Pietro Fiorentini

Series 200/MP

Magnetic pilot for pressure regulators

Revision H - Edition 09/2024

USE, MAINTENANCE AND WARNING MANUAL

EN

1 - INTRODUCTION

FOREWORD

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The manufacturer is in no way responsible for the consequences of operations carried out in a manner not in accordance with the manual.

GENERAL REMARKS

All operating, maintenance instructions and recommendations described in this manual must be observed. In order to obtain the best performance and to keep the equipment in efficient condition, the manufacturer recommends that maintenance operations be carried out regularly.
It is of particular importance that the personnel responsible for the equipment be trained in its use, maintenance and application of the safety instructions and procedures indicated in this manual.

1.1 - REVISION HISTORY

Revision index	Date
A	02/2022
B	05/2022
C	10/2022
D	10/2022
E	09/2022
F	09/2023
G	02/2024
H	09/2024

Tab. 1.1

INDEX

2 - GENERAL INFORMATION

2.1 - MANUFACTURER IDENTIFICATION

Manufacturer	PIETRO FIORENTINI S.P.A.
Address	Via Enrico Fermi, 8/10 36057 Arcugnano (VI) - ITALY **Tel. +39 0444 968511 Fax +39 0444 960468** **www.fiorentini.com arcugnano@fiorentini.com**

Tab. 2.2

2.2 - IDENTIFICATION OF THE PRODUCT

Equipment	MAGNETIC PILOT FOR PRESSURE REGULATORS
Model	Pilot 201/MP/D - 201/MP/I Pilot 204/MP/D - 204/MP/D/FO Pilot 204/MPH/D - 204/MPH/D/FO Pilot 204/MP/I Pilot 204/MPH/I Pilot 205/MP/D/FO Pilot 205/MPH/D/FO

The "series 200/MP" refers to all models mentioned in Table 2.3.

The "models 200/MP(H)" refer to 201/MP..., 204/MP... and 204/MPH....

The "models 200/MP(H)/D/FO" refer to 204/MP/D/FO, 204/MPH/D/FO, 205/MP/D/FO AND 205/MPH/D/FO.

The "version /D" models are defined as Decrease, while "version /I" is Increase.

Tab. 2.3.

2.3 - REGULATORY FRAMEWORK

PIETRO FIORENTINI S.P.A., with registered offices in Arcugnano (Italy) - Via E. Fermi, 8/10, declares under its sole responsibility that the equipment of the series described in this manual is designed, manufactured, tested and checked in compliance with the requirements of EN 334 standard on gas pressure regulators.

The equipment complies with the requirements of Directive 2014/34/EU (ATEX) and is listed under art. 4 par. 3 of Directive 2014/68/EU ("Pressure Equipment Directive" PED).

NOTICE!

The declaration of conformity in its original version is delivered together with the equipment and this operating and warning manual.

2.4 - WARRANTY

PIETRO FIORENTINI S.P.A. guarantees that the equipment was manufactured using the best materials, with high quality workmanship, and complies with the quality requirements, specifications and performance set out in the order.
The warranty shall be considered null and void and PIETRO FIORENTINI S.P.A. shall not be liable for any damage and/or malfunctions:

- due to any acts or omissions of the purchaser or end-user, or any of their carriers, employees, agents, or any third party or entity;
- in the event that the purchaser, or a third party, makes changes to the equipment supplied by PIETRO FIORENTINI S.P.A. without the prior written approval of the latter;
- in the event of failure by the purchaser to comply with the instructions contained in this manual, as provided by PIETRO FIORENTINI S.P.A.

NOTICE!

The warranty conditions are specified in the commercial contract.

2.5 - SYMBOLS USED IN THE MANUAL

Symbol	Definition
	Symbol used to identify important warnings for the safety of the operator and/or equipment.
	Symbol used to identify information of particular importance in the instruction manual. The information may also concern the safety of the personnel involved in using the equipment.
	Obligation to consult the instruction manual/booklet. Indicates a requirement for the personnel to refer to (and understand) the operating and warning instructions of the machine before working with or on it.

Tab. 2.4

HAZARD!

Alerts to a hazard with a high level of risk, an imminent hazardous situation which, if not prevented, will result in death or severe damage.

WARNING!

Alerts to a hazard with a medium level of risk, a potentially hazardous situation which, if not prevented, may result in death or severe damage.

ATTENTION!

Alerts to a hazard with a low level of risk, a potentially hazardous situation which, if not prevented, could result in minor or moderate damage.

NOTICE!

Alerts to specific warnings, directions or notes of particular concern, that are not related to physical injury, as well as practices for which physical injury is not likely to occur.

2.6 - RECIPIENTS, SUPPLY AND STORAGE OF THE MANUAL

The instruction manual is intended for qualified technicians responsible for operating and managing the equipment throughout its service life.
It contains the necessary information to properly use the equipment and keep its functional and qualitative characteristics unchanged over time. All information and warnings for safe, correct use are also provided.
The manual, as well as the declaration of conformity and/or test certificate, is an integral part of the equipment and must always accompany it whenever it is moved or resold. It is up to the user to keep this documentation intact for reference throughout the lifespan of the equipment.

⚠ WARNING!

Removing, rewriting or editing the pages of the manual and their contents is not allowed.
Keep the instruction manual near the equipment, in an accessible place known by all qualified technicians involved in using and running it.
PIETRO FIORENTINI S.p.A. shall not be held liable for any damage to people, animals and property caused by failure to adhere to the warnings and operating procedures described in this manual.

2.7 - LANGUAGE

The original instruction manual was drawn up in Italian.
Any translations into additional languages are to be made from the original instruction manual.

⚠ HAZARD!

The Manufacturer is not responsible for any incomplete translations. If any inconsistency is found, please refer to the text of the original manual.
If inconsistencies are found or the text does not make sense:

- **stop any actions;**
- **immediately contact the relevant offices of PIETRO FIORENTINI S.p.A.**

⚠ WARNING!

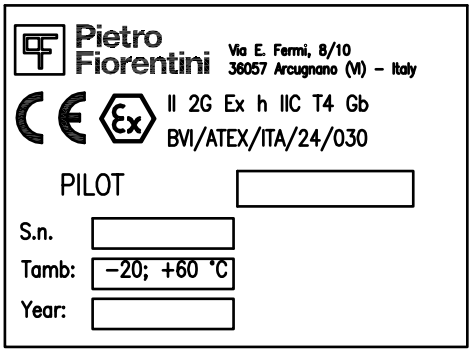
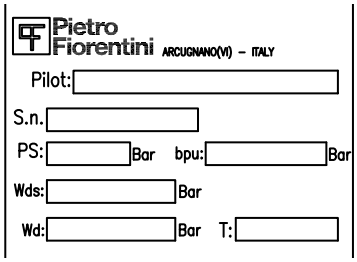
PIETRO FIORENTINI S.p.A. shall be held liable for the information provided in the original manual only.

2.8 - APPLIED RATING PLATES

⚠ WARNING!

Removing nameplates and/or replacing them with other plates is strictly not allowed. Should the plates be unintentionally damaged or removed, the customer must notify PIETRO FIORENTINI S.p.A.

The equipment and its accessories are provided with rating plates.
The rating plates specify identification details of the equipment and its accessories to be provided, if necessary, to PIETRO FIORENTINI S.p.A.
Tab. 2.5 shows the nameplates applied:

Id.	Type	Image
1	RATING PLATE PILOT	
2	MAGNETIC ACTUATOR PLATE	
3	ATEX PLATE	

Tab. 2.5

2.8.1 - GLOSSARY FOR RATING PLATES

The terms and abbreviations used on nameplates are described in Tab. 2.6:

Term	Description
AC	Accuracy class.
AG max	Accuracy class of pressure boosting slam-shut valves. “OPSO” (Over pressure shut off).
AG min	Accuracy class of safety devices for pressure drop. ”UPSO”(Under pressure shut off).
bpu	Range of inlet pressure for which the regulator ensures a given accuracy class.
CE	Marking certifying compliance with applicable European directives.
Cg	Flow rate coefficient.
Class	Alphanumeric designation used for reference purposes related to a combination of mechanical and dimensional characteristics for flanges, in accordance with the relevant parts of EN 1759 series, which includes the word Class followed by a dimensionless whole number.
DN	Nominal size of connections.
Fail safe mode	Regulator reaction mode (Fail open or Fail close).
Flange	Type of flanged connections or type of connection thread.
Fluid	Type of fluid compatible with the equipment.
ID n.	Number of the Notified Body participating in the conformity assessment of the equipment.
Pilot	Pilot family.
PS	Maximum permissible pressure for which the equipment was designed.
Pumax	Maximum inlet pressure at which the regulator can operate continuously under specific conditions.
REGULATOR	Equipment family.
SG	Shut-off pressure class.
Slam-shut device	Slam-shut valve family.
S.n.	Equipment serial number.
Strength type	Strength class: Integral strength (IS) or differential strength (DS).
T	Permissible temperature range (min. and max.) that the equipment was designed for.
Tripping unit	Pressure switch family.
Type	Accessory type and family.
Wd	Full setpoint range that can be obtained from the regulator by adjusting and/or replacing certain components (e.g. replacement of valve seat or control element, e.g. spring).
Wdo	Full setpoint range with regard to tripping caused by increased pressure in the pressure switch built into the slam-shut valve. This range can be obtained by adjusting and/or replacing the components (for example, spring or sensitive element).
Wds	Full setpoint range that can be obtained from the regulator by adjusting but not replacing the components.
Wdso	Full setpoint range with regard to tripping caused by increased pressure in the pressure switch built into the slam-shut valve. This range can be obtained by adjusting but not replacing the components.

Term	Description
Wdu	Full setpoint range with regard to tripping caused by decreased pressure in the pressure switch built into the slam-shut valve. This range can be obtained by adjusting and/or replacing the components (for example, spring or sensitive element).
Wdsu	Full setpoint range with regard to tripping caused by decreased pressure in the pressure switch built into the slam-shut valve. This range can be obtained by adjusting but not replacing the components.

Tab. 2.6

2.9 - GLOSSARY OF MEASUREMENT UNITS

Type of measurement	Unit of measurement	Description
Volumetric flow rate	Sm^3/h	Standard cubic metres per hour
	Scfh	Standard cubic feet per hour
Pressure	bar	Unit of measurement in the CGS system
	psi	Pounds per square inch
	“wc	inches water column
	Pa	Pascal
Temperature	°C	Degree centigrade
	°F	Fahrenheit degree
	K	Kelvin
Tightening torque	Nm	Newton metre
	ft-lbs	Foot per pound
Sound pressure	dB	Decibel
Other measurements	V	Volt
	W	Watt
	Ω	Ohm

Tab. 2.7

2.10 - QUALIFIED PROFESSIONAL FIGURES

Qualified operators in charge of using and managing the equipment throughout its technical service life:

Professional figure	Definition
Mechanical maintenance technician	Qualified technician able to: • perform preventive/corrective maintenance operations on all mechanical parts of the equipment subject to maintenance or repair; • access all device parts for visual inspection, equipment checks, adjustments and settings. The maintenance mechanical technician is not authorised to operate on live electrical systems (if any).
Electrical maintenance technician	Qualified technician able to: • perform preventive/corrective maintenance operations on all electrical parts of the device subject to maintenance or repair; • read wiring diagrams and check the correct functional cycle; • perform adjustments and operate on electrical systems for maintenance, repair and replacement of worn parts. The electrical maintenance technician can operate in the presence of voltage inside electrical panels, junction boxes, control equipment etc. only if he/she is deemed to be suitable (S.P.). For general requirements, refer to the IEC EN 50110-1:2014 standard.
Worker in charge of transport, handling, unloading and placement on site	Operator qualified to: • use lifting equipment; • handle materials and equipment. The equipment must be lifted and handled strictly in accordance with the instructions provided by the manufacturer as well as the regulations in force at the place where the equipment is installed.
Installer	Qualified operator able to: • carry out all the operations necessary to properly install the equipment; • perform all the operations necessary for the proper functioning of the equipment and the system in safety.
User's technician	Technician trained and authorized to use and manage the equipment for the activities for which it was supplied. They must: • be able to perform all operations required to properly run the equipment and the system, ensuring their own safety and that of any personnel on site; • have proven experience in properly using the equipment similar to that described in this manual, and be trained, informed and instructed in this regard. The technician may carry out maintenance only if authorised/qualified to do so.

Tab. 2.8

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3 - SAFETY

3.1 - GENERAL SAFETY WARNINGS

⚠ WARNING!

The equipment described in this instruction manual is:

- **a device subjected to pressure in pressurised systems;**
- **normally installed in systems carrying flammable gases (for example: natural gas).**

⚠ WARNING!

If the gas used is a combustible gas, the installation area of the equipment is defined as a "danger zone" as there are residual risks that potentially explosive atmospheres may be generated.
In "danger zones" and in close proximity thereto:

- **there must not be any effective sources of ignition;**
- **no smoking.**

⚠ ATTENTION!

Authorised operators must not carry out operations or services on their own initiative that do not fall within their competence.
Never operate the equipment:

- **while under the influence of intoxicating substances such as alcohol;**
- **if you are using drugs that may slow reaction times.**

NOTICE!

The employer must train and inform operators on how to behave during operations and on the equipment to be used.

Before installation, commissioning or maintenance, operators must:

- take note of the safety regulations applicable to the place of installation they are working in;
- obtain the necessary permits to operate when required;
- wear the personal protective equipment required by the procedures described in this instruction manual:
- ensure that the required collective protective equipment and safety information are available in the area they are operating in.

3.2 - PERSONAL PROTECTIVE EQUIPMENT

Tab. 3.9 shows the personal protective equipment (PPE) and its description. An obligation is associated with each symbol. Personal protective equipment means any equipment intended to be worn by the worker in order to protect them against one or several risks that are likely to threaten their safety or health during work.
For the operators in charge, depending on the type of work requested, the most appropriate PPE of the following will be reported and must be used:

Symbol	Meaning
	**Obligation to use safety or insulated gloves.** Indicates a requirement for the personnel to use safety or insulated gloves.
	**Obligation to use safety goggles.** Indicates a requirement for personnel to use protective goggles for eye protection.
	**Obligation to use safety shoes.** Indicates a requirement for the personnel to use accident-prevention safety shoes.
	**Obligation to use noise protection equipment.** Indicates a requirement for the personnel to use ear muffs or ear plugs to protect their hearing.
	**Obligation to wear protective clothing.** Indicates a requirement for the personnel to wear specific protective clothing.
	**Obligation to use a protective mask.** Indicates a requirement for the personnel to use respiratory masks in the event of a chemical risk.
	**Obligation to use a protective helmet.** Indicates a requirement for the personnel to use protective helmets.
	**Obligation to wear high visibility vests.** Indicates a requirement for the personnel to use high visibility vests.

Tab. 3.9

⚠ WARNING!

Each licensed operator is obliged to:

- **take care of his/her own health and safety and that of other people in the workplace who are affected by his/her actions or omissions, in accordance with the training, instructions and equipment provided by the employer;**
- **appropriately use the PPE made available;**
- **immediately report to the employer, the manager or the person in charge any deficiencies in the equipment and devices, as well as any dangerous conditions they may become aware of.**

3.3 - RESIDUAL RISKS

In accordance with the requirements of PED 2014/68/EU, point 1.2 of Annex I, below is an assessment of the risks associated with the equipment and an indication of the principles adopted for their prevention, according to the following classification:

a) Elimination and/or reduction of the risk.
b) Application of appropriate protective measures.
c) information to users about residual risks.

3.3.1 - TABLE SHOWING RESIDUAL RISKS DUE TO PRESSURE

Risk and Hazard	Event and Cause	Effect and Consequence	Solution and Prevention
Pressurised gas leak. Projection of metallic and non-metallic pressurised parts.	• Violent impact; • Impact (also due to falling, improper handling, etc.).	• Deformation; • Broken connections and, if pressurised, even burst.	a. Handling and installation with appropriate devices to avoid localised stress. b. Installation in suitable places and spaces with appropriate guards and packaging. c. Information in the instructions for use and warning.
Pressurised gas leak. Projection of metallic and non-metallic pressurised parts.	• Use of inappropriate fluids.	• Corrosion; • Embrittlement; • Explosion.	a. The user must check compliance of the used fluid with the specifications on the data plate.
Pressurised gas leak. Projection of metallic and non-metallic pressurised parts.	• Operation at temperatures below the minimum permissible temperature.	• Embrittlement; • Breakage; • Explosion.	a. Install in places where the temperature is not below the minimum permissible value and/or insulate the equipment adequately. b. The minimum temperature allowed is indicated on the data plate.
Pressurised gas leak. Projection of metallic and non-metallic pressurised parts. Explosion.	• Overpressure or exceedance of the rated limit values (maximum pressure allowed)	• Explosion; • Breaks; • Cracks; • Permanent deformations.	a. The device has appropriate design safety margins. b. The user must check the maximum pressure applicable to the equipment. c. The maximum allowable pressure is highlighted on the appropriate plate on the equipment.
Falling of the equipment.	• Dangerous handling.	• Deformation; • Cracking; • Breakage.	b. The user must have suitably sized lifting equipment. c. The above requirements are referred to in the equipment use and warning manual.
Pressurised fluid leak. Projection of metallic and non-metallic pressurised parts.	• Incorrect fixing of the equipment.	• Deformation; • Breakage.	a. The device is equipped with unified type process connections and compression fittings. b. The user must ensure correct fixing to the line. c. Directions in the instructions for use and warning.
Explosion of the appliance pressurised fluid leakage. Projection of metallic parts.	• Operation at temperatures above the maximum permissible temperature.	• Reduction of mechanical resistance and breakage of the device; • Explosion.	a. The user must equip the system with suitable safety and control devices. b. The maximum temperature allowed is indicated on the data plate.
Pressurised gas leak.	• Device maintenance with the system running.	• Inappropriate opening of pressurised chambers.	a. The user must perform any maintenance with the equipment not running. b. The above requirements are referred to in the use and warning manual.

Risk and Hazard	Event and Cause	Effect and Consequence	Solution and Prevention
Pressurised gas leak. Projection of metallic and non-metallic pressurised parts.	• External loads bearing on the device.	• Deformation; • Cracking and slot formation; • If under pressure, even burst.	a. With the exclusion of what is set out in the project, the user must verify that no additional concentrated load bears on the device.
Pressurised gas leak. Projection of metallic and non-metallic pressurised parts.	• Electrostatic potential differential stray currents.	• Corrosion localised in the device.	b. The user must equip the device with the necessary protection and earthing devices. c. The above requirements are referred to in the use and warning manual.
Pressurised gas leak. Projection of metallic and non-metallic pressurised parts.	• Humidity; • Environments with aggressive atmosphere.	• Deterioration of external surfaces; • Corrosion.	a. The user must periodically check the state of conservation of the external surfaces. b. The above requirements are referred to in the use and warning manual.

Tab. 3.10

3.3.2 - TABLE OF RESIDUAL RISKS FOR POTENTIALLY EXPLOSIVE ATMOSPHERES

Tab. 3.11 shows the conditions that can lead to the generation of a potentially explosive atmosphere by the PILOT 200/MP. The table is valid for use with natural gas with a density of no more than 0.8; for different densities, the installation and environmental conditions must also be evaluated.

⚠ WARNING!

If the gas used is a combustible gas, the installation area of the equipment is defined as a "danger zone" as there are residual risks that potentially explosive atmospheres may be generated.
There must be no effective sources of ignition in "danger zones" and in close proximity thereto.

Operating conditions	Potentially explosive atmosphere	Normative references	Management measures included in the instructions for use and warning
First start-up	No	Before commissioning, the external sealing of the system portion on which the equipment is installed is checked at a suitable pressure (in accordance with the provisions of standards EN 12186 and EN 12279).	The instructions for use indicate the need to meet the requirements in Standards EN 12186 and EN 12279.
Operation in normal conditions	No	The indications in the previous point apply, in addition: • the equipment is installed outdoors or in an environment with natural ventilation (in accordance with Standards EN 12186 and EN 12279); • the installation is subject to surveillance according to current national rules/good practice/ the equipment manufacturer's instructions (in accordance with the provisions of Standard EN 12186 and Standard EN 12279).	The instructions for use indicate that: • any environment in which the equipment is installed must meet the requirement of Standards EN 12186 and EN 12279; • periodic checks and maintenance must be carried out during surveillance in accordance with the national rules in force (if any), and with the specific manufacturer's recommendations.
Breakage of the control head diaphragm (malfunction): • **Position 11 fig. 4.3.1 and 4.3.2 for models 201, 204, 205** • **Position 15 fig. 4.3.1 of the control head of only model 201**	No	This event must be considered a rare malfunction. All atmospheric pressure chambers delimited on at least one side by a diaphragm must be channelled to a safe area (in accordance with the provisions of Standard EN 12186 and Standard EN 12279).	The instructions for use indicate the need to meet the requirements of Standards EN 12186 and EN 12279.
Breakage of other non-metallic parts (malfunction)	No	This type of malfunction is not reasonably expected as it involves static seals (to the outside) that cannot generate any external leakage.	-

Operating conditions	Potentially explosive atmosphere	Normative references	Management measures included in the instructions for use and warning
Decommissioning	No	• The pressure of the system section in which the equipment is installed must be reduced with appropriate vent lines channelled to a safe area (in accordance with the provisions of Standard EN 12186 and Standard EN 12279). • The residual gas must be discharged as indicated above.	The instructions for use indicate the need to meet the requirements of Standards EN 12186 and EN 12279
Reboot	No	• After reassembling the regulator, carry out an external leakage test at a convenient pressure value as specified by the manufacturer. • Before commissioning, the external sealing of the system portion on which the equipment is installed is checked at a suitable pressure (in accordance with the provisions of standards EN 12186 and EN 12279).	The instructions for use indicate: • the minimum conditions for testing internal leakage; • the need to meet the requirements of Standards EN 12186 and EN 12279.

Tab. 3.11

3.4 - OBLIGATIONS AND PROHIBITIONS

The following is a list of obligations and prohibitions to be observed for the safety of the operator.

It is mandatory to:

- carefully read and understand the instructions for use and warning;
- check whether the downstream equipment is suitably sized according to the performance required of the regulator in the actual operating condition;
- before installing the equipment, the data on the rating plates must be checked;
- avoid violent shocks and impacts that could damage the equipment and, as a result, cause the pressure fluid to leak.

It is forbidden to:

- operate in various capacities on the equipment without the PPE indicated in the work procedures described in these use and warning instructions;
- operate in the presence of open flames or bring open flames close to the work area;
- smoke near the equipment or while working on it;
- use the equipment with parameters other than those indicated on the rating plate;
- use the equipment with fluids other than those indicated on the rating plate and in these use and warning instructions;
- use the equipment outside the operating temperature range specified on the rating plate and in these use and warning instructions;
- service the equipment with the system portion, on which it is installed, running;
- install or use the equipment in environments other than those specified in these instructions for use and warning.

3.5 - SAFETY PICTOGRAMS

The following safety pictograms may be shown on the equipment and/or packaging PIETRO FIORENTINI S.p.A.:

Symbol	Definition
	Symbol used to identify an ELECTRICAL HAZARD.
	Symbol used to identify a GENERIC HAZARD.

Tab. 3.12

HAZARD!

It is absolutely forbidden to remove the safety pictograms on the equipment.
The user is required to replace the safety pictograms which, following wear, removal or tampering, are illegible.

3.6 - NOISE LEVEL

Depending on the operating conditions, use and configuration required, the equipment may generate noise other than that permitted by current legislation in the country of installation.
For the value of the noise generated by the equipment and further information, contact PIETRO FIORENTINI S.p.A.

ATTENTION!

The obligation to use earmuffs or ear plugs to protect the operator's hearing remains in the event that the noise in the installation environment of the equipment (depending on specific operating conditions) exceeds the value of 85 dBA.

4 - DESCRIPTION AND OPERATION

4.1 - GENERAL DESCRIPTION

The equipment PILOT 200/MP is an electro-mechanical device used to drive a pilot-type pressure regulator that reduces the inlet gas pressure while maintaining a stable downstream value even when the following varies:

- inlet pressure value;
- the required flow rate within the operating conditions of the equipment.

The main elements of the equipment are:

Pos.	Description	Pos.	Description
1	Device body	5	Adjusting screw
2	Plug unit	6	Gas inlet and outlet
3	Seat unit	7	Downstream sensing line
4	Setting spring	8	Magnetic actuator

Tab. 4.13

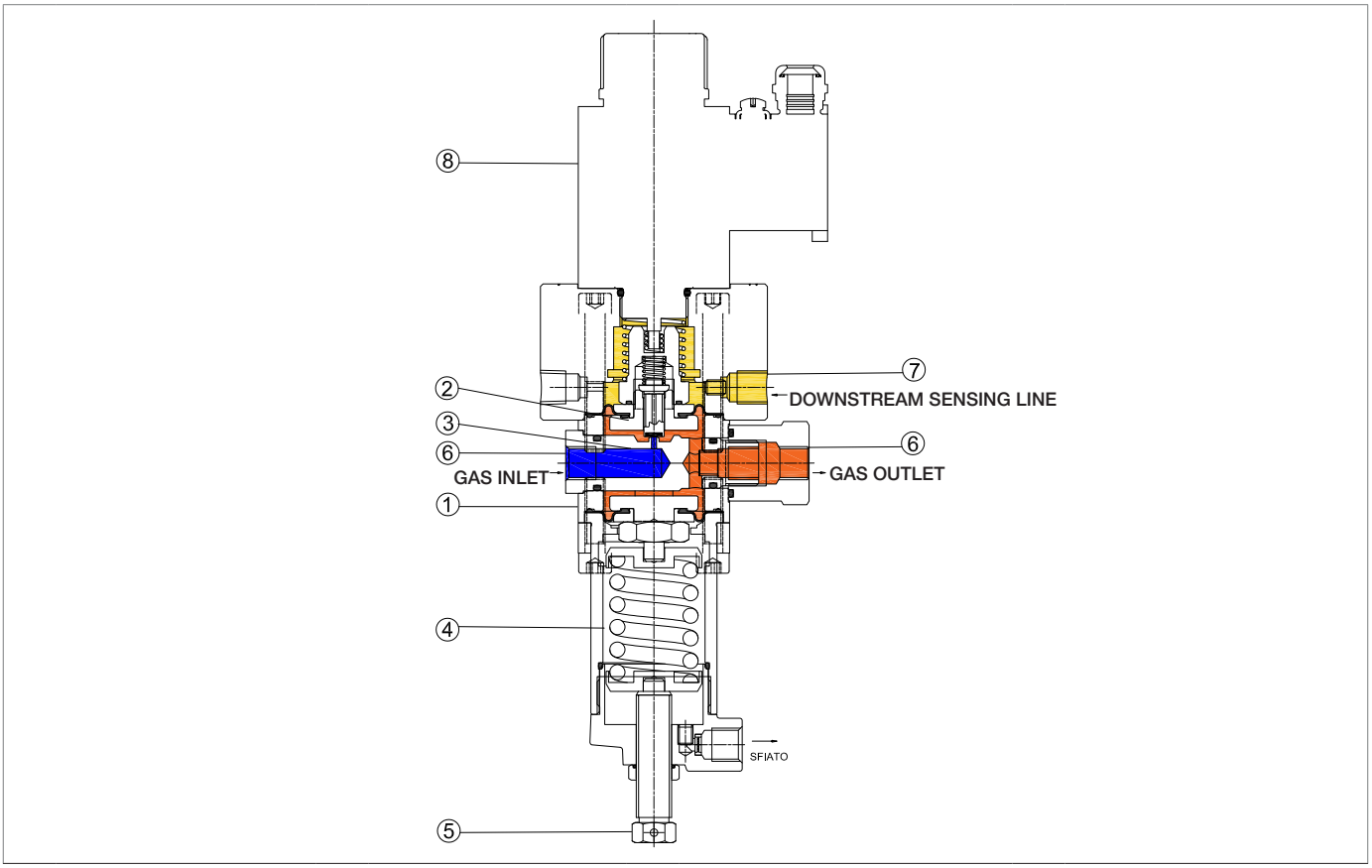


Fig. 4.1. General description PILOT 200/MP

4.1.1 - REGULATOR REACTION MODES

The equipment PILOT 200/MP is a “fail open” reacting equipment, i.e., it lets flow through downstream in the event of:

- breakage of the diaphragm (ref. 11, fig. 4.1)
- breakage of the diaphragm (ref. 15, fig. 4.1)
- lack of pneumatic supply.

4.2 - MAGNETIC ACTUATOR

The magnetic pilot works in conjunction with a magnetic actuator and they are mechanically connected.

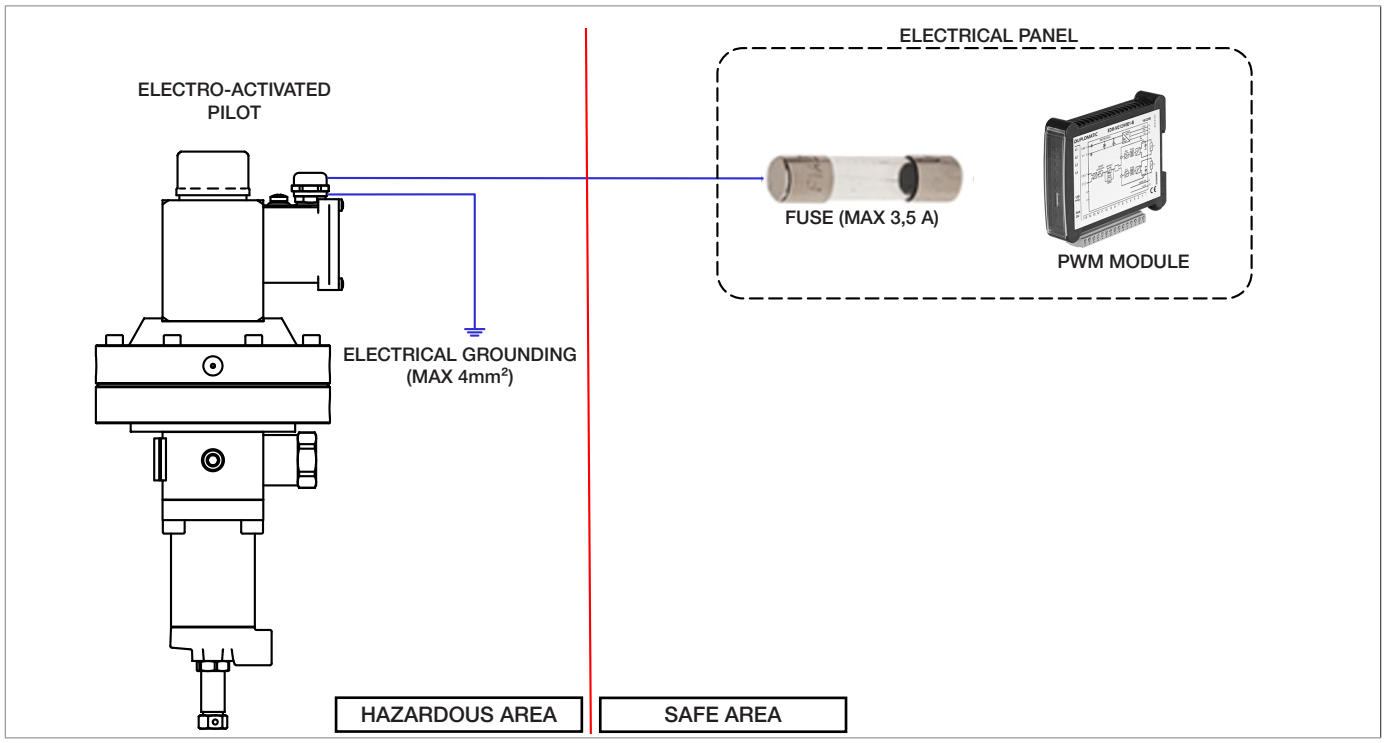


Fig. 4.2. Block diagram of pilot connection to electrical regulation panel

The magnetic actuator is powered by the current and generates a magnetic field proportional to it. The mobile part of the device is magnetic and moves in accordance with the intensity of the field itself.

