

MT-188-E

ENGLISH

SLAM-SHUT VALVE

SBC
187

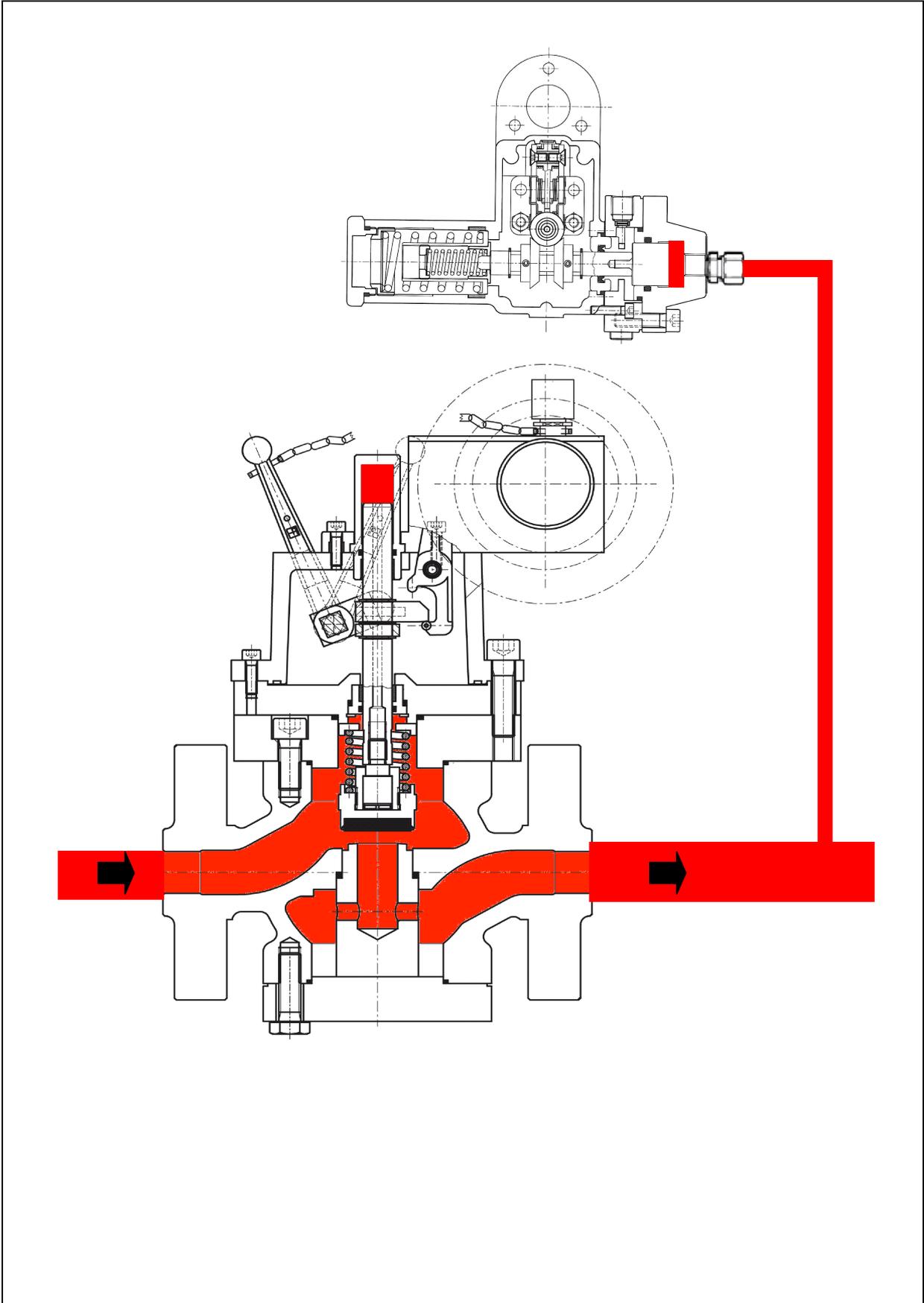


TECHNICAL MANUAL

INSTRUCTIONS FOR THE
INSTALLATION, COMMISSIONING
AND MAINTENANCE

 **Pietro
Fiorentini®**

SBC 187



WARNINGS

GENERAL WARNINGS

The equipment described in this manual is a device subject to pressure installed in systems under pressure.

The involved equipment is usually embedded in systems conveying flammable gases (e.g. natural gas).

WARNINGS FOR THE OPERATORS

Before performing the installation, commissioning or maintenance, the operators must:

- go through the safety provisions applicable to the installation where they have to operate;
- obtain the necessary authorizations to operate, when required;
- be equipped with the necessary personal protective equipment (helmet, goggles, etc.)
- make sure that the area in which they have to operate is equipped with the required collective protections as well as with the necessary safety signs.

PACKAGING

The packaging materials used for transporting the equipment and the related spare parts have been designed and manufactured to avoid damages during normal transport, storage, and related handling. Therefore, the equipment and spare parts must be kept in their respective original packages till their installation in the final destination site. When the packages are opened, it is necessary to verify the integrity of the materials therein contained. In case of damages, report the detected damages to the suppliers preserving the original package to allow the performance of necessary inspections.

HANDLING

The handling of the equipment and its components must be performed after having established that the lifting means are suitable for the loads to be lifted (lifting capacity and functionality).

When necessary, the handling of the equipment must be performed using the lifting points foreseen on the equipment itself. The use of motorized means is reserved to authorized personnel only.

INSTALLATION

The installation of the device must occur in compliance with the provisions (laws or regulations) in force in the place of installation.

In detail, natural gas plants must show features complying with the law provisions or regulations in force in the place of installation or at least complying with the standards EN 12186 or EN 12279 - more specifically, the paragraphs 6.2, 7.5.2, 7.7, and 9.3 of the standard EN 12186 and 6.2, 7.4, 7.6, and 9.3 of the standard EN 12279 must be observed. The installation in compliance with such standards minimizes the risk of fire and the formation of potentially hazardous atmospheres.

