

REFLUX 919



TECHNICAL MANUAL MT029

*INSTALLATION, COMMISSIONING AND MAINTENANCE
INSTRUCTIONS*

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Enclosures:

TT1007	Table of the setting springs of Reflux 919 Control
TT1012	Table of the springs of the ECKARDT SRP 981 pneumatic positioner on Reflux 919 Control
TT1009	Table of the springs of the ECKARDT SRI 986 electro-pneumatic positioner on Reflux 919 Control
TT1013	Connection scheme of the Eckardt Positioner on the Reflux 919 Control
TT 641	Sheet no. 3 Wrench for the reinforced gasket
SR 204	Spare Part list

1. AIM

This manual aims to supply the basic information for the installation, the start-up and the scheduled maintenance of the Reflux 919 Control valve.

A summary table listing the most common troubles and the suggested interventions to solve them is also included.

MAIN SPECIFICATION

The main specification of the Reflux 919 control valve are:

- Design pressure: up to 100 bar;
- Working temperature range: -20 °C / +60 °C (higher or lower temperature on request);
- Ambient temperature: -20 °C / +60 °C

2. DESCRIPTION OF THE VALVE

The Reflux 919 Control valve is a diaphragm control valve and it is especially designed for natural gas or other preliminarily filtered non-corrosive gases.

It may be supplied in the direct-action type (it is closed by air) (see fig. 1) or in the reverse-action type (it is opened by air) (see fig. 2).

Both types may be equipped with a built-in silencer (make reference to fig. 3); this device may be installed also later on already operating valves.

The valve is usually equipped with an ECKARDT pneumatic positioner model SRP 981 or electro-pneumatic positioner model SRI 986 ; please make reference to its instructions manual for the operating features and for the start-up of this device. We here below make reference, when necessary, to some characteristics of the above mentioned positioner; in case, for any reason, another model is installed, you should make reference to the characteristics of the latter.