The PWM module has as its output a modulated voltage that feeds the magnetic actuator, in which a variable current flows, generating a magnetic field. The mobile equipment shifts, changing the force on the pilot's diaphragm unit.

The operation of the magnetic pilot is described in paragraph (4.3).

The electromechanical device used in the 200/MP series pilots consists of a magnetic actuator that imparts a force proportional to the current set in the PWM module, which is subtracted from the force imparted by the setting spring.

EU-Type Examination Certificate	IBExU 16 ATEX 1143 X
IEXEx Certificate of Conformity	IECEx IBE 16.0023X
Explosion protection ATEX / IECEx	CE 0637 Ex II 2G Ex eb mb IIC T4 Gb II 2D Ex tb IIIC T130°C Db
Applied standards	EN IEC 60079-0:2018 (IEC 60079-0:2017) EN 60079-7:2015 (IEC 60079-7:2015) EN 60079-18:2015 (IEC 60079-18:2014) EN 60079-31:2014 (IEC 60079-31:2013)
Protection System acc. to IEC / EN 60529	IP65
Protection Class acc. To DIN VDE 0580	I
Related Documents:	
EU-Declaration of Conformity	DC927215-002
Dimensional drawing	927255 – 902315 – 923683
Diagram sheet	-

The device consists of the components:

- outer body, known as the “solenoid” (1) and is inserted into the central tube. Available in Decrease (2.1) or Increase (2.2) versions
- an O-ring (2.3)
- a plug (2.4) used to secure the tube and body.

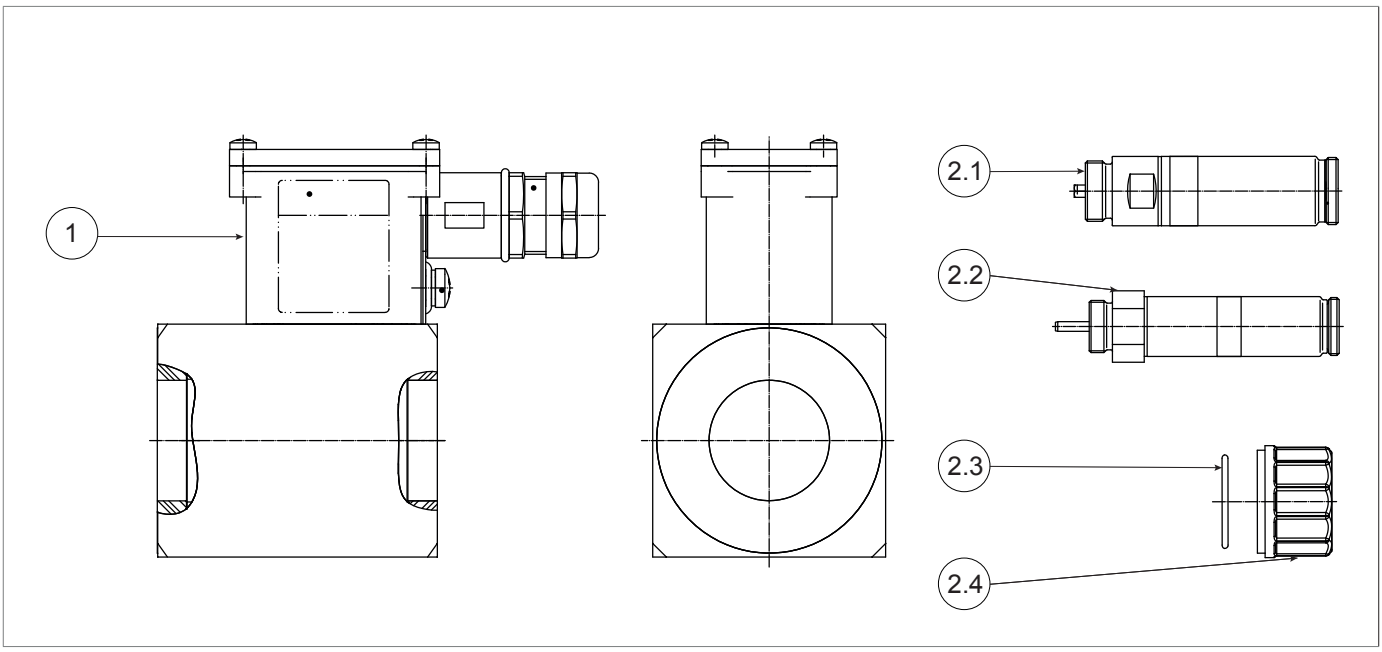


Fig. 4.3. Magnetic actuator components

4.3 - PILOT 200/MP OPERATION

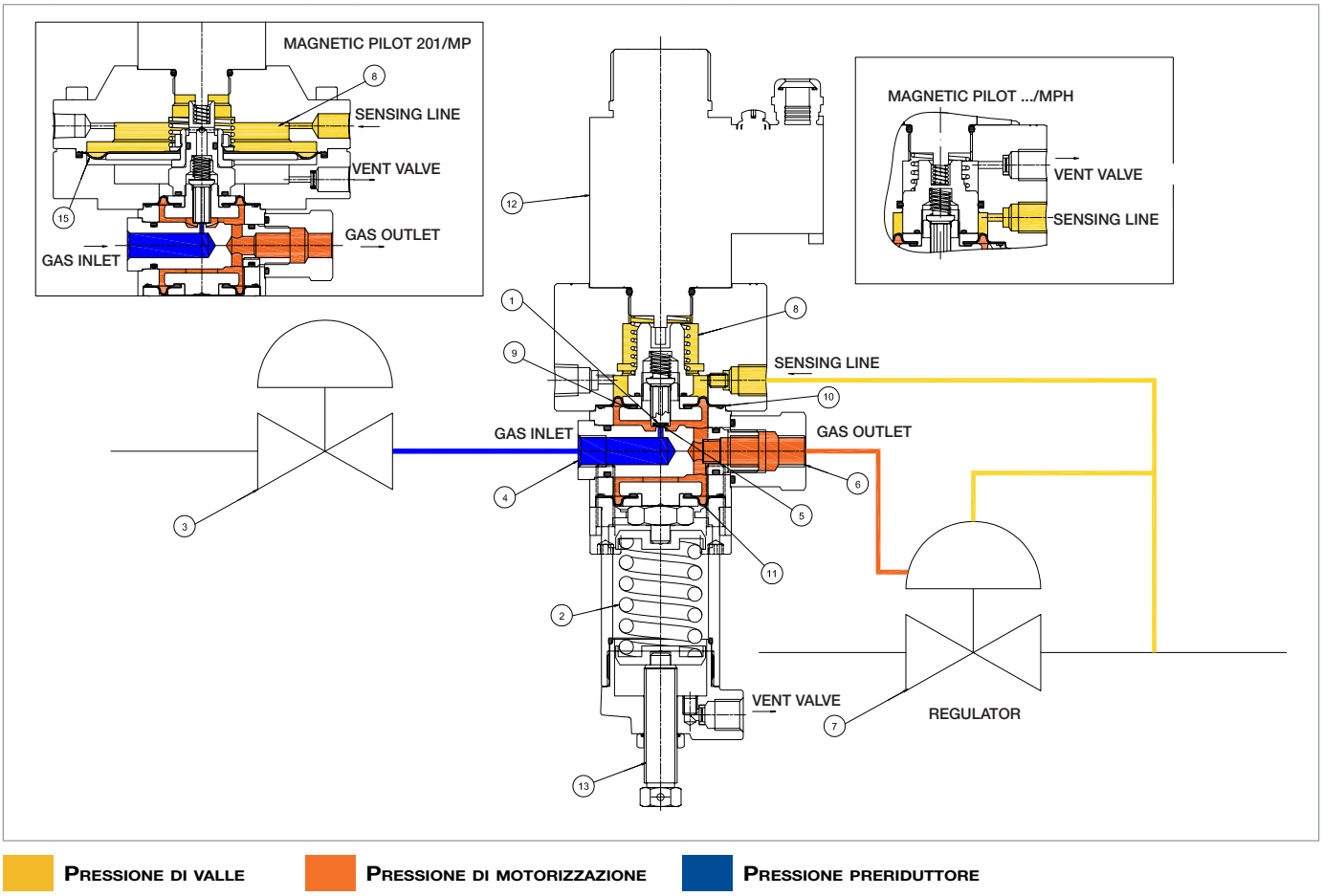


Fig. 4.4. Operation PILOT 200/MP

In the absence of outlet pressure from the pre-regulator (3) and power supply, the pilot plug (1) is held in the open position by the setting spring (2).

During normal operation, the pressure upstream of the pilot, i.e. the pre-regulator outlet pressure, flows into the pilot through the inlet connection (4), passes the valve seat (5) and exits the outlet connection (6) in the direction of the pilot-type regulator's loading chamber (7).

This pressure, called loading pressure, exerts a force that moves the regulator plug, allowing gas to flow from upstream to downstream of the pressure regulator.

The pilot chamber (8) is connected to the downstream pressure at the regulator outlet. As this pressure rises, it actuates the diaphragm unit (9) and moves the plug towards the valve seat.

4.4 - PILOT 200/MP/D/FO OPERATION

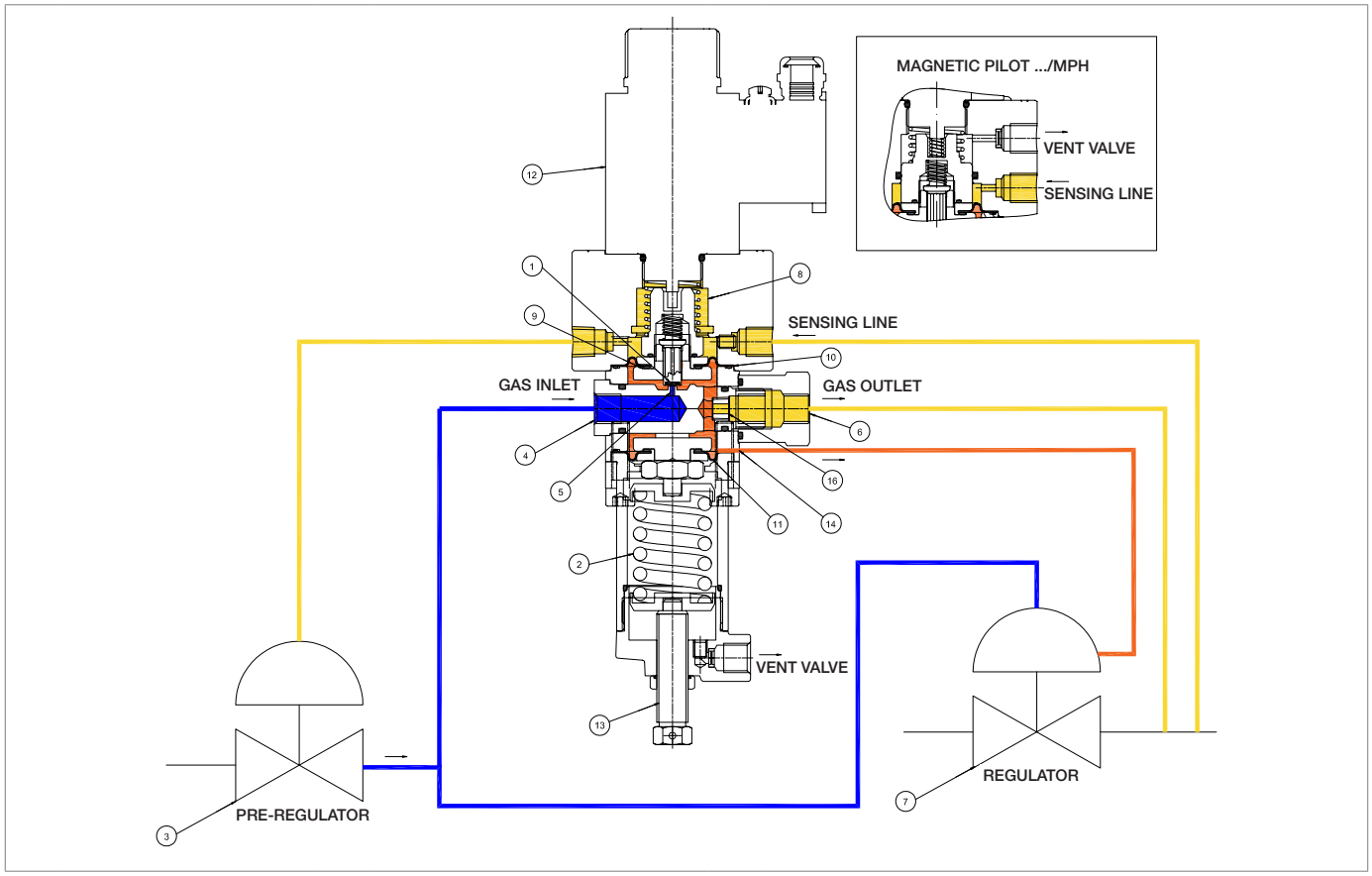


Fig. 4.5. Operation PILOT 200/MP/D/FO

In the absence of outlet pressure from the pre-regulator (3) and power supply, the pilot plug (1) is held in the open position by the setting spring (2).

During normal operation, the pre-regulator outlet pressure flows into the pilot through the inlet connection (4), passes the valve seat (5) and exits the outlet connection (14) in the direction of the pilot-type regulator's loading chamber (7).

This pressure, known as loading pressure, is obtained by comparing the force of the pilot setting spring (2) and the pressure itself acting on the diaphragm (9) in the chamber (8).

The pilot circuit is an open circuit with continuous downstream discharge through a dedicated hole (16) in the pilot.

The pressure of the pre-regulator (3) feeds the pilot, which in turn regulates the value of the loading pressure to be fed into the regulator head chamber (7). The loading pressure exerts a force on the regulator plug, allowing gas to flow from upstream to downstream.

Depending on the magnetic actuator installed on the pilot device, (Decrease or Increase), two different downstream pressure controls can be achieved. The Decrease actuator can be installed in the 200/MP(H) and the 200/MP(H)/D/FO models, the Increase can only be installed in the 200/MP(H) versions.

DECREASE, Downstream Pressure Reduction (PUSH Type Actuator)
Increasing the current intensity results in a higher closing thrust and a reduction of the pilot setting value.
In this case you get:

- Maximum calibration, mechanically set by the force of the setting spring;
- Minimum calibration, generated by the spring force minus the magnetic actuator component.

INCREASE, Downstream Pressure Increase (PULL Type Actuator)
Increasing the current intensity results in a lower closing thrust and an increase in the pilot setting value.
In this case you get:

- Minimum calibration, mechanically set by the force of the setting spring;
- Maximum calibration, generated by the spring force plus the magnetic actuator component.

Once the desired setting has been set mechanically, with the PWM module it is possible to change the pressure regulator setting remotely without acting directly on the adjusting screw of the pilot system.

This module allows continuous and automatic regulation of the downstream setting, improving the regulator's AC accuracy class both as the required flow rate and upstream pressure change.

Under normal operating conditions, the plug (ref.1, Fig. 4.4, Fig. 4.5) of the pilot is self-positioned so that the loading pressure is such that the downstream pressure is maintained at around the set value.

Operating conditions	Operating consequences	Concluding outcome
Decrease in downstream pressure (Pd) due to: • **rise in the requested flow rate;** • **drop in upstream pressure (Pu).**	Imbalance in the mobile unit (ref. 9, Fig. 4.4, Fig. 4.5) of the pilot, which causes the plug to open (ref. 1, fFig. 4.4, Fig. 4.5).	• Increase in loading pressure (Pm); • Move the regulator plug during opening until the downstream pressure value (Pd) is restored.
Increased downstream pressure (Pd) due to: • **drop in the requested flow rate;** • **increase in upstream pressure (Pu).**	The force exerted by the downstream pressure (Pd) on the pilot diaphragm moves the mobile unit (ref. 9, Fig. 4.4, Fig. 4.5) and shifts the plug (rif. 1,Fig. 4.4, Fig. 4.5) of the pilot to the shut-off position.	• Decrease in loading pressure (Pm); • Move the regulator plug (5) during closing until the downstream pressure value (Pd) is restored.

Tab. 4.14

4.5 - INTENDED USE

4.5.1 - ENVISAGED USE

The equipment in question is intended for:

Operation	Permitted	Unpermitted	Work environment
Piloting a pressure regulator:	Gaseous, and non-corrosive, fluids that have been filtered beforehand.	• Liquids. • Any product other than those permitted.	Installations to carry and convey natural gas to supply networks for: • civil use; • industrial use.

Tab. 4.15

This equipment is used as a piloting system for a pressure regulator.
The device can be used in the following PIETRO FIORENTINI S.p.A. pressure regulators:
- REFLUX 819 and 819/FO
- REVAL 182
- ASX 176.

It was designed to be used exclusively within the limits specified on the rating plate and according to the instructions and limits of use referred to in this manual.

Safe work conditions are as follows:
- use within the limits stated on the rating plate and in this manual;
- compliance with the user manual procedures;
- routine maintenance to be carried out when and how recommended;
- special maintenance to be carried out if required;
- do not tamper with and/or bypass the safety devices.

4.5.2 - REASONABLY FORESEEABLE MISUSE

Incorrect and reasonably foreseeable use means the use of the equipment in a way not foreseen in the phase but which can result from readily foreseeable human behaviour:
- corrosive fluids;
- fluids not properly treated upstream;
- liquids;
- instinctive reaction of an operator in the event of a malfunction, accident or breakdown while using the equipment;
- behaviour resulting from pressure to keep the machine running under all circumstances;
- behaviour resulting from carelessness;
- behaviour resulting from the use of the equipment by unauthorised and unsuitable people;
- using the equipment in a manner other than that referred to under “4.5.1 - Envisaged use”.

Any use of the equipment other than the intended use must be previously approved in writing by PIETRO FIORENTINI S.p.A.
If no written approval is provided, use shall be considered improper.
In the event of “improper use”, PIETRO FIORENTINI S.p.A. shall not be held liable for any damage caused to people or property, and any type of warranty on the equipment shall be deemed void.

4.5.3 - TYPES OF FLUIDS

The equipment works with combustible gases used:
- in pressure control stations according to EN 12186 or EN 12279;
- in transmission and distribution networks.
- in commercial and industrial plants (after checking by contacting the Manufacturer).

NOTICE!

The equipment may be also used with inert gases, subject to verification by contacting the manufacturer.

4.6 - TECHNICAL FEATURES/PERFORMANCE

The equipment PILOT 200/MP is a piloting device for medium and high pressure piloted regulators. This piloting system couples pneumatic actuation with electromechanical actuation ensuring a stable, precise and variable outlet pressure via a remote control.

The main specifications of these devices are:

Technical features	
Maximum allowable pressure	Up to 102 bar
Ambient temperature range	-20 °C + 60 °C
Inlet gas temperature range	-10 °C + 60 °C (class 1) -20 °C + 60 °C (class 2)
Inlet pressure range (bpu)	0.2 to 102 bar
Possible regulation range (Wd)	0.007 - 43 bar (depending on the pilot installed)
Minimum differential pressure	0.12 bar (depending on the chosen pilot)
Accuracy class (AC)	up to 1 (depending on operating conditions)*
Lock up pressure class (SG)	up to 1 (depending on operating conditions)*

Tab. 4.16

Pilot version	Minimum pneumatic setting (bar)	Minimum pneumatic setting (bar) maximum (bar)	Maximum setting variation with electric control (bar)
201/MP/D	0.007	0.58	Up to 0.160
201/MP/I	0.007	0.58	Up to 0.120
204/MP/D	0.3	43	Up to 1.2
204/MP/I	0.2	43	Up to 0.900
204/MPH/D	2.5	43	Up to 6
204/MPH/I	2.5	43	Up to 4.3
204/MP/D/FO	1	33	Up to 1.2
204/MPH/D/FO	4.5	35	Up to 6
205/MP/D/FO	20	60	Up to 1.2
205/MPH/D/FO	20	60	Up to 6

Tab. 4.17.

4.6.1 - TECHNICAL DATA OF THE MAGNETIC ACTUATOR

Technical features	
Manufacturer	Magnet-Schultz GmbH&Co. KG Allgäuer Str. 30, D-87700 Memmingen
Version	FMME 060 K01 A02
Electric variant	006
Resistance R_{20}[Ω]	11
Rated current I_N[*mA DC*]	1257
Maximum current adjustment range I_G[*mA DC*] **(I_G= 1.1 x I_N)**	0 – 1383
Rated voltage U_B[*V*]	20.1
Limiting power P_G[*W*]	32.1
Ripple *w*[%]	Max. 48
Duty cycle *ED*	S1 (100%)
Ambient temperature T_a	-40°C … +60°C
Diode for transient overvoltage limitations	Type 1.5SMC220CA (Internally mounted)
Short-circuit protection: A fuse of **max. 3.5 A according to IEC/EN 60127-2** or, respectively, an actuator short-circuit protection switch (corresponding to the rated current) and a quick thermal release must be installed in series with each solenoid winding.	

Tab. 4.18

4.6.2 - PWM MODULE

The PWM module is a component that generates the PWM (Pulse Width Modulation) current required to drive the magnetic pilot.

Pilot Series 200/MP Decrease, Downstream Pressure Reduction (PUSH Type Actuator)
A low current value results in a lower magnet thrust on the pilot spring and thus a higher regulated pressure value. Maximum current, on the other hand, means greater thrust of the magnet on the spring and thus a reduction in regulated pressure.

Pilot Series 200/MP Increase, Downstream Pressure Increase (PULL Type Actuator)
A low current value results in a higher magnet thrust on the pilot spring and thus a lower regulated pressure value. Maximum current, on the other hand, means less thrust of the magnet on the spring and thus an increase in regulated pressure.

The module used is:
- brand: Duplomatic
- model: EDM-M32222/40E0-A

Alternatively, an equivalent PWM module with the following electrical characteristics can be used:
- maximum PWM signal current: 1.2 A
- maximum PWM signal frequency: 200 Hz
- power supply: 24 VDC
- analogue input signal: 0-10V or 4-20mA

The following will explain how to set the current and frequency values of the Duplomatic PWM module.

CAUTION: this guide is intended as a brief summary of the operations required to change the minimum and maximum current that the PWM module supplies to the magnet.
It is however recommended to consult the “Software Manual EDM-M40 Smart manager” provided by Duplomatic MS Spa before proceeding with the modification or for any other information on the subject.

In order to change the minimum and maximum current limits, it is necessary to connect the PWM module to a PC via a micro USB cable (Figure 4.5).

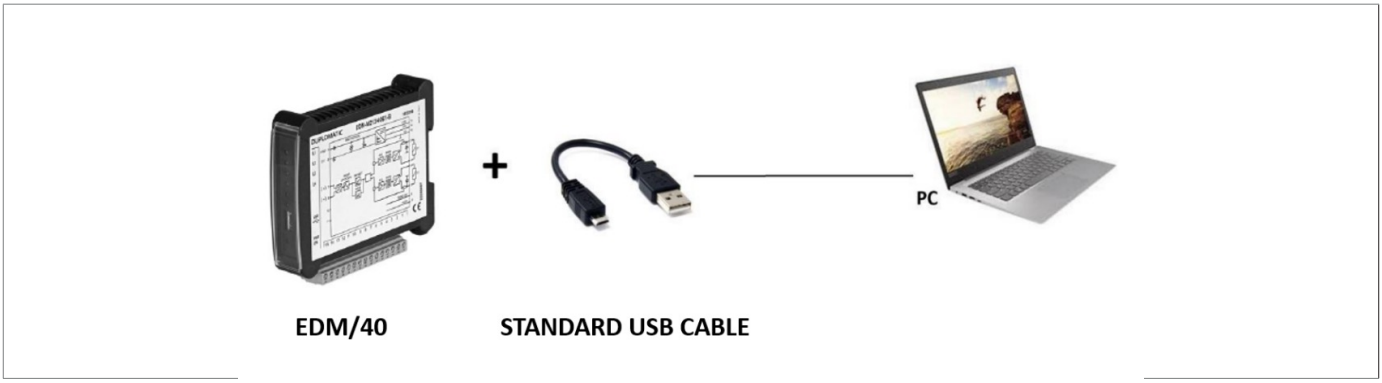


Fig. 4.6. Connection of PWM module to PC

The cable has a micro USB connector on one side and a standard PC USB connector on the other. The side with the micro USB is connected to the PWM module by lifting the transparent front flap (Figure 4.6).

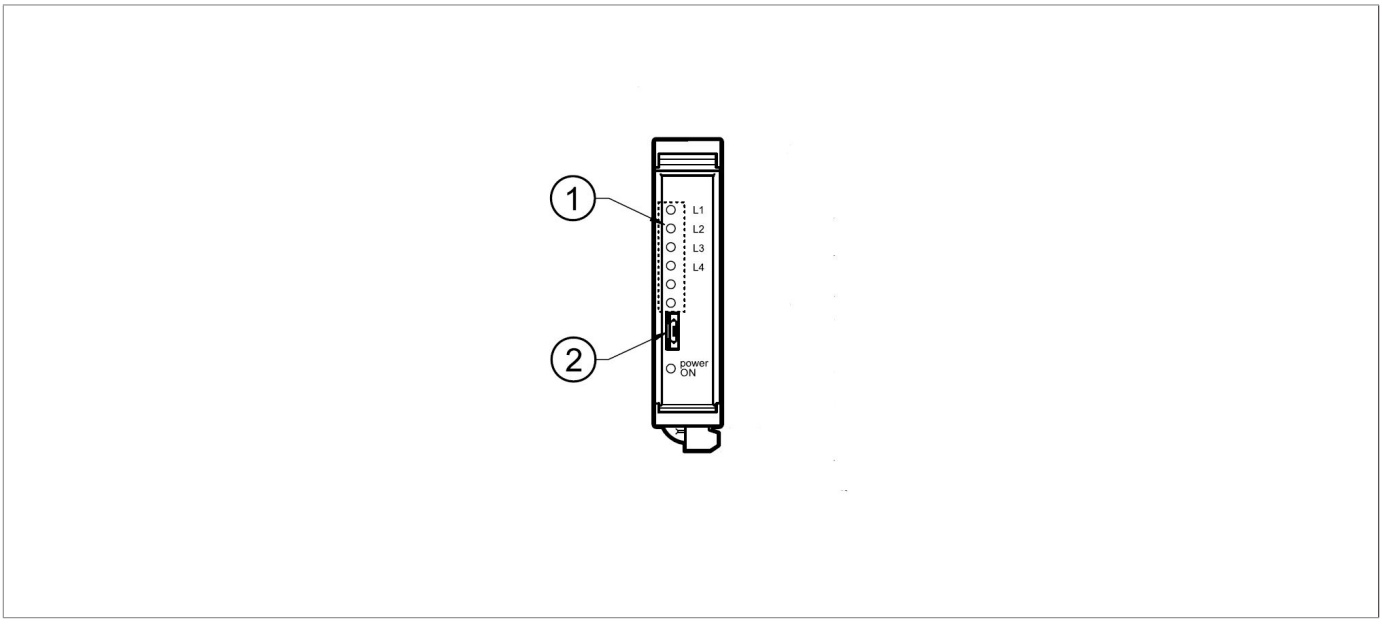


Fig. 4.7. Micro USB connector for PC connection

With this connection, the module is powered directly from the PC's USB port. The front LEDs flash to indicate that supply is being supplied via USB and not from an external 24VDC source (if not present).

To set and change the supply currents for the magnetic actuator, please refer to paragraph “8.1 - Setting the supply currents” in Chapter “8 - Commissioning”.

4.7 - POSSIBLE MODELS

The 200/MP series pilots are divided into the following models:

- Pilot 201/MP… coupled to the R31/A pre-regulator;
- Pilot 204/MP… coupled to the R14/A pre-regulator;
- Pilot 204/MPH… coupled to the R14/A pre-regulator;
- Pilot 204/MP/D/FO coupled to the R14/A/FO pre-regulator;
- Pilot 204/MPH/D/FO coupled to the R14/A/FO pre-regulator;
- Pilot 205/MP/D/FO coupled to the R14/A/FO pre-regulator;
- Pilot 205/MPH/D/FO coupled to the R14/A/FO pre-regulator.

The pilots in the previous list consist of a pneumatic device coupled with a solenoid magnetic actuator, which imparts a force to the diaphragm unit directly proportional to the current supplied by the PWM module.
These devices are used in medium- and low-pressure pilot-controlled regulators, and thanks to the electromechanical component, it is possible to vary the calibration pressure via a remote control and improve the regulator's AC accuracy class.
The maximum force that the actuator imparts, and thus the maximum change in calibration pressure, is limited according to the maximum set current as described in paragraph 4.2.
The maximum calibration pressure variation via the electrical control is up to:

Pilot version Decrease	$\Delta P_d max$ (bar)	Pilot version Increase	$\Delta P_d max$ (bar)
201/MP/D	0.160	**201/MP/I**	0.120
204/MP/D	1.2	**204/MP/I**	0.900
204/MPH/D	6	**204/MPH/I**	4.3
204/MP/D/FO	1.2	-	
204/MPH/D/FO	6	-	
205/MP/D/FO	1.2	-	
205/MPH/D/FO	6	-	

Tab. 4.19.

Decrease pilots, at Pressure Reduction, set a value at the maximum setting P_{ds}max, by turning the adjusting screw, by means of the electrical control, a minimum calibration pressure is obtained P_{ds}min = P_{ds}max - ΔP_d.

Increase pilots, at Pressure Increase, set a value at the minimum setting P_{ds}min, by turning the adjusting screw, by means of the electrical control, a maximum calibration pressure is obtained P_{ds}max = P_{ds}min + ΔP_d.

The 200/MPH Pilots have a reduced surface area over which the downstream pressure acts. This allows a greater variation of the calibration pressure. The use of 200/MPH pilots is recommended when the main requirement is a high downstream pressure variation.
Tab. 4.19 shows for each Pilot the values of the minimum and maximum pneumatic calibrations and the maximum possible calibration change by electrical control.

