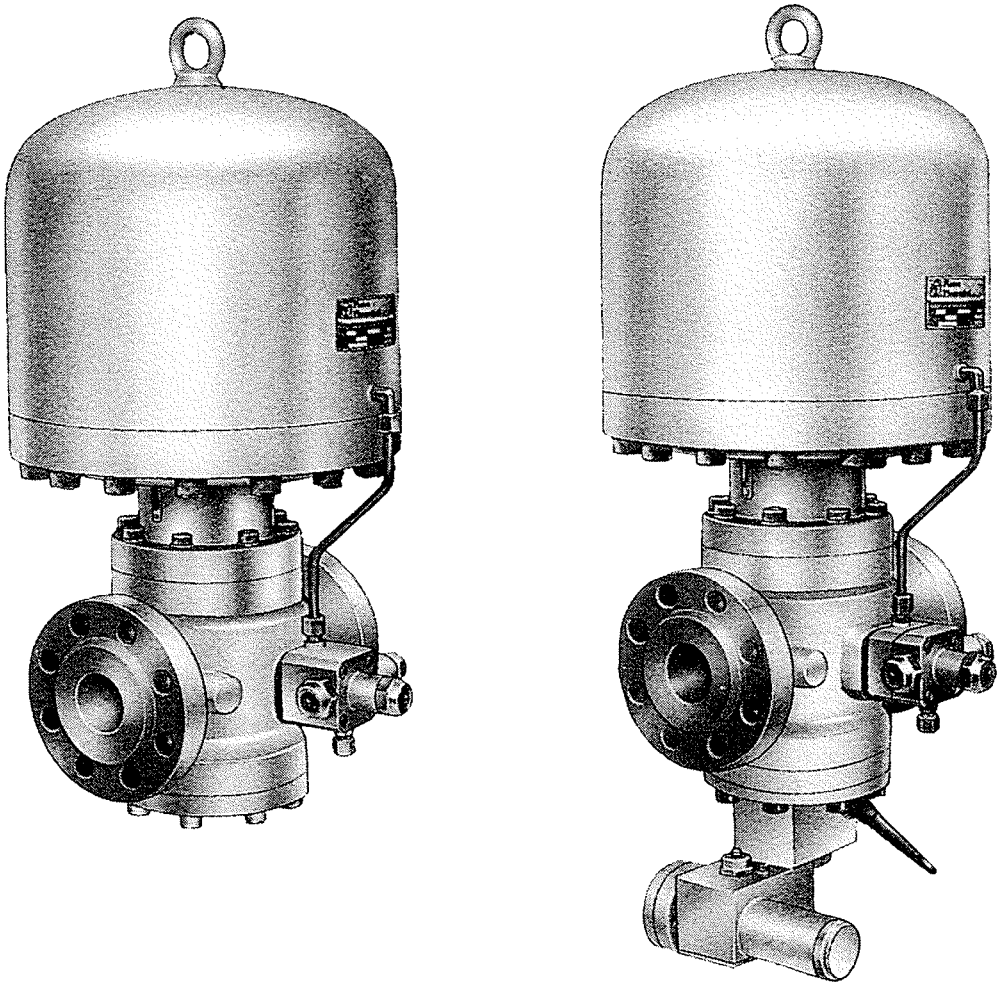
Pietro Fiorentini®

PRESSURE REGULATOR

STAFLUX 185



TECHNICAL MANUAL

MT053/E

INSTALLATION, COMMISSIONING AND MAINTENANCE INSTRUCTIONS

Pietro Fiorentini®

INDEX

1. DESCRIPTION

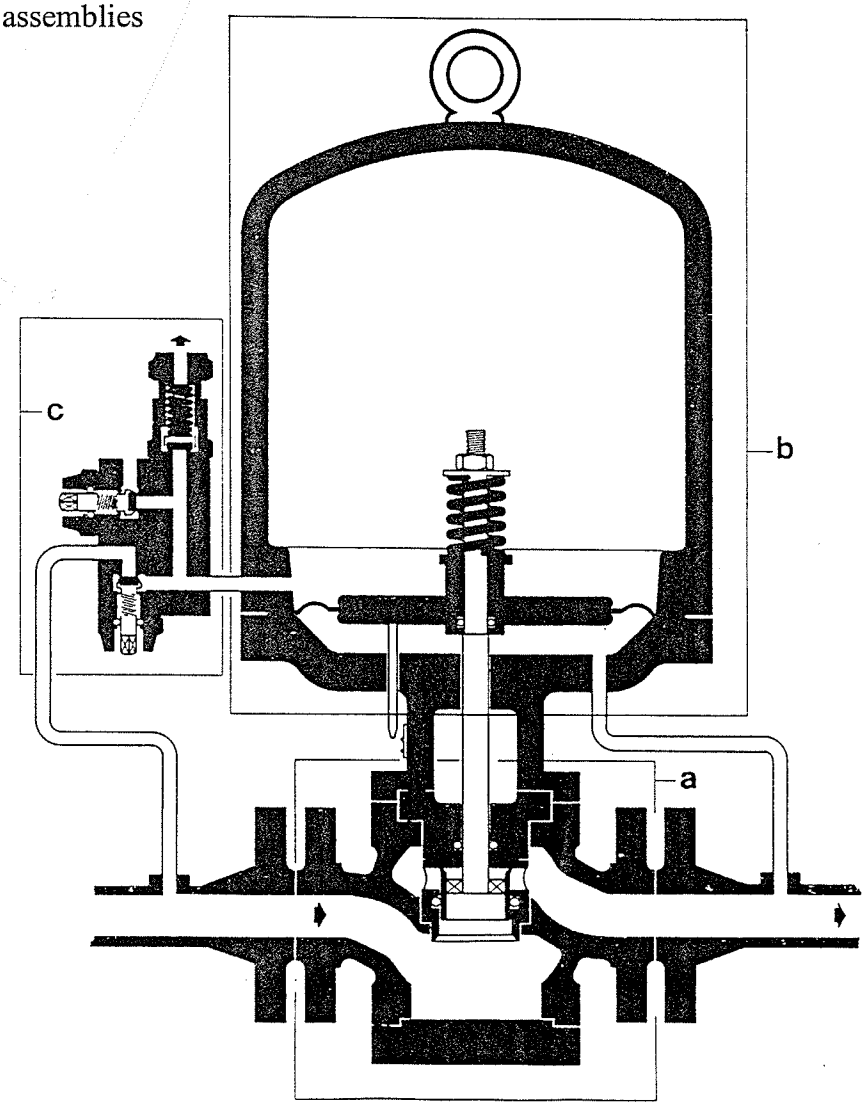
The STAFLUX regulator is an apparatus which, when supplied with gas at a variable pressure, decompresses and regulates it at a pre-established value.
It is essentially composed of three operative assemblies (see fig. 1):

a – valve body
b – servomotor
c – three-way valve for setting

The valve assembly, which carries out the decompression, is housed in the body **A**.

There is a diaphragm in the servomotor **B,** the function of which is to transmit the movement to the mobile obturator by means of a rod. This movement is measured by a stroke indicator which allows the opening of the valve to be controlled at all times. This measurement can be transmitted remotely by appropriate instruments.
The three-way valve **C** commands the input and discharge of the pressure in the pressurized chamber **B** so as to obtain the desired setting of the downstream pressure. The components of this assembly are the input cock **9**, the discharge cock **10**, and the safety valve **11** which protects the chamber **B** (fig. 2).

