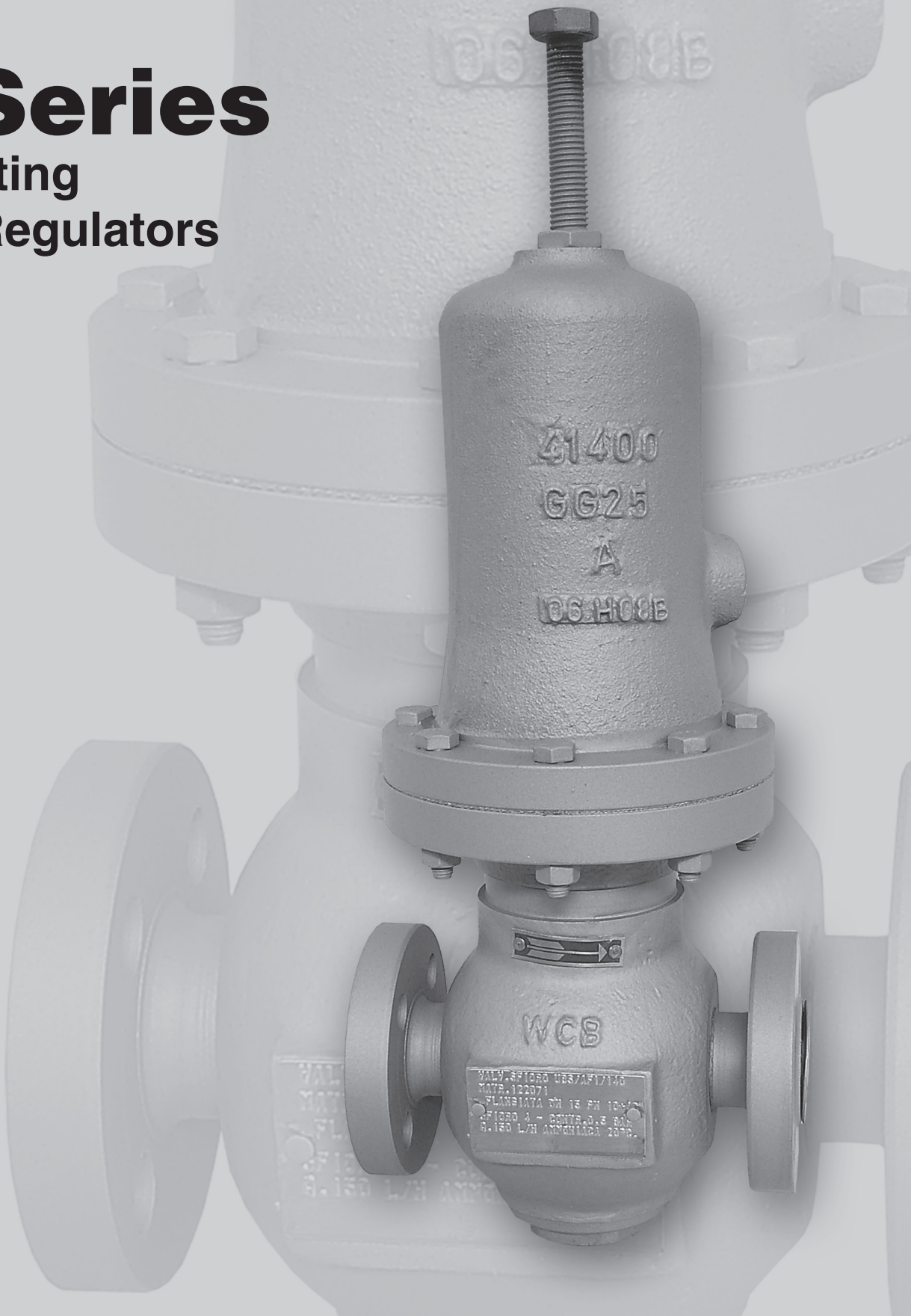
DRESSER® Masoneilan

Instructions
EY0173
10/08

173 Series

Self-Operating Pressure Regulators



Caution: The instructions on the following pages should be thoroughly reviewed and understood prior to installing, operating, or performing maintenance on this equipment. Throughout the text, safety and/or caution notes will appear and must be strictly adhered to; otherwise, serious injury or equipment malfunction could result.

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Safety Information

Important - Please Read Before Installation

Masoneilan 173 Series instructions contain **DANGER**, **WARNING**, and **CAUTION** labels, where necessary, to alert you to safety related or other important information. Read the instructions carefully **before** installing and maintaining your control valve. **DANGER** and **WARNING** hazards are related to personal injury. **CAUTION** hazards involve equipment or property damage. Operation of damaged equipment can, under certain operational conditions, result in degraded process system performance that can lead to injury or death. Total compliance with all **DANGER**, **WARNING**, and **CAUTION** notices is required for safe operation.

