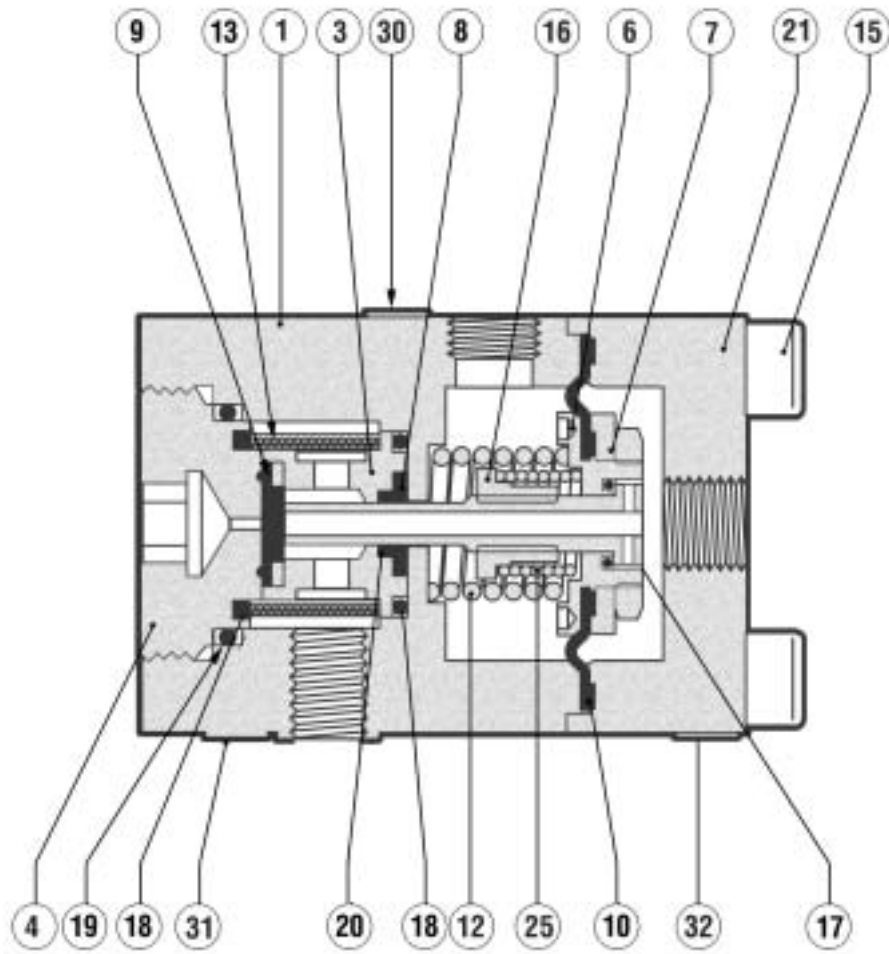


Fig. 28

Procedure for disassembling, completely changing the spare parts, and reassembling of REFLUX 819/FO pressure regulator with 204/A/FO + R14/A/FO pilot (PREVENTATIVE PROGRAMMED MAINTENANCE)

PRELIMINARY OPERATIONS

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

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 204/A/FO + R14/A/FO pilot assembly from the regulator.

DISASSEMBLY

(The positions refer to fig. 26)

- 4) Slacken the fixing screws, pos. (25).
- 5) Remove the top cover, pos. (3), using appropriate means and turning the eyebolt, pos. (32).
- 6) Slacken the fixing screws, pos. (27).
- 7) Separate the top cover, pos. (3), from the top flange, pos. (14).
- 8) Remove the stroke indicator rod guide, pos. (14), from the top flange, pos. (17).
- 9) Keeping the diaphragm-holder assembly fixed with a wrench, unscrew and remove the balancing rod guide, pos. (11).
- 10) Separate the balancing piston, pos. (15), from the balancing guide rod, pos. (11).
- 11) Remove the diaphragm holder assembly.
- 12) Slacken the diaphragm-holder assembly fixing screws, pos. (29).
- 13) Separate the protection discs, pos. (12), from the diaphragm, pos. (50).
- 14) Slacken the fixing screws, pos. (27).
- 15) Separate the bottom cover, pos. (3), from the obturator guide, pos. (2).
- 16) Remove the guide rod, pos. (20).
- 17) Control and clean all the disassembled metal parts.
- 18) Replace all the parts from the spare parts kit.

REASSEMBLING THE REGULATOR SERVOMOTOR UNIT

Remember that the O-rings and the sliding mechanical parts (rods, etc.) must be lightly lubricated, before reassembly, with a fine layer of silicone grease, while static parts require grease to make them softer but mainly to hold them in their slots:

- 19) Reassemble the guide rod, pos. (20).
- 20) Reassemble the bottom cover, pos. (2), on the obturator guide, pos. (3), remembering to align the downstream sensing line hole properly.
- 21) Reassemble and fix the screws, pos. (27).
- 22) Reassemble and fix the screws of the diaphragm-holder assembly, remember to align the hole for the transfer nozzle.
- 23) Reassemble the diaphragm-holder assembly on the head.
- 24) Reassemble the balancing piston, pos. (15), on the balancing guide rod, pos. (11).
- 25) Screw and fix the balancing guide rod, pos. (11), to the rod, keeping the diaphragm-holder fixed.
- 26) Reassemble the stroke indicator rod guide, pos. (14), onto the top flange (17).
- 27) Reassemble the top cover, pos. (3), and the top flange, pos. (14), and fix the screws, pos. (27).
- 28) Reassemble the stroke indicator rod, pos. (18), (preferably not above the transfer holes).
- 29) Using appropriate means on the eyebolt, pos. (32), reassemble the top cover, pos. (3), after checking that the diaphragm is correctly positioned with respect to the bottom cover.
- 30) Reassemble and fix the screws, pos. (25).

DISASSEMBLING THE REGULATOR REGULATION UNIT

- 31) Slacken the fixing screws, pos. (31).
- 32) Remove the regulation unit from the main body, pos. (1).
- 33) Completely slacken the spring, pos. (54), unscrewing the lock nut, pos. (9).
- 34) Remove the obturator, pos. (5), the spacer, pos. (22), and the spring, pos. (54), from the obturator, pos. (2).
- 35) Slacken the fixing screws, pos. (31), on the bottom blind flange, pos. (4).
- 36) Remove the bottom blind flange, pos. (4).
- 37) Slacken the fixing screws, pos. (30), of the lock ring, pos. (7), of the reinforced gaskets, pos. (8).
- 38) Remove the lock ring, pos. (8), and the rein-forced gaskets, pos. (7).
- 39) Check and clean the inside of the regulator body.
- 40) Carefully control the condition of the obturator seat, pos. (5).
- 41) Replace all the parts from the spare parts kit.

REASSEMBLING THE REGULATOR REGULATION UNIT

Remember that the O-rings and the sliding mechanical parts (rods, etc.) must be lightly lubricated, before reassembly, with a fine layer of silicone grease, while static parts require grease to make them softer but mainly to hold them in their slots:

- 42) Reassemble the reinforced gaskets, pos. (7), the lock ring, pos. (8), and fix the screws of the ring itself, pos. (30).
- 43) Reassemble the bottom blind flange, pos. (4), and fix the screws, pos. (31).
- 44) Reassemble the spring, pos. (54), the spacer, pos. (22) and the obturator, pos. (5), on the rod, pos. (6), and fully screw in the lock nut, pos. (9).
- 45) Reassemble the regulation unit on the main body, and fix the screws, pos. (31).

DISASSEMBLING GROUP PILOT

- 46) Disconnect the connectors between the pilot 204/A/FO and the preregulator R14/A/FO, unscrewing the tapered seal connectors.

DISASSEMBLING THE PILOT 204/A/FO (Fig. 27)

- 47) Slacken the lock nut (9).
- 48) Slacken the adjustment screw (10) for its complete stroke by turning it anticlockwise.
- 49) Remove the pilot plug (8).
- 50) From the pilot, remove the spring support (7), the spring (22) and the spring support (13).
- 51) Slacken the screw (24) and remove the sleeve (6) and the pilot bracket (14).
- 52) Unscrew the lock nut (25) and remove the protection disc (5) and the bottom diaphragm (16).
- 53) Slacken the screws (24) and remove the pilot cover (1) along with the spring (20).
- 54) Unscrew the pilot nut (2) and remove the spring (21), the pilot obturator (17), the protection disc (15) and the top diaphragm (16).
- 55) Unscrew the lock nut from the valve seat (25).
- 56) From the pilot body (4) remove the shaft of the valve seat (3) along with the diaphragm support (5).
- 57) Clean and carefully check that the valve seat (3) is in good condition.
- 58) **Replace all the components which are part of the spare parts kit.**

REASSEMBLING THE PILOT 204/A/FO

- 59) On the pilot body (4), reassemble the shaft of the valve seat (3), putting the diaphragm support (5) between them.
- 60) Screw the lock unit (25).
- 61) Reassemble the bottom diaphragm (16), the protection disc (15) and screw in the pilot lock nut (25).
- 62) Insert the pilot obturator (17), the spring (21), the top diaphragm and the protection disc (15).
- 63) Screw in the pilot nut (2).
- 64) Centre the valve seat shaft and diaphragm support secure the nut (5).
- 65) Reassemble the pilot cover (20) along with the spring (1) and fix the screws (24).
- 66) Reassemble the sleeve (6) and the pilot bracket (14) and secure it by screwing in the screws (24).
- 67) Position the spring support (13), the spring (22), and the spring support (7) and fix the pilot plug (8).

DISASSEMBLING THE PRE-REGULATOR R14/A/FO (Fig. 28)

- 68) From the pre-regulator body (1), remove the cover (2), slackening the screws (15).
- 69) Remove the diaphragm obturator assembly and the spring (12).
- 70) Separate the diaphragm assembly (10) and obturator (5), unscrewing the lock nut (16).
- 71) Unscrew the pre-regulator plug (4).
- 72) From the pre-regulator body (1), remove the pre-regulator plug (4), the reinforced gasket (9), the filter (13) the obturator guide (3) and the guide ring (8).
- 73) Clean and carefully check that the obturator (5) is in a good state.
- 74) **Replace all the components which are part of the spare parts kit.**

REASSEMBLING THE PRE-REGULATOR R14/A/FO

- 75) Reassemble the shaft-filter guide assembly.
- 76) Screw in the pre-regulator plug (4).
- 77) Reassemble the diaphragm-obturator assembly.
- 78) Reassemble the spring and the diaphragm-obturator assembly and fix the cover (2) , securing the screws (15).

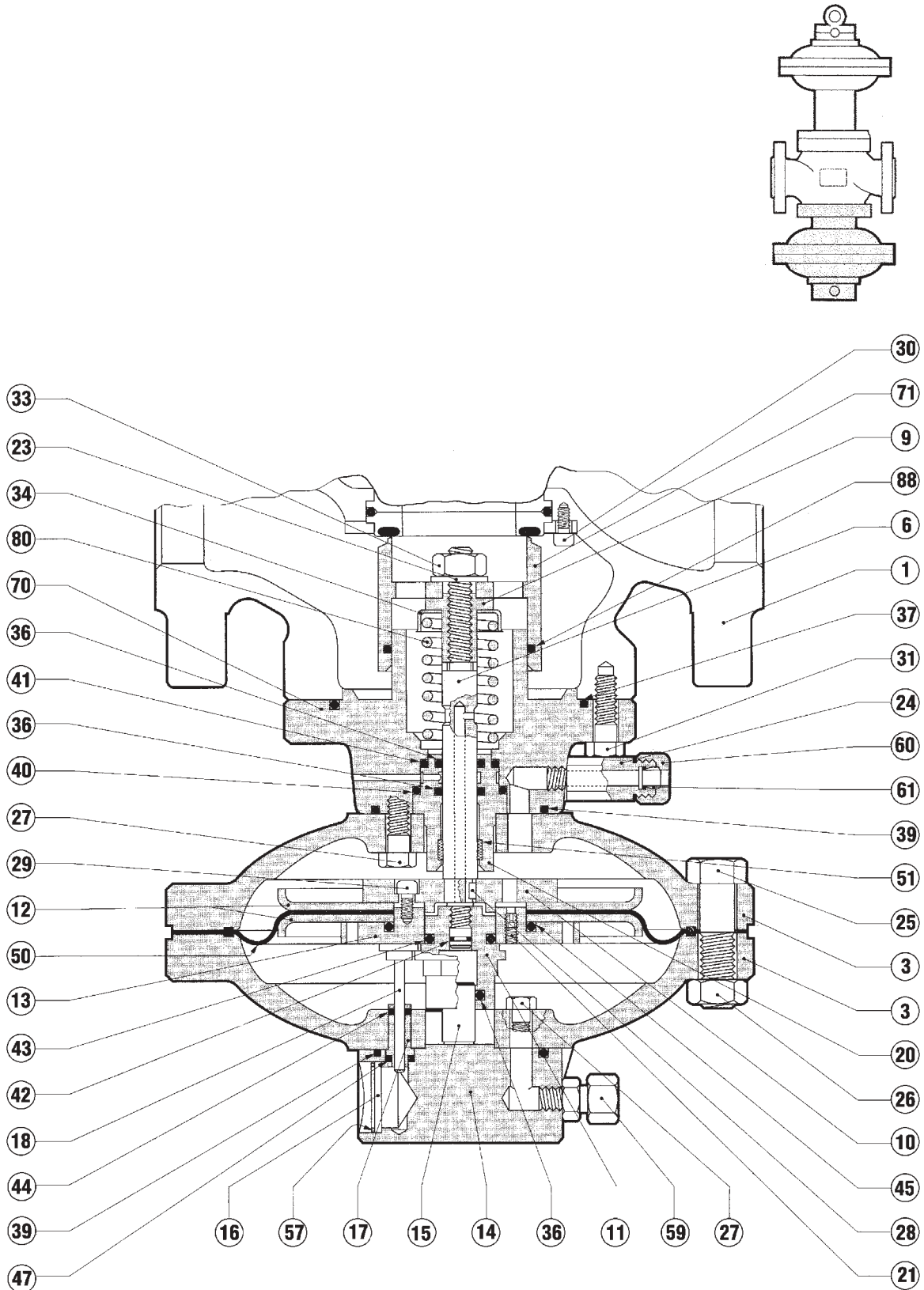
REASSEMBLING THE PILOT ASSEMBLY

- 79) Reconnect the connectors between the pilot 204/A/FO and the pre-regulator R14/A/FO screwing in the tapered seal connectors.

FINAL OPERATIONS

- 80) Reassemble the pilot 204/A/FO + R14/A/FO assembly on the regulator.
- 81) Secure the nut of the bracket holding the pilot on the regulator.
- 82) Reconnect all the feed and impulse connectors of the pilot and regulator, screwing in the tapered seal connectors.