Figure 1
Operative assemblies



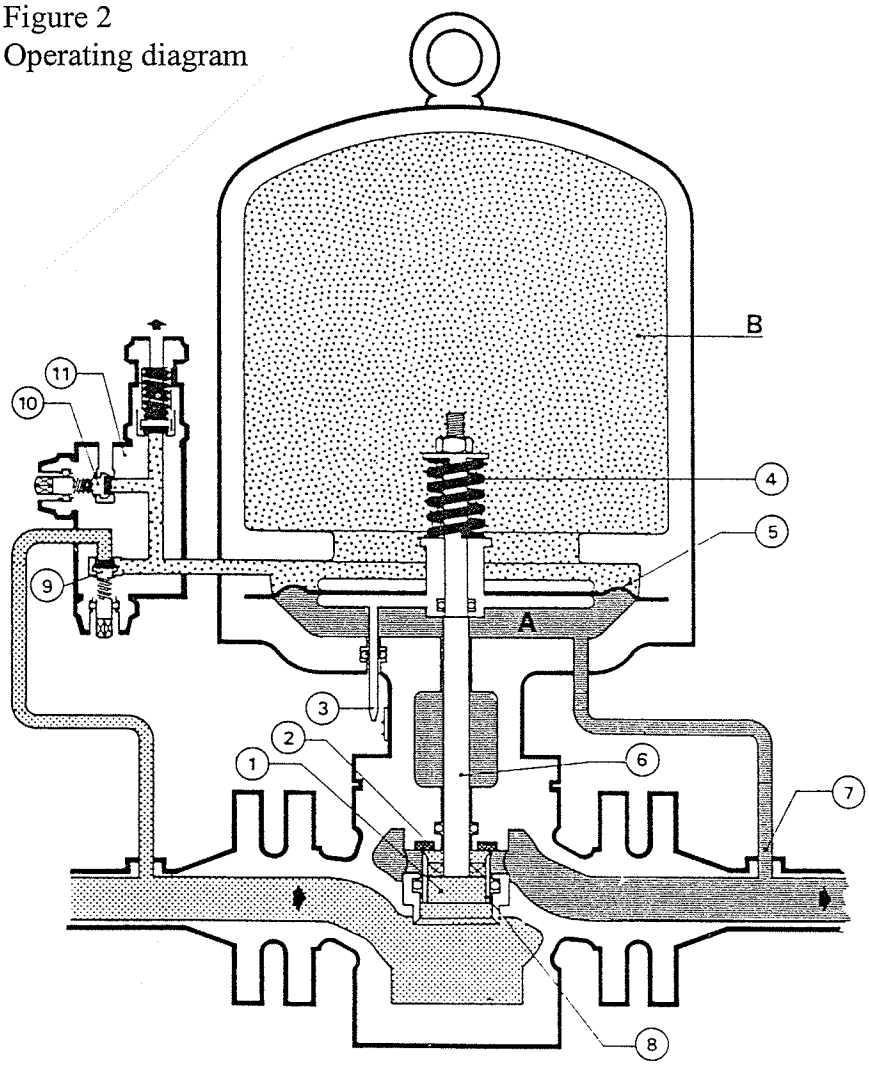
2. REGULATOR OPERATION

The STAFLUX is a diaphragm-controlled direct-action regulator with a contrasting action and a pressurized chamber, for medium and high downstream pressures which cannot be achieved with conventional spring regulators.
The operating principle is based on the equilibrium of the forces acting on the diaphragm **5** to which the obturator **8** is linked.
These forces are:

- in one direction, the downstream pressure which, through the sensing line, acts on one side of the diaphragm, chamber **A**;
- in the other direction, the pressure of the pressurized chamber **B** which acts on the other side of the diaphragm plus the weight of the assembly.

The upstream pressure, even if variable, does not influence the position of the obturator **8** as it is perfectly balanced. If during operation, as a result of a pressure drop upstream or increased flow, there is a drop in the regulated pressure, a disequilibrium is created on the diaphragm **5** through the downstream sensing line and this lets the force due to the pressure in the chamber **B** to prevail, thereby causing the obturator to open and permit greater gas flow until the downstream pressure is restored to the set-point.

Figure 2
Operating diagram



pressures:

inlet

outlet

motorization

Inversely, when the regulated pressure begins to rise because the upstream pressure has increased or the flow has dropped, the obturator moves back towards the closed position, again following a variation in the pressure transmitted by the sensing line **7** thereby returning the regulated pressure to the set-point.