This is the safety alert symbol. It alerts you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

CAUTION

When used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, could result in property damage.

Note: Indicates important facts and conditions.

About this Manual

- The information in this manual is subject to change without prior notice.
- The information contained in this manual, in whole or part, shall not be transcribed or copied without Masoneilan's written permission.
- Please report any errors or questions about the information in this manual to your local supplier.
- These instructions are written specifically for the 173 Series back pressure regulators, and do not apply to other regulators outside of this product line.

Warranty

Items sold by Dresser® are warranted to be free from defects in materials and workmanship for a period of one year from the date of shipment provided said items are used according to Dresser recommended usages. Dresser, Inc. reserves the right to discontinue manufacture of any product or change product materials, design or specifications without notice.

This instruction manual applies to the Masoneilan 173 Series back pressure regulators.

The Regulator MUST BE:

- Installed, put into service and maintained by qualified and competent professionals who have undergone suitable training.
- Under certain operating conditions, the use of damaged equipment could cause a degradation of the performance of the system which may lead to personal injury or death.
- Changes to specifications, structure, and components used may not lead to the revision of this manual unless such changes affect the function and performance of the product.
- All surrounding pipe lines must be thoroughly flushed to ensure all entrained debris has been removed from the system.

1. General Information:

1.0 Introduction

The following instructions are designed to assist maintenance personnel in performing most of the maintenance required on the series 173 regulators and if followed carefully will reduce maintenance time.

Masoneilan has highly skilled Service Engineers available for start-up, maintenance and repair of our regulators and component parts. In addition, regularly scheduled training programs are conducted to train customer service and instrumentation personnel in the operation, maintenance and application of our control valves, regulators and instrumentation. Arrangements for these services can be made through your Masoneilan Representative or District Office. When performing maintenance use only genuine Masoneilan replacement parts. Parts are obtainable through your local Masoneilan Representative or District Office. When ordering parts always include **MODEL** and **SERIAL NUMBER** of the unit being repaired.

2. Transport, Storage and Handling

Transport

Depending on their size, regulators can be transported loose, packed in cardboard boxes or in wooden crates.

All the regulator ends are fitted with covers to prevent dirt from entering. Units can be placed on pallets if required. Follow all and any instructions noted on the packaging.

CAUTION

Operators moving loads must take all necessary precautions to prevent accidents.

Storage

Regulators must be kept in a dry place to protect them from atmospheric conditions. They may only be removed from their crates or packing immediately prior to installation.

The end protections and covers must be kept on until installation. Regulators, whether packed or not, must not be subject to impact.

Regulators, whether packed or not, must always be kept upright, that is, never lying on one side, in order to prevent distortion and damage to internal parts.

Handling

When unpacking the regulators and removing the end protectors immediately prior to installation, take great care to make sure that foreign material does not enter the regulator inlet and outlet ports while it is being connected.

CAUTION

When handling the regulator, make sure the work area is kept clear in order to prevent injury to people and damage to property.