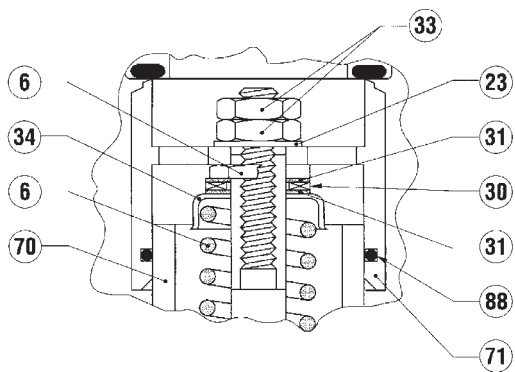
7.3 PM/819 MONITOR MAINTENANCE PROCEDURE



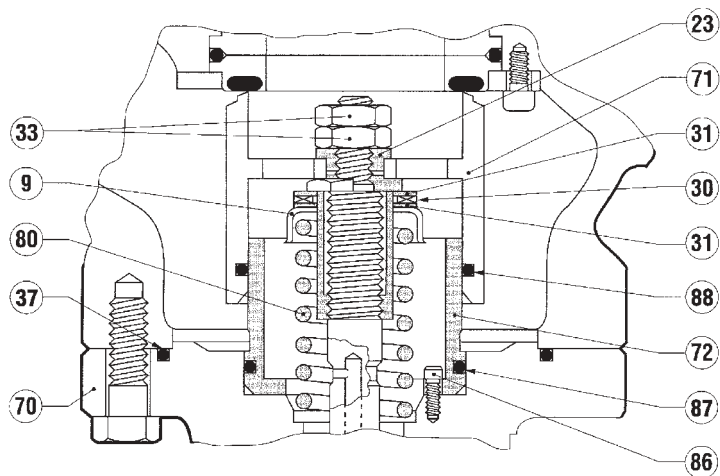
DN: 2"

Fig. 29

VERSIONS



DN: 3" - 4"



DN: 6" ÷ 10"

Fig. 29/A

204/A + R14/A PILOT

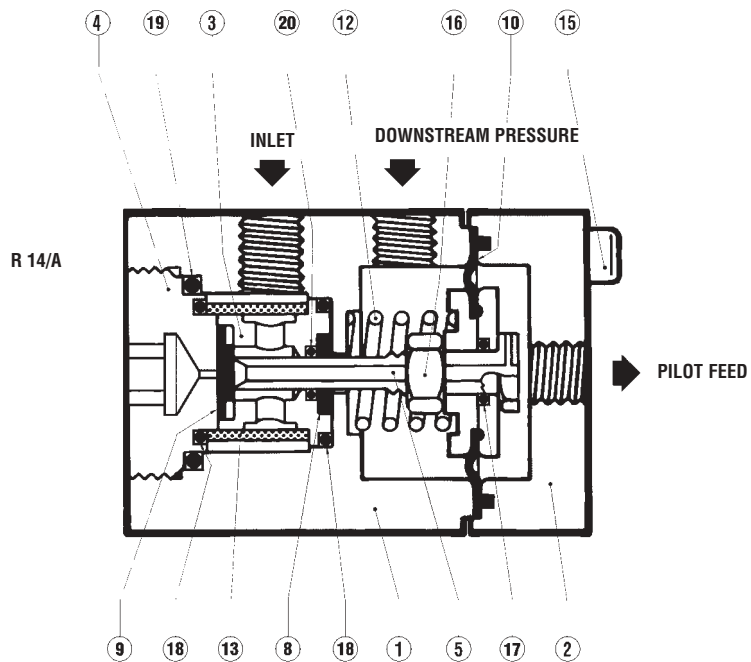
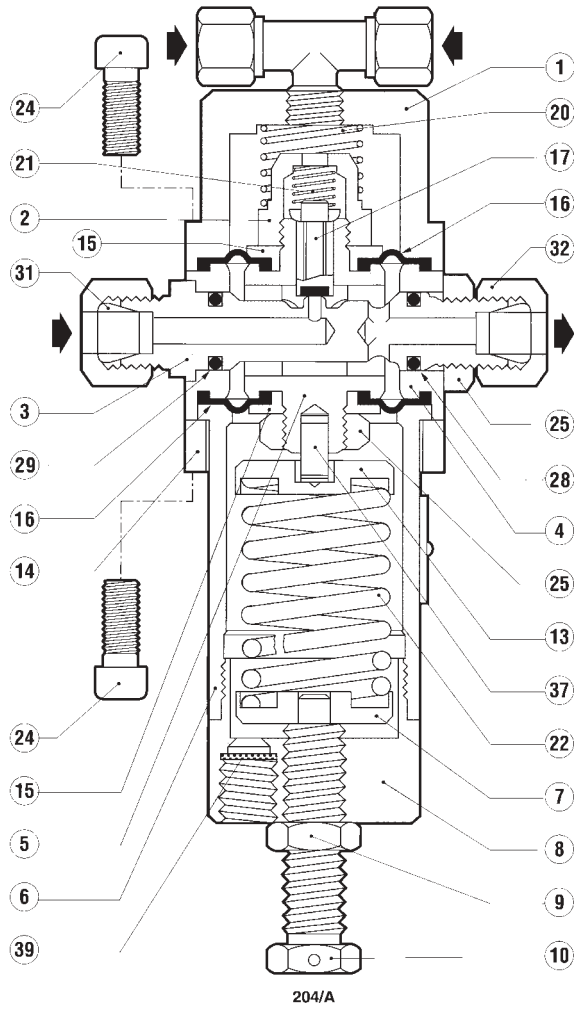


Fig. 30

PM/819 MONITOR (FIG. 29)

- 1) Disconnect the connection pipes between the regulator and monitor and the respective pilot units, and between the latter and the downstream pressure take-offs.
- 2) Remove the screws (88) which secure the reduction assembly (90) of the monitor to the body, making sure that the weight of the reduction assembly itself can be sustained. When removing the assembly from the body, the maximum care must be taken so as to avoid denting the sealing edge of the obturator (5).
- 3) Lay the reduction assembly on one side.
- 4) Slacken the lock nut, (33), fixing the obturator, (71) to the rod (6), and remove the obturator, (71) from the obturator guide (70).
- 5) Completely slacken the spring, (80), by unscrewing the lock nut, (9).
- 6) Remove the screws (25) and the nuts (26) from the obturator guide (2).
- 7) Raise the top cover (3) with the flange (14) and the indicator rod guide (17). To separate the three parts, unscrew the screws (27).
- 8) Separate the parts (11) and (13) making use of the flat faces on the piston guide (11) and the holes on the disc (13).
- 9) Raise the assembly composed of the diaphragm (50) and the discs (10), (12) and (13); disassemble the diaphragm (50) by removing the screws (23).
- 10) Remove the stem (6) from the side of the cover.
- 11) Disassemble the bottom cover (3) by removing the screws (27), and remove the stem guide (20).

Take the following precautions during reassembly:

- the bottom cover (3) should be fixed to the obturator guide (2) in such a way that the hole of the motorization pressure passage mates with the similar hole on the obturator guide itself;
- when assembling the assembly consisting of the diaphragm (50) and the guard discs, check that the hole with the nozzle on disc (13) is aligned with the hole on disc (10); also check that the hole on nozzle (21) is free from dirt and foreign bodies;
- when assembling the assembly composed of the top cover (3) with the flange (14) and the indicator rod ensure that the washer of the indicator rod (18) is correctly fitted between the disc (13) and the piston guide (11) and that it does not obstruct the hole in disc (13); it should all be turned in such a way that the indicator port is completely visible;
- before securing the lock nut (9), check that the spring (54) is properly housed in the special centring beat on the obturator guide (2).

DISASSEMBLING THE PILOT ASSEMBLY

- 1) Disconnect the connection nipples between the pilot 204/A and the preregulator R14/A, unscrewing the tapered seal connectors.

DISASSEMBLING THE 204/A PILOT (FIG. 30)

- 2) Slacken the lock nut (9).
- 3) Slacken the adjustment screw (10) for its complete stroke by turning it anticlockwise.
- 4) Remove the pilot plug (8).
- 5) Remove the spring support (7), the spring (22) and the spring support (13) from the pilot.
- 6) Slacken the screw (24) and remove the sleeve (6) and the pilot bracket (14).
- 7) Unscrew the lock nut, (25) and remove the protection disc (5) and the bottom diaphragm (16).
- 8) Slacken the screws (24) and remove the pilot cover (1) along with the spring (20).
- 9) Unscrew the pilot nut (2) and remove the spring (21), the pilot obturator (17), the protection disc (15) and the top diaphragm (16).
- 10) Unscrew the lock nut from the valve seat (25).
- 11) From the pilot body (4) remove the shaft of the valve seat (3) along with the diaphragm support (5).
- 12) Clean and carefully check that the valve seat (3) is in good condition.
- 13) **Replace all the components which are part of the spare parts kit.**

REASSEMBLING THE 204/A PILOT

- 14) On the pilot body (4), reassemble the shaft of the valve seat (3), putting the diaphragm support (5) between them.
- 15) Screw and tighten the nut (25).
- 16) Reassemble the bottom diaphragm (16), and the protection disc (15) and screw in the pilot lock nut (25).
- 17) Insert the pilot obturator (17), the spring (21), the top diaphragm and the protection disc (15).
- 18) Screw in the pilot nut (18).
- 19) Check and centre the diaphragm support (5).
- 20) Reassemble the pilot cover (20) along with the spring (1) and fix the screws (24).
- 21) Reassemble the sleeve (6) and the pilot bracket (14) on the pilot body (4) and secure it by screwing in the screws (24) mm.
- 22) Position the spring support (13), the spring (22), and the spring support (7) and fix the pilot plug (8)

DISASSEMBLING THE R14/A PRE-REGULATOR (Fig.30)

- 23) By slackening the screws (5), remove the cover (2), from the pre regulator body (1).
- 24) Remove the diaphragm obturator assembly and the spring (12).
- 25) Separate the diaphragm assembly (10) and obturator (5), by unscrewing the lock nut (16).
- 26) Unscrew the pre-regulator plug (4).

- 27) From the pre-regulator body (1), remove the pre-regulator plug (4), the reinforced gasket (9), the filter (13), the obturator guide (3) and the guide ring (8).
- 28) Clean and carefully check that the obturator (5) is in a good state.
- 29) **Replace all the components which are part of the spare parts kit.**

REASSEMBLING THE R14/A PRE-REGULATOR

- 30) Reassemble the filter-shaft guide assembly.
- 31) Screw in the pre-regulator plug (4).
- 32) Reassemble the diaphragm-obturator assembly.
- 33) Reassemble the spring and the diaphragm-obturator assembly and fix the cover (2), securing the screws (15).

REASSEMBLING THE PILOT ASSEMBLY

- 34) Reconnect the connection nipples between the pilot 204/A and the pre-regulator R14/A screwing in the tapered seal connectors.

7.4 DB/819 SILENCER MAINTENANCE PROCEDURE

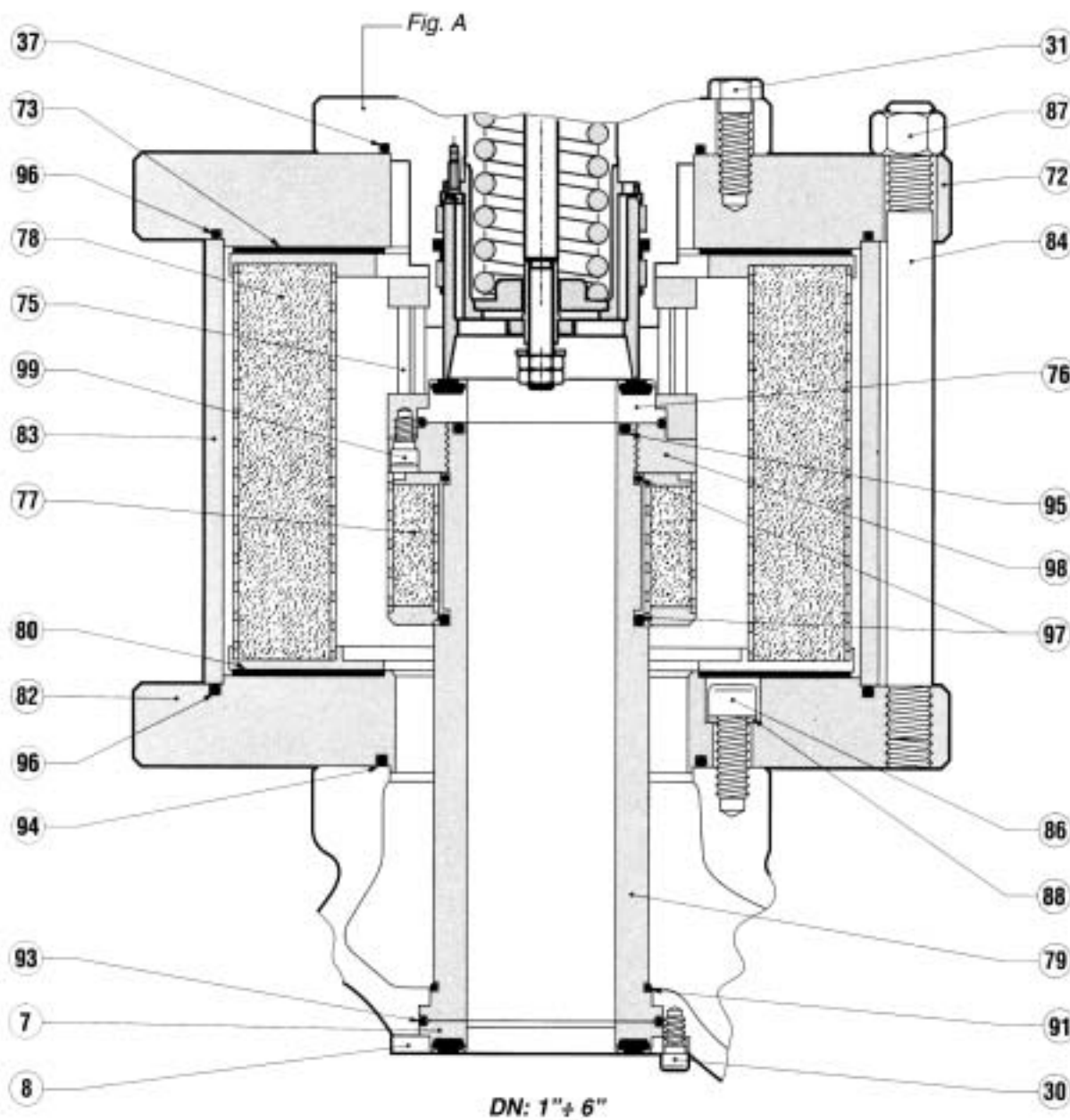
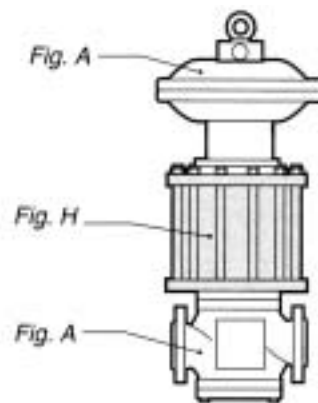


Fig. 31

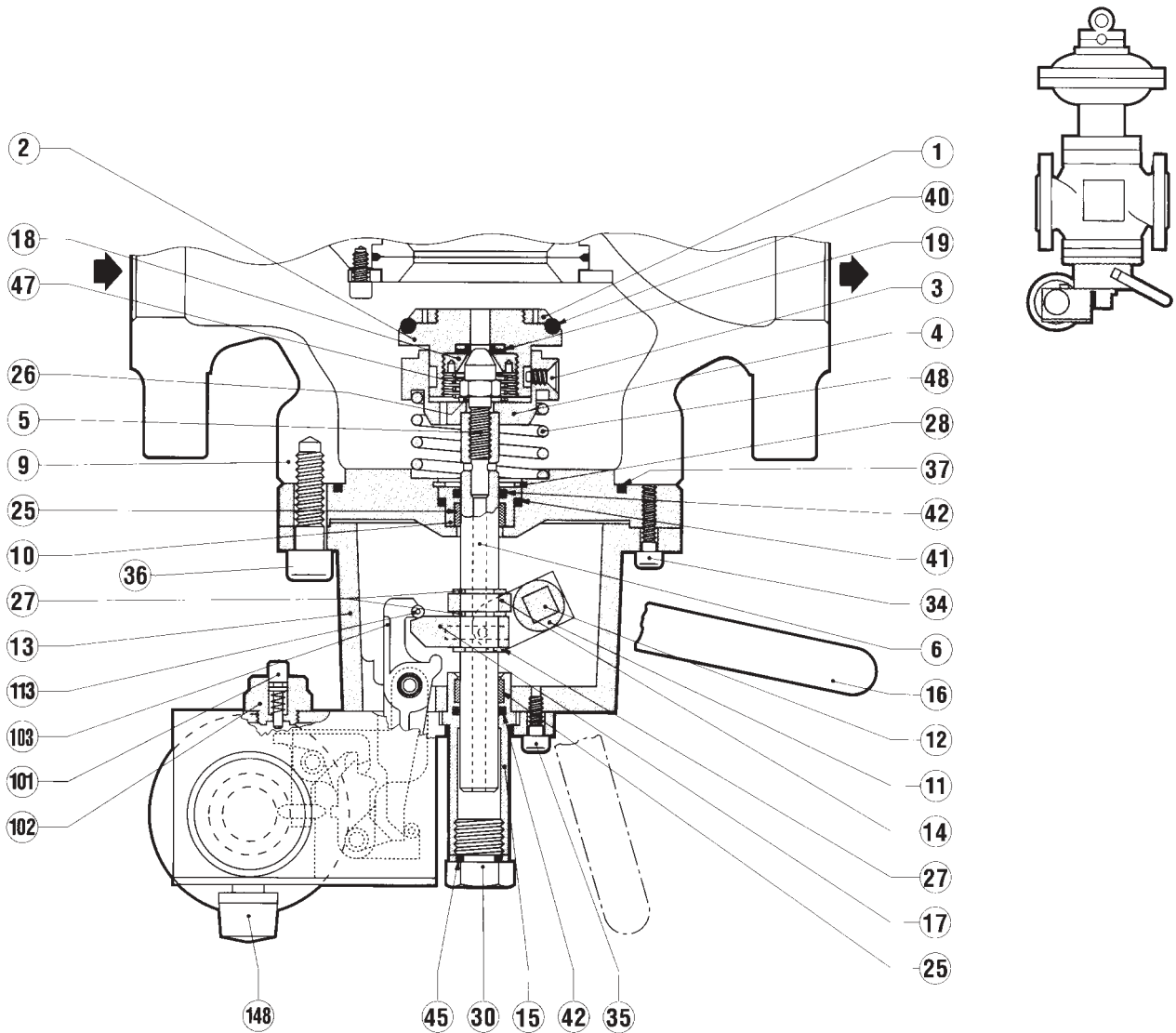
DB/819 SILENCER (FIG. 31)

- 1) Slacken and remove the screws, pos. (31), and detach the motorization head from the main body.
- 2) Unscrew the eyebolts and nuts, pos. (87), and raise the flange, pos. (72).
- 3) From the sleeve, pos. (79), remove the complete grill, pos. (75), the reinforced gasket, pos. (7), and the fixing ring, pos. (98).
- 4) Detach the grill, pos. (75) from the reinforced gasket, pos. (7), slackening the screws, pos. (99).
- 5) From the sleeve, pos. (79), remove the internal basket, pos. (77).
- 6) Remove the outer basket, pos. (78), with its gaskets, pos. (73) and (80).
- 7) Remove the plating, pos. (83).
- 8) Slacken the screws, pos. (86), and remove the bottom flange of the silencer, pos. (82).