The regulator is fitted with a valve opening indicator **3**. It is also provided with a spring **4** to protect the rubber gasket **2** and the diaphragm **5** from improper operation; the latter is also protected by bottom and top supports.
The apparatus is equipped with a cock **9** for letting the gas into the chamber **B** and an outlet cock **10**, making it easy to select the regulated pressure.

Furthermore, the chamber **B** is protected by a spring safety valve **11** preset at the maximum pressure value of the pressurized chamber.

As the pressure value of the fluid in the pressurized chamber **B** is influenced by variations in the ambient temperature, there is also a variation in the regulation pressure of the regulator. This variation is ± 2% for a variation in the temperature of the fluid in the chamber **B** of $\Delta T = 10°C$. Note that the flow of the gas at a constant temperature inside the valve mitigates the effect caused by variations in the ambient temperature; furthermore, it is easy to cover the outer surface of the pressurized chamber **B** with an insulating jacket, thereby obtaining good regulation even when there is a considerable swing in temperature during the day. Setting should be carried out again with each change of season to allow for seasonal temperature ranges.

3. INSTALLATION

The STAFLUX pressure regulator is supplied ready for installation which must be carried out as indicated in fig. 3; the sensing line pipe and associated connection fittings are supplied separately.

Before proceeding with the installation of the regulator, it is indispensable to ensure that:

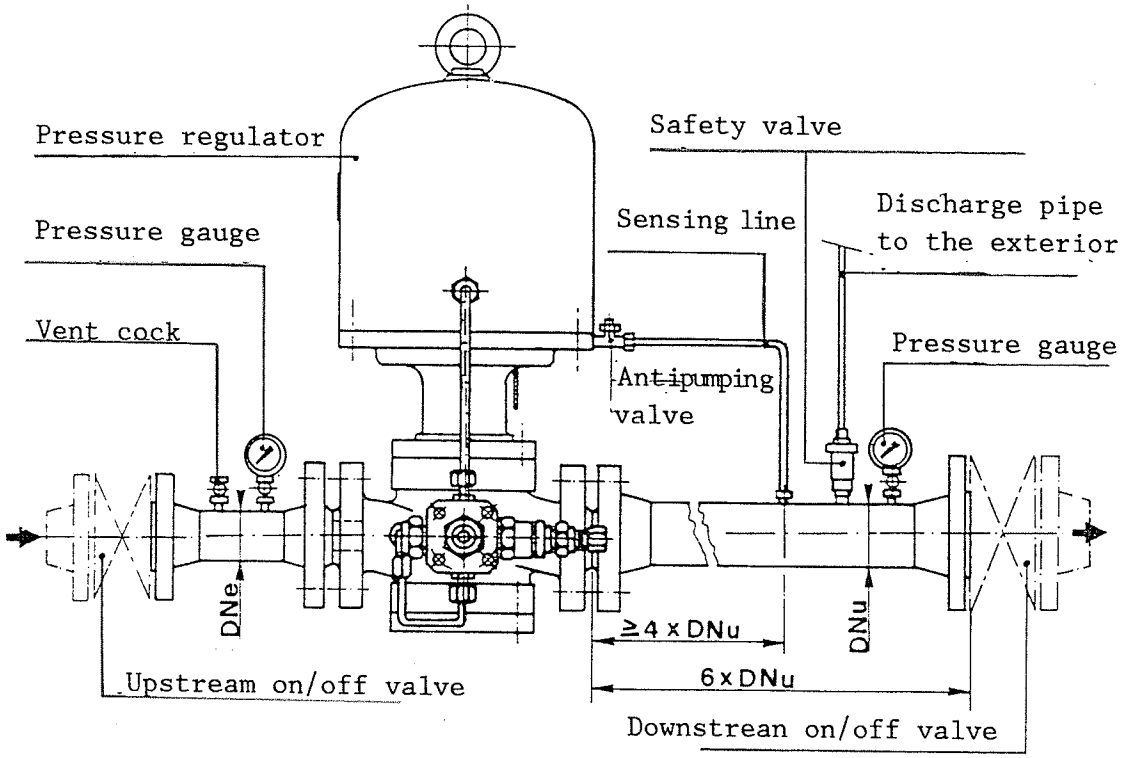
- the regulator can be inserted in the space provided for it and that it can be completely disassembled in it;
- the piping, upstream and downstream, is at the same level and capable of supporting the weight of the apparatus; otherwise, appropriate supports should be installed;
- the connection flanges should be perfectly parallel;
- the inside of the mouths of the regulator must be clean and they must not have been damaged during transport;
- the piping upstream must be purged to expel any residual impurities (welding dross, sand, etc.).

