

Aperflux 851

High medium pressure gas regulator



Revision B - Edition 10/2022

**USE, MAINTENANCE
AND WARNING
MANUAL**

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 CONSIDERATIONS

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.

Revision: B

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1.1 - REVISION HISTORY

Revision index	Date	Revision contents
A	08/2021	First issue
B	10/2022	Chapter 13: <ul style="list-style-type: none">• calibration table for pressure switch model 102M: spring 2700513 added• calibration tables for pressure switches models 103M/MH, 104M/MH, 105M/MH: spring 2702450 substitutes spring 2702454

Tab. 1.1.

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2 - GENERAL INFORMATION

2.1 - MANUFACTURER IDENTIFICATION

Manufacturer	PIETRO FIORENTINI S.P.A.
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Tab. 2.2.

2.2 - IDENTIFICATION OF THE PRODUCT

Equipment	HIGH PRESSURE REGULATOR
Model	APERFLUX 851

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 Aperflux 851 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 2014/68/EU ("Pressure Equipment Directive" PED). The assessment procedure adopted is in accordance with module H1 as per Annex III of the Directive.

NOTE!

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 malfunctioning:

- in the event of any acts or omissions by 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.

NOTE!

The warranty conditions are specified in the commercial contract.

2.5 - ADDRESSEES, SUPPLY AND STORAGE OF THE MANUAL

The manual is intended for the qualified operator in charge of operating and managing the equipment throughout its technical service life.

It contains the necessary information for the correct use of the equipment in order to maintain its functional and qualitative characteristics over time. All information and warnings for correct use in full safety 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 transferred or changes ownership. It is the user's responsibility to keep this documentation intact for consultation throughout the lifespan of the equipment.

WARNING!

Removing, rewriting or modifying the pages of the manual and their contents is not allowed.




Keep the 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.

The original manual has been drawn up in Italian.

Any translations into additional languages are made from the original instructions.

2.6 - 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 manual. The information may also concern the safety of the personnel involved in using the equipment.
	Referring to the instruction manual/booklet is mandatory. Indicates a requirement for the personnel to refer to (and understand) the operating and warning instructions of the equipment 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.

NOTE!

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.

2.7 - NAMEPLATES APPLIED

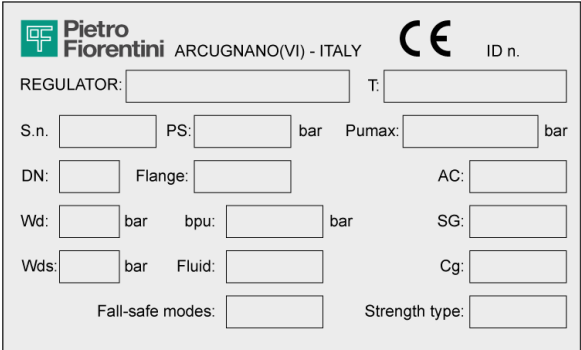

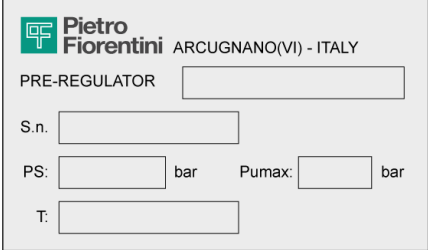



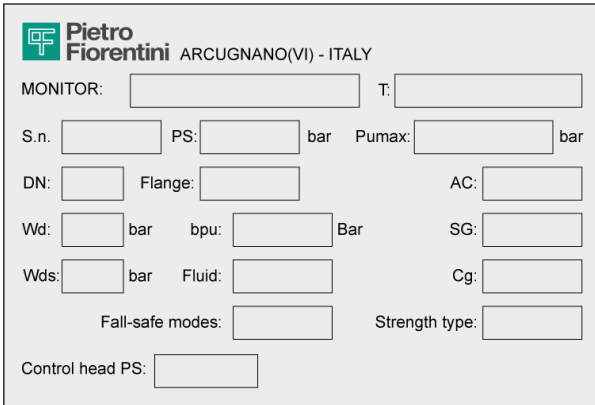


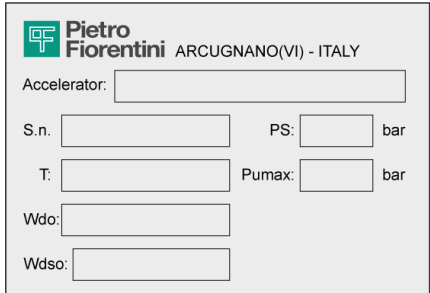
**Removing nameplates and/or replacing them with other plates is strictly not allowed.
Should the plates be unintentionally damaged or removed, the customer must notify
PIETRO FIORENTINI S.p.A.**

The equipment and its accessories are provided with nameplates (from Id.1 to Id.8).

The nameplates specify identification details of the equipment and its accessories to be mentioned in case of need to PIETRO FIORENTINI S.p.A.

List of the nameplates applied:

Id.	Type	Image
1	NAMEPLATE REGULATOR (EC version)	
2	NAMEPLATE PILOT	
3	NAMEPLATE PRE-REGULATOR	
4	NAMEPLATE DB SILENCER	

Id.	Type	Image
5	NAMEPLATE MONITOR	 <p>Pietro Fiorentini ARCUGNANO(VI) - ITALY</p> <p>MONITOR: <input type="text"/> T: <input type="text"/></p> <p>S.n. <input type="text"/> PS: <input type="text"/> bar Pumax: <input type="text"/> bar</p> <p>DN: <input type="text"/> Flange: <input type="text"/> AC: <input type="text"/></p> <p>Wd: <input type="text"/> bar bpu: <input type="text"/> Bar SG: <input type="text"/></p> <p>Wds: <input type="text"/> bar Fluid: <input type="text"/> Cg: <input type="text"/></p> <p>Fall-safe modes: <input type="text"/> Strength type: <input type="text"/></p> <p>Control head PS: <input type="text"/></p>
6	NAMEPLATE SLAM-SHUT VALVE	 <p>Pietro Fiorentini ARCUGNANO(VI) - ITALY</p> <p>SLAM SHUT DEVICE <input type="text"/></p> <p>S.n. <input type="text"/> Class: <input type="text"/></p> <p>DN: <input type="text"/> T: <input type="text"/></p>
7	NAMEPLATE PRESSURE SWITCH	 <p>Pietro Fiorentini ARCUGNANO(VI) - ITALY</p> <p>TRIPPING UNIT: <input type="text"/></p> <p>S.n. <input type="text"/> Wdo: <input type="text"/> Bar</p> <p>T: <input type="text"/> Wdso: <input type="text"/> Bar</p> <p>AG max: <input type="text"/> Wdu: <input type="text"/> Bar</p> <p>AG min: <input type="text"/> Wdsu: <input type="text"/> Bar</p>
8	NAMEPLATE ACCELERATING VALVE	 <p>Pietro Fiorentini ARCUGNANO(VI) - ITALY</p> <p>Accelerator: <input type="text"/></p> <p>S.n. <input type="text"/> PS: <input type="text"/> bar</p> <p>T: <input type="text"/> Pumax: <input type="text"/> bar</p> <p>Wdo: <input type="text"/></p> <p>Wdso: <input type="text"/></p>

Tab. 2.5.

2.7.1 - GLOSSARY FOR NAMEPLATES

The terms and abbreviations used on the nameplates are described below:

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	Mark certifying compliance with applicable European directives.
Cg	Flow rate coefficient.
Class	Alphanumeric designation used for references 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 threading.
Fluid	Type of fluid compatible with the equipment.
ID no.	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	Lock-up pressure class.
Slam shut device	Slam-shut valve family.
S.n.	Equipment serial number.
Strength type	Resistance class: Integral strength or differential strength (DS).
T	Permissible temperature range (min. and max.) for which the equipment was designed.
Triggering 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 as a result of triggering caused by pressure increase of the pressure switch incorporated in 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 as a result of triggering caused by pressure increase of the pressure switch incorporated in the slam-shut valve. This range can be obtained by adjusting but not replacing the components.
Wdu	Full setpoint range as a result of triggering caused by pressure decrease of the pressure switch incorporated in the slam-shut valve. This range can be obtained by adjusting and/or replacing the components (for example, spring or sensitive element).

Term	Description
Wdsu	Full setpoint range as a result of triggering caused by pressure decrease of the pressure switch incorporated in the slam-shut valve. This range can be obtained by adjusting but not replacing the components.

Tab. 2.6.

2.8 - GLOSSARY OF MEASUREMENT UNITS

Type of measurement	Unit of measurement	Description
Volumetric flow rate	Stm 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	water column inch
	Pa	Pascal
Temperature	°C	Degree centigrade
	°F	Fahrenheit Degree
	K	Kelvin
Tightening torque	Nm	Newton metro
	ft-lbs	Foot per pound
Sound pressure	dB	Decibel
Other measures	V	Volt
	W	Watt
	Ω	Ohm

Tab. 2.7.

2.9 - QUALIFIED PROFESSIONAL FIGURES

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

Professional figure	Definition
Maintenance mechanical technician	<p>Qualified technician able to:</p> <ul style="list-style-type: none"> perform preventive/corrective maintenance operations on all mechanical parts of the equipment subject to maintenance or repair; access all device parts for visual inspection, checking equipment status, making adjustments and calibrations. <p>The maintenance mechanical technician is not authorised to operate on live electrical systems (if any).</p>
Electrical maintenance technician	<p>Qualified technician able to:</p> <ul style="list-style-type: none"> 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. <p>The electrical maintenance technician can operate in the presence of voltage inside electrical panels, junction boxes, control equipment etc. only if he/she is a suitable person (S.P.). For general requirements, refer to the CEI EN 50110-1: 2014 standard.</p>
Worker in charge of transport, handling, unloading and placement on site	<p>Qualified operator:</p> <ul style="list-style-type: none"> for the use of lifting equipment; for the handling of materials and equipment. <p>Lifting and handling of the equipment must be carried out strictly in accordance with the instructions provided by the manufacturer and in compliance with the regulations in force at the place where the equipment is installed.</p>
Installer	<p>Qualified operator able to:</p> <ul style="list-style-type: none"> 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	<p>Technician trained and authorised to use and manage the equipment for the activities it was supplied for. They must:</p> <ul style="list-style-type: none"> be able to perform all operations required for the proper functioning of the equipment and the system, and for their safety or that of any personnel present; have proven experience in the correct use of equipment like that described in this manual and be trained, informed and instructed in this regard. <p>The technician may carry out maintenance only if authorised/qualified to do so.</p>

Tab. 2.8.

3 - SAFETY

3.1 - GENERAL SAFETY INSTRUCTIONS

WARNING!

The equipment described in this 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 "dangerous area" as there are residual risks of the formation of potentially explosive atmospheres.

In "dangerous areas" and in the immediate vicinity it is absolutely:

- necessary that there are no effective sources of ignition;
- necessary that there is no smoking.

ATTENTION!

Authorised operators must not carry out operations or interventions on their own initiative that are not within their competence.

Never operate the equipment:

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

NOTE!

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 that they are working in;
- obtain the necessary permits to operate when required;
- equip themselves with the necessary personal protection required in the procedures described in this manual;
- ensure that the area that they are operating in is equipped with the required collective protections and the necessary safety information.

3.2 - PERSONAL PROTECTIVE EQUIPMENT

Table 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 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 personnel to use accident-prevention safety shoes.
	Obligation to use noise protection equipment. Indicates a requirement for personnel to use ear muffs or ear plugs to protect their hearing.
	Obligation to wear protective clothing. Indicates a requirement for personnel to wear specific protective clothing.
	Obligation to use a protective mask. Indicates a requirement for personnel to use respiratory masks in the event of a chemical risk.
	Obligation to use a protective helmet. Indicates a requirement for personnel to use the protective helmet.
	Obligation to wear a high visibility vest. Indicates a requirement for personnel to use a high visibility vest.

Tab. 3.9.

WARNING!

Each licensed operator is obliged to:

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

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 the 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 leakage. Projection of metallic and non-metallic pressurised parts.	<ul style="list-style-type: none"> violent impact; impact (also due to falling, improper handling, etc.). 	<ul style="list-style-type: none"> deformation; breakage of connections and, if pressurised, even burst. 	<p>a. Handling and installation with appropriate devices to avoid localised stress.</p> <p>b. Installation in suitable places and spaces with appropriate protections, suitable packaging.</p> <p>c. Information in the instructions for use and warning.</p>
Pressurised gas leakage. Projection of metallic and non-metallic pressurised parts.	<ul style="list-style-type: none"> Use of inappropriate fluids. 	<ul style="list-style-type: none"> corrosion; embrittlement; explosion. 	<p>a. The user must check compliance of the used fluid with the specifications on the data plate.</p>
Pressurised gas leakage. Projection of metallic and non-metallic pressurised parts.	<ul style="list-style-type: none"> operation at temperatures below the minimum permissible temperature. 	<ul style="list-style-type: none"> embrittlement; breaking; explosion. 	<p>a. Install in places where the temperature is not below the minimum permissible temperature and/or insulate the equipment adequately.</p> <p>b. The minimum temperature allowed is indicated on the data plate.</p>
Pressurised gas leakage. Projection of metallic and non-metallic pressurised parts. Explosion.	<ul style="list-style-type: none"> overpressure or exceeding of the rated limit values (maximum pressure allowed) 	<ul style="list-style-type: none"> explosion; breaks; cracks; permanent deformation. 	<p>a. The device has appropriate design safety margins.</p> <p>b. The user must check the maximum pressure applicable to the equipment.</p> <p>c. The maximum allowable pressure is highlighted on the appropriate plate on the equipment.</p>
Falling of the equipment.	<ul style="list-style-type: none"> dangerous handling. 	<ul style="list-style-type: none"> deformation; cracking; breaking. 	<p>b. The user must have suitably sized lifting equipment.</p> <p>c. The above requirements are referred to in the equipment use and warning manual.</p>
Pressurised fluid leakage. Projection of metallic and non-metallic pressurised parts.	<ul style="list-style-type: none"> incorrect fixing of the equipment. 	<ul style="list-style-type: none"> deformation; breaking. 	<p>a. The device is equipped with unified type process connections and compression fittings.</p> <p>b. The user must ensure correct fixing to the line.</p> <p>c. Directions in the instructions for use and warning.</p>
Explosion of the device pressurised fluid leakage. Projection of metallic parts.	<ul style="list-style-type: none"> operation at temperatures above the maximum permissible temperature. 	<ul style="list-style-type: none"> reduction of mechanical resistance and breakage of the device; explosion. 	<p>a. The user must equip the system with suitable safety and control devices.</p> <p>b. The maximum temperature allowed is indicated on the data plate.</p>
Pressurised gas leakage.	<ul style="list-style-type: none"> device maintenance with the system running. 	<ul style="list-style-type: none"> inappropriate opening of pressurised chambers. 	<p>a. The user must perform any maintenance with the equipment not in operation.</p> <p>b. The above requirements are referred to in the use and warning manual.</p>

Risk and Hazard	Event and Cause	Effect and Consequence	Solution and Prevention
Pressurised gas leakage. Projection of metallic and non-metallic pressurised parts.	<ul style="list-style-type: none"> external loads bearing on the device. 	<ul style="list-style-type: none"> deformation; cracking and slot formation; if pressurised, also bursting. 	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 leakage. Projection of metallic and non-metallic pressurised parts.	<ul style="list-style-type: none"> electrostatic potential, differential stray currents. 	<ul style="list-style-type: none"> 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 leakage. Projection of metallic and non-metallic pressurised parts.	<ul style="list-style-type: none"> humidity; environments with aggressive atmosphere. 	<ul style="list-style-type: none"> 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

Table 3.11 shows the conditions that can lead to the generation of a potentially explosive atmosphere respectively for:

- APERFLUX 851 pressure regulator;
- PM/819 monitor;
- SB/82 or HB/97 slam shut valves.

Considering that the silencer does not have active functional parts, in this analysis it is considered an integral part of the APERFLUX 851 regulator.

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 "dangerous area" as there are residual risks of the formation of potentially explosive atmospheres.

In the "dangerous areas" and in the immediate vicinity it is absolutely necessary that there are no effective sources of ignition.

Operating conditions	Potentially explosive atmosphere	Regulatory references	Management measures included in the instructions for use and warning
Commissioning	No	<ul style="list-style-type: none"> • During the production cycle and before the CE marking according to Directive 2014/68/EU, the external tightness of the equipment is checked at a value of 1.1 PS (in accordance with Standard EN 334). • Before commissioning, the external tightness of the portion of the system on which the equipment is installed is checked at a suitable pressure (in accordance with standards EN 12186 and EN 12279). 	The instructions for use indicate the need to meet the requirements of Standards EN 12186 and EN 12279.
Operation in normal conditions	No	<p>The indications in the previous point apply, in addition:</p> <ul style="list-style-type: none"> • 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). 	<p>The instructions for use indicate that:</p> <ul style="list-style-type: none"> • 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.

Operating conditions	Potentially explosive atmosphere	Regulatory references	Management measures included in the instructions for use and warning
Breakage of the control head diaphragm (malfunction)	No	<p>This event must be considered as a rare malfunction.</p> <p>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).</p>	<p>The instructions for use indicate the need to meet the requirements of Standards EN 12186 and EN 12279.</p>
Breakage of other non-metallic parts (malfunction)	No	<p>This type of malfunction is not reasonably expected as it involves static seals (to the outside) that cannot generate any external leakage.</p>	-
Decommissioning	No	<ul style="list-style-type: none"> 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. 	<p>The instructions for use indicate the need to meet the requirements of Standards EN 12186 and EN 12279</p>
Reboot	No	<ul style="list-style-type: none"> After reassembling the regulator, carry out an external leakage test at a convenient pressure value as specified by the manufacturer. Before commissioning, the external tightness of the portion of the system on which the equipment is installed is checked at a suitable pressure (in accordance with standards EN 12186 and EN 12279). 	<p>The instructions for use indicate:</p> <ul style="list-style-type: none"> 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:



- 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 nameplates must be checked;
- Avoid violent shocks and impacts that could damage the equipment and, as a result, cause the pressure fluid to escape.

It is strictly 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 you are working on it;
- use the equipment with parameters other than those indicated on the nameplate;
- use the equipment with fluids other than those indicated on the nameplate and in these use and warning instructions;
- use the equipment outside the operating temperature range declared on the nameplate and in these use and warning instructions;
- service the equipment with the portion of the system on which it is installed in operation;
- 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 - RISK 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 headphones 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 APERFLUX 851 is a piloted pressure regulator for medium and high pressure which reduces the inlet gas pressure, keeping the downstream value stable 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	Main regulator	5	Main regulator body
2	Piloting unit	6	Valve seat
3	AR100 lamination valve	7	Pressure control element
4	300 series pilot	8	Control head

Tab. 4.13.

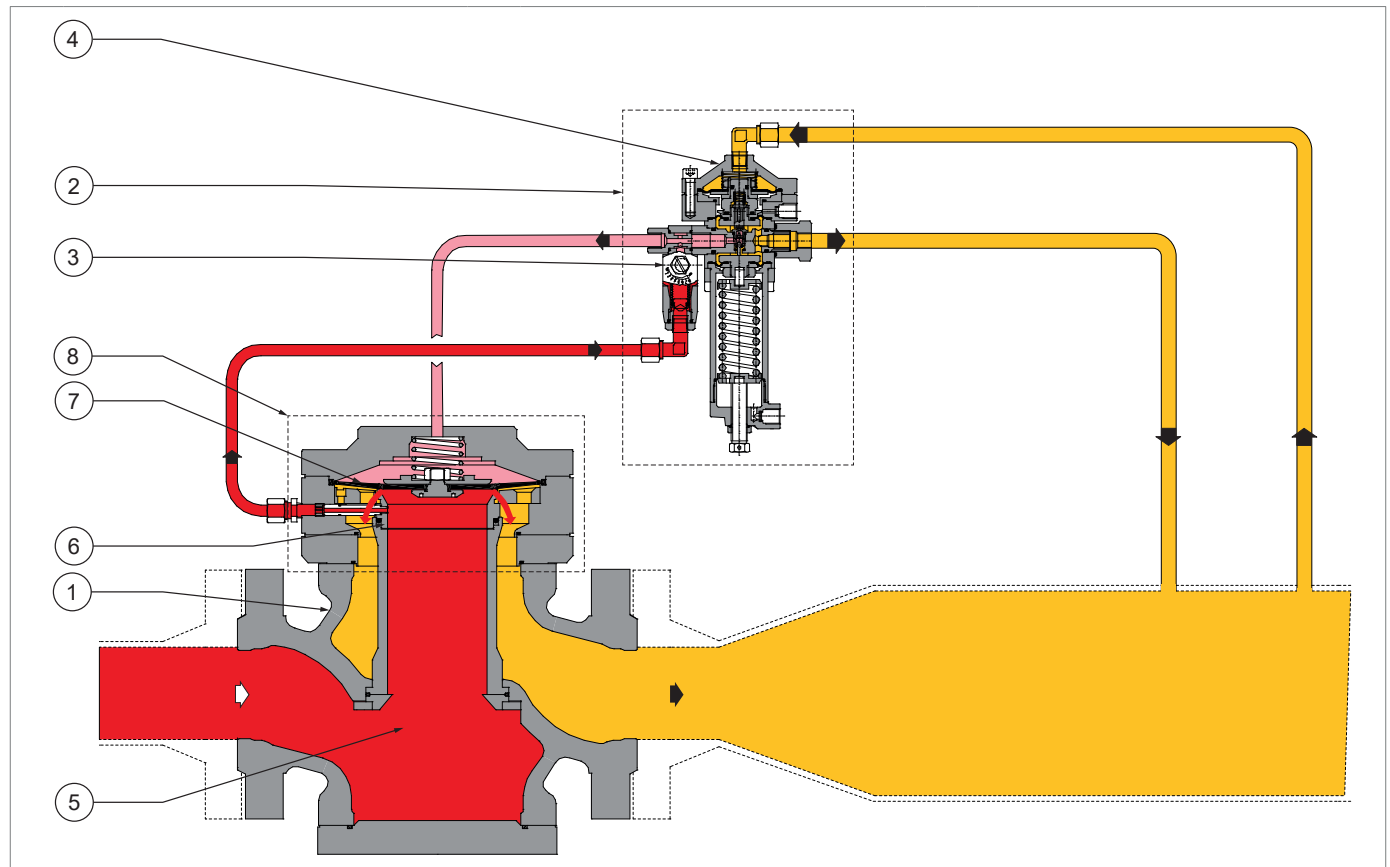


Fig. 4.1. General description APERFLUX 851

4.1.1 - REGULATOR REACTION MODES

The APERFLUX 851 equipment is a regulator piloted with a “fail open” reaction (on-opening reaction), that is, it opens in the event of:

- breakage of the pilot diaphragm(s);
- breakage of the pilot plug;
- no power supply in the pilot circuit.

4.2 - OPERATION

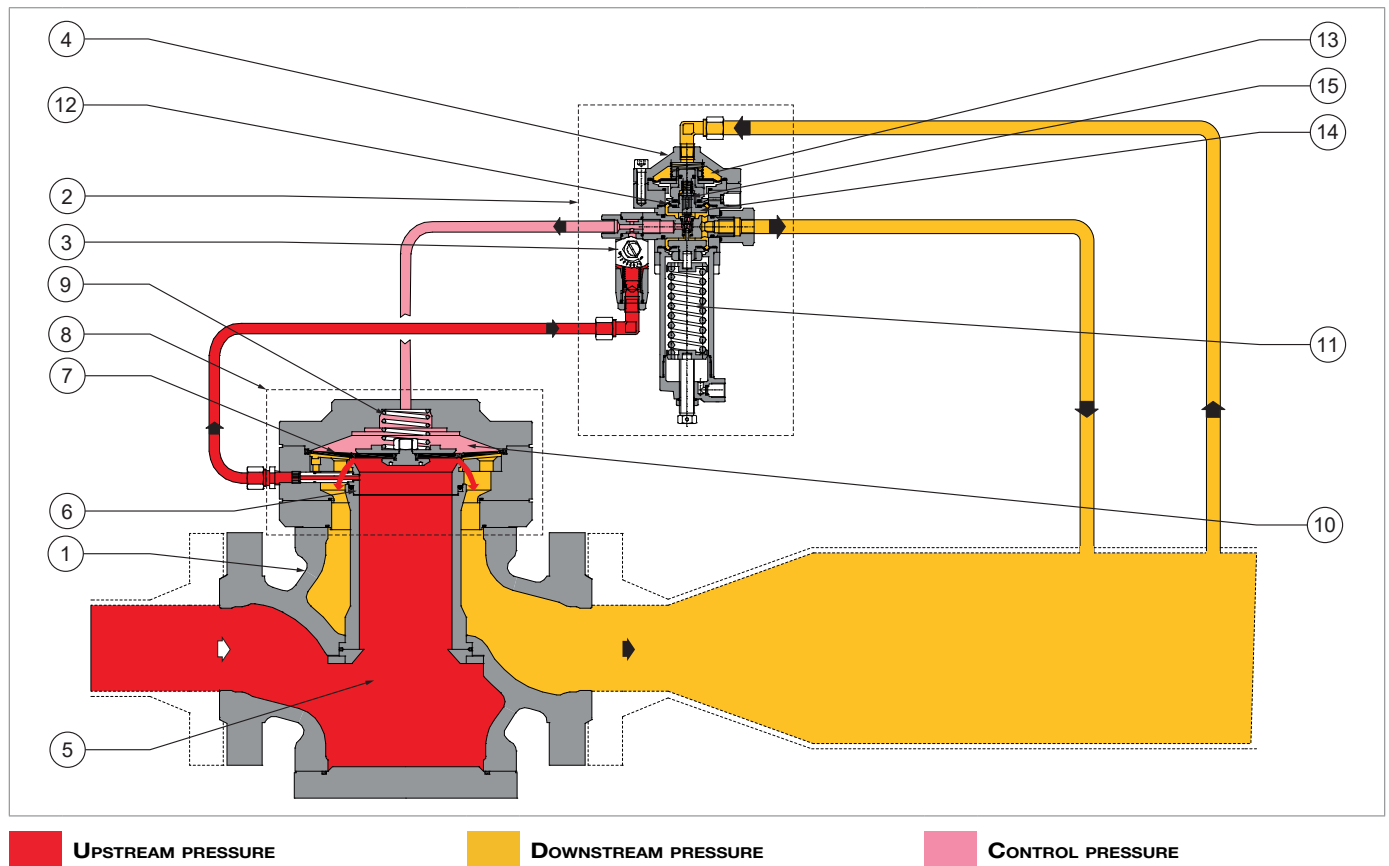


Fig. 4.2. Operation APERFLUX 851

In the control head (8), the pressure control element (7), if not pressurised, is kept in the closed position by the spring (9).

In normal operating conditions, the following forces act on the control element (7):

- on the upper side: spring load (9), thrust resulting from the control pressure (C_p) in the control chamber (10) and weight of the mobile unit;
- on the lower side: thrusts deriving from the upstream (U_p) and downstream (D_p) pressure as well as residual dynamic components.

The gas used to feed the pilot (4) and the control chamber (10) is carried upstream of the control element (7) at the U_p pressure and cleaned of solid contaminants by the filter incorporated in the AR100 lamination valve (3).

The C_p value is adjusted by the pilot (4) by comparing:

- the load of the calibration spring (11);
- the action of the pressure D_p on the diaphragm (12) in the upper chamber (13).

During normal operation, the plug is positioned so that the control pressure (C_p) value above the control element (7) is such as to keep the downstream pressure (D_p) at approximately the selected value. If, during operation, the following should occur:

Operating conditions	Operating consequences	Concluding outcome
Downstream pressure decrease (D_p) lower than the calibration value (D_{ps}), due to an increase in the required flow rate.	Imbalance of the mobile unit (14) which causes: <ul style="list-style-type: none"> • an increase in plug opening (15); • a decrease in control pressure (C_p). 	Increase in gas flow until the downstream pressure (D_p) is restored to the calibration value (D_{ps}).
Increase in downstream pressure (D_p) above the calibration value (D_{ps}), due to a decrease in the required flow rate or an increase in the upstream pressure (U_p).	Imbalance of the mobile unit (14) to the detriment of the calibration spring (11) which causes: <ul style="list-style-type: none"> • partial closure of the plug (15) and flow of a lower quantity of gas; • the increase in the control pressure (C_p) due to the decrease in the pressure loss generated by the lamination valve (3). 	Decrease in gas flow rate until the downstream pressure (D_p) is restored to the calibration value (D_{ps}).