Remember that once they have been removed, the washers, pos. (88) are no longer able to guarantee tightness, and must therefore be replaced by new ones.

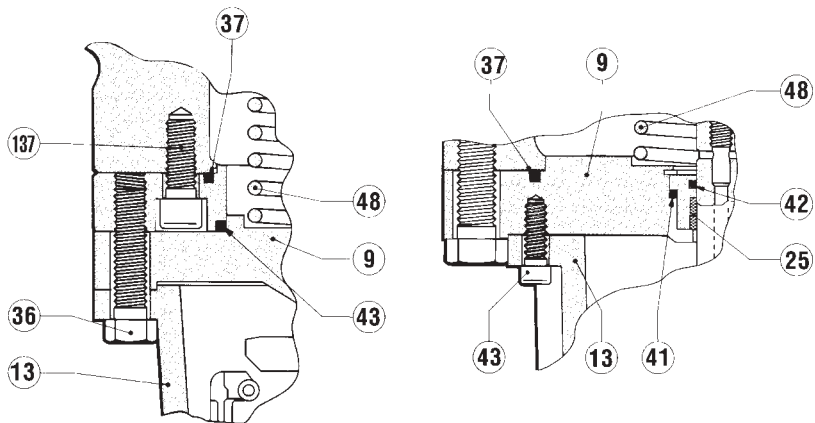
When re-assembling the outer basket, pos. (78), ensure that the support with the smaller internal diameter is turned towards the flange, pos. (82).

7.5 SLAM-SHUT DEVICE SB/82 MAINTENANCE PROCEDURE



DN: 2"

VERSIONS

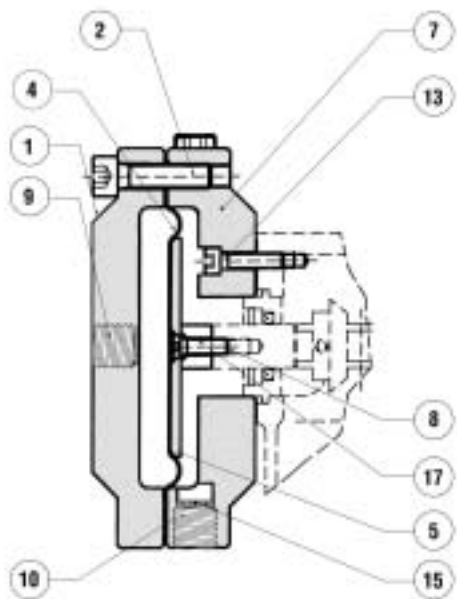


DN: 1"

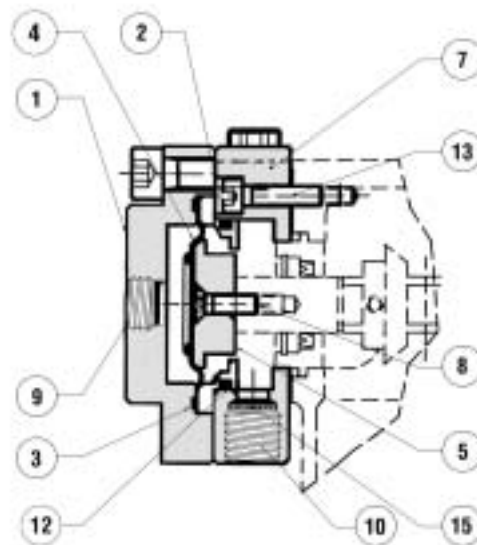
DN: 3" - 4" - 6" - 8"

Fig. 31

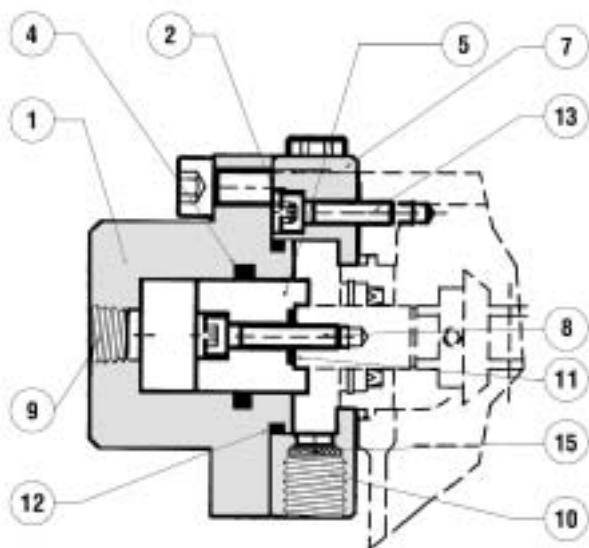
SLAM-SHUT CONTROL HEADS



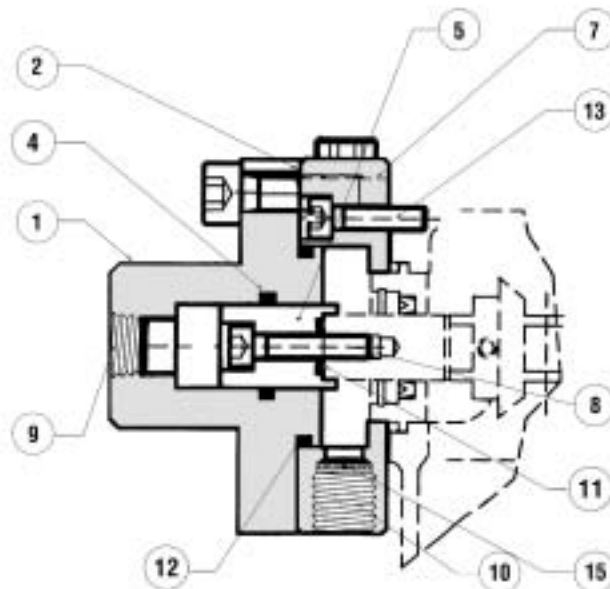
MOD. 102 -106



MOD. 103 -106



MOD. 104 -107



MOD. 105-108 - 109

Fig. 32

SB/82 SLAM-SHUT (FIG. 31 and 32)

- 1) Check that the slam-shut is in the closed position.
- 2) Disconnect the pipe between the downstream pressure take-off and the head of the slam-shut pressure switch.
- 3) Slacken the fixing screws, pos. (36), so as to partially slacken the spring, pos. (48) ; before removing them completely, ensure that you can support the weight of the slam-shut device adequately.
- 4) Remove the screws and separate the slam-shut from the body, pos. (9) .
- 5) Put the slam-shut on its side.
- 6) Unscrew the screws, pos. (3) , and remove the obturator, pos. (2) , and the spring, pos. (47) .
- 7) Unscrew the ring, pos. (1) , and the ring, pos. (18) , from the obturator, pos. (2) .
- 8) Keeping the shaft, pos. (6) firm, slacken the screw, pos. (26) .
- 9) Remove the ring, pos. (4) , and the spring, pos. (48) .
- 10) Remove the retaining ring, pos. (28) and the shaft guide, pos. (10) .
- 11) Slacken the screws, pos. (2) , from the pressure switch device, and remove the cover, pos. (1) .

Replace all the components included in the spare parts kit.

RE-ASSEMBLY

- 12) Fit the cover, pos. (1) , and fix the screws, pos. (2) on the pressure switch device.
- 13) Put back the shaft guide, pos. (10) and fix it with the retaining ring, pos. (28) .
- 14) Put back the spring, pos. (48) and the ring, pos. (4) , and fix the screw, pos. (26) .
- 15) Put back the rings, pos. (1) and pos. (18) on the obturator, pos. (2) .
- 16) Put back the spring, pos. (47) and the obturator, pos. (2) , fixing the screws, pos. (3) .
- 17) Put the slam-shut device back on the body, pos. (9) and fix the screws, pos. (36) .
- 18) Restore the connection between the downstream pressure take-off and the head of the slam-shut pressure switch.

8.0 FINAL OPERATIONS














8.1 TIGHTNESS AND SETTING CHECK

- 1) Very slowly open the on/off valve upstream from the regulator and, using a foam solution or the like, check:
 - the tightness of the external surfaces of the regulator and of the pilot;
 - the tightness of the internal 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) Turn the pilot setting screw, pos. ⑩, to obtain the desired set-point.
- 4) Close the bleed cock.

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 preregulator.
- 2) Fix the lock-nut, pos. ⑨ of the pilot.

Tab. 13 MAINTENANCE WRENCHES FOR REFLUX 819/FO PRESSURE REGULATORS WITH 204/A/FO AND R14/FO PILOT

 (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		














REFLUX 819/FO

Tipo/Type	DN	1"	2"	3"	4"	6"	8"	10"
A	Ch.	13-15-17 19-24-30	13-15-17 19-24-30	13-15-17 19-24-27 30	13-15-17 19-24-27 30	13-15-17 19-24-30 32-41	13-15-17 19-24-30 32-41	13-15-17 19-24-32 46-50
B	L.	300						
C	∅	4						
D	Ch.					27-41	27-41	30-55
E	Ch.	3-12	3-12	3-12	3-12	3-12	3-12	3-12
F	Ch.	5-6	5-6	5-6	5-6	5-6	5-6	5-6
G	Ch.	17-20	17-20	17-19-22	17-19-22	22	22	
L	Cod.	7999099						

REFLUX 819/FO+PM/819

Tipo/Type	DN	1"	2"	3"	4"	6"	8"	10"
A	Ch.	13-15-17 19-24-30	13-15-17 19-24-30	13-15-17 19-24-27 30	13-15-17 19-24-27 30	13-15-17 19-24-30 32-41	13-15-17 19-24-30 32-41	13-15-17 19-24-32 46-50
B	L.	300						
C	∅	4						
D	Ch.					27-41	27-41	30-55
E	Ch.	3-12	3-12	3-12	3-12	3-12	3-12	3-12
F	Ch.	5-6	5-6	5-6	5-6	5-6	5-6	5-6
G	Ch.	17-20	17-20	17-19-22	17-19-22	22	22	
L	Cod.	7999099						

Tab. 14 MAINTENANCE WRENCHES FOR REFLUX 819/FO PRESSURE REGULATORS WITH 204/A/FO AND R14A/FO PILOT

 (A) Combination spanner	 (B) Adjustable spanner	 (C) Compass pin wrench
 (D) Box spanner	 (E) Hexagon or allen key	 (F) Hexagonal tee 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		

REFLUX 819/FO+DB/819

Tipo/Type	DN	1"	2"	3"	4"	6"	8"	10"
A	Ch.	13-15-17	13-15-17	13-15-17	13-15-17	13-15-17	13-15-17	13-15-17
		19-22-24 30	19-24-27 30	19-24-27 30	19-24-27 30	19-24-27 30	19-24-30 32-41	19-24-30 32-36-41
B	L.	300						
C	∅	4						
D	Ch.					27-41	27-41	30-55
E	Ch.	3-12	3-12	3-12	3-12	3-12	3-12	3-12
F	Ch.	5-6-8	5-6-10	5-6-10	5-6-14	5-6-17	5-6-17	5-6-17
G	Ch.	17-20	17-20	17-19-22	17-19-22	22	22	
L	Cod.	7999099						
O	Cod.	7999031	7999033	7999035	7999036	7999037	7999038	7999041

REFLUX 819/FO+SB/82

Tipo/Type	DN	1"	2"	3"	4"	6"	8"	10"
A	Ch.	8-13-14-15	8-13-14-15	8-13-14-15	8-13-14-15	8-13-14-15	8-13-14-15	8-13-14-15
		17-19-24-27 30-32	17-19-24-27 30-32	17-19-24 30-32	17-19-24-27 30-32	17-19-24-27 30-32	17-19-24-27 30-32-41	17-19-24-27 30-32-41
B	L.	300						
C	∅	4						
D	Ch.	10-15-24	10-15-24	10-15-24	10-15-24	10-15-24-27-41	10-15-24-27-41	10-15-24-30-55
E	Ch.	2-3-4-5-8-12	2-3-4-5-10-12	2-3-12	2-3-4-5-12	2-3-4-5-12	2-3-4-5-12	2-3-4-5-12
F	Ch.	5-6	5-6	5-6	5-6	5-6	5-6	5-6
G	Ch.	17-20	17-20	17-19-22	17-19-22	22	22	
L	Cod.	7999099						
M	∅	19 ÷ 60						
N	Cod.	7999019						

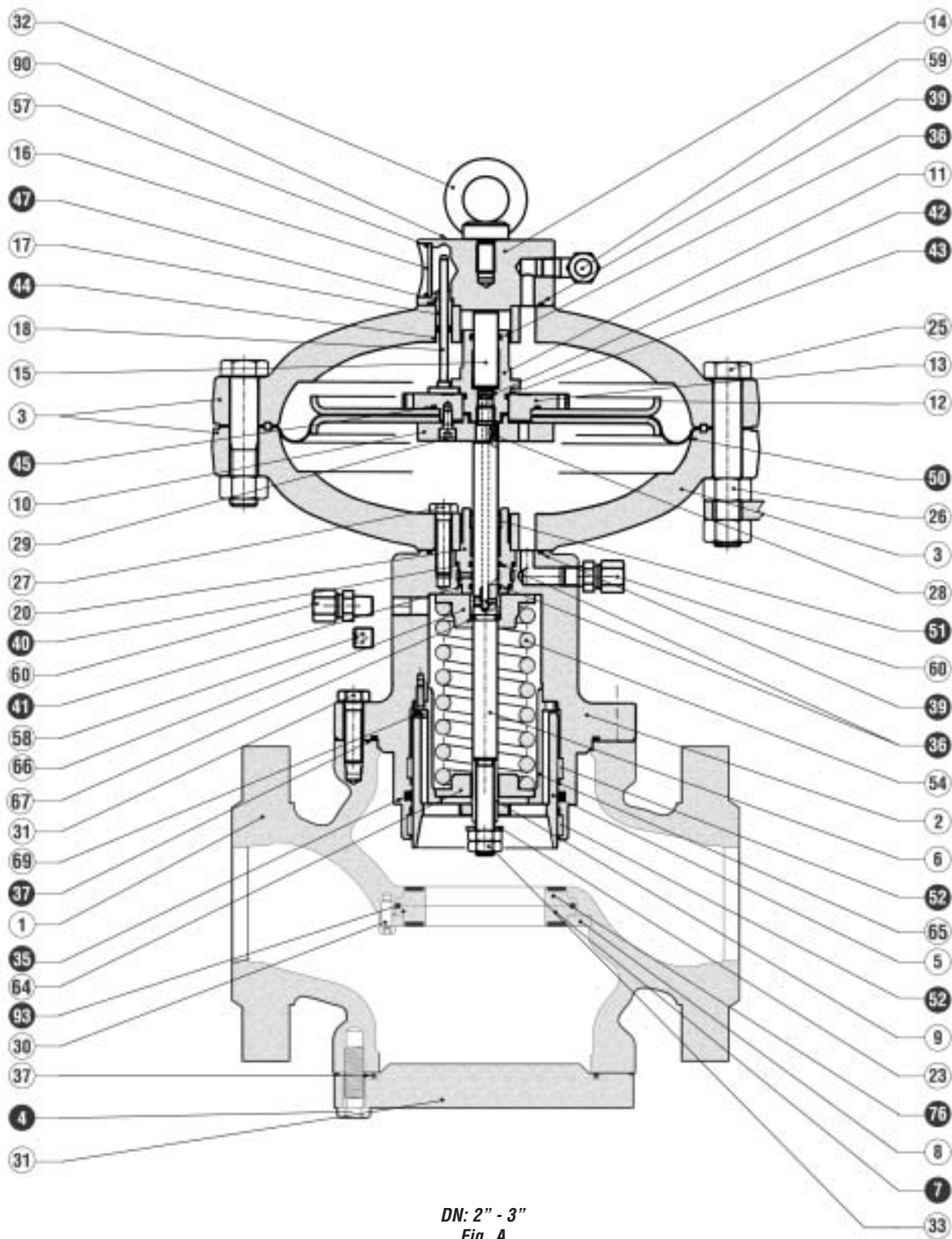
9.0 WEIGHT OF THE COMPONENTS

9.1 Tab. 13 WEIGHT OF THE COMPONENTS IN KG.

DN	1"	2"	3"	4"	6"	8"	10"
	11,100	11,100	21,900	21,900	59,300	59,300	124,500
	0,250	0,250	0,350	0,350	0,825	0,825	1,560
	2,700	2,700	4,100	4,100	11,500	11,500	44,000
	9	9	19,900	19,900	54	54	114
	0,250	0,250	0,250	0,250	0,600	0,600	0,930
	4,300	8,900	16,500	21,000	42	60	125
	0,150	0,200	0,300	0,350	1,100	1,100	2
	0,100	0,250	0,300	0,700	0,900	0,900	1,950
	0,200	0,700	1,100	3,500	8,900	15,100	26
	0,100	0,100	0,050	0,050	0,420	0,420	0,890
	9,400	20,500	37	66	148	234	385
	0,100	0,200	0,450	0,750	0,950	1,850	2,900
	0,100	0,200	0,450	0,750	0,950	1,850	2,900
	0,100	0,150	0,320	0,500	0,900	1,200	1,500
	1,300	3	5,700	10,400	19,700	35	78