When the above checks have been carried out, the valve can be mounted in the line, as indicated in figure 3.

After ensuring that the regulator is turned so that the flow goes in the direction of the arrow impressed on its body, tighten the bolts in the flange in a uniform manner.

For proper regulation, it is indispensable for the sensing line, connected to the piping downstream from the regulator, to be installed so that, upstream and downstream from it, there are two stretches of rectilinear piping at least four times as long and twice as long respectively as the diameter of the pipe. In no case should you exceed the limit of 12 times the diameter in the stretch between the outlet flange of the regulator and the sensing line point.

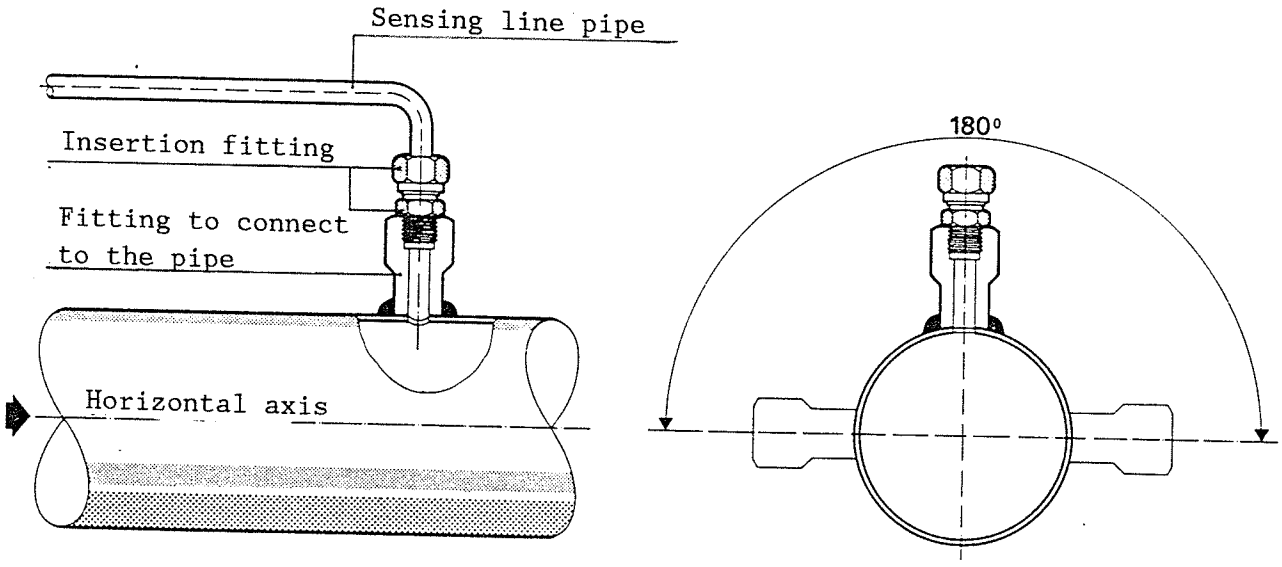
Figure 3
Installation diagram



The fitting for the sensing line must be made as follows (see figure 4):

- weld the fitting to the pipe;
- bore the pipe;
- carefully deburr the hole inside the pipe.