4.8 - ACCESSORIES

For magnetic pilots version 200/MP(H)/D and 200/MP(H)/I, with the exception of the 200/MP(H)/D/FO version, pneumatic pilots can also be installed in the pneumatic pilot circuit (Fig. 4.8).
The main purposes are:

- ensure system operation in the event of a magnetic pilot failure
- limit the possible calibration range with the magnet

The pneumatic pilot named *Maximum* (3), is placed in series with the magnetic pilot (2) and is set at a pressure Pds MAX greater than the calibration pressure of the magnetic pilot Pds.
The pneumatic pilot named *Minimum* (7), is placed in parallel with the magnetic pilot (2) and is set at a pressure Pds MIN less than the calibration pressure of the magnetic pilot Pds.
During normal operation, the magnetic pilot (2) will adjust the pressure, while the two pneumatic pilots will be :

- Maximum pilot (3) fully open, because Pds MAX > Pds.
- Minimum pilot (7) closed, because Pds MIN < Pds.

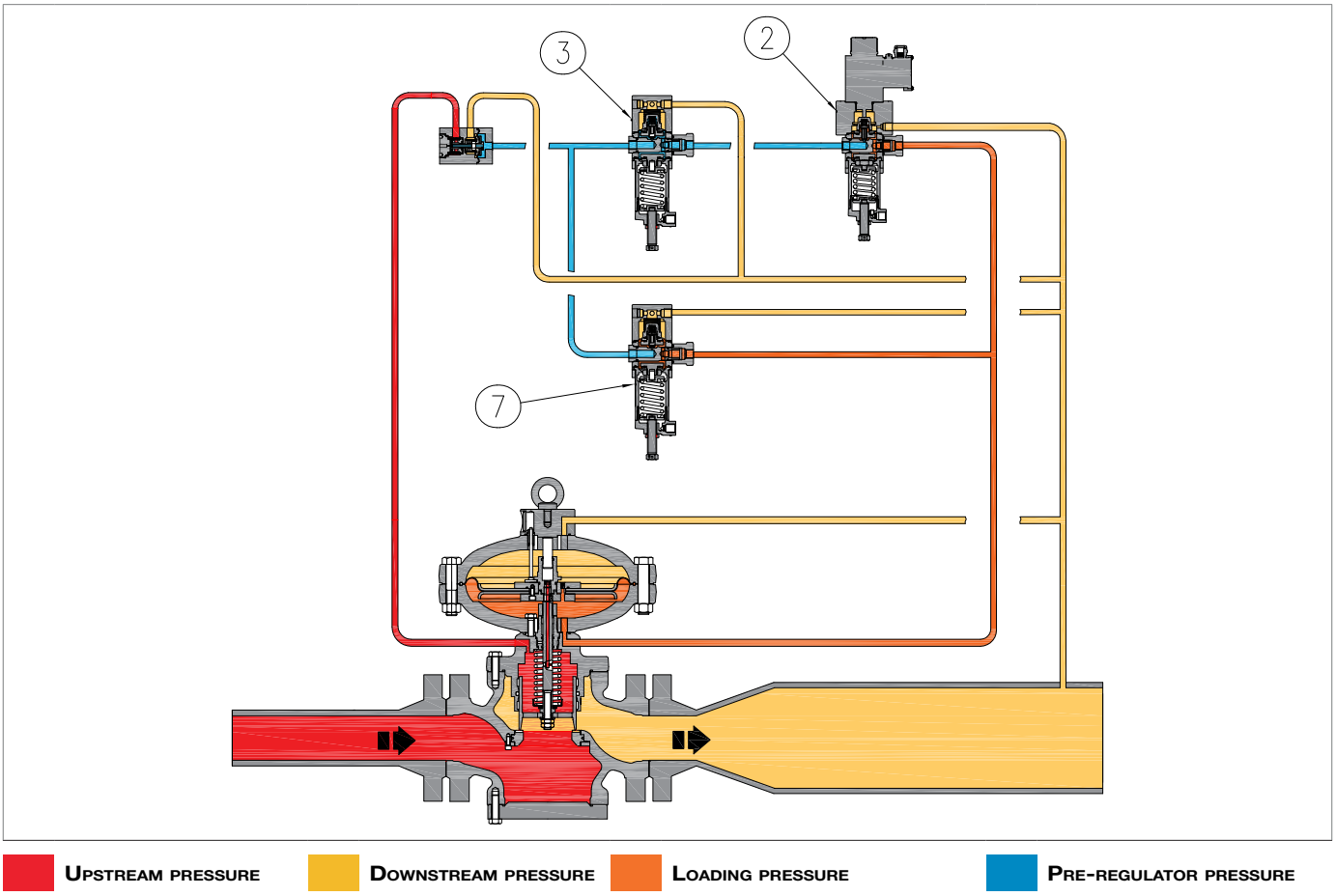


Fig. 4.8. Magnetic pilot circuit with pneumatic pilots in normal operation

If the magnetic pilot were to rise to a regulating pressure greater than the expected Pds and even greater than Pds MAX, the Maximum pilot would begin to operate and regulate the downstream pressure to Pds MAX.
If the magnetic pilot were to go to a regulating pressure lower than the expected Pds and even lower than Pds MIN, the Minimum pilot would begin to operate and regulate the downstream pressure to Pds MIN.

5 - TRANSPORT AND HANDLING

5.1 - SPECIFIC WARNINGS FOR TRANSPORT AND HANDLING

NOTICE!

Transport and handling must be carried out by personnel:

- **qualified (specially trained);**
- **who are familiar with accident prevention and workplace safety regulations;**
- **authorised to use lifting equipment;**
- **in compliance with the regulations in force in the country of destination of the equipment.**

Transport with forklift or crane	
Operator qualification	Person in charge of transport, handling, unloading and placing on site
PPE required	 **WARNING!** **The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:** • **the regulations in force in the country of installation;** • **any information provided by the Safety Manager at the installation facility.**
Lifting equipment	Hoist crane, forklift truck or other suitable equipment.
Weights and dimensions of the equipment	For dimensions and weights please refer to “5.2 - Physical characteristics of the equipment”.

Tab. 5.20

5.1.1 - PACKAGING AND FASTENERS USED FOR TRANSPORT

The transport packaging is designed and manufactured to avoid damage during normal transport, storage and handling.
The equipment and spare parts must be kept in their packaging until they are installed.
Upon receiving the equipment:

- make sure that no part has been damaged during transport and/or handling;
- immediately report any damage found to PIETRO FIORENTINI S.p.A..

NOTICE!

PIETRO FIORENTINI S.p.A. shall not be liable for any damage to people or property caused by accidents due to failure to comply with the instructions provided in this manual.

Tab. 5.21 shows the types of packaging used:

Ref.	Type of packaging	Image
A	Cardboard box	
B	Wooden box	
C	Pallet	

Tab. 5.21

5.2 - PHYSICAL CHARACTERISTICS OF THE EQUIPMENT

5.2.1 - PILOT 200/MP(H)/D AND 200/MP(H)/FO/D

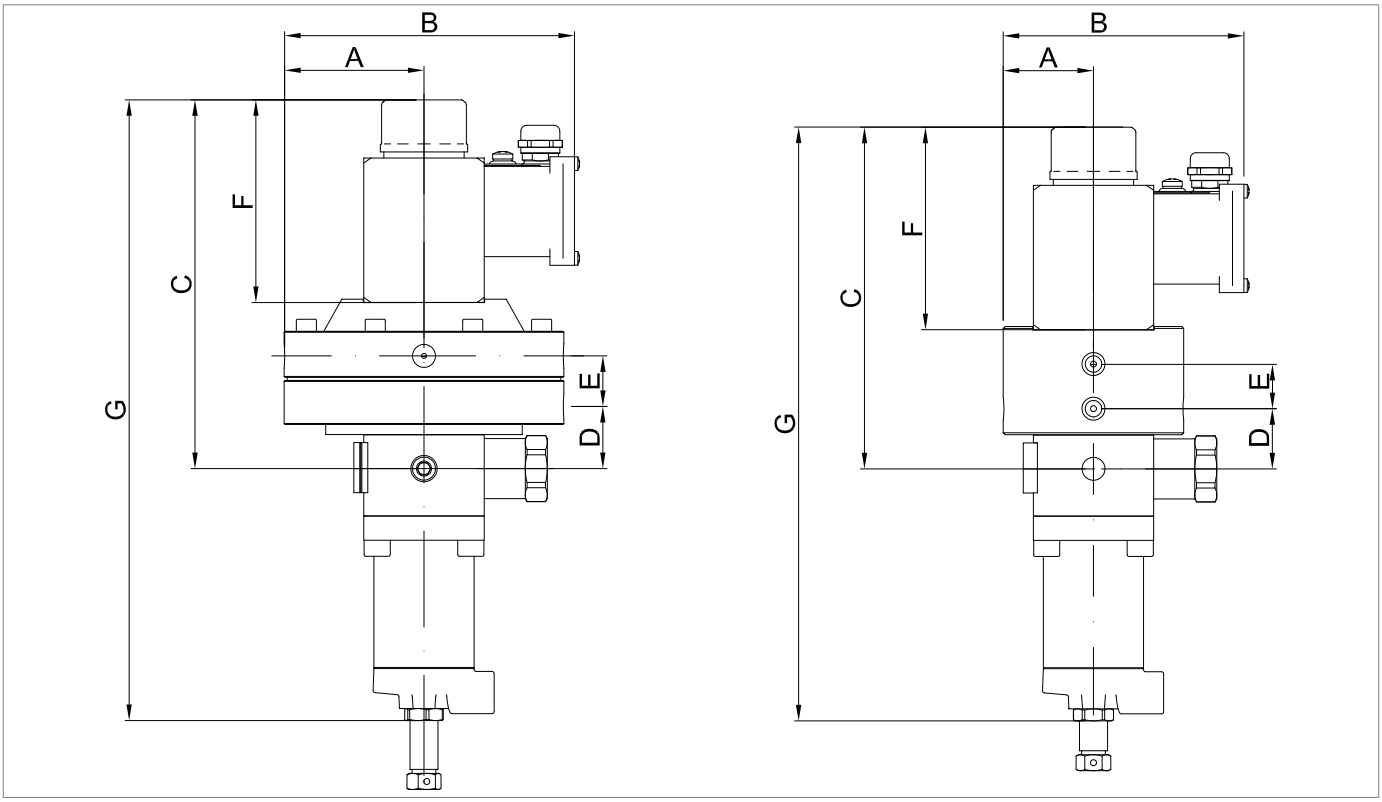


Fig. 5.9. Physical characteristics 200/MP(H)/D and 200/MP(H)/FO/D

Dimensions and weight	201/MP/D	204/MP/D(/FO) 205/MP/D/FO	204/MPH/D(/FO) 205/MPH/D(/FO)
A	70	45	45
B	145	120	120
C	184	170	170
D	31	30.05	30.05
E	25.2	22.25	22.25
F	101	101	101
G	310	296	296
Weight [kg]	5.6	4.5	4.5

Tab. 5.22

5.2.2 - PILOT 200/MP(H)/I

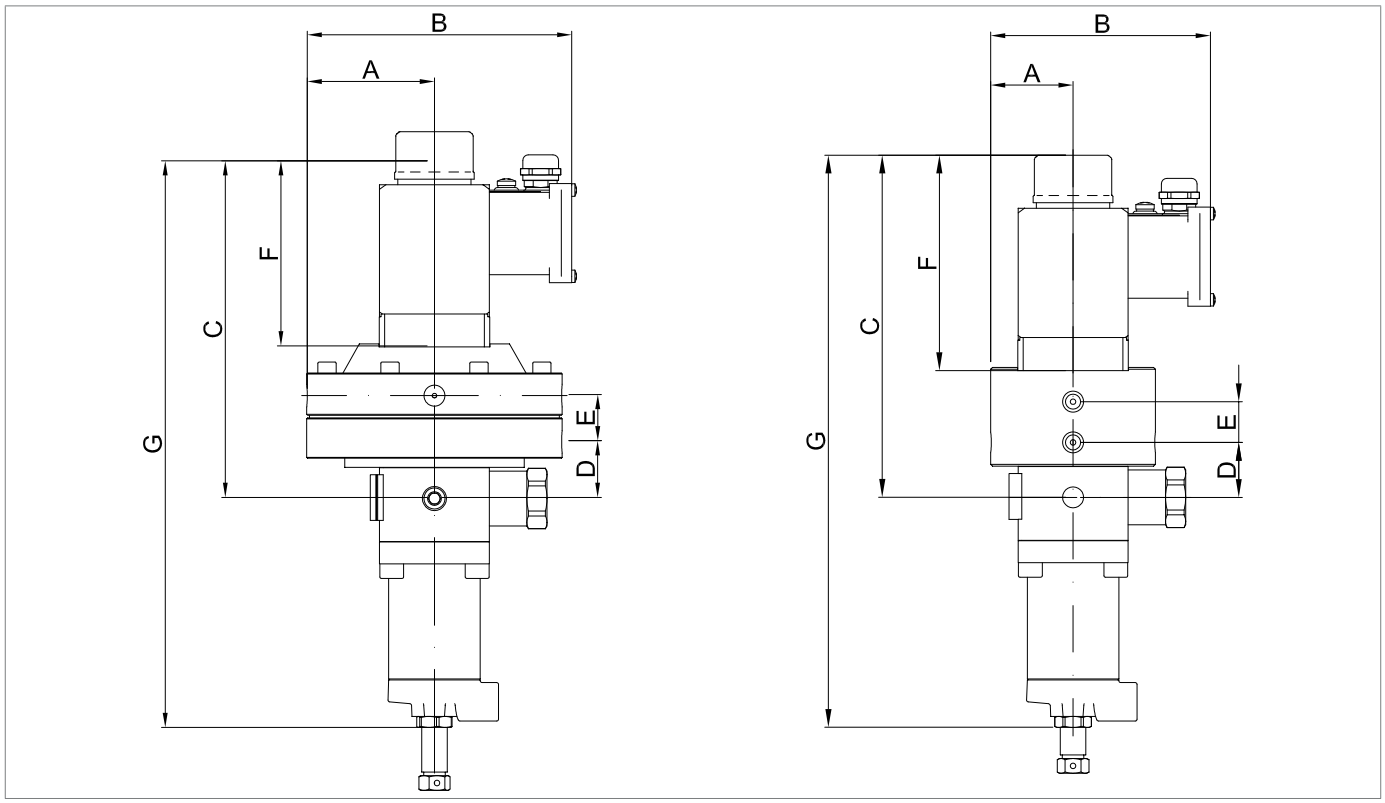


Fig. 5.10. *Physical characteristics 200/MP(H)/I*

Dimensions and weight	201/MP/I	204/MP/I 205/MP/I	204/MPH/I 205/MPH/I
A	70	45	45
B	145	120	120
C	200	186	186
D	31	30	30
E	25	22	22
F	117	117	117
G	326	312	312
Weight [kg]	5.6	4.5	4.5

Tab. 5.23

5.3 - EQUIPMENT ANCHORING AND LIFTING METHOD

HAZARD!

Before moving the equipment, make sure that the capacity of the lifting equipment is suitable for the load.

WARNING!

Unloading, transport and handling activities must be carried out by operators qualified and specially trained:

- **on accident prevention rules;**
- **on maximum safety in the workplace;**
- **on the use of lifting equipment.**

ATTENTION!

Before moving the equipment:

- **remove any movable or hanging component or firmly secure it to the load;**
- **protect fragile equipment;**
- **check that the load is stable.**

5.3.1 - FORKLIFT HANDLING METHOD

HAZARD!

It is forbidden to:

- **Do not transit under suspended loads;**
- **Do not move the load over the personnel operating in the site/plant area.**

WARNING!

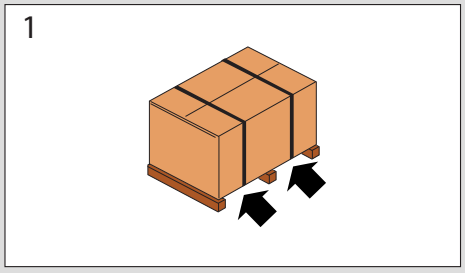
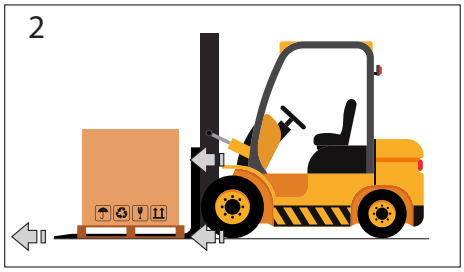
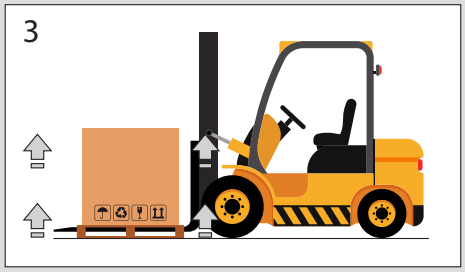
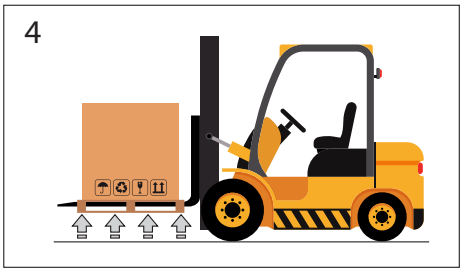
The following is not allowed on forklifts:

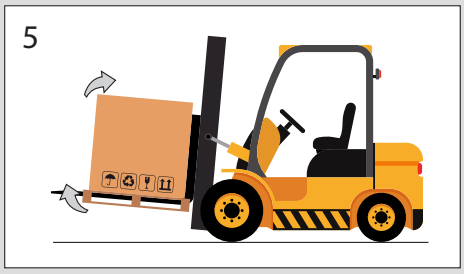
- **carrying passengers;**
- **lifting people.**

NOTICE!

Packaging must always be handled in a vertical position

Proceed as described at Tab. 5.24:

Step	Action	Image
1	Place the forks of the forklift under the load surface.	
2	Make sure that the forks protrude from the front of the load (by at least 5 cm), far enough to eliminate any risk of the transported load tipping.	
3	Raise the forks until they are touching the load. **NOTICE!** **Fasten the load to the forks with clamps or similar devices if required.**	
4	Slowly lift the load by a few dozen centimetres and check its stability, making sure that the centre of gravity of the load is positioned at the centre of the lifting forks.	

Step	Action	Image
5	Tilt the mast backwards (towards the driver's seat) to help the overturning moment and to ensure greater load stability during transport.	
6	Adjust transport speed according to the type of floor and load, avoiding sudden manoeuvres. **⚠ WARNING!** **In case of:** • **obstacles along the path;** • **particular operating situations;** **hinder operator visibility, the assistance of a ground operator is required, standing outside the range of action of the lifting equipment, with the task of signalling.**	-
7	Place the load in the chosen installation area.	-

Tab. 5.24

5.3.2 - CRANE HANDLING METHOD

⚠ WARNING!

CE-marked chains, ropes and eyebolts must be used. Do not use chains connected to each other by bolts.
Always check that:

- **the safety catch of the hook returns to the initial position;**
- **the ropes are in excellent condition and have adequate sections.**

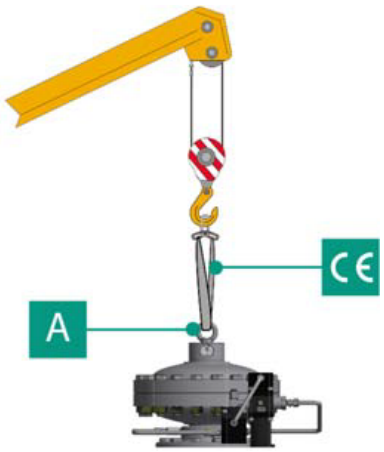
It is forbidden to:

- **drag the load on the ground;**
- **operate near power lines;**
- **stand within the range of action of the crane.**

NOTICE!

Packaging must be always handled in a vertical position.

The equipment must be handled using the lifting points provided on the equipment itself. For proper transport, follow the procedure in Tab. 5.25:

Step	Action	Image
1	Attach the lifting rope or chain to the appropriate supports (A). **⚠ WARNING!** **The lifting point is sized for lifting only the equipment, and not other parts of the system connected to it.**	
2	Slightly lift the load making sure the ropes or chains are secure. **NOTICE!** **Check whether the load is properly balanced.**	
3	Handle the load avoiding sudden movements.	
4	Place the load in the chosen installation area.	

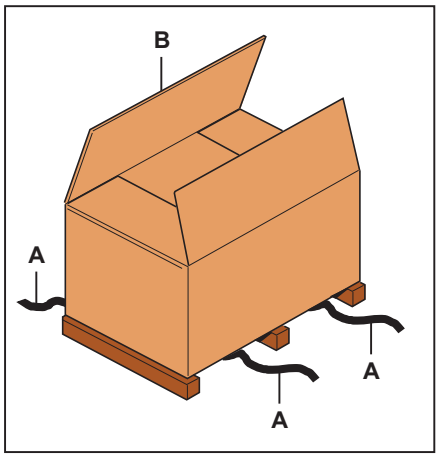
Tab. 5.25

5.4 - PACKAGING REMOVAL

Packaging removal	
Operator qualification	• Person in charge of transport, handling, unloading and placing on site; • Installer.
PPE required	 **WARNING!** **The PPE listed in this table is related to the risk associated with the equipment. For the PPE necessary to protect against risks associated with the workplace or operating conditions, please refer to:** • **the regulations in force in the country of installation;** • **any information provided by the Safety Manager at the installation facility.**

Tab. 5.26

To unpack the equipment in a cardboard box, proceed as described in Tab. 5.27:

Step	Action	Image
1	Remove the straps (A).	
2	Remove the packaging cardboard (B).	
3	Remove the fasteners that secure the equipment to the base (if any).	
4	Move the equipment from the base to the place intended for it. **NOTICE!** **Have at least 2 operators manually move the equipment, if required due to its dimensions/weight.**	

Tab. 5.27

NOTICE!

After removing all packaging materials, check for any anomalies.
If there are anomalies:
- **do not install the equipment;**
- **contact PIETRO FIORENTINI S.p.A. and specify the details provided on the equipment rating plate.**

5.4.1 - PACKAGING DISPOSAL

NOTICE!

Sort the various materials making up the packaging and dispose of them in compliance with the regulations in force in the country of installation.

5.5 - STORAGE AND ENVIRONMENTAL CONDITIONS

If the equipment needs to be stored for an extended period, the minimum environmental conditions for the intended storage are provided. Only by complying with these requirements can the declared performance be guaranteed:

Conditions	Data
Maximum storage period	Maximum 3 years. **NOTICE!** **For installations in later periods, see paragraph "5.5.1 - Pre-installation warnings after prolonged storage".**
Temperature	Not above 40°C
Humidity	Not above 70%
Radiation	Away from radiation sources according to UNI ISO 2230:2009

Tab. 5.28

5.5.1 - PRE-INSTALLATION WARNINGS AFTER PROLONGED STORAGE

For installations that have been stored for longer than 3 years, the condition of all rubber parts must be checked and, if found to be damaged, they must be replaced in order to ensure the correct functioning of the equipment.
For the replacement of the rubber parts of the equipment, please refer to "9 - Maintenance and functional checks".

NOTICE!

PIETRO FIORENTINI S.p.A. recommends checking the condition of rubber parts in case of downtime or storage longer than 3 years.

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6 - INSTALLATION

6.1 - INSTALLATION PRE-REQUISITES

6.1.1 - ALLOWED ENVIRONMENTAL CONDITIONS

⚠ WARNING!

To safely use the equipment, in full respect of the allowed environmental conditions, follow the data shown on the regulator plate and on any accessories (refer to paragraph "2.8 - Applied rating plates").

The installation site must be suitable for the safe use of the equipment.
The installation area of the equipment must be properly lit to ensure proper operator visibility during working on the equipment.

NOTICE!

The equipment must operate in places that are properly lit by artificial lighting suitable for the protection of the operator (in compliance with UNI EN 12464-1:2011 and UNI EN 12464-2:2014). If maintenance work is to be performed in areas and/or parts that are poorly lit, it is mandatory to:

- **use all the light sources of the installation plant;**
- **be equipped with a lighting system handheld or connected to the power supply network, compliant with Directive 2014/34/EU (ATEX) for use in environments at risk of explosion;**
- **adhere to the temperature specified on the equipment nameplate.**

6.1.2 - CHECKS BEFORE INSTALLATION

The equipment does not require any further upstream safety device for protection against any overpressure with respect to its **PS admissible pressure** when, for the upstream reduction station, the maximum incidental downstream pressure is:

$$MIPd \leq 1.1\ PS$$

MIPd = Maximum incidental downstream pressure value (for further information, see UNI EN 12186:2014).

⚠ ATTENTION!

If the installation of the equipment requires the application of compression fittings, these must be installed in accordance with the instructions of the Manufacturer of the fittings themselves.
The choice of fittings must be compatible with:

- **the use specified for the equipment;**
- **the plant specifications when required.**

Before installation, it must be ensured that:

- the expected dimensions of the installation site are compatible with those of the equipment;
- there are no impediments for the workers in charge of maintenance;
- the upstream and downstream pipes are at the same level and can bear the weight of the equipment;
- the inlet and outlet connections of the pipes are aligned on the flanges;
- the inlet and outlet connections of the equipment are clean and flawless;
- the inside of the upstream pipe is clean and free of processing residues such as welding slag, sand, paint residues, water, etc…

Installation	
Operator qualification	Installer
PPE required	 **⚠ WARNING!** **The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:** **• the regulations in force in the country of installation;** **• any information provided by the Safety Manager at the installation facility.**
Necessary equipment	Please refer to the chapter “7 - Commissioning/maintenance equipment”.

Tab. 6.29

6.2 - SPECIFIC SAFETY INSTRUCTIONS FOR THE INSTALLATION STEP

⚠ WARNING!

Before proceeding with installation, make sure that the upstream and downstream valves installed on the line are shut off.

⚠ WARNING!

Installation may also take place in areas where there is a risk of explosion, which implies that all necessary prevention and protection measures have to be taken.
For these measures, please refer to the regulations in force at the place of installation.

6.3 - GENERAL INFORMATION ON CONNECTIONS

The equipment must be installed on the pressure regulator as prescribed in its specific manual.
In line installation as well as in square installation, they must be present (see Fig. 6.11 and Fig. 6.12):

Pos.	Description
1	1 **shut-off valve upstream** of the equipment.
2	2 **vent valves** one upstream and one downstream of the equipment.
3	2 **pressure gauges** one upstream and one downstream of the equipment.
4	1 **pressure regulator**.
5	1 **downstream shut-off valve**.

Tab. 6.30

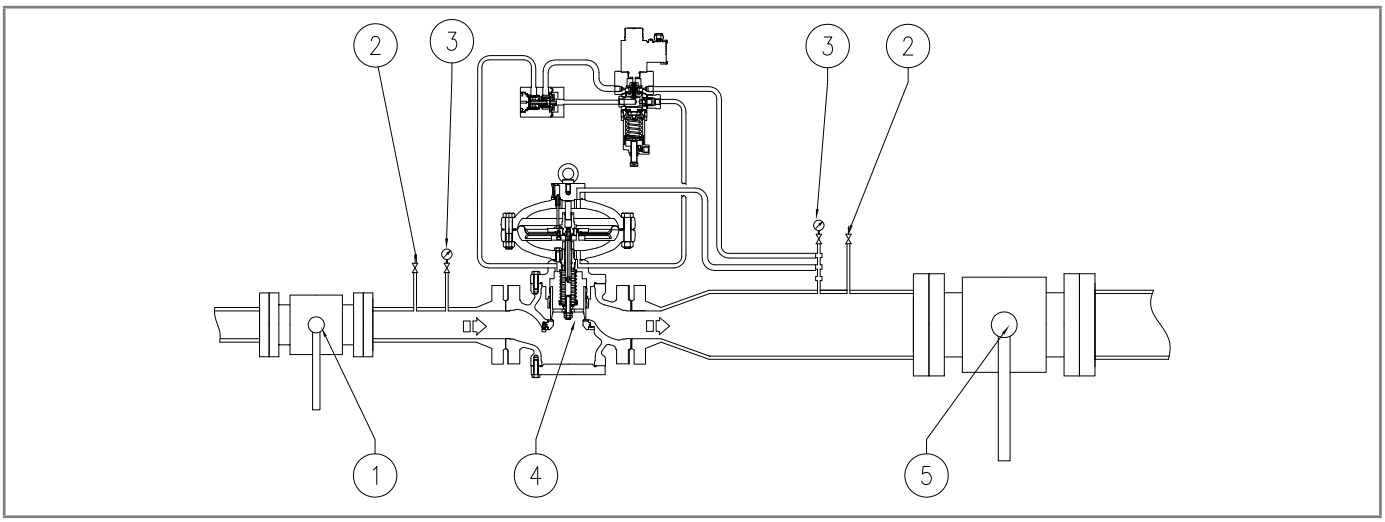

Fig. 6.11. In-line installation

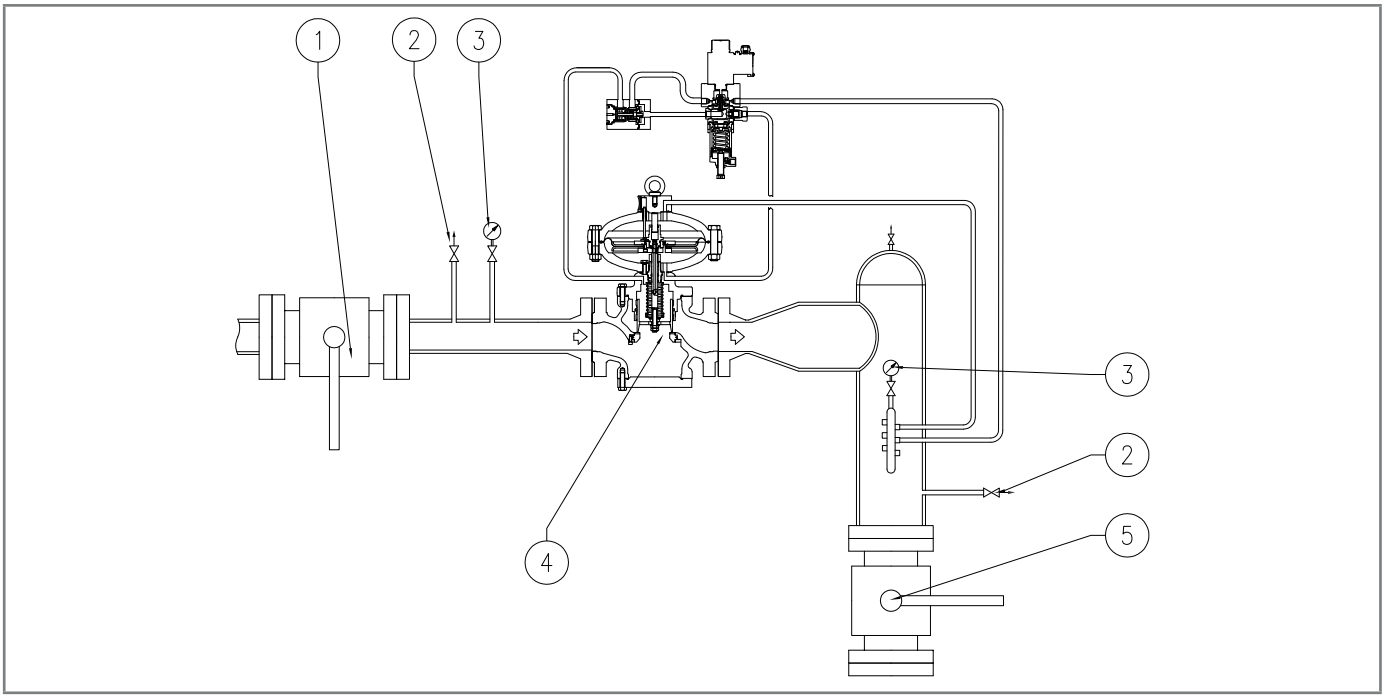

Fig. 6.12. Angle installation

NOTICE!