Tab. 4.14.

4.3 - INTENDED USE

4.3.1 - ENVISAGED USE

The equipment in question is intended for:

Permitted Operation	Unpermitted Operation	Work environment
Adjustment of the downstream pressure for:	Gaseous, and non-corrosive, fluids that have been filtered beforehand. <ul style="list-style-type: none"> Liquids. Any product other than those permitted. 	Installations for the transport and distribution of natural gas to supply networks for: <ul style="list-style-type: none"> civil use; industrial use

Tab. 4.15.

The equipment in question is used as a main regulator and in-line monitor regulator.

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

Safe work parameters are:

- use within the limits stated on the nameplate 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.

4.3.2 - REASONABLY FORESEEABLE MISUSE

Reasonably foreseeable misuse means using the equipment in a way that is not envisaged in the design phase but which may result from easily predictable 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 (children, disabled);
- using the equipment in a manner other than that referred to under "Intended 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.

4.3.3 - 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).

NOTE!

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

4.4 - TECHNICAL FEATURES/PERFORMANCE

The APERFLUX 851 equipment is a medium and high pressure regulator.

APERFLUX 851 is a “top entry” type regulator that can be easily serviced and equipped with on-site accessories. The regulation system is balanced and guarantees a stable outlet pressure even when the inlet pressure varies.

The main specifications for this regulator are:

Technical features	
Maximum allowable pressure	Up to 100 bar
Inlet gas temperature range	-10 °C + 60 °C (class 1) -20 °C + 60 °C (class 2)
Ambient temperature range	-20 °C + 60 °C
Input pressure range (bpu)	1 - 85 bar
Possible regulation range (Wd)	0.8 - 74 bar (depending on the pilot installed)
Minimum differential pressure	0.5 bar (recommended > 2 bar)
Accuracy class (AC)	up to 1.5 (depending on operating conditions)
Lock up pressure class (SG)	up to 2.5 (depending on operating conditions)

Tab. 4.16.

Cg, Kg and K1 coefficients							
Nominal diameter [mm]	25	50	80	100	150	200	250
Size [inches]	1”	2”	3”	4”	6”	8”	10”
Coefficient Cg	480	1550	3790	5554	11112	17316	24548
Kg coefficient	504	1627	3979	5837	11678	18199	25850
Coefficient K1	113.9	113.9	113.9	113.9	113.9	113.9	113.9

Tab. 4.17.

4.5 - POSSIBLE CONFIGURATIONS

The APERFLUX 851 equipment can have different configurations through the installation of the following accessories:

- DB/851 silencer
- PM/819 monitor
- SB/82 incorporated slam-shut valve
- HB/97 incorporated slam-shut valve*

* available for nominal diameters DN 100, 150, 200, 250.

The possible configurations are summarised as follows:

APERFLUX 851	Silencer DB/851	Monitor PM/819	Slam-shut valve built-in SB/82	HB/97 incorporated slam-shut valve
DB/851 silencer	-	Yes	Yes	Yes
PM/819 monitor	Yes	-	No	No
SB/82 slam-shut valve	Yes	No	-	No
HB/97 slam-shut valve	Yes	No	No	-

Tab. 4.18.

The accessories can be installed directly at the factory or, at a later time, directly on site.



The installation of accessories is described in the relevant chapter of this manual.

4.5.1 - INCORPORATED SILENCER

The DB/851 silencer (1) is incorporated between the head (2) and the main body of the equipment (3).

The DB/851 silencer reduces the noise generated by the equipment during the lamination process. Noise is absorbed precisely where it is generated, which prevents it from propagating.

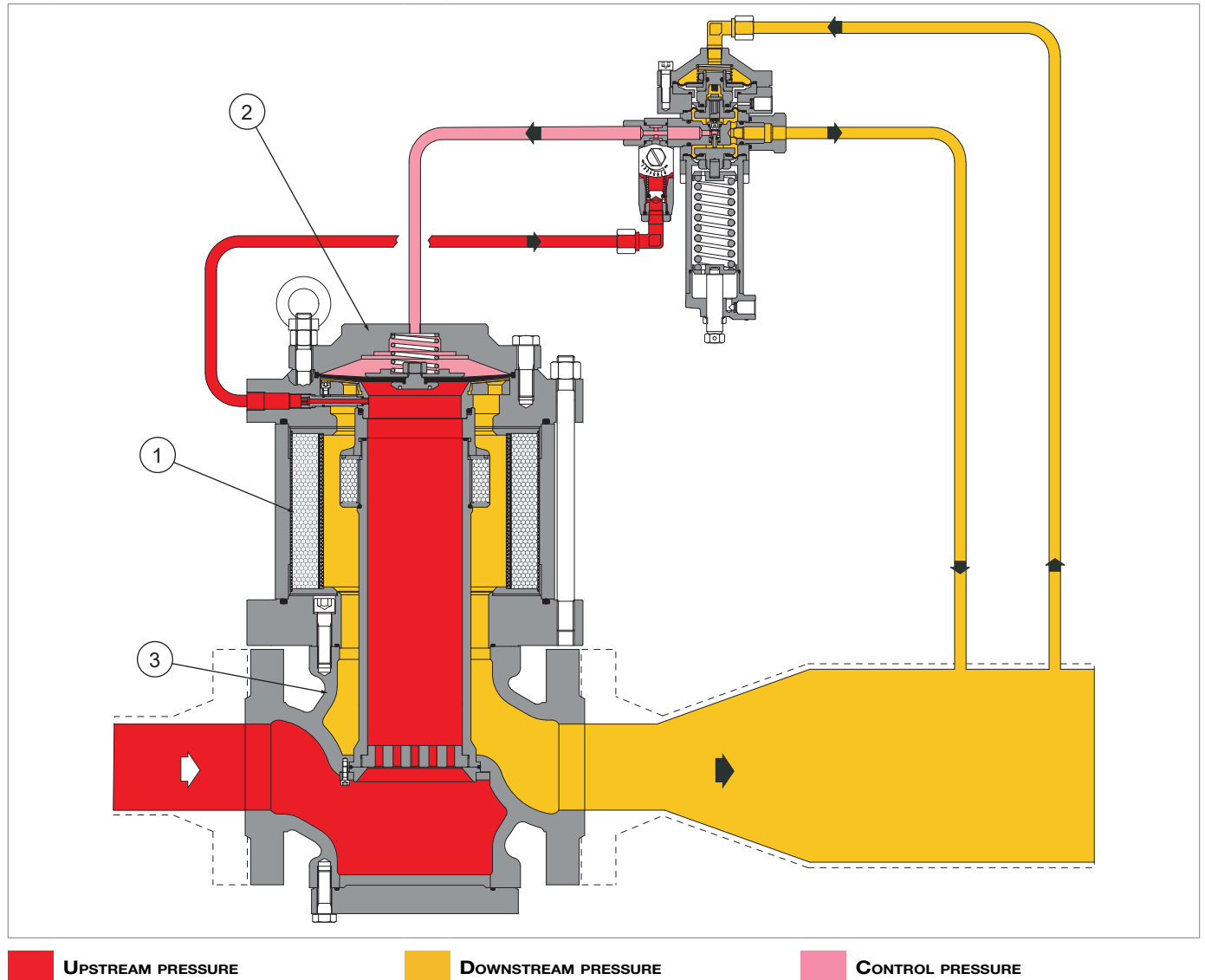


Fig. 4.3. Incorporated DB/851 silencer

4.5.2 - MONITOR

The PM / 819 monitor (1) is normally installed upstream of the main pressure regulator (2) in a fully open position during normal operation.

The PM/819 monitor is used to keep the pressure value downstream of the main regulator within the preset limits in case of failure.

The PM/819 monitor can be:

- incorporated in the regulator (2);
- installed in line with the regulator (2).

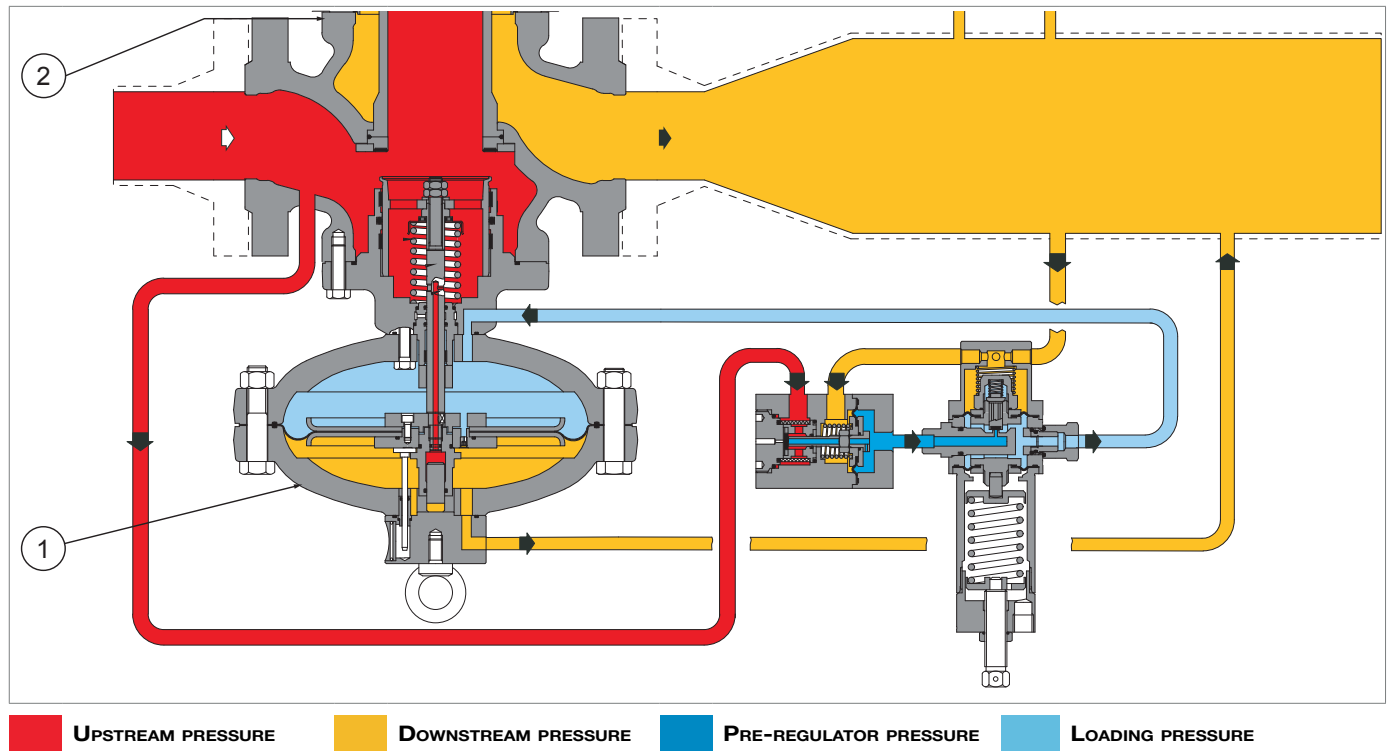


Fig. 4.4. APERFLUX 851 with PM/819 monitor

4.5.2.1 - INCORPORATED MONITOR

The PM/819 monitor (1) is assembled directly on the body of the service regulator (2), converting the equipment into two pressure regulators with a common valve body. The two regulators have the following characteristics:

- they are controlled by two distinct pilots and by independent servomotors;
- they work on independent valve seats.

INCORPORATED MONITOR OPERATION

NOTE!

To check the position of the plug (3), look at the position of the stroke indicator rod (E) referring to the glass cover (F) on the flange (G) of the monitor:

- open 100%;
- closed 0%.

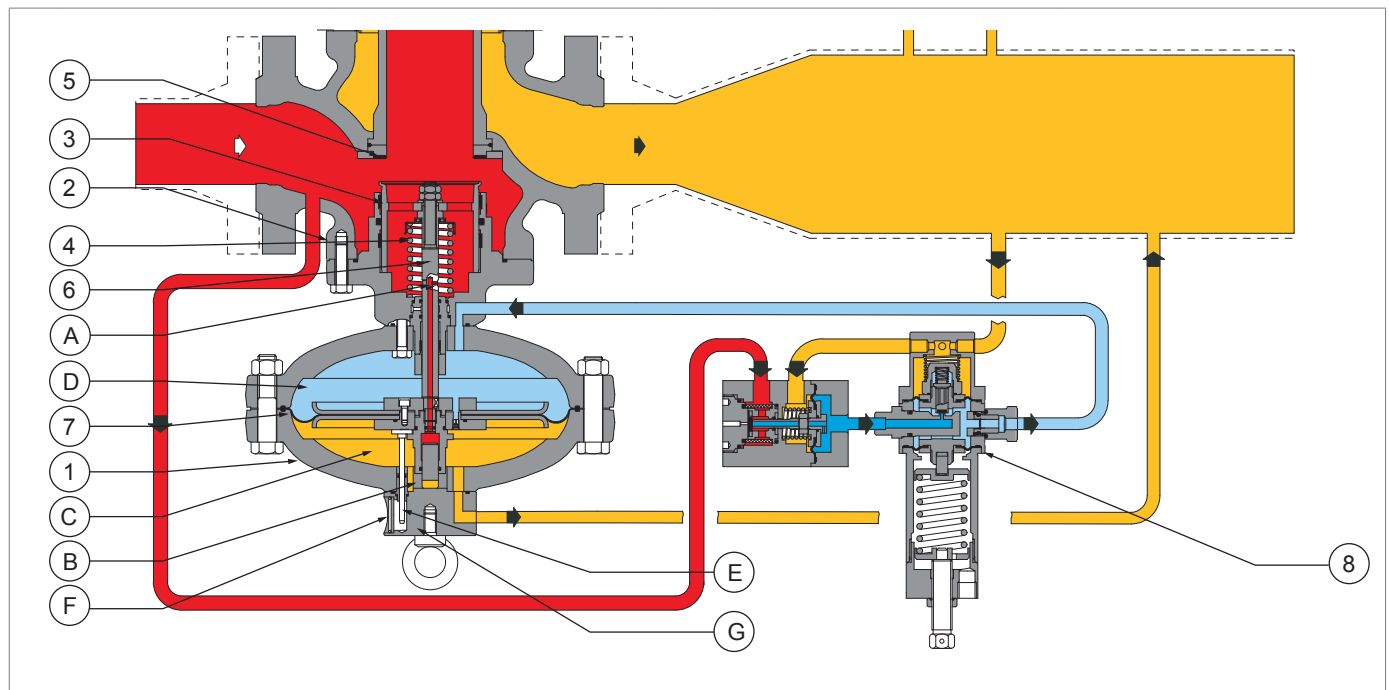
In depressurised conditions, the plug (3) is kept in a closed position by the spring (4) and rests on the reinforced gasket (5).

The upstream pressure (U_p), even if variable, does not change this position as the plug (3) is completely balanced, just like the stem (6), as a result of the upstream pressure (U_p), through the hole (A), in the chamber (B).

The position of the plug (3) is controlled by the movements of the diaphragm (7) that the following act on:

- towards the closed position: the load of the spring (4) and the thrust resulting from the downstream pressure (P_d) in the chamber (C),
- towards the open position: the thrust resulting from the loading pressure (P_m) in the chamber (D), supplied by the pilot (8).

The weight of the mobile unit acts towards the closed or open position depending on where the regulator (2) is installed.



■ UPSTREAM PRESSURE
 ■ DOWNSTREAM PRESSURE
 ■ PRE-REGULATOR PRESSURE
 ■ LOADING PRESSURE

Fig. 4.5. Incorporated monitor operation

OPERATION OF THE INCORPORATED MONITOR IN STAND-BY CONDITIONS:

The PM/819 incorporated monitor (1) is normally open during standard operation as pilot (2) calibration is higher than that of the main regulator's (4) pilot.

The passage of the pre-regulator pressure (P_{ep}), generated by the R14/A pre-regulator (5) through the completely open pilot (2), also keeps the PM/819 incorporated monitor (1) fully open.

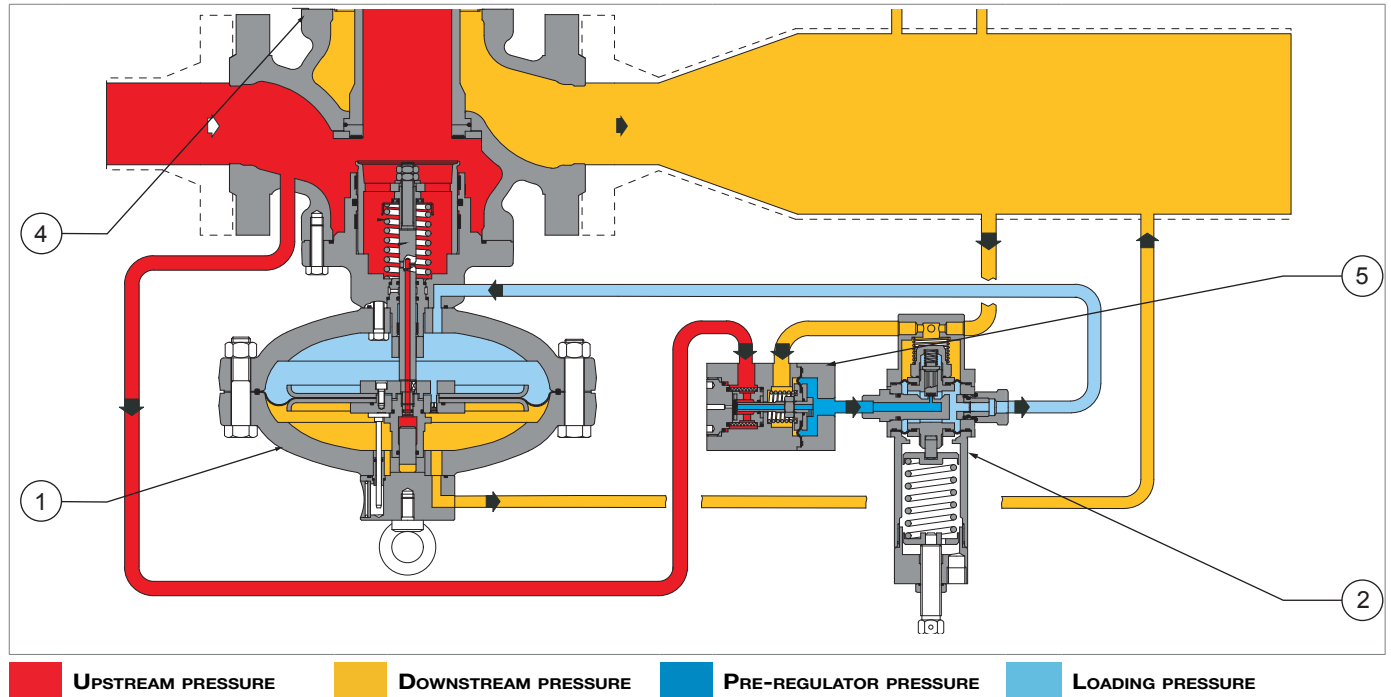


Fig. 4.6. Operation of the built-in monitor in stand-by conditions

INCORPORATED MONITOR OPERATION IN THE EVENT OF FAILURE OF THE MAIN REGULATOR:

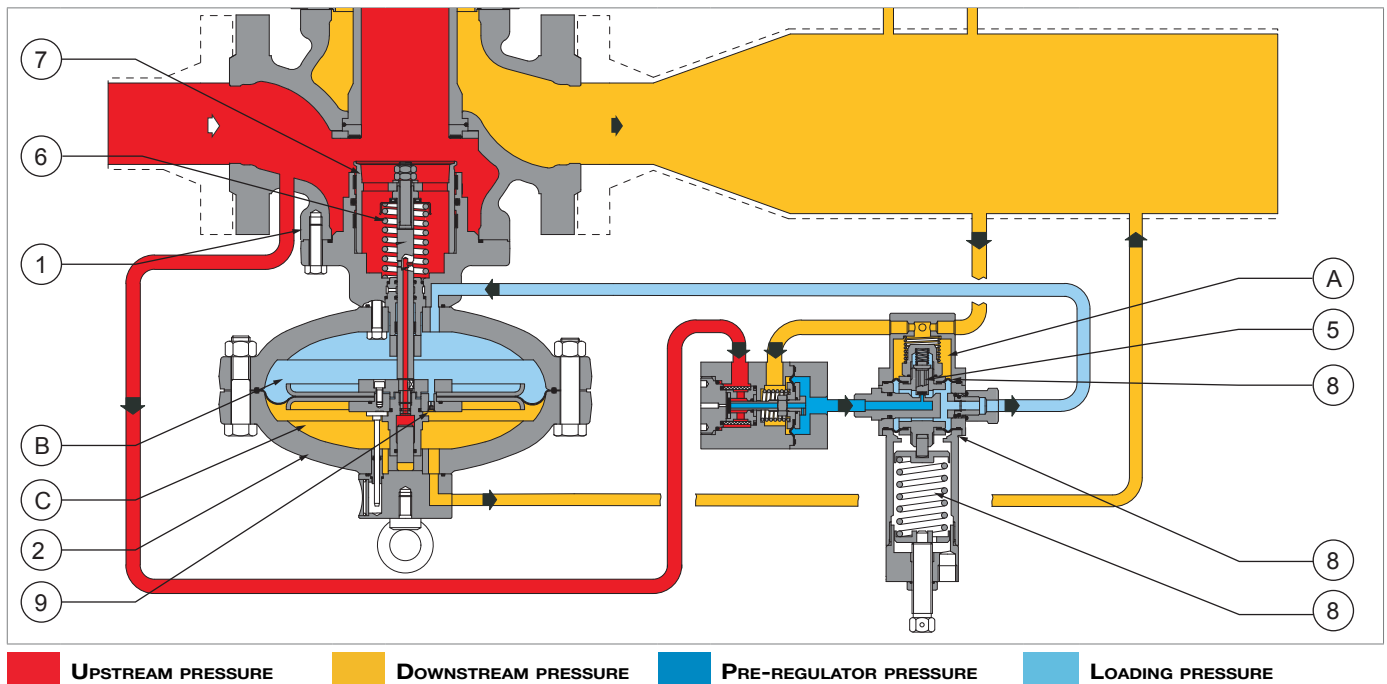


Fig. 4.7. Built-in monitor operation in the event of failure of the main regulator

Should the main regulator (1) fail, the PM/819 monitor (2) will trip until balanced adjustment is achieved. Therefore, should the following occur during operation:

Operating conditions	Operating consequences	Concluding outcome
Decrease in downstream pressure (D_p) due to: <ul style="list-style-type: none"> • increase in the requested flow rate; • or decrease in upstream pressure (U_p). 	Imbalance between the pressure force in the chamber (A) and the calibration spring (3) of the pilot (4) which causes: <ul style="list-style-type: none"> • increased opening of the pilot (4) plug (5); • consequent increase in the value of the loading pressure (P_m), inside the chamber (B). 	Opening of the main regulator (1) plug (7) until forces between the downstream pressure (D_p) in the chamber (A) and the pilot (4) calibration spring (3) have been balanced again.
Increase in downstream pressure (P_d) and displacement of the pilot (4) plug (5) towards the closed position.	Displacement of the main regulator (1) plug (7) towards the closed position due to: <ul style="list-style-type: none"> • decrease in the loading pressure (L_p) due to the transfer of the pressure itself between the chambers (B) and (C) of the regulator (1) through the orifice (9); • force applied by the spring (6). 	Return of the downstream pressure (D_p) to the preset value and to the balance of forces between the downstream pressure (D_p) in the chamber (A) and the pilot (4) calibration spring (3)

Tab. 4.19.

4.5.2.2 - M/A ACCELERATOR

NOTE!

For the monitor to be used as a safety accessory according to “PED” Directive 2014/68/EU, installing the M/A accelerator is recommended.

In the event of problems with the main regulator (1), in order to speed up triggering of built-in monitor PM/819 (2), installing the M/A accelerator (3) is required.

The M/A accelerator (3), based on a downstream pressure signal (D_p), discharges the gas contained in the loading chamber of the monitor into the atmosphere, thus enabling more rapid triggering.

The M/A accelerator calibration:

- must be higher than the closing pressure of the monitor (2) with reference to the specific SG value;
- is carried out by turning the adjustment screw (4) clockwise or counterclockwise to increase or decrease its value.

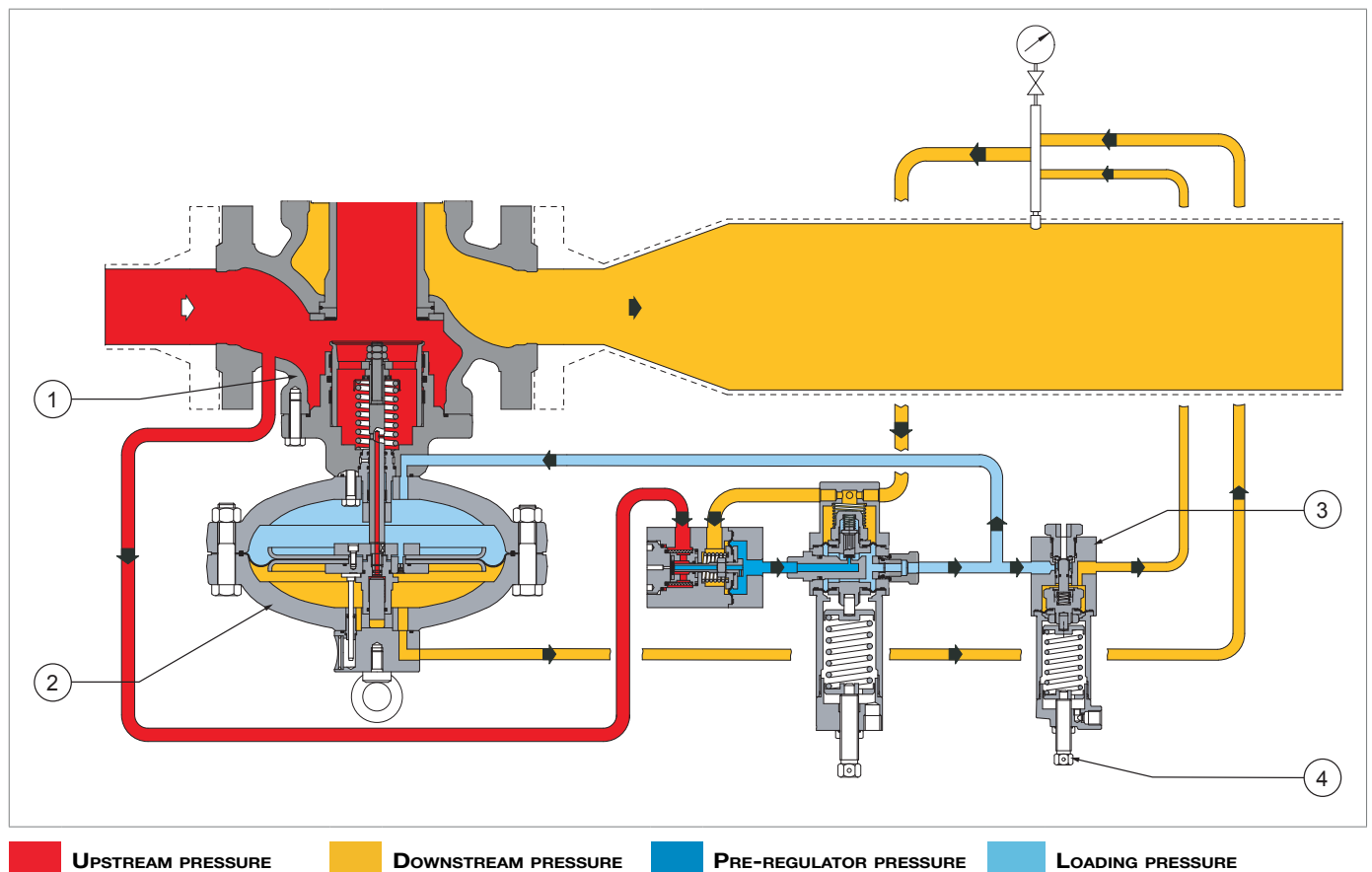


Fig. 4.8. Accelerating valve

4.5.3 - SLAM-SHUT VALVE

The slam-shut valve is a safety device is used to shut off the gas flow if the pressure value at the control point exceeds the calibration value of the valve itself.