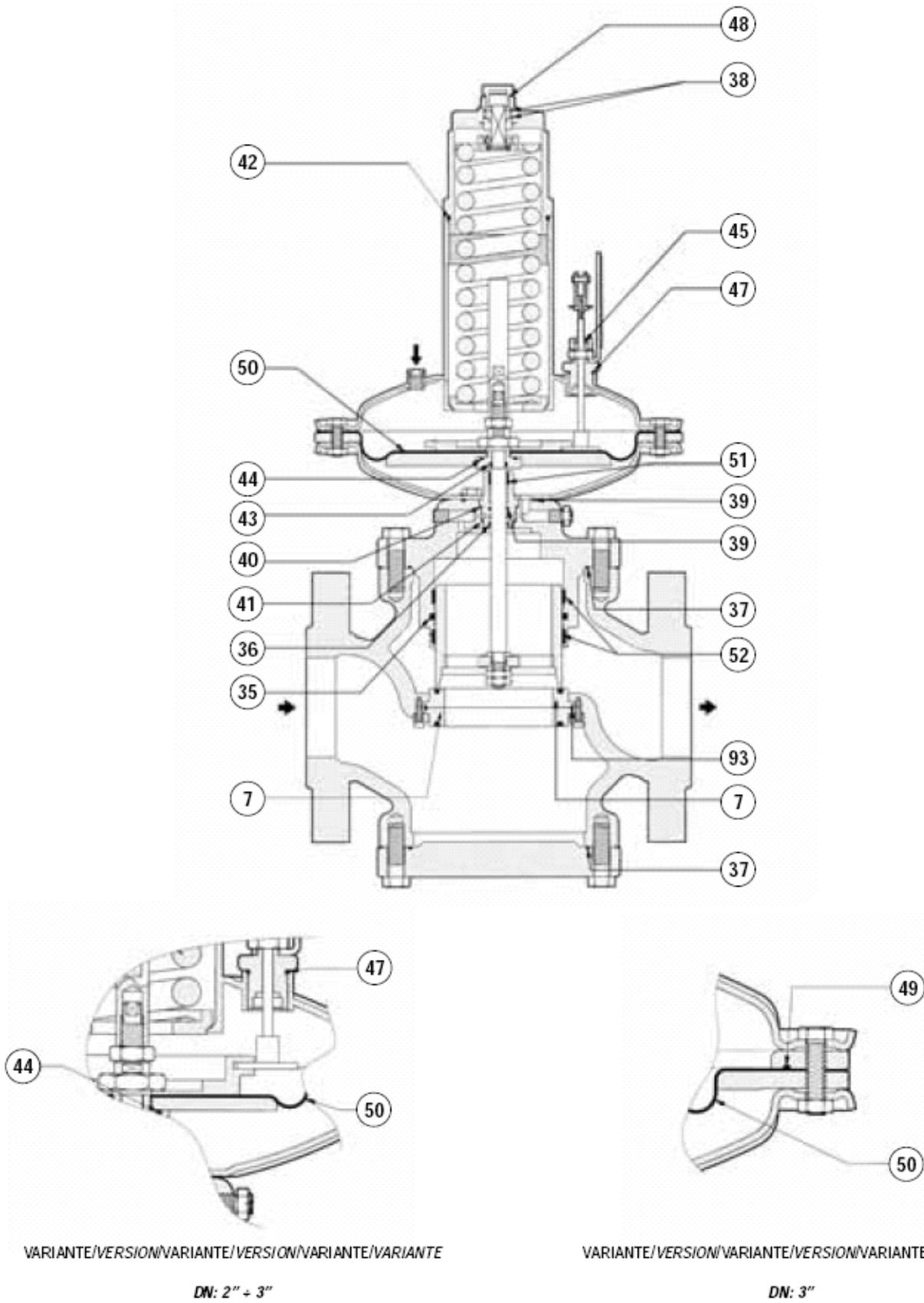
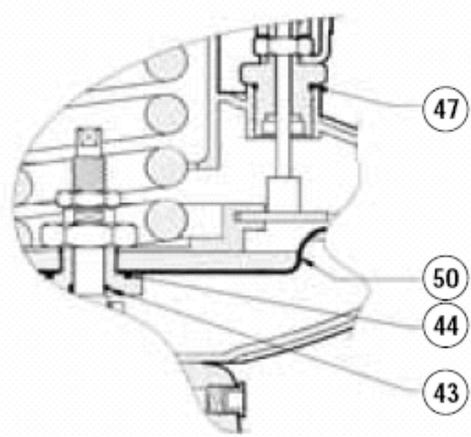
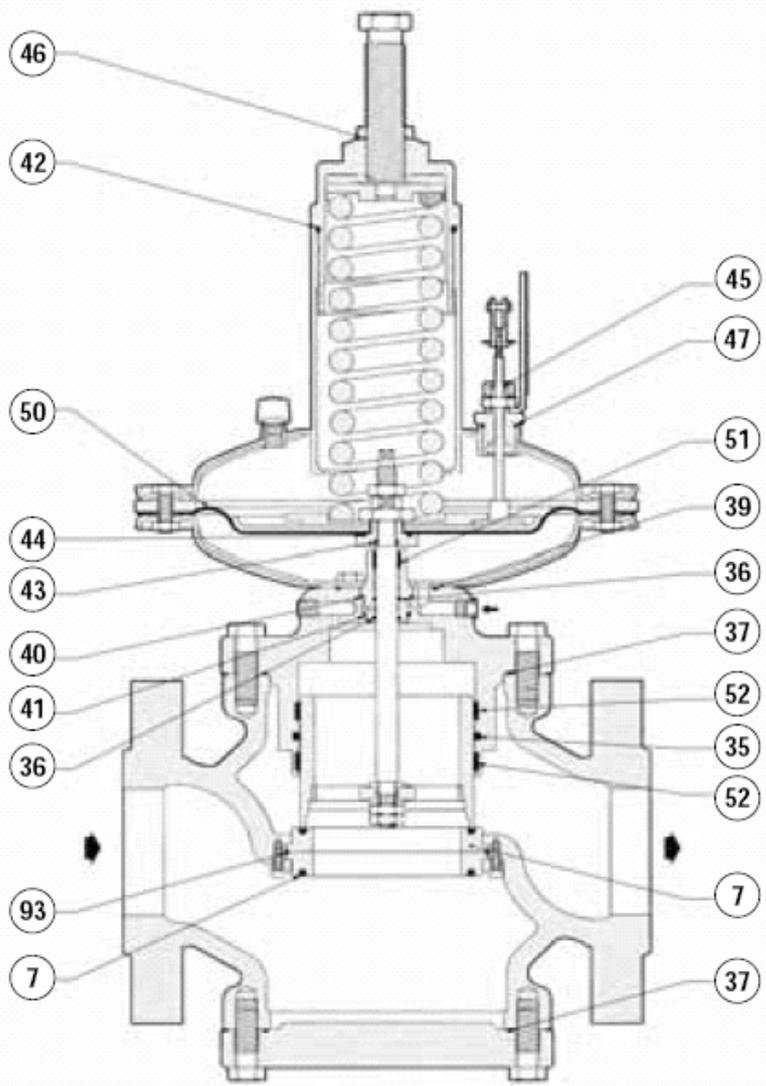
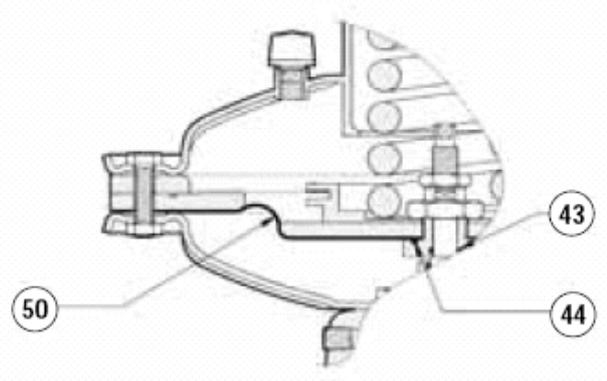


Figure 1: Reflex 919 Control: direct action



VARIANTE/VERSION/VARIANTE/VERSION/VARIANTE/VARIANTE
 DN: 2" + 3"



VARIANTE/VERSION/VARIANTE/VERSION/VARIANTE/VARIANTE
 DN: 3"