The equipment is not provided with internal pressure limitation devices; therefore, it must be installed making sure that the operating pressure of the assembly in which it is installed does never exceed the value of maximum allowable pressure (**PS**).

Therefore, the user, when he deems it necessary, shall provide for the installation of suitable pressure limitation systems on the assembly. Moreover, the user shall equip the plant with suitable relief or drain

systems in order to be able to discharge the pressure and the fluid contained in the plant before proceeding with any inspection and maintenance activity.

Should the installation of the equipment require the installation on site of compression fittings, these latter have to be installed following the instructions provided by the manufacturer of the fittings. The selection of the fittings must be compatible with the use specified for the equipment and with the plant specifications, when available.

COMMISSIONING

The commissioning must be carried out by **suitably trained personnel**.

During the commissioning, the personnel not strictly necessary must be kept away and the limited access area must be properly marked (signs, barriers, etc.).

Verify that the equipment calibrations are the ones required. If necessary, restore the required values for the same as provided for later on in this manual.

During the commissioning, the risks determined by any discharges to the atmosphere of flammable or noxious gases must be assessed.

In case of installation on natural gas distribution networks, it is necessary to consider the risk of formation of a (gas/air) explosive mixture inside the piping.

COMPLIANCE WITH DIRECTIVE 97/23/EC (PED)

The slam-shut valve SBC 187 is classified as pressure accessory pursuant to Directive 97/23/EC (PED).

The slam-shut valve SBC 187 with pressure switch tripping in case of maximum pressure is classified as safety accessory pursuant to the PED Directive and, therefore, it can be used as both a pressure accessory and a safety accessory, always pursuant to the PED Directive.

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1.0 INTRODUCTION

This manual aims at supplying essential information on the installation, commissioning, disassembly, reassembly, and maintenance of the valve **SBC 187**. Moreover, it is deemed suitable to provide the reader with a brief description of the main features of the valve and its accessories.

1.1 MAIN FEATURES

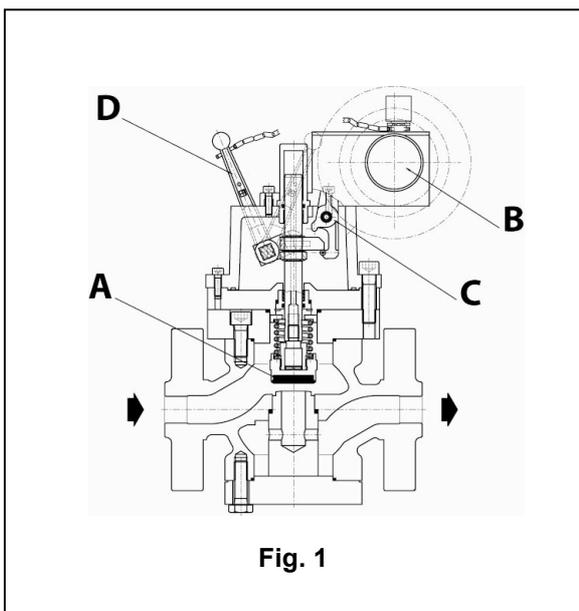
This is a device immediately blocking the gas flow, either if pressure inside a piping reaches the preset value for its tripping due to any fault or if it is enabled manually.

The main features of this valve are:

- Design pressure **PS**: 220 bar;
- Operating temperature: -20°C / + 60 °C;
- Ambient temperature: -20°C / + 60 °C;
- Tripping due to pressure increase and/or decrease
- Tripping range due to pressure increase **Wdo**: 2 / 90 bar;
- Tripping range due to pressure decrease **Wdu**: 0.2 / 90 bar;
- Accuracy (**AG**): 1% of the calibration value in case of pressure increase; 5% of the calibration value in case of pressure decrease;
- External manual bypass by means of a hand wheel to obtain pressure balancing and ease the restoration of the device;
- Manual tripping control by means of push-button.

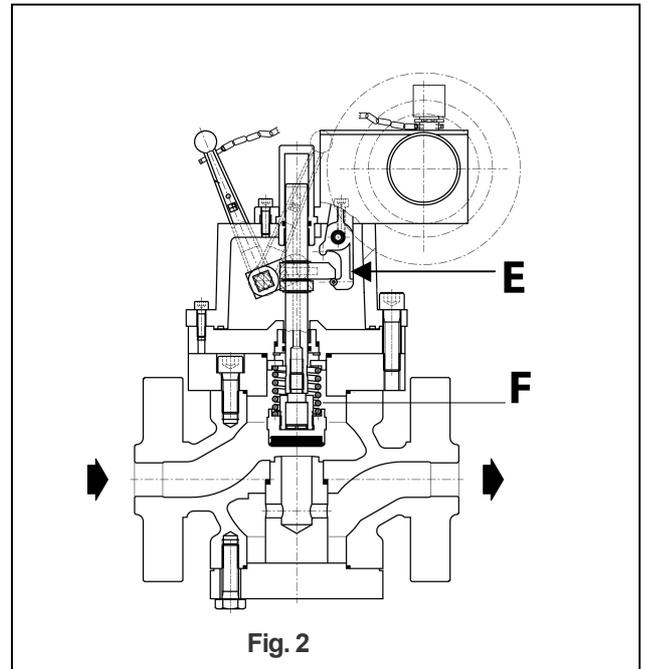
1.2 OPERATION OF THE VALVE SBC 187 (Fig. 1)

The slam-shut device consists of an obturator **A**, a control head **B**, a lever mechanism system for the release **C** and a restoration system **D** controlled manually through the lever.

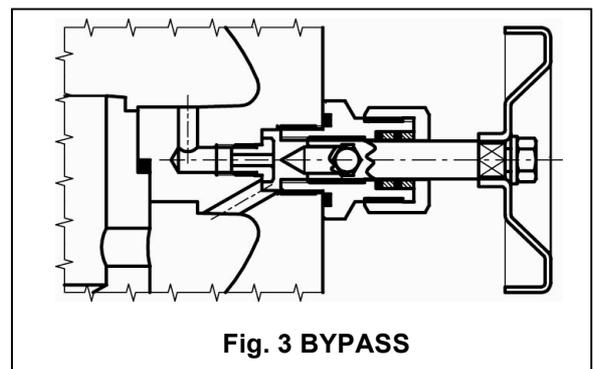


The pressure of the circuit to be controlled acts on the control head with a force opposing the forces of the setting springs for maximum and minimum pressure calibrated to the pre-set values.