Figure 4
Sensing line connection



As shown in figure 4, the fitting for the sensing line must be completely on the top of the pipe. It must never be fitted on the bottom as condensate and impurities could be deposited in it, leading to regulation problems.
To complete the installation, two pressure gauges must always be fitted, positioned upstream and downstream from the regulator respectively.
When installation has been completed as specified above, the tightness of all the connections should be tested.

4. COMMISSIONING

To prevent the formation of explosive mixtures, it is necessary, before going on to commission the regulator, to ensure that the chamber **B** is not under pressure from air used during testing in the works. It is also necessary to make sure that all the on/off valves (inlet, outlet, and by-pass where applicable) are closed and that the gas is at a temperature which will not lead to malfunctions.

Then proceed as follows:

- open the on/off valve upstream from the regulator to permit a very small gas flow;
- on the pressure gauges, check that the pressure rises slowly. When the set-point or a slightly higher value has been reached, the downstream pressure should stabilize while the upstream pressure continues to rise.

If the pressure downstream does not stop at the set-point, the commissioning operation must be halted by closing the on/off valve.

The causes for failure of the pressure to stabilize can be:

- set-point not the pre-established one
- tightness failure at zero flow.

To find the origin of the failure, proceed as follows:

- discharge the pressurized chamber **B** by means of the inlet cock **10** so that the obturator **8** (fig. 2) closes.

If the downstream pressure does not increase, tightness failure is not the problem and therefore you can proceed with the setting of the regulator, following the instructions provided in chapter 5 "SETTING". On the other hand, if the downstream pressure continues to rise, it is necessary to find out why the apparatus does not close with zero flow and act as a consequence.

- when the pressures upstream and downstream have stabilized, completely open the upstream on/off valve.
- slowly open the downstream valve until the pipe is completely filled.

When these operations have been concluded, the regulator is ready for use.

5. SETTING

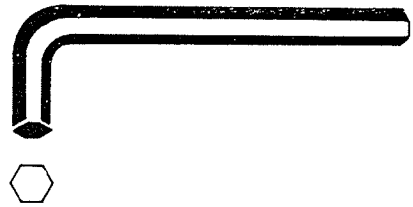
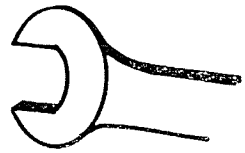
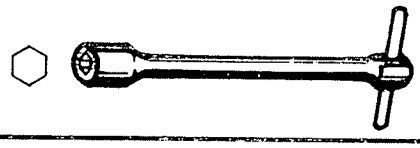
It is very easy to set the Staflux:

with minimum flow in the piping, put in or expel fluid slowly from chamber **B** through the cocks **9** and **10** respectively until the downstream pressure gauge shows that the desired set-point has been reached.

STAFLUX disassembly tools

Table **A** below shows the tools required for completely disassembling the STAFLUX.

Table A
STAFLUX disassembly tools

tipo	pos.	DN 1"	DN 2"	DN 3"
	(30)	8	10	12
	(31)	8	10	–
	(32)	8	10	12
	(33)	14		
	(34)	5-6		
	(35)	–	3	5
	(22)	45		
	(31)	–	–	19
	(37)	19		
	(29)	32	–	–