Figure 2: Reflex 919 Control: reverse action

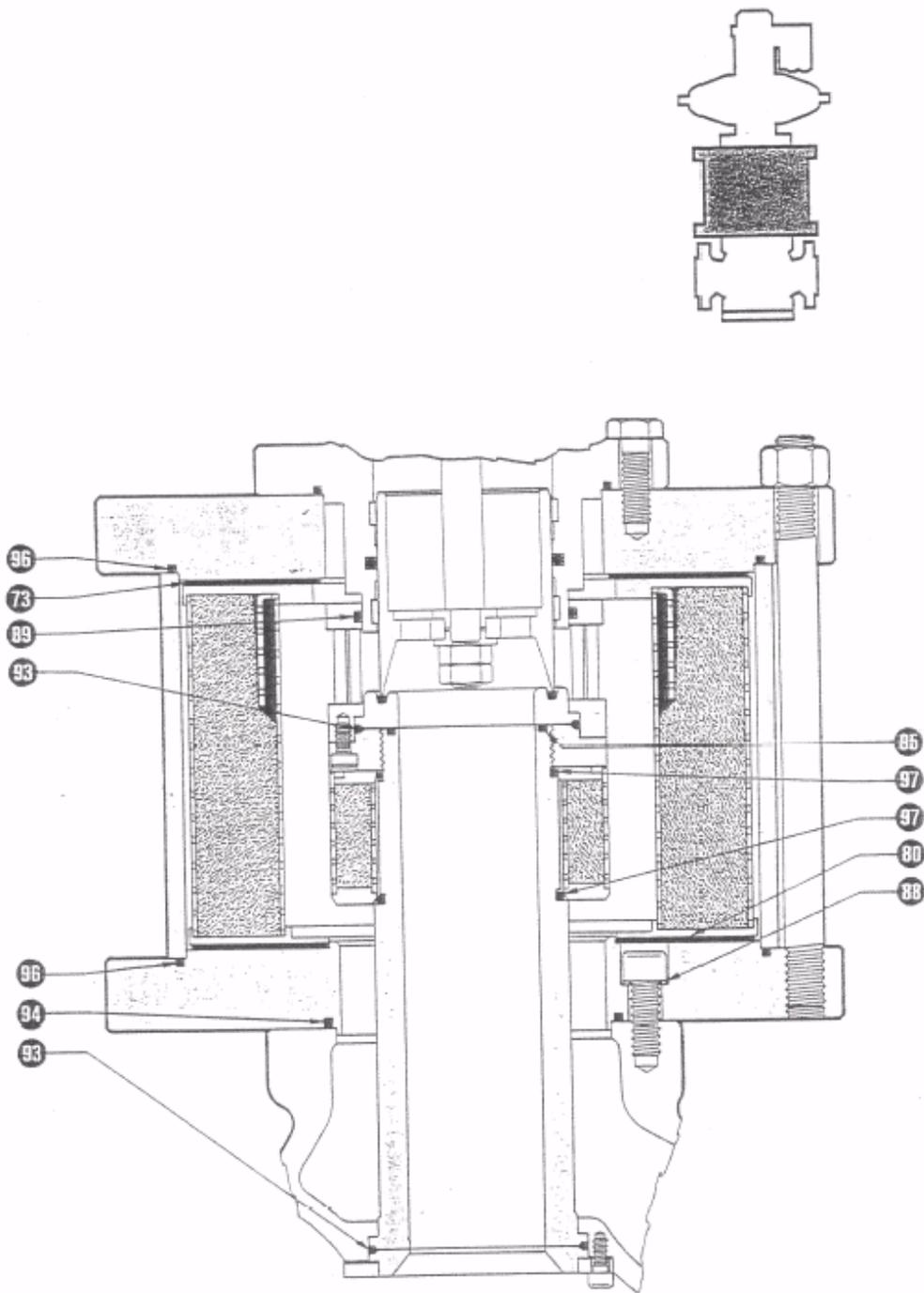


Figure 3: Silencer for Reflex 919 Control

3. IDENTIFICATION OF THE VALVE

Each control valve is identified by means of a name plate, as shown in fig. 4, reporting the basic data concerning the characteristics of the valve itself.

We here below list the meaning of some of the information reported on the above mentioned plate.

DN: nominal diameter

flange: flanging class and facing

PS: max. pressure the valve body may undergo under safety conditions

Pumax: max. operating pressure at the valve inlet

bpu: range of the inlet pressure of the valve under normal operation

Action: type of action (direct or reverse action)

Wds: working range of the actuator by using the available adjusting springs

Wd: working range of the actuator by using the inserted spring

Cg: valve coefficient

Cv: flow rate coefficient

T: working temperature range

Strenght type: (IS o DS)

Warning!

Do not remove the name plate from the valve; there are some important data to be made reference to during the life of the valve.

	Pietro Fiorentini		ID n.
REGULATOR	<input type="text"/>	Action:	<input type="text"/>
S.n.	<input type="text"/>	PS:	<input type="text"/> Bar
		Pumax:	<input type="text"/> Bar
DN:	<input type="text"/>	Flange:	<input type="text"/>
		T:	<input type="text"/>
		Cv:	<input type="text"/>
Wds:	<input type="text"/> Bar	bpu:	<input type="text"/> Bar
		Cg:	<input type="text"/>
Wd:	<input type="text"/> Bar	Fluid:	<input type="text"/>
		Strength type:	<input type="text"/>

figure 4

4. INSTALLATION

4.1 General Information

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

- The characteristics of the valve, which are reported on the plate mentioned in par. 3, are those required by the use
- The valve may be inserted in the arranged space and that it is possible to reach it in order to carry out the maintenance operations (make reference to the table 1 for the overall dimensions)
- The upstream and downstream piping are at the same level and may support the weight of the valve (please make reference to the table 1 for the possible weights); otherwise, arrange some suitable supports.
- the inlet/outlet flanges on the piping are perfectly parallel.
- the mouthpieces of the valve are clean inside and that the valve has not been damaged during the transport.