When used in gas pressure reduction stations, the device must be installed at least according to the requirements of standards UNI EN 12186:2014 or UNI EN 12279:2007.
Equipment vents must be ducted in accordance with UNI EN 12186:2014 or UNI EN 12279:2007 or the standards in force at the place of installation of the equipment.

6.4 - CONNECTION OF THE SENSING LINES TO THE DOWNSTREAM PIPING

To prevent the sensing line pipes from collecting impurities and condensation, it is necessary that:

- the pipe connections are always welded on the upper part or at maximum 90 degrees on the axis of the pipe (refer to Fig. 6.13);
- the hole in the piping has no burrs or internal protrusions;
- the slope of the pipe is always 5-10% towards the downstream pipe connection.

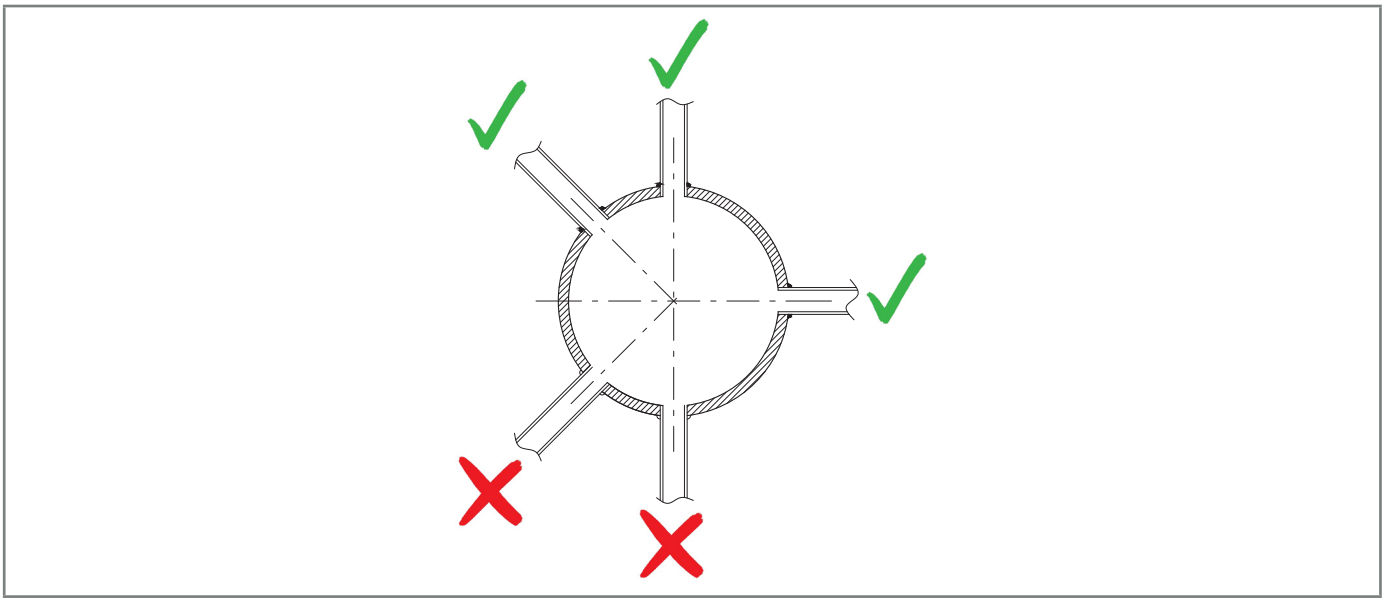

Fig. 6.13. Welded pipe connections

If there is a sensing line, provide equipment connections as shown below:

- 1 and 2 to the discharge outlet of the control head of the regulator
- 3 and 4 to the pilot sensing lines
- 5 and 6 to the sensing lines of the block and/or accelerating valve, when present.

NOTICE!

If there is a multiple sensing line, it is not recommended to place shut-off valves on sensing lines.
In any case, follow the regulations in force in the place of installation and use of the equipment.

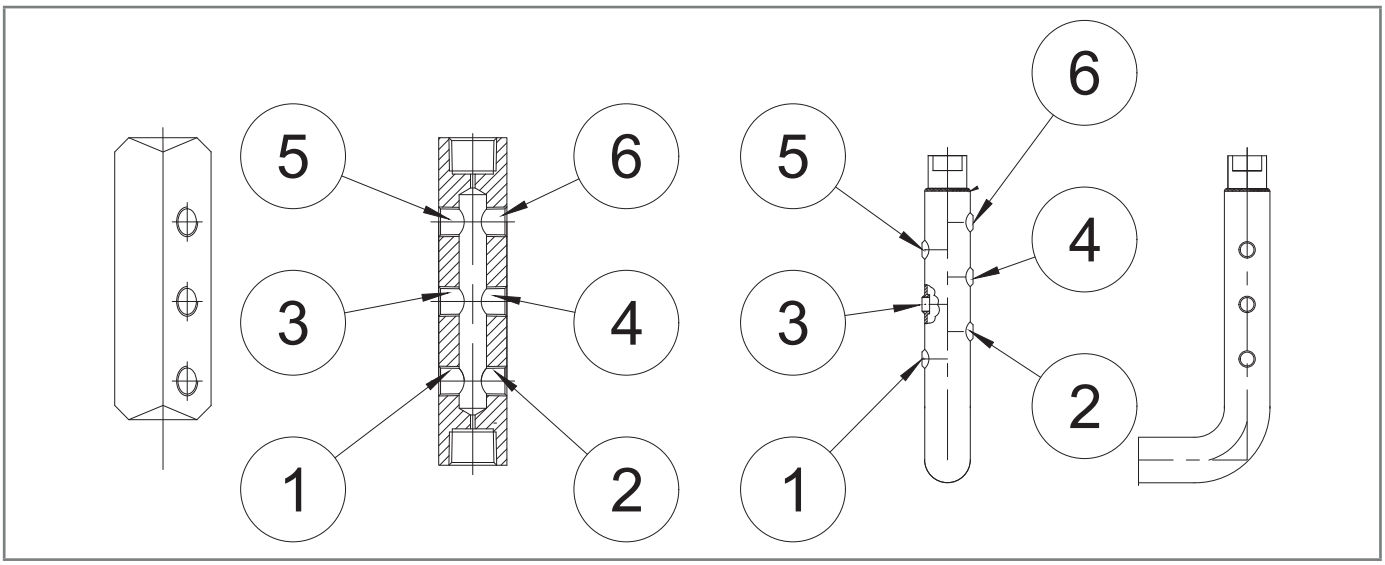

Fig. 6.14. Equipment connections

6.5 - INSTALLATION AND ELECTRICAL CONNECTION OF THE MAGNETIC ACTUATOR

These operations must be carried out by a qualified installer.
The cable gland integrated in the magnetic actuator may only be used for unarmoured, unbraided cables and fixed installations.
Cable gland suitable for cables with an outer diameter of 4.5-10 mm. Minimum section: 1.5 mm^2.

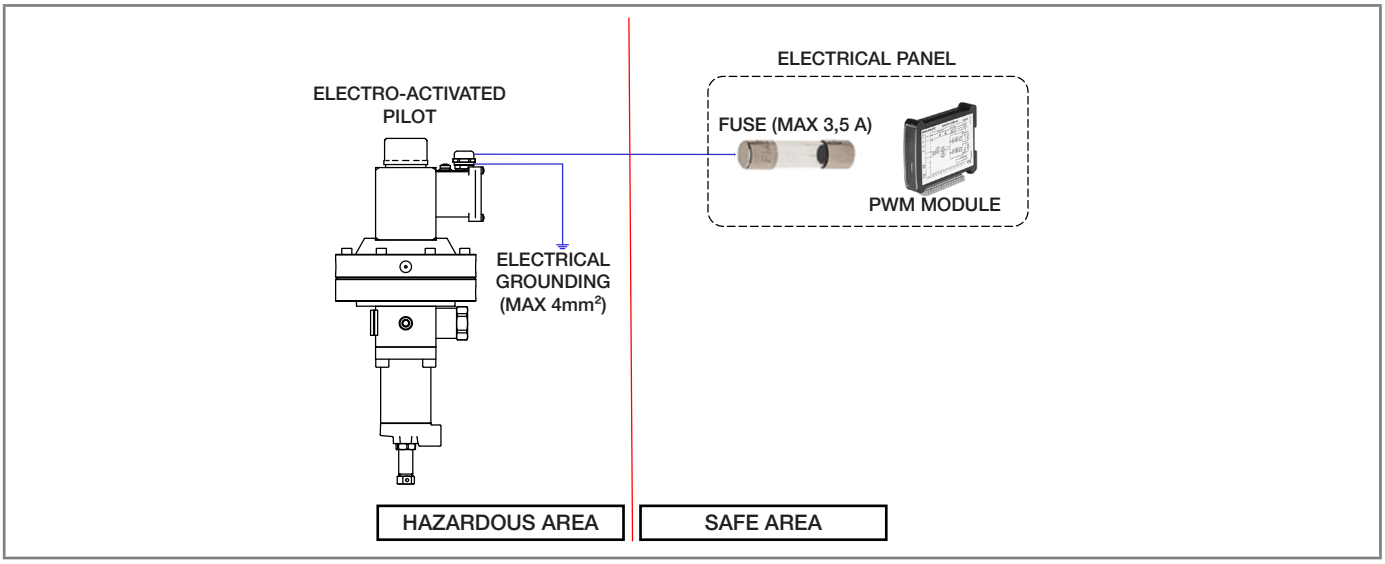

Fig. 6.15. Electrical connection block diagram

Maximum distance between electro-actuated pilot and panel: 50 m. For longer distances, increase the cable cross-section.

For the equipotential bonding, there is a protective earth terminal (maximum cross-section 4 mm^2) inside the terminal block of the device and an earth connection outside the terminal block of the device, as shown in Fig. 6.15.

After connecting the solenoid coil, close the terminal block by tightening the four cover screws evenly diagonally (torque 0.4-0.5 Nm). Pay attention to the correct positioning of the gasket in the terminal block cover.

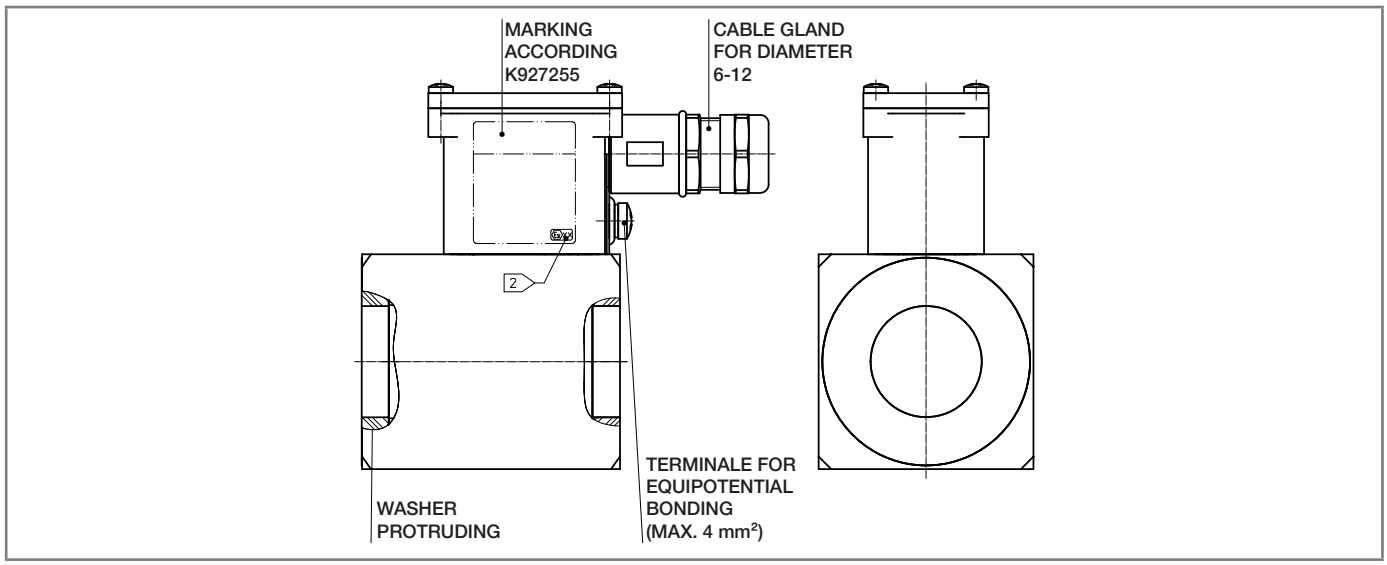

Fig. 6.16. Magnetic actuator solenoid

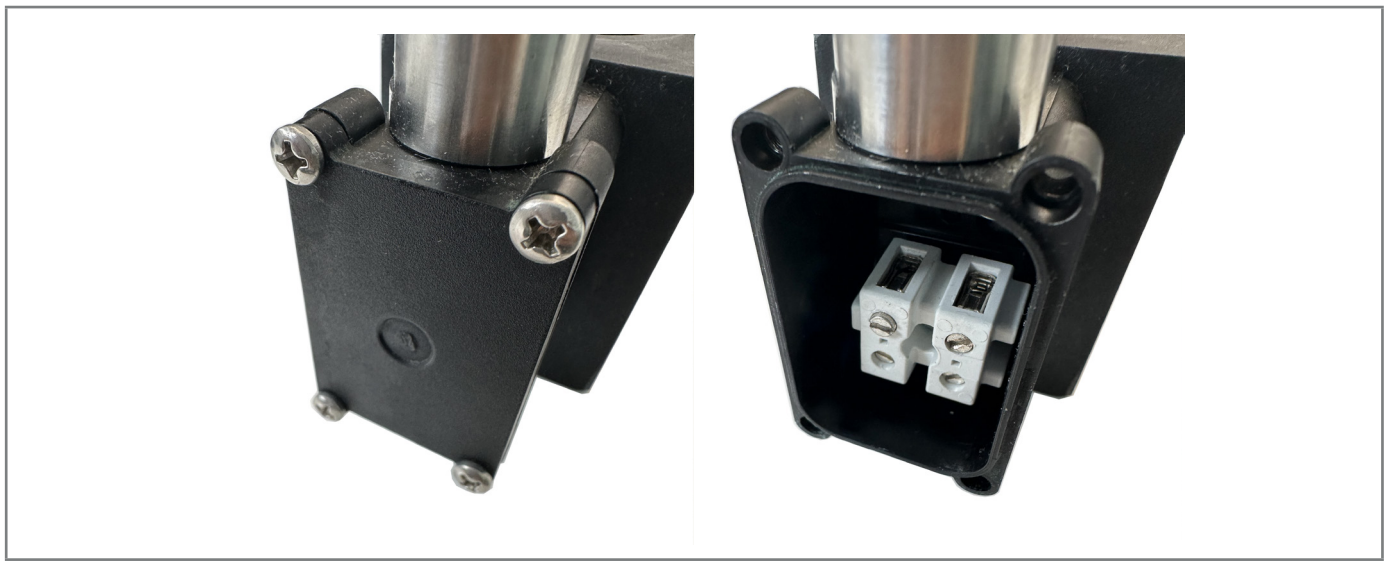

Fig. 6.17. Cover and internal terminal block of the magnetic actuator

6.6 - POST-INSTALLATION AND PRE-COMMISSIONING CHECKS

When the equipment is operating, make sure that all connections are:

- properly secured/tightened to prevent any leakage during commissioning;
- connected correctly.

7 - COMMISSIONING/MAINTENANCE EQUIPMENT

7.1 - LIST OF EQUIPMENT

Use of commissioning/maintenance equipment	
Operator qualification	• Mechanical maintenance technician; • Electrical maintenance technician; • Installer; • Name of the user.
PPE required	 **⚠ WARNING!** **The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:** • **the regulations in force in the country of installation;** • **any information provided by the Safety Manager at the installation facility.**

Tab. 7.31

The types of equipment required to commission and service the equipment are described in Tab. 7.32:

Ref.	Equipment type	Image
A	Combination wrench	
B	Adjustable wrench	
C	Double ended bi-hex tubular socket wrench	
D	Bent male hex key	
E	Male T-handle hex wrench	
F	O-ring extraction tool	

Tab. 7.32

7.2 - EQUIPMENT NEEDED FOR THE DIFFERENT CONFIGURATIONS

Each table is distinguished by:

Term	Description
Ch.	Key, with reference to the equipment indicated in Tab. 7.32.
Code	Code, referring to the equipment.
DN	Indicates the Nominal Diameter of the reference configuration.
L.	Length, referred to the equipment.
Ref.	Reference to the equipment.
Type	Type (size) or code of the equipment.

Tab. 7.33.

Pilot devices								
Equipment		**Size [inches] | DN [mm]**						
Ref.	**Type**	**25 | 1”**	**50 | 2”**	**80 | 3”**	**100 | 4”**	**150 | 6”**	**200 | 8”**	**250 | 10”**
A	Ch.	13-15-17-19-24-30	13-15-17-19-24-30	13-15-17-19-24-27-30	13-15-17-19-24-27-30	13-15-17-19-24-30-32-41	13-15-17-19-24-30-32-41	13-15-17-19-24-32-46-50
B	L.	300						
C	Ø	4						
D	Ch.	-	-	-	-	27-41	27-41	30-55
E	Ch.	3-12	3-12	3-12	3-12	3-12	3-12	3-12
F	Ch.	5-6-8	5-6-10	5-6-10	5-6-14	5-6-17	5-6-17	5-6-17
G	Ch.	17-20	17-20	17-19-22	17-19-22	22	22	-
L	Code	7999099						

Tab. 7.34

8 - COMMISSIONING

8.1 - GENERAL WARNINGS

8.1.1 - SAFETY REQUIREMENTS FOR COMMISSIONING

HAZARD!

During commissioning the risks associated with any discharges to the atmosphere of flammable or noxious gases must be evaluated.

HAZARD!

In case of installation on distribution networks for natural gas, consider the risk associated with explosive mixtures (gas/air) being formed inside the piping, if the line is not subjected to inerting.

WARNING!

During commissioning, any unauthorised personnel must keep away.
The no entry area has to be marked with signs and/or boundaries.

NOTICE!

Commissioning has to be carried out by authorised and qualified personnel.

NOTICE!

It is possible that for various reasons (e.g. vibrations during transport) the calibration of the equipment's accessories may vary, although within the values indicated on the identification plates.

Before commissioning the equipment, it is necessary to check that:
- all shut-off valves (upstream, downstream, any bypass) are closed;
- the gas is at a temperature within the limits specified on the data plate.

Commissioning	
Operator qualification	• Installer; • Qualified technician.
PPE required	 **WARNING!** **The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:** • **the regulations in force in the country of installation;** • **any information provided by the Safety Manager at the installation facility.**
Necessary equipment	Please refer to the chapter “7 - Commissioning/maintenance equipment”.

Tab. 8.35

8.2 - PRELIMINARY PROCEDURES FOR COMMISSIONING

⚠ HAZARD!

Before commissioning the equipment, it must be ensured that any source of explosion has been eliminated if there is such a danger.

⚠ WARNING!

Before commissioning, you need to make sure that the characteristics of the equipment are suitable for the conditions of use.

⚠ ATTENTION!

To protect the equipment from damage, never:

- **pressurise the equipment through a valve located downstream of it;**
- **depressurise the equipment through a valve located upstream of it.**

Commissioning can be carried out using two different procedures:

Commissioning types	
Injection of an inert fluid	Pressurising the equipment by injecting an inert fluid (e.g. nitrogen) to avoid potentially explosive mixtures for services with combustible gases. **⚠ WARNING!** **During pressurisation, always check that the equipment has no leaks.**
Direct injection	Direct injection of gas into pipes, keeping the gas velocity in the pipes as low as possible (maximum permitted value of 5 m/s).

Tab. 8.36

8.3 - PROPER COMMISSIONING CHECK

Completely sprinkle the equipment with a foaming solution (or equivalent control system) in order to check the tightness of the regulator's external surfaces and of the connections made during installation.

8.3.1 - PNEUMATIC PART

Completely sprinkle the equipment with a foaming solution in order to check the tightness of the regulator's external surfaces and of the connections made during installation (or equivalent control system).

8.3.2 - ELECTRICAL PART

Check the correct mechanical and electrical connection from the PWM module to the magnetic actuator of the 200/MP series pilot:

- verify correct actuator assembly on pilot;
- verify the presence of the earthing cable;
- verify correct tightening of the cable gland;
- ensure the use of electrical cables with the correct cross-section;
- verify the presence of the maximum 3.5 A fuse inside the panel between PWM module and electro-actuated pilot.

8.1 - SETTING THE SUPPLY CURRENTS

In order to be able to change the supply currents of the magnetic actuator, it is necessary to use the PWM module manufacturer's interface SW by connecting it to the standard PC via the micro A-type USB cable.

- Brand: Duplomatic
- Name: EDM40_SmartManager
- Revision: download latest available version from: https://duplomaticmotionsolutions.com/edm-m.html

Once the SW is installed on the PC, it runs and is presented with the screen in Fig. 8.18.

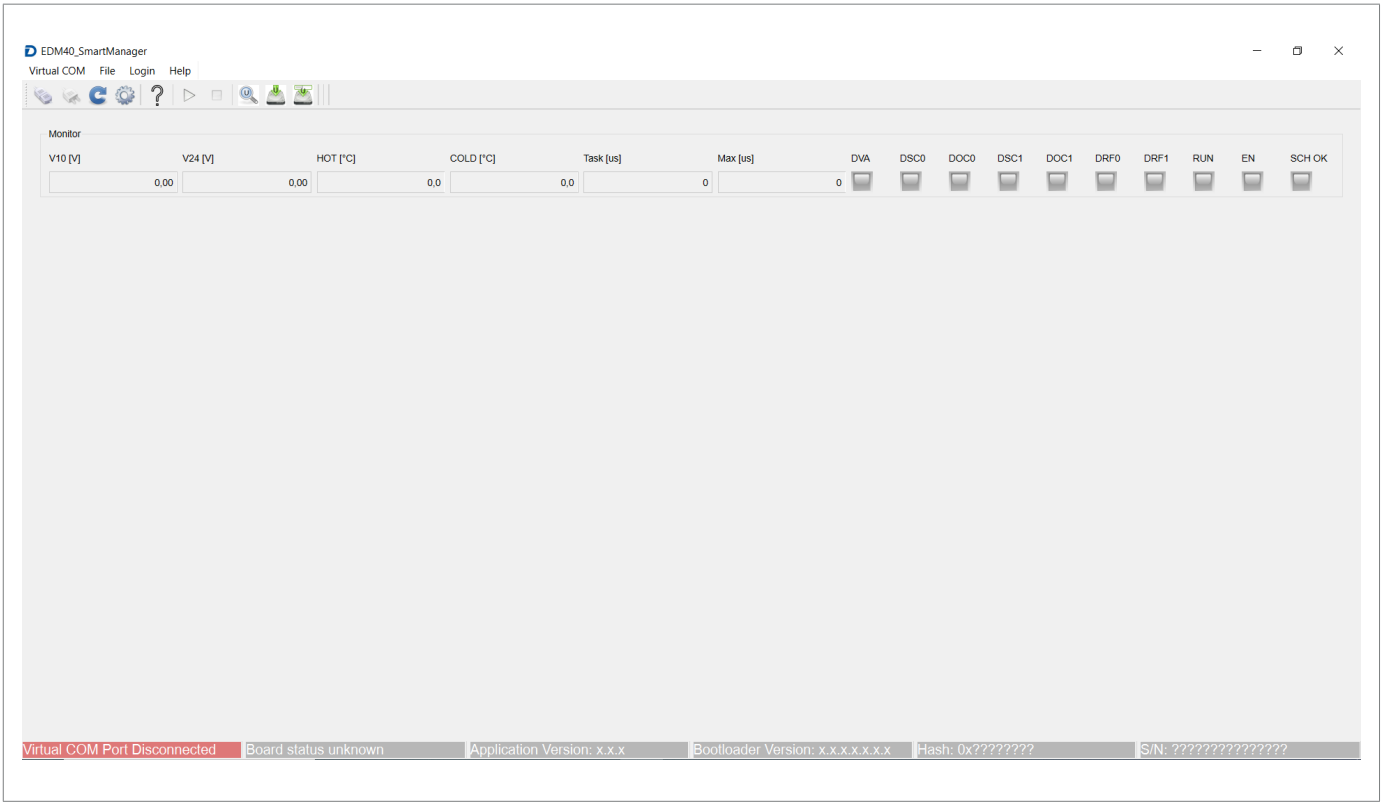

Fig. 8.18. First start-up screen of the Duplomatic software

To change the parameters of the PWM module, from the main screen, you must verify that the software recognises the COM with which you are connected to the board (Fig. 8.19).

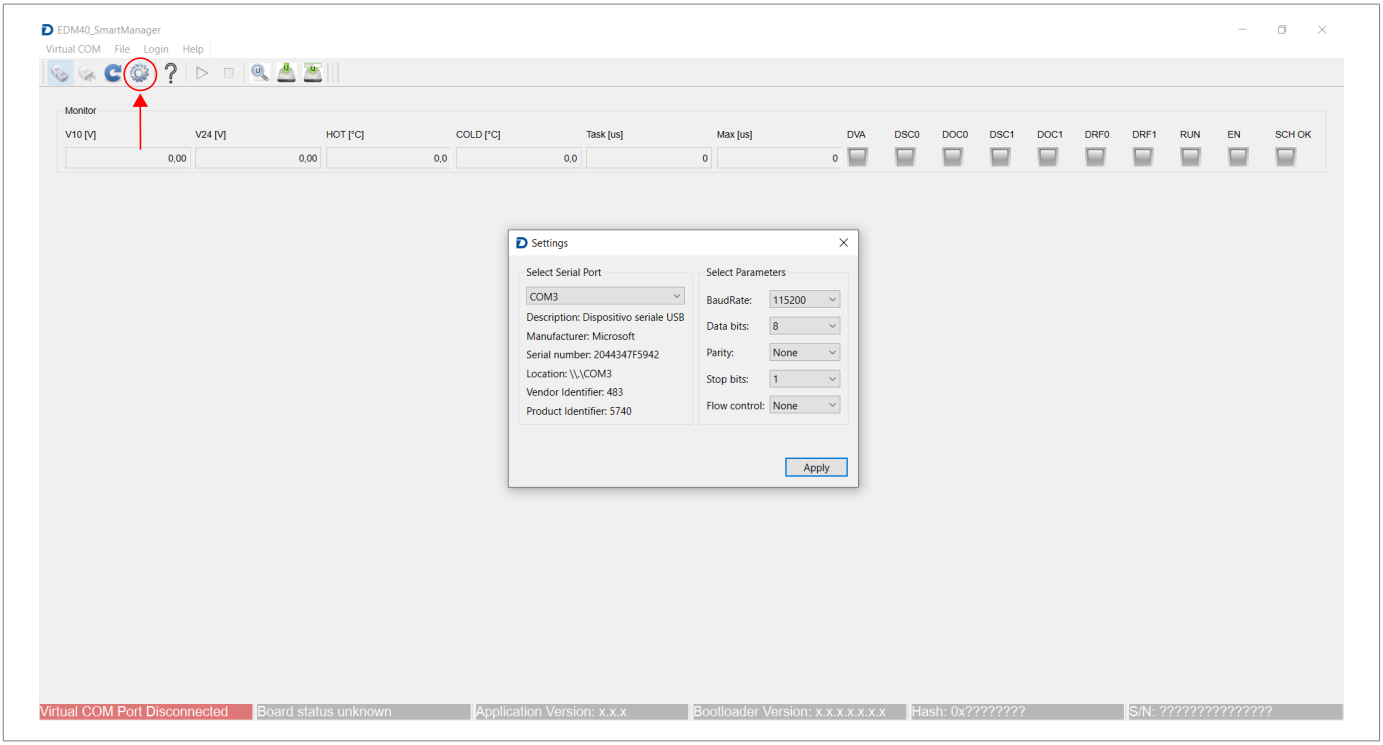

Fig. 8.19. PC COM port selection

Then press the button “Connect to serial port” the first one on the top left and then “Identify” represented by ‘?’. Once this is done, the central part of the screen will show the parameters of the board, which can also be freely modified (Fig. 8.20).