The slam-shut valve is incorporated into the main body of the equipment and consists of:

- a control system;
- a locking mechanism.

In the event of triggering, the slam-shut valve shuts off power supply to the regulator and its control pilot.

4.5.3.1 - INCORPORATED SB/82 SLAM-SHUT VALVE

The SB/82 built-in slam-shut valve can be operated:

- by the pressure switch;
- manually;
- with remote control.

The main features of the SB/82 built-in slam-shut valve are:

- triggering due to downstream pressure increase and/or decrease;
- design pressure: 100 bar for all accessory components;
- local closing button;
- precision (AG):
 - » 1 on the triggering value for maximum pressure;
 - » 5 on the triggering value for minimum pressure;
- manual reset only with internal bypass activated by the reset lever.

The SD8/2 built-in slam-shut valve consists of:

Pos.	Description
1	Plug
2	Control pressure switch
3	Reset system (manually operated through a lever)

Tab. 4.20.

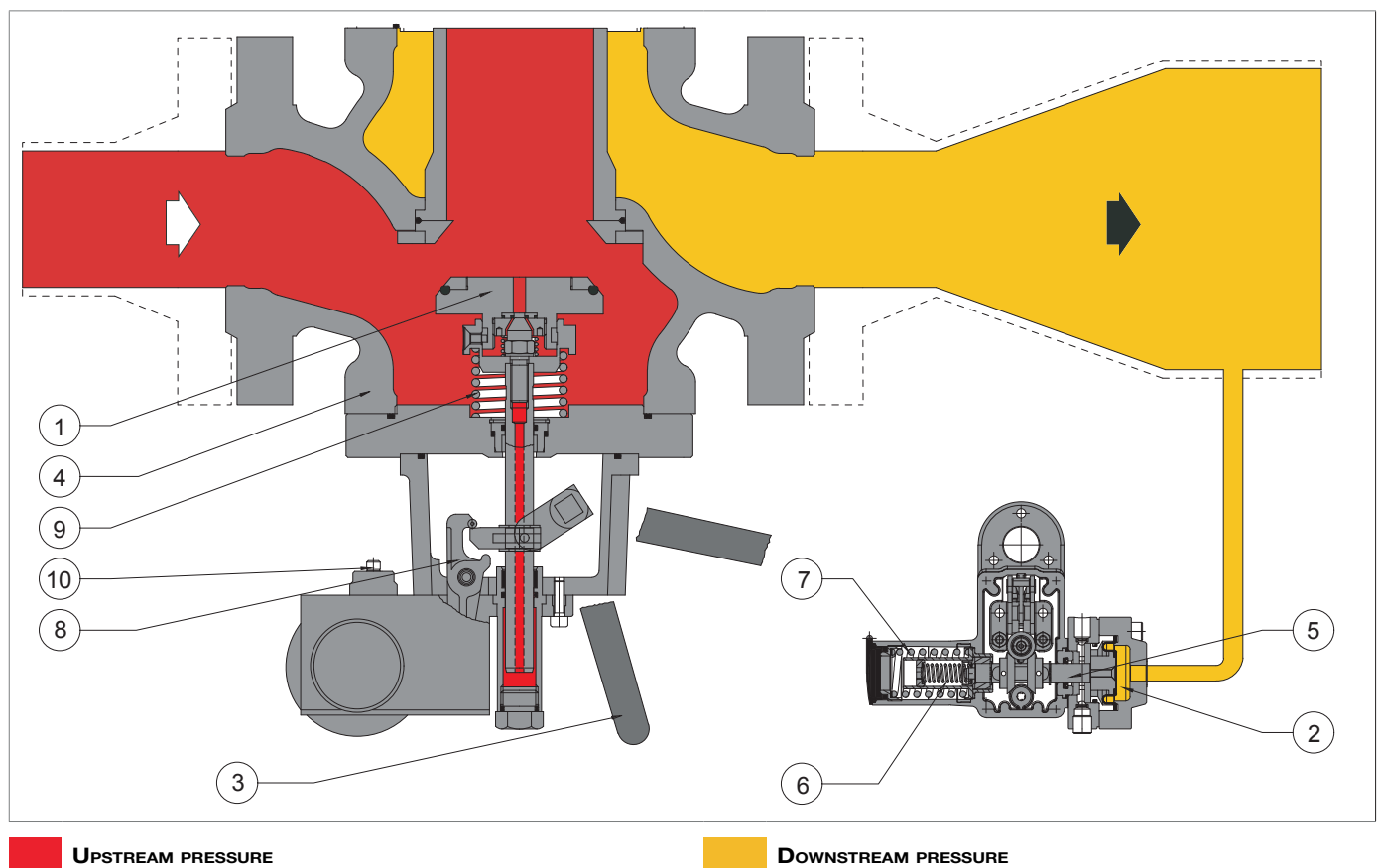


Fig. 4.9. APERFLUX 851 with SB/82 incorporated slam-shut valve

OPERATION:

The triggering pressure acts on the control element of the control pressure switch (2), which is solidly connected to the stem (5), and receives an antagonistic force through the springs due to maximum (7) and minimum (6) pressure triggering, calibrated to the preset values.

The translation of the stem (5) causes the control device (8) of the mobile system to be released and, through the action of the spring (9), the plug (1) to be closed. To reset the device, it is necessary to act on the lever (3) which:

- opens an internal bypass in the first section of the stroke allowing the upstream pressure to be transferred from the inlet chamber to the outlet chamber of the regulator body (4), thereby rebalancing the pressure on the plug (1);
- re-couples the control device (8) of the mobile system.

 **NOTE!**

The release of the control device (8) of the mobile system can also be controlled manually by means of a button (10).

4.5.3.2 - HB/97 INCORPORATED SLAM-SHUT VALVE

The built-in HB/97 incorporated slam-shut valve can be operated:

- by the pressure switch;
- manually;
- with remote control.

The main features of the HB/97 built-in slam-shut valve are:

- balanced valve plug;
- self-powered indirect pneumatic drive;
- local closing button;
- triggering due to downstream pressure increase and/or decrease;
- precision (AG):
 - » 1 on the triggering value for maximum pressure;
 - » 5 on the triggering value for minimum pressure;
- built-in bypass;
- manual rearming only.

The HB/97 built-in slam-shut valve consists of:

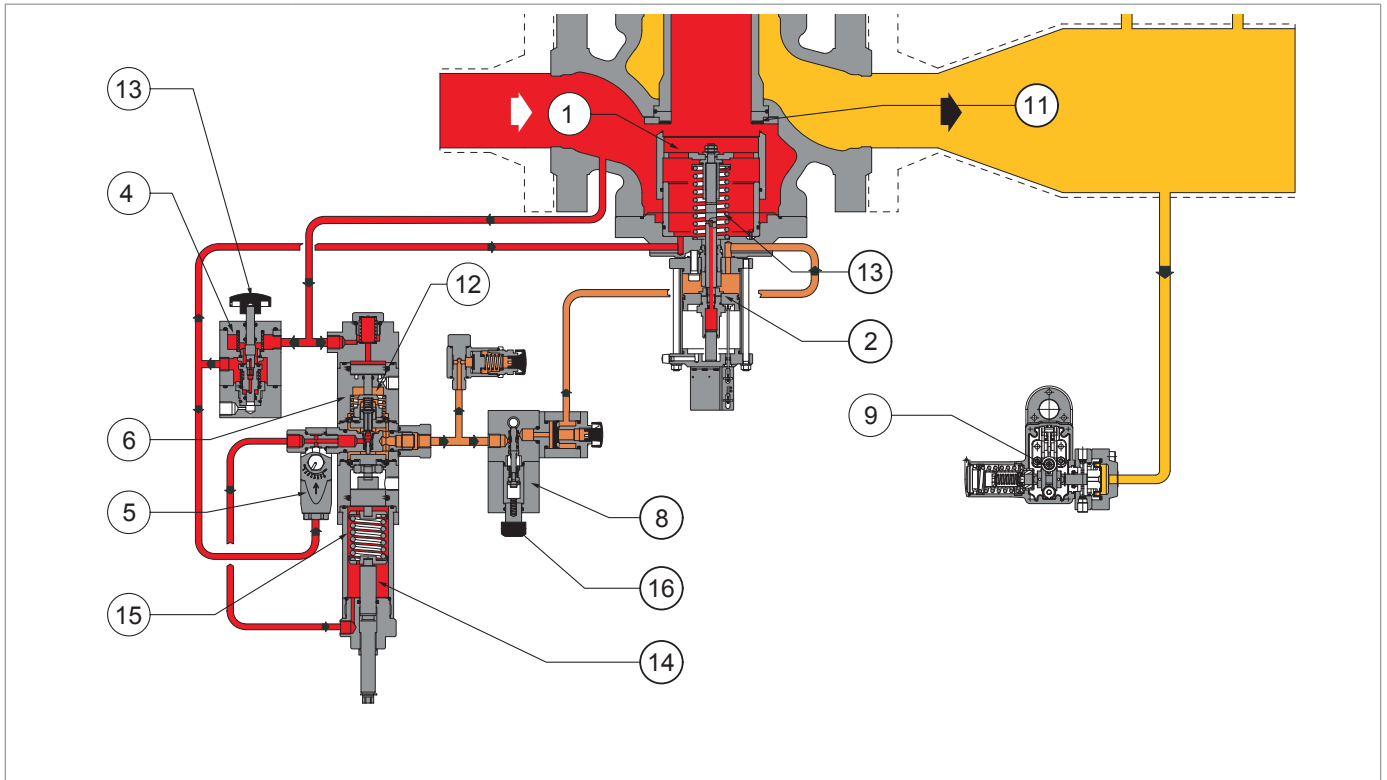
Pos.	Description
1	Balanced valve plug
2	Single acting pneumatic actuator
3	LINE OFF 2.0 device

Tab. 4.21.

The LINE OFF 2.0 device (3) consists of:

Pos.	Description
4	HP2/2: gas filtering device before entering the circuit with bypass function necessary for resetting the built-in slam-shut valve HB/97.
5	AR100: flow lamination valve to adjust the pressure loading speed in the pneumatic circuit and to filter the gas entering the R44/SS regulator (Pos. 6). <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE! The regulation of the pressure loading speed in the pneumatic circuit is regulated by a screw (minimum value 1, maximum value 8).</p> </div>
6	R44/SS: pressure regulator necessary to decrease the upstream pressure of the regulator to the loading pressure of the HB/97 incorporated slam-shut valve's cylinder.
7	VS/FI: safety valve used to: <ul style="list-style-type: none"> • discharge any overpressure generated by malfunction of the R44/SS pressure regulator into the atmosphere; • protect the entire circuit downstream of the R44/SS pressure regulator.
8	3/2 valve used to pressurise and depressurise the cylinder of the HB/97 incorporated slam-shut valve.
9	Control pressure switch. Through the head of the control pressure switch connected downstream, it allows the HB/97 built-in slam-shut valve to trip due to decreases or increases in downstream pressure.

Tab. 4.22.



UPSTREAM PRESSURE
 DOWNSTREAM PRESSURE
 ACTUATOR SUPPLY PRESSURE
 CONTROL PRESSURE

Fig. 4.10. APERFLUX 851 with HB/97 incorporated slam-shut valve

OPERATION:

At no pressure, the valve plug (1) is kept in the closed position by the spring (10) and rests on the reinforced gasket (11).

The upstream pressure (U_p) reaches the HP2/2 bypass device (4) and the upper head (12) of the R44/SS regulator (6) to prevent inappropriate resetting of the valve. By acting on the activation button (13) of the bypass, the pressurised gas is filtered and feeds the AR100 lamination valve (5), which in turn supplies:

- the chamber of the adjustment spring (14);
- the upstream of the R44/SS regulator (6), calibrated at a pressure of 4.5 bar to overcome the force of the closing spring (15) of the main valve.

Pressing the reset lever (16) acts on the pressure switch coupling system (9), so as to allow, through the 3/2 valve (8):

- the actuator (2) of the slam-shut valve to be pressurised by the R44/SS regulator (6);
- the plug (1) to open.

If the downstream pressure (D_p) increases or decreases, the pressure switch coupling system (9) moves to:

- discharge the pressure from the actuator (2) into the atmosphere through the 3/2 valve (8);
- allow the spring (10) to bring the plug (1) to the closed position.

4.5.4 - SLAM-SHUT VALVE PRESSURE SWITCHES

The pressure switch is a control device consisting of:

Pos.	Description
1	Control element. NOTE! The control element can be a diaphragm or a piston.
2	Stem.
3-4	Adjustment feeler gauges.
5	Spring for maximum pressure triggering.
6	Spring for minimum pressure triggering.
7	OPSO maximum spring adjustment nuts (5).
8	UPSO minimum spring adjustment nuts (6).
10	Manual release button.

Tab. 4.23.

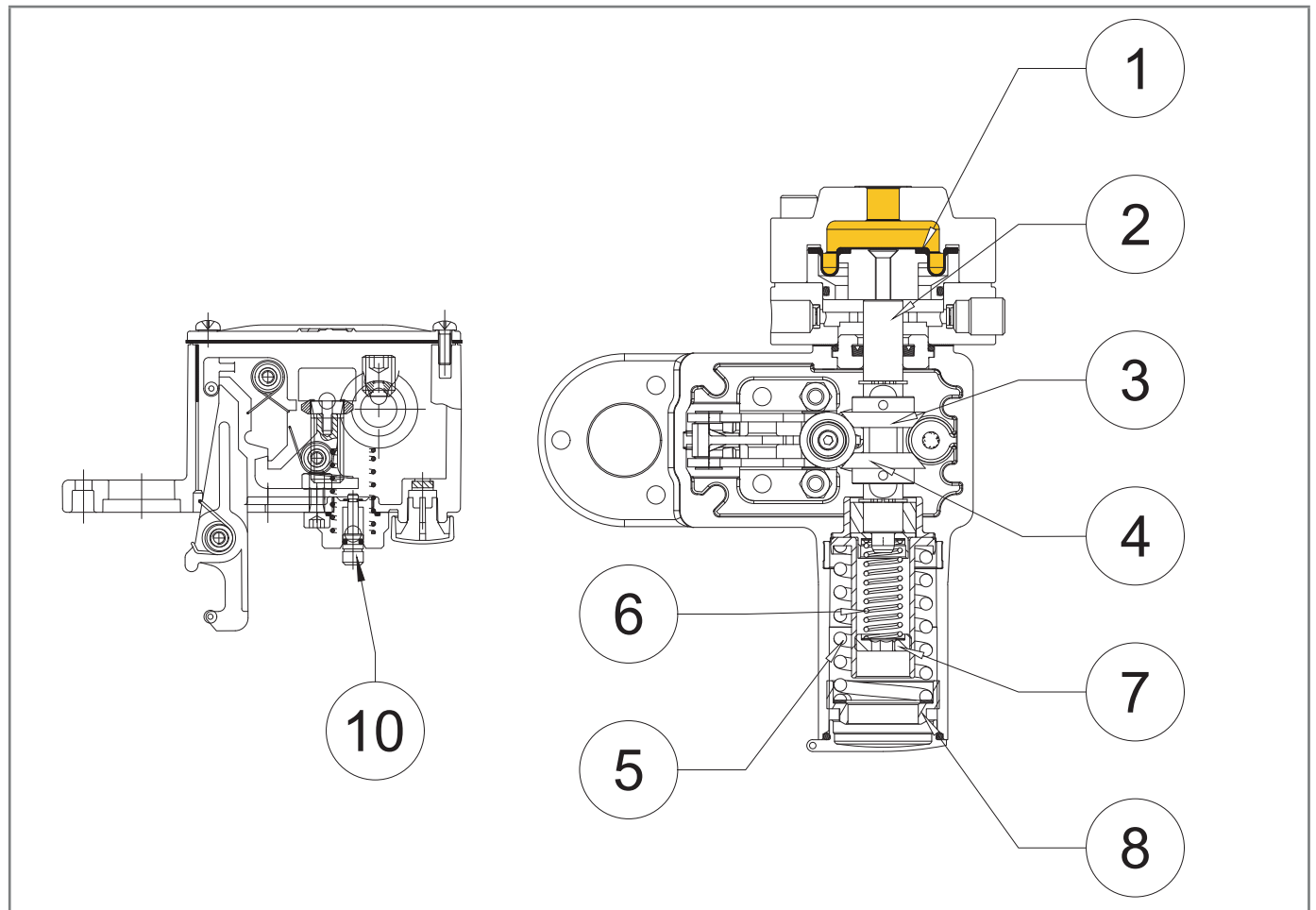


Fig. 4.11.

Slam-shut device pressure switch

Below is a list of the pressure switch models available for this regulator:

Pressure switch model	Max [bar]	Min [bar]
102M	0.2 - 5.5	0.05 - 2.8
102MH	0.2 - 5.5	2.8 - 5.5
103M	2 - 22	0.2 - 8
103MH	2 - 22	8 - 19
104M	15 - 45	1.6 - 18
104MH	15 - 45	18 - 41
105M	30 - 90	3 - 44
105MH	30 - 90	44 - 90

Tab. 4.24.

5 - TRANSPORT AND HANDLING


5.1 - SPECIFIC WARNINGS FOR TRANSPORT AND HANDLING

NOTE!

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	 <p>WARNING!</p> <p>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, installation or operating conditions, it is necessary to refer to:</p> <ul style="list-style-type: none"> • the regulations in force in the country of installation; • <u>any information provided by the Safety Manager at the installation facility.</u>
Lifting equipment	Hoist crane, forklift truck or other suitable equipment.
Weights and dimensions of the equipment	For dimensions and weights, refer to paragraph 5.2 "Physical characteristics of the equipment"

Tab. 5.25.

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..

! NOTE!

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.

Below is a list of the types of packaging used:

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

Tab. 5.26.

5.2 - PHYSICAL CHARACTERISTICS OF THE EQUIPMENT

5.2.1 - APERFLUX 851

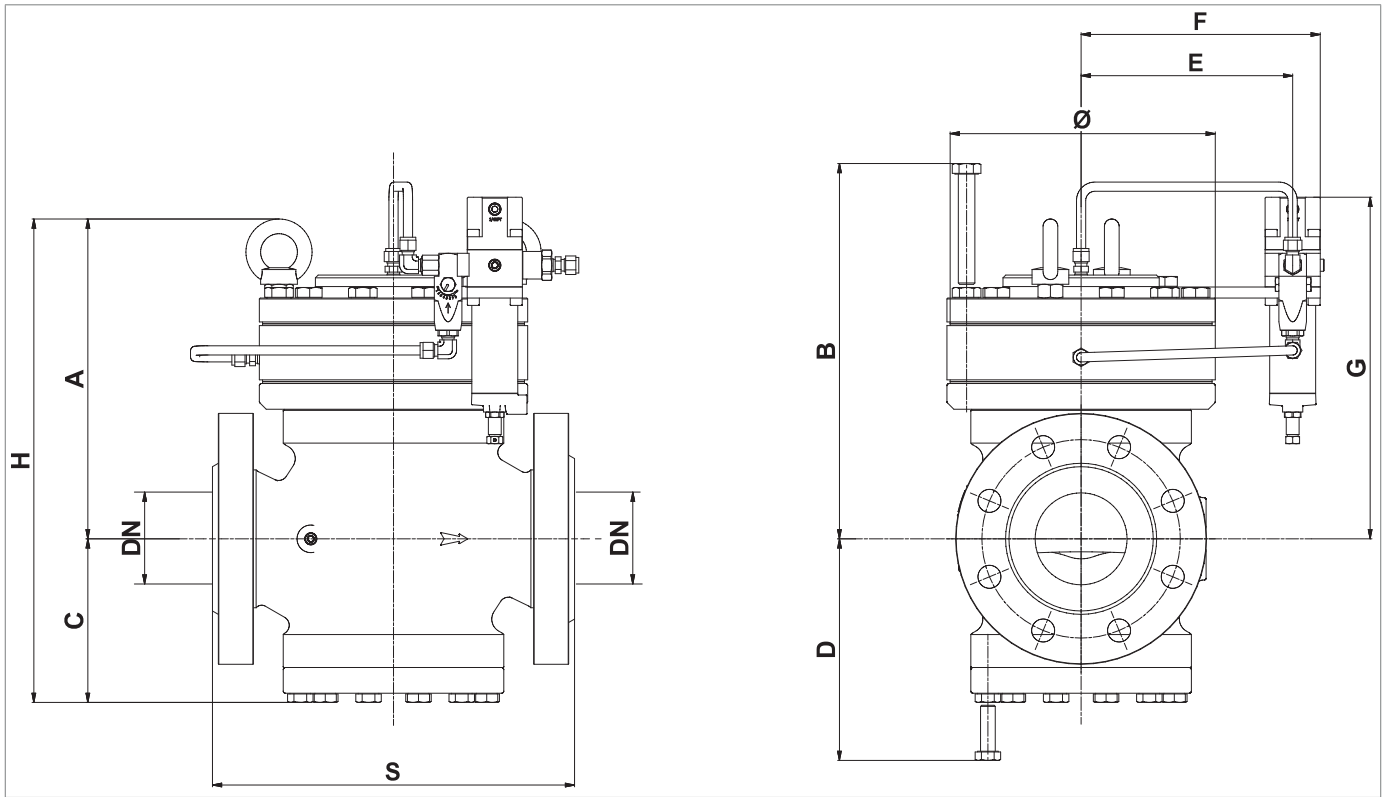


Fig. 5.12. APERFLUX 851 physical characteristics

APERFLUX 851 overall dimensions

Nominal diameter [mm]	25	50	80	100	150	200	250
Size [inches]	1"	2"	3"	4"	6"	8"	10"
S - Ansi 150/PN 16	184	254	298	352	451	543	673
S - Ansi 300	197	267	317	368	473	568	708
S - Ansi 600	210	286	336	394	508	609	752
Ø	125	160	245	290	385	490	615
A	200	230	300	340	420	455	580
B	230	260	340	380	470	510	520
C	100	130	150	190	240	265	340
D	130	160	200	250	300	320	440
E	140	145	190	210	260	315	370
F	160	175	220	240	290	345	415
G	260	280	350	380	450	490	380
H	300	360	450	530	660	720	920
Connecting pneumatic pipes	Øe 10mm x Øi 8mm						

Tab. 5.27.

Weight [kgf]							
Ansi 150/PN 16	20	35	76	115	235	335	700
Ansi 300	21	36	82	128	257	395	750
Ansi 600	22	38	85	138	290	435	850

Tab. 5.28.

5.2.2 - APERFLUX 851 + DB/851

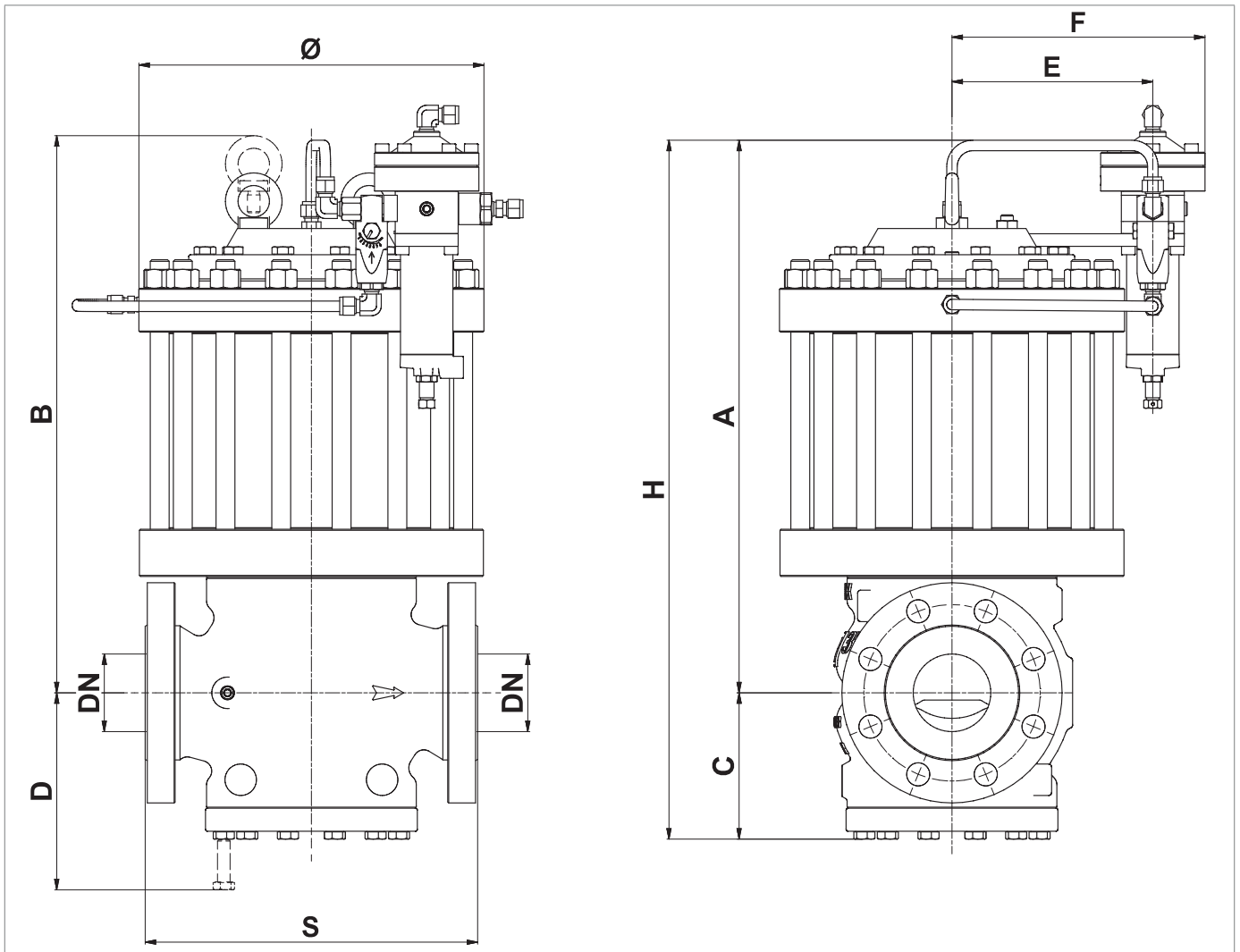


Fig. 5.13. APERFLUX 851 + DB/851 physical characteristics

APERFLUX 851 + DB/851 overall dimensions

Nominal diameter [mm]	25	50	80	100	150	200	250
Size [inches]	1"	2"	3"	4"	6"	8"	10"
S - Ansi 150/PN 16	184	254	298	352	451	543	673
S - Ansi 300	197	267	317	368	473	568	708
S - Ansi 600	210	286	336	394	508	609	752
Ø	220	300	330	390	480	645	740
A	355	420	500	570	715	910	1025
B	465	530	625	695	850	1045	1085
C	100	130	150	190	240	265	340
D	130	160	200	250	300	320	440
E	162	196	216	241	234	237	262
F	192	226	246	271	264	267	292
G	370	440	525	595	745	950	1396
H	455	550	650	790	980	1175	1215
L	560	673	792	897	1081	1332	1372
Connecting pneumatic pipes	Øe 10mm x Øi 8mm						

Tab. 5.29.
Weight [kgf]

Ansi 150/PN 16	47	100	168	240	391	760	1240
Ansi 300	49	102	177	268	433	834	1292
Ansi 600	50	104	180	278	466	874	1392

Tab. 5.30.