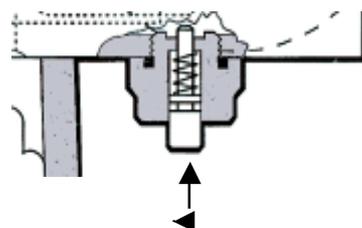
The translation movement causes the shifting of the lever mechanisms controlling the release **E** of the entire mobile system freeing the obturator, which closes due to the action of the spring **F**.



In order to restore the device, act on the lever **D** after having balanced the pressure on the obturator by feeding pressure through the manual bypass system with which the valve is equipped. After the restoration close the bypass.



The release can be controlled also manually using the suitable button.



1.3 Tab. 1 SETTING SPRINGS

Code	Spring characteristics				Setting range (bar)		Pressure switch mod.
	Color	De	Lo	d	MAX	MIN	
2701530	Yellow	35	60	4	2 ÷ 4		103M -103MH
2701790	Yellow/Black		60	4.5	4.1 ÷ 7.5		
2702280	White/Red		60	5.5	7.6 ÷ 15		
2702454	Fuchsia		70	6	15.1 ÷ 22		
2700464	Orange	15	40	1.7		0.2 ÷ 0.5	103M
2700513	Red		40	2		0.51 ÷ 0.8	
2700713	Green		40	2.3		0.81 ÷ 2	
2700750	Black		40	2.5		2.1 ÷ 3.7	
2700985	Brown		40	3		3.8 ÷ 8	
2700985	Brown	15	40	3		8 ÷ 13	103MH
2700980	Blue		35	3		13.1 ÷ 19	
2700985	Brown		40	3			
2700985	Brown		40	3			
2702280	White/Red	35	60	5.5	15 ÷ 30		104M
2702454	Fuchsia		70	6	30.1 ÷ 45		
2700713	Green	15	40	2.3		1.6 ÷ 3	104M
2700750	Black		40	2.5		3.1 ÷ 8	
2700985	Brown		40	3		8.1 ÷ 18	
2700985	Brown	15	40	3		18 ÷ 30	104MH
2700980	Blue		35	3		30.1 ÷ 41	
2700985	Brown		40	3			
2700985	Brown		40	3			
2702280	White/Red	35	60	5.5	30 ÷ 60		105M
2702454	Fuchsia		70	6	60.1 ÷ 90		
2700713	Green	15	40	2.3		3 ÷ 7	
2700750	Black		40	2.5		7.1 ÷ 16	
2700985	Brown		40	3		16.1 ÷ 44	
2700985	Brown	15	40	3		44 ÷ 60	105MH
2700980	Blue		35	3		60.1 ÷ 90	
2700985	Brown		40	3			
2700985	Brown		40	3			

De = external diameter **d** = wire diameter **Lo** = Length

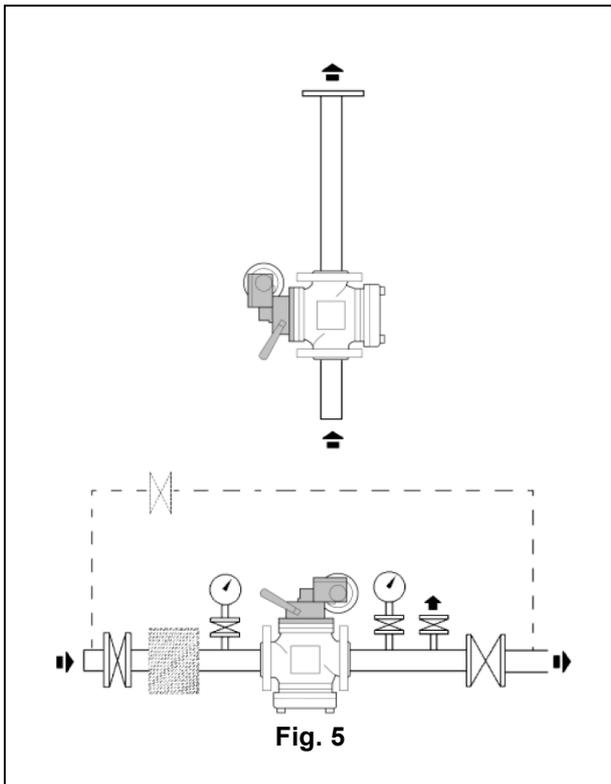
2.0 INSTALLATION

2.1 GENERAL

Before installing the valve, it is necessary to make sure that:

- the valve can be inserted in the forecast space and is sufficiently accessible for performing the following maintenance operations;
- the upstream and downstream piping are on the same level and are able to support the valve weight;
- the inlet/outlet flanges of the piping are parallel;
- the inlet/outlet flanges of the valve are clean and the valve itself has not been subject to damage during transport;
- the piping is clean, removing any residual impurities such as welding scraps, sand, paint residues, etc. - also check that they do not show sign of damages, corrosion, etc.

Provisions that are usually required to be observed are shown in Fig. 5.



After having performed the above mentioned checks, it is possible to install the valve on the line paying attention to position its body in such a way that the gas flows in the same direction of the arrow stamped on the body itself.

To obtain the correct operation it is essential that the downstream impulse circuit is connected to a straight section of the downstream piping having a length complying to Fig. 5 (therefore, without any signal turbulence), as well as that the maximum gas speed at the connection point does not exceed 30 m/sec.

In order to avoid deposits of impurities and condensate in the pressure feeding connection piping, provide for the following:

- The piping shall always be positioned on a descending slope towards the connection of the downstream piping with a slope of about 5 - 10%;
- Piping connections shall always be positioned on the upper part of the piping and the hole on the piping shall not show any burrs or projections towards the internal side.

The most frequent types of installation on a gas pressure reduction line of the valve SBC 187 are shown in Fig. 6 and Fig. 7.