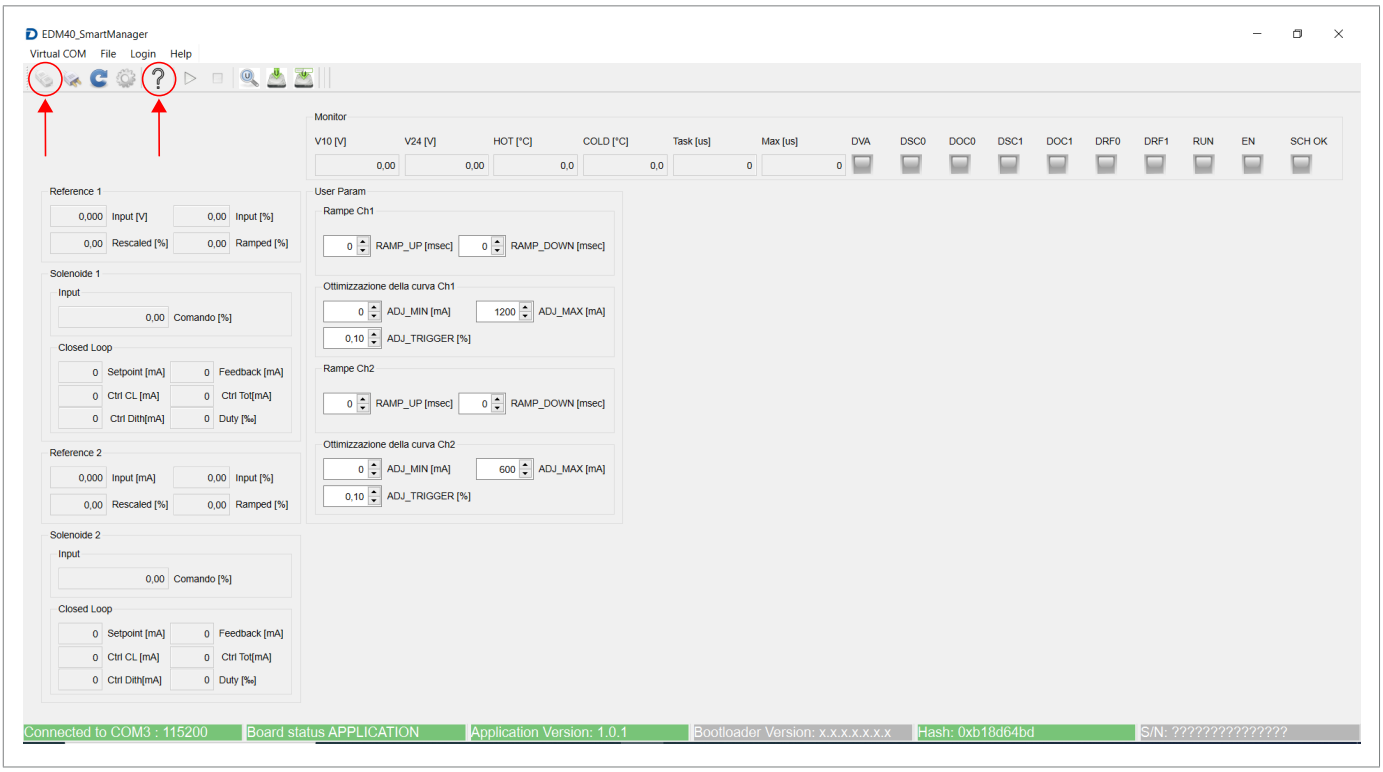

Fig. 8.20. PWM module parameters

At this point, it is possible to modify parameters including:

- ADJ_MIN [mA] = minimum PWM current (in mA) going to the magnetic pilot
- ADJ_MAX [mA] = maximum PWM current (in mA) going to the magnetic pilot

To make the change effective, simply enter the corresponding field, change the value and press “Set user parameter” (Figure 8.18).

Instead, to store the values just written, the “Store user parameter” button must be pressed. Only in this way, in the event of a power failure, the data just written is not lost on reboot (Fig. 8.21).

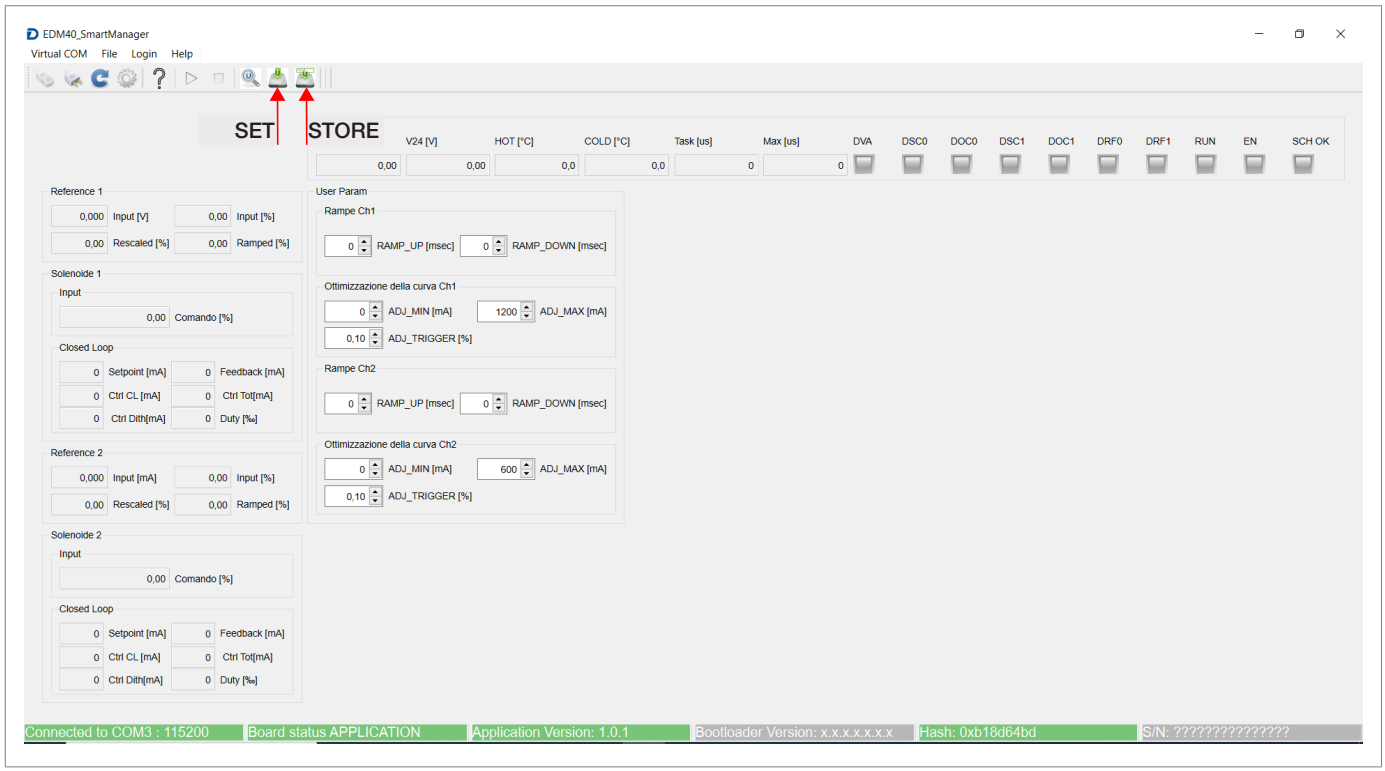

Fig. 8.21. Set and Store user parameters

Using the “Start” and “Stop” buttons (Fig. 8.22), it is possible to start and stop the live data reading of the electronic board.

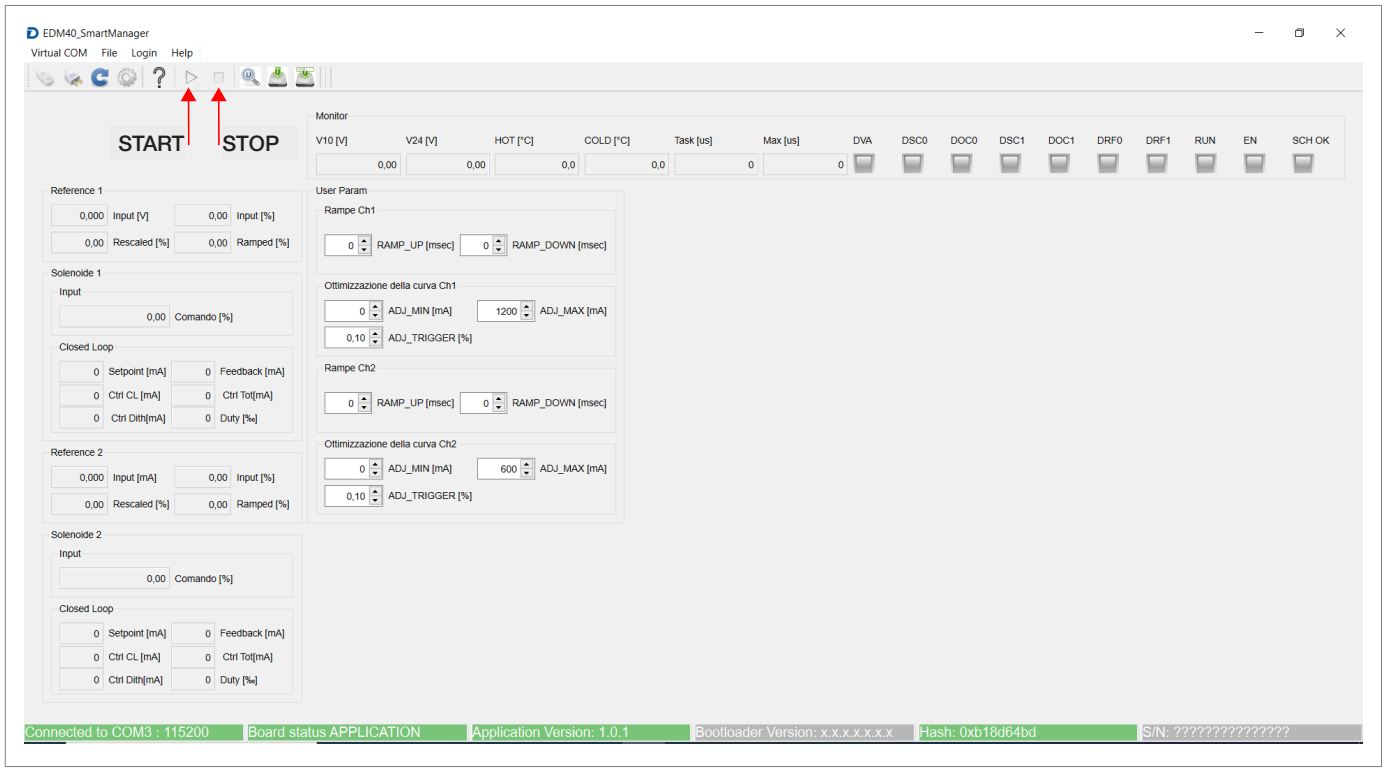

Fig. 8.22. Reading live data

In particular, it is useful to keep an eye on (Fig. 8.23):

- Reference Input [V]: corresponds to the 0-10V reference input signal
- Solenoid Input Command [%]: corresponds to the command that regulates the current to the magnet (0% to minimum current, 100% to maximum current)
- Closed loop Setpoint [mA]: is the calculated value of current to be supplied to the magnet
- Closed loop feedback [mA]: is the actual value of the current supplied to the magnet by the board

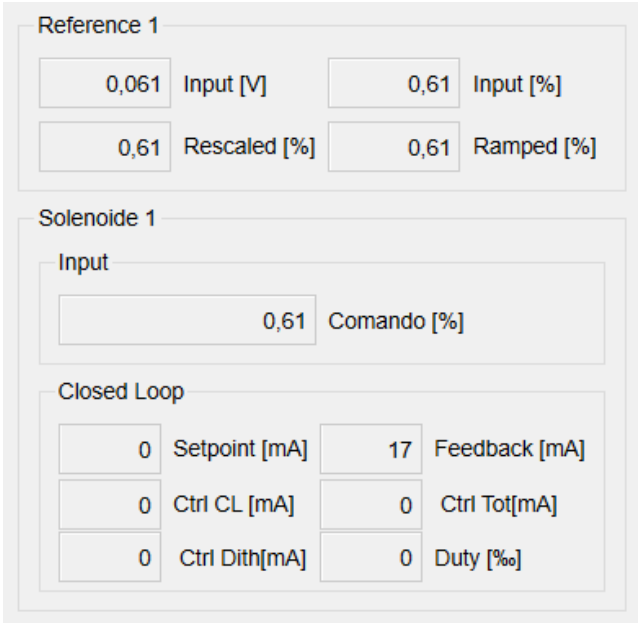

Fig. 8.23. Parameters to be observed during normal operation

N.B. These parameters are available for both solenoids connected to the board, powered on different circuits.

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8.4 - REGULATOR COMMISSIONING PROCEDURE

In the application consisting of two pressure adjusting lines, it is advisable to commission one line at a time, starting with the line with the lowest set point.
The set point value is mentioned on the test certificate enclosed with each piece of equipment.

For the correct commissioning of the pressure regulator, please refer to the individual regulator-specific manuals.

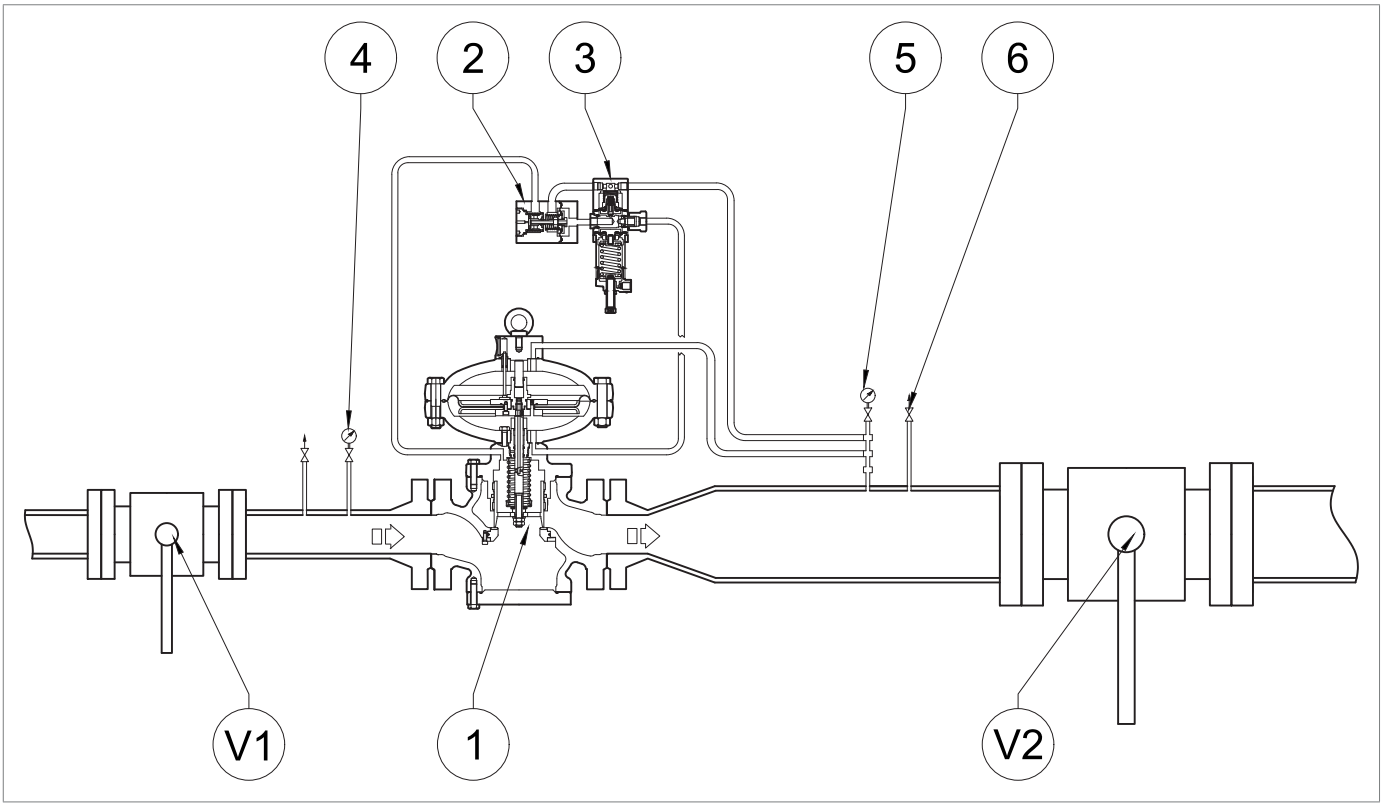

Fig. 8.24. Commissioning of the regulator with 200/MP series pilot

Step	Action
1	Manually set the PWM supply current to the set minimum value, or set it to zero, in order to deactivate the magnetic actuator component
2	Partially open the bleed cock (6).
3	Completely unscrew the fixing nut and adjusting screw (Fig. 8.26) of the pilot (3) to relieve the spring.
4	Open the inlet shut-off valve (V1) very slowly. **NOTICE!** **Check the pressure referring to the upstream pressure gauge (4).**
5	Turn the pilot adjustment screw (3) clockwise to load the calibration spring until the regulator (1) trips. **NOTICE!** **Check the pressure referring to the downstream pressure gauge (5).**
6	Slowly close the bleed cock (6).
7	Check that the downstream pressure, after an increase phase, does not exceed the shut-off pressure value (refer to the SG value on the nameplate, see par. 2.8). **NOTICE!** • **If the downstream pressure exceeds the closing pressure value, refer to chapter 10 "Troubleshooting" to clear the causes of the malfunctions.** • **Check the pressure referring to the downstream pressure gauge (5).**
8	Check the tightness of all the fittings between the shut-off valves (V1, V2). **NOTICE!** **Check for sealing with a foaming substance.**
9	Open the downstream shut-off valve (V2) very slowly until the piping has been filled completely. **NOTICE!** • **If at the beginning of this operation, the pressure in the downstream pipeline is much lower than the calibration pressure, shutter the opening of this valve so as not to exceed the maximum flow rate of the system.** • **Check the pressure referring to the downstream pressure gauge (5).**
10	Lock the adjustment screw (Fig. 8.26, ref. 10) with the pilot fastening nut (3).

Tab. 8.37

8.5 - CALIBRATION OF 200/MP SERIES PILOTS

8.5.1 - MODEL 200/MP(H)/D E 200/MP(H)/D/FO PILOTS

Set the PWM supply current to the minimum permitted value as defined in paragraph 8.4. This deactivates the magnetic actuator component.
Turn the adjusting screw (10) in Fig. 8.25 to set the value for the maximum calibration pressure:

- anti-clockwise to decrease the adjusted pressure;
- clockwise to increase the adjusted pressure.

Set the PWM supply current to the minimum permitted value as defined in paragraph 8.4 and check the minimum calibration pressure.
Then set the desired calibration value from the PWM module

8.5.2 - MODEL 200/MP(H)/I PILOTS

Set the PWM supply current to the minimum permitted value as defined in paragraph 8.4. This deactivates the magnetic actuator component.
Turn the adjusting screw (10) in Fig. 8.25 to set the value for the minimum calibration pressure:

- anti-clockwise to decrease the adjusted pressure;
- clockwise to increase the adjusted pressure.

Set the PWM supply current to the minimum permitted value as defined in paragraph 8.4 and check the maximum calibration pressure.
Then set the desired calibration value from the PWM module

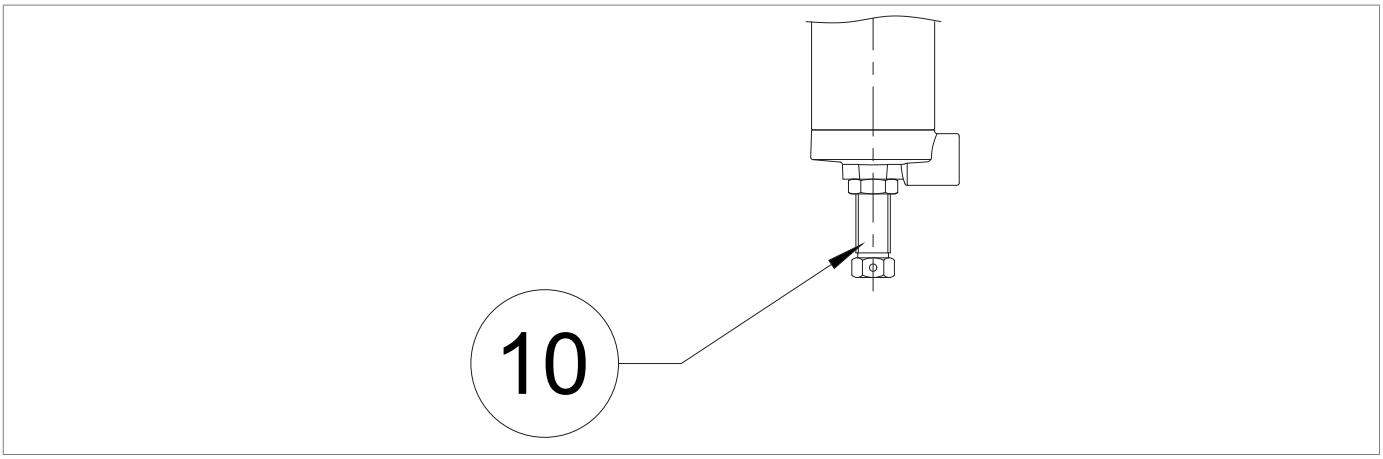

Fig. 8.25. *200/A series pilots*

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8.6 - CALIBRATION OF ANY ACCESSORIES

Please refer to the specific manuals of the individual pressure regulators for the correct calibration of all accessories in the equipment.

8.6.1 - CALIBRATION OF MAXIMUM AND MINIMUM PNEUMATIC PILOTS

The set point value is mentioned on the test certificate enclosed with each piece of equipment.

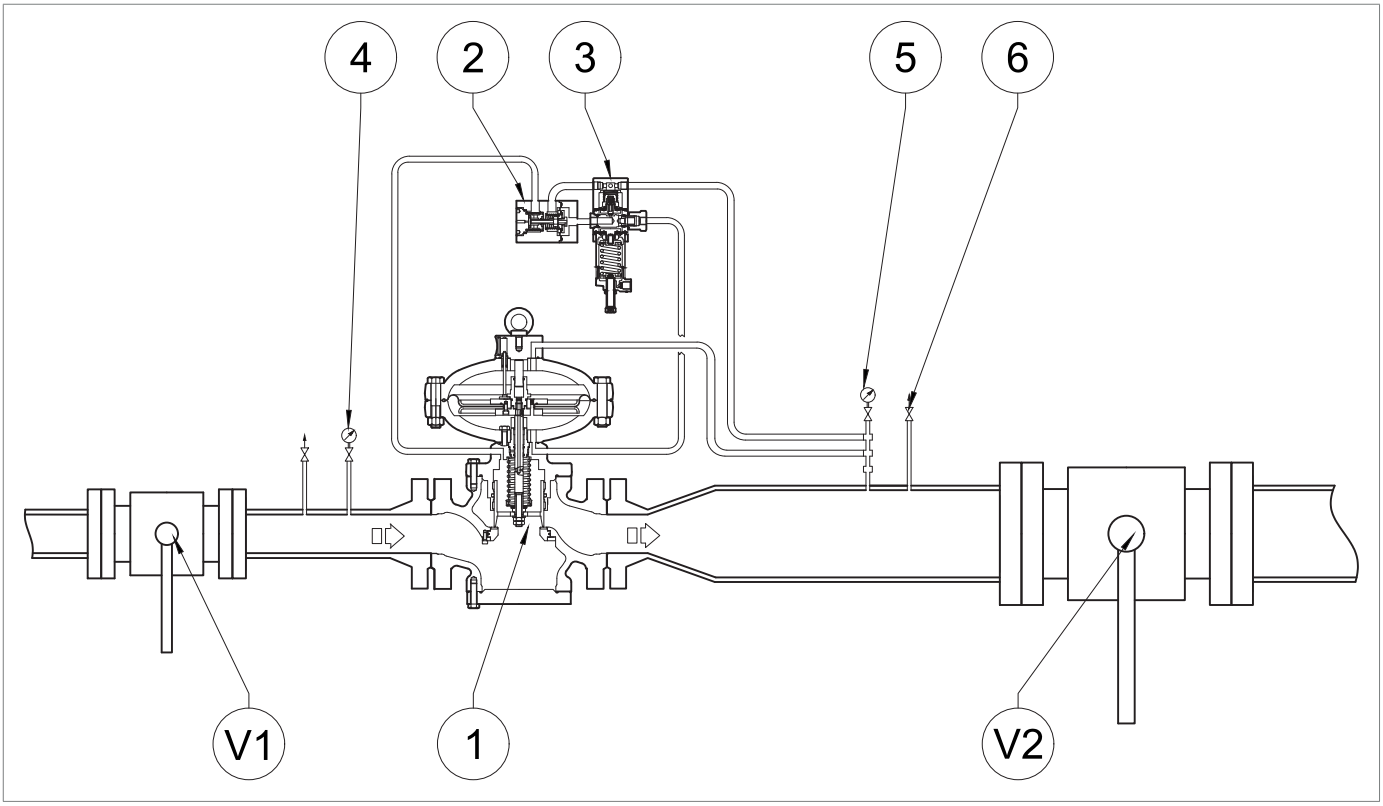

Fig. 8.26. Commissioning of the regulator with 200/MP series pilot

Step	Action
1	Partially open the bleed cock (6).
2	Completely unscrew the fixing nut and the screw of the magnetic pilot (2) and the maximum pneumatic pilot (3).
3	Open the inlet shut-off valve (V1) very slowly. **NOTICE!** **Check the pressure referring to the upstream pressure gauge (4).**
4	Turn the minimum pneumatic pilot adjusting screw (7) clockwise to load the setting spring until the regulator (1) trips. **NOTICE!** **Check the pressure referring to the downstream pressure gauge (5).**
5	Once the desired setting has been reached, secure the screw by also tightening the fixing nut
6	Tighten the adjusting screw of the magnetic pilot (2) completely.
7	Turn the maximum pneumatic pilot adjusting screw (3) clockwise to load the setting spring.
8	Check that the downstream pressure of the pressure gauge (5) exceeds the setting of the minimum pneumatic pilot (7) up to the setting of the maximum pilot (3).
9	Turn the magnetic pilot adjusting screw (2) anti-clockwise to relieve the setting spring to the desired setting.
10	Slowly close the bleed cock (6).
11	Check that the downstream pressure, after an increase phase, does not exceed the shut-off pressure value (refer to the SG value on the nameplate, see par. 2.8). **NOTICE!** • **If the downstream pressure exceeds the closing pressure value, refer to chapter 10 "Troubleshooting" to clear the causes of the malfunctions.** • **Check the pressure referring to the downstream pressure gauge (5).**
12	Check the tightness of all the fittings between the shut-off valves (V1, V2). **NOTICE!** **Check for sealing with a foaming substance.**
13	Complete the calibration of the magnetic pilot (3), as per paragraph 8.6.
14	Open the downstream shut-off valve (V2) very slowly until the piping has been filled completely. **NOTICE!** • **If at the beginning of this operation, the pressure in the downstream pipeline is much lower than the calibration pressure, shutter the opening of this valve so as not to exceed the maximum flow rate of the system.** • **Check the pressure referring to the downstream pressure gauge (5).**
15	Lock the adjustment screw (Fig. 8.25, ref. 10) with the pilot fastening nut (3).

Tab. 8.38

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9 - MAINTENANCE AND FUNCTIONAL CHECKS

9.1 - GENERAL WARNINGS

HAZARD!

- **Maintenance work must be carried out by qualified personnel trained on safety in the workplace and authorised to carry out equipment-related activities.**
- **Repair or maintenance work not provided for in this manual may be carried out only if approved by PIETRO FIORENTINI S.p.A.. PIETRO FIORENTINI S.p.A. shall not be held liable for damage to persons or property resulting from operations other than those described herein or carried out in ways other than as indicated.**

WARNING!

Before conducting any work, make sure that the line on which the equipment is installed:

- **has been shut off downstream and upstream;**
- **has been discharged.**

After releasing the pressure from the line, trigger the slam-shut valve.

WARNING!

In case of doubt, do not perform any work. Contact PIETRO FIORENTINI S.p.A. for the necessary clarifications.

The management and/or use of the equipment includes interventions that are necessary as a result of normal use such as:

- inspection and checks;
- functional checks;
- routine maintenance;
- special maintenance.

NOTICE!

Maintenance work is strictly related to:

- **the quality of the conveyed gas (impurities, humidity, gasoline, corrosive substances);**
- **the effectiveness of filtration;**
- **the equipment conditions of use.**

To properly run the equipment, one should:

- follow the service frequency referred to in the manual for functional checks and routine maintenance.
- not exceed the time interval between one service and the next. The time interval is to be understood as the maximum acceptable; it can, however, be shortened;
- promptly check the causes of any anomalies such as excessive noise, leakage of fluids or similar and remedy them. The timely removal of any causes of anomaly and/or malfunction prevents further damage to the equipment and ensures operator safety;

Before beginning disassembly of the equipment, make sure that:

- the spare parts and parts used in replacements have adequate requirements to ensure the original performance of the equipment. Use recommended original spare parts;
- the operator must have the necessary equipment (see chapter "7 - Commissioning/maintenance equipment").

NOTICE!

The recommended spare parts are unambiguously identified with tags indicating:

- **the assembly drawing number of the equipment where they are installed (see Chapter "12 - Recommended spare parts");**
- **the position specified in the assembly drawing of the equipment.**

The equipment maintenance operations are divided, from an operational point of view, into three main categories:

Commissioning and maintenance operations	
Periodic checks and inspections	All those checks that the operator must carry out on a regular basis to ensure that the equipment is in proper working order.
Routine maintenance	All those operations that the operator must preventively carry out to ensure proper operation of the device over time. Routine maintenance includes: • inspection; • control; • adjustment; • cleaning; • lubrication; • replacement; of all spare parts.
Special maintenance	All those operations to be carried out by the operator when the equipment requires them. **HAZARD!** **Special maintenance:** • **requires extensive and specialised knowledge of the machines, operations required, risks involved and correct procedures to operate safely;** • **must be provided by qualified, trained and authorised technicians.**

Tab. 9.39

9.2 - PERIODICALLY CHECKING AND INSPECTING THE EQUIPMENT FOR PROPER OPERATION

Periodic checks and inspections	
Operator qualification	Mechanical maintenance technician
PPE required	 **⚠ WARNING!** **The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:** • **the regulations in force in the country of installation;** • **any information provided by the Safety Manager at the installation facility.**

Tab. 9.40

Tab. 9.41 lists the checks and inspections, i.e. the operations that do not require any manual service on the equipment. Some items thereof can be replaced remotely using suitable remote control tools:

Activity description	Equipment/accessories involved	Evaluation criterion	Minimum frequency
Significant performance check*	Pressure regulators	• No fluctuations in the adjusted pressure. • Significant pressure values within preset limits.	Monthly
	Gas flow slam-shut type safety devices (external position indicator)	• Fully open position.	
	Stand-by monitor (external position indicator)	• Fully open position.	
Visual inspection of the equipment outside condition	All	• No visible damage. • External surface protection as per UNI 9571-1:2012.	Half-yearly

Tab. 9.41

** These checks may be carried out remotely if there is a remote control system capable of analysing the significant performance of the equipment and of sending alerts/alarms when pre-set thresholds are reached.*

9.3 - ROUTINE MAINTENANCE

9.3.1 - GENERAL SAFETY WARNINGS

HAZARD!

- **Put the equipment in a safe condition (close the downstream and then the upstream shut-off valve, drain the equipment completely and lastly drain the line);**
- **Ensure that the pressure upstream and downstream of the equipment is “0”.**

WARNING!

After releasing the pressure from the line, trigger the slam-shut valve.

NOTICE!

Before installing new sealing elements (o-rings, diaphragm, etc.), they must be checked for integrity.

9.3.2 - REPLACEMENT FREQUENCY FOR COMPONENTS SUBJECT TO WEAR

NOTICE!

The following provisions shall apply to equipment components only.

The non-metallic parts of the equipment concerned are divided into the following two categories:

Preventive maintenance work	
Category 1	Parts subject to wear and/or abrasion, where: • wear and tear means the normal degradation of a part after prolonged use under normal operating conditions; • abrasion is the mechanical action on the surface of the affected part resulting from the passage of gas under normal operating conditions.
Category 2	Parts subject to aging only, including parts that also require lubrication and/or cleaning.