5.2.3 - APERFLUX 851 + PM/819

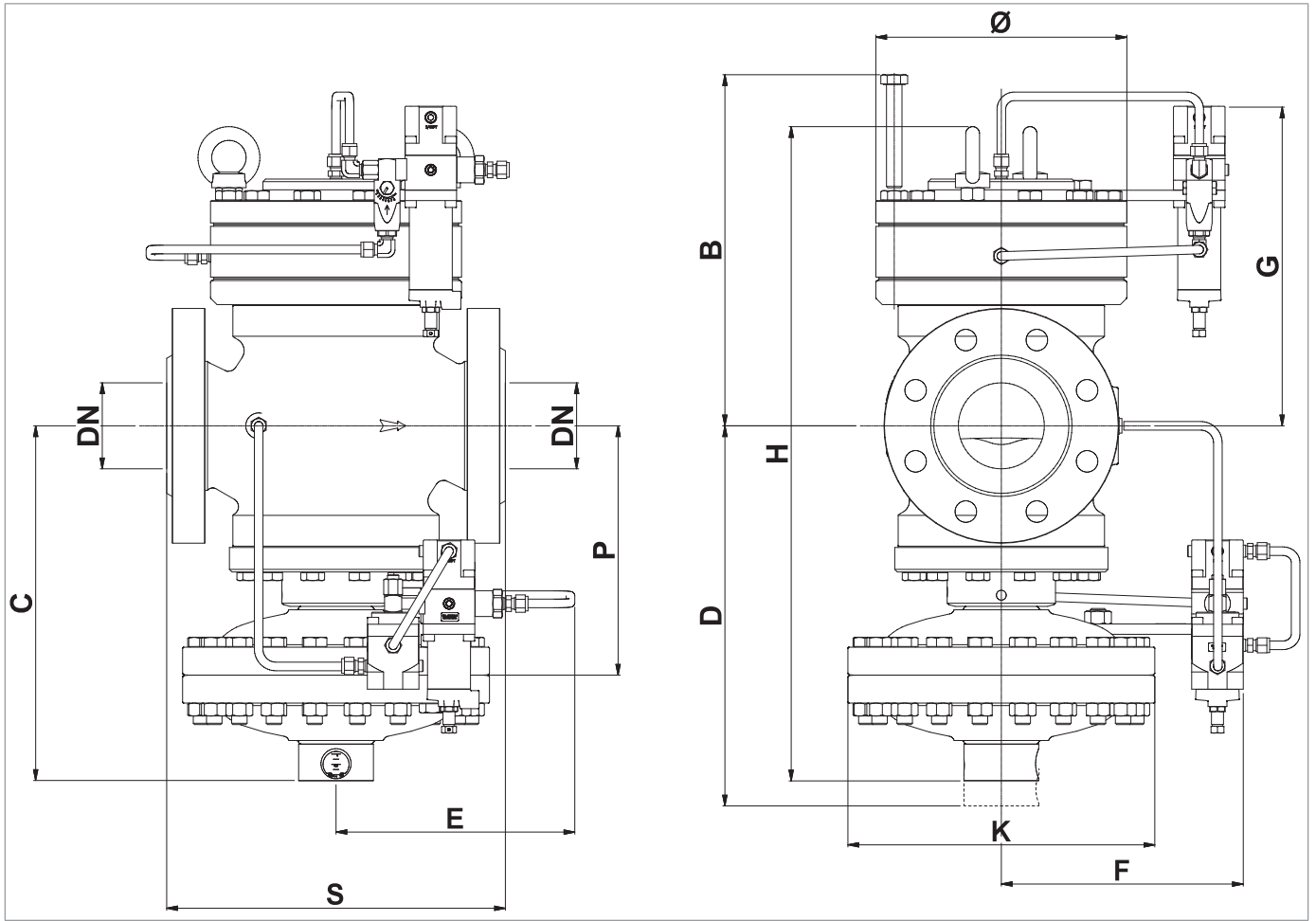


Fig. 5.14. APERFLUX 851 + PM/819 physical characteristics

APERFLUX 851 + PM/819 overall dimensions

Nominal diameter [mm]	25	50	80	100	150	200	250
Size [inches]	1"	2"	3"	4"	6"	8"	10"
S - Ansi 150/PN 16	184	254	298	352	451	543	673
S - Ansi 300	197	267	317	368	473	568	708
S - Ansi 600	210	286	336	394	508	609	752
Ø	125	160	245	290	385	490	615
B	230	260	340	380	470	510	520
C	320	350	430	490	650	750	680
D	410	430	370	600	735	850	900
E	370	370	410	410	485	485	370
F	270	270	310	310	385	385	415
G	260	280	350	380	450	490	380
H	520	580	730	830	1070	1205	1380
K	278	278	360	360	510	510	610
P	170	200	260	290	320	370	500
Connecting pneumatic pipes	Øe 10mm x Øi 8mm						

Tab. 5.31.
Weight [kgf]

Ansi 150/PN 16	33	68	135	160	370	525	1100
Ansi 300	34	70	138	165	390	585	1150
Ansi 600	35	72	148	190	420	625	1250

Tab. 5.32.

5.2.4 - APERFLUX 851 + SB /82 OR + HB/97

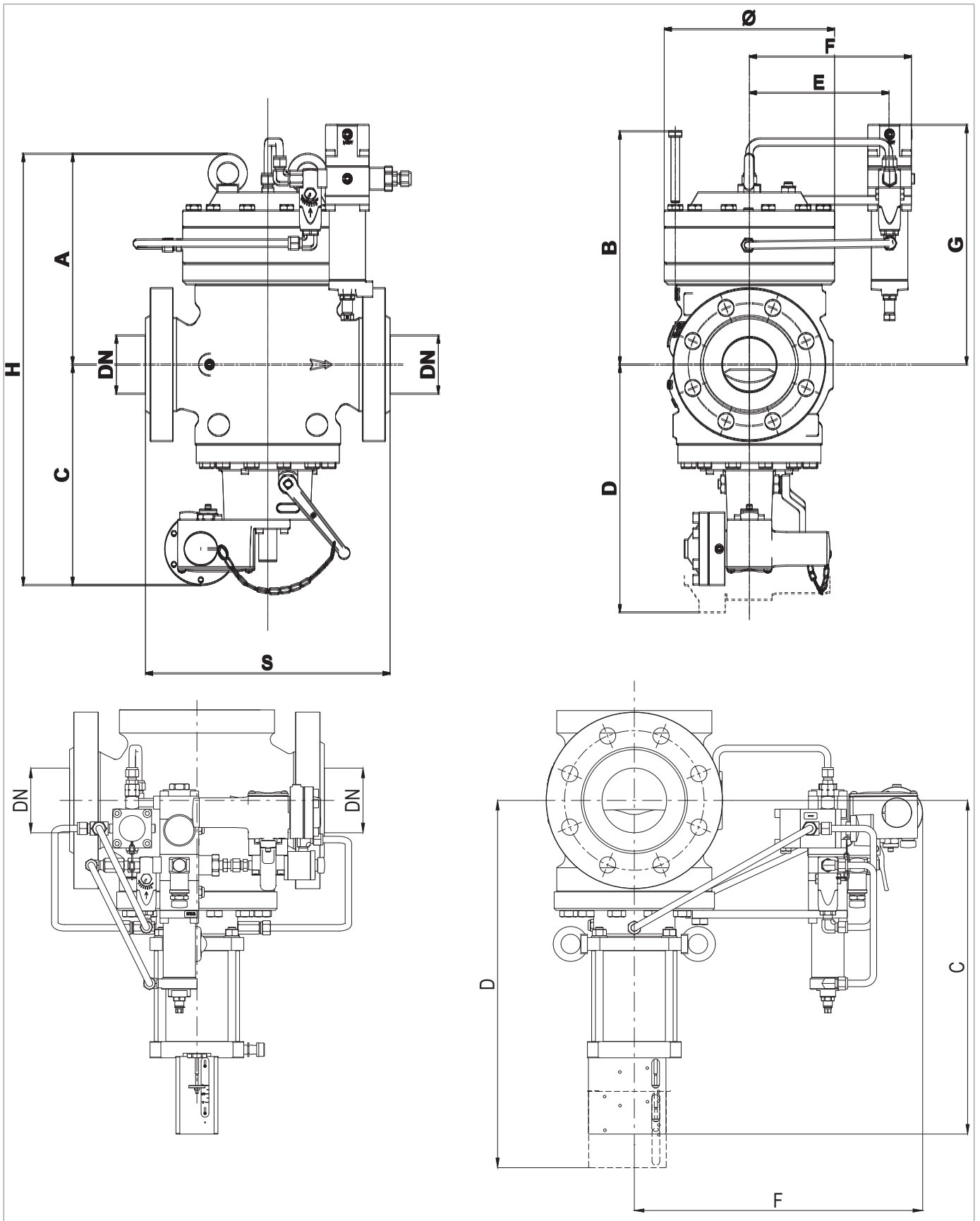


Fig. 5.15. APERFLUX 851 + SB/82 OR + HB/97 physical characteristics

APERFLUX 851 + SB/82 OR + HB/97 overall dimensions

Nominal diameter [mm]	25	50	80	100	150	200	250
Size [inches]	1"	2"	3"	4"	6"	8"	10"
S - Ansi 150/PN 16	184	254	298	352	451	543	673
S - Ansi 300	197	267	317	368	473	568	708
S - Ansi 600	210	286	336	394	508	609	752
Ø	125	160	245	290	385	490	615
A	200	230	300	340	420	455	580
B	230	260	340	380	470	510	520
C WITH SB/82	215	240	270	300	375	450	680
C WITH HB/97	-	-	-	518	645	687	796
D WITH SB/82	320	370	420	480	600	665	900
D WITH HB/97	-	-	-	650	835	900	1060
E	140	145	190	210	260	315	370
F WITH SB/82	160	175	220	240	290	345	415
F WITH HB/97	-	-	-	358	410	445	510
G	260	280	350	380	450	490	380
H WITH SB/82	415	470	570	640	795	905	1260
H WITH HB/97	-	-	-	858	1065	1132	1376
Connecting pneumatic pipes	Øe 10mm x Øi 8mm						

Tab. 5.33.
Weight [kgf]

Ansi 150/PN 16	27	44	86	130	260	400	750
Ansi 300	27	46	92	145	290	470	800
Ansi 600	30	48	96	155	320	510	900

Tab. 5.34.

5.2.5 - APERFLUX 851 + DB/851 + PM/819

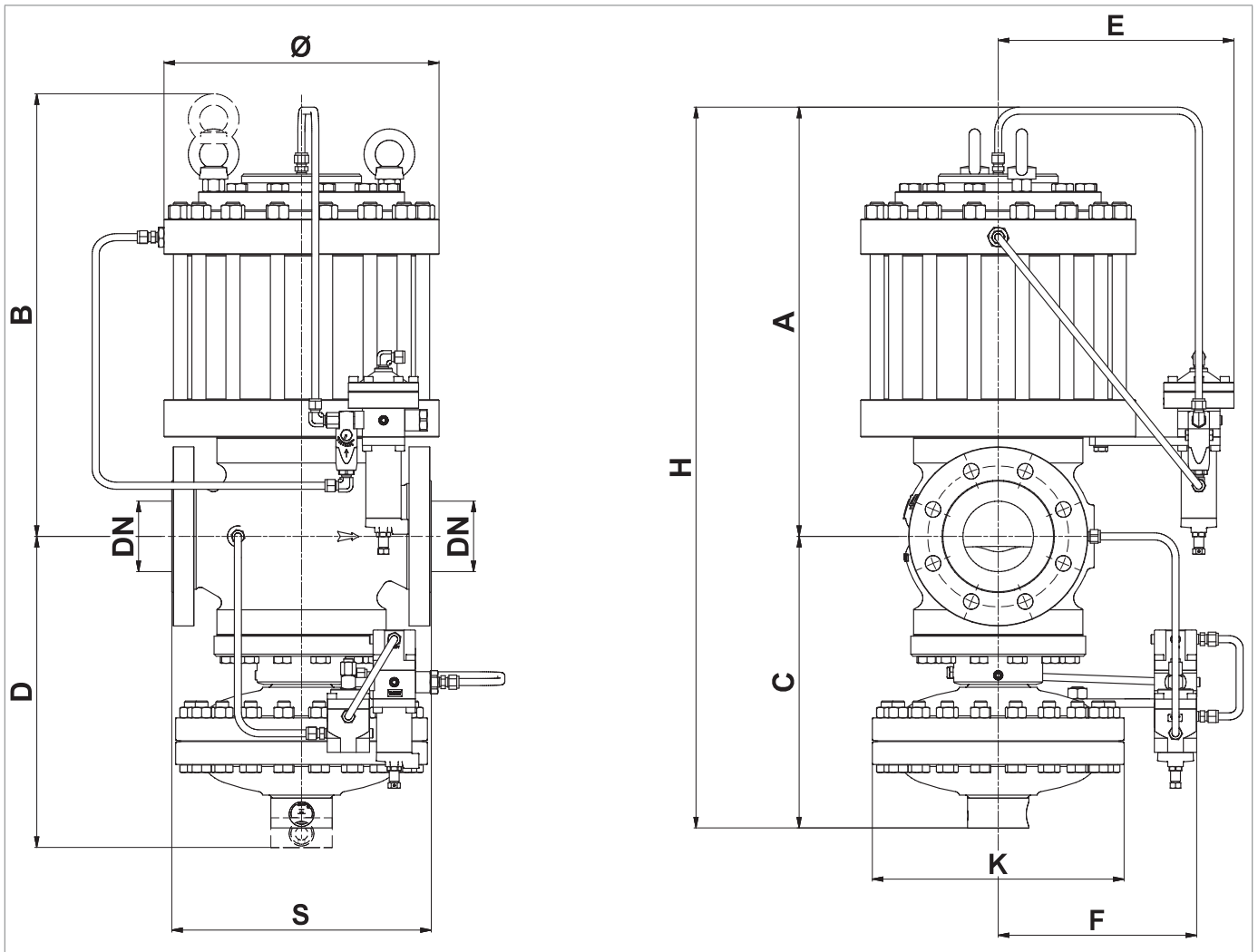


Fig. 5.16. APERFLUX 851 + DB/851 + PM/819 physical characteristics

APERFLUX 851 + DB/851 + PM/819 overall dimensions

Nominal diameter [mm]	25	50	80	100	150	200	250
Size [inches]	1"	2"	3"	4"	6"	8"	10"
S - Ansi 150/PN 16	184	254	298	352	451	543	673
S - Ansi 300	197	267	317	368	473	568	708
S - Ansi 600	210	286	336	394	508	609	752
Ø	220	300	330	390	480	645	740
A	335	420	500	570	715	910	1025
B	465	530	625	695	850	1045	1085
C	320	350	430	490	650	750	800
D	410	430	530	600	735	850	900
E	192	226	246	271	264	267	292
F	270	270	310	310	385	385	415
G	590	660	805	895	1155	1435	1856
H	685	750	905	995	1260	1530	1545
I	905	970	1185	1295	1670	2015	2005
Connecting pneumatic pipes	Øe 10mm x Øi 8mm						

Tab. 5.35.
Weight [kgf]

Ansi 150/PN 16	60	133	223	295	526	950	1640
Ansi 300	62	135	232	325	568	1024	1692
Ansi 600	63	137	235	332	601	1064	1792

Tab. 5.36.

5.2.6 - APERFLUX 851 + DB/851 + SB/82 OR + HB/97

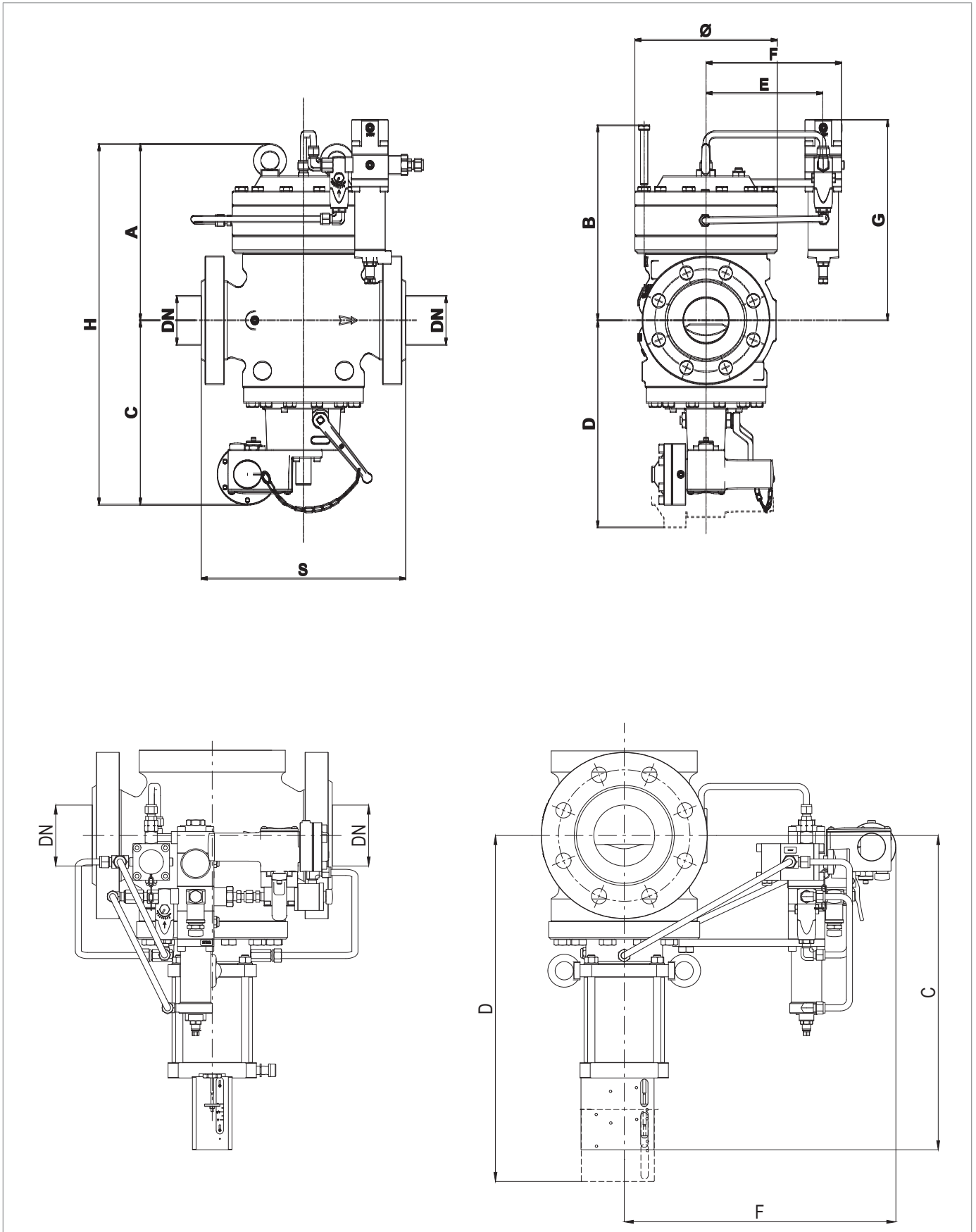


Fig. 5.17. Physical characteristics APERFLUX 851 + DB/82 + SB/82 OR + HB/97

Footprint and dimensions APERFLUX 851 +DB/82 + SB/82 OR + HB/97

Nominal diameter [mm]	25	50	80	100	150	200	250
Size [inches]	1"	2"	3"	4"	6"	8"	10"
S - Ansi 150/PN 16	184	254	298	352	451	543	673
S - Ansi 300	197	267	317	368	473	568	708
S - Ansi 600	210	286	336	394	508	609	752
Ø	220	300	330	390	480	645	740
A	335	420	500	570	715	910	1025
B	465	530	625	695	850	1045	1085
C WITH SB/82	215	240	270	300	375	450	680
C WITH HB/97	-	-	-	518	645	687	769
D WITH SB/82	320	370	420	480	600	665	900
D WITH HB/97	-	-	-	650	835	900	1060
E	192	226	246	271	264	267	292
F WITH SB/82	485	550	645	705	880	1135	1736
F WITH HB/97	-	-	-	358	410	445	510
G	570	660	770	870	1115	1360	1555
H WITH SB/82	675	783	912	1007	1216	1517	1712
H WITH HB/97	-	-	-	1088	1360	1597	1794
Connecting pneumatic pipes	Øe 10mm x Øi 8mm						

Tab. 5.37.
Weight [kgf]

Ansi 150/PN 16	54	109	178	255	416	825	1290
Ansi 300	56	112	187	283	466	909	1342
Ansi 600	58	114	191	294	499	949	1442

Tab. 5.38.

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!

Prohibitions:

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

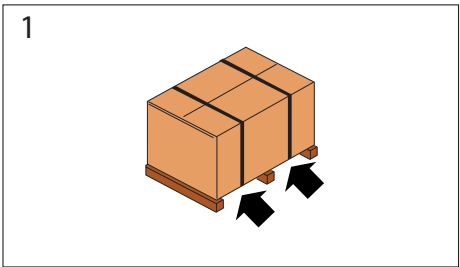
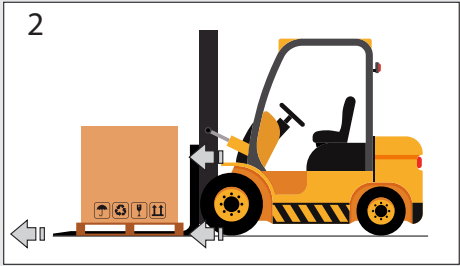
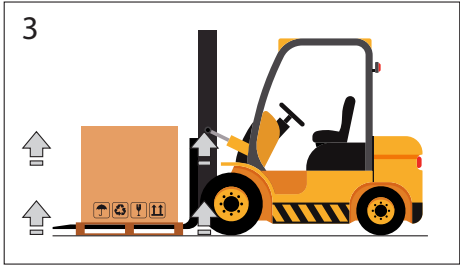

WARNING!



- Do not use forklifts to carry people;
- Do not use forklifts to lift people.

NOTE!

Packaging must always be handled in a vertical position

Proceed as follows:

Step	Action	Image
1	Place the forks of the forklift under the load surface.	
2	Make sure that the forks extend from the front of the load (by at least 5 cm), far enough to eliminate any risk of the transported load from tipping.	
3	<p>Raise the forks until they are touching the load.</p> <p>NOTE! Fasten the load to the forks with clamps or similar devices if required.</p>	
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 over-turning moment and to ensure greater load stability during transport.	
6	Adjust transport speed according to the type of floor and load, avoiding sudden manoeuvres. <div style="background-color: #f4a460; padding: 5px; margin: 5px 0;">  WARNING! </div> If: <ul style="list-style-type: none"> • obstacles along the path; • particular operating situations; do not allow the operator a perfect view, the assistance of a ground operator performing hand signals is required outside the range of action of the lifting equipment.	-
7	Place the load in the chosen installation area.	-

Tab. 5.39.

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 an adequate section.


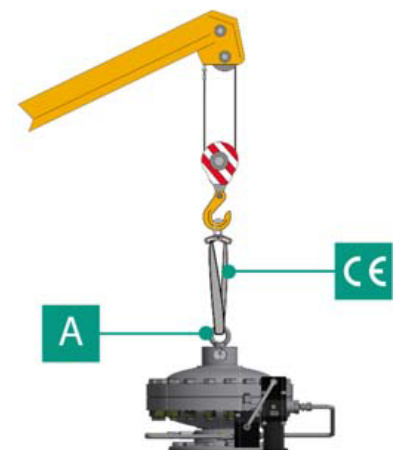

Prohibitions:

- do not drag the load on the ground;
- do not operate near power lines;
- do not stand within the range of action of the crane.

NOTE!


Packaging must be always handled in a vertical position.

The equipment must be handled using the lifting points provided on the equipment itself. To carry out transportation correctly, follow the procedure below:

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.  NOTE! Check whether the load is properly balanced.	
3	Handle the load avoiding sudden movements.	
4	Place the load in the chosen installation area	

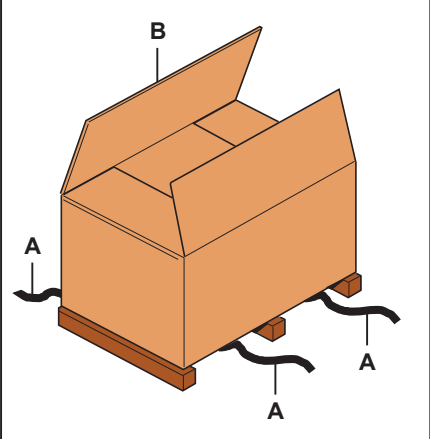
Tab. 5.40.

5.4 - PACKAGING REMOVAL

Packaging removal	
Operator qualification	<ul style="list-style-type: none"> Person in charge of transport, handling, unloading and placing on site; Installer.
PPE required	 <p>WARNING!</p> <p>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:</p> <ul style="list-style-type: none"> the regulations in force in the country of installation; any information provided by the Safety Manager at the installation facility.

Tab. 5.41.

To unpack the equipment in a cardboard box, proceed as follows:

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. <div style="border: 1px solid blue; padding: 5px; margin-top: 10px;"> <p>NOTE!</p> <p>Have at least 2 operators manually move the equipment, if required due to its dimensions/weight.</p> </div>	

Tab. 5.42.

NOTE!

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 nameplate.


5.4.1 - PACKAGING DISPOSAL

NOTE!

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.
	 NOTE! For installations in later periods, see paragraph “pre-installation warnings after prolonged storage.”
Temperature	Not above 25°C
Humidity	Not above 70%
Radiation	Away from radiation sources according to UNI ISO 2230:2009

Tab. 5.43.

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.

To replace the rubber parts of the equipment, please refer to chapter 9 “Maintenance and functional checks”.

NOTE!

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

6 - INSTALLATION

6.1 - INSTALLATION PRE-REQUISITES

6.1.1 - ENVIRONMENTAL CONDITIONS ALLOWED

WARNING!

To safely use the equipment, adhere to the environmental conditions allowed and to the data provided on the nameplate of the regulator and any accessories (refer to paragraph 2.7 “Nameplates applied”).

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 that the operator has good view when working on the equipment.

NOTE!

The equipment must operate in places that are properly lit by artificial lighting that is 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 safety device upstream to be protected against any overpressure with respect to its **PS admissible pressure** when, for the upstream reduction station, the maximum incidental downstream pressure is:

$$\text{MIPd} \leq 1.1 \text{ PS}$$

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

ATTENTION!

If the installation of the equipment requires the on-site 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 to perform 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 have not been damaged;
- 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	 <p> WARNING!</p> <p>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, installation or operating conditions, it is necessary to refer to:</p> <ul style="list-style-type: none"> • the regulations in force in the country of installation; • any information provided by the Safety Manager at the installation facility.
Required equipment	Refer to chapter 7 "Equipment for commissioning / maintenance".

Tab. 6.44.

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 closed.

 **WARNING!**

Installation may also take place in areas where there is a risk of explosion, and this implies that all necessary prevention and protection measures must 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 in the line with the arrow on the body pointing in the gas flow direction.
For installation in line as well as in a square pattern, the following must be on hand:

Pos.	Description
1	1 shut-off valve upstream of the equipment.
2	2 vent valves located 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. 6.45.