1st	2nd	3rd	-	1st	2nd	3rd	4th	-	Option
1	7	3		X	X	X	X		X

Regulator Series

Action
- 1 Relieving Metal Seat
- 2 Relieving Soft Seat

Diaphragm
- 1 Metal Diaphragm
- 2 Elastomeric Diaphragm

Trim Size
- 01
- 05
- 08
- 10
- 12
- 16
- 20
- 35
- 45

Action
- 50 Differential Pressure

3. 173

3.1 Cross-section drawing

Fig. 1

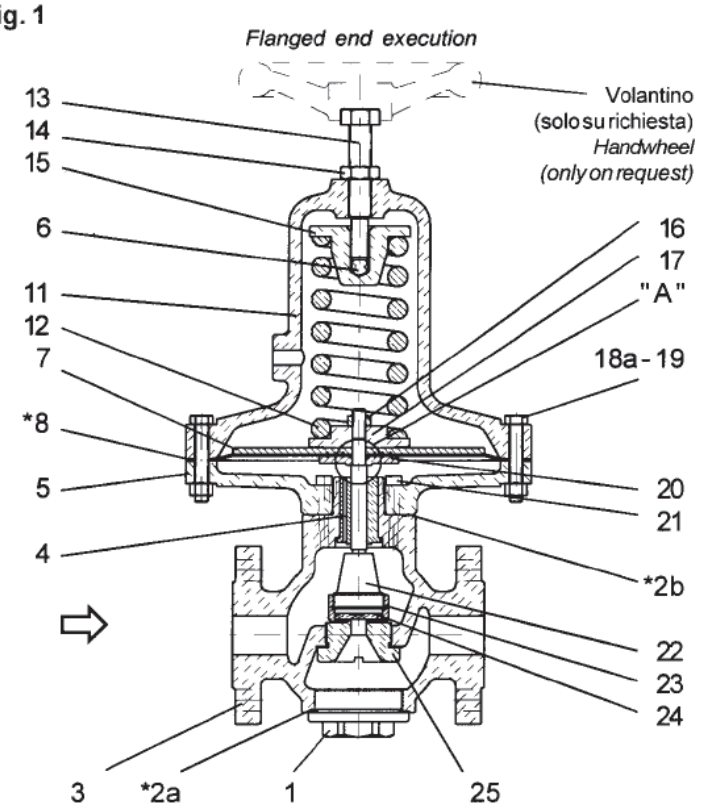


Fig. 2

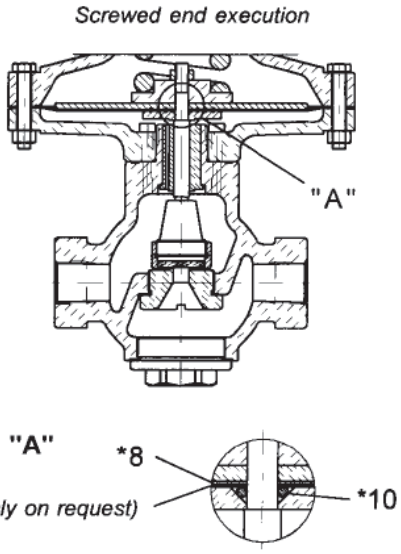
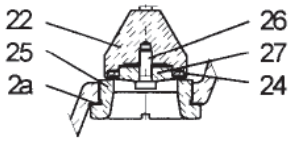


Fig. 5



Resilient tightness disc for valves ND 40 (1.½") and ND 50

Fig. 3

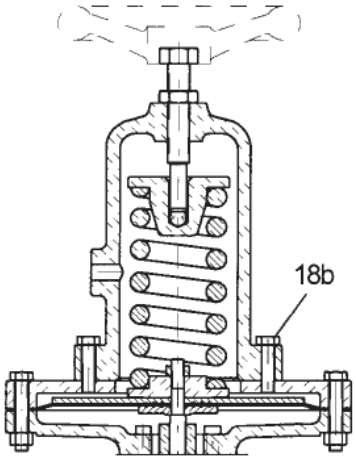
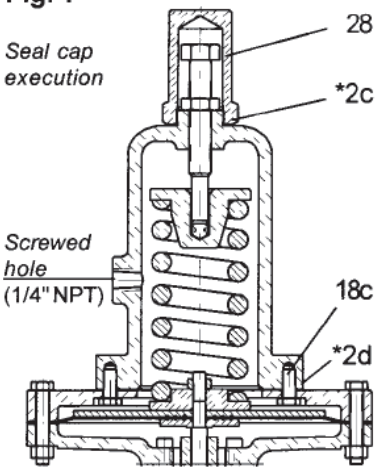


Fig. 4



ATEX Construction Gr. II Cat. 2

	Part
1	Blindhead
*2	Gasket Set
3	Body
4	Guide
5	Diaphragm Case
6	Ball
7	Diaphragm Plate (Upper)
*8	Diaphragm
*9	Protector – optional
*10	O-Ring
11	Spring Case
12	Spring
13	Adjusting Screw
14	Lock Nut
15	Spring Button
16	Nut
17	Spring Guide
18	Screw
19	Nut
20	Diaphragm Plate – Lower
21	Screw
*22	Plug
*23	Ring
*24	Disc
*25	Seat
*26	Screw
*27	Gasket Plate
28	Cap

* Recommended spare parts

Construction ATEX Gr.II Cat.2 (Fig.4)

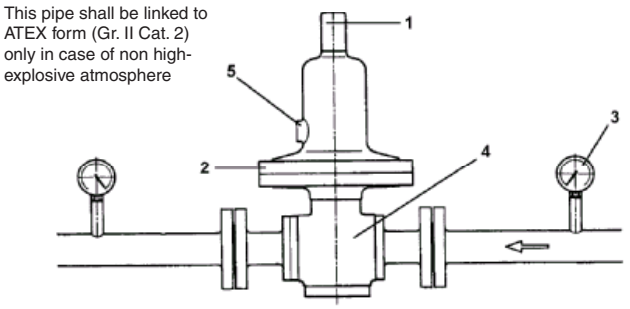
3.2 Installation

3.2.1 173 Series regulators must be installed with the actuator (2) facing upwards and the diaphragm perfectly horizontal, as shown in Fig.6.

In pressure reducing applications regulating very low downstream pressures (normally lower than 100 mm water column); the regulator must be installed with the actuator facing downwards and perfectly horizontal (below pipeline) as indicated by the nameplate orientation as shown in Fig. 7.

3.2.2 Before installation, ensure piping is clean, free of any debris (machining chips, weld slag, etc). Contaminants remaining in the piping system can damage internal components of the regulator.