Tab. 9.42

NOTICE!

Check, within the minimum frequency specified in "Tab. 9.43", the available components for wear/abrasion/aging.

Category	Part description	Evaluation criterion	Minimum replacement frequency
1	Valve seat sealing rings and non-metallic plugs	Pressure regulators	6 years
		Safety devices	
		Pressure safety system equipment	
1	Non-metallic parts with internal sealing function of valve seats and accessories of individual equipment	Pilots	6 years
		Pre-regulators	
		Accelerators	
		Any others	
1	Non-metallic parts with a sealing function between parts, at least one of which is in motion under normal working/operating conditions	Pressure regulators	6 years
		Gas flow slam-shut type safety devices	
		Relief devices with discharge to atmosphere	
1	Non-metallic parts with sealing function involved in disassembly operations during maintenance	Equipment subject to maintenance	6 years
2	Non-metallic parts providing feedback (sensing elements) of the controlled pressure of safety equipment	Safety equipment and/or accessories	6 years
2	Non-metallic parts with sealing and performance functions (diaphragms) of equipment	Pressure regulators and accessories	6 years
		Gas flow slam-shut type safety devices	6 years
		Relief device with discharge to atmosphere	6 years
2	Non-metallic parts of equipment with an internal sealing function: under normal operating conditions during maintenance	Relief valves	6 years
		Regulation lines disconnection equipment	If there are proven leaks
2	Non-metallic parts with a static sealing function only	Various equipment	If there are proven leaks

Category	Part description	Evaluation criterion	Minimum replacement frequency
2	Lubricating parts	Shut-off valves	Yearly
		Other equipment	Yearly
2	Filter elements	Filters	As needed

Tab. 9.43

9.4 - ROUTINE MAINTENANCE PROCEDURES

Routine maintenance	
Operator qualification	Mechanical maintenance technician
PPE required	 **⚠ WARNING!** **The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:** • **the regulations in force in the country of installation;** • **any information provided by the Safety Manager at the installation facility.**
Necessary equipment	Please refer to the chapter "7 - Commissioning/maintenance equipment".

Tab. 9.44

9.4.1 - TIGHTENING TORQUES PILOT 200/MP

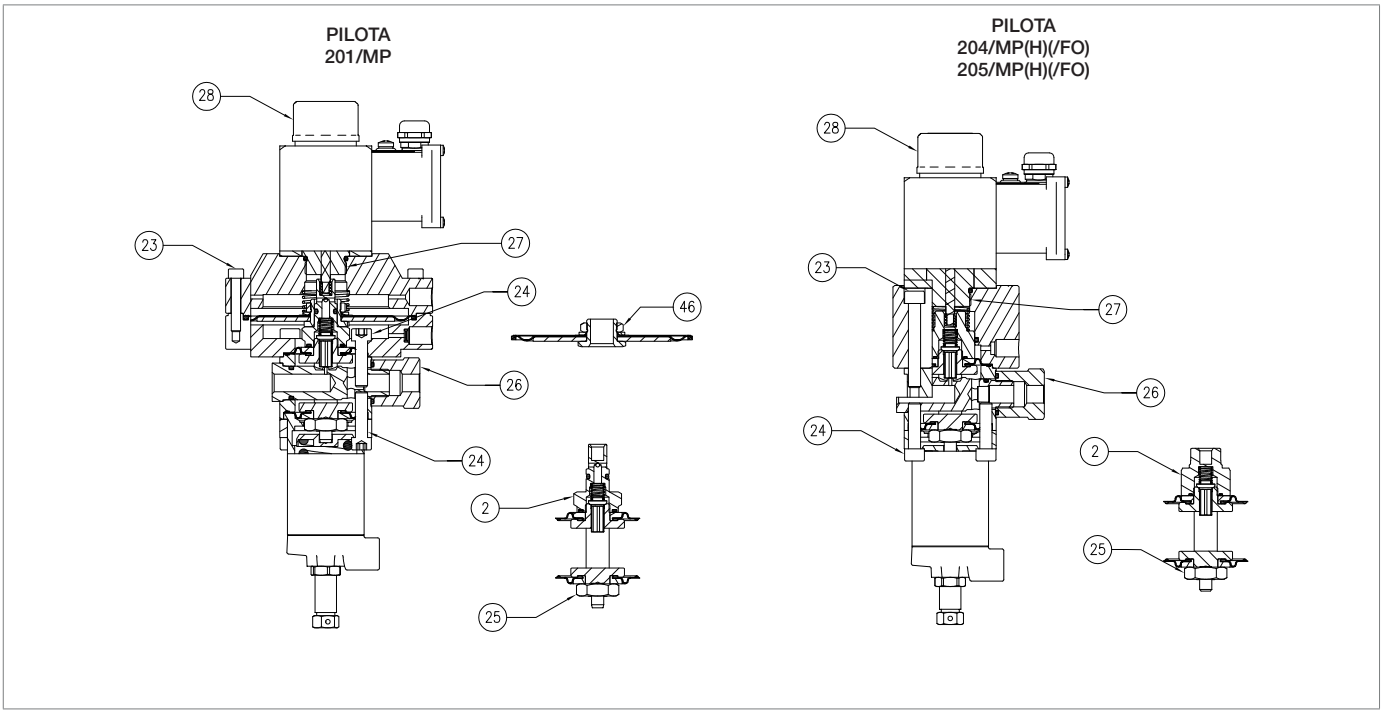


Fig. 9.27. Tightening torques for pilots 201/MP... – 204/MP... (/FO) – 205/MP... (/FO)

PILOT 201/MP			
Pos.	**Description**	**Torque (Nm)**	**Torque (ft - lb)**
2	Nut M16X1	25	18
23	Screw M6X35 UNI 5931	7	5
24	Screw M8X30 UNI 5931	20	14
25	Nut M16X1.5	25	18
26	Nut M18X1.5	20	14
27	Magnetic actuator tube	50	37
28	Magnetic actuator cap	6	4
46	Nut M20X1	8	6

Tab. 9.45

PILOT 204/MP(H) (/FO) - 205/MP(H) (/FO)			
Pos.	**Description**	**Torque (Nm)**	**Torque (ft - lb)**
2	Nut M16X1	25	18
23	Screw M6X55 UNI 5931	20	14
24	Screw M8X30 UNI 5931	20	14
25	Nut M16X1.5	25	18
26	Nut M18X1.5	20	14
27	Magnetic actuator tube	50	37
28	Magnetic actuator cap	6	4

Tab. 9.46

9.4.2 - REPLACING ELEMENTS SUBJECT TO WEAR AND ABRASION

9.4.2.1 - INITIAL OPERATIONS

⚠ WARNING!

After releasing the pressure from the line, trigger the slam-shut valve.

⚠ ATTENTION!

Before carrying out any work, it is important to ensure that the line on which the regulator is installed has been shut off upstream and downstream, and discharged.

⚠ ATTENTION!

During assembly, make sure to tighten the screws as per the tables (tightening torques), according to the size for which maintenance is being carried out.

Proceed as follows:

Step	Action
1	Unscrew the conical seal fittings to disconnect all power outlets and sensing lines for the pilot and regulator.
2	Loosen the nut securing the pilot support bracket to the regulator.
3	Remove the 200/MP series pilot present with the R14/A or R31/A pre-regulator from the regulator. **NOTICE!** **For replacement and pilot disconnection procedures for the 200/MP series and the R14/A or R31/A pre-regulator, please refer to section 9.4.6.**

Tab. 9.47

9.4.2.2 - CROSS DIAGRAM FOR TIGHTENING SCREWS

When indicated by the maintenance procedure, refer to the following diagram to tighten the screws:

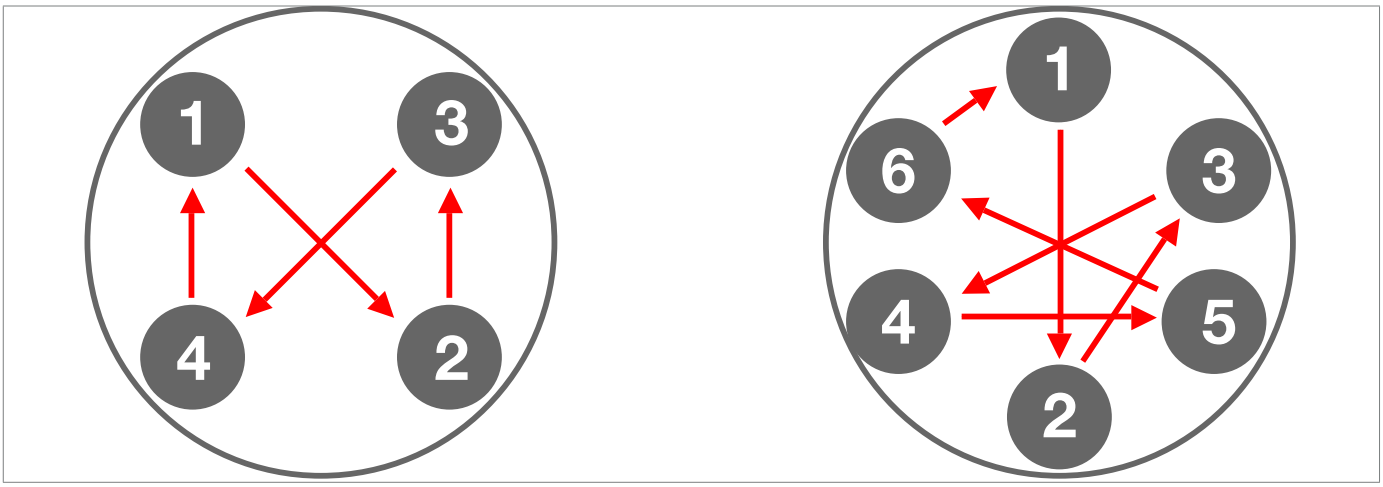


Fig. 9.28. Cross diagram

9.4.3 - MAINTENANCE PROCEDURE OF PILOT 200/MP

9.4.3.1 - PILOT DISCONNECTION MODEL 200/MP(H)

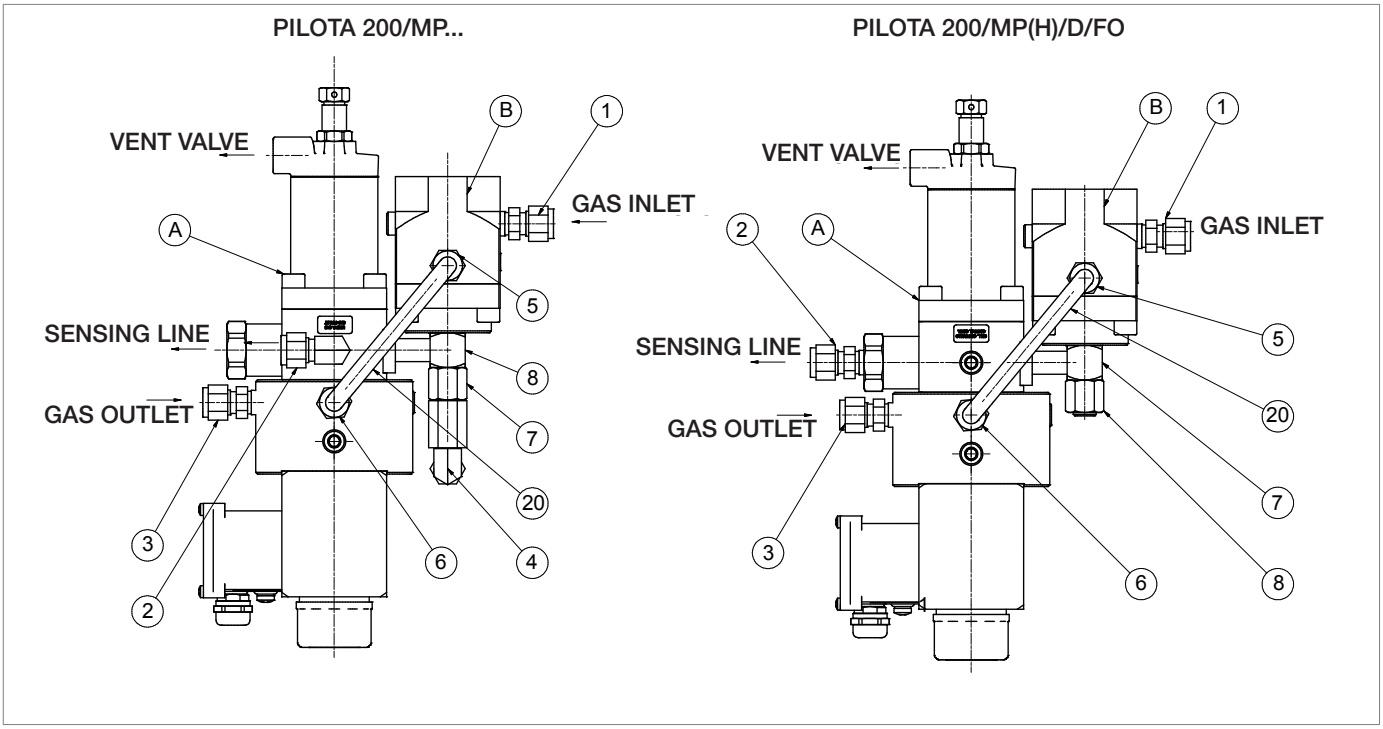


Fig. 9.29. Pilot disconnection series 200/MP

To disconnect the pilot, proceed as indicated in Tab. 9.48 (see Fig. 9.29):

Step	Action
1	Disconnect the sensing lines between the 200/A pilot and the regulator by adjusting the fittings (1, 2, 3).
2	Unscrew and remove the fixing screw to remove the pilot from the regulator.
3	Remove the pipe (20) by adjusting the fittings (4, 5).
4	Unscrew and remove the screw (6) to separate the R14/A pre-regulator from the pilot.
5	Undo and remove the screw (7) from pilot 200/A.

Tab. 9.48

9.4.3.2 - MAINTENANCE PROCEDURE FOR PILOT MODEL 201/MP/I (VERSIONE INCREASE)

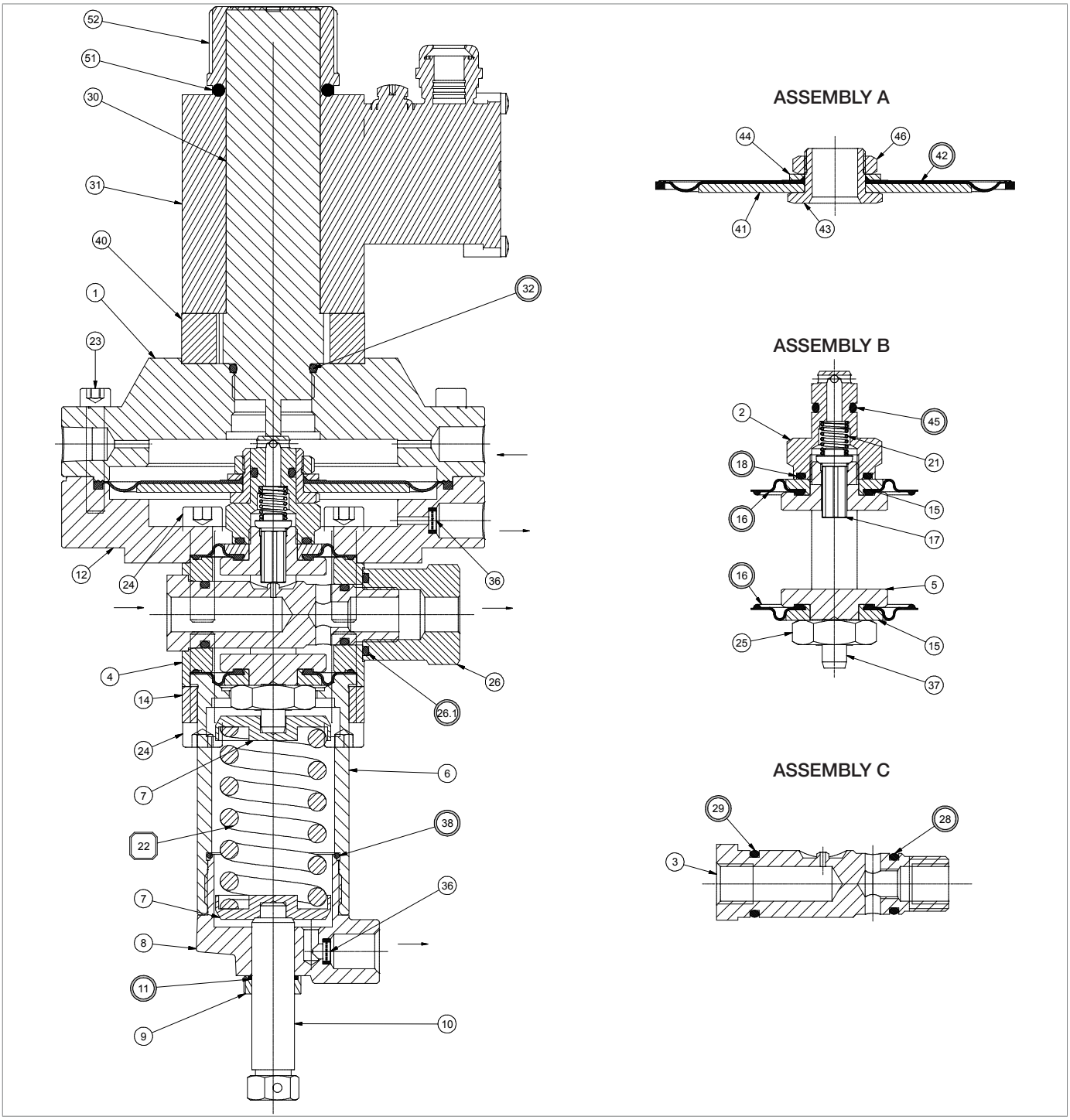
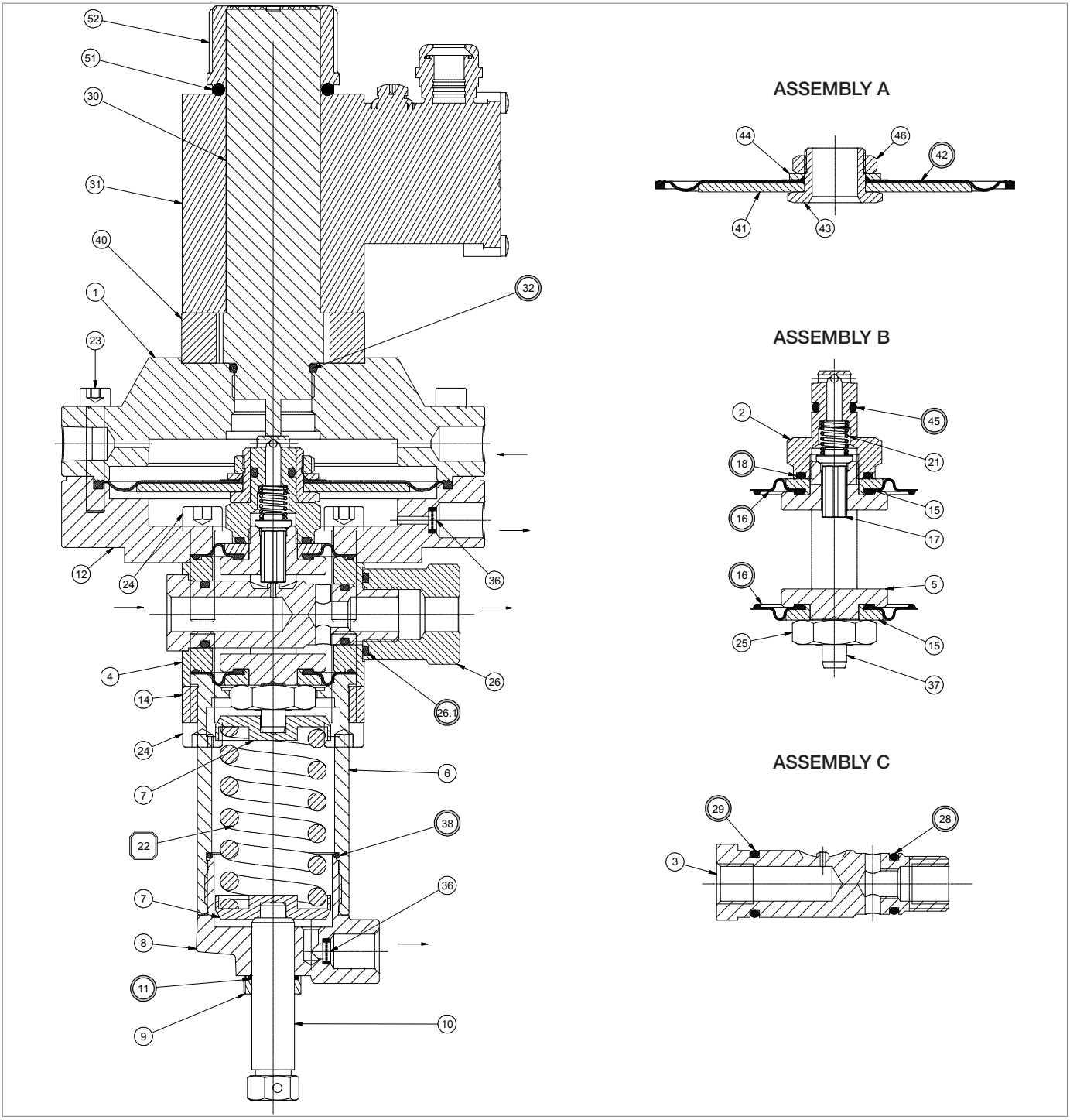


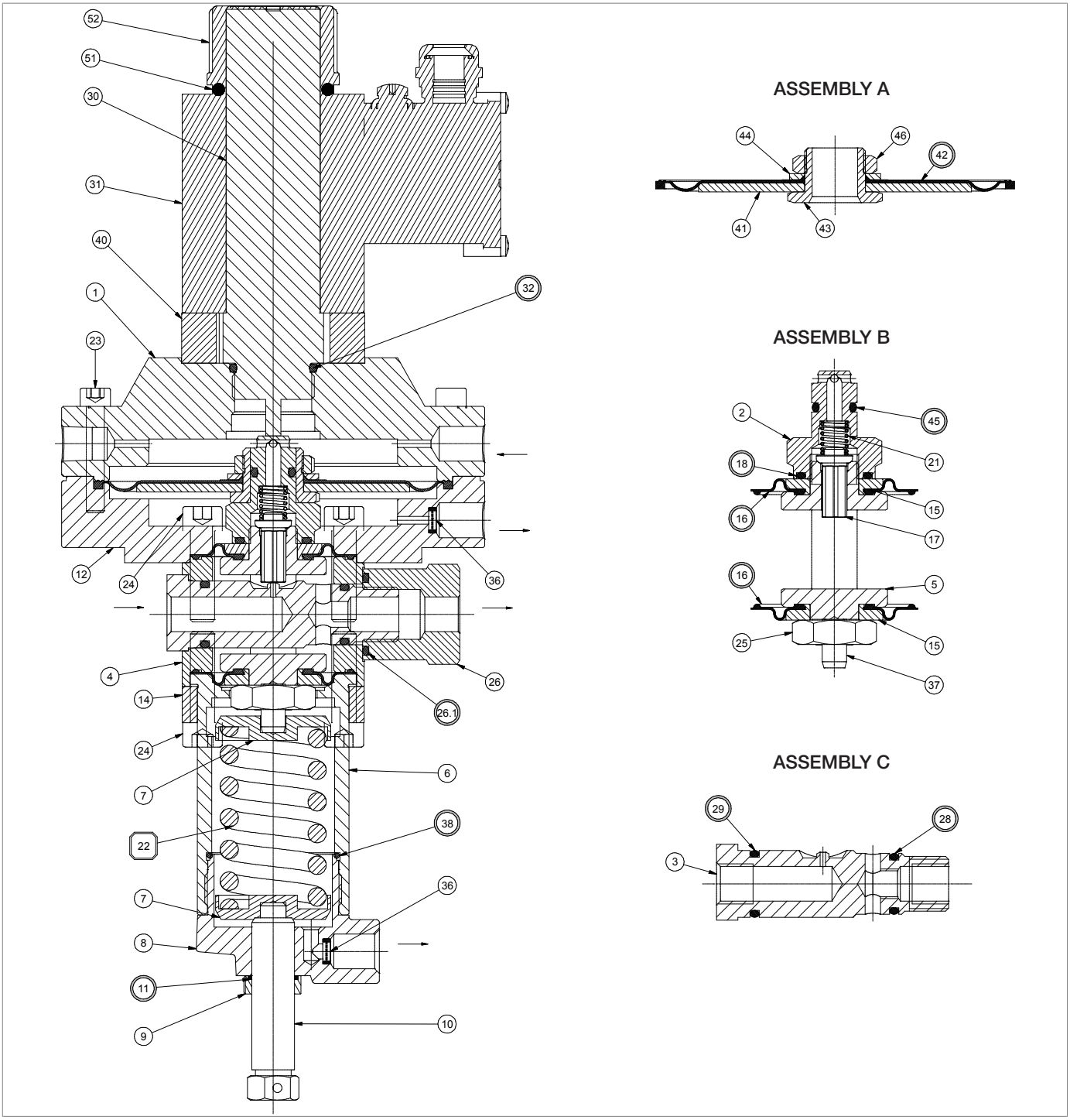
Fig. 9.30. Pilot 201/MP/I (increase version)

Step	Action
1	Unscrew and remove the cap (52) of the magnetic actuator (31), replace the O-ring (51) only if it is particularly worn.
2	Remove the outer case of the magnetic actuator (31) by unscrewing the central tube (30).
3	Remove flange (40) before pulling out the central tube (30).
4	Remove the O-ring (32) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
5	Loosen the nut (9).
6	Completely release the spring (22) by turning the adjusting screw (10).
7	Remove the adjusting screw (10) together with the cap (9).
8	Remove the cap (8).
9	Remove the O-ring (38) from the cap (8) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
10	Remove the spring (22) and the spring supports (7).
11	Undo and remove the screws of the lower section (24).
12	Remove the bracket (14) from the sleeve (6).
13	Remove the sleeve (6).
14	Undo and remove the screws (23).
15	Remove the pilot cover (1).
16	Remove the assembly “A” (diaphragm).
17	Unscrew and remove the nut (46) together with the washer (44). **NOTICE!** **During this operation hold the diaphragm support (43) in place.**
18	Remove and replace the diaphragm (42).
19	Position the washer (44) with the conical part facing the diaphragm (42).
20	Insert and fix the nut (46). **NOTICE!** **During this operation hold the diaphragm support (43) in place.**
21	Undo and remove the screws of the upper section (24).
22	Remove the flange (12).
23	Unscrew and remove the nut (26).
24	Remove the O-ring (26.1) from the nut (26) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
25	Remove assembly “C” (valve).
26	Remove the O-rings (28, 29) from the valve seat (3) and replace them, taking care to lubricate them with synthetic grease. **NOTICE!** **Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.**



Pilot 201/MP/I (increase version)

Step	Action
27	Remove assembly “B” (plug) from the valve body (4) by pushing it from the bottom upwards.
28	Unscrew and remove the pilot nut (2).
29	Remove the O-rings (18, 45) from the pilot nut (2) and replace them, taking care to lubricate them with synthetic grease. **NOTICE!** **Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.**
30	Remove the spring (21).
31	Remove and replace the plug (17).
32	Remove the upper protection disc (15).
33	Remove and replace the upper diaphragm (16), taking care to lubricate the lanyards with synthetic grease. **NOTICE!** **Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.**
34	Unscrew and remove the nut (25).
35	Remove the lower protection disc (15).
36	Remove and replace the lower diaphragm (16), taking care to lubricate the lanyards with synthetic grease. **NOTICE!** **Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.**
37	Fit the lower protection disc (15).
38	Fix the nut (25) according to the following tightening torque: • Pilot 201/MP/I: Tab. 9.45
39	Fit the plug (17) and then the spring (21).
40	Fit the upper protection disc (15).
41	Fix the pilot nut (2) according to the following tightening torque: • Pilot 201/MP/I: Tab. 9.45
42	Insert assembly “B” (plug) from the top downwards into the valve body (4). **NOTICE!** • **Take care not to damage the diaphragms (16) during this step** • **Make sure the marking on the lower section of the headframe is parallel to the axis of the hole for inserting the seat (3) into the valve body (4).**
43	Insert assembly “C” (valve) into the valve body (4). **NOTICE!** **Take care not to damage the O-rings (28, 29) and the valve seat (3).**
44	Screw in the nut (26) according to the following tightening torque:
45	Fit the flange (12).
46	Tighten the upper screws (24) according to the following tightening torques:
47	Fit assembly “A” (diaphragm).
48	Fit the cover (1).
49	Insert and fix the screws of the upper section (23) according to the following tightening torque:
50	Fit the sleeve (6) and the bracket (14).
51	Insert and fix the screws of the lower section (24) according to the following tightening torque:
52	Fit the spring (22) and the spring supports (7).
53	Unscrew the cap (8).



Pilot 201/MP/I (increase version)

Step	Action
54	Remove and replace the O-ring (11) in the nut (9), lubricating it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
55	Fit the adjusting screw (10) together with the cap (9).
56	Position the flange (40).
57	Tighten the central tube (30) with the O-ring (32).
58	Slide the outer body (31) of the magnetic actuator onto the tube (30).
59	Insert O-ring (51) and screw in the cap (52) of the magnetic actuator.

Tab. 9.49.

WARNING!

Ensure that all parts have been fitted correctly.