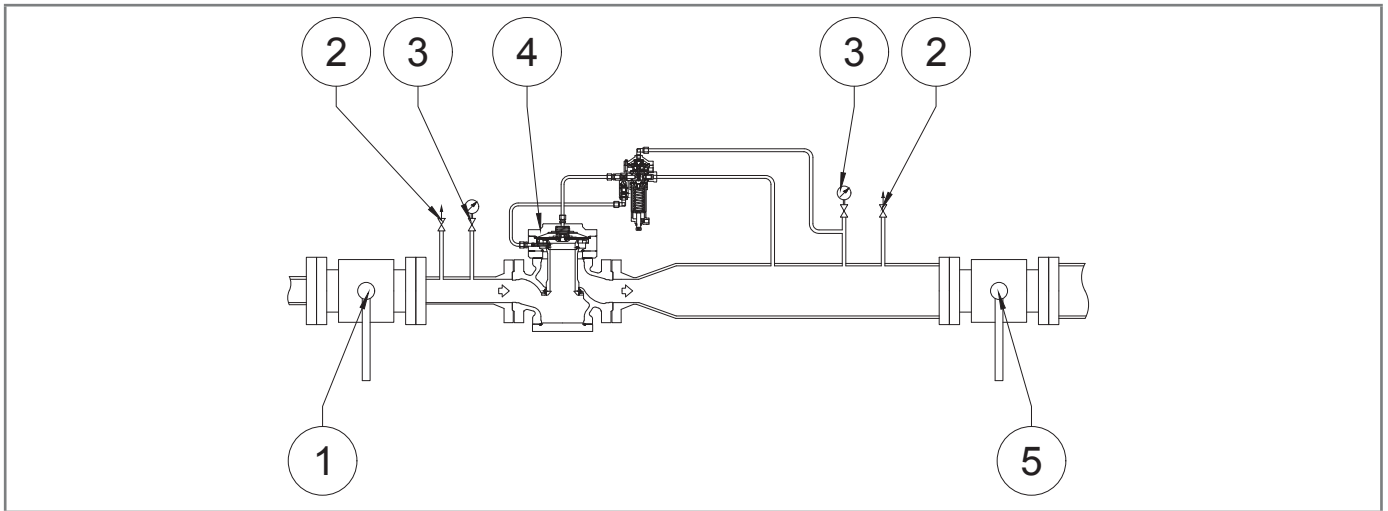


Fig. 6.18. In-line installation

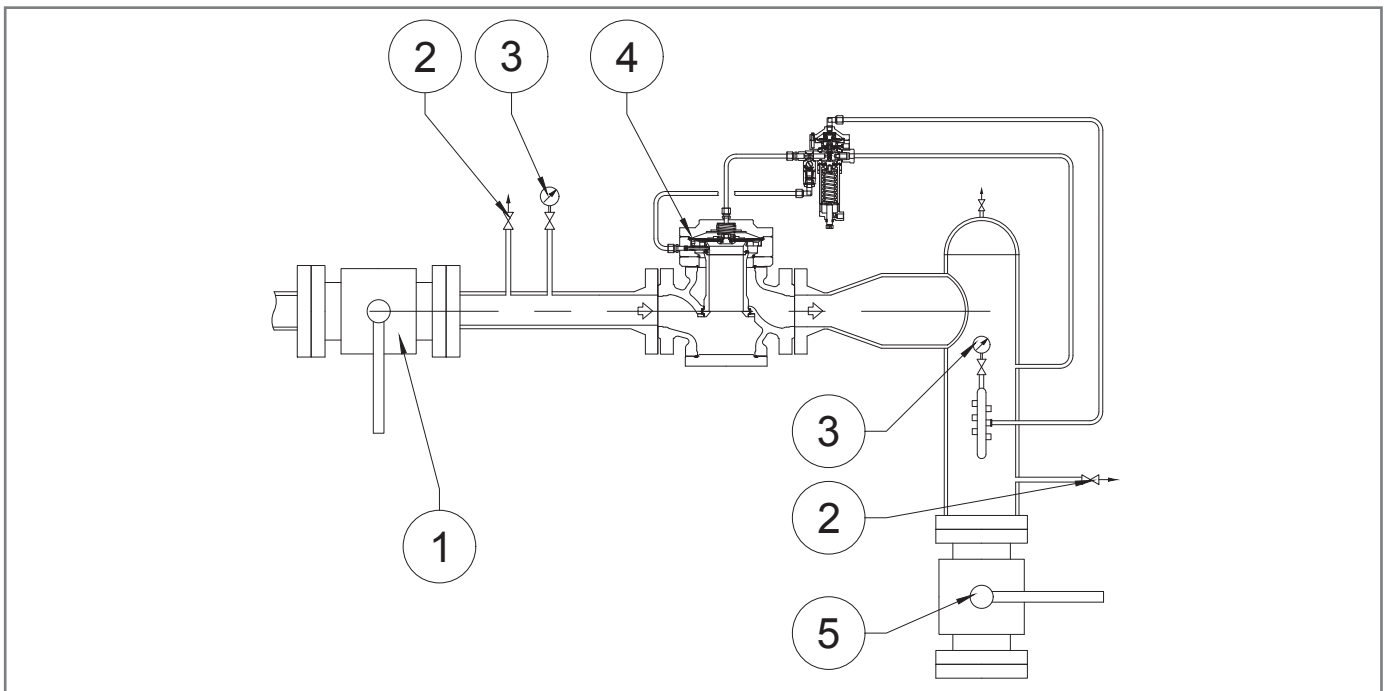


Fig. 6.19. Installation in a square pattern

! NOTE!

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 - REGULATOR INSTALLATION POSITIONS

The regulator is typically installed as follows:

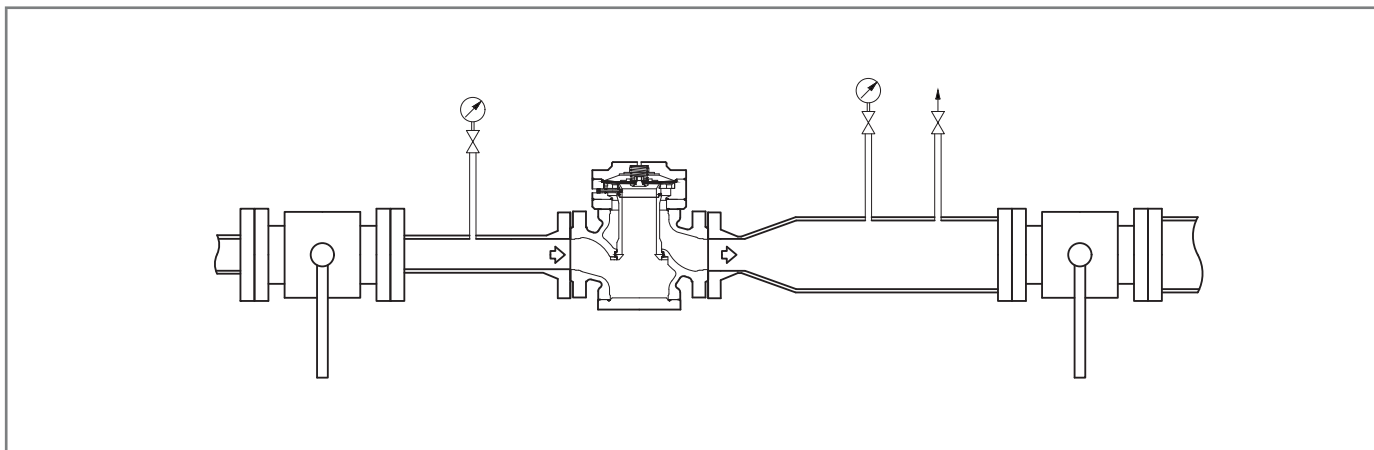


Fig. 6.20. Standard position

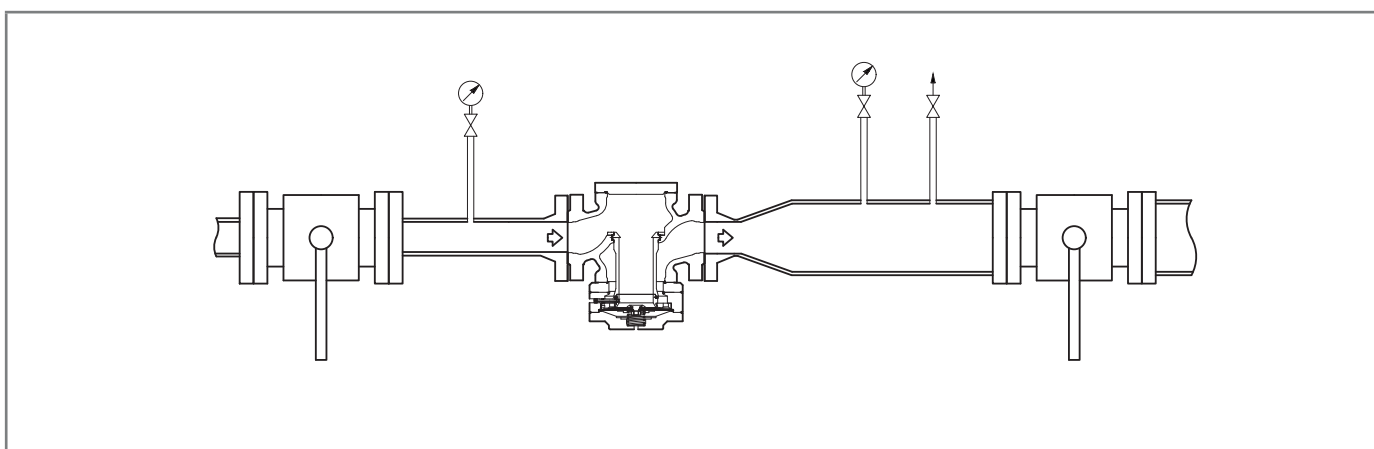


Fig. 6.21. Inverted position

6.5 - INSTALLATION PROCEDURES

6.5.1 - EQUIPMENT INSTALLATION PROCEDURE

To install the equipment in line and in a square pattern, proceed as follows:

Step	Action
1	Place the equipment in the section of the line designated for it.
2	Place the gaskets between the line flange and the regulator flange.
3	Insert the bolts into the appropriate holes of the connecting flanges.
4	Screw the bolts following the technical rules for tightening flanges.

Tab. 6.46.

6.5.2 - CONNECTION OF THE SENSING LINES TO THE DOWNSTREAM PIPING

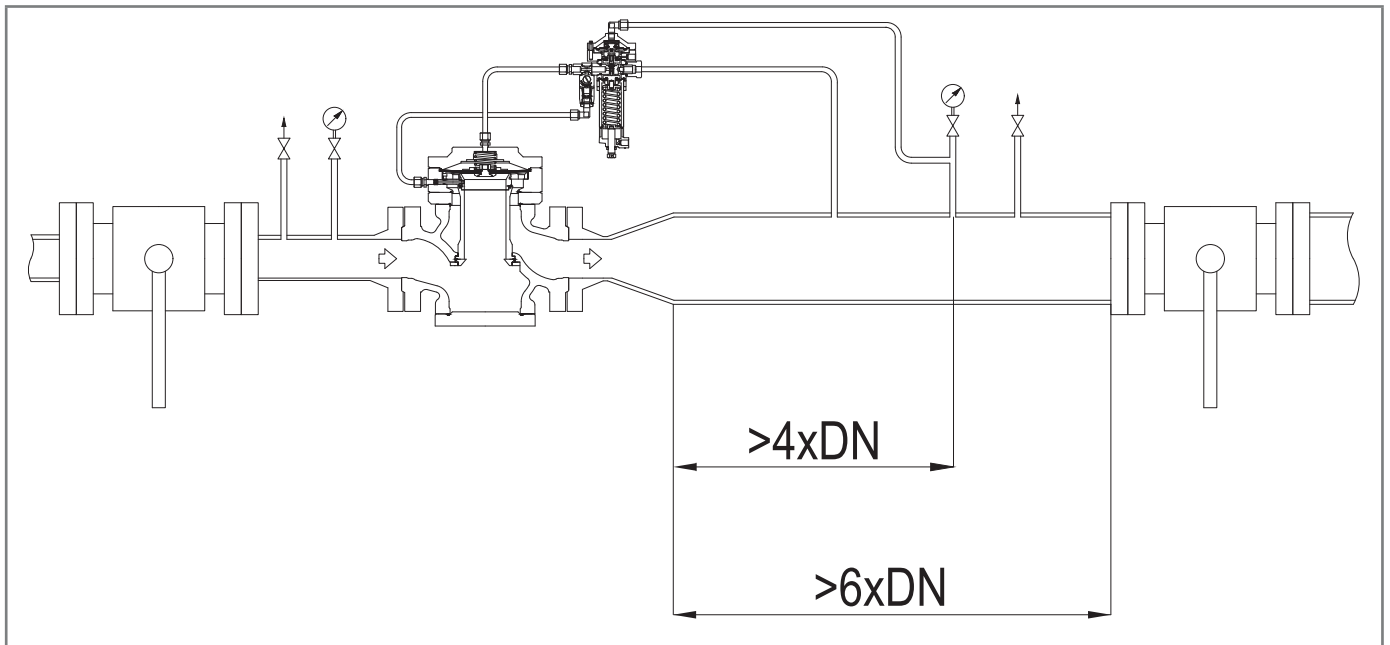


Fig. 6.22. Connection of sensing lines to the downstream piping

To obtain proper regulation, it is essential that:

- the downstream shut-off valve is placed at a distance of least 6 times the rated diameter of the pipe downstream of the regulator;
- the downstream sensing lines are placed on a straight section of pipe (with uniform diameter) having a length equal to at least 4 times the rated diameter of the pipe itself;

ATTENTION!

The pilot drain must not be connected to the multi-socket switch.

- the velocity of the pressurised fluid at the sampling point does not exceed the following values:
 $V_{max} = 30 \text{ m/s}$ for $P_a > 5 \text{ bar}$
 $V_{max} = 25 \text{ m/s}$ for $P_a < 5 \text{ bar}$

To calculate the flow rate, use the following formula:

$$V = 345,92 \times \frac{Q}{DN^2} \times \frac{1 - 0,002 \times Pd}{1 + Pd}$$

V = gas velocity in m/sec

Q = gas flow rate Stm³/h

DN = nominal diameter of the regulator in mm

Pd = regulator outlet pressure in barg

NOTE!

All on-site pneumatic connections must have pipes with a minimum internal diameter of 8 mm

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. 6.23);
- 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.

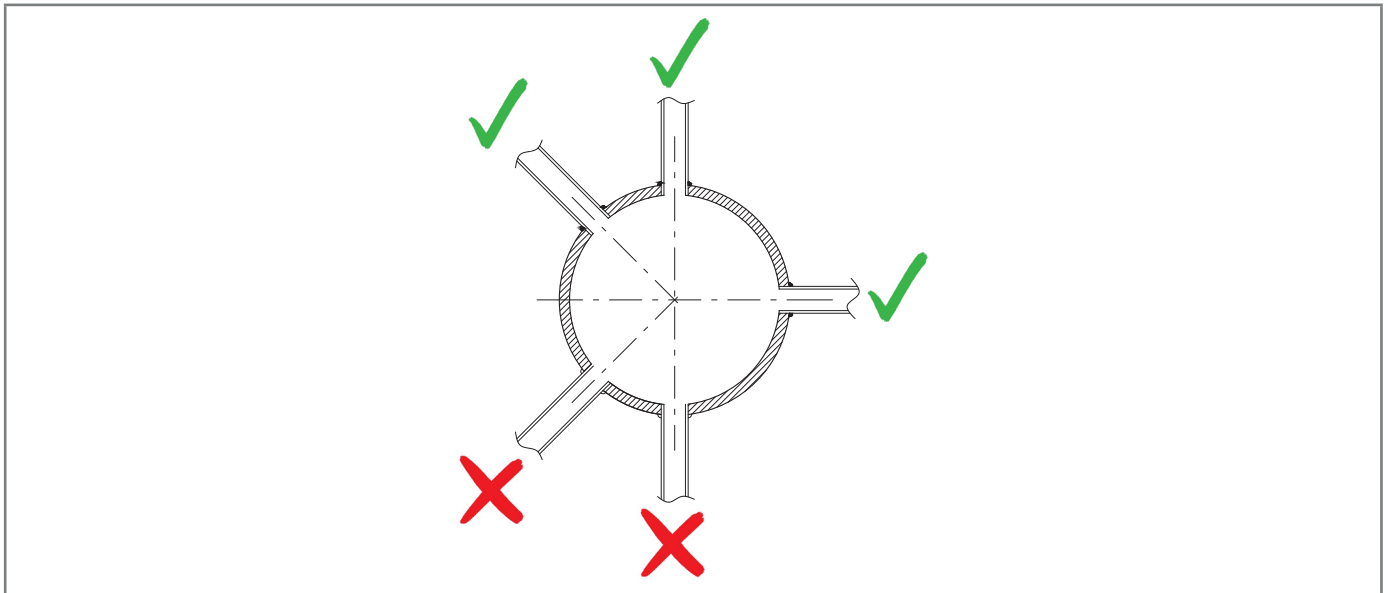


Fig. 6.23. Welded pipe connections

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 PM/819 monitor, if any;
- 3 and 4 to the pilot sensing lines;
- 5 and 6 to the sensing lines of the accelerator of the slam-shut device, if any.

NOTE!

**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.**

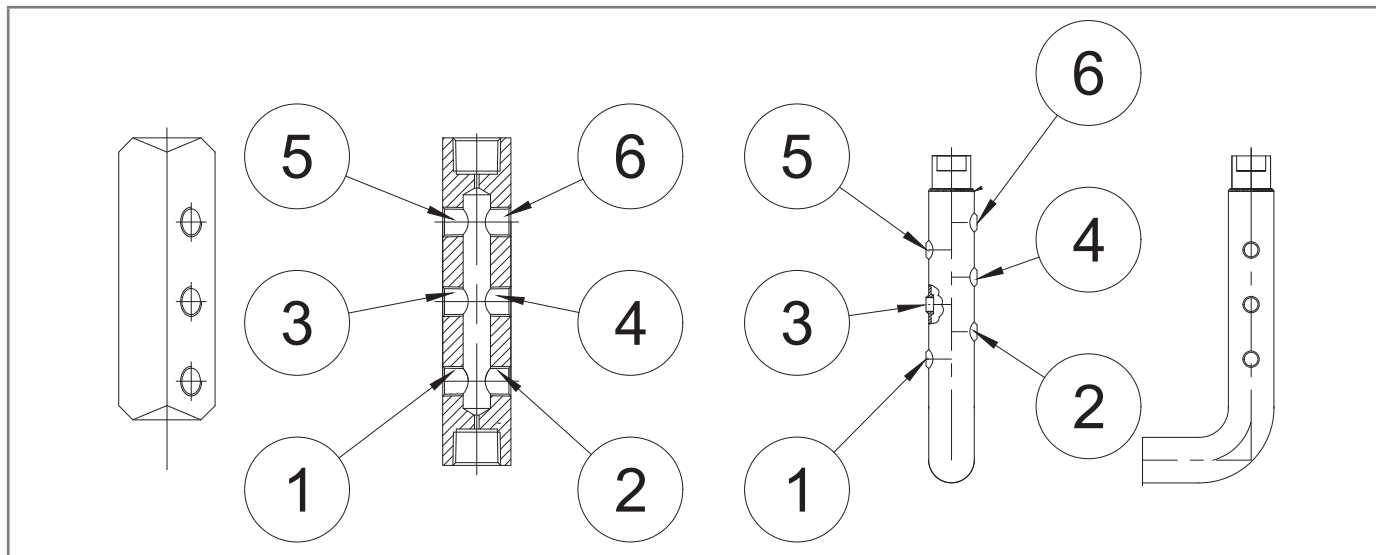


Fig. 6.24. Equipment connections


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.



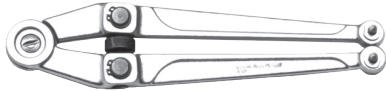



7 - COMMISSIONING/MAINTENANCE EQUIPMENT




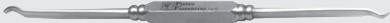

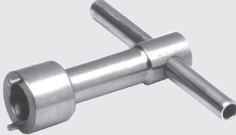


7.1 - LIST OF EQUIPMENT

Commissioning/maintenance equipment	
Operator qualification	<ul style="list-style-type: none"> • Mechanical maintenance technician; • Electrical maintenance technician; • Installer; • User's technician.
PPE required	<div style="display: flex; align-items: center;">  </div> <div style="background-color: #f4a460; padding: 5px; margin-top: 5px;"> <p>⚠ WARNING!</p> </div> <p>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:</p> <ul style="list-style-type: none"> • the regulations in force in the country of installation; • <u>any information provided by the Safety Manager at the installation facility.</u>

Tab. 7.47.

We list the types of equipment required for commissioning and maintenance of the equipment:

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

Ref.	Equipment type	Image
G	T-handle hex socket wrench	
H	Phillips screwdriver	
I	Slotted screwdriver	
L	O-ring extraction tool	
M	Circlip pliers	
N	Fiorentini special key	
O	Fiorentini special key	
P	Fiorentini special tool	

Tab. 7.48.

7.2 - EQUIPMENT NEEDED FOR THE DIFFERENT CONFIGURATIONS

Each table is distinguished by:

Term	Description
Ref.	Reference to the equipment indicated in Tab.7.48.
Type	Report the type (size) or code of the equipment.
DN	Indicates the Nominal Diameter of the reference configuration.

Tab. 7.49.

Aperflux 851								
Equipment		DN						
Ref.	Type	1"	2"	3"	4"	6"	8"	10"
A	Ch.	14-17-19-24-27	14-17-19-24-27	14-17-19-24-27-32	14-17-19-24-27-32	14-17-19-24-27-32	14-17-19-24-27-32	14-16-17-29-24-27-32-36
B	L.	300						
C	Ø	4						
F	Ch.	5-6	5-6	5-6-10	5-6-14	5-6-17	5-6-17	4-5-6-17
I	L.	6.5 x 100						
L	Code	7999099						

Tab. 7.50.

Aperflux 851 + DB/851								
Equipment		DN						
Ref.	Type	1"	2"	3"	4"	6"	8"	10"
A	Ch.	14-17-19-24-27	14-17-19-24-27	14-17-19-24-27-32	14-17-19-24-27-32	14-17-19-24-27-32	14-17-19-24-27-32	14-16-17-29-24-27-32-36
B	L.	300						
C	Ø	4						
F	Ch.	5-6	5-6	5-6-10	5-6-14	5-6-17	5-6-17	4-5-6-17
I	L.	6.5 x 100						
L	Code	7999099						
O	Code	7999020	7999022	7999023	7999024	7999025	7999027	7999028

Tab. 7.51.

Aperflux 851 + PM/819								
Equipment		DN						
Ref.	Type	1"	2"	3"	4"	6"	8"	10"
A	Ch.	14-17-19-24-27	14-17-19-24-27	14-17-19-24-27-32	14-17-19-24-27-32	14-17-19-24-27-32	14-17-19-24-27-32	14-16-17-29-24-27-32-36
B	L.	300						
C	Ø	4						
D	Ch.	-	-	-	-	27-41	27-41	30-41-55
E	Ch.	3-12	3-12	3-12	3-12	3-12	3-12	3-12
F	Ch.	5-6	5-6	5-6-10	5-6-14	5-6-17	5-6-17	4-5-6-17
G	Ch.	9-17-20	9-17-20	9-17-19-22	9-17-19-22	9-22	9-22	-
I	L.	6.5 x 100						
L	Code	7999099						

Tab. 7.52.

Aperflux 851 + SB/82								
Equipment		DN						
Ref.	Type	1"	2"	3"	4"	6"	8"	10"
A	Ch.	14-17-19-- 24-27	14-17-19 24-27	14-17-19- 24-27-32	14-17-19- 24-27-32	14-17-19- 24-27-32	14-17-19- 24-27-32	14-16-17- 29-24-27- 32-36
B	L.	300						
C	Ø	4						
D	Ch.	9-10-15-24	9-10-15-24	9-10-15-24	9-10-15-24	9-10-15-24	9-10-15-24	27
E	Ch.	2-3-4-8	9-10-15-24	9-10-15-24	9-10-15-24	9-10-15-24	9-10-15-24	27
F	Ch.	2-3-4-8	2-3-4-10	2-3-4	2-3-4	2-3-4	2-3-4	2-3-4
I	L.	6.5 x 100						
L	Code	7999099						
M	Ø	16-60						
N	Code	7999019						

Tab. 7.53.

Aperflux 851 + HB/97					
Equipment		DN			
Ref.	Type	4"	6"	8"	10"
A	Ch.	7-14-17-19-22-24- 27-30-32-41	7-14-17-19-22-24- 27-30-32-41	7-14-17-19-22-24- 27-32-41	7-14-16-17-19-24- 27-32-36-50-57
B	L.	300			
C	Ø	4			
D	Ch.	9-10-15-17-21- 22-24-27	9-10-15-17-21- 22-24-27	9-10-15-17-21- 22-24-27	17-21-27-30
E	Ch.	9-10-15-24	9-10-15-24	9-10-15-24	27
F	Ch.	2-3-4-5-6	2-3-4-5-6	2-3-4-5-6	2-3-4-5-6-17
I	L.	6.5 x 100			
L	Code	7999099			
M	Ø	16-60			
N	Code	7999019			
P	Code	7999097			

Tab. 7.54.

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 natural gas distribution networks, one should consider the risk of explosive mixtures (gas/air) forming inside the piping, if the line is not subjected to inertisation.

WARNING!

During commissioning, any unauthorised personnel must be removed. The delimited area must be marked with signs and/or fencing.

NOTE!

Commissioning must be carried out by authorised and qualified personnel.

The equipment is supplied with the pilot unit already calibrated.

Even if the PM/819 built-in monitor or the SB/82 and HB/97 built-in slam-shut valves are mounted on the equipment, any pilots or pressure switches present will be already calibrated.



NOTE!

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 (inlet, outlet, any bypass) are closed;
- the gas is at a temperature within the limits specified on the data plate.

Commissioning

Operator qualification	<ul style="list-style-type: none"> • Installer; • Qualified technician.
PPE required	 <p> WARNING!</p> <p>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:</p> <ul style="list-style-type: none"> • the regulations in force in the country of installation; • <u>any information provided by the Safety Manager at the installation facility.</u>
Necessary equipment	Refer to chapter 7 "Equipment for commissioning/maintenance".

Tab. 8.55.

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, the following operations must never be carried out:

- pressurisation through a valve located downstream of the equipment;
- depressurisation through a valve located upstream of the equipment.

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. <div style="background-color: #f4a460; padding: 5px; margin-top: 5px;">  WARNING! During pressurisation, always check that the equipment has no leaks. </div>
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. 8.56.

8.3 - PROPER COMMISSIONING CHECK

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).

8.4 - CALIBRATION OF ANY ACCESSORIES

To properly calibrate all the accessories in the equipment, refer to the table below where, starting from the calibration of the regulator, all relevant values are defined:

**Calibration of a line consisting of: Aperflux 851 + incorporated monitor PM/819
or SB/82 slam-shut valve
or HB/97 + LINE OFF 2.0/Pressure switch**

Calibration REGULATOR (Pd) bar	Calibration MONITOR	Calibration ACCELERATOR	Calibration Max BLOCK	Calibration Min BLOCK
0.8 - 2.1	Pd x 1.1	Pd x 1.2	Pd x 1.5	Pd - 0.3 bar
2.1 - 5	Pd x 1.1	Pd x 1.2	Pd x 1.4	Pd - 0.5 bar
5 - 25	Pd x 1.05	Pd x 1.1	Pd x 1.3	Pd - 3 bar
25 - 60	Pd x 1.03	Pd x 1.06	Pd x 1.3	Pd - 5 bar

Tab. 8.57.

8.5 - COMMISSIONING THE REGULATOR

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.

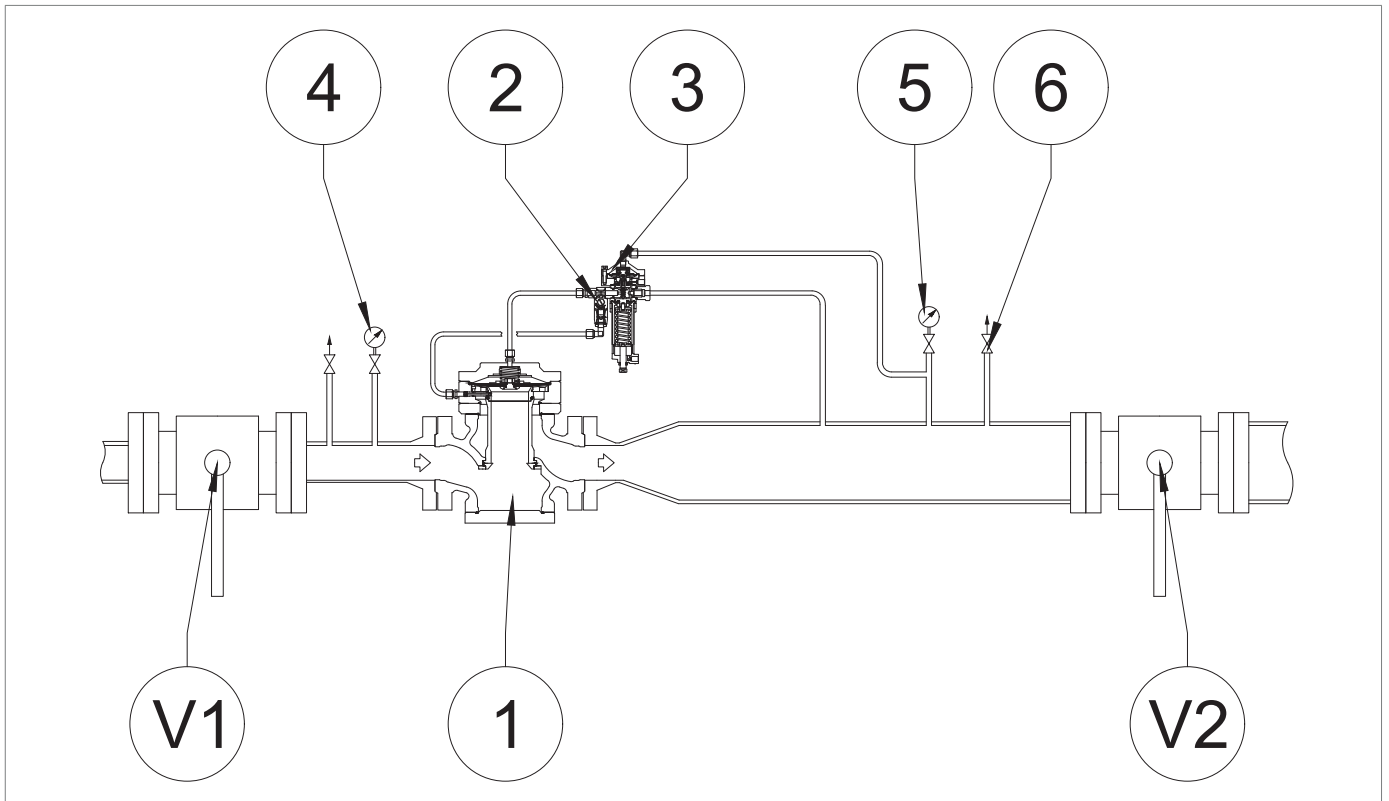


Fig. 8.25. Commissioning the regulator

Step	Action
1	Open the air vent valve (6).
2	Completely unscrew the fixing nut of the pilot screw (3).
3	Open the screw of the AR100 lamination valve (2) to a value between 3 and 5.
4	Open the inlet shut-off valve V1 very slowly. NOTE! Check the pressure by referring to the pressure gauge (4) located upstream.
5	Close the drain cock (6) and check that the downstream pressure, after an increase phase, does not exceed the closing pressure value (refer to the SG value specified with reference to the calibration value/set point). NOTE! If the downstream pressure exceeds the closing pressure value, refer to chapter 10 "Fault search and troubleshooting" to remove the causes of the malfunction.
6	Using a foaming agent, check all the junctions between shut-off valves V1 and V2 for proper sealing.
7	Open outlet shut-off valve V2 very slowly until the pipeline fills completely. NOTE! If at the beginning of this operation the pressure in the downstream pipeline is much lower than the calibration pressure, it will be advisable to shutter the opening of this valve so as not to exceed the maximum flow rate of the system.
8	Readjust the calibration set in Step 3 : <ul style="list-style-type: none"> • by increasing the opening of the screw of the AR100 lamination valve (2), if pumping events occur in normal operating conditions; • by decreasing the opening of the screw of the AR100 lamination valve (2), if an excessive decrease in the regulated pressure occurs as the flow rate increases.
9	Lock the pilot screw with the appropriate fixing nut.