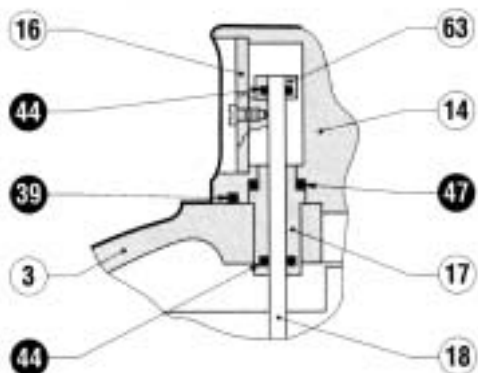
10.0 LIST OF RECOMMENDED SPARES

REFLUX 819/FO PRESSURE REGULATOR



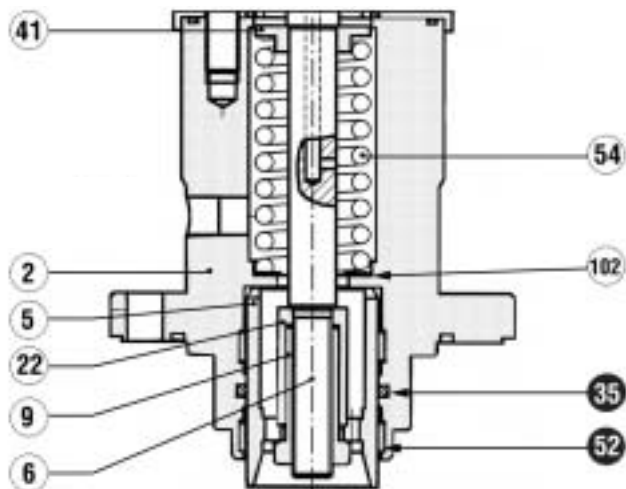
DN: 2" - 3"
Fig. A

VERSIONS



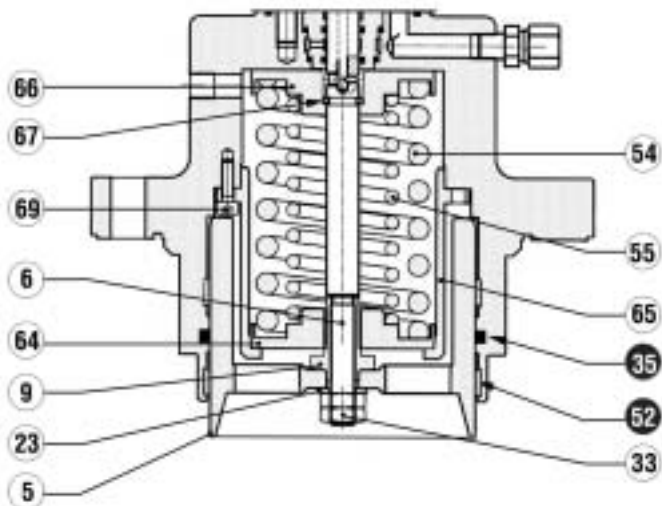
VERSION
DN: 6'' - 10''

Fig. B



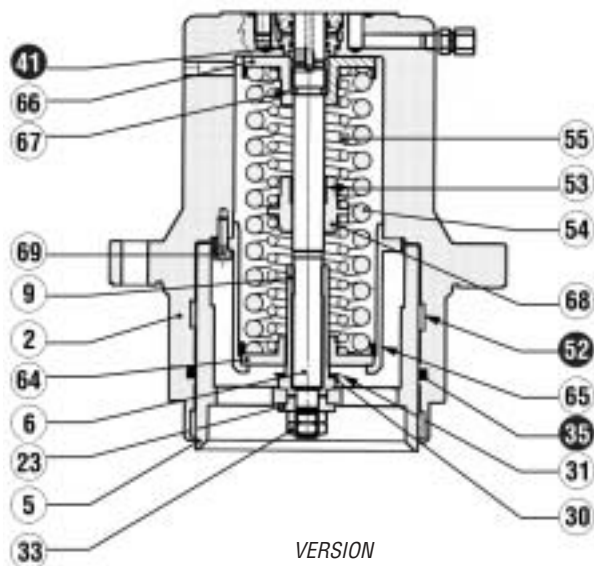
VERSION
DN: 1''

Fig. C



VERSION
DN: 4''

Fig. D

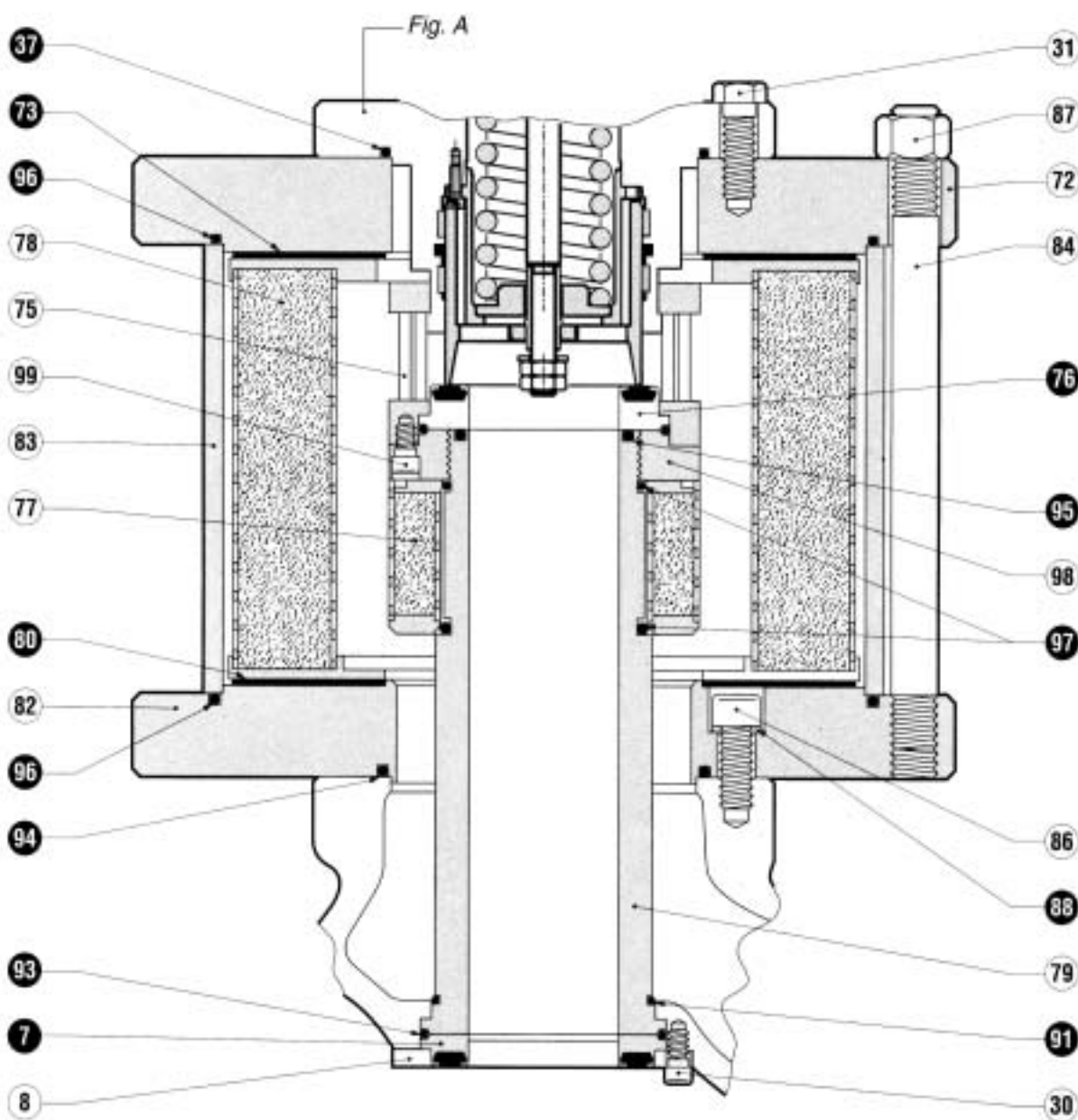
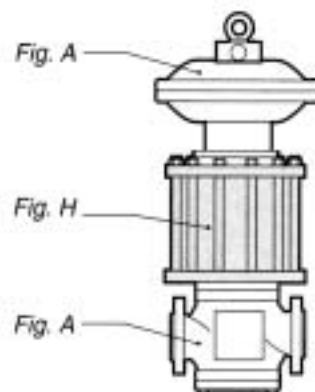


VERSION
DN: 6'' ÷ 10''

Fig. E

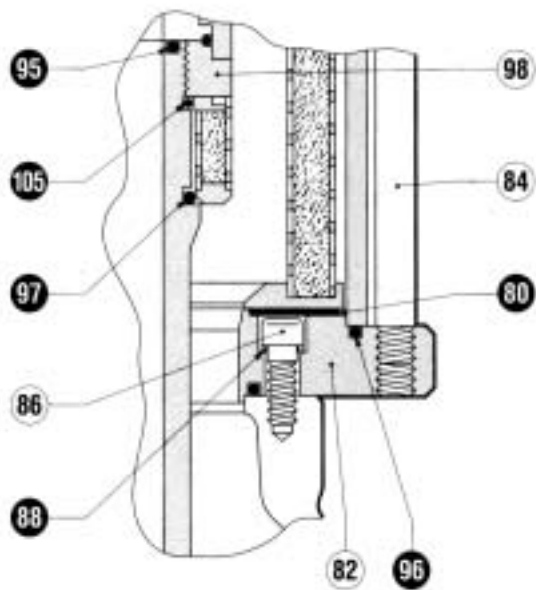
	POS.	DESCRIPTION	DN	N. OF PIECES			
				1" ÷ 4"	6"	8"	10"
REFLUX 819/FO	7	Reinforced gasket		1	1	1	1
	35	O. Ring		1	1	1	1
	36	O. Ring		3	3	3	3
	37	O. Ring		2	2	2	2
	39	O. Ring		2	2	2	2
	40	O. Ring		1	1	1	1
	41	O. Ring		1	1	1	1
	42	O. Ring		1	1	1	1
	43	O. Ring		1	1	1	1
	44	O. Ring		1	2	2	2
	45	O. Ring		1	1	1	-
	47	O. Ring		1	1	1	1
	50	Diaphragm		1	1	1	1
	51	Guide ring		1	1	1	1
	52	Guide ring		2	2	2	2
	76	Reinforced gasket		1	1	1	1
93	O. Ring		1	1	1	1	

REFLUX 819/FO PRESSURE REGULATOR + DB/819



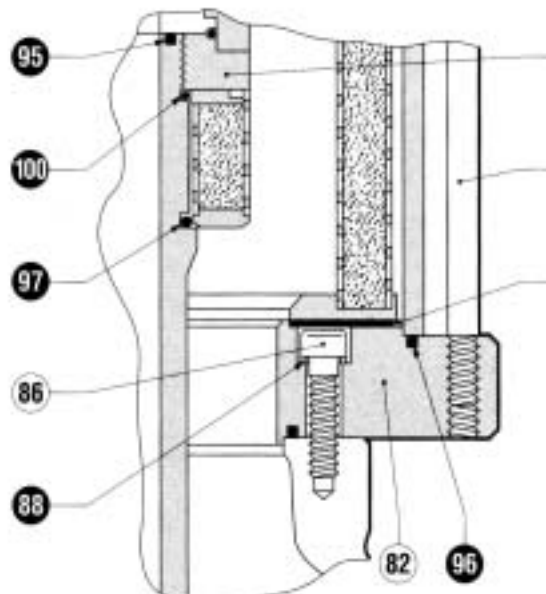
DN: 1" ÷ 6"
Fig. H

VERSIONS



VERSION
DN: 8"

Fig. G



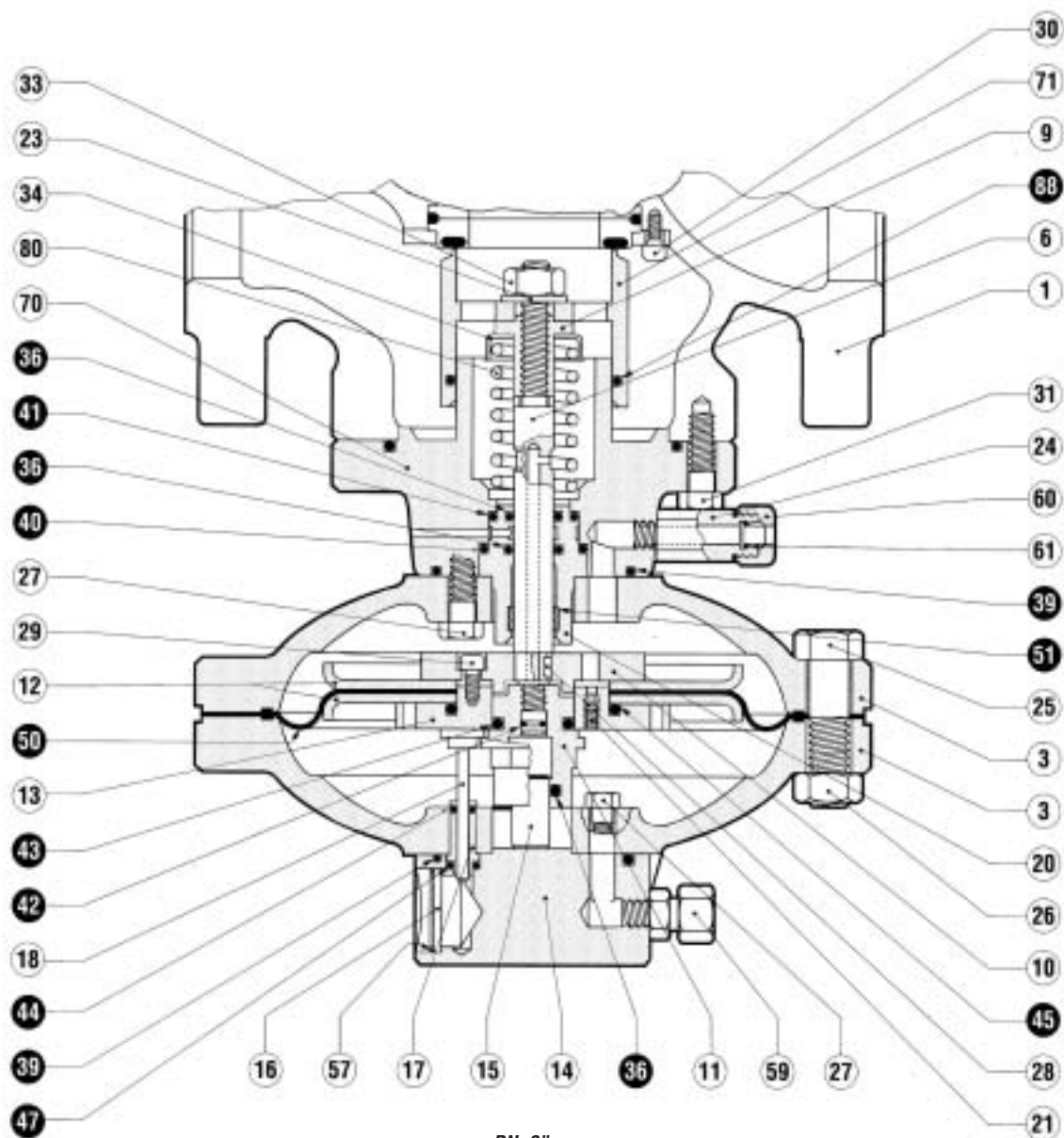
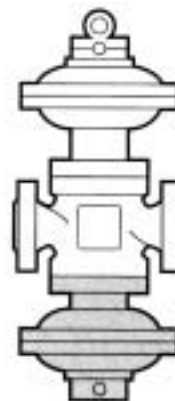
VERSION
DN: 10"