Fig.6



1) Adjustment screw (spring holder)

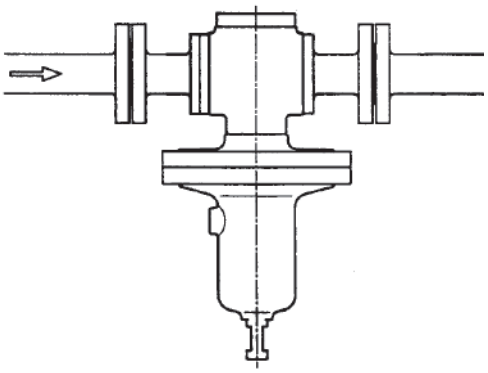
2) Actuator

3) Pressure gauge

4) Regulator body

5) Drain hole

Fig.7

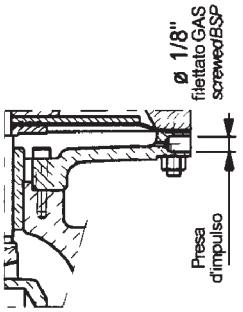


3.2.3 WARNING/CAUTION ON ATEX USAGE: When handling/working on harmless fluids (e.g. inert gases, like nitrogen, carbon dioxide and noble gases) the spring cover is not normally airtight (ATEX construction, Group II- Cat.2), and has a hole (5) in Fig.6 and 7 which prevents it from pressurizing if the diaphragm breaks. If the spring cover is airtight (Fig.4), made from carbon steel and stainless steel, the hole (5) in Fig.6 and 7 is always threaded ¼"NPT and must be connected to pipe conveying the discharge to a suitable place (safely and constantly at atmospheric pressure).

3.2.4 Please bear in mind that the regulated pressure sensing port is located inside the regulator, therefore the pressure drops in the inter-connecting piping between the regulator and the point of use will affect the accuracy of the maintained set pressure. This pressure drop must be considered when calculating the size of the connection piping.

3.2.5 When it is essential to avoid pressure variations at the point of use, the regulators are fitted with an external sensing line connection, as shown in Fig 8. The 1/8" female threaded port must be connected to a nipple as near as possible to the point of use.

Fig.8



External sensing line (only on request)

3.3 Start-Up and Calibration

3.3.1 The 173 series pressure regulators are shipped with a pressure setting at the low end of the adjustable range unless otherwise specified by the customer. The pressure setting can be changed to any value within the adjustable range by loosening the adjusting screw locknut (14) and turning the adjusting screw (13) clockwise to increase the pressure setting or counterclockwise to decrease the pressure setting.

⚠CAUTION

During regulator start-up or operation, do not touch any part of the regulator as this can conduct heat if the fluid used is at a high temperature.

3.4 Maintenance

3.4.1 The required maintenance interval will vary depending on application. The user must establish a suitable maintenance depending on the operating conditions. Prior to disassembly remove all system pressure from the regulator.

Before starting the above operation, make sure the recommended spare parts are available (Figs.1-2-3-4-5, parts list).

3.4.2 Disassembly (see Figs.1-2-3-4-5).

3.4.2.1 Actuator Disassembly

Remove spring compression by unscrewing the adjustment screw (13) (counter-clockwise) after loosening the locknut (14). The position of the locknut should be noted to allow closer preliminary adjustment when reassembling. If the regulator is equipped with a sealed cap (Fig.4), first remove the cap (28) and gasket.

Remove the spring case (11) by loosening the nuts (19). Note; it is not necessary to remove the housings on actuator sizes 220 and 360.

Remove the spring. Unscrew the nut (16).

Remove the diaphragm and washers.

3.4.2.2 Body Disassembly

Unscrew and remove the blindhead (1) with gasket. Unscrew the seat (25) with a screwdriver (see Figs. 1, 2 and 5).

Pull the plug off its guide and remove it from the body.

3.4.2.3 Parts inspection

All the components are now ready to be inspected. Replace any worn items. Clean all parts.

Pay particular attention to the condition of the disk and plug, both elastomeric and metal, and the seat.

If the seat is worn, it may be able to restore it by lapping using a metal disk and abrasive paste.

The diaphragm should be replaced if it shows any damage. The same applies to Teflon diaphragm protector (if equipped).

Gaskets should not be re-used.

If preferred, the regulator may be returned to an authorized Masoneilan repair center to be reconditioned.

3.4.2.4 Reassembly

Carry out the disassembly operations in reverse order.

Push the stem of the plug into body and push it into its guide. Tighten the seat (25), making sure the washer is new and correctly positioned. Replace the small retention ring (10) after thoroughly cleaning its seat.

Install the diaphragm, taking care to install the protector (9), if applicable, underneath, towards the regulator body on top of lower diaphragm plate (20). Install upper diaphragm plate (7) and the spring guide (17) and fully tighten nut (16).