9.4.3.3 - MAINTENANCE PROCEDURE FOR PILOT MODEL 201/MP/D (VERSIONE DECREASE)

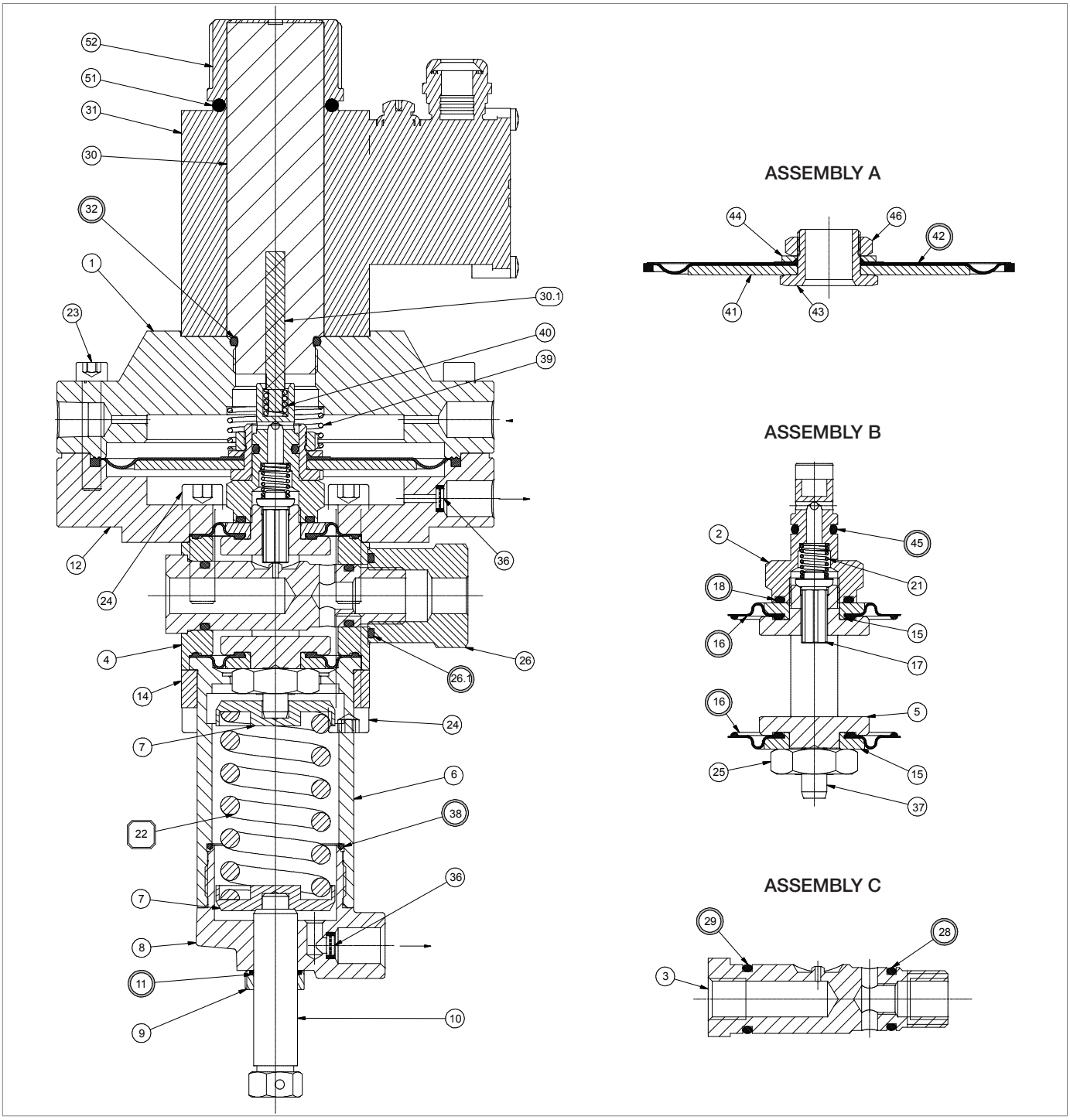
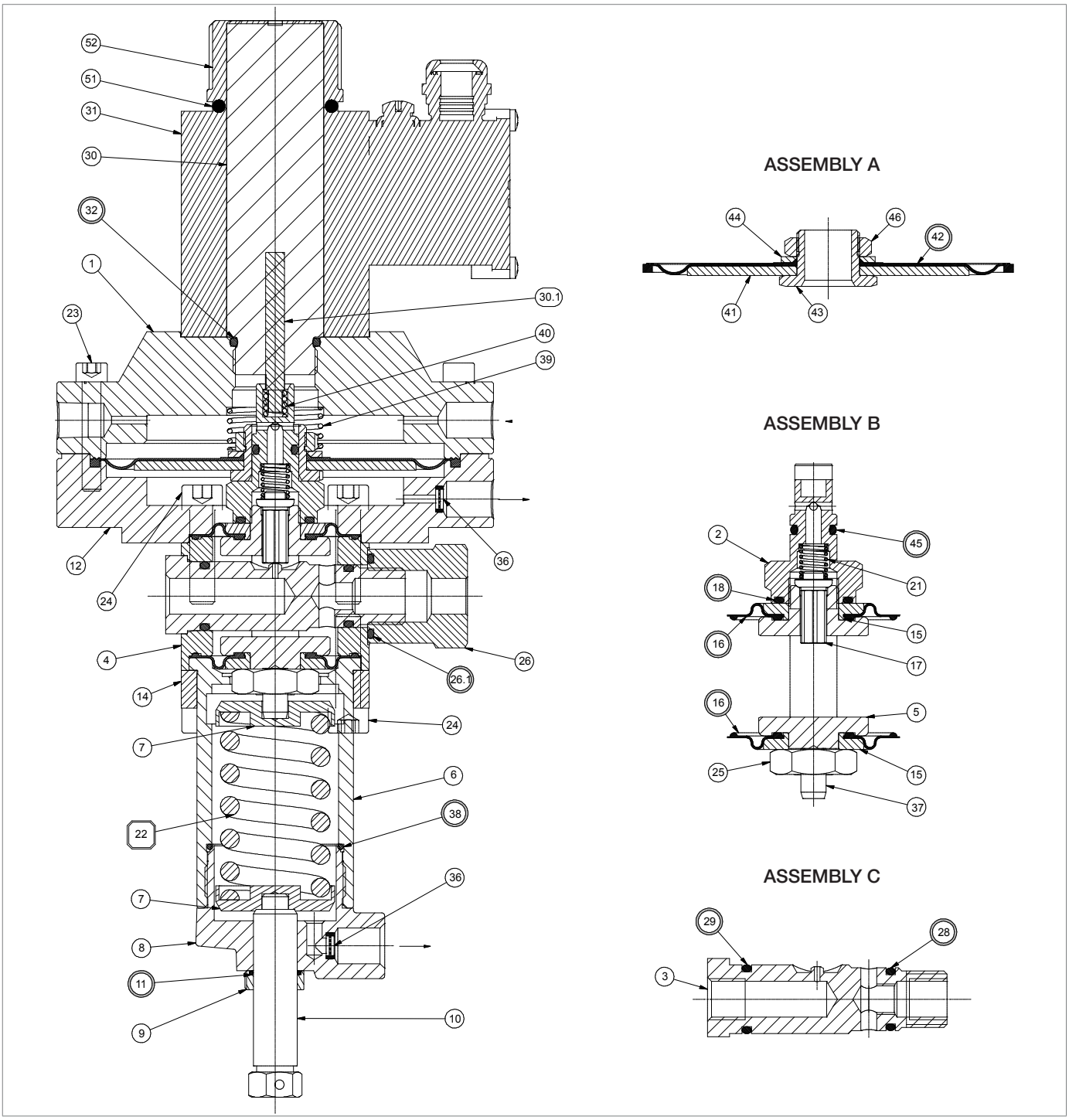


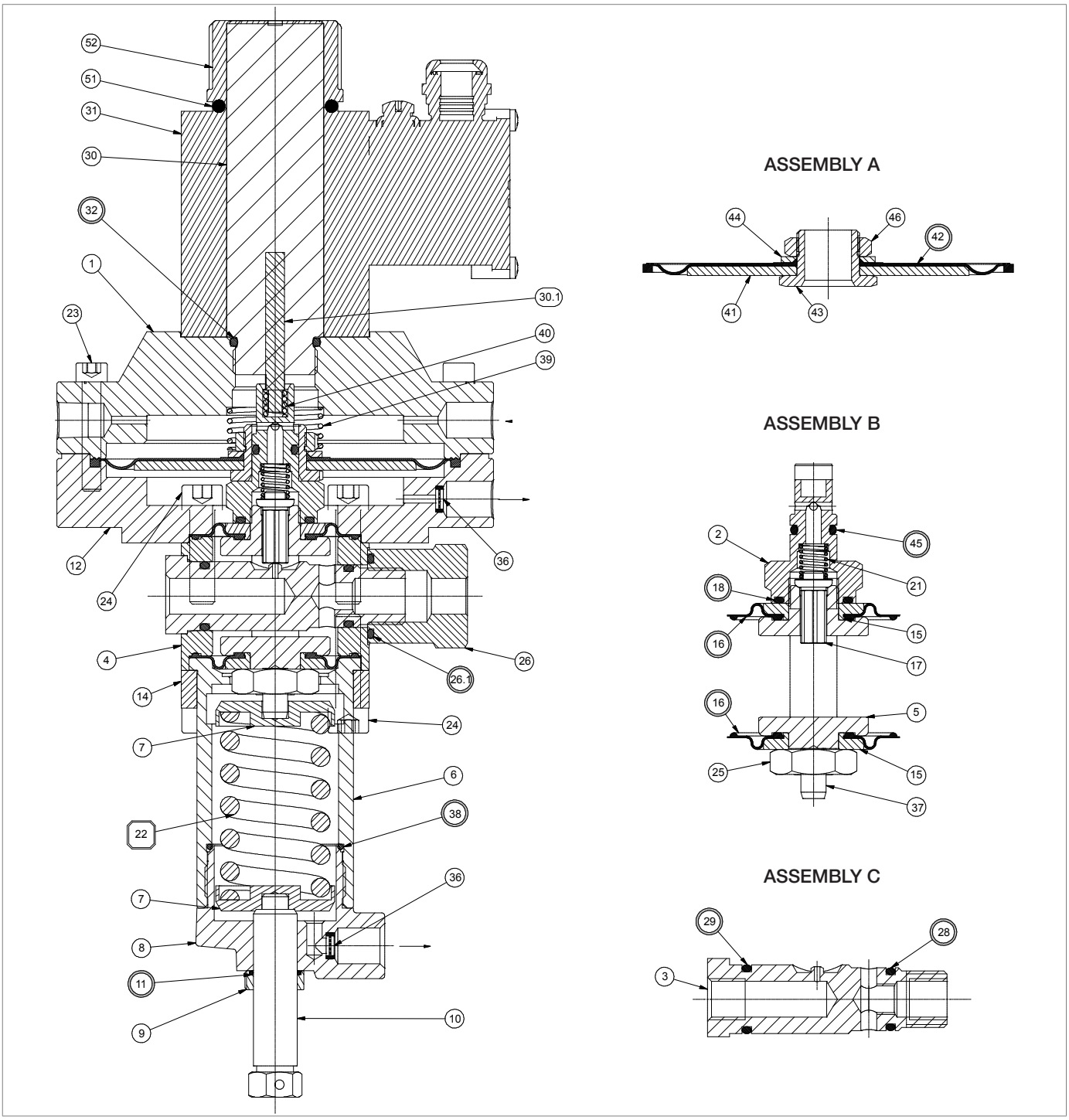
Fig. 9.31. Pilot 201/MP/D (decrease version)

Step	Action
1	Unscrew and remove the cap (52) of the magnetic actuator (31), replace the O-ring (51) only if it is particularly worn.
2	Remove the outer case of the magnetic actuator (31) by unscrewing the central tube (30).
3	Remove the stem (30.1) from the central tube (30).
4	Remove the O-ring (32) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
5	Loosen the nut (9).
6	Completely release the spring (22) by turning the adjusting screw (10).
7	Remove the adjusting screw (10) together with the cap (9).
8	Remove the cap (8).
9	Remove the O-ring (38) from the cap (8) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
10	Remove the spring (22) and the spring supports (7).
11	Undo and remove the screws of the lower section (24).
12	Remove the bracket (14) from the sleeve (6).
13	Remove the sleeve (6).
14	Undo and remove the screws (23).
15	Remove the pilot cover (1).
16	Remove spring (39) and spring (40).
17	Remove the assembly “A” (diaphragm).
18	Unscrew and remove the nut (46) together with the washer (44). **NOTICE!** **During this operation hold the diaphragm support (43) in place.**
19	Remove and replace the diaphragm (42).
20	Position the washer (44) with the conical part facing the diaphragm (42).
21	Insert and fix the nut (46). **NOTICE!** **During this operation hold the diaphragm support (43) in place.**
22	Undo and remove the screws of the upper section (24).
23	Remove the flange (12).
24	Unscrew and remove the nut (26).
25	Remove the O-ring (26.1) from the nut (26) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
26	Remove assembly “C” (valve).
27	Remove the O-rings (28, 29) from the valve seat (3) and replace them, taking care to lubricate them with synthetic grease. **NOTICE!** **Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.**



Pilot 201/MP/D (decrease version)

Step	Action
28	Remove assembly “B” (plug) from the valve body (4) by pushing it from the bottom upwards.
29	Unscrew and remove the pilot nut (2).
30	Remove the O-rings (18, 45) from the pilot nut (2) and replace them, taking care to lubricate them with synthetic grease. **NOTICE!** **Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.**
31	Remove the spring (21).
32	Remove and replace the plug (17).
33	Remove the upper protection disc (15).
34	Remove and replace the upper diaphragm (16), taking care to lubricate the lanyards with synthetic grease. **NOTICE!** **Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.**
35	Unscrew and remove the nut (25).
36	Remove the lower protection disc (15).
37	Remove and replace the lower diaphragm (16), taking care to lubricate the lanyards with synthetic grease. **NOTICE!** **Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.**
38	Fit the lower protection disc (15).
39	Fix the nut (25) according to the following tightening torque: • Pilot 201/MP/D: Tab. 9.45
40	Fit the plug (17) and then the spring (21).
41	Fit the upper protection disc (15).
42	Fix the pilot nut (2) according to the following tightening torque: • Pilot 201/MP/D: Tab. 9.45
43	Insert assembly “B” (plug) from the top downwards into the valve body (4). **NOTICE!** • **Take care not to damage the diaphragms (16) during this step** • **Make sure the marking on the lower section of the headframe is parallel to the axis of the hole for inserting the seat (3) into the valve body (4).**
44	Insert assembly “C” (valve) into the valve body (4). **NOTICE!** **Take care not to damage the O-rings (28, 29) and the valve seat (3).**
45	Screw in the nut (26) according to the following tightening torque:
46	Fit the flange (12).
47	Tighten the upper screws (24) according to the following tightening torques:
48	Fit assembly “A” (diaphragm).
49	Fit the springs (39) and (40).
50	Fit the cover (1).
51	Insert and fix the screws of the upper section (23) according to the following tightening torque:
52	Fit the sleeve (6) and the bracket (14).
53	Insert and fix the screws of the lower section (24) according to the following tightening torque:
54	Fit the spring (22) and the spring supports (7).



Pilot 201/MP/D (decrease version)

Step	Action
55	Unscrew the cap (8).
56	Remove and replace the O-ring (11) in the nut (9), lubricating it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
57	Fit the adjusting screw (10) together with the cap (9).
58	Place the stem (30.1) in the central tube (30).
59	Tighten the central tube (30) with the O-ring (32).
60	Slide the outer body (31) of the magnetic actuator onto the tube (30).
61	Insert O-ring (51) and screw in the cap (52) of the magnetic actuator.

Tab. 9.50.

WARNING!

Ensure that all parts have been fitted correctly.

9.4.3.4 - MAINTENANCE PROCEDURE FOR PILOT MODELS 204/MP (/FO) - 205/MP (/FO) (INCREASE VERSION)

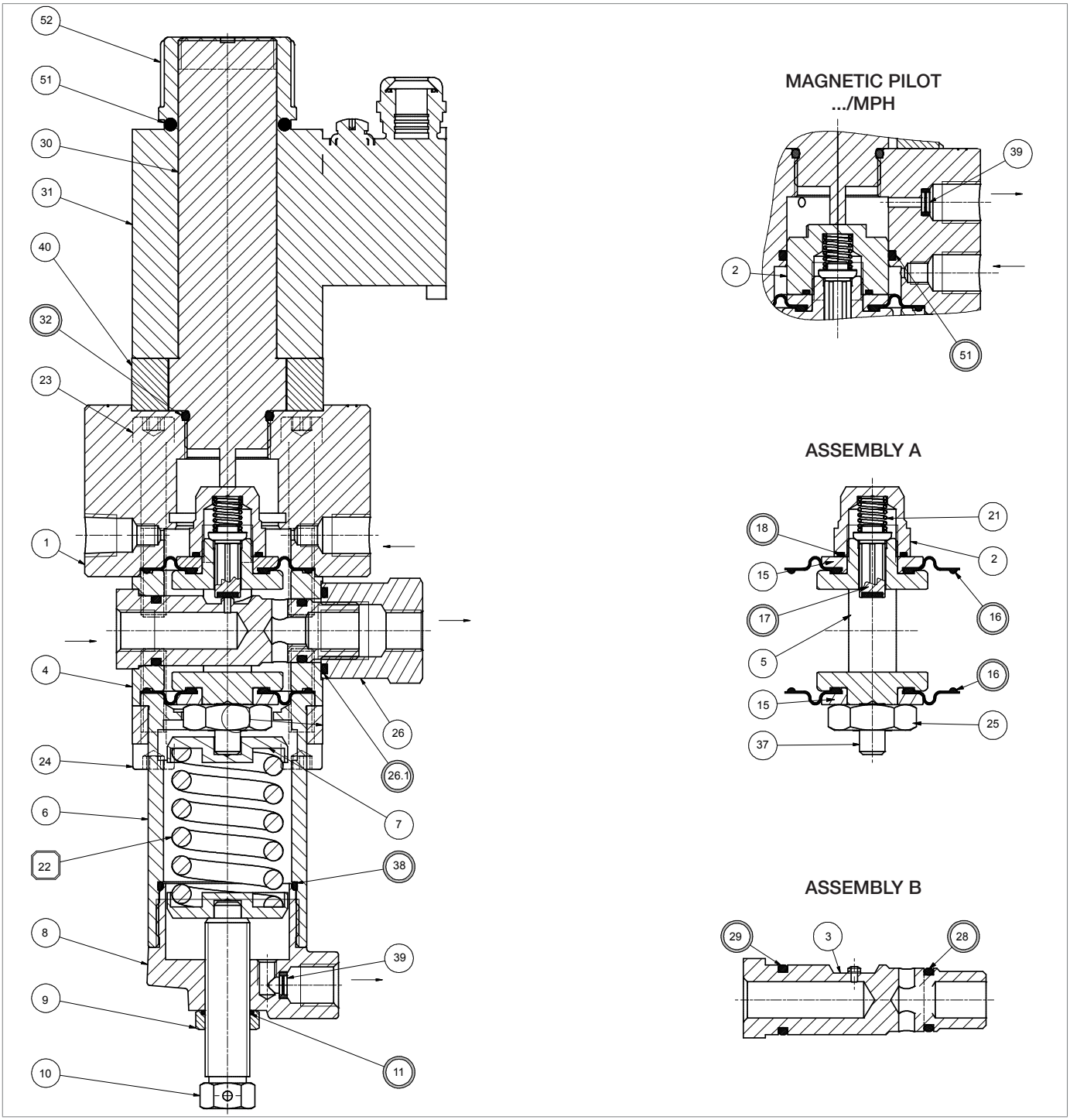
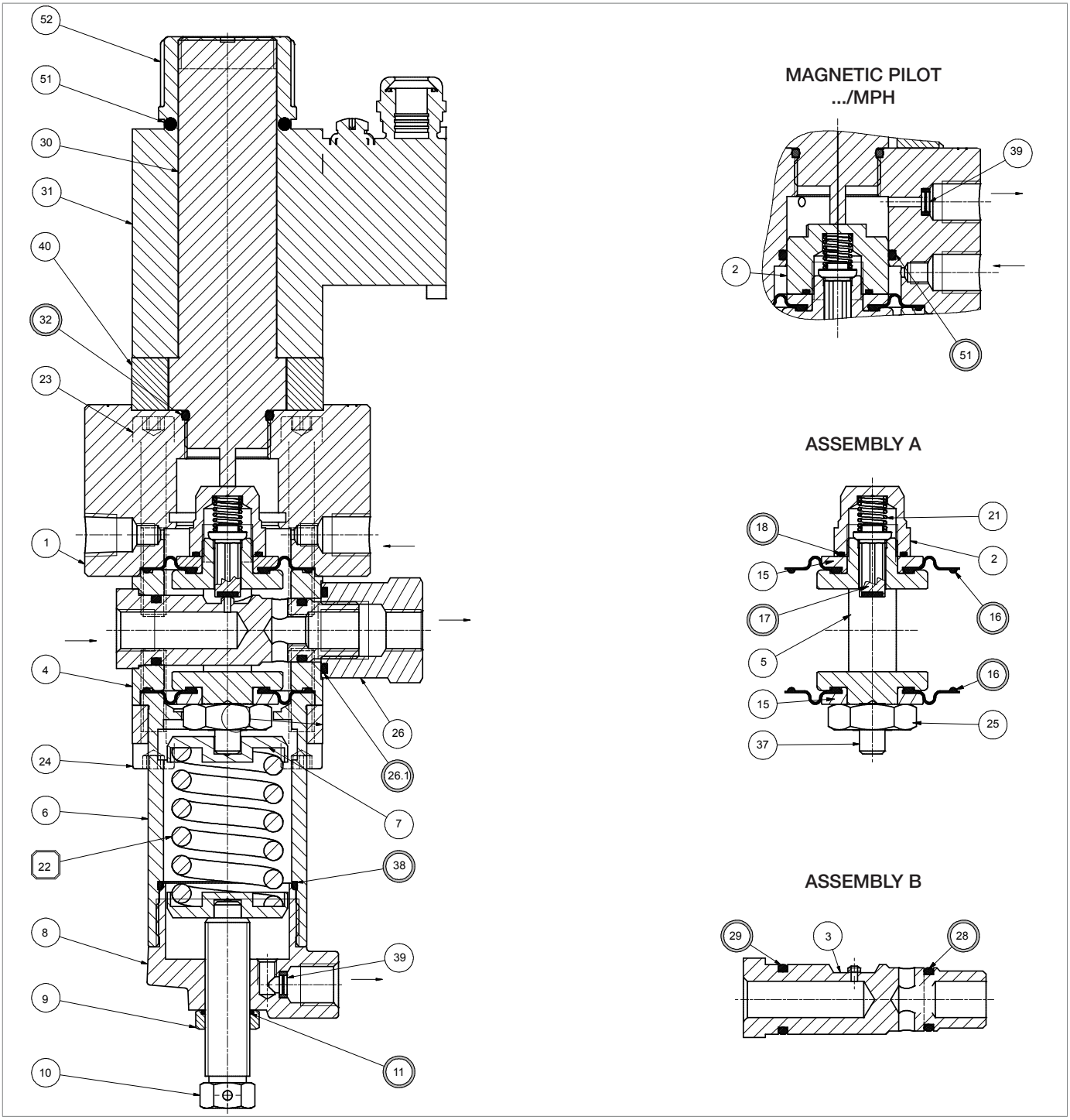


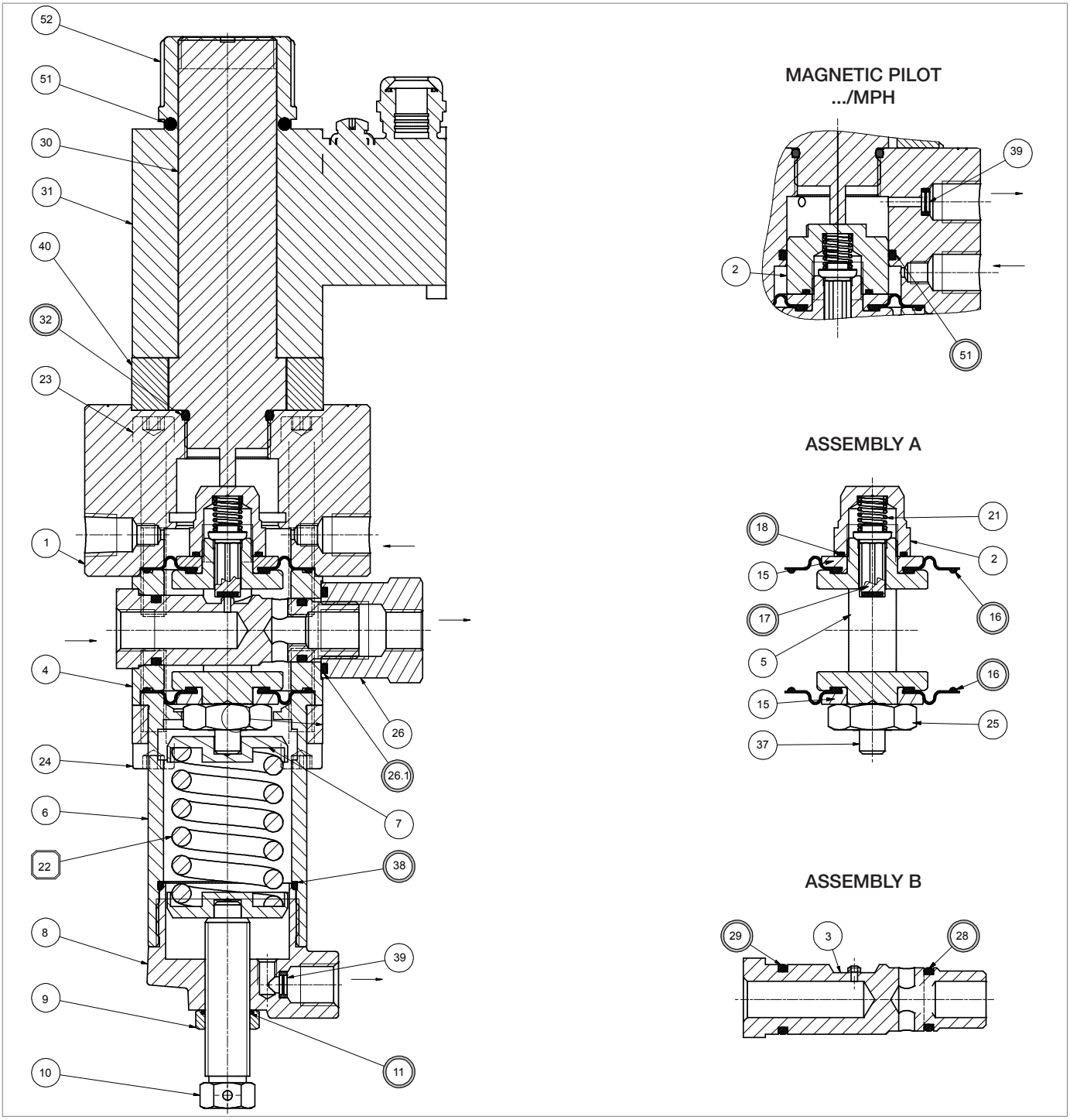
Fig. 9.32. Pilots 204/MP(H)/D (/FO) - 205/MP(H)/D (/FO) (increase version)

Passo	Azione
1	Unscrew and remove the cap (52) of the magnetic actuator (31), replace the O-ring (51) only if it is particularly worn.
2	Remove the outer case of the magnetic actuator (31).
3	Unscrew the central tube (30).
4	Remove flange (40) before pulling out the central tube (30).
5	Remove the O-ring (32) from the cap (8) and replace it, taking care to lubricate it with synthetic grease. **AVVISO!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
6	Loosen the nut (9).
7	Completely release the spring (22) by turning the adjusting screw (10).
8	Remove the adjusting screw (10) together with the cap (9).
9	Remove the cap (8).
10	Remove the O-ring (38) from the cap (8) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
11	Remove the spring (22) and the spring supports (7).
12	Undo and remove the screws of the lower section (24).
13	Remove the bracket (14) from the sleeve (6).
14	Remove the sleeve (6).
15	Undo and remove the screws of the upper section (23).
16	Remove the pilot cover (1).
17	Unscrew and remove the nut (26).
18	Remove the O-ring (26.1) from the nut (26) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
19	Remove the assembly “B” (valve).
20	Remove the O-rings (28, 29) from the valve seat (3) and replace them, taking care to lubricate them with synthetic grease. **NOTICE!** **Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.**
21	Remove the assembly “A” (plug) from the valve body (4) by pushing it from the bottom upwards.
22	Unscrew and remove the pilot nut (2).
23	**FOR MPH VERSION** Remove the O-ring (51), taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
24	Remove the O-ring (18), taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**



Pilots 204/MP(H)/D (/FO) - 205/MP(H)/D (/FO) (increase version)

Passo	Azione
25	Remove the spring (21).
26	Remove and replace the plug (17).
27	Remove the upper protection disc (15).
28	Remove and replace the upper diaphragm (16), taking care to lubricate the lanyards with synthetic grease. **NOTICE!** **Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.**
29	Unscrew and remove the nut (25).
30	Remove the lower protection disc (15).
31	Remove and replace the lower diaphragm (16), taking care to lubricate the lanyards with synthetic grease. **NOTICE!** **Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.**
32	Fit the lower protection disc (15).
33	Insert and fix the nut (25) according to the following tightening torque: • Pilota 204/MP... (/FO) – 205/MP... (/FO): Tab. 9.46
34	Fit the plug (17) and then the spring (21).
35	Fit the upper protection disc (15).
36	Insert and fix the pilot nut (2) according to the following tightening torque: • Pilota 204/MP... (/FO) – 205/MP... (/FO): Tab. 9.46
37	Insert assembly “A” (plug) from the top downwards into the valve body (4). **AVVISO!** • **Take care not to damage the diaphragms (16) during this step** • **Make sure the marking on the lower section of the headframe is parallel to the axis of the hole for inserting the seat (3) into the valve body (4).**
38	Insert assembly “B” (valve) into the valve body (4). **AVVISO!** **Take care not to damage the O-rings (28, 29) and the valve seat (3).**
39	Insert and fix the nut (26) according to the following tightening torque: • Pilot 204/MP... (/FO) – 205/MP... (/FO): Tab. 9.46
40	Fit the cover (1).
41	Insert and fix the screws of the upper section (23) according to the following tightening torque: • Pilot 204/MP... (/FO) – 205/MP... (/FO): Tab. 9.46
42	Fit the sleeve (6) and the bracket (14).
43	Insert and fix the screws of the lower section (23) according to the following tightening torque: • Pilot 204/MP... (/FO) – 205/MP... (/FO): Tab. 9.46
44	Fit the spring (22) and the spring supports (7).
45	Screw the cap (8).
46	Remove and replace the O-ring (11) from the nut (9) and replace it, lubricating it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
47	Fit the adjusting screw (10) together with the cap (9).



Pilots 204/MP(H)/D (/FO) - 205/MP(H)/D (/FO) (increase version)

Passo	Azione
48	Position the flange (40).
49	Tighten the central tube (30) with the O-ring (32).
50	Slide the outer body (31) of the magnetic actuator onto the tube (30).
51	Insert O-ring (51) and screw in the cap (52) of the magnetic actuator.

Tab. 9.51.

⚠ WARNING!

Ensure that all parts have been fitted correctly.