Fig. 6 shows the installation of the valve on a generic piping segment.

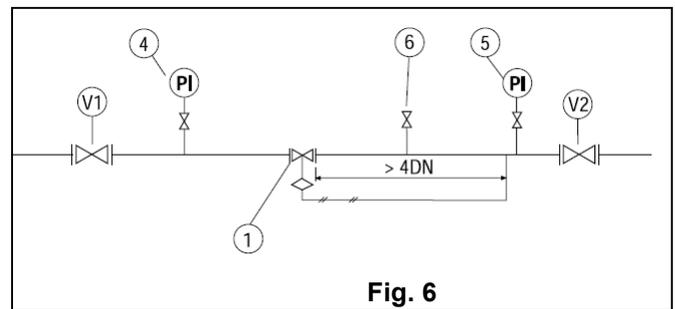
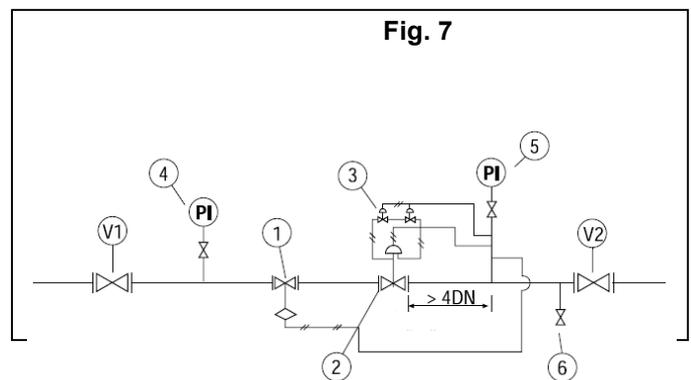


Fig. 7 shows the installation of the valve on a gas pressure reduction line as safety in case of fault of the pressure regulator.



- 1 Slam-Shut Valve
- 2 Pressure regulator
- 3 Pilot
- 4 Upstream gauge
- 5 Downstream gauge
- 6 Drain valve to the atmosphere
- V1 Upstream on/off valve
- V2 Downstream on/off valve

NB. IT IS RECOMMENDED NOT TO INTERPOSE ON/OFF VALVES ON THE IMPULSE CONNECTION POINTS

3.0 ACCESSORIES

3.1 "PUSH" THREE-WAY SWITCH VALVE

The "Push" valve is a three-way switch valve with spring return. With knob 1 set to the normal operation position, the ways **A** and **B** are angle communicating; while way **C** is excluded.

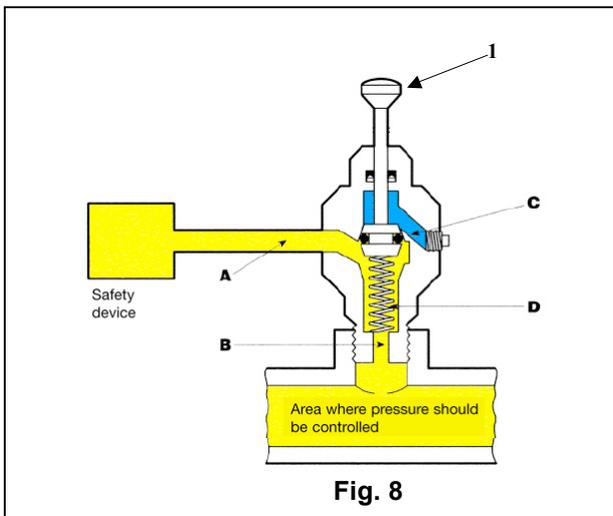


Fig. 8

With the knob pressed downwards, in "check" position, the ways **A** and **C** are communicating, while way **B** is excluded. When the knob **1** is released, the communication between the ways **A** and **B** is automatically restored due to the tripping of the spring **D**.

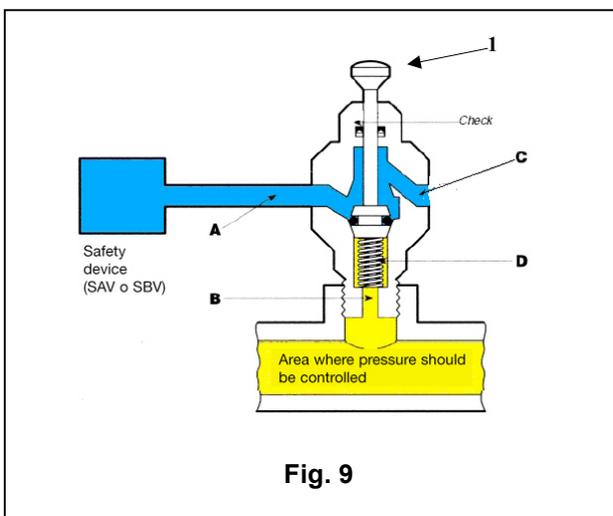


Fig. 9

This valve is usually installed in the impulse line of safety devices against pressure increase and/or decrease (SAV or SBV) in order to be able to verify their calibrations in a very short time without disconnecting the impulse pipe during the periodic checks.

The application of this accessory involves, during normal operation, that the pressure switch head (or the pilot of the safety device) receives the signal of the pressure to be kept monitored and controlled through the ways **A** and **B**. In the control phase, the control head receives a signal from an auxiliary external controlled pressure from way **C** to way **A**. Once the check has been performed, when the knob returns to the normal operation position, the connection between the area with the pressure to be monitored and controlled and the head of the safety device is restored automatically, thus avoiding the on/off switching of the device, which may happen due to a sheer oversight, if the three-way valve is of the normal type with manual operation. As a consequence, the "Push" device is a second safety device, which assures the non-exclusion of the main safety device and allows its periodical check.

4.0 COMMISSIONING

4.1 GENERAL

After the installation, verify that the on/off valves at inlet and outlet, any available bypass valve on the line, and the relief valve to the atmosphere are closed.

Before commissioning, it is recommended to verify that the use conditions do meet the features of the equipment.

Such features are given on the rating plates present on the equipment itself.