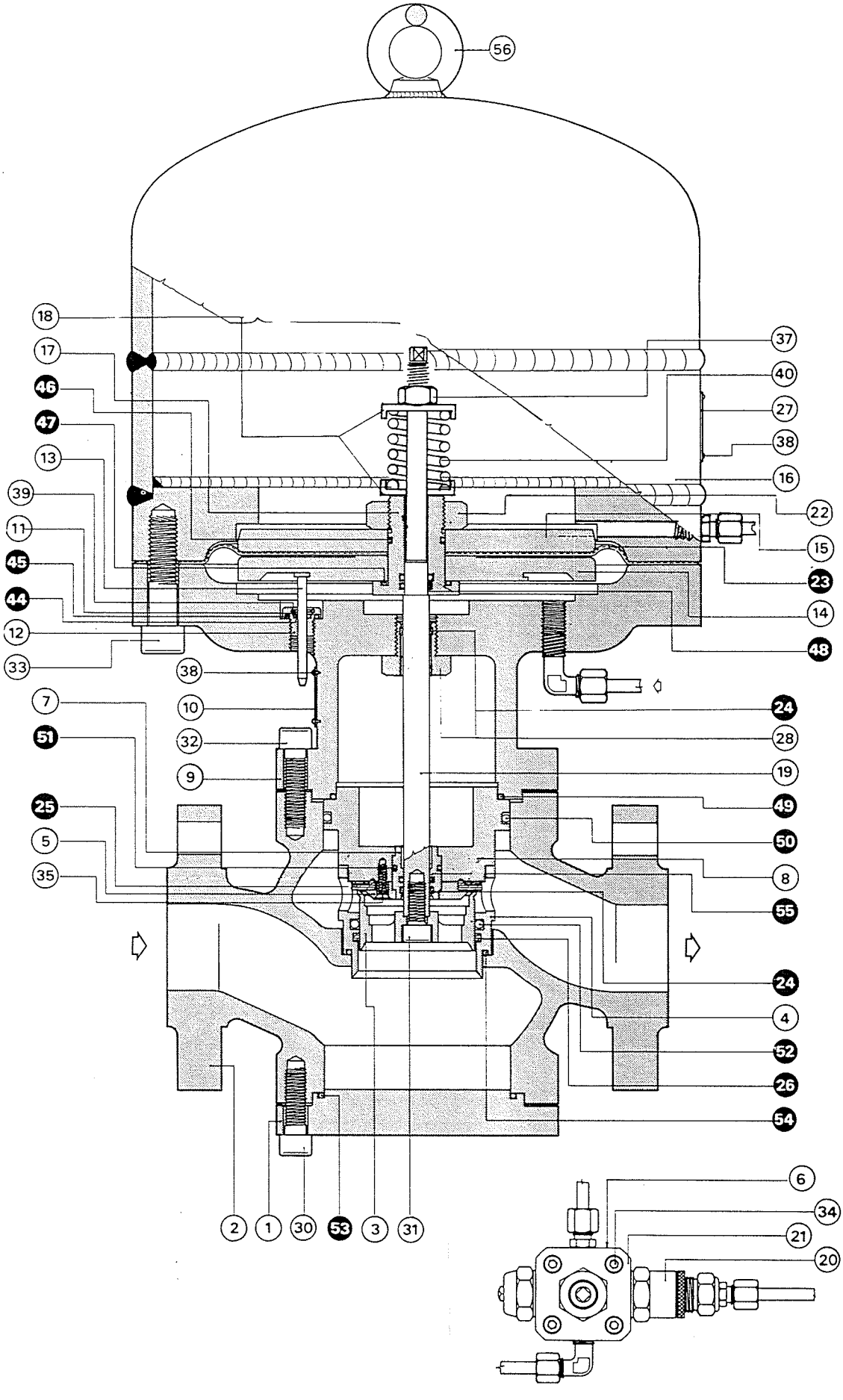

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FIG. 5

Pos.	Name		
1.	Flange	28.	Rod guide
2.	Valve body	29.	Nut
3.	Obturator	30.	Screw
4.	Obturator guide	31.	Screw
5.	Ring	32.	Screw
6.	Bracket	33.	Screw
7.	Rod guide	34.	Screw
8.	Gasket support	35.	Screw
9.	Body	37.	Nut
10.	Stroke indicator plate	38.	Rivet
11.	Protection ring	39.	Spring washer
12.	Rod guide	40.	Spring
13.	Indicator rod	41.	Spring washer
14.	Protective disc	42.	O-ring
15.	Protective disc	43.	O-ring
16.	Pressurized chamber	44.	O-ring
17.	Diaphragm support	45.	O-ring
18.	Spring support	46.	O-ring
19.	Rod	47.	O-ring
20.	Safety valve	48.	O-ring
21.	Inlet valve	49.	O-ring
22.	Nut	50.	O-ring
23.	Diaphragm	51.	O-ring
24.	Guide ring	52.	O-ring
25.	Valve gasket	53.	O-ring
26.	Guide ring	54.	Eyebolt
27.	Specification plate		

6. MAINTENANCE

Before carrying out any operation, it is important to ensure that the regulators have been cut off upstream and downstream and that the pressure has been discharged in the section of pipe where work will be carried out.