Fig. H

		N. OF PIECES				
		DN	1" ÷ 4"	6"	8"	10"
POS.	DESCRIPTION					
...+DB/819	73	Gum gasket	1	1	1	1
	80	Gum gasket	1	1	1	1
	89	O. Ring	1	1	1	1
	91	O. Ring	1	-	-	-
	93	O. Ring	1	1	1	1
	94	O. Ring	1	1	1	1
	95	O. Ring	1	1	1	1
	96	O. Ring	2	2	2	2
	97	O. Ring	2	2	1	1
	100	O. Ring	-	-	-	1
105	O. Ring	1	1	1	-	
88	Metal gasket	see				

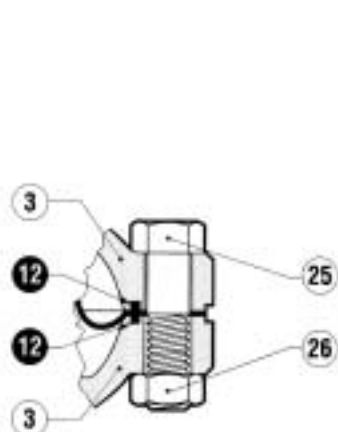
DB 819	QTY
DN	
1" - 2"	8
3" - 4" - 6"	12
8"	16
10"	28

PM/819 MONITOR

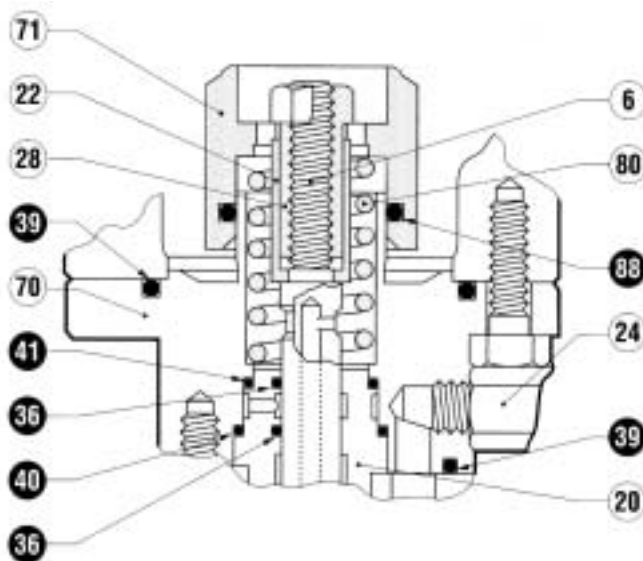


DN: 2"

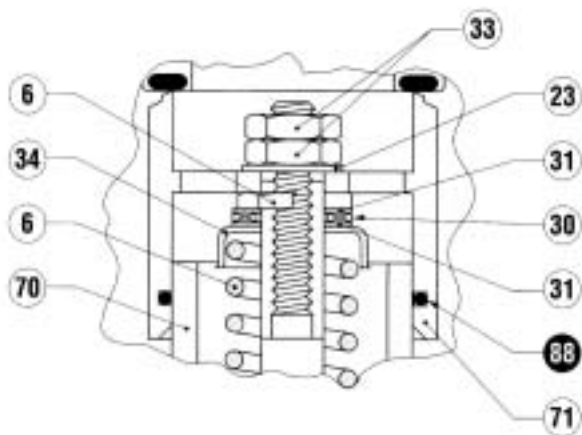
VERSIONS



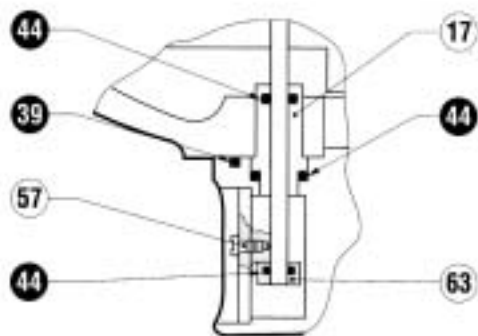
VERSION
DN: 10"



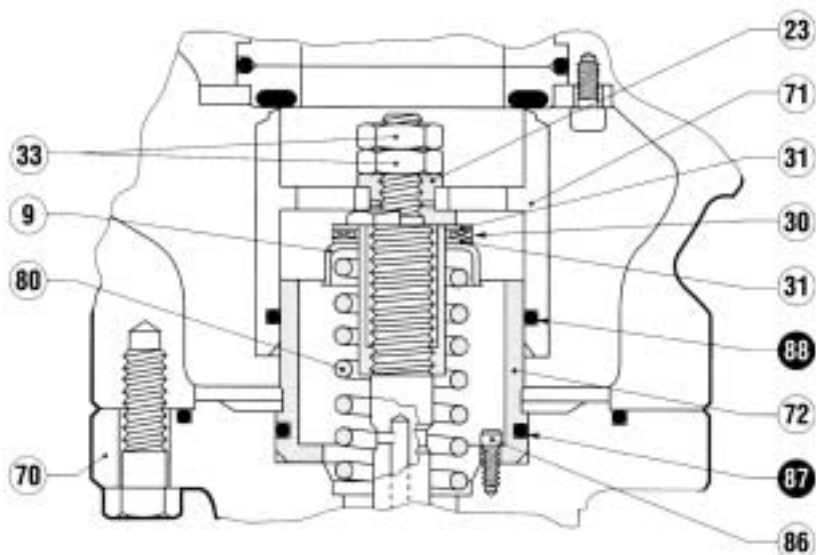
VERSION
DN: 1"



VERSION
DN: 3" - 4"



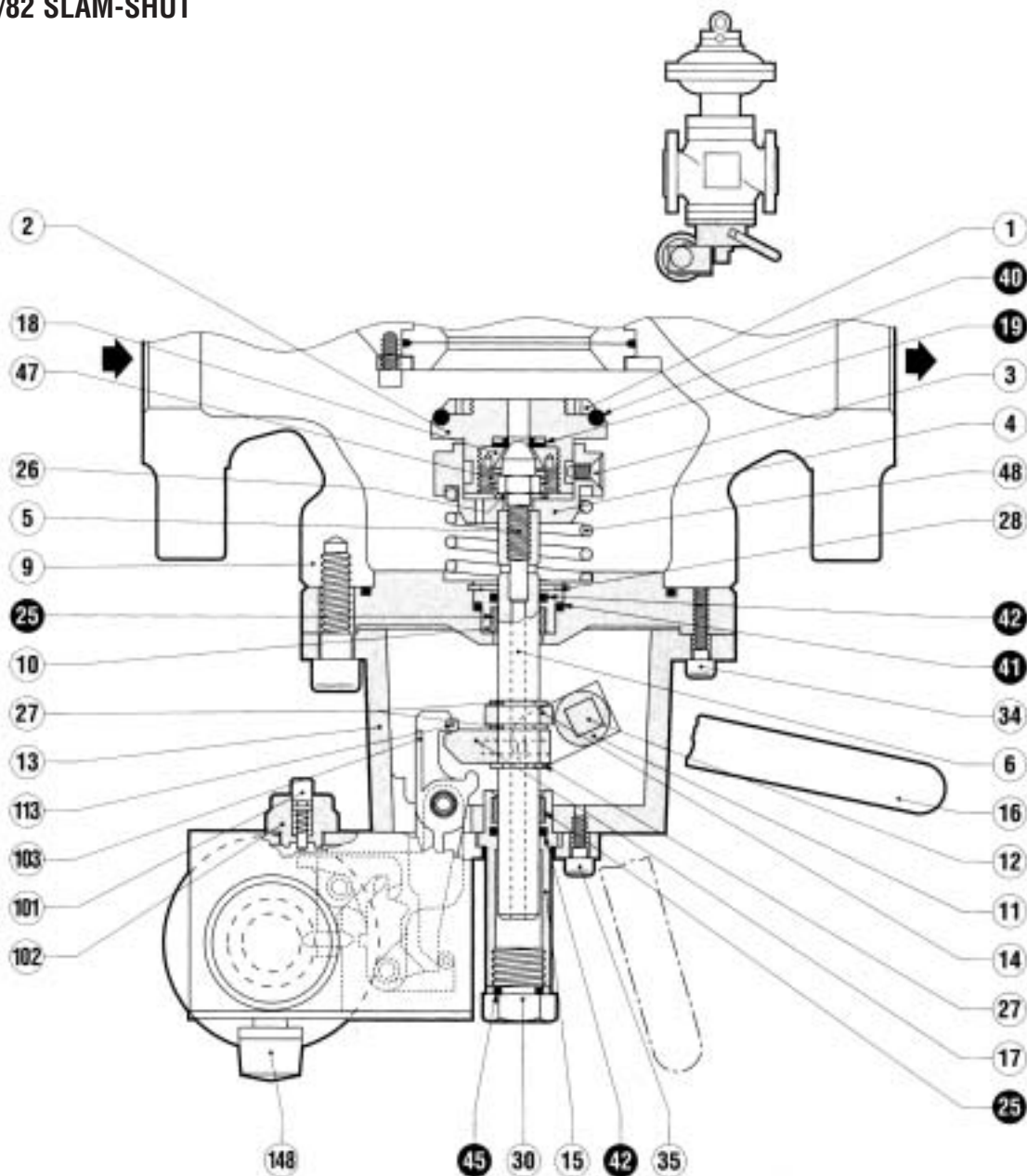
VERSION
DN: 6" ÷ 10"



VERSION
DN: 6" ÷ 10"

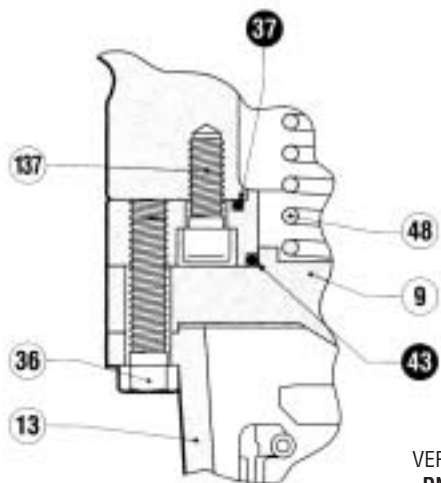
	POS.	DESCRIPTION	DN	N. OF PIECES		
				1" ÷ 4"	6" - 8"	10"
...+ PM/819	12	O. Ring		-	-	2
	36	O. Ring		3	3	3
	39	O. Ring		2	2	2
	40	O. Ring		1	1	1
	41	O. Ring		1	1	1
	42	O. Ring		1	1	1
	43	O. Ring		1	1	1
	44	O. Ring		1	2	2
	45	O. Ring		1	1	1
	47	O. Ring		1	1	1
	50	Diaphragm		1	1	1
	51	Guide ring		1	1	1
	87	O. Ring		-	1	1
	88	O. Ring		1	1	1

... + SB/82 SLAM-SHUT

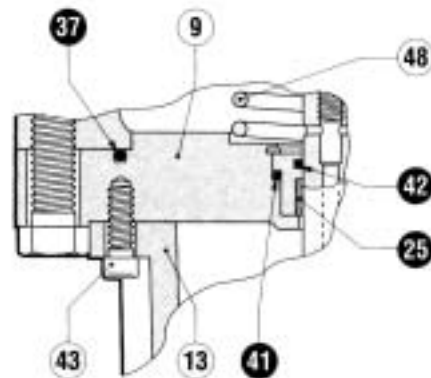


DN: 2"

VERSIONS

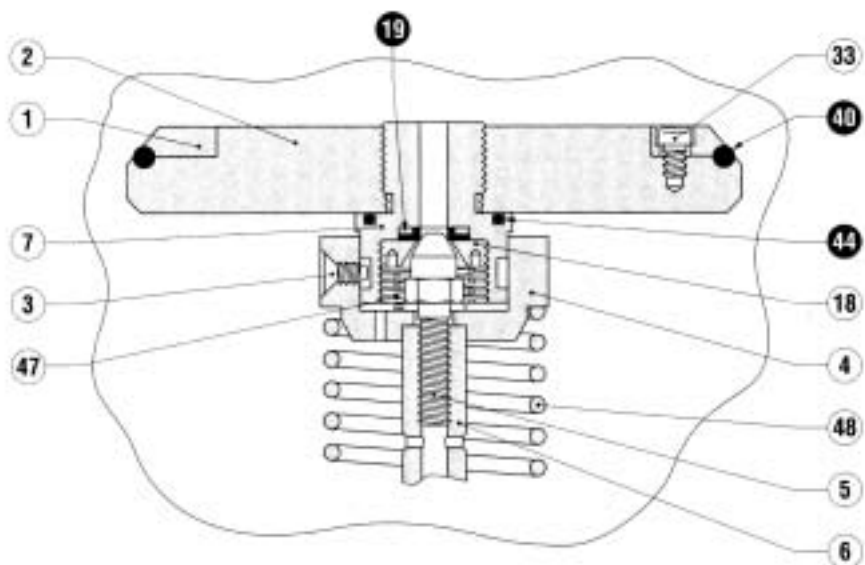


VERSION
DN: 1"

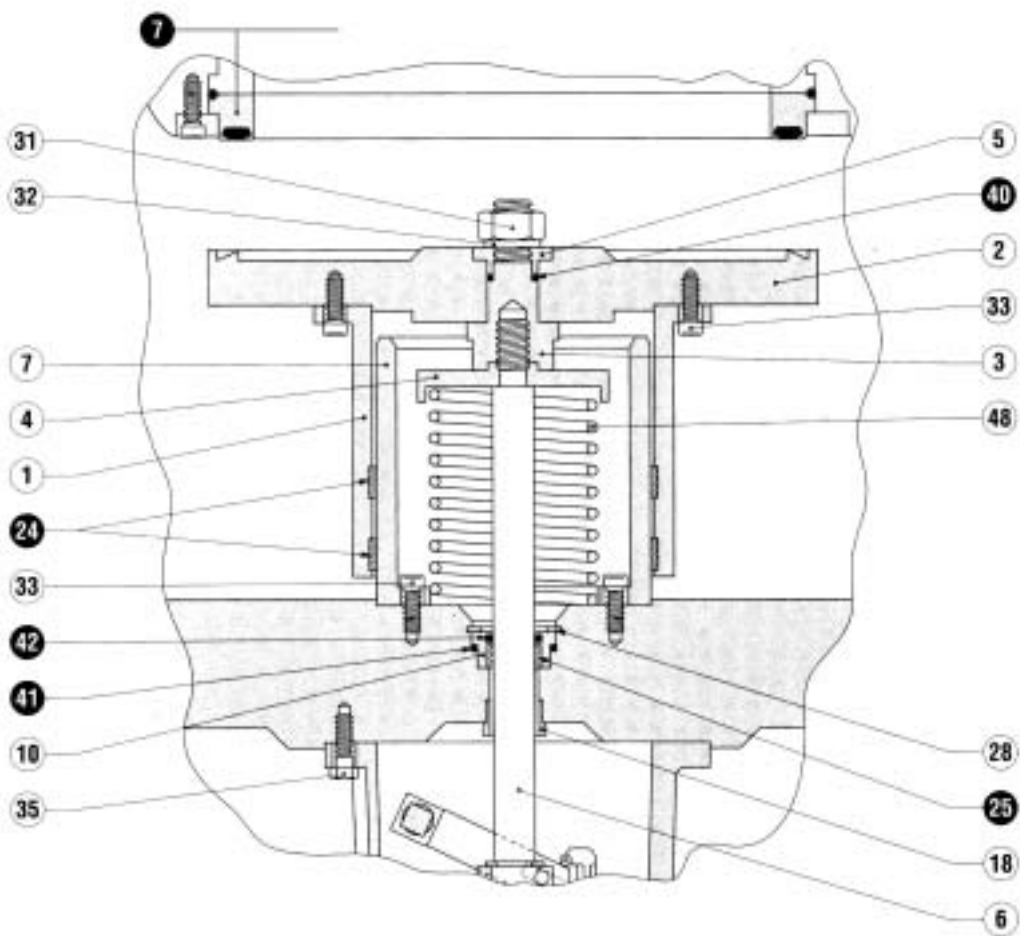


VERSION
DN: 3" - 4" - 6" - 8"