It is recommended to enable the opening and closing on/off valve very slowly. Too fast maneuvers may cause the involuntary tripping of the device or damage the valve.

EQUIPMENT RATING PLATES

Pietro Fiorentini		CE	REGULATOR		SBC 187	T: _____
S.n.:	PS:	Pumax:	bar			
DN:	Flange:	AC:				
Wd:	Bp:	SG:	bar			
Wds:	Fluido:	Cg:	METANO			

Pietro Fiorentini		SLAM SHUT DEVICE	LA
S.n.:	Wds:	bar	
T:	Wds:	bar	
AG:	Wds:	bar	
AG:	Wds:	bar	

Here below there is the list of the symbols used together with their meaning.

CE = Compliance with Directive 97/23/EC (PED)

Pumax = maximum operation pressure at device inlet.

PS = maximum allowable pressure that can be born under safety conditions by the device body structure.

AG = tripping accuracy.

Wdso = tripping range due to slam-shut valve overpressure, which can be obtained by using the setting spring mounted during final testing.

Wdo = tripping range due to slam-shut valve overpressure, which can be obtained by using the setting springs listed in the tables.

Wdsu = tripping range due to slam-shut valve pressure decrease, which can be obtained by using the setting spring mounted during final testing.

Wdu = tripping range due to slam-shut valve pressure decrease, which can be obtained by using the setting springs listed in the tables.

4.2 GAS FEEDING, CHECK OF EXTERNAL TIGHTNESS AND CALIBRATIONS

Pressure feeding to the equipment shall be performed very slowly. When not any inertization procedure is implemented, it is recommended to keep gas speed in the feeding piping under a value of 5 m/sec during the pressure feeding phase.

In order to prevent the equipment from being damaged, the following shall be absolutely avoided:

- Pressurization through a valve positioned downstream of the equipment itself.
- Depressurization through a valve positioned upstream of the equipment itself.

The external tightness is assured when by applying a foam medium on the element under pressure no bubbles are produced.

Usually, the slam-shut valves are supplied already calibrated to the requested value. However, it may happen that due to several reasons (e.g. vibrations during transport) the calibrations may be subject to slight changes, though remaining within the range of the values allowed by the springs used. Therefore, it is advisable to verify the calibrations according to the procedures outlined here below.

Before commissioning the valve, it is necessary to verify that all on/off valves (inlet, outlet, and bypass - if any) are closed and that the gas has such a temperature as not to create malfunctions.

4.3 CALIBRATION CHECK

Check and record the tripping of the slam-shut device as follows:

A) For the slam-shut devices connected to the downstream piping through the "push" three-way switch valve, proceed as follows (Fig. 10):

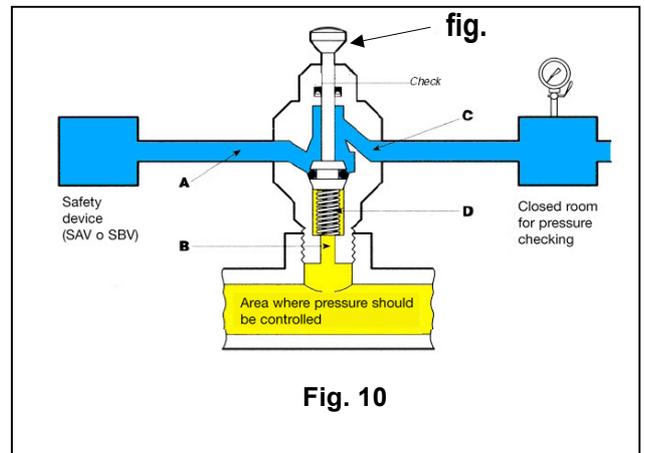


Fig. 10

- connect to the way C a controlled auxiliary pressure;
- restore the slam-shut device by means of the suitable lever;
- press knob 1 and:
 - For safety devices tripping in case of maximum pressure slowly increase the auxiliary pressure and verify the tripping value. If necessary, increase the tripping value by rotating clockwise the adjustment ring nut or decrease the tripping value by rotating it counter-clockwise.
 - For safety devices tripping in case of pressure increase and decrease, slowly increase the auxiliary pressure and record the tripping value. If necessary, increase the tripping value by rotating clockwise the adjustment ring nut or decrease the tripping value by rotating it counter-clockwise. Decrease the auxiliary pressure and perform the device restoration procedure. Slowly decrease the auxiliary pressure and verify the tripping in case of pressure decrease. If necessary, increase the tripping value by rotating clockwise the adjustment ring nut or decrease the tripping value by rotating it counter-clockwise.

- make sure that the operation is fine by repeating the procedure for at least 2-3 times.
- disconnect the controlled auxiliary pressure from way C;

B) For the devices not equipped with "push" valve, it is recommended to connect separately the control head at a controlled auxiliary pressure and repeat the operations described above (Fig. 11).

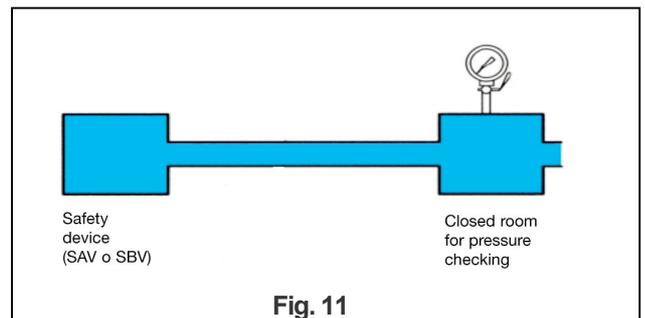


Fig. 11



CAUTION

At the end of the procedure, connect the control head back to the downstream pressure connection point.

5.0 TROUBLESHOOTING

Table 2 here below shows some of the anomalies that may happen along the time having different nature. These are phenomena linked to the gas conditions, as well as, of course, to the natural ageing and wear of the materials.

Please note that all interventions on the equipment **must be performed by technically qualified personnel having suitable knowledge on the matter.**

The tampering of the equipment due to the use of not qualified personnel relieves Pietro Fiorentini SpA from any liability whatsoever.