Align the holes of the diaphragm with those in the actuator flange and install the spring, spring holder and spring case. Install blindhead (1). Return the adjusting screw (13) to the position marked by the nut (14) or the position noted (see 3.4.2.1). Exact adjustment must be checked when the regulator is returned to service.

3.4.2.5 Diaphragm Replacement

The diaphragm may require replacement without having to make other repairs. If the regulator is easy to access and isolate, it can be replaced while leaving the regulator installed in the piping provided it can be isolated. In this case, isolate the regulator and vent all pressure. Ensure isolation valves are locked to prevent accidental pressurization will working on the regulator. Remove the actuator following the instructions in section 3.4.1.2.

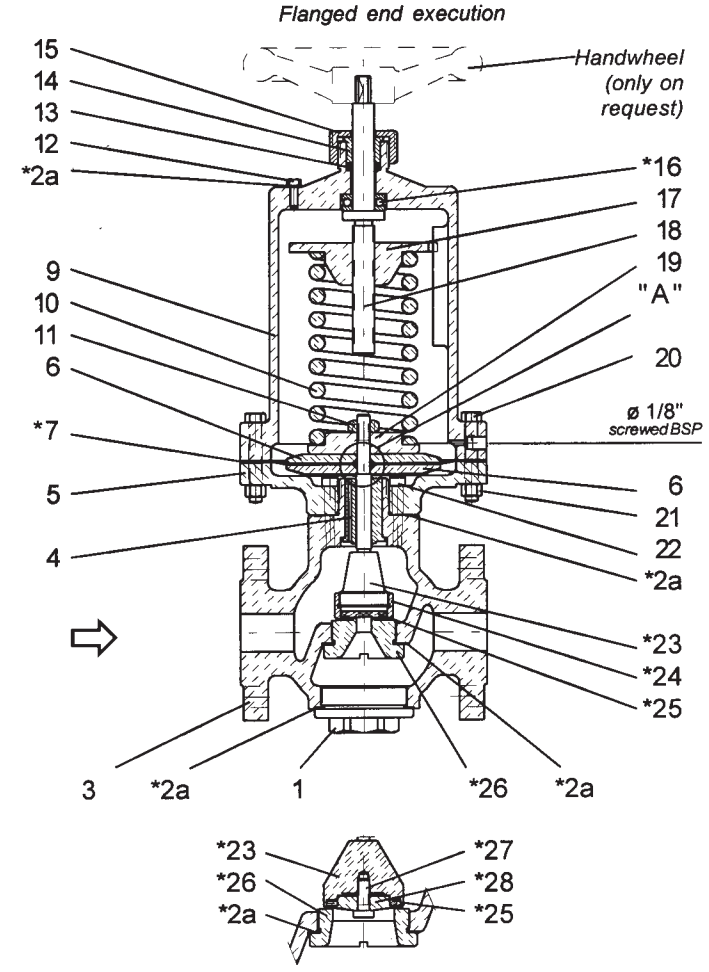
Replace and install the diaphragm and reassemble the actuator as shown in section 3.4.2.4. Check calibration once more when the regulator is returned to service.

⚠CAUTION

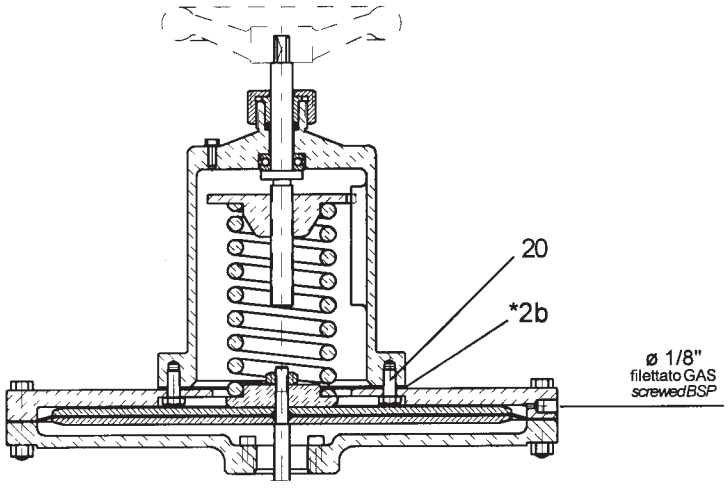
When welding piping, do not attach the earth connector to the regulator as this may damage important sliding parts.