The maintenance operations are closely linked to the nature of the gas regulated (impurities in general, humidity, gasoline, corrosive substances).
Carrying out preventive maintenance is therefore always useful. Its frequency can be established on the basis of the importance of the service the plant must provide.

Before starting STAFLUX disassembly operations, check that all the means, tools and spare parts subject to wear are available.
Having done so, proceed as described in the paragraphs below, with reference to figure 5.

DIAPHRAGM DISASSEMBLY AND MAINTENANCE

a) disconnect from the elbow fitting (57)
b) remove the socket head screws (33) and dismantle the pressure chamber (16)
c) unscrew the nut (37) and remove the spring supports (18) and the spring (40)
d) unscrew the nut (22)
e) remove the diaphragm (23) along with the protective discs (15) and (14)

Controls and parts which may require substitution.

- diaphragm (23)
- O-ring (47)
- O-ring (48)
- O-ring (46)
- spring (40)

To reassemble correctly, ensure that:
a) all the O-rings are in perfect condition;
b) the stroke indicator rod (13) is inserted in the provided groove in the diaphragm disc (15);
c) the ends of the diaphragm are inserted perfectly into their seat;
d) its movement is not impeded (this control is facilitated by the particular conformation of the diaphragm and of the seats).

DISASSEMBLY AND MAINTENANCE OF THE MOBILE OBTURATOR (3) AND VALVE GASKET (25)

a) detach the connections with elbow fittings;
b) remove the socket head screws (32);
c) lift using the eyebolt (56); on one side we will have the main body (2) and the obturator guide, easily extractable, and on the other the pressurized chamber (16) which will have pulled the obturator (3) and the gasket support (8) with it;
d) unscrew the socket head screw (31) which connects the obturator (3) to the shaft (19) after which check the sealing surface of the obturator;
e) remove the screws (35) which allow you to disassemble the gasket retaining ring (5), and remove the gasket from valve (25) and the rod guide (7).

Controls and parts which may require substitution.
- valve gasket (25)
- mobile obturator (3)
- obturator guide (4)
- Obturator guide ring (26)
- O-rings (49) – (50) – (51) – (52) – (54) – (55)
- shaft guide ring (24)

To reassemble correctly, ensure that:
a) the valve gasket is not damaged;
b) the screws (35) are uniformly tightened so as to guarantee correct seating of the valve seal and the tightness between the high pressure zone and the low pressure zone of the valve body;
c) the obturator guide enters its seat perfectly and that the parts in contact with the mobile obturator is not rough;
d) the O-rings (49) – (50) – (51) – (52) – (54) – (55) are in perfect condition;
e) the obturator support (26) which, because of its particular figure acts as a cleaner ring, is not damaged or worn and is mounted correctly;
f) the outer surface of the mobile obturator is not rough and the throttling surfaces are intact;
g) there are no insertion difficulties with the complete assembly and it couples perfectly with the mating surfaces;
h) the screws (32) are uniformly tightened.

It should be noted that, given the way the essential parts of the regulator are disassembled, once it has been installed it is not necessary to remove the body of the apparatus from the line as any operation can be carried out without removing it.

7. OPTIONS

This technical manual describes the STAFLUX considering its main pressure reduction and regulation functions.
In a more general context, the versatility of the apparatus permits the following applications:

a) installation of another STAFLUX upstream with monitor functions;
b) insertion in the STAFLUX of a slam-shut valve with its own sensitive element, with possibility of intervention if the regulated pressure is too high and/or too low.

The STAFLUX in point a) is completely the same as the regulator described. The option in point b) can also be inserted in regulators which did not originally have it.