Therefore, you are kindly invited to have your personnel entrusted with maintenance become qualified or to avail yourself of our customer service centers (CART), which are officially authorized by us.

5.1 SLAM-SHUT VALVE SBC 187 (Tab. 2)

PROBLEM	POSSIBLE CAUSES	SOLUTION
The obturator does not close	Break of the membrane or O-ring pos. 43	Replacement
Leak from the slam-shut obturator	Obturator gasket pos. 1 fig. 12 worn	Replacement
	O-ring (pos. 15 fig. 13) of the obturator gasket (pos. 1 fig. 12) worn	Replacement
	Valve seat (Pos. 4 Fig. 12) eroded or scratched	Cleaning / Replacement
Wrong release pressure	Wrong calibration of the min. and/or max. pressure spring	Recalibrate acting on the ring nuts
	Lever mechanisms subject to friction	Replace the release device casing
It is not possible to perform restoration	The cause, which led to the pressure increase or decrease downstream, persists	Reduce or increase the downstream pressure
	Broken or splintered lever mechanisms	Replace the release device casing

NB. If the slam-shut valve tripped, first of all close the inlet and outlet valves (V1 and V2, Fig. 6) of the line and discharge the pressure. Solve the causes, which led to the tripping, before restoring the equipment.

In case of malfunctions and not having qualified personnel available for the specific intervention, contact our customer service center closer to you. For any further information, refer to our customer service service@fiorentini.com at our plant in Arcugnano (VI), Italy.

6.0 MAINTENANCE

6.1 GENERAL

Maintenance, inspection and operation activities have to be carried out in compliance with the regulations in force on the matter in the place of installation of the equipment (type and frequency). Before performing any kind of intervention, it is important to make sure that the device has been closed at inlet and outlet and that the pressure has been discharged from the piping between the valve and the cut-off valves. Maintenance interventions are strictly bound to the quality of the conveyed gas (impurities, humidity, gasoline, corrosive substances) and to the filtration efficiency.

Therefore, it is always recommended to perform preventive maintenance interventions whose frequency shall be determined according to the following aspects, unless specified by regulations already in force:

- the quality of the conveyed gas;
- the cleanness and preservation status of the piping upstream of the regulator: in general, for example, after the first start of the plants, more frequent maintenance interventions are required if the internal cleanness of the piping is precarious.
- the reliability level required from the plant.

Before starting disassembling the equipment make sure:

- to have a series of original spare parts available. Spare parts shall be original spare parts by Pietro Fiorentini; consider that the most important parts such as membranes are marked.
- to have a series of wrenches as shown in table 10.

For a correct maintenance, suggested spare parts are unmistakably identified by means of tags bearing the following information:

- the SR layout drawing number of the equipment in which they can be used;
- The position given on the SR layout drawing of the equipment;

It is suggested to replace all rubber parts; for this purpose, use the suitable spare part kit as highlighted in Fig. 12, 13, 14.

NB. The use of not original parts relieves Pietro Fiorentini S.p.A. from any responsibility.

The depressurization procedure shall occur paying attention to discharge the drains into a safe area; to avoid risks related to the formation of sparks due to bumps of impurity particles inside the discharge lines, it is recommended to keep fluid speed lower than 5 m/sec.

Moreover, it is suggested to perform reference marks on the parts before disassembling those parts that can be positioned or oriented in more than one way during re-assembly.

Finally, it shall be underlined that O-rings and sliding mechanical parts (stems, etc.) have to be lubricated before reassembling them, applying a thin layer of silicone grease. Before commissioning, it is necessary to verify the external tightness of the equipment at a suitable pressure for assuring the absence of external leaks.

6.2 MAINTENANCE PROCEDURE FOR THE SLAM-SHUT VALVE SBC 187

PROGRAMMED PREVENTIVE MAINTENANCE

Procedure for disassembling, completely replacing the spare parts and reassembling the valve SBC 187.

PRELIMINARY OPERATIONS

- A) Shut off the valves upstream and downstream of the system and open the drain cock carefully.
- B) Make sure that the pressure upstream and downstream of the device is equal to zero.