4. 173-50 Differential Pressure Regulator

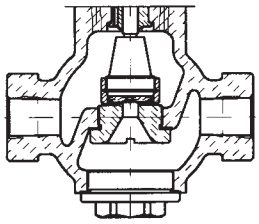
4.1 Cross-Section Drawing 173-50 Single Diaphragm



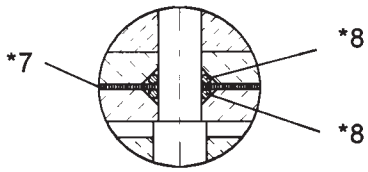
Resilient tightness disc for valves ND 40 (1.½") and ND 50 (2")



Screwed end execution



PART. "A"

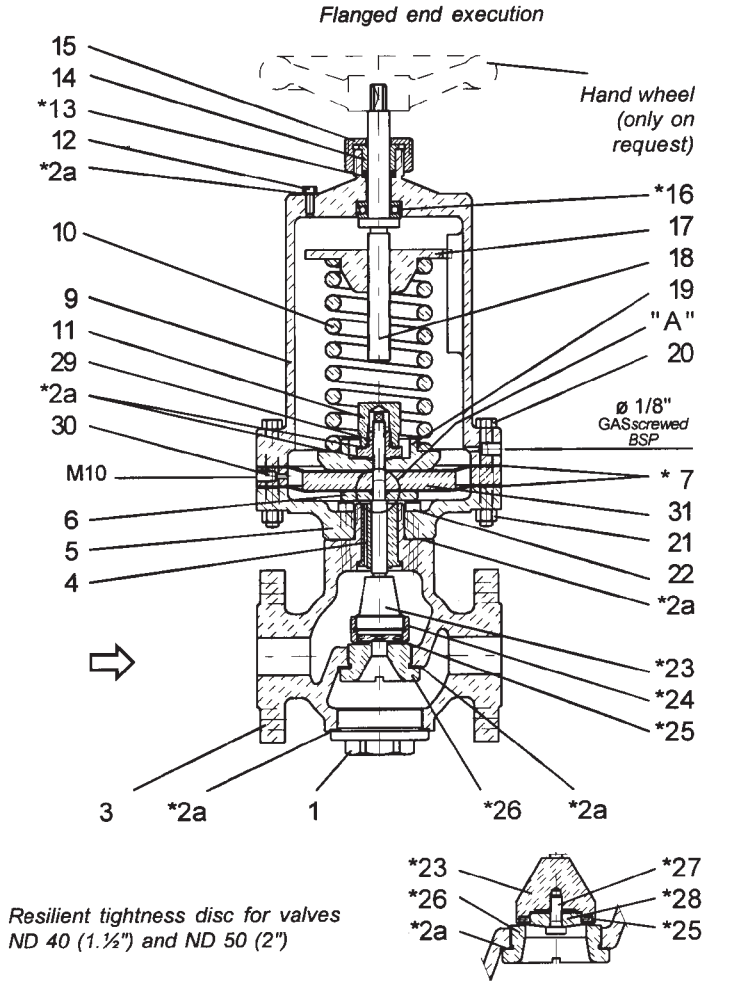


	Part
1	Blindhead
*2	Gasket Set
3	Body
4	Guide
5	Diaphragm Case
6	Diaphragm Plate
*7	Diaphragm
*8	O-Ring
9	Spring Case
10	Spring
11	Nut
12	Screw
*13	Gasket
14	Lock Nut
15	Packing Gland
*16	Bearing
17	Spring Button
18	Adjusting Screw
19	Spring Guide
20	Screw
21	Nut
22	Screw
*23	Plug
*24	Ring
*25	Disc
*26	Seat
*27	Screw
28	Gasket Plate

* Recommended spare parts

Fig. 9

4.2 Cross-Section Drawing 173-50 Double Diaphragm



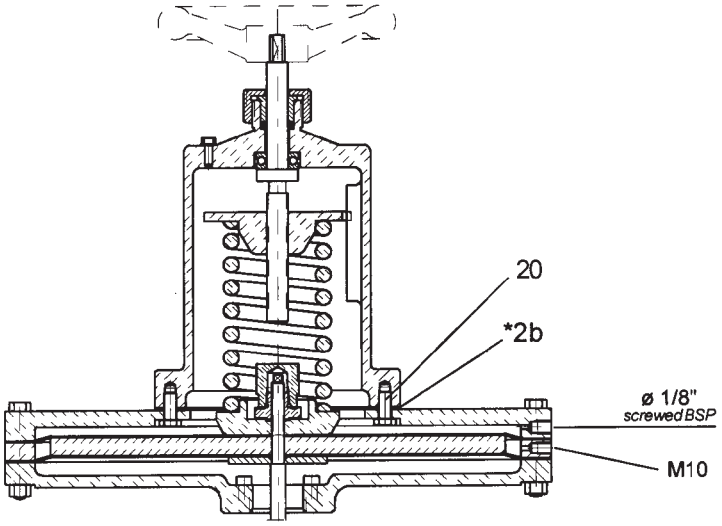
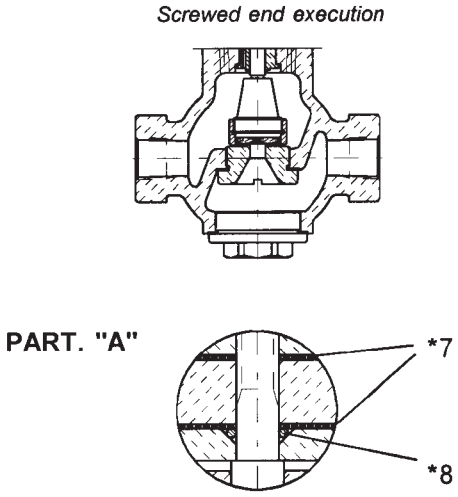