The mouthpieces of the valve are protected by means of special protections; remove such protections just before the installation.

- The upstream piping has been cleaned in order to remove impurities such as welding scraps, sand, paint, water, etc.

Table 1: Reflux 919 Control

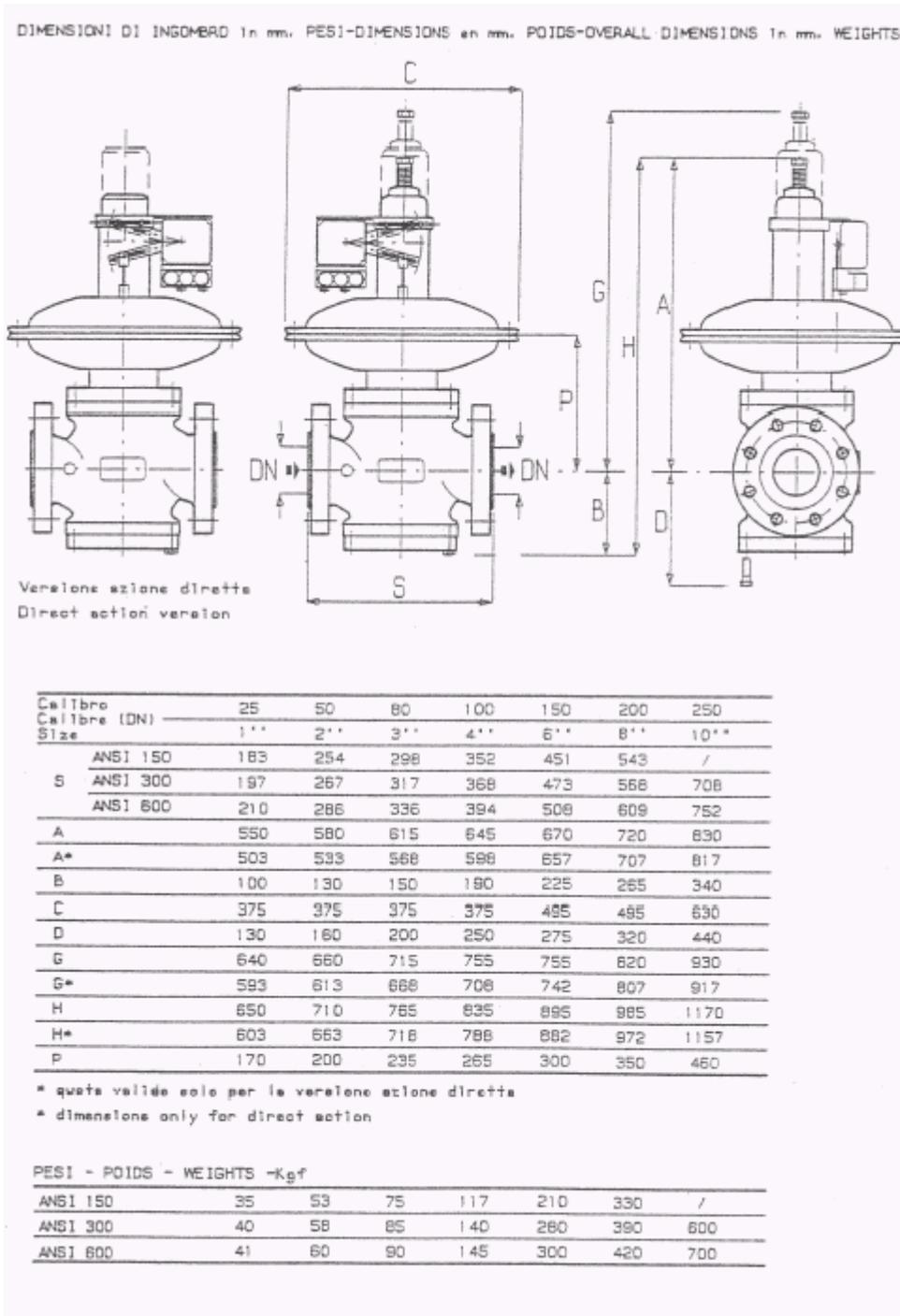
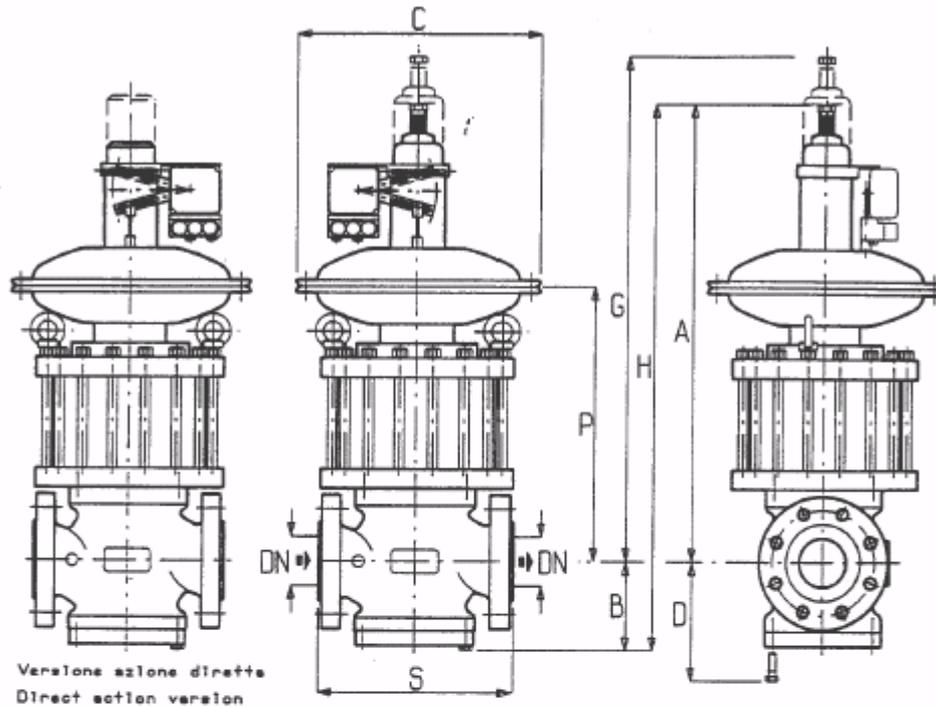