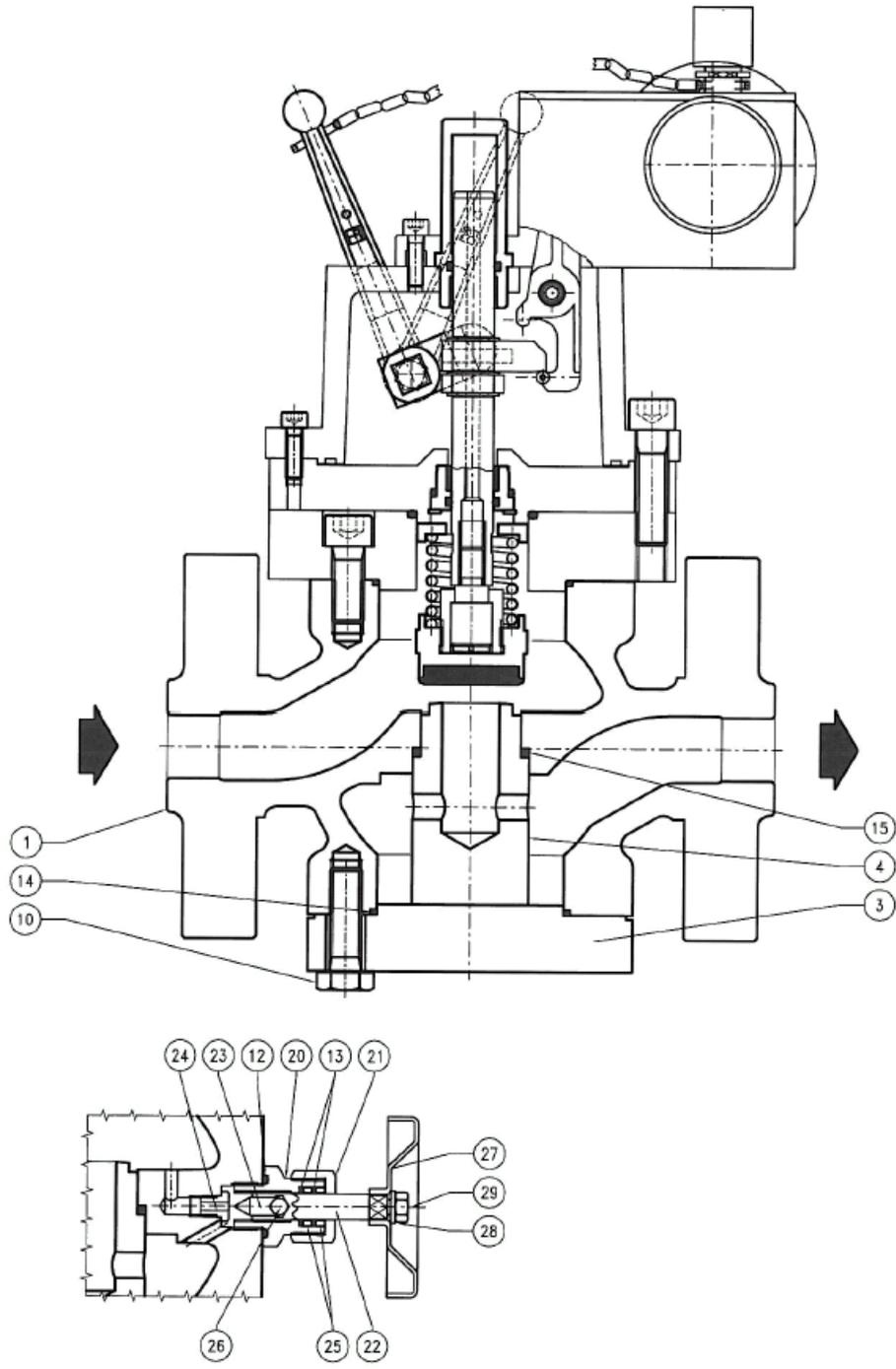


FIG. 12

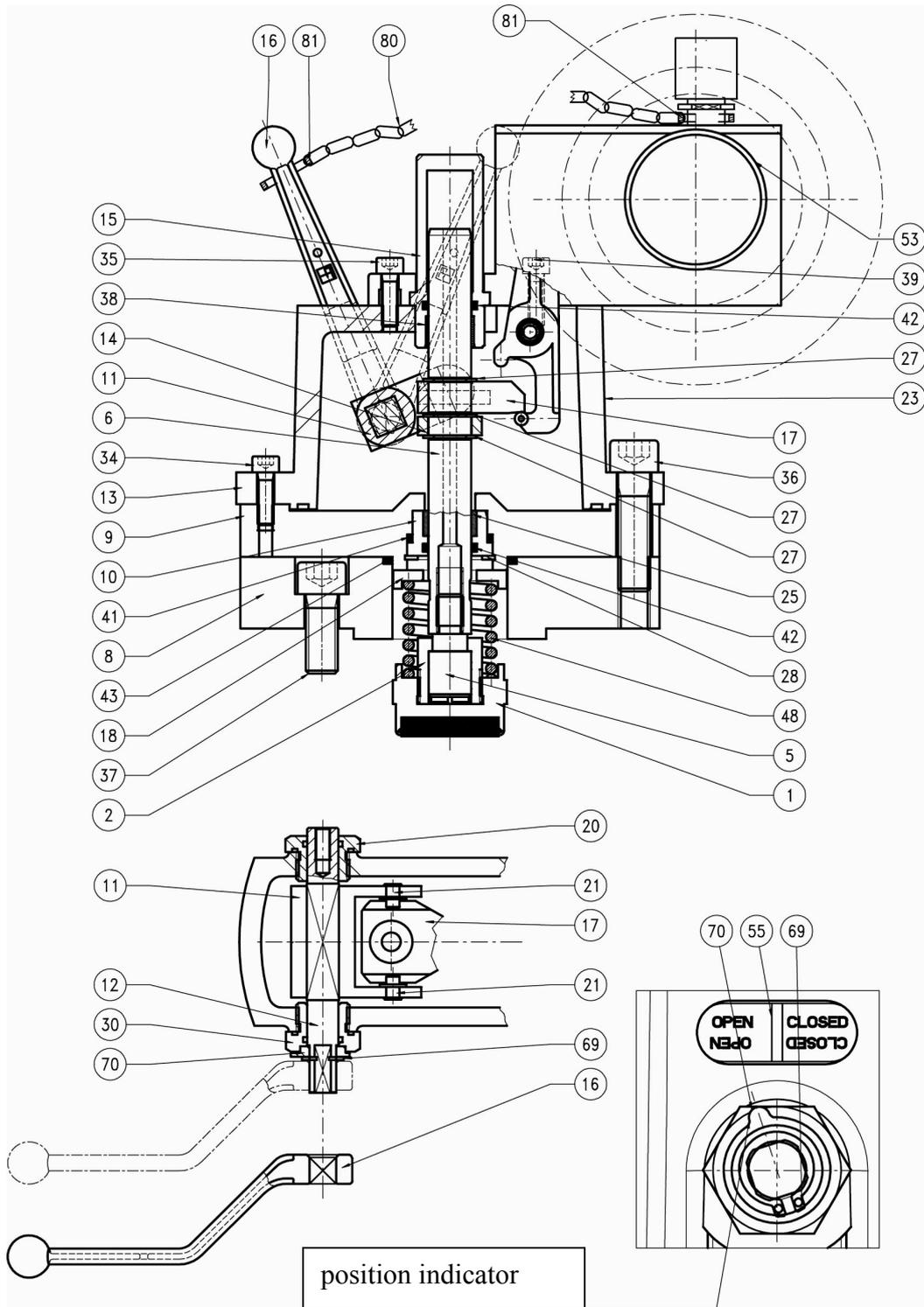


Fig. 13

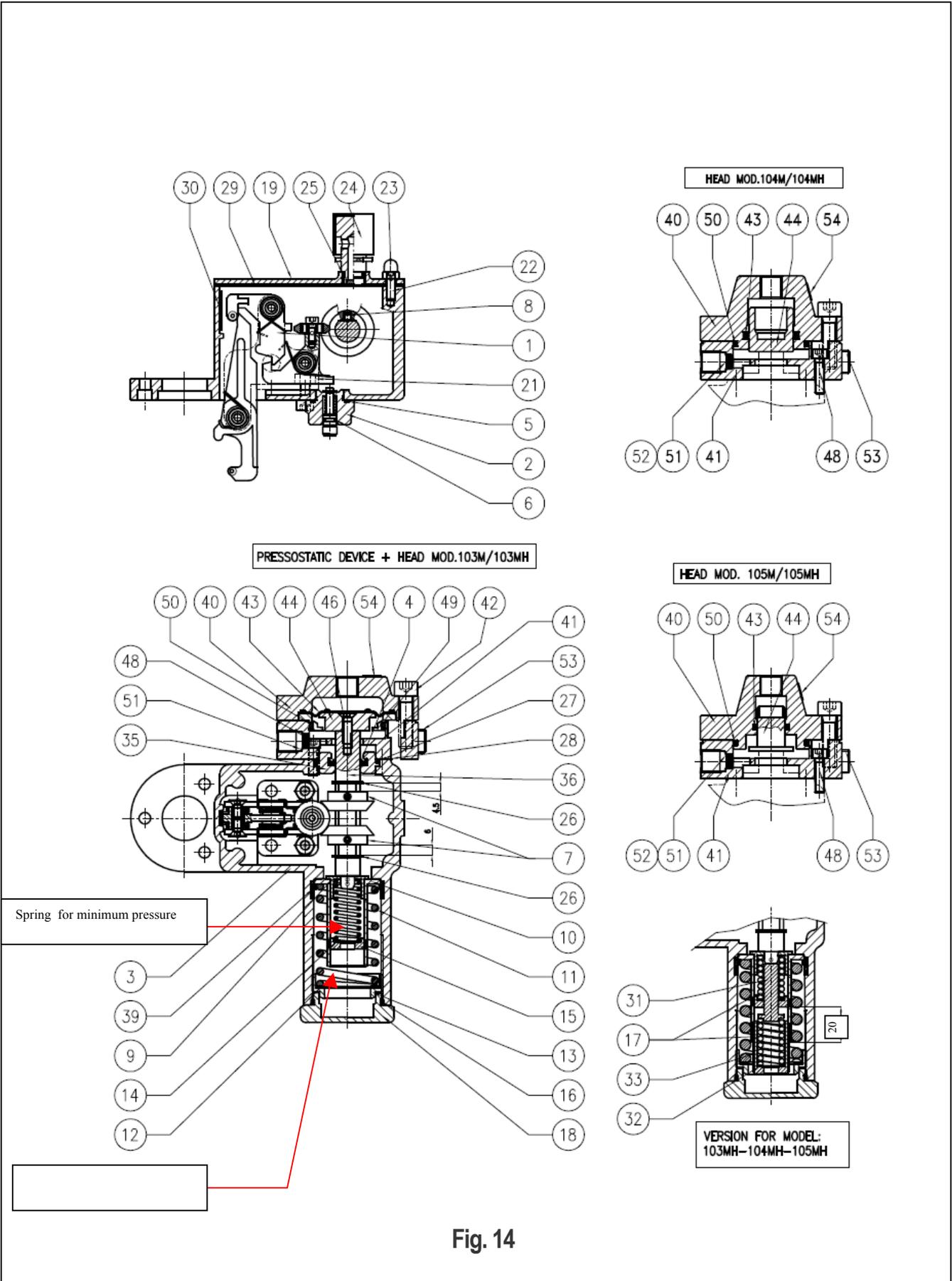


Fig. 14

DISASSEMBLY

- 1) Make sure that the blocking device is in closed position.
- 2) Disconnect the connection pipe between the downstream pressure connection point and the control head of the slam-shut valve pressure switch.
- 3) Loosen the tightening screws pos. 36 (fig. 13) and separate the device from the flange (pos. 8).
- 4) Lay the slam-shut device on one side.
- 5) Unscrew and remove the reinforced gasket pos. 1 (fig. 13) from the blocking fitting pos. 2.
- 6) Remove the spring from pos. 48 and the spring support pos. 18.
- 7) Remove the elastic ring pos. 28 and the bushing pos. 10.
- 8) Loosen the tightening screws pos. 10 and remove the hollow flange pos. 3 (Fig. 12).
- 9) Remove the valve seat pos. 4 (Fig. 12).
- 10) Remove the tightening screws pos. 35 from the pressure switch (Fig. 13).

REASSEMBLY

To re-assemble the slam-shut valve, follow the procedure described for disassembly in reverse order.

Before reassembling the tightness elements (O-rings, membranes, etc.), it is necessary to check their integrity and, if necessary, replace them.