VERSIONS

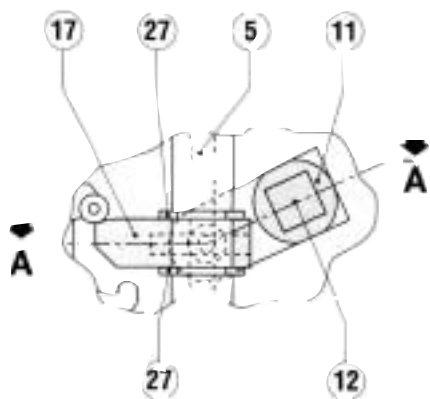


VERSION
DN: 4" - 6" - 8"

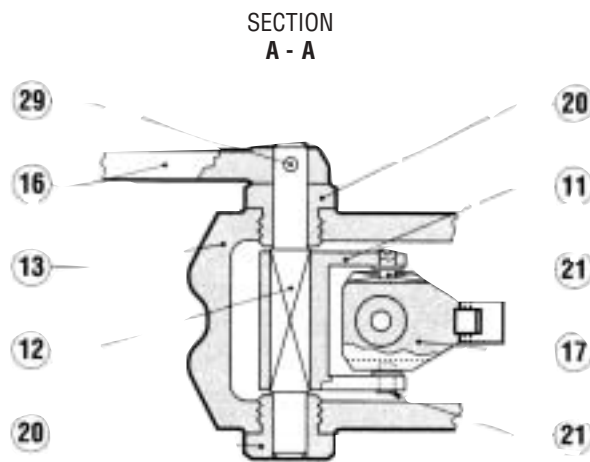


VERSION
DN: 10"

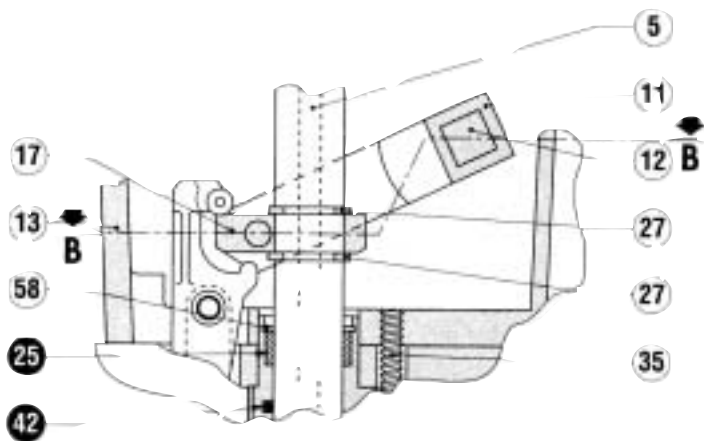
VERSIONS



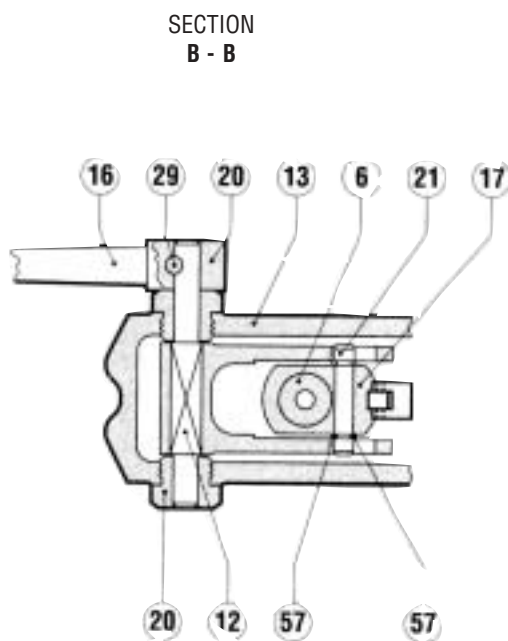
VERSION
DN: 1" ÷ 4"



VERSION
DN: 1" ÷ 4"

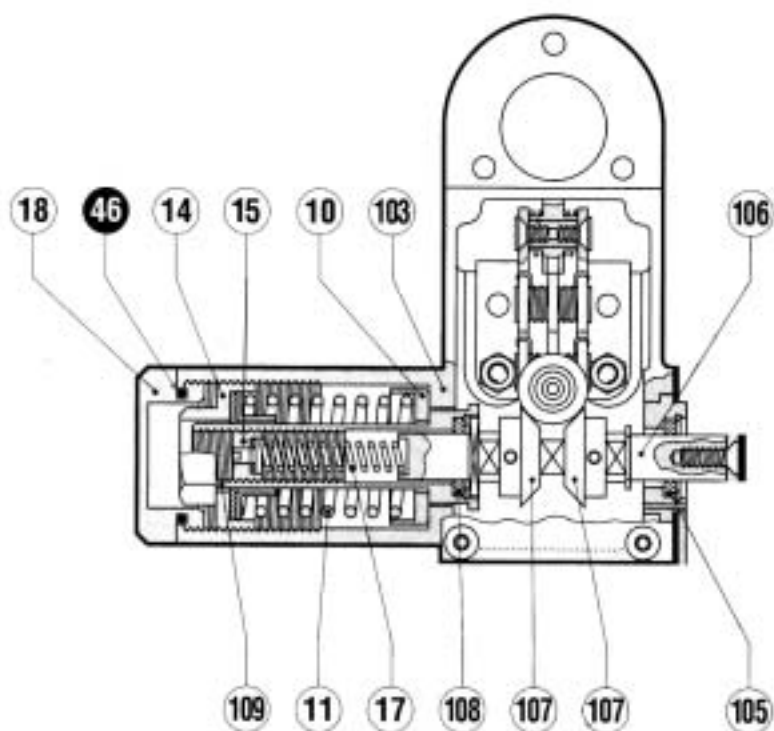


VERSION
DN: 6" - 8" - 10"

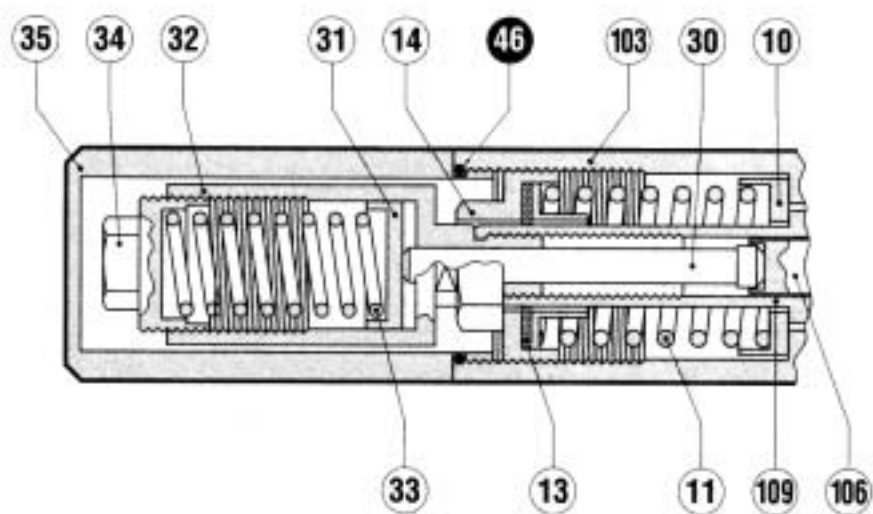


VERSION
DN: 6" - 8" - 10"

CONTROL DEVICE

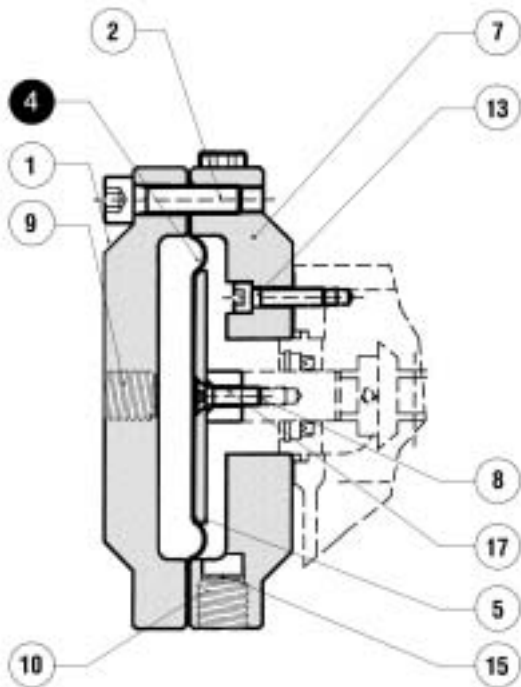


Mod.: 102 - 103 - 104 - 105

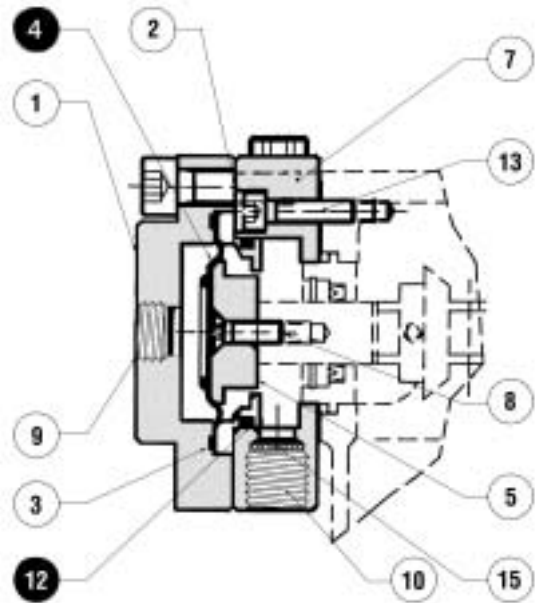


Mod.: 106 - 107 - 108 - 109

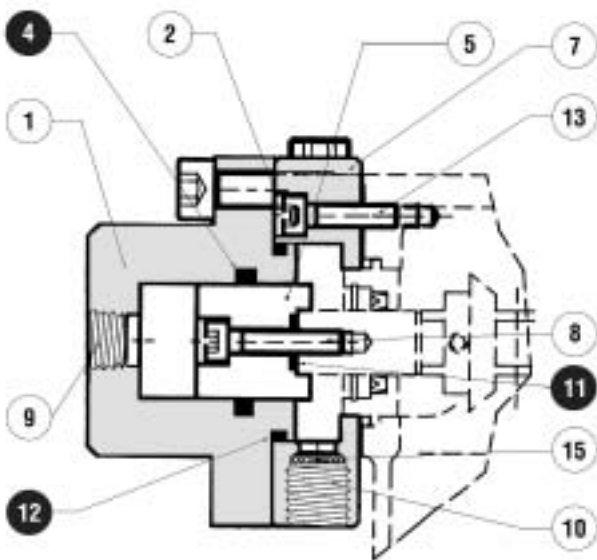
CONTROL HEADS



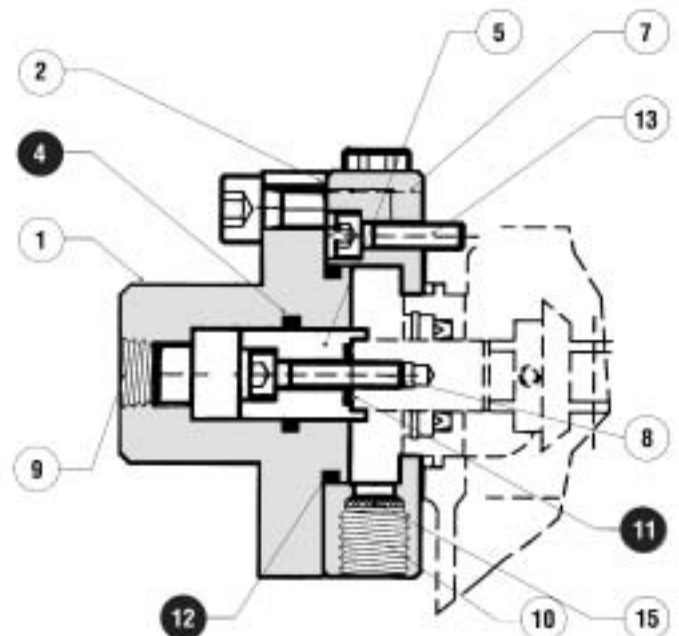
Mod.: 102-106



Mod.: 103-106



Mod.: 104-107



Mod.: 105-108

TECHNICAL MANUAL MT103

	POS.	DESCRIPTION	DN	N. OF PIECES			
				1"	2" ÷ 3"	4" ÷ 8"	10"
SB/82 SLAM-SHUT	19	Reinforced gasket		1	1	1	-
	24	Guide ring		-	-	-	2
	25	Guide ring		2	2	2	-
	40	O. Ring		1	1	1	1
	41	O. Ring		1	1	1	1
	42	O. Ring		2	2	2	2
	43	O. Ring		1	-	-	-
	44	O. Ring		-	-	1	-
	45	O. Ring		1	1	1	1