Fig. 10



	Part
1	Blindhead
*2	Gasket Set
3	Body
4	Guide
5	Diaphragm Case
6	Diaphragm Plate (Lower)
*7	Diaphragm
*8	O-Ring
9	Spring Case
10	Spring
11	Nut
12	Screw
*13	Gasket
14	Packing Gland
15	Lock Nut
*16	Bearing
17	Spring Button
18	Adjusting Screw
19	Spring Guide
20	Screw
21	Nut
22	Screw
*23	Plug
*24	Ring
*25	Disc
*26	Seat
*27	Screw
*28	Gasket Plate
29	Nut
30	Actuator Ring
31	Intermediate Plate

* Recommended spare parts

The 173-50 regulators comprise two groups of regulators:

Group 1 :

All the group 1 regulators have one diaphragm; one of the controlled pressures acts under the diaphragm through an internal sensing line connection while the other acts over the diaphragm through a sensing line connection on the spring housing. The plug is kept closed by the spring. The following types belong to this group:

173-50 Single Diaphragm (see Fig. 9);

Group 2 :

All the group 2 regulators have two diaphragms separated by a chamber communicating with the outside; the controlled pressures act under the lower diaphragm (through an internal sensing line connection) and over the upper diaphragm (through a sensing line nipple on the spring housing). The plug is kept closed by the spring.

The following types belong to this group:

173-50 Double Diaphragm (see Fig. 10);

4.3 Installation

4.3.1 All 173-50 regulators must be installed with the actuator facing upwards and the diaphragm horizontal.

4.3.2 Installation diagrams.

In most cases the flow crosses the regulator as shown by the arrow in Figs. 9 and 10.

The installation diagrams are therefore as follows:

4.3.3 - Group 1 regulators: Fig. 11

4.3.4 - Group 2 regulators: Fig. 12

4.3.5 Install an isolation valve upstream, downstream and on the sensing and discharge line connection piping, in order to service the regulator (if necessary) while the plant is pressurized.

Install one filter or pressure gauge upstream from the regulator and another one on the sensing line connection, as shown in the diagrams, in order to calibrate the differential pressure and keep it constantly under control.

4.3.6 Prior to installing the regulator in the piping, make sure the inside of the pipes are clean and free of any debris (machining cuttings, weld slag, etc.), especially the upstream section; blow down the piping if possible to eliminate any remaining dirt: small drops of weld slag may seriously damage the regulator.

4.3.7 In group 2 regulators, the chamber between the two diaphragms must be connected to piping to vent the discharge to a suitable place, safely and constantly at atmospheric pressure. This hole can be closed with a plug or pressure gauge with an electrical contact for the remote signaling that the diaphragm has broken, as long as the downstream plant is protected as shown in the following.

4.3.8 If there is the slightest possibility of the pressure upstream from the reduction regulator exceeding the maximum admissible pressure for the installation, caused by the failure of the overflow regulator, a safety relief valve must be installed upstream, without an isolation valve in between, in order to discharge the entire flow crossing the differential pressure regulator.

4.3.9 Please keep in mind that the regulated pressure sensing port is located inside the regulator, therefore the pressure drops in the inter-connecting piping between the regulator and the point of use will affect the accuracy of the maintained set pressure. This pressure drop must be considered when calculating the size of the connection

When it is essential to avoid pressure variations at the point of use, the regulators are fitted with an external sensing line connection, replacing the internal connection and fitted to the lower flange of the actuator. This connection must be connected as near as possible to the point of use where the installation of a pressure gauge is also recommended.

4.4 Start-Up and Calibration (Figs. 9-10)

4.4.1 This operation is similar for both groups. The sensing line connection regulator and the upstream and downstream isolation valves must be closed. Slightly open the downstream valve and then the upstream valve together with the sensing line connection, making sure that the pressure difference read on the pressure gauges is correct. If necessary, to decrease it, turn the adjustment screw (18) clockwise to increase differential pressure and counterclockwise to decrease.

When the required value is reached, fully open all the valves. When the downstream system is working at full power, calibrate by adjusting the screw (18).

4.5 Maintenance (Figs. 9-10)

4.5.1 The required maintenance interval will vary depending on application. The user must establish a suitable maintenance schedule depending on the operating conditions. Prior to disassembly remove all system pressure from the regulator.