Table 1: Reflux 919 Control+Silencer

DIMENSIONI DI INGOMBRO in mm. PESI-DIMENSIONS in mm. POUNDS-OVERALL DIMENSIONS in mm. WEIGHTS



Versione azione diretta
Direct action version

Calibro Calibre (DN) Size	25	50	80	100	150	200	250
	1"	2"	3"	4"	6"	8"	10"
S	ANSI 150	183	254	298	352	451	543
	ANSI 300	197	267	317	368	473	568
	ANSI 600	210	286	336	394	508	609
A	750	805	885	955	955	1055	1330
A*	703	758	838	908	942	1042	1317
B	100	130	150	190	225	265	340
C	375	375	375	375	495	495	630
D	130	160	200	250	275	320	440
G	840	885	985	1065	1040	1155	1430
G*	793	838	938	1018	1027	1142	1417
H	850	935	1035	1145	1180	1320	1670
H*	803	888	988	1098	1167	1307	1657
P	370	425	505	575	585	685	860

* quote valide solo per la versione azione diretta

* dimensions only for direct action

PESI - POUNDS - WEIGHTS -Kg f

ANSI 150	58	93	135	207	405	620	/
ANSI 300	63	108	167	240	480	665	1000
ANSI 600	64	112	175	263	500	705	1130

4.2 Handling of the valve

The valve shall be handled by using especially designed hoisting eyebolts only.

Warning:

The size of the eyebolts is suitable to support only the weight of the valve.

Never use such eyebolts to hoist parts of the plant to which the valve is connected.

4.3 How to install the valve

The valve shall be assembled on the piping by paying attention to place it in such a way that the direction of the flow has the same direction of the arrow on the body.

The valves shall be assembled in a vertical position with the actuator turned upwards.

4.4 Installation schemes

The Reflux 919 Control valve may be used in different ways and therefore no installation scheme is given; we wish, however, to remind you that it is necessary to arrange as follows:

- on-off valves are to be placed upstream and downstream from the control equipment
- vent valves are to be placed on the sections of piping upstream and downstream from the control valves
- pressure gauges are to be placed upstream and downstream from the control valve.

These suggestions are briefly summarized in the fig. 5.

We wish to point out that for all the operating conditions the temperature of the gas inside the valve shall exceed the dew point.

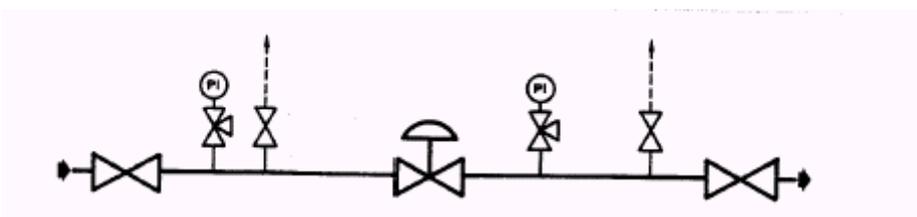


figure 5

4.5 Pneumatic connections

As we mentioned in par. 2, the valve is equipped with a positioner; this instrument is already secured to the valve by means of a proper support; **the pneumatic connections between the positioner and the actuator, however, are not made in our factory. Such connections shall be made by the user before the start-up.**

The table TT1013 shows briefly how to make the connections in case of direct-action and reverse-action valves.

The connections shall be made by means of a stainless steel pipe \varnothing 10x1 and by means of suitable compression fittings.

Both the positioner and the valve have female threads 1/4" ISO 7/1.

The input of the command pulses to the actuator is shown with the adhesive label as in fig. 6.

We remind you that also the connections for the inlet variable to the positioner and the feeding system to the positioner shall be arranged.



figure 6

5. SETTING

5.1 General information

Usually, when the valves are supplied, they have already been regulated and set; we suggest, however, to check all settings again before the start-up, by following the here below listed instructions. To this purpose, it is necessary to make use of a source of pressure and of pressure gauges in order to measure the here below listed range of pressures.