MOD. 102-103-104-105-106-107-108-109

	POS.	DESCRIPTION	N. OF PIECES
CONTROL DEVICE	46	O. Ring	1

MOD. 102-106

	POS.	DESCRIPTION	N. OF PIECES
CONTROL HEADS	4	Membrana	1

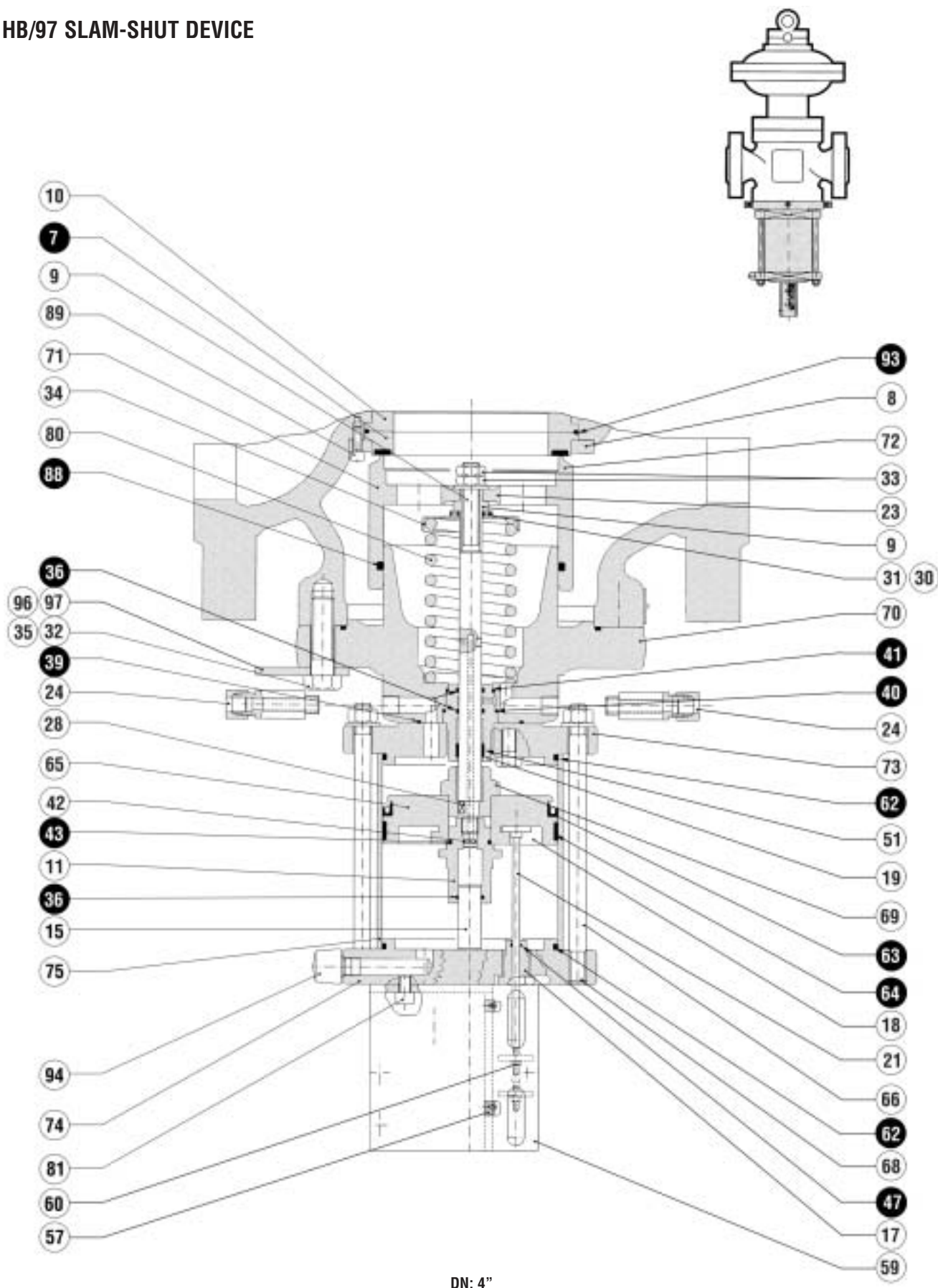
MOD. 103

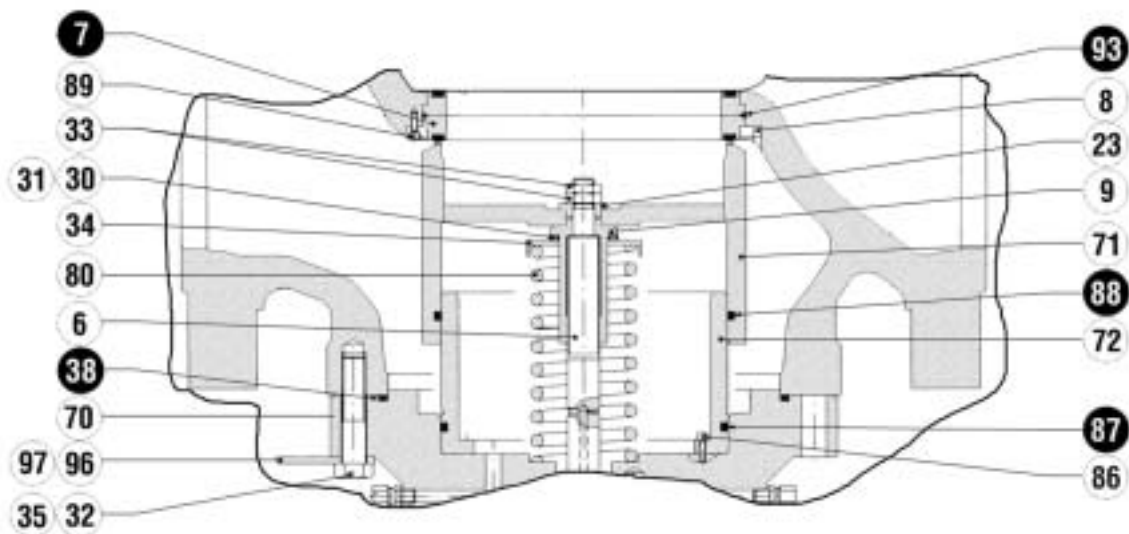
	POS.	DESCRIPTION	N. OF PIECES
CONTROL HEADS	4	Diaphragm	1
	12	O. Ring	1

MOD. 104 - 105 - 107 - 108 - 109

	POS.	DESCRIPTION	N. OF PIECES
CONTROL HEADS	4	O. Ring	1
	11	O. Ring	1
	12	O. Ring	1

HB/97 SLAM-SHUT DEVICE

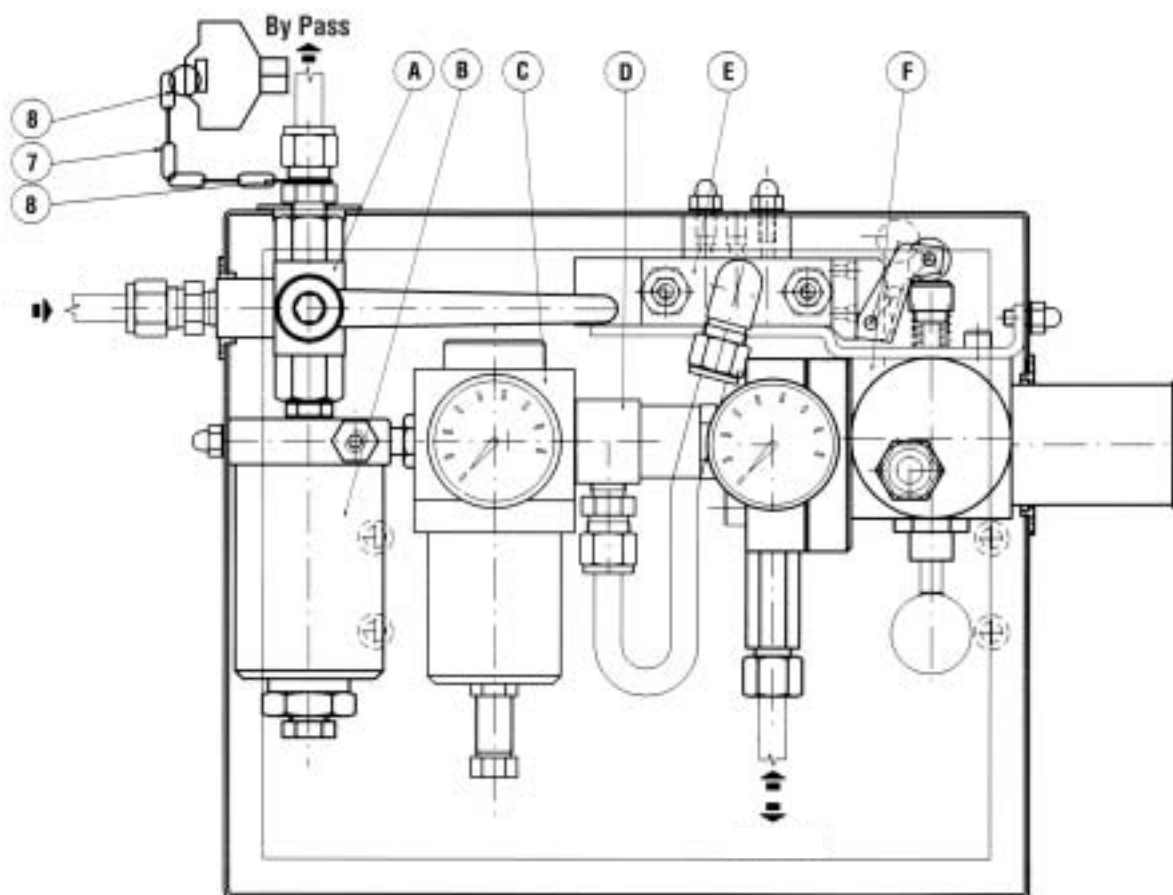




VARIANTE
DN: 6" - 8" - 10"

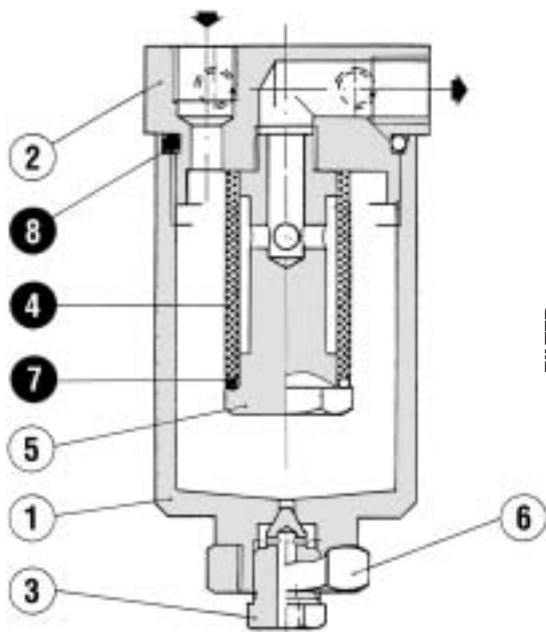
		N. OF PIECES				
		DN	4"	6"	8"	10"
POS.	DESCRIPTION					
...+ HB/97 SLAM-SHUT VALVE	7	Reinforced gasket	1	1	1	1
	36	O. Ring	3	3	3	3
	39	O. Ring	1	1	1	1
	40	O. Ring	1	1	1	1
	41	O. Ring	1	1	1	1
	42	O. Ring	1	1	1	1
	43	O. Ring	1	1	1	1
	47	O. Ring	1	1	1	1
	51	Guide ring	1	1	1	1
	62	O. Ring	2	2	2	2
	63	GACO ring	1	1	1	1
	64	Guide ring	1	1	1	1
	87	O. Ring	-	1	1	1
	88	O. Ring	1	1	1	1
93	O. Ring	1	1	1	1	

LINE OFF DEVICE



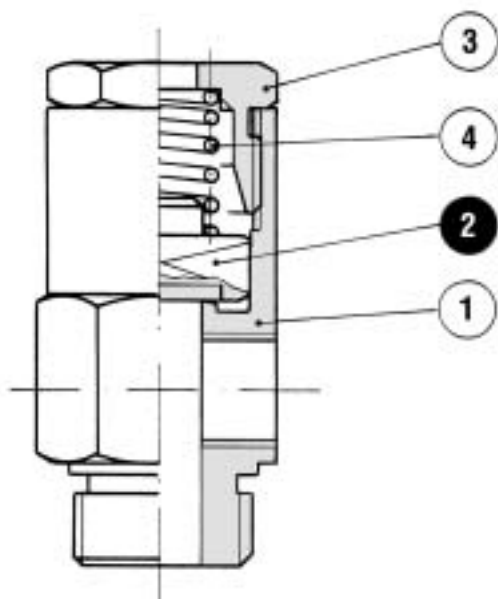
- PART. A** Three-ways valve
- PART. B** Filter
- PART. C** Pressure regulator
- PART. D** Relief valve
- PART. E** Slide valve
- PART. F** Control device

PART. B
FILTER



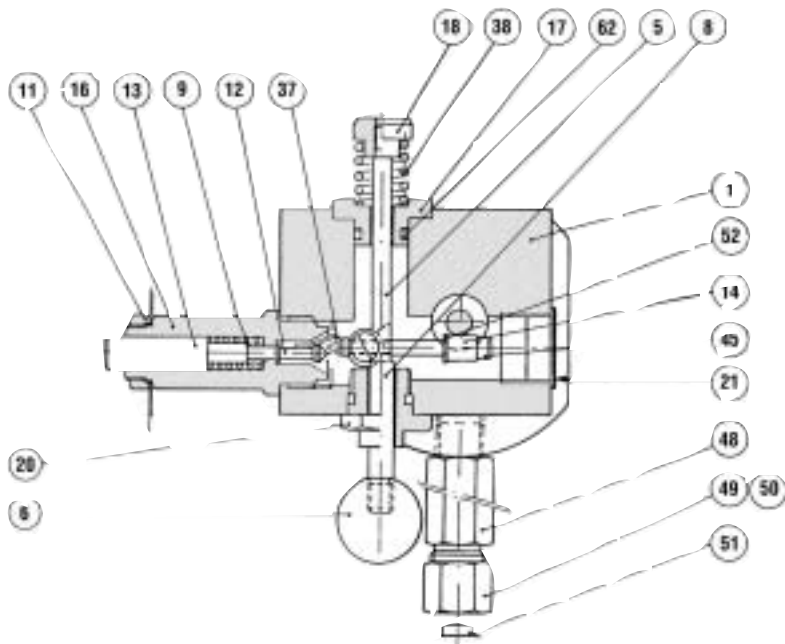
PART. B			
	POS.	DESCRIPTION	N. OF PIECES
FILTER	4	Filter cartridge	1
	7	O. Ring	
	8	O. Ring	

PART. D
RELIEF VALVE

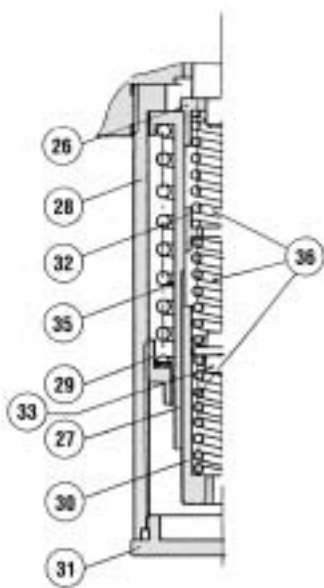
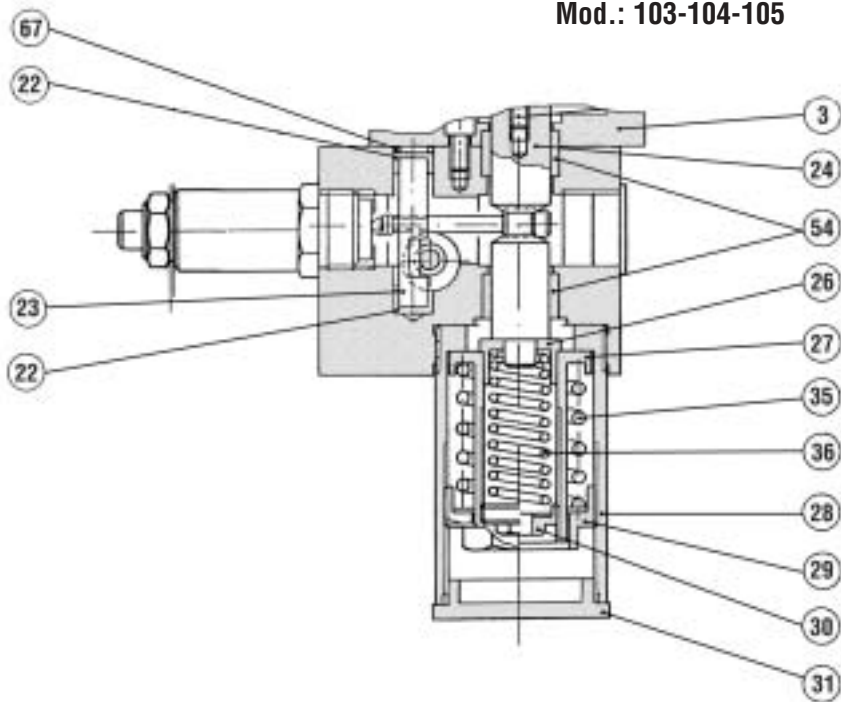