Before starting the above operation, make sure the recommended spare parts are available (Figs.9-10, parts list).

4.5.2 Disassembly

Disassembling and reassembling operations for all types of 173-50 regulators as long as the diaphragms are considered. These are:

- 1 single elastomeric diaphragm for 173-50 Single Diaphragm;

- 2 elastomeric diaphragms (one per side) for 173-50 Double Diaphragm.

Make sure the spares match the above and take great care when mounting the diaphragm assembly.

4.5.3 Actuator disassembly

Release the spring compression by turning the adjustment screw counter-clockwise, counting and noting the number of turns in order to restore calibration after reassembly. Remove the spring housing (9) by loosening the nuts (21). It is not necessary to remove the housings of the 220 and 360 actuators. Remove the spring.

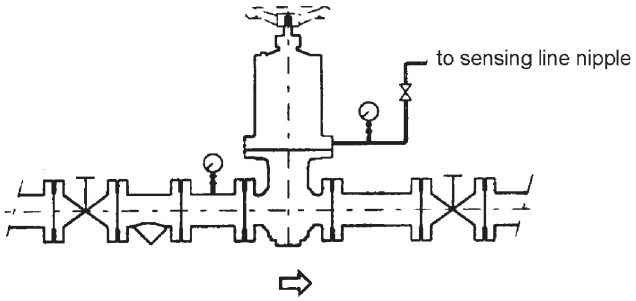
- For Group 1 regulators: unscrew the nut (11) and remove the diaphragm with the diaphragm plate (6) and spring guide (19) - (see Fig. 9).
- For Group 2 regulators: unscrew the lock nut (11) and nut (29); remove the double diaphragm assembly with ring (30), intermediate plate (31), diaphragm plate (6) and spring guide (19) - (see Fig. 10).

4.5.4 Body disassembly

Unscrew and remove the cover with relevant gasket. Unscrew the seat with a screwdriver (see Fig. 9-10)

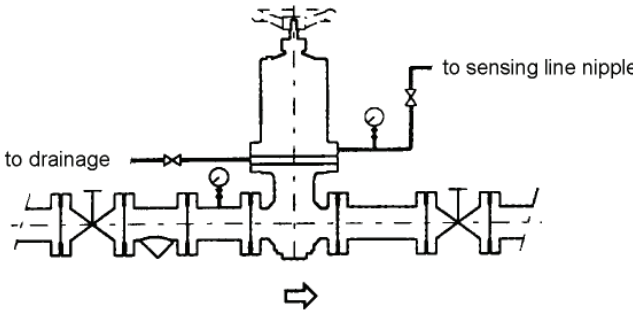
Pull the plug off its guide and remove it from the body.

Fig.11



Example of installation layout - Group 1 regulators: 173-50 Single Diaphragm.

Fig. 12



Example of installation layout – Group 2 regulators: 173-50 Double Diaphragm.

4.5.5 Parts inspection (Figs. 9-10)

All the components are now ready to be inspected. Replace any worn items. Clean all parts.

Pay particular attention to the condition of the disc of the plug (24), both elastomeric and metal, and the seat.

If the seat is worn, it may be able to restore it by lapping using a metal disc and abrasive paste.

The diaphragm should be replaced if it shows any damage. The same applies to Teflon diaphragm protector (if equipped).

Gaskets should not be re-used.

If preferred, the regulator may be returned to an authorized Masoneilan repair center to be reconditioned.

4.5.6 Reassembly

Carry out the disassembly operations in reverse order. Push the stem of the plug into its guide and tighten the seat (26). Screw back the cover (1). Install the diaphragm/s (see 4.5) taking care to properly arrange the Teflon protectors. Make sure the seats of the O-rings are perfectly clean before mounting them. Assemble:

- for Group 1 regulators: plug assembly, diaphragm plate, diaphragm and spring guide (with gaskets), nut.
- for Group 2 regulators: plug assembly, diaphragm plate, lower diaphragm, intermediate plate and actuator ring, upper diaphragm, spring guide (with gaskets), nut and lock nut.

Match the holes of the diaphragm/s with the holes in the actuator flange and install the spring, spring holder and housing. Turn the adjustment screw the number of turns noted down during dismounting. Exact calibration must then be checked when the regulator is placed back into service.

4.5.7 Replacing the diaphragm

The diaphragm may require replacement without having to make other repairs. If the regulator is easy to access and isolate, it can be replaced while leaving the regulator installed in the piping provided it can be isolated. In this case, isolate the regulator and vent all pressure. Ensure isolation valves are locked to prevent accidental pressurization will working on the regulator. Remove the actuator following the instructions in section 4.5.2.

Replace and install the diaphragm and reassemble the actuator as shown in section 4.5, 4.5.3 and 4.5.6. Check calibration once more when the regulator is returned to service.

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