Once again, pay utmost care while handling the valve seat pos. 4 (Fig. 12) in order not to damage the sealing edges.

7.0 FINAL OPERATIONS

7.1 CHECK OF TIGHTNESS AND CALIBRATIONS

- 1) Open very slowly the on/off valve positioned upstream of the slam-shut valve and, using a foamy solution or the alike, check the following:
 - tightness of the valve external surfaces;
 - internal tightness of the slam-shut valve (downstream pressure shall not increase).
- 2) Open the manual bypass and pressurize the network part downstream of the valve. Completely open the valve till it blocks. Close the manual bypass.
- 3) Verify the calibrations as described under point 4.3.

7.2 COMMISSIONING

- 1) Open very slowly the downstream on/off valve;
- 2) Verify that the downstream pressure is stable and shows the forecast value;
- 3) Make sure that the plant is under safety conditions.

Tab. 10 WRENCHES FOR MAINTAINING SBC 187

		
Combined wrench	Adjustable spanner	Double polygonal box spanner
Wr. 8-9-10-11-12-13-17-18-19-20-21--24-41	L=300	Wr. 10--27
		
Hexagon Allen wrench	Philips screwdriver	Flat blade screwdriver
Wr. 2-3-4-5-6-8-10		6.5 x 100.
		
Pliers for rings		
19÷40		



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