PART. D			
	POS.	DESCRIPTION	N. OF PIECES
RELIEF VALVE	2	Plug	1

Part. F
CONTROL DEVICE

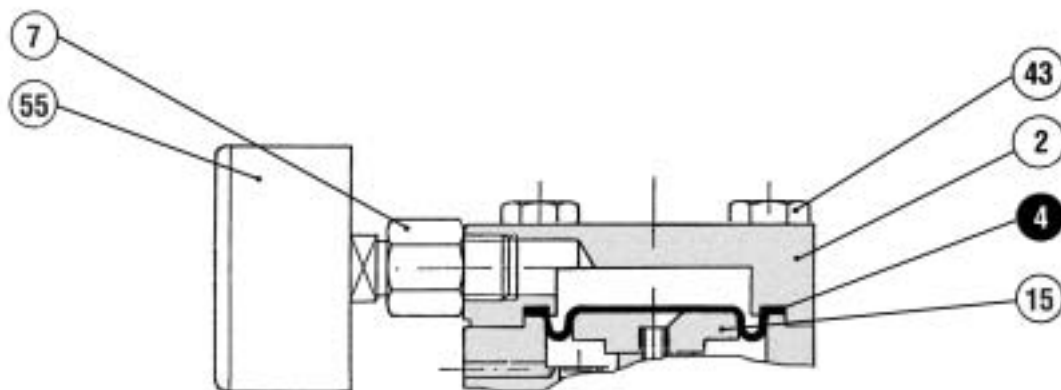


Mod.: 103-104-105



Mod.: 105/92

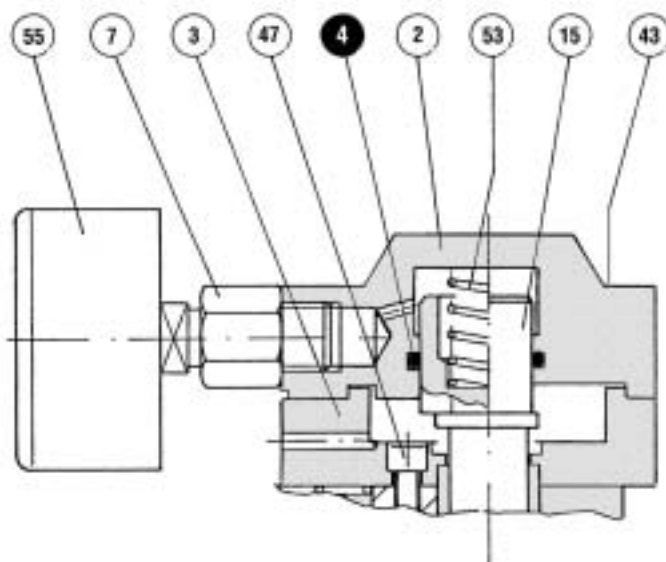
CONTROL HEAD



Mod.: 103

MOD. 103

	POS.	DESCRIPTION	N. OF PIECES
CONTROL HEAD	4	Diaphragm	1

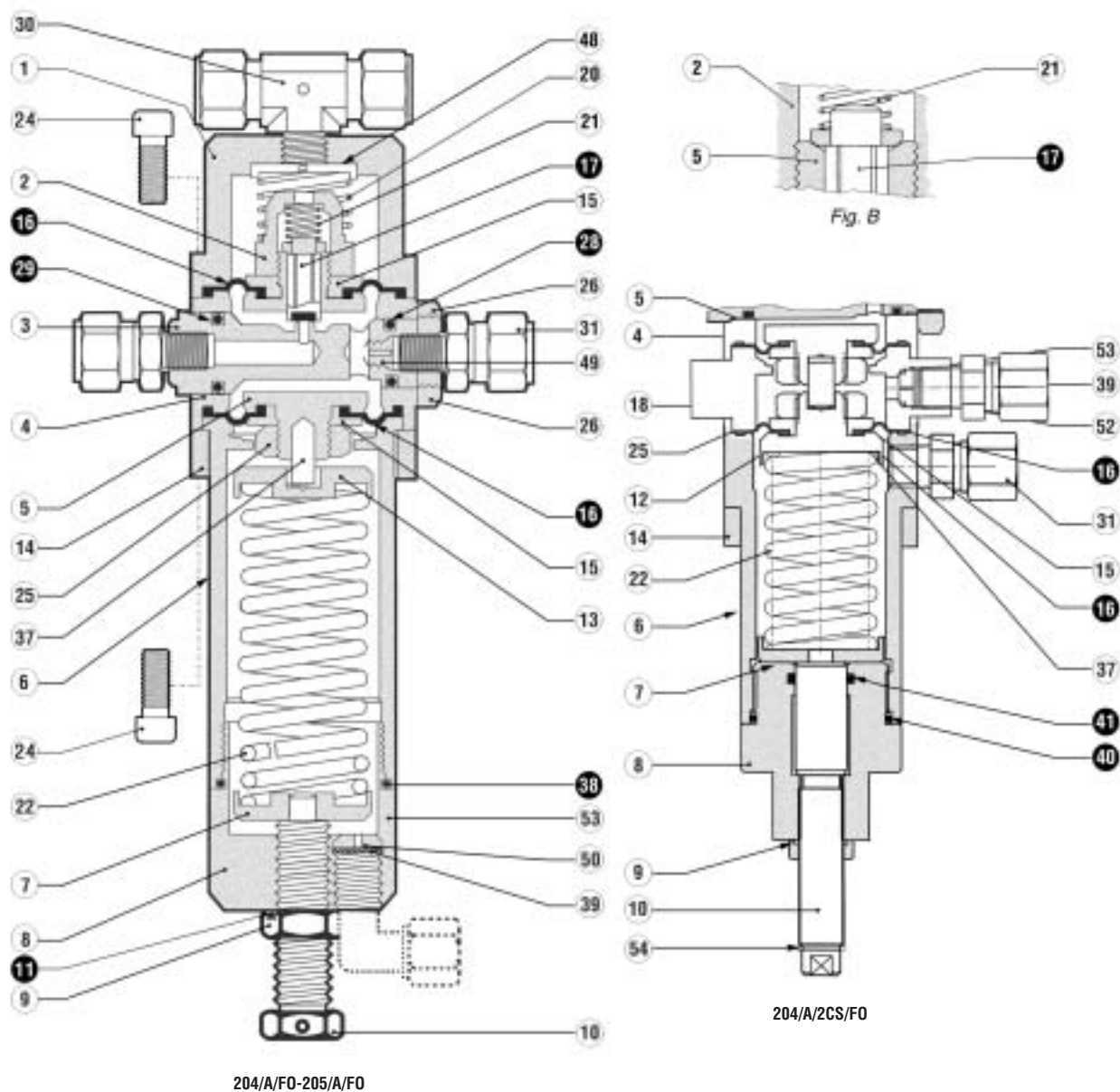


Mod.: 104-105

MOD. 103-105

	POS.	DESCRIPTION	N. OF PIECES
CONTROL HEAD	4	O. Ring	1

PILOTS MOD. 204/A/FO-204/A/2CS/FO-205/A/FO

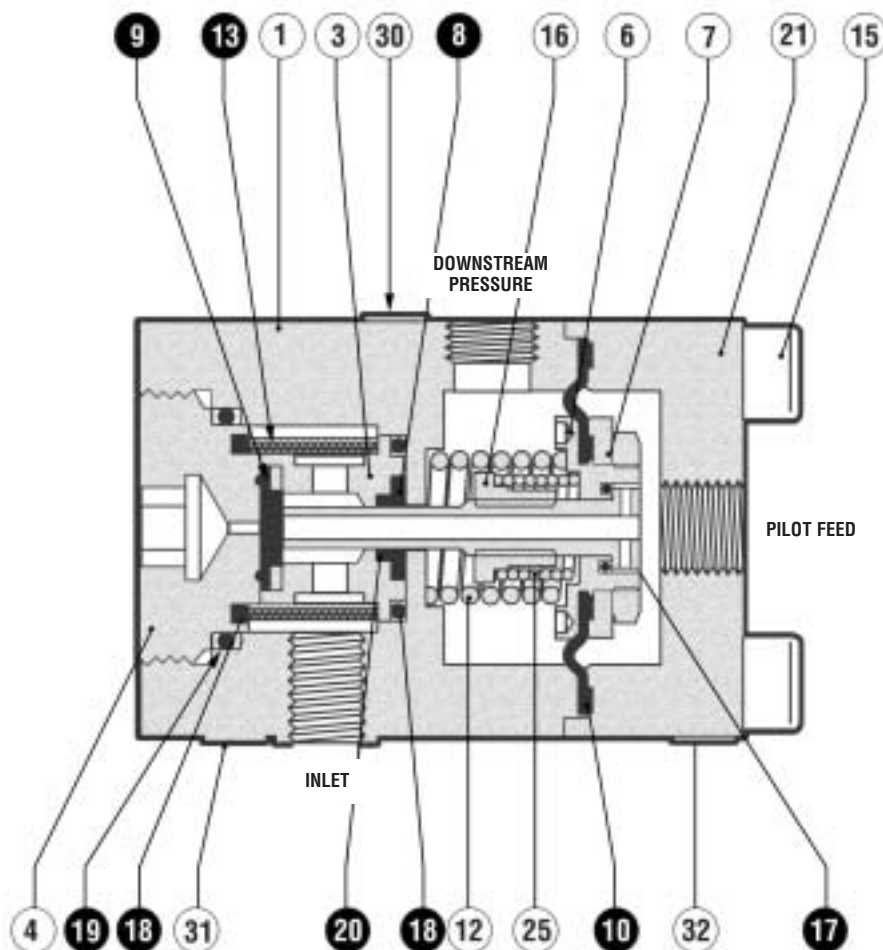


POS. DESCRIPTION

N. OF PIECES

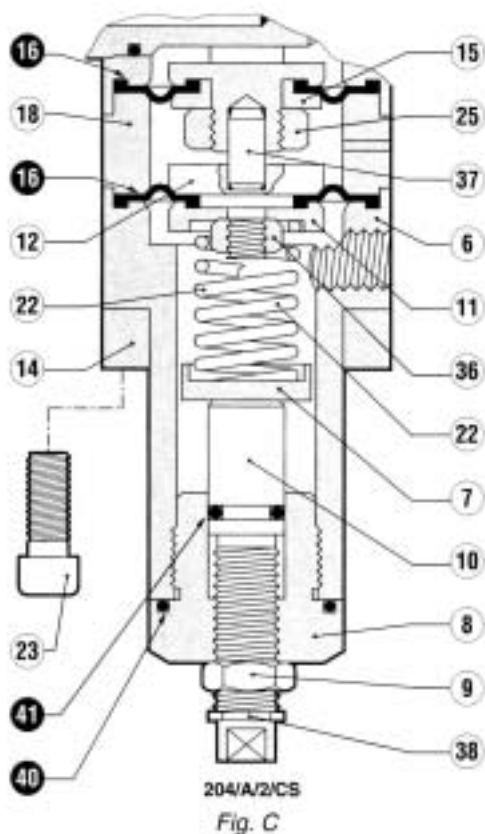
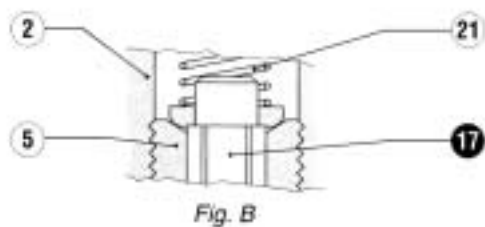
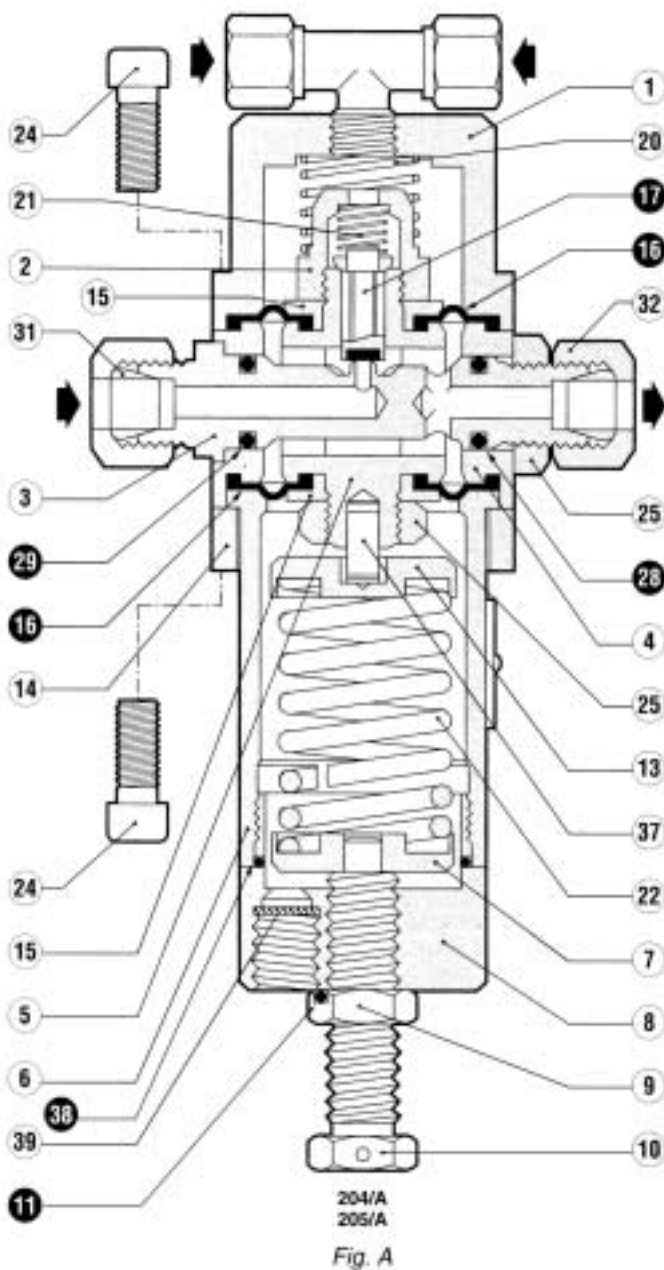
		204/A/FO	205/A/FO	204/A/2CS/FO
11	O. Ring	1	1	-
16	Diaphragm	2	2	3
17	Plug	1	1	1
28	O. Ring	1	1	1
29	O. Ring	1	1	1
38	O. Ring	1	1	-
40	O. Ring	-	-	1
41	O. Ring	-	-	1

PRE-REGULATOR R14/A/FO



POS.	DESCRIPTION	N. OF PIECES
8	Guide ring	1
9	Reinforced gasket	1
10	Diaphragm	1
13	Filter	1
17	O. Ring	1
18	O. Ring	2
19	O. Ring	1
20	O. Ring	1

204/A PILOT

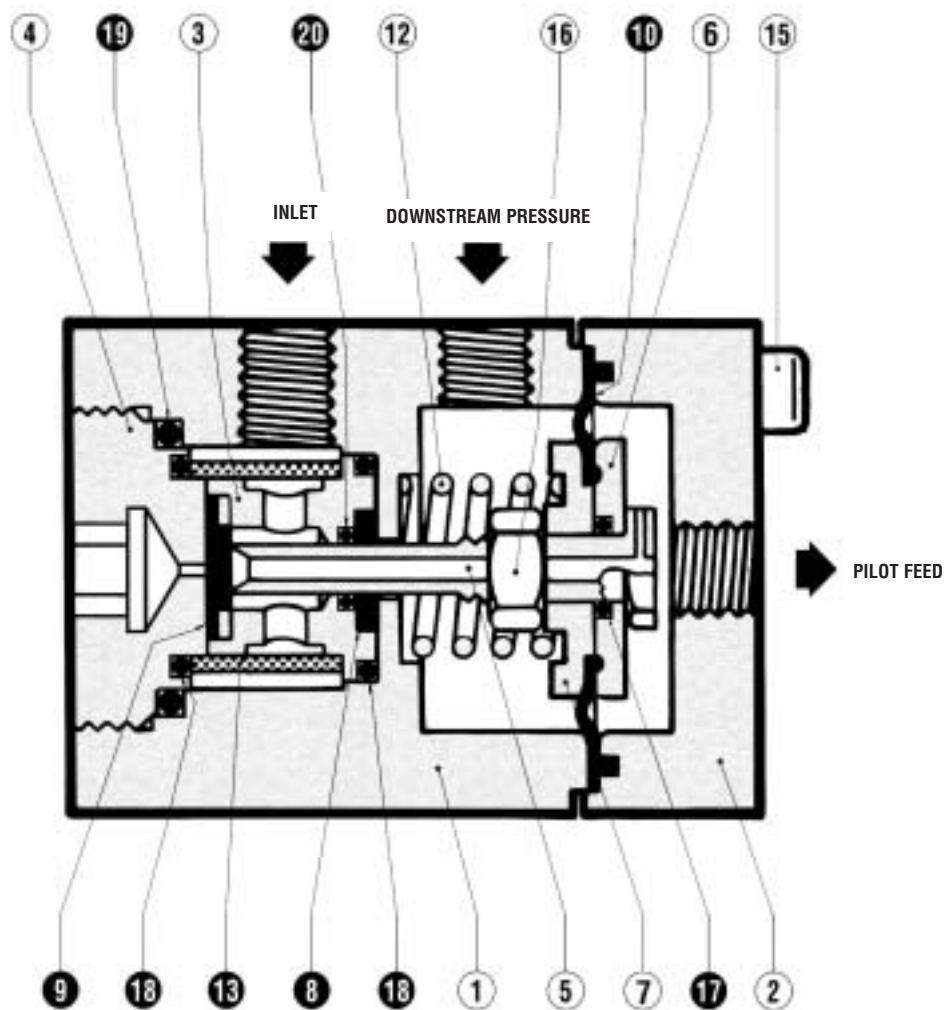


POS. DESCRIPTION

N. OF PIECES

	204/A	205/A	204/A/2/CS	204/A/1/CS	204/A/MO
11	1	1	1	1	1
16	2	2	3	3	2
17	1	1	1	1	1
18	-	-	-	-	1
28	1	1	1	1	1
29	1	1	1	1	1
38	1	1	1	1	1
40	-	-	1	-	-
41	-	-	1	-	-

R14/A PRE-REGULATOR



POS. DESCRIPTION N. OF PIECES

POS.	DESCRIPTION	N. OF PIECES
8	Guide ring	1
9	Reinforced gasket	1
10	Diaphragm	1
13	Filter	1
17	O. Ring	1
18	O. Ring	2
19	O. Ring	1
20	O. Ring	1

WHEN ORDERING SPARE PARTS, PLEASE SPECIFY:

FOR REGULATORS

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 control head

The no. of the part (position no.)

Quantity desired

FOR PILOTS

Type of pilot

Pe (inlet pressure)

Operating Pressure

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.

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A CURA DI

Edigraf


MONTECCHIO MAGGIORE (VI)
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