Tab. 8.58.

8.6 - PROCEDURE FOR COMMISSIONING THE APERFLUX 851 REGULATOR WITH PM/819 BUILT-IN MONITOR

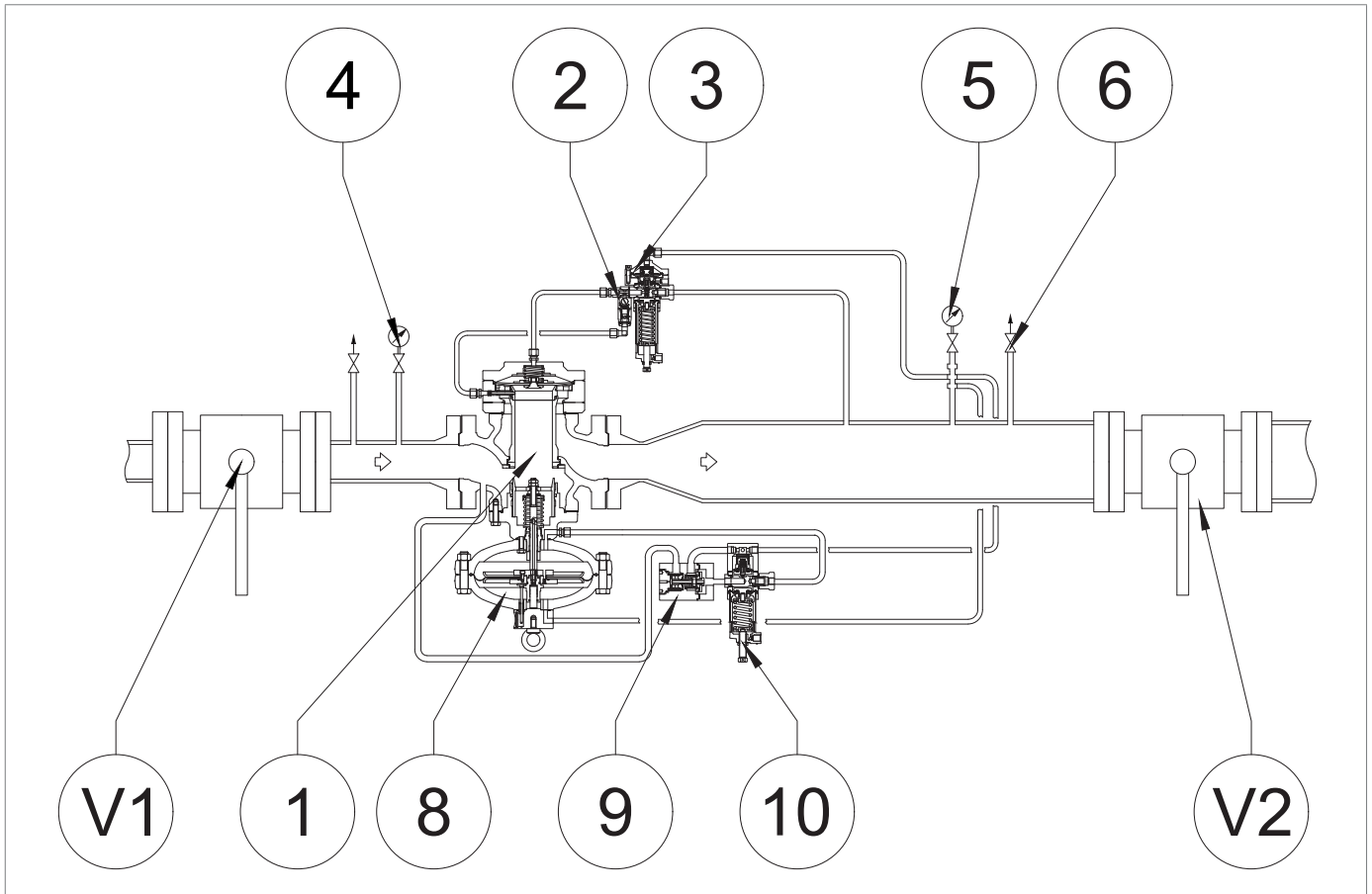


Fig. 8.26. Procedure for commissioning the regulator with PM/819 built-in monitor

Step	Action
1	Partially open the drain cock (6).
2	Completely unscrew the fixing nut of the pilot screw (positions 3 and 10).
3	Fully compress the pilot spring (3) by turning the adjustment screw clockwise.
4	Fully discharge the pilot spring (10) by turning the adjustment screw clockwise.
5	Close the screw of the AR100 lamination valve (2) to a value of 1.
6	Open the inlet shut-off valve V1 very slowly. NOTE! Check the pressure by referring to the pressure gauge (4) located upstream.
7	Turn the monitor pilot adjustment screw (10) clockwise to increase the downstream pressure value up to the operating value chosen for the monitor. NOTE! Check the pressure referring to the pressure gauge (5) located upstream.
8	Open the screw of the AR100 lamination valve (2) to a value between 3 and 5.
9	Turn the pilot adjustment screw (3) anticlockwise to release the calibrating spring until the regulator trips.

Step	Action
10	<p>Make sure that the PM/819 monitor (8) is fully open (100%) by checking the position of the stroke indicator rod.</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Check the pressure referring to the pressure gauge (5) located upstream.</p> </div>
11	<p>Close the drain cock (6) and check that the downstream pressure, after an increase phase, does not exceed the closing pressure value (refer to the SG value specified with reference to the calibration value/set point).</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>If the downstream pressure exceeds the closing pressure value, refer to chapter 10 “Fault search and troubleshooting” to remove the causes of the malfunction.</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Check the pressure referring to the pressure gauge (5) located upstream.</p> </div>
12	<p>Using a foaming agent, check all the junctions between shut-off valves V1 and V2 for proper sealing.</p>
13	<p>Open the outlet shut-off valve V2 very slowly until the pipeline fills completely.</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>If at the beginning of this operation the pressure in the pipeline is much lower than the calibration pressure, it will be advisable to shutter the opening of this valve so as not to exceed the maximum flow rate of the system.</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Check the pressure referring to the pressure gauge (5) located upstream.</p> </div>
14	<p>Readjust the calibration set in Step 8:</p> <ul style="list-style-type: none"> • by increasing the opening of the screw of the AR100 lamination valve (2), if pumping events occur in normal operating conditions; • by decreasing the opening of the screw of the AR100 lamination valve (2), if an excessive decrease in the regulated pressure occurs as the flow rate increases.
15	<p>Lock the screws of the pilots with the appropriate fixing nuts.</p>

Tab. 8.59.

8.7 - PROCEDURE FOR COMMISSIONING THE APERFLUX 851 REGULATOR WITH PM/819 BUILT-IN MONITOR AND M/A ACCELERATOR

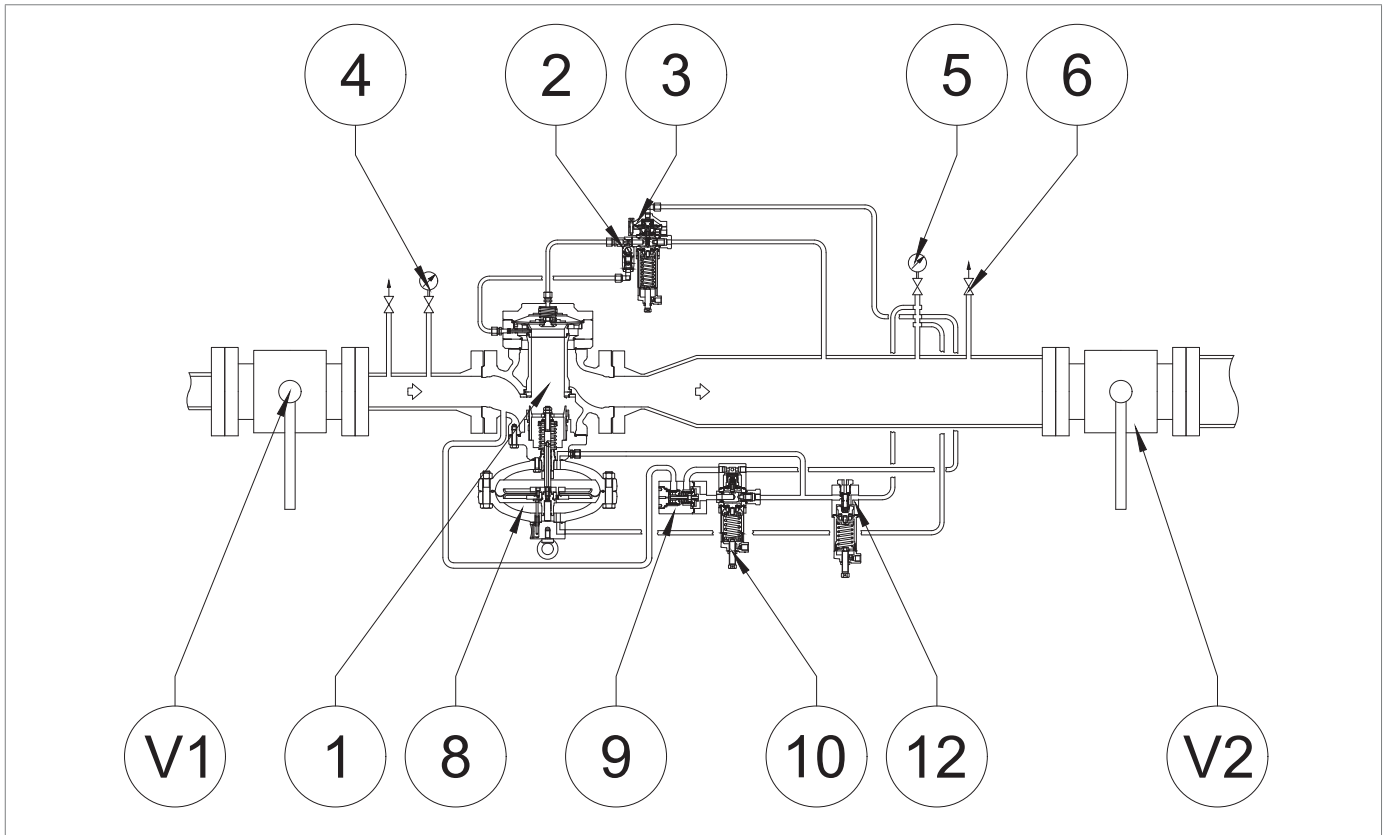


Fig. 8.27. Procedure for commissioning the regulator with PM/819 built-in monitor and M/A accelerator

Step	Action
1	Partially open the drain cock (6).
2	Completely unscrew the fixing nut of the screw of the pilots (positions 3 and 10) and of the M/A accelerator (12).
3	Fully compress the pilot spring (3) by turning the adjustment screw clockwise.
4	Fully discharge the pilot spring (10) by turning the adjustment screw clockwise.
5	Fully compress the spring of the M/A accelerator (12) by turning the adjustment screw clockwise.
6	Close the screw of the AR100 lamination valve (2) to a value of 1.
7	Open the inlet shut-off valve V1 very slowly. NOTE! Check the pressure by referring to the pressure gauge (4) located upstream.
8	Slowly increase the downstream pressure by turning the monitor's (10) pilot adjustment screw clockwise until the M/A accelerator's (12) tripping pressure value has been reached. NOTE! Check the pressure referring to the pressure gauge (5) located upstream.
9	Turn the adjustment screw of the M/A accelerator (12) anticlockwise to decrease the calibrated tripping pressure value until, by using a foaming substance, some gas leaks from the appropriate drain.

Step	Action
10	<p>Turn the monitor pilot adjustment screw (10) anticlockwise to decrease the downstream pressure value up to the selected working value of the monitor, making sure that the accelerator valve (12) has stopped the gas discharge; then lock the pilot screw 10 with the appropriate nut 9 (fig. 21).</p> <p>NOTE! Check the pressure referring to the pressure gauge (5) located upstream.</p>
11	Lock the monitor pilot adjustment screw (10) with the appropriate nut (9).
12	Open the screw of the AR100 lamination valve (2) to a value between 3 and 5.
13	<p>Turn the pilot adjustment screw (3) anticlockwise to release the calibrating spring until the regulator trips.</p> <p>NOTE! Check the pressure referring to the pressure gauge (5) located upstream.</p>
14	Make sure that the PM/819 monitor (8) is fully open (100%) by checking the position of the stroke indicator rod.
15	<p>Close the drain cock (6) and check that the downstream pressure, after an increase phase, does not exceed the closing pressure value (refer to the SG value specified with reference to the calibration value/set point).</p> <p>NOTE! If the downstream pressure exceeds the closing pressure value, refer to chapter “Troubleshooting” to remove the causes of the malfunction.</p> <p>NOTE! Check the pressure referring to the pressure gauge (5) located upstream.</p>
16	Using a foaming agent, check all the junctions between shut-off valves V1 and V2 for proper sealing.
17	<p>Open the outlet shut-off valve V2 very slowly until the pipeline fills completely.</p> <p>NOTE! If at the beginning of this operation the pressure in the pipeline is much lower than the calibration pressure, it will be advisable to shutter the opening of this valve so as not to exceed the maximum flow rate of the system.</p> <p>NOTE! Check the pressure referring to the pressure gauge located upstream.</p>
18	<p>Repeat the operations of Step 12:</p> <ul style="list-style-type: none"> • by increasing the opening of the screw of the AR100 lamination valve (2), if pumping events occur in normal operating conditions; • by decreasing the opening of the screw of the AR100 lamination valve (2), if an excessive decrease in the regulated pressure occurs as the flow rate increases.
19	Lock the screws of the pilots with the appropriate fixing nuts.

Tab. 8.60.

8.8 - PROCEDURE FOR COMMISSIONING THE APERFLUX 851 REGULATOR WITH SB/82 BUILT-IN SLAM-SHUT VALVE

8.8.1 - CHECKING THE SB/82 SLAM-SHUT VALVE FOR PROPER SEALING WHEN CLOSING

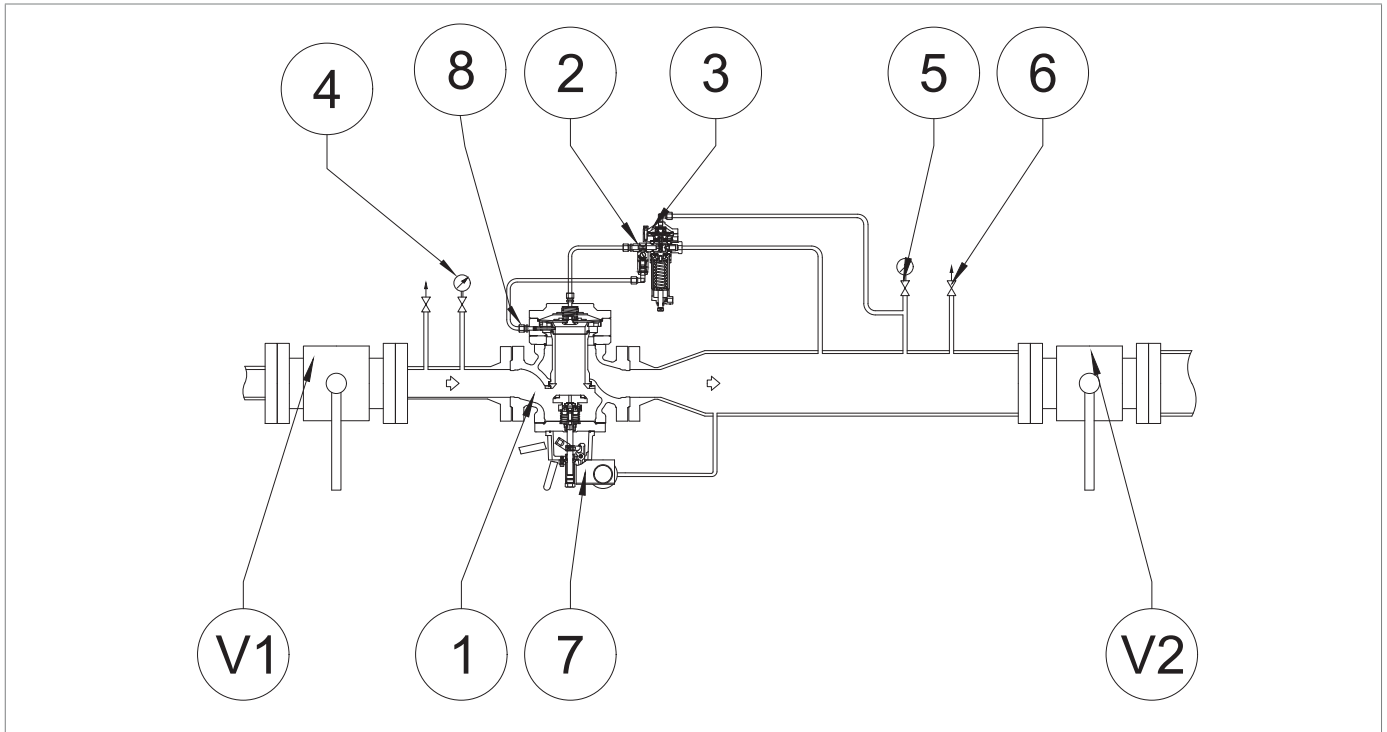


Fig. 8.28. Sealing of the SB/82 slam-shut valve when closing

Step	Action
1	Check that the slam-shut valve is in the closed position.
2	Fully release the pilot spring (3) by turning the adjustment screw anticlockwise.
3	Open the vent (6) and drain the downstream section completely.
4	Disconnect the pipe (8) between the AR100 lamination valve (2) and the regulator head.
5	Slowly open upstream valve V1.
6	Check the slam-shut valve for sealing through the connection to the regulator head with a foaming substance. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>NOTE! If the connection is leaking, refer to chapter 10 “Fault search and troubleshooting” to remove the causes of the malfunction.</p> </div>
7	Disconnect the pipe between the AR100 lamination valve (2) and the regulator head (1). <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>NOTE! Check whether to replace the fitting by referring to the fitting manufacturer’s instructions.</p> </div>
8	Check spring calibration for minimum pressure trip.

Tab. 8.61.

8.8.2 - PRESSURE SWITCHES CALIBRATION PROCEDURE 102M/102MH - 105M/105MH

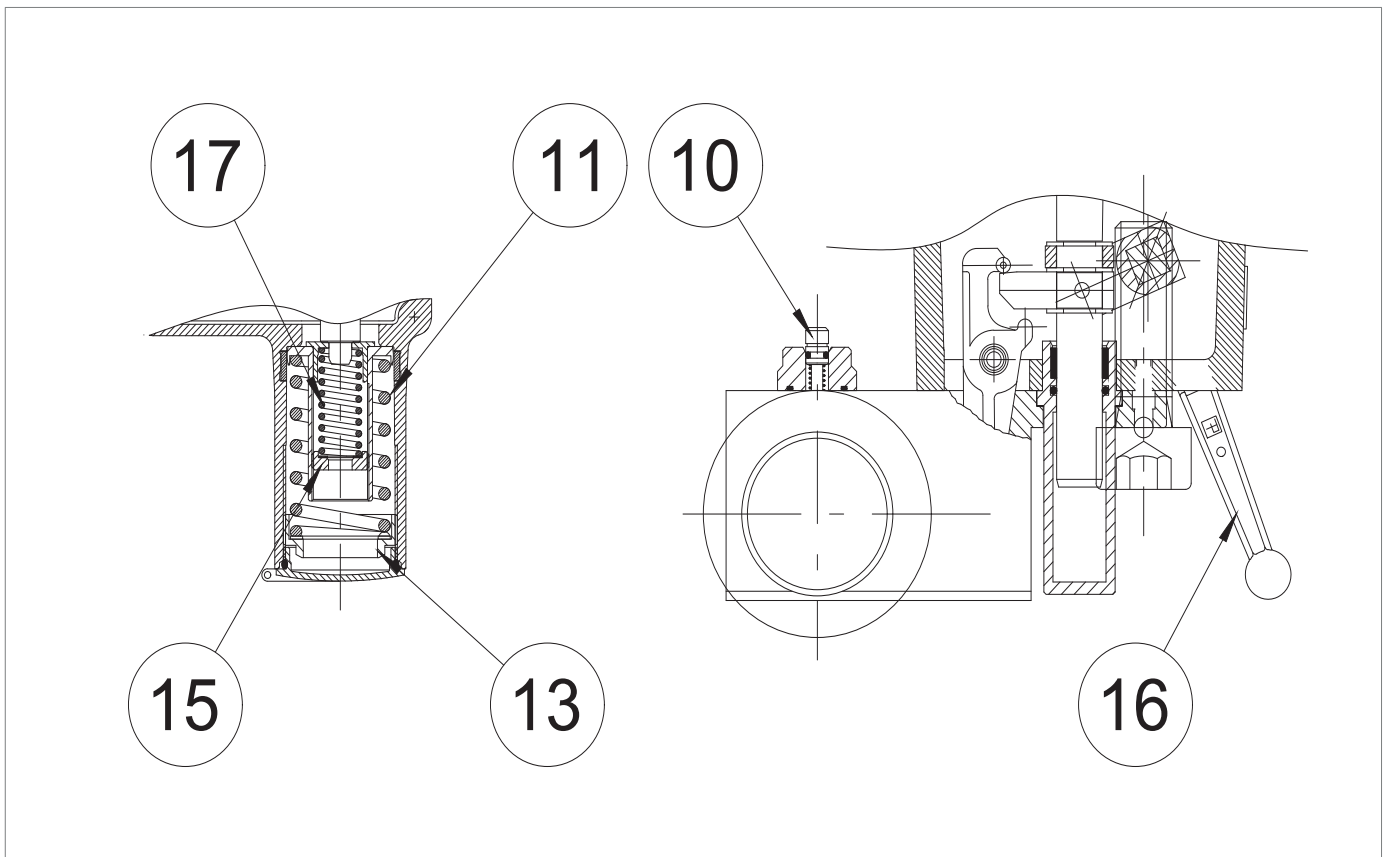





Fig. 8.29. Pressure switches calibration Models 102M/102MH - 105M/105MH

SPRING CALIBRATION FOR MAXIMUM PRESSURE TRIP

Step	Action
1	<p>In order to check for proper tripping calibration, increase the downstream pressure until the slam-shut device trips by acting on the pilot adjustment screw (3).</p> <div style="border: 1px solid black; padding: 5px;"> <p>NOTE!</p> <p>To check the pressure, refer to the pressure gauge downstream of the equipment. If the slam-shut valve:</p> <ul style="list-style-type: none"> • trips before the expected pressure value, screw in (clockwise) the adjustment ring nut (13); • does not trip before the expected pressure value, unscrew (anticlockwise) the adjustment ring nut (13). </div>
2	Reduce the pressure in the downstream section by opening the vent (6) to the regulator (1) calibration value.
3	Trigger the slam-shut device by operating the control lever (16).
4	Repeat steps 1-2-3 at least three times for correct calibration.

Tab. 8.62.

SPRING CALIBRATION FOR MINIMUM PRESSURE TRIP (IF ANY)

Step	Action
1	Open the vent to the atmosphere (6) and keep it open for the next steps.
2	Use the pilot adjustment screw (3) to decrease the downstream pressure to the minimum pressure required for the slam-shut device to trip. <div style="border: 1px solid black; padding: 5px;">  NOTE! To check the pressure, refer to the pressure gauge downstream of the equipment. </div>
3	In order to check for proper tripping calibration, decrease the downstream pressure until the slam-shut device trips by acting on the pilot adjustment screw (3). <div style="border: 1px solid black; padding: 5px;">  NOTE! To check the pressure, refer to the pressure gauge downstream of the equipment. If the slam-shut valve: <ul style="list-style-type: none"> • trips before the expected pressure value, screw in (clockwise) the adjustment ring nut (15); • does not trip before the expected pressure value, unscrew (anticlockwise) the adjustment ring nut (15). </div>
4	Close the vent (6).
5	Trigger the slam-shut device by operating the control lever (16).
6	Re-open the vent (6).
7	Repeat steps 3-4-5-6 at least three times for correct calibration. <div style="border: 1px solid black; padding: 5px;">  NOTE! The calibration value must comply with the operating limits specified on the plate. </div>

Tab. 8.63.