9.4.3.5 - MAINTENANCE PROCEDURE FOR PILOT MODELS 204/MP (/FO) - 205/MP (/FO) (DECREASE VERSION)

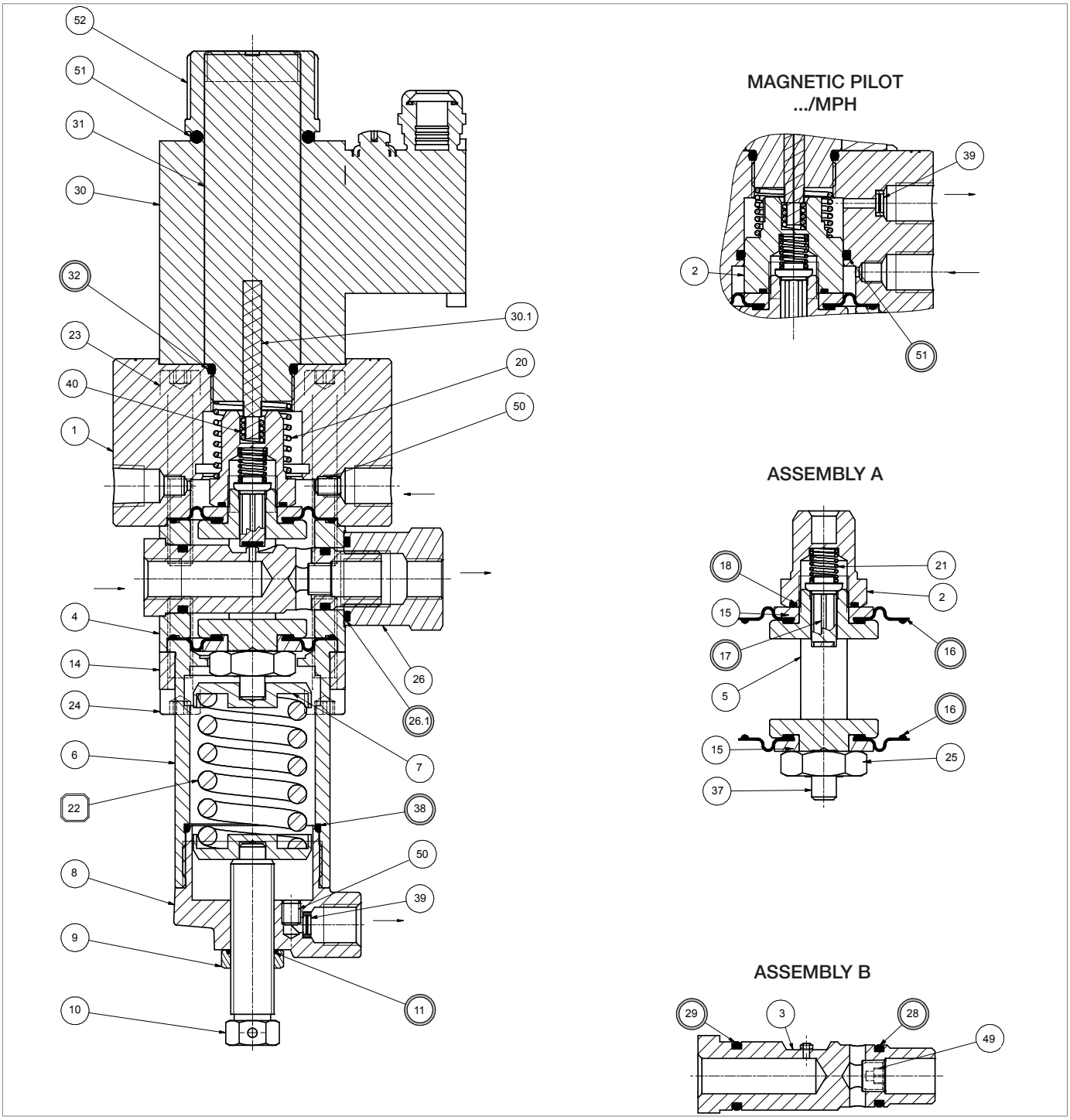
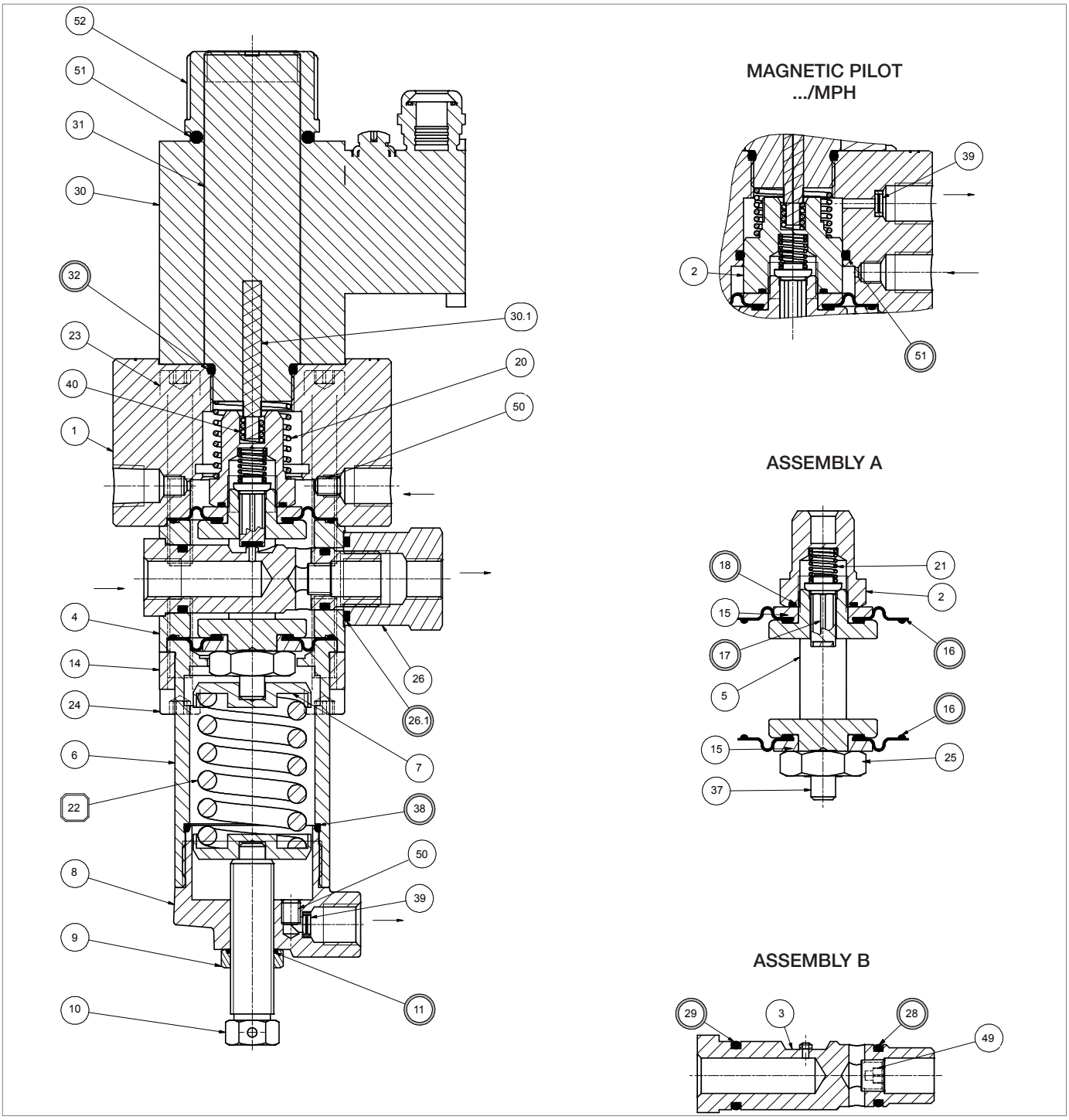


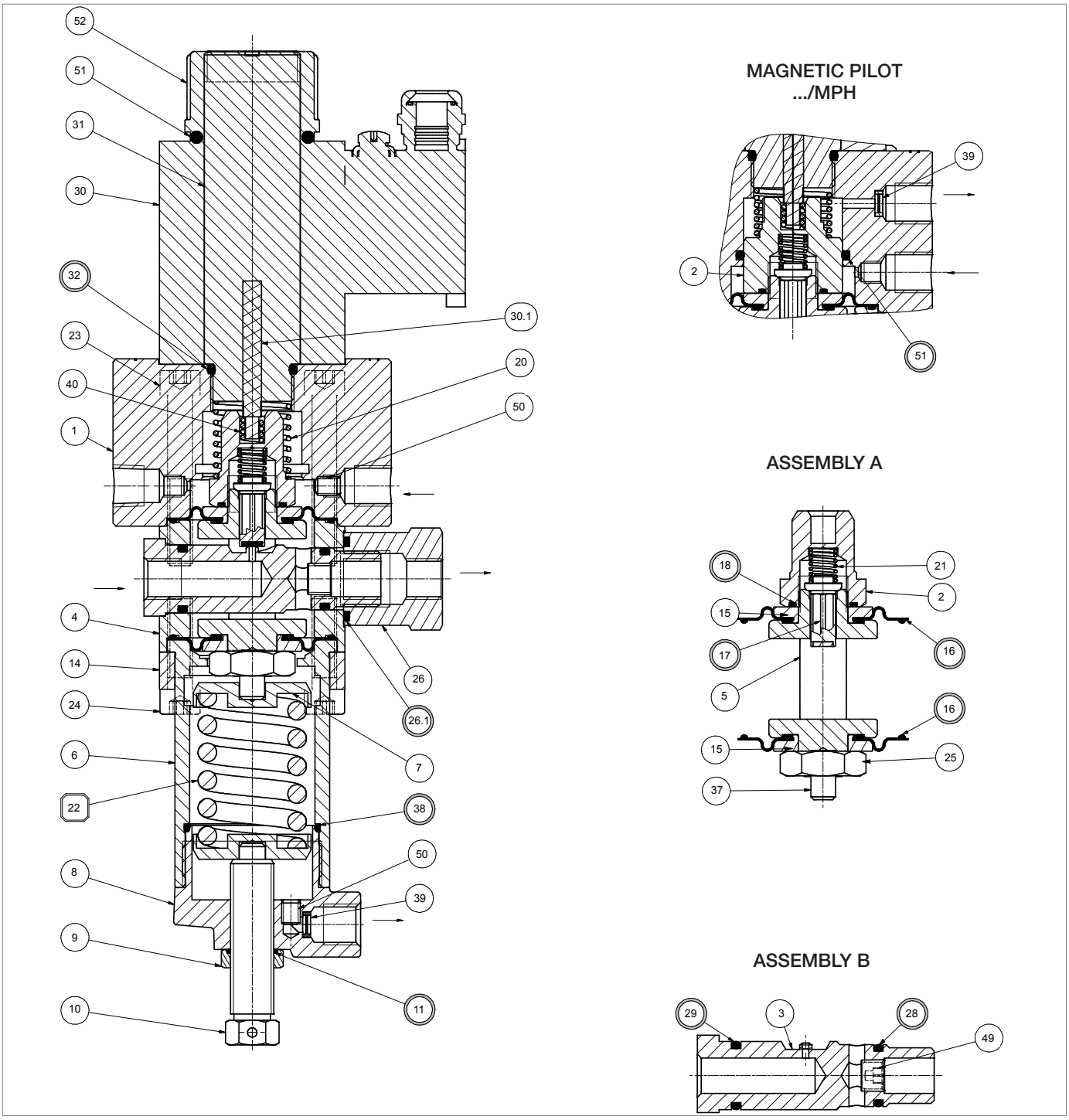
Fig. 9.33. Pilot 204/MP(H)/D (/FO) - 205/MP(H)/D (/FO) (decrease version)

Passo	Azione
1	Unscrew and remove the cap (52) of the magnetic actuator (31), replace the O-ring (51) only if it is particularly worn.
2	Remove the outer case of the magnetic actuator (31).
3	Unscrew the central tube (30)
4	Remove the stem (30.1) from the central tube (30).
5	Remove the O-ring (32) from the cap (8) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
6	Loosen the nut (9).
7	Completely release the spring (22) by turning the adjusting screw (10).
8	Remove the adjusting screw (10) together with the cap (9).
9	Remove the cap (8).
10	Remove the O-ring (38) from the cap (8) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
11	Remove the spring (22) and the spring supports (7).
12	Undo and remove the screws of the lower section (24).
13	Remove the bracket (14) from the sleeve (6).
14	Remove the sleeve (6).
15	Undo and remove the screws of the upper section (23).
16	Remove the pilot cover (1).
17	Unscrew and remove the nut (26).
18	Remove the O-ring (26.1) from the nut (26) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
19	Remove assembly “B” (valve).
20	Remove the O-rings (28, 29) from the valve seat (3) and replace them, taking care to lubricate them with synthetic grease. **NOTICE!** **Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.**
21	Remove assembly “A” (plug) from the valve body (4) by pushing it from the bottom upwards.
22	Unscrew and remove the pilot nut (2).
23	**FOR MPH VERSION** Remove the O-ring (51) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**
24	Remove the O-ring (18) and replace it, taking care to lubricate it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**



Pilot 204/MP(H)/D (/FO) - 205/MP(H)/D (/FO) (decrease version)

Passo	Azione
25	Remove the spring (21).
26	Remove and replace the plug (17).
27	Remove the upper protection disc (15).
28	Remove and replace the upper diaphragm (16), taking care to lubricate the lanyards with synthetic grease. **NOTICE!** **Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.**
29	Unscrew and remove the nut (25).
30	Remove the lower protection disc (15).
31	Remove and replace the lower diaphragm (16), taking care to lubricate the lanyards with synthetic grease. **NOTICE!** **Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.**
32	Fit the lower protection disc (15).
33	Insert and fix the nut (25) according to the following tightening torque: • Pilot 204/MP... (/FO) – 205/MP... (/FO): Tab. 9.46
34	Fit the plug (17) and then the spring (21).
35	Fit the upper protection disc (15).
36	Insert and fix the nut (2) according to the following tightening torque: • Pilot 204/MP... (/FO) – 205/MP... (/FO): Tab. 9.46
37	Insert assembly “A” (plug) from the top downwards into the valve body (4). **NOTICE!** • **Take care not to damage the diaphragms (16) during this step** • **Make sure the marking on the lower section of the headframe is parallel to the axis of the hole for inserting the seat (3) into the valve body (4).**
38	Insert assembly “B” (valve) into the valve body (4). **NOTICE!** **Take care not to damage the O-rings (28, 29) and the valve seat (3).**
39	Fit the springs (20) and (40).
40	Insert and fix the nut (26) according to the following tightening torque: • Pilot 204/MP... (/FO) – 205/MP... (/FO): Tab. 9.46
41	Fit the cover (1).
42	Insert and fix the screws of the upper section (23) according to the following tightening torque: • Pilot 204/MP... (/FO) – 205/MP... (/FO): Tab. 9.46
43	Fit the sleeve (6) and the bracket (14).
44	Insert and fix the screws of the lower section (24) according to the following tightening torque: • Pilot 204/MP... (/FO) – 205/MP... (/FO): Tab. 9.46
45	Fit the spring (22) and the spring supports (7).
46	Screw the cap (8).
47	Remove and replace the O-ring (11) from the nut (9), lubricating it with synthetic grease. **NOTICE!** **Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.**



Pilot 204/MP(H)/D (/FO) - 205/MP(H)/D (/FO) (decrease version)

Passo	Azione
48	Fit the adjusting screw (10) together with the cap (9).
49	Place the stem (30.1) in the central tube (30).
50	Tighten the central tube (30) with the O-ring (32).
51	Slide the outer body (31) of the magnetic actuator onto the tube (30).
52	Insert O-ring (51) and screw in the cap (52) of the magnetic actuator.

Tab. 9.52.

⚠ WARNING!

Ensure that all parts have been fitted correctly.

9.4.3.6 - RECONNECT PILOT SERIES 200/MP(H)

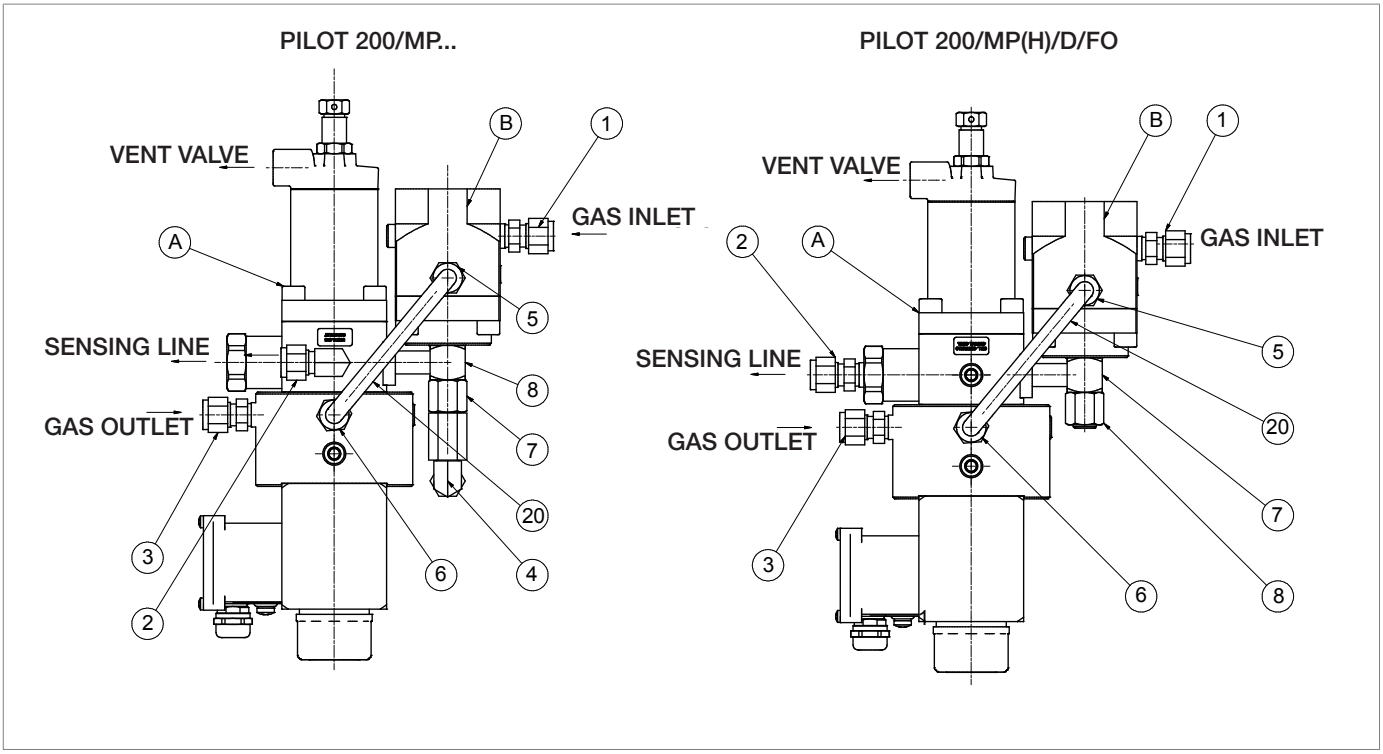


Fig. 9.34. Pilot reconnection series 200/MP

To disconnect the pilot, proceed as indicated in Tab. 9.53 (vedere Fig. 9.34):

Passo	Azione
1	Insert and fix the screw (7) in the 200/MP.
2	Insert and fix the screw (6) to reconnect the pre-regulator R14/A or il R31/A to the pilot 200/MP.
3	Connect the pipe (20) by adjusting the fittings (4, 5).
4	Insert and fix the fixing screw to connect the pilot to the regulator.
5	Connect the sensing lines between the pilot and the regulator by adjusting the fittings (1, 2, 3).

Tab. 9.53

9.4.3.7 - RECONNECT THE PILOT GROUP TO THE REGULATOR

AVVISO!

Please refer to the manual of the installed pressure regulator.

AVVERTENZA!

Ensure that all parts have been fitted correctly.

9.4.4 - MAINTENANCE PROCEDURE OF THE MAGNETIC ACTUATOR

The magnetic actuator requires no routine maintenance. No dust is allowed on the surface of the device with a thickness > 5 mm. Remove any dust present.

9.4.5 - PROCEDURE FOR RECOMMISSIONING AFTER MAINTENANCE

AVVISO!

For the recommissioning procedure, refer to the relevant paragraph.

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10 - TROUBLESHOOTING

Listed below are the cases (causes and tripping) that could occur in the form of malfunctions of various kinds over time. These situations depend on the conditions of the gas as well as on the natural ageing and wear of the materials.

10.1 - GENERAL WARNINGS

HAZARD!

Maintenance work must be carried out by qualified personnel:

- **trained on workplace safety also based on the regulations in force in the place of installation of the work equipment;**
- **qualified and authorised to carry out activities related to the equipment.**

WARNING!

PIETRO FIORENTINI S.p.A. shall not be held liable for any damage to people and property due to services:

- **other than those described;**
- **performed according to methods other than those specified;**
- **carried out by unsuitable personnel.**

NOTICE!

If an operating fault occurs and qualified personnel are not available for the specific intervention, call the Assistance Centre authorised by PIETRO FIORENTINI S.p.A.

10.2 - OPERATOR QUALIFICATION SPECIFICATION

Commissioning	
Operator qualification	• Mechanical maintenance technician; • Electrical maintenance technician; • Installer; • Name of the user.
PPE required	 **⚠ WARNING!** **The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:** • **the regulations in force in the country of installation;** • **any information provided by the Safety Manager at the installation facility.**
Necessary equipment	Please refer to the chapter “7 - Commissioning/maintenance equipment”.

Tab. 10.54

10.3 - TROUBLESHOOTING PROCEDURES

For proper troubleshooting, proceed as follows:
- close the upstream and downstream shut-off valves;
- refer to the troubleshooting tables listed below.

10.4 - TROUBLESHOOTING TABLES

NOTICE!

See chapter "9 - Maintenance and functional checks" for pictures of the regulator PILOT 200/MP and its accessories.

10.4.1 - TROUBLESHOOTING PILOT 200/MP

Guasto	Apparecchio	Cause possibili	Intervento
Operation faults	200/MP SERIES PILOT	Worn diaphragms (16)	Replace
		Spring (22) collapsed or out of level	Reposition and replace if necessary
		AC out of class due to unsuitable spring (22)	Replace
		SG out of class due to dirty or worn plug (17)	Clean and replace if needed
		Stem of magnetic actuator not correctly mounted	Check mounting
		Incorrect electrical connection	Check that the switchboard and PWM module are powered
		Electrical cable cut	Replace electrical cable
		PWM current range incorrectly set	Change PWM module min. and max. current values
Failed sealing or zero flow rate	200/MP SERIES PILOT	Damaged plug (17)	Replace
		Diaphragm holder (16) and plug (17) assembly locked in open position	Check and clean if needed
		Plug spring (21) collapsed	Replace
		Downstream sensing line obstructed	Clean
Downstream pressure increases in delivery	200/MP SERIES PILOT	Damaged plug (17)	Replace
		Diaphragm holder (16) and plug (17) assembly locked in open position	Check and clean if needed
		Plug spring (21) collapsed	Replace
		Obstructed downstream sensing line	Clean
		PWM module set-point value incorrectly set	Change PWM module parameters
Downstream pressure decreases in delivery	200/MP SERIES PILOT	PWM module set-point value incorrectly set	Change PWM module parameters
		Diaphragm holder (16) and plug (17) assembly locked in open position	Check and clean if needed
		Obstructed downstream sensing line	Clean
		PWM module set-point value incorrectly set	Change PWM module parameters

Tab. 10.55.

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11 - UNINSTALLATION AND DISPOSAL

11.1 - GENERAL SAFETY WARNINGS

HAZARD!

Make sure that there are no potentially explosive ignition sources in the work area set up to uninstall and/or dispose of the equipment.

WARNING!

Before proceeding with uninstallation and disposal, make the equipment safe by disconnecting it from any power supply.

11.2 - QUALIFICATION OF THE OPERATORS IN CHARGE

Commissioning	
Operator qualification	Installer
PPE required	 **WARNING!** **The PPE listed in this table is related to the risk associated with the equipment. For the PPE required to protect against risks associated with the workplace, installation or operating conditions, please refer to:** • **the regulations in force in the country of installation;** • **any information provided by the Safety Manager at the installation facility.**
Necessary equipment	Please refer to the chapter “7 - Commissioning/maintenance equipment”.

Tab. 11.56

11.3 - UNINSTALLATION

ATTENTION!

Before uninstalling the equipment, completely drain the fluid in the reduction line and inside the equipment.

NOTICE!

For equipment uninstallation procedures, please refer to the installation procedures (see chapter “6 - Installation”), proceeding in reverse order.

11.4 - INFORMATION REQUIRED IN CASE OF RE-INSTALLATION

NOTICE!

Should the equipment be reused after uninstallation, refer to chapter:

- **“6 - Installation”;**
- **“8 - Commissioning”.**

11.5 - DISPOSAL INFORMATION

NOTICE!

Bear in mind that the laws in force in the country of installation must be complied with.
Illegal or improper disposal involves the application of the penalties provided for by the legislation in force in the country of installation.

NOTICE!

Proper disposal prevents damage to humans and the environment and promotes the reuse of precious raw materials.

The equipment was manufactured with materials that can be recycled by specialised companies.
For proper disposal of the equipment, proceed as specified in “Tab. 11.57”:

Step	Action
1	Set up a large work area free from obstacles where to safely dismantle the equipment.
2	Sort the various components by type of material for easier recycling through separate collection.
3	Send the materials obtained in **Step 2** to a specialised company.

Tab. 11.57

The equipment in any configuration consists of the following materials:

Material	Disposal/recycling indications
Plastic	It must be dismantled and disposed of separately.
Lubricants/Oils	They must be collected and delivered to the appropriate specialised and authorised collection and disposal centres.
Iron	Disassemble and collect separately. It must be recycled through the specific collection centres.
Steel	Disassemble and collect separately. It must be recycled through the specific collection centres.
Aluminium	Disassemble and collect separately. It must be recycled through the specific collection centres.
Pneumatic/electric components	They must be dismantled in order to be reused if they are still in good condition or, if possible, overhauled and recycled.

Tab. 11.58

NOTICE!

Please refer to the chapter “9 - Maintenance and functional checks” to better identify the composition of the equipment and its parts.

12 - RECOMMENDED SPARE PARTS

12.1 - GENERAL WARNINGS

NOTICE!

If spare parts not marked are used, PIETRO FIORENTINI S.p.A. their declared performance cannot be guaranteed.
It is recommended to use original spare parts PIETRO FIORENTINI S.p.A.
PIETRO FIORENTINI S.p.A. shall not be held liable for any damage caused by using non-original parts.

12.2 - HOW TO REQUEST SPARE PARTS

NOTICE!

For specific information, please refer to the sales network of PIETRO FIORENTINI S.p.A.

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13 - CALIBRATION TABLES

13.1 - 200 SERIES PILOT CALIBRATION TABLES

The adjustment ranges of the different pilots are shown in the following tables:

Pilot 201/MP/D							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2700680	Brown	2,3	60	35	0,007	0,028
2	2700830	Red/Black	2,5			0,029	0,050
3	2700920	White/Yellow	2,8			0,051	0,085
4	2701040	White/Orange	3			0,086	0,120
5	2701260	White	3,5			0,121	0,250
6	2701530	Yellow	4			0,251	0,580
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.59

Pilot 204/MP/D REFLUX 819							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2701260	White	3,5	60	35	0,3	1
2	2701530	Yellow	4			1,001	2
3	2702070	Orange	5			2,001	6
4	2702450	Red	6			6,001	12
5	2702815	Green	7			12,001	18
6	2703220	Black	8			18,001	28
7	2703420	Blue	8,5			28,001	43
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.60

Pilot 204/MP/D REVAL 182							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2701260	White	3,5	60	35	0,3	1
2	2701530	Yellow	4			1,001	2
3	2702070	Orange	5			2,001	6
4	2702450	Red	6			6,001	12
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.61

Pilot 204/MPH/D REFLUX 819							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2701260	White	3,5	60	35	2,5	6
2	2701530	Yellow	4			6,001	12
3	2702070	Orange	5			12,001	36
4	2702450	Red	6			36,001	43
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.62

Pilot 204/MPH/D REVAL 182							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2701260	White	3,5	60	35	0,3	1
2	2701530	Yellow	4			1,001	2
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.63

Pilot 201/MP/I							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2701260	White	3,5	60	35	0,007	0,120
2	2701530	Yellow	4			0,121	0,450
3	2702070	Orange	5			0,451	0,580
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.64

Pilot 204/MP/I REFLUX 819							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2701530	Yellow	4	60	35	0,2	1
2	2702070	Orange	5			1,001	5
3	2702450	Red	6			5,001	11
4	2702815	Green	7			11,001	17
5	2703220	Black	8			18,001	28
6	2703420	Blue	8,5			28,001	43
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.65

Pilot 204/MP/I REVAL 182							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2701530	Yellow	4	60	35	0,2	1
2	2702070	Orange	5			1,001	5
3	2702450	Red	6			5,001	11
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.66

Pilot 204/MPH/I REFLUX 819							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2701530	Yellow	4	60	35	2,5	7
2	2702070	Orange	5			7,001	31
3	2702450	Red	6			31,001	43
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.67

Pilot 204/MPH/I REVAL 182							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2701530	Yellow	4	60	35	2,5	7
2	2702070	Orange	5			7,001	31
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.68

Pre-regulator R31/A							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2700493	Yellow	1,8	40	22	0,180	0,360
2	2700525	Orange	2			0,250	0,440
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm) **Min./Max. =** pressione (bar)							

Tab. 13.69.

Pre-regulator R14/A							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2700525	Orange	2	40	22	0,65	2,15
2	2700645	Red	2,3			1,25	2,8
3	2700775	Green	2,5			1,95	3,6
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm) **Min./Max. =** pressione (bar)							

Tab. 13.70.

13.2 - 200/MP(H)/FO SERIES PILOT CALIBRATION TABLES

Pilot 204/MP/D/FO							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2701541	White	4	100	35	1	2,2
2	2701800	Yellow	4,5			2,201	3,5
3	2702080	Orange	5			3,501	5
4	2702290	Red	5,5			5,001	8
5	2702460	Green	6			8,001	13
6	2702660	Black	6,5			13,001	20
7	2702820	Blue	7			20,001	33
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.71

Pilot 204/MPH/D/FO							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2701541	White	4	100	35	4,5	10,5
2	2701800	Yellow	4,5			10,501	16,5
3	2702080	Orange	5			16,501	24
4	2702290	Red	5,5			24,001	35
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.72

Pilot 205/MP/D/FO							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2702820	Blue	7	100	35	20	30
2	2703045	Brown	7,5			30,001	44
3	2703224	Grigio	8			44,001	60
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.73

Pilot 205/MPH/D/FO							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2702080	Orange	5	100	35	20	26
2	2702290	Red	5,5			26,001	38
3	2702460	Green	6			38,001	60
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm)							

Tab. 13.74

Pre-regulator R14/A							
Pos.	**Spring item code**	**Spring colour**	**d**	**Lo**	**De**	**Min.**	**Max**
1	2700629	Yellow	2,2	40	22	1,1	1,1
2	2700645	Red	2,3			1,4	1,4
3	2700648	Azzurro	2,3			1,7	1,7
4	2700775	Green	2,5			2	2
d = Wire Diameter (mm) **Lo =** Spring length (mm) **De =** External Diameter (mm) **Min./Max. =** pressione (bar)							

Tab. 13.75.

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