The below regulations, however, are to be carried out after any maintenance intervention.

5.2 Setting of the positioner

As mentioned in par. 2, the Reflux 919 control valve are equipped with the positioner ECKARDT SRP 981 (pneumatic version) or SRI 986 (electro-pneumatic version); **all what is here below reported refers to that models.** For further information, please make reference to the instructions manual of the positioner.

- a) Make sure that the positioner is installed in the correct position with reference to the direction of flow, in particular as shown in TT1013:
 - right side, gas flow, for direct-action valves
 - left side, gas flow, for reverse-action valves.
- b) Make sure that the distance between the pivot of the fork of the positioner lever and the fulcrum of the same lever corresponds to what is reported in TT1012 (pneumatic version) or TT1009 (electro-pneumatic version). Otherwise, adjust the adjustable support of the positioner and restore the required distance.
- c) Make sure that the spring inside the positioner is in compliance with the range of the required command signal (make reference to table TT1012 or TT1009), otherwise replace it.

5.3 Setting of the valve

5.3.1 Control pressure

The Reflux 919 Control valves may be operated by a control pressure ranging both from 3÷15 psi and from 6-30 psi.

Therefore, before carrying out the regulations here below described, check in which condition it is operating. The required information may be found in the name plate under "Wa" (make reference to par. 3).

Suitable springs are inside the actuator according to the control pressure; the table TT 1007 shows the springs required for the different diameter and command signal.

To change the control pressure from the range 3-15 psi to the range 6-30 psi or vice versa, you just need to replace the adjusting spring; of course, you shall also carry out the here below described settings.

The here below listed operations are to be carried out when the control equipment is shut off.

5.3.2 Direct-action valve

To set the direct-action valve, follow the here below listed instructions (please make reference to fig. 1)

- a)** Determine the control pressure range of the valve (3÷15 psi or 6÷30 psi)
- b)** Disconnect the pneumatic connection from the positioner (output variable y) and the feedback lever.
- c)** Connect an external adjustable source of pressure to the actuator, instead of the pneumatic connection mentioned in par. b)
- d)** Increase the control pressure at its maximum value (15 psi or 30 psi). Check that there is no internal leakage through the obturator and the seat valve. In case of internal leakage, adjust the adjusting screw 17 according to the instructions of the following par. i) to o), up to no leakage condition is reached.
- e)** Make sure that the stroke index 61 is in the position "C" of the graduated plate pos. 74 (see fig. 7), otherwise adjust the position of such plate by loosening the clamping screws and by using the slots of this plate.
- f)** Check that decreasing the control pressure below its maximum value the obturator (pos. 5) starts moving; otherwise adjust the adjusting screw 17 according to the

instructions of the following par. i) to o). Repeat the adjustments up to both conditions d) and f) are satisfied. Internal leakage at its max. value (15 psi or 30 psi) is very important.

- g)** Decrease the control pressure slowly until it reaches its minimum value (3 psi or 6 psi) and make sure that the stroke index covers the nominal stroke of the valve (pos. "A" on the graduated plate). Otherwise, it is necessary to adjust the adjusting screw 17 as reported in the par. i) to o).
- h)** Repeat the above operations until the above mentioned conditions are achieved as much as possible, after successive approximations.



figure 7

As mentioned in the above par. d), f) and g), in order to make the control pressure correspond to the position of the valve, it is necessary to adjust the spring load by means of the adjusting square screw pos 24.

In order to adjust it, act as follows (see fig. 8):

- i)** Remove the plug pos. 15.
- l)** Turn the square screw pos 24 clockwise to increase the load of the spring pos. 54 and therefore the required control pressure; turn the square screw pos 24 counterclockwise to decrease the spring load.
- m)** Put the plug pos. 15 back to its original position, by checking that the O-ring pos. 48 is in its correct position, and tighten.
- n)** Check the setting of the valve as indicated in par. c) to g)

The above operations are to be carried out successively when the control equipment is under pressure; we suggest to keep the pressure upstream and downstream from the valve at an average value of the working range of the valve.

When all this has been completed, restore the connections of the positioner (make reference to par. b).

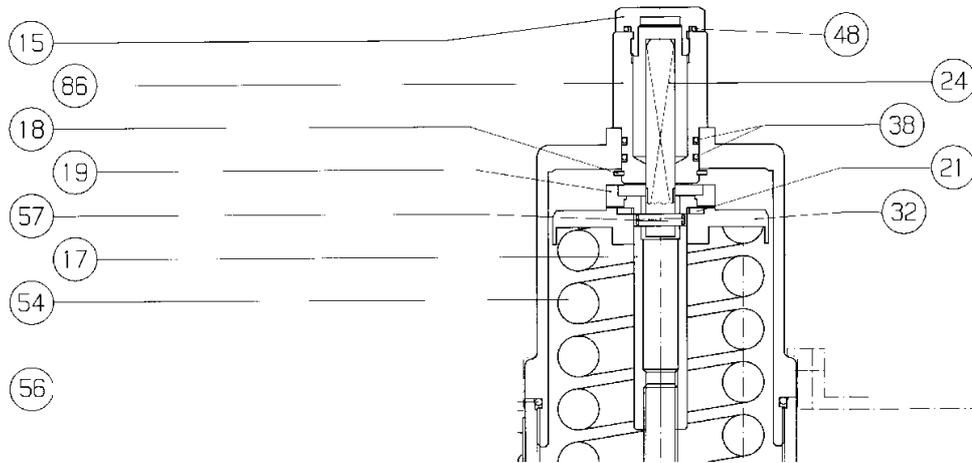


figure 8

5.3.3 Reverse-action valve

To set the reverse-action valve, follow the here below listed instructions (please make reference to fig. 2)