COMMISSIONING THE REGULATOR

<div style="border: 1px solid black; padding: 5px;">  NOTE! Refer to paragraph 8.5 “Regulator commissioning procedure” in this chapter. </div>
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8.9 - PROCEDURE FOR COMMISSIONING THE APERFLUX 851 REGULATOR WITH HB/97 BUILT-IN SLAM-SHUT VALVE

8.9.1 - CHECKING THE HB/97 BUILT-IN SLAM-SHUT VALVE FOR SEALING WHEN CLOSING

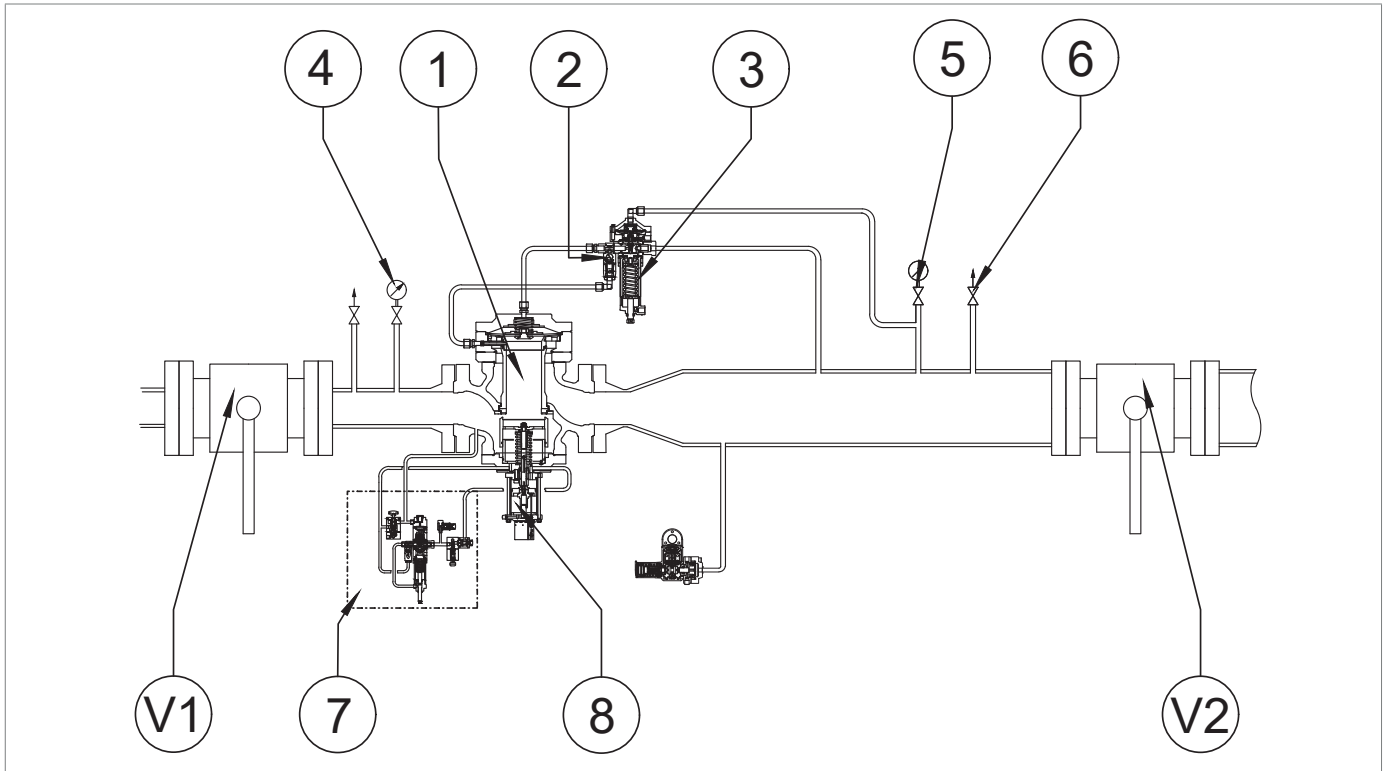


Fig. 8.30. Sealing of the HB/97 slam-shut valve when closing

Step	Action
1	Check that the built-in slam-shut valve is in the closed position.
2	Completely unscrew the fixing nut of the pilot screw (3).
3	Fully release the pilot spring (3) by turning the adjustment screw anticlockwise.
4	Open the vent (6) and drain the downstream section completely.
5	Disconnect the pipe between the AR100 lamination valve (2) and the regulator head (1).
6	Disconnect the pipe between the AR100 lamination valve (2) and the regulator head (1). <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>NOTE! Check whether to replace the fitting by referring to the fitting manufacturer's instructions.</p> </div>
7	Check the built-in slam-shut valve for sealing with a foaming substance through the connection to the regulator head. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>NOTE! If the connection is leaking, refer to chapter 10 "Fault search and troubleshooting" to remove the causes of the malfunction.</p> </div>

Tab. 8.64.

8.9.2 - LINE OFF 2.0 COMMISSIONING AND CALIBRATION PROCEDURE FOR HB/97 BUILT-IN SLAM-SHUT VALVE

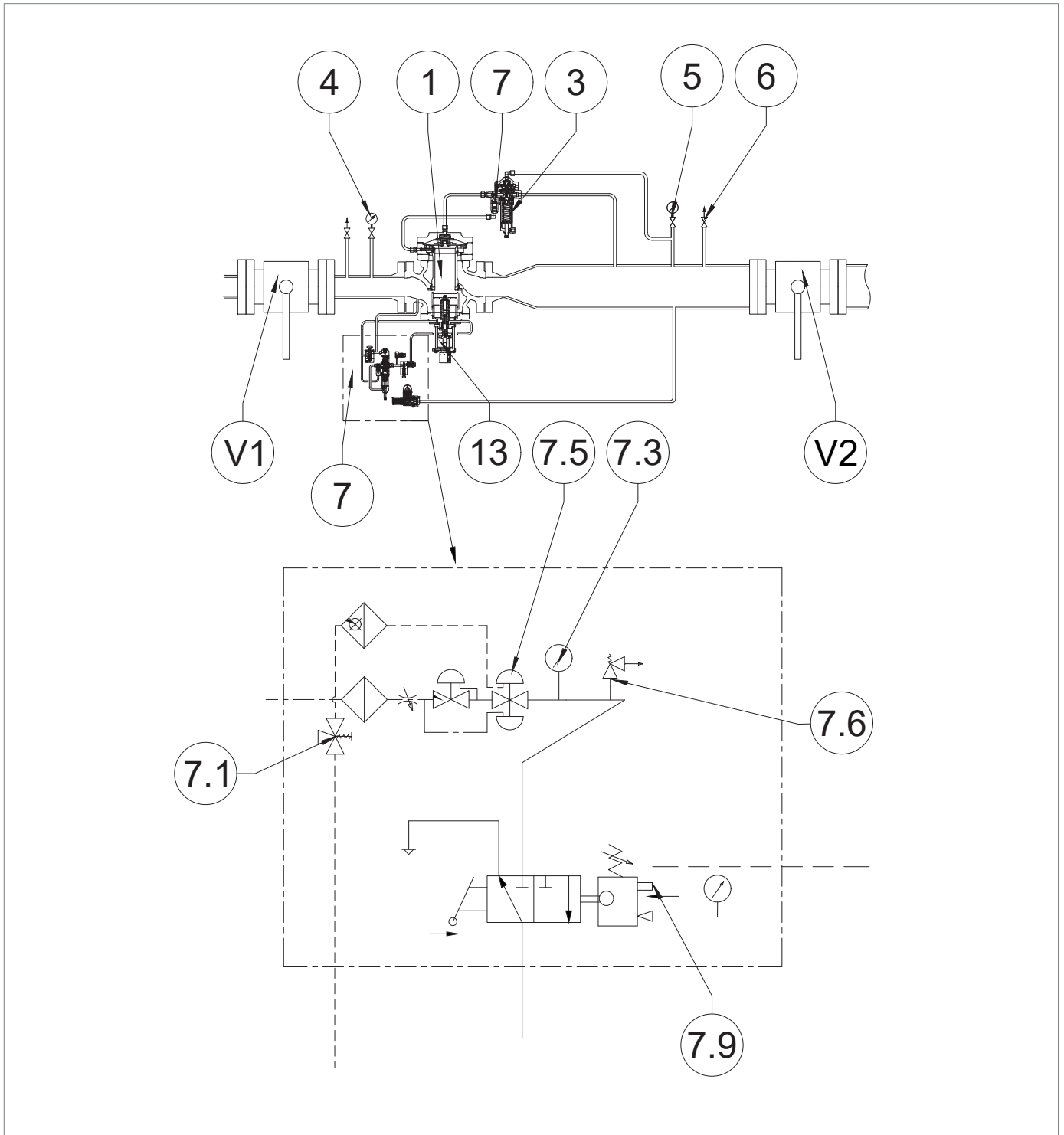



Fig. 8.31. LINE OFF 2.0 commissioning and calibration for the HB/97 built-in slam-shut valve

Step	Action
1	Completely unscrew the fixing nut of the pilot adjustment screw (3).
2	Fully release the pilot spring (3) by turning the adjustment screw anticlockwise.
3	Press and hold the button of the bypass device HP2/2 (7.1) to: <ul style="list-style-type: none"> bring the upstream pressure to the LINE-OFF 2.0 power supply unit (7); balance the pressure of the HB/97 built-in slam-shut valve plug.
4	Turn the adjustment screw of the R44/SS regulator (7.5) clockwise until the calibration value (7.6) of the safety valve is reached. <div style="border: 1px solid blue; padding: 5px; margin-top: 10px;">  NOTE! To check the pressure, refer to the pressure gauge connected to the R44/SS regulator (7.5). </div>
5	If the safety valve VS/FI (7.6): <ul style="list-style-type: none"> opens before the expected pressure value: unscrew the locking ring nut and tighten (clockwise) the adjustment plug so that the spring inside it is compressed more; does not open at the expected pressure value: unscrew the locking ring nut and unscrew (anticlockwise) the adjustment cap, so as to relieve the spring inside.
6	Tighten the adjustment screw of the R44/SS regulator (7.5) slowly by turning it clockwise, until the tripping pressure value of the VS/FI valve (7.6) is reached.
7	Reduce the outlet pressure of the R44/SS regulator (7.5) by unscrewing its adjustment screw and repeat step 6 at least three times for correct calibration of the VS/FI valve (7.6).
8	Repeat step 6 at least three times to properly calibrate the VS/FI safety valve (7.6).
9	By acting on the adjustment screw, adjust the R44/SS regulator (7.5) to the required pressure value referring to the connected pressure gauge (7.3), then: <ul style="list-style-type: none"> screw the adjustment screw (clockwise) so as to further compress the spring inside, if the pressure value on the pressure gauge is lower than the calibration value of the R44/SS regulator (7.5); unscrew the adjustment screw (anticlockwise) so as to further release the spring inside, if the pressure value on the pressure gauge is higher than the calibration value of the R44/SS regulator (7.5).
10	Trigger the HB/97 built-in slam-shut valve by operating the lever (7.9).
11	Release the button of the bypass device HP2/2 (7.1).

Tab. 8.65.

COMMISSIONING THE REGULATOR

 **NOTE!**

Refer to paragraph 8.5 “Regulator commissioning procedure” in this chapter.

8.10 - CALIBRATION OF THE PRESSURE SWITCH FOR LINE OFF 2.0

 **NOTE!**

For the pressure switch calibration procedure, refer to paragraph 8.8.2 “Calibration procedure for pressure switches 102M/102MH - 105M/105MH”.

8.11 - DEVICE CALIBRATION

8.11.1 - 200 AND 300 SERIES PILOTS

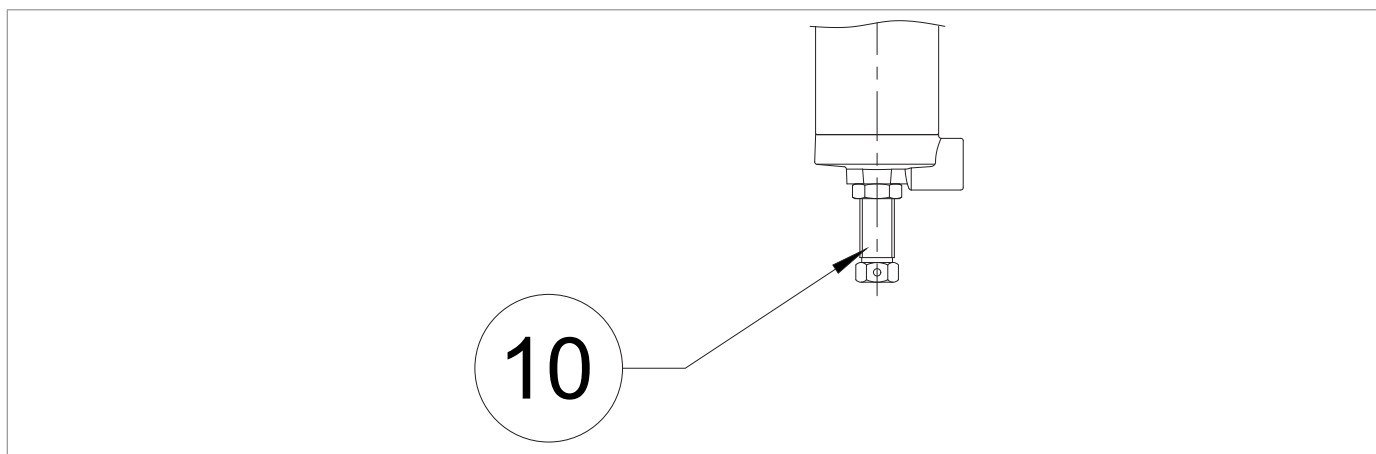


Fig. 8.32. 200 and 300 series pilots

Turn the adjustment screw (10):

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

8.11.2 - PRESSURE SWITCHES MODELS 102M/102MH - 105M/105MH

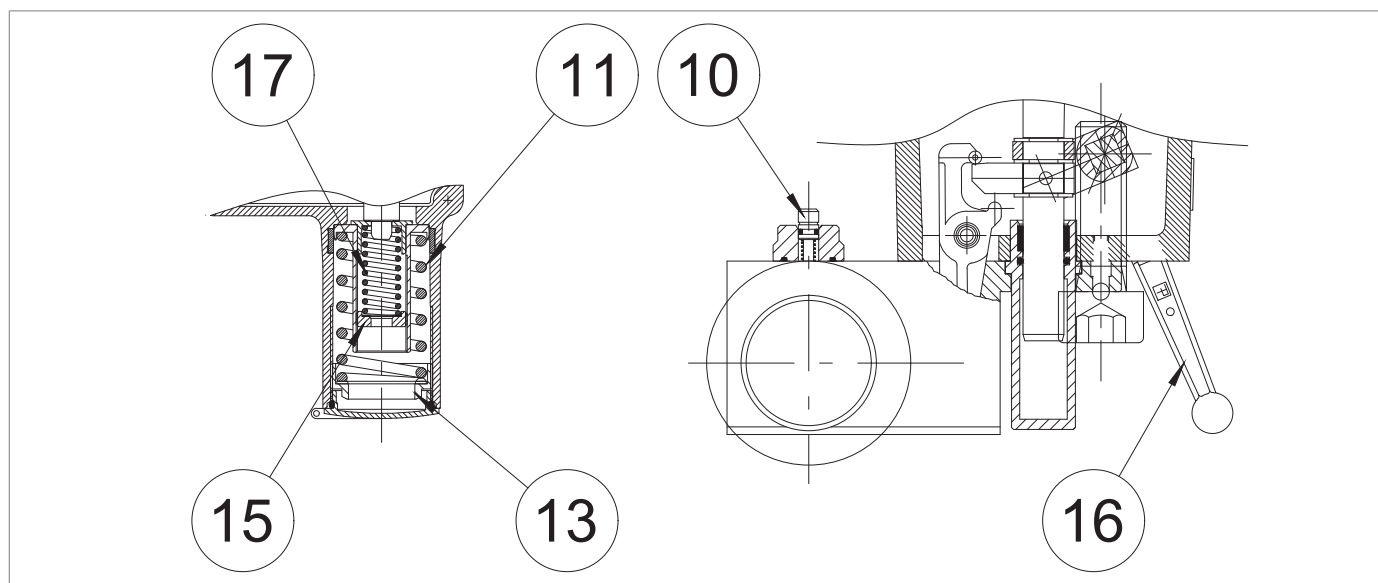


Fig. 8.33. Pressure switches models 102 - 105

Turn the ring nut of max (13):

- anticlockwise to decrease the slim-shut device tripping pressure;
- clockwise to increase the slim-shut device tripping pressure.

Turn the min ring nut (15):

- anticlockwise to decrease the slim-shut device tripping pressure;
- clockwise to increase the slim-shut device tripping pressure.

NOTE!

For calibration ranges, please refer to chapter 13 "Calibration tables".

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 the 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.

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.

NOTE!

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.
- do not exceed the time interval between servicing. The time interval is to be understood as the maximum acceptable; it can, on the other hand, 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 has the necessary equipment (see chapter 7 “Equipment for commissioning/maintenance”).


 **NOTE!**

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: <ul style="list-style-type: none"> • 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. <div style="background-color: red; color: white; padding: 5px; margin-top: 10px;">  HAZARD! </div> <p>Special maintenance:</p> <ul style="list-style-type: none"> • 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. 9.66.

9.2 - PERIODICALLY CHECKING AND INSPECTING THE EQUIPMENT FOR PROPER OPERATION

Periodic checks and inspections	
Operator qualification	Mechanical maintenance technician
PPE required	 <div style="background-color: #f4a460; padding: 5px; margin-top: 10px;">  WARNING! </div> <p>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:</p> <ul style="list-style-type: none"> • the regulations in force in the country of installation; • <u>any information provided by the Safety Manager at the installation facility.</u>

Tab. 9.67.

Checks and inspections do not require any manual operation on the equipment.

Some of them can be replaced by remote monitoring using suitable remote control equipment. The following is listed below:

Activity description	Equipment/accessories involved	Evaluation criterion	Minimum frequency
Significant performance check*	Pressure regulators	<ul style="list-style-type: none"> • No fluctuations in the adjusted pressure. • Significant pressure values within pre-set limits. 	Monthly
	Gas flow lock type safety devices (external position indicator)	<ul style="list-style-type: none"> • Fully open position. 	
	Stand-by monitor (external position indicator)	<ul style="list-style-type: none"> • Fully open position. 	
Visual inspection equipment external condition	All	<ul style="list-style-type: none"> • No visible damage. • External surface protection as per UNI 9571-1:2012. 	Half-yearly

Tab. 9.68.

* 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”.

 **NOTE!**

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

NOTE!

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	Covers parts subject to wear and/or abrasion, where: <ul style="list-style-type: none"> 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	takes into account parts subject to aging only, including parts that also require lubrication and/or cleaning.

Tab. 9.69.

NOTE!


Check, within the minimum frequency specified in Tab. 9.70, the available components for wear/abrasion/aging.

Category	Part description	Evaluation criterion	Minimum replacement frequency
1	Sealing rings for non-metallic valve and plugs seats	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-reducers	
		Accelerators	
		Other	
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 blocking 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 blocking 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. 9.70.

9.4 - ROUTINE MAINTENANCE PROCEDURES

Routine maintenance	
Operator qualification	Mechanical maintenance technician
PPE required	 <p>⚠ WARNING!</p> <p>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:</p> <ul style="list-style-type: none"> • the regulations in force in the country of installation; • <u>any information provided by the Safety Manager at the installation facility.</u>
Necessary equipment	Refer to chapter 7 "Equipment for commissioning/maintenance".

Tab. 9.71.

9.4.1 - TIGHTENING TORQUES APERFLUX 851

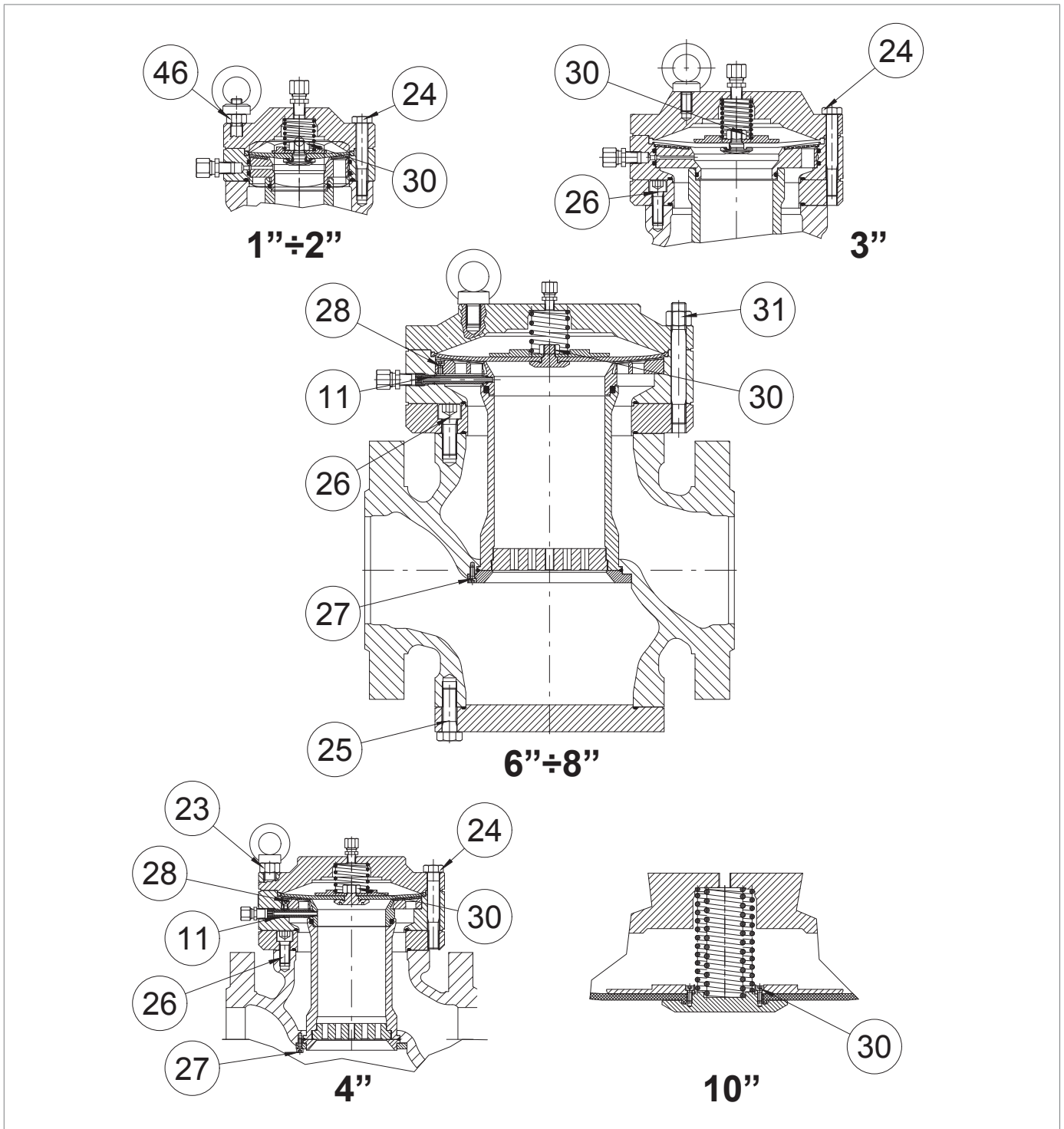


Fig. 9.34. Tightening torques APERFLUX 851

APERFLUX 851 DN 1"

Pos.	Description	Torque (nm)	Torque (ft - lb)
24	Screw M10X80 UNI 5939	45	33
25	Screw M10X30 UNI 5739	45	33
27	Screw M6X12 UNI 5931	10	7
30	Nut M12 UNI 5588	50	36
46	Nut M10 UNI 5588	45	33

Tab. 9.72.
APERFLUX 851 DN 2"

Pos.	Description	Torque (nm)	Torque (ft - lb)
24	Screw M12X80 UNI 5937	80	59
25	Screw M12X35 UNI 5739	80	59
27	Screw M6X12 UNI 5931	10	7
30	Nut M12X1.25 UNI 5588	50	36
46	Nut M12 UNI 5588	80	59

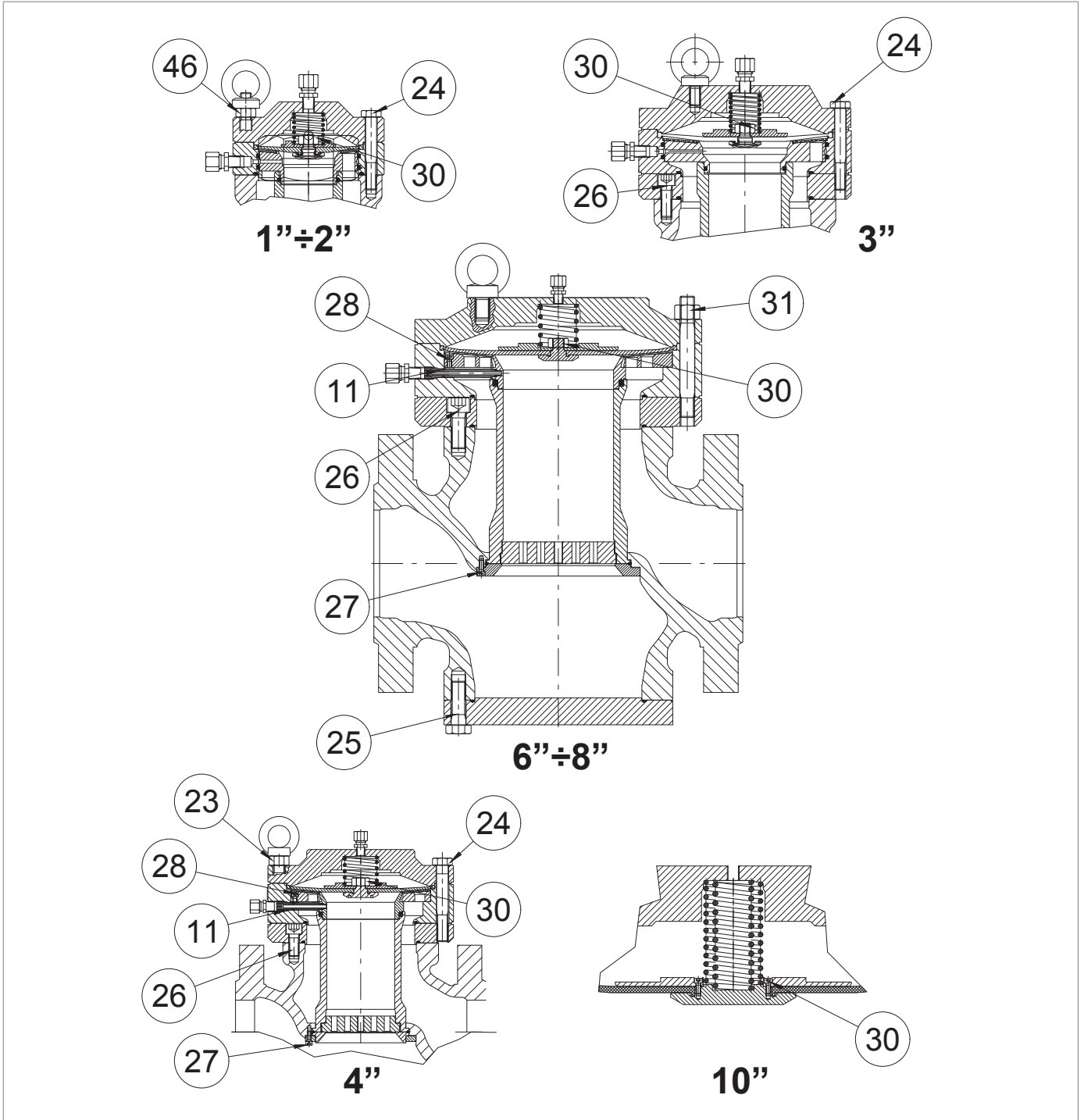
Tab. 9.73.
APERFLUX 851 DN 3"

Pos.	Description	Torque (nm)	Torque (ft - lb)
24	Screw M12X90 UNI 5939	80	59
25	Screw M12X40 UNI 5739	80	59
26	Screw M12X40 UNI 5931	80	59
27	Screw M6X16 UNI 5931	10	7
30	Nut M12X1.25 UNI 5588	50	36

Tab. 9.74.
APERFLUX 851 DN 4"

Pos.	Description	Torque (nm)	Torque (ft - lb)
11	Fitting Aperflux	5	3
23	Nut M18 UNI 5588	200	147
24	Screw M18X120 UNI 5937	200	147
25	Screw M16X50 UNI 5737	150	110
26	Screw M16X35 UNI 5931	150	110
27	Screw M16X16 UNI 5931	10	7
28	Screw M6X16 UNI 5931	10	7
30	Nut M16 UNI 5588	80	59

Tab. 9.75.



Tightening torques APERFLUX 851

APERFLUX 851 DN 6"

Pos.	Description	Torque (nm)	Torque (ft - lb)
11	Fitting Aperflux	5	3
25	Screw M20X60 UNI 5737	150	110
26	Screw M20X50 UNI 5931	280	206
27	Screw M6X16 UNI 5931	10	7
28	Screw M6X20 UNI 5931	10	7
28	Screw M6X25 UNI 5931	10	7
30	Nut M16 UNI 5588	80	59
31	Nut M20 UNI 5587	250	184

Tab. 9.76.
APERFLUX 851 DN 8"

Pos.	Description	Torque (nm)	Torque (ft - lb)
11	Fitting Aperflux	5	3
25	Screw M22X70 UNI 5737	280	206
26	Screw M22X80 UNI 5931	280	206
27	Screw M6X16 UNI 5931	10	7
28	Screw M6X25 UNI 5931	10	7
30	Nut M16 UNI 5588	80	59
31	Nut M24 UNI 5587	300	221

Tab. 9.77.
APERFLUX 851 DN 10"

Pos.	Description	Torque (nm)	Torque (ft - lb)
25	Screw M22X90 UNI 5737	280	206
26	Screw M22X70 UNI 5931	280	206
27	Screw M6X16 UNI 5931	10	7
28	Screw M6X25 UNI 5931	10	7
30	Screw M5X12 UNI 5931	6	4
31	Nut M24 UNI 5587	300	221

Tab. 9.78.