- a)** Determine the control pressure range of the valve (3÷15 psi or 6÷30 psi)
- b)** Disconnect the pneumatic connection from the positioner (output variable y) and the feedback lever of the pneumatic positioner.
- c)** Connect an external adjustable source of pressure to the actuator, instead of the connection mentioned in par. b)
- d)** Increase the control pressure at its minimum value (3 psi or 6 psi). Check that there is no internal leakage through the obturator and the seat valve. In case of internal leakage, adjust the adjusting screw 17 according to the instructions of the following par. i) to n), up to no leakage condition is reached.
- e)** Make sure that the stroke index 61 is in the position "C" of the graduated plate pos. 74 (see fig. 7), otherwise adjust the position of such plate by loosening the clamping screws and by using the slots of this plate.

f) Check that increasing the control pressure over its minimum value the obturator (pos. 5) starts moving; otherwise adjust the adjusting screw 17 according to the instructions of the following par. i) to n). Repeat the adjustments up to both conditions d) and f) are satisfied. Internal leakage at its min. value (3 psi or 6 psi) is very important.

g) Increase the control pressure slowly until it reaches its maximum value (15 psi or 30 psi) and make sure that the stroke index covers the nominal stroke of the valve (pos. "A" on the graduated plate).

Otherwise, it is necessary to adjust the adjusting screw 17 as indicated in the par. i) to n).

h) Repeat the above operations until the above mentioned conditions are achieved as much as possible, after successive approximations.

As mentioned in the above par. d), f) and g), in order to make the control pressure correspond to the position of the obturator, it is necessary to adjust the spring load by means of the adjusting screw 17.

In order to adjust it, act as follows (see fig. 9):

i) Loosen the lock nut pos. 8

l) Turn the screw 17 clockwise to increase the spring load pos. 54 and therefore the required control pressure; turn the screw 17 counterclockwise to decrease the spring load.

m) When the setting has been completed, tighten the lock nut pos. 8, by checking that the O-ring pos. 46 is in its correct position.

n) Check the setting of the valve as indicated in par. c) to g)

The above operations are to be carried out successively when the control equipment is under pressure; we suggest to keep the pressure upstream and downstream from the valve at an average value of the working range of the valve.

When all this has been completed, restore the connections of the positioner (make reference to par. b).

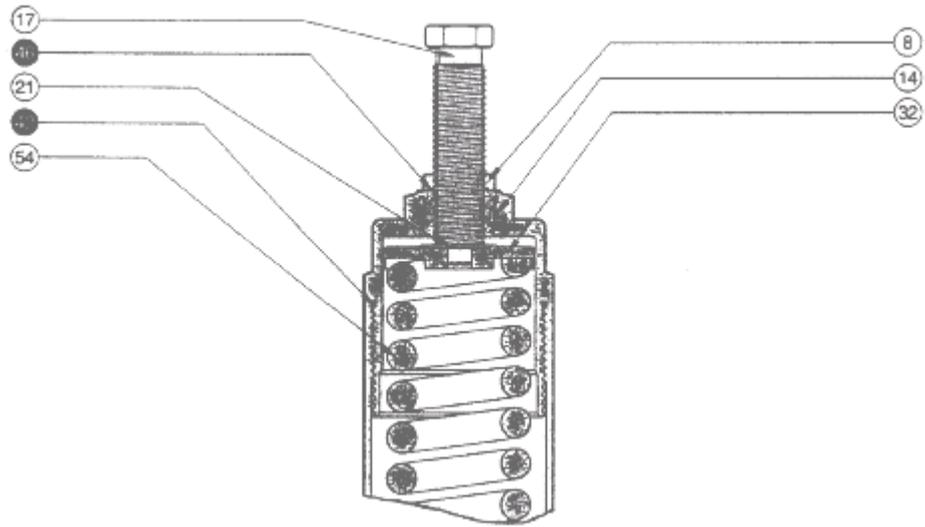


figure 9

5.3.4 Functional test of the valve-positioner system

When the above mentioned adjustments have been completed, it is necessary to check the functionality of the valve-positioner system according to the below description.

5.3.4.1 Direct-action valve

- a) Check that the pneumatic and mechanical connections are properly arranged (make reference to the above paragraphs)
- b) Check the range of the command signal to the positioner (ΔW).
- c) Feed the positioner.
- d) Generate the input variable to the positioner (W) by means of an external adjustable source.
- e) Set the input variable to the max. value of the range and set the output variables Y so that the control valve is at a fully-close position (the stroke indicator shall be in the position "C" of the plate shown in fig.7); the setting of the max. value of the output variable shall be carried out according to the instructions reported in the instructions manual of the positioner.
- f) Set the input variable to the minimum value of the range and set the output variable Y so that the control valve is at a fully-open position (the stroke indicator shall be in the position "A" of the plate shown in fig.7); the setting of the min. value of the output variable shall be carried out according to the instructions reported in the instructions manual of the positioner.
- g) Set the input variable at the average values of the range and check that the position of the valve corresponds to the average proportional values.
Otherwise, check the settings again.

5.3.4.2 Reverse-action valve

- a) Check that the pneumatic and mechanical connections are properly arranged (make reference to the above paragraphs)
- b) Check the range of the command pulse to the positioner (ΔW).
- c) Feed the positioner.
- d) Generate the input variable to the positioner (W) by means of an external adjustable source.

- e)** Set the input variable to the min. value of the range and set the output variable Y so that the control valve is at a fully-close position (the stroke indicator shall be in the position "A" of the plate shown in fig.7); the setting of the max. value of the output variable shall be carried out according to the instructions reported in the instructions manual of the positioner.
- f)** Set the input variable to the minimum value of the range and set the output variable Y so that the control valve is at a fully-open position (the stroke indicator shall be in the position "A" of the plate shown in fig.7); the setting of the min. value of the output variable shall be carried out according to the instructions reported in the instructions manual of the positioner.
- g)** Set the input variable at the average values of the range and check that the position of the valve corresponds to the average proportional values.
Otherwise, check the settings again.

6 MAINTENANCE

6.1 General conditions

The interventions depend on the quality of the gas (impurities in general, humidity, gasoline, etc.) and on the efficiency of the filtering and of the preheating upstream from the control equipment.

We suggest, therefore, to always carry out a preliminary check/maintenance, the frequency of which may be determined according to:

- the quality of the gas
- the conditions of cleaning and of preservation of the piping upstream from the valve.

Generally speaking, for example, after the first start-up of the stations, more frequent maintenance interventions are required because of the poor inside cleanness of the piping.

6.2 Depressurization of the control equipment

Before any maintenance intervention, it is necessary to release the pressure from the control equipment by following the here below listed instructions:

- a) Close the inlet on/off valve
- b) Close the outlet on/off valve
- c) Release the pressure from the sections of the control equipment upstream and downstream from the control valve very slowly.

6.3 Disassembly of the valve

Before starting to disassemble the valve, it is necessary to check:

- a) that the valve has been shut off both upstream and downstream and that the pressure in the different sections of the piping has been released
- b) to have a set of suggested spare parts available (make reference to the parts list SR 204).

We wish also to remind you that it is necessary:

- c) to shut off the feeding lines to the positioner and to disconnect such lines.
- d) to remove the positioner in case this prevents the next operations
- e) it is absolutely necessary to release the adjusting spring inside the actuator completely

- f) to disassemble the control head for the replacement of the reinforced gasket.
- g) it is necessary to pay particular attention in disassembling the rubber parts in order not to damage them.

Please notice that it is possible to disassemble the control valve and to carry out the necessary maintenance without disconnecting the body from the piping.

For the disassembly of the control valve, no special wrenches are required, except for the control valves with built-in silencer; in this case for the disassembly of the reinforced gasket, it is necessary to use the wrench mentioned in the TT 641 sheet no. 3.

This manual does not report the detailed steps for the disassembly of the different parts of the valves; we wish to give you, however, some instructions on how to do this under certain situations.

- h) To remove the actuator and to reach the reinforced gasket, remove the screws of pos. 31 (series on the upper part); then lift the actuator.
- i) To remove the valve from the stem, it is necessary:
 - to remove the actuator from the body;
 - to remove the upper part of the actuator (remind to release the spring completely)
 - to loosen the nuts pos. 33 completely by keeping the stem pos. 6 on the opposite side by means of the special squared element

6.4 Reassembly of the valve

The valve is assembled according to a reverse sequence of operations as those mentioned for the disassembly.

Please notice that it is necessary to:

- a) check that the surface of the rubber parts is not damaged
- b) check that the sealing surfaces are clean and in a good condition
- c) position the bonnet between the actuator and the body so that the connecting hole of the command signal to the actuator is connected with the head (only for reverse-action valves)
- d) lubricate the external surface of the valve and of the stem with a thin layer of grease of the Compound Greasil MS4) type.

7. MAINTENANCE CARD

The here below table summarizes the most common troubles and the interventions to solve them.

TROUBLE	POSSIBLE CAUSES	INTERVENTION
No-seal when the flow rate is zero	the reinforced gasket is damaged	Replacement
	the o-ring pos. 35 is damaged	Replacement
	the o-ring pos. 93 is damaged	Replacement
	There is ice or dirt between the reinforced gasket and the valve	Check the filtering and the temperature of the gas
	The command signal is insufficient (direct-action valves)	Check the regulation of the valve and of the positioner
Huntings	Anomalous frictions of the movable unit	Inspect the regulation of the control system
Fall in the outlet pressure as the flow rate increase	Wrong regulation of the control system	Check the regulation of the control system
	The valve is jammed	Replace the damaged parts
	The diaphragm pos. 50 is broken (reverse-action valve)	Replacement
	The control pressure is not sufficient (reverse-action valve)	Check the regulation of the valve and of the positioner

Other types of troubles may be caused by a faulty operation of the positioner or of the control system. In this case, please make reference to the instructions manuals of the above mentioned components.