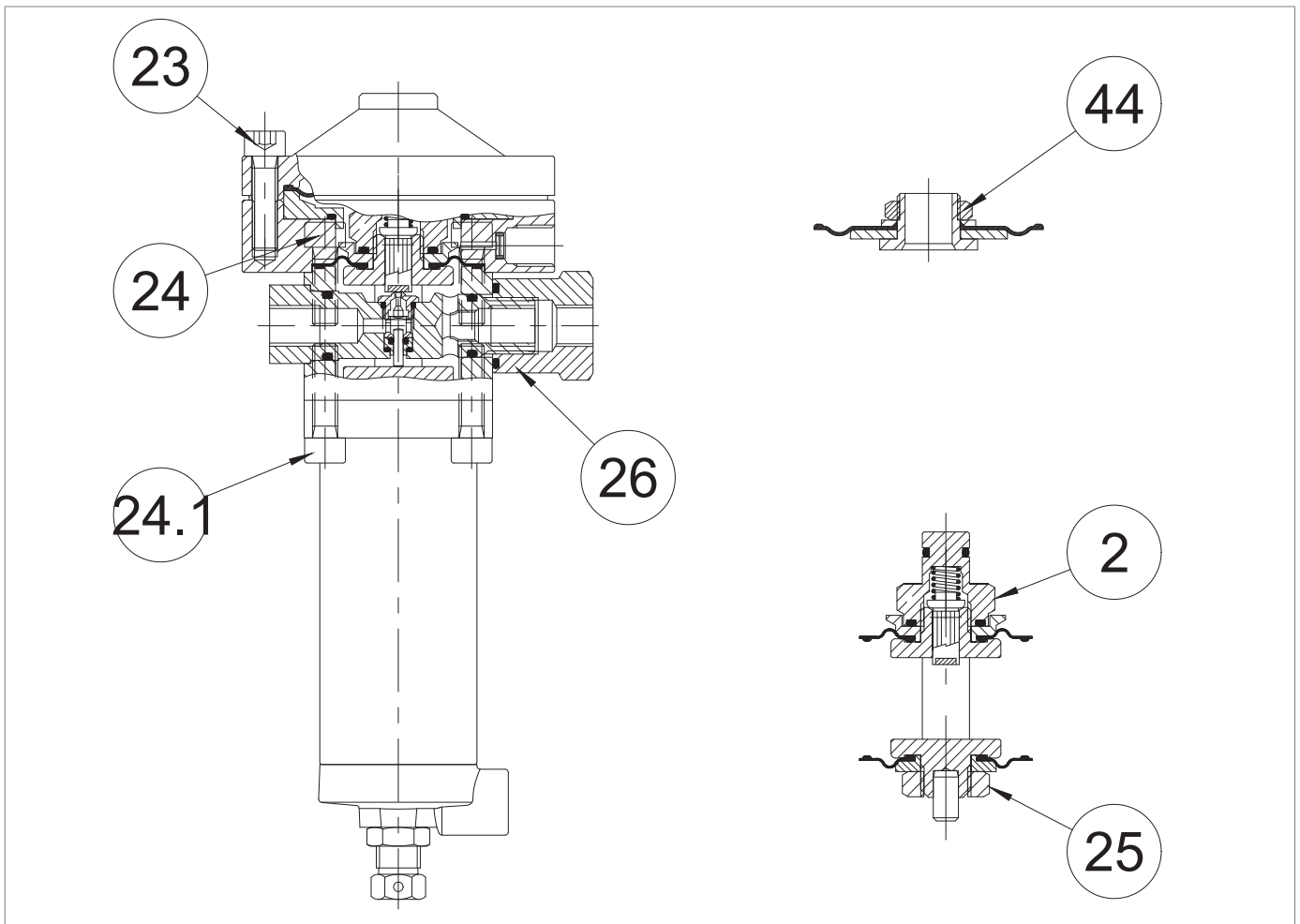
9.4.1.1 - TIGHTENING TORQUES FOR PILOTS SERIES 300


Fig. 9.35. Tightening torques for 302/A pilot

PILOT 302/A			
Pos.	Description	Torque (nm)	Torque (ft - lb)
2	Nut M16X1	20	14
23	Screw M8X30 UNI 5931 AISI	20	14
24	Screw M8X25 UNI 5931 AISI	20	14
24.1	Screw M8X30 UNI 5931 AISI	20	14
25	Nut M16X1.5	20	14
26	Nut M18X1.5	20	14
44	Nut M20X1	8	5

Tab. 9.79.

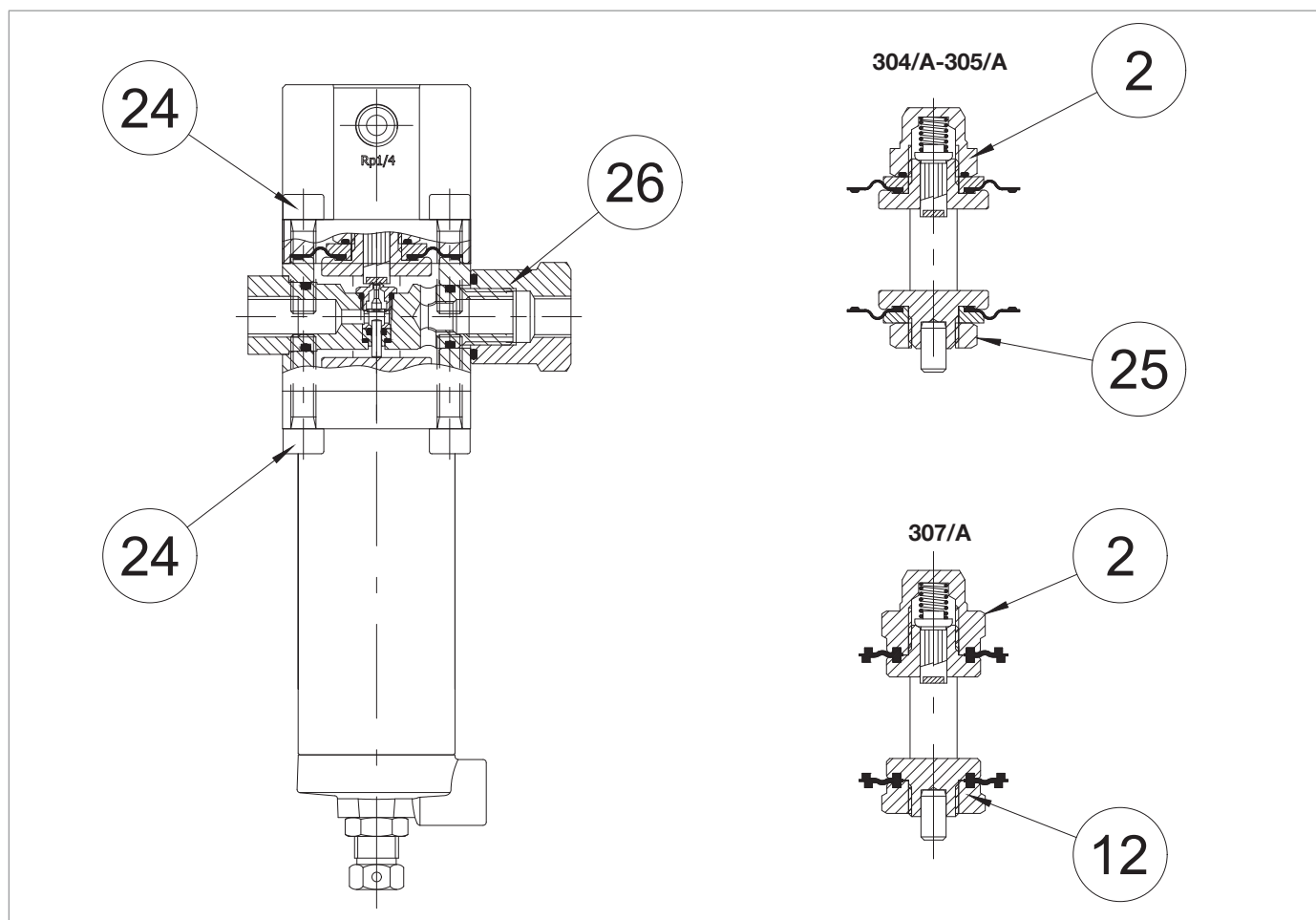


Fig. 9.36. Tightening torques for 304/A-305/A-307/A pilots

PILOTS 304/A-305/A-307/A			
Pos.	Description	Torque (nm)	Torque (ft - lb)
2	Nut M16X1	20	14
12	Nut M16X1.5	20	14
24	Screw M8X30 UNI 5931 AISI	16	11
25	Nut M16X1.5	20	14
26	Nut M18X1.5	20	14

Tab. 9.80.

9.4.1.2 - TIGHTENING TORQUES FOR LAMINATION VALVE AR100

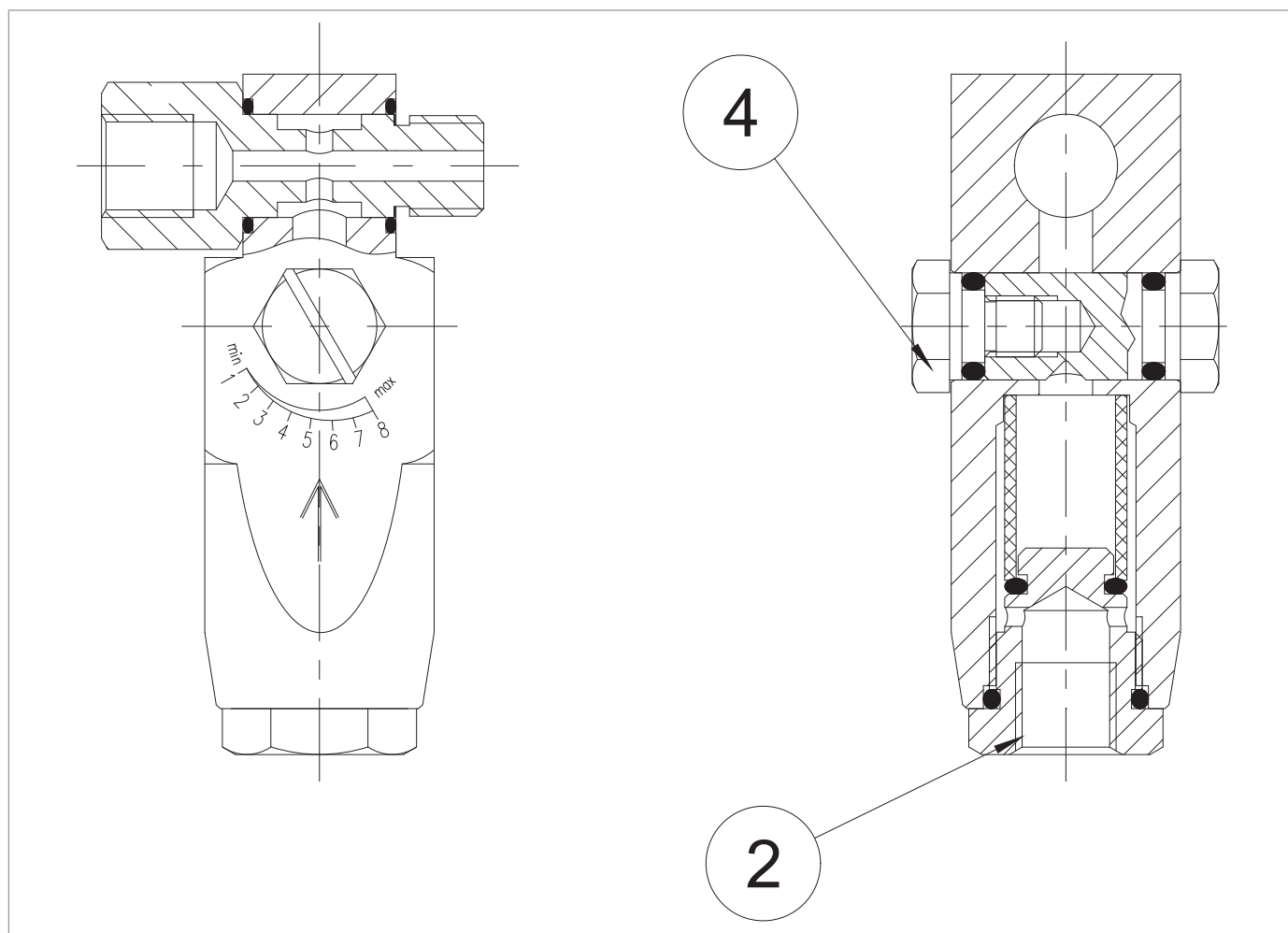


Fig. 9.37. Tightening torques for lamination valve AR100

LAMINATION VALVE AR100			
Pos.	Description	Torque (nm)	Torque (ft - lb)
2	Cap M20X1.5	20	14
4	Screw M8 AISI	4	2

Tab. 9.81.

9.4.1.3 - TIGHTENING TORQUES APERFLUX 851 + SILENCER DB/851

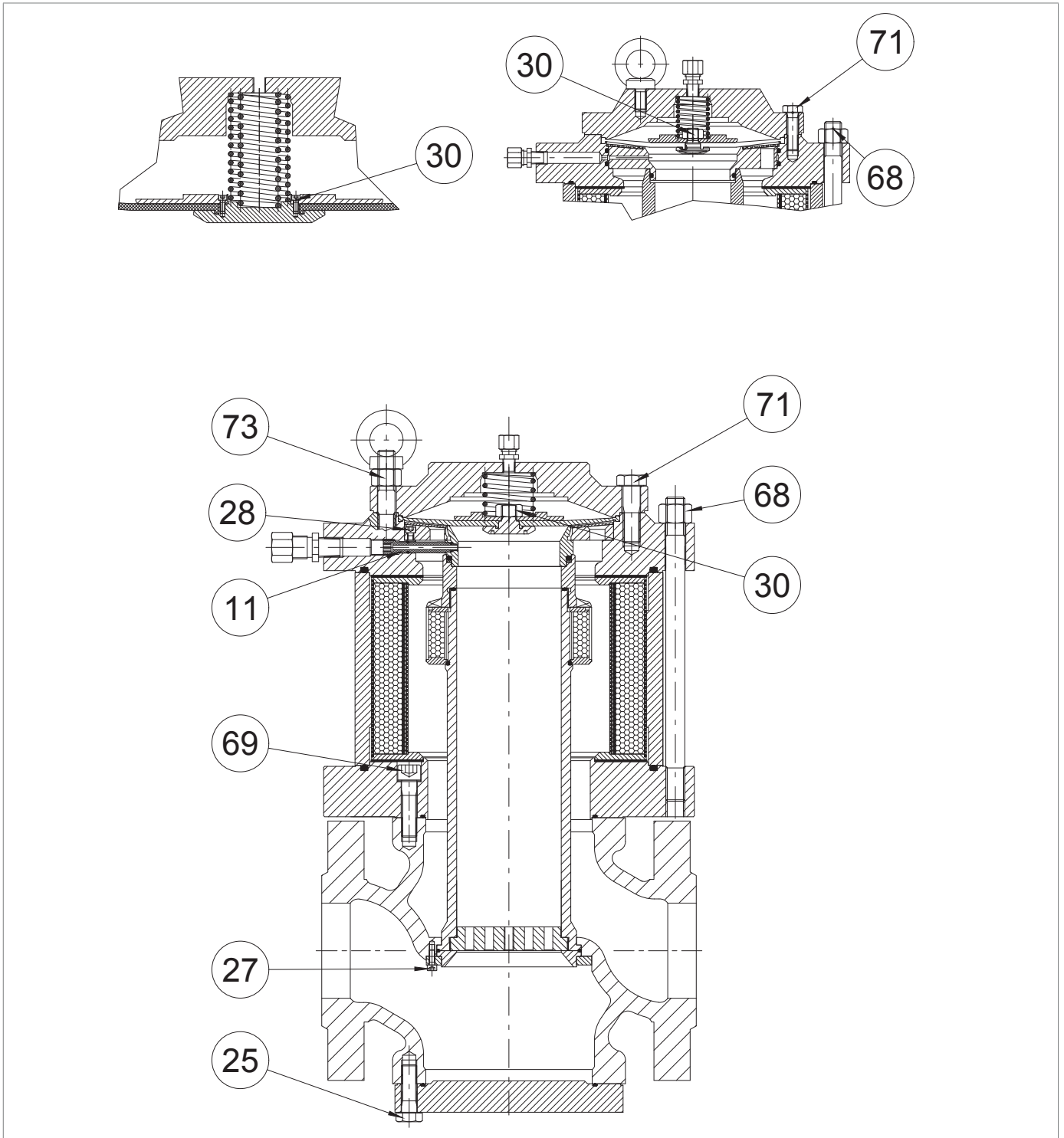


Fig. 9.38. Tightening torques APERFLUX 851 + Silencer DB/851

APERFLUX 851 DN 1" + DB/851

Pos.	Description	Torque (nm)	Torque (ft - lb)
25	Screw M10X30 UNI 5739	45	33
27	Screw M6X12 UNI 5931	10	7
30	Nut M12 UNI 5588	50	36
69	Screw M10X35 UNI 5931	45	33
68	Nut M14 UNI 5588	115	84
71	Screw M10X45 UNI 5939	45	33

Tab. 9.82.
APERFLUX 851 DN 2" + DB/851

Pos.	Description	Torque (nm)	Torque (ft - lb)
25	Screw M12X35 UNI 5739	80	59
27	Screw M6X12 UNI 5931	10	7
30	Nut M12 UNI 5588	50	36
68	Nut M18 UNI 5588	200	147
69	Screw M12X45 UNI 5931	80	59
71	Screw M12X40 UNI 5939	80	59

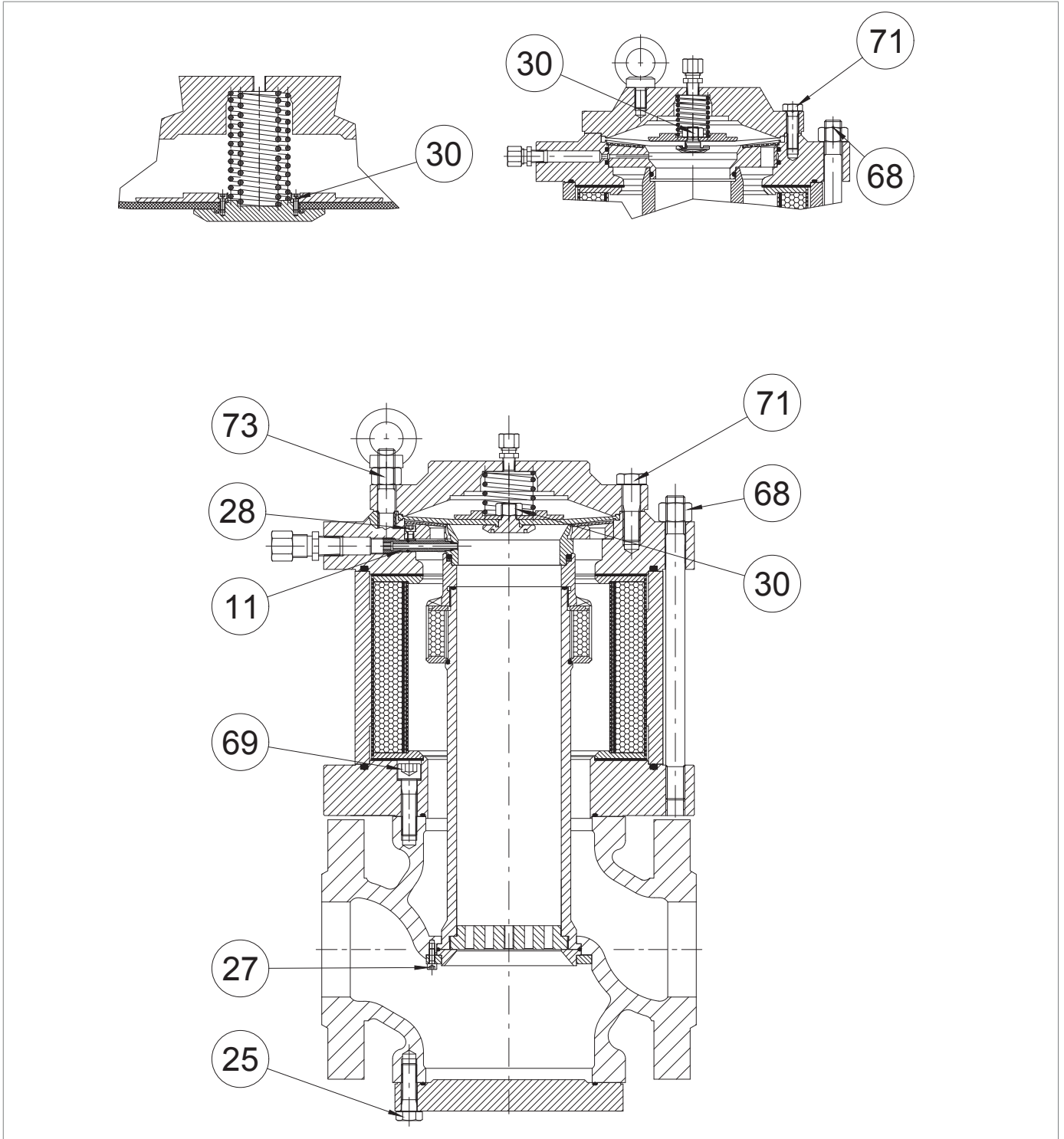
Tab. 9.83.
APERFLUX 851 DN 3" + DB/851

Pos.	Description	Torque (nm)	Torque (ft - lb)
25	Screw M12X40 UNI 5739	80	59
27	Screw M6X16 UNI 5931	10	7
30	Nut M12 UNI 5588	50	36
68	Nut M18 UNI 5588	200	147
69	Screw M12X45 UNI 5931	80	59
71	Screw M12X45 UNI 5939	80	59

Tab. 9.84.
APERFLUX 851 DN 4" + DB/851

Pos.	Description	Torque (nm)	Torque (ft - lb)
11	Fitting Aperflux	5	3
25	Screw M16X50 UNI 5737	150	110
27	Screw M16X16 UNI 5931	10	7
28	Screw M6X16 UNI 5931	10	7
30	Nut M16 UNI 5588	80	59
68	Nut M20 UNI 5588	250	184
69	Screw M16X60 UNI 5931	200	147
71	Screw M18X60 UNI 5937	200	147
73	Nut M18 UNI 5587	200	147

Tab. 9.85.



Tightening torques APERFLUX 851 + Silencer DB/851

APERFLUX 851 DN 6" + DB/851

Pos.	Description	Torque (nm)	Torque (ft - lb)
11	Fitting Aperflux	5	3
25	Screw M20X60 UNI 5737	150	110
27	Screw M6X16 UNI 5931	10	7
28	Screw M6X20 UNI 5931	10	7
30	Nut M16 UNI 5588	80	59
68	Nut M22 UNI 5588	280	206
69	Screw M20X70 UNI 5931	400	295
71	Screw M20X60 UNI 5737	250	184

Tab. 9.86.
APERFLUX 851 DN 8" + DB/851

Pos.	Description	Torque (nm)	Torque (ft - lb)
11	Fitting Aperflux	5	3
25	Screw M22X70 UNI 5737	280	206
27	Screw M6X16 UNI 5931	10	7
28	Screw M6X25 UNI 5931	10	7
30	Nut M16 UNI 5588	80	59
68	Nut M24 UNI 5587	300	221
69	Screw M22X80 UNI 5931	500	368
71	Screw M24X90 UNI 5937	300	221

Tab. 9.87.
APERFLUX 851 DN 10" + DB/851

Pos.	Description	Torque (nm)	Torque (ft - lb)
25	Screw M22X90 UNI 5737	280	206
27	Screw M6X16 UNI 5931	10	7
28	Screw M6X25 UNI 5931	10	7
30	Screw M5X12 UNI 5931	6	4
68	Nut M24 UNI 5587	300	221
69	Screw M22X110 UNI 5931	280	206
71	Screw M24X90 UNI 5937	300	221

Tab. 9.88.

9.4.1.4 - TIGHTENING TORQUES FOR PM/819 BUILT-IN MONITOR

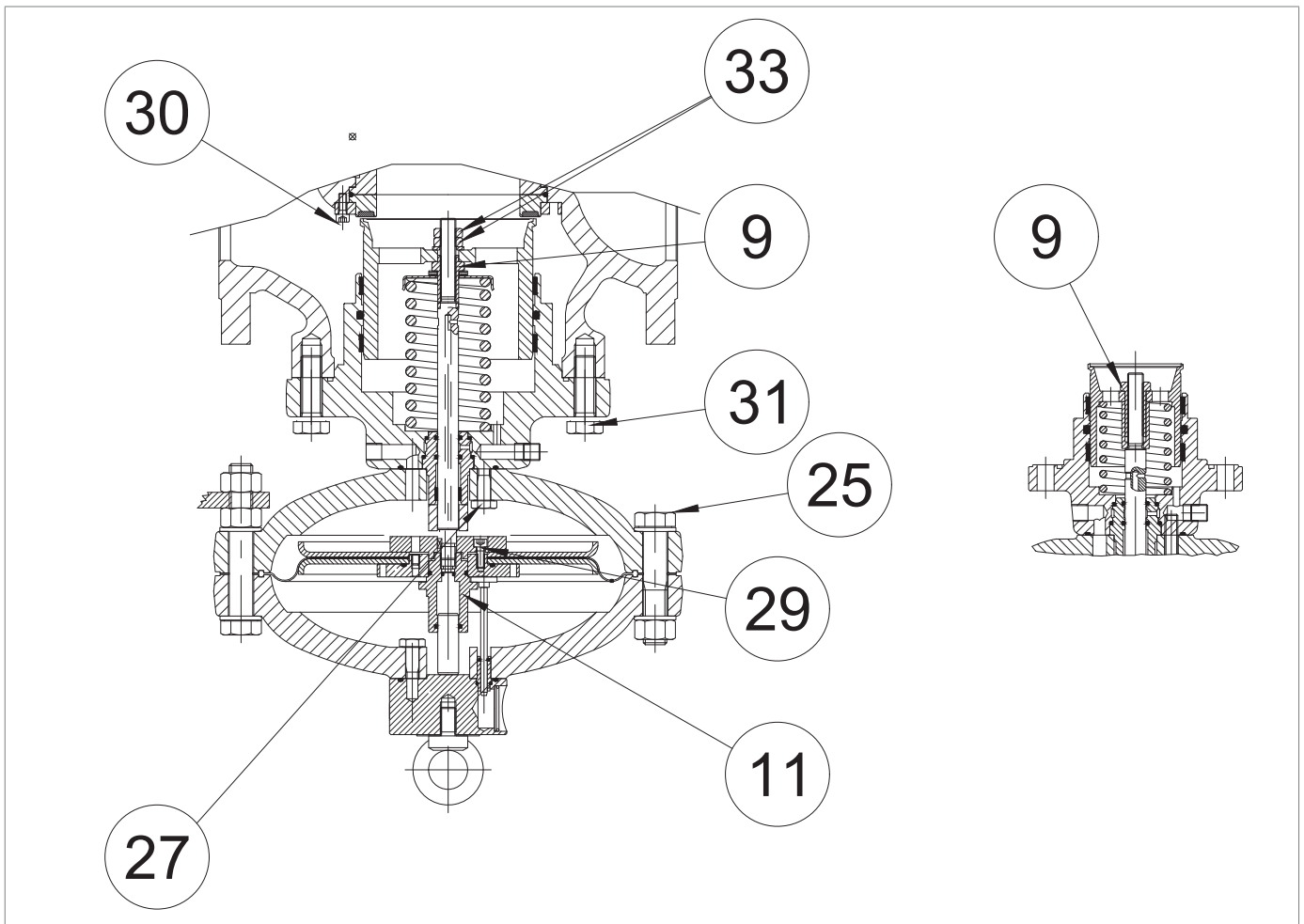


Fig. 9.39. Tightening torques for PM/819 built-in monitor

PM/819 DN 1"			
Pos.	Description	Torque (nm)	Torque (ft - lb)
9	Nut M12	35	25
11	M12 balancing piston guide	35	25
25	Screw M16X70 UNI 5737	60	44
27	Screw M10X35 5739	45	33
29	Screw M6X14 UNI 5931	10	7
30	Screw M6X12 UNI 5931	10	7
31	Screw M10X30 UNI 5739	45	33

Tab. 9.89.

PM/819 DN 2"

Pos.	Description	Torque (nm)	Torque (ft - lb)
9	Nut M12	35	25
11	M12 balancing piston guide	35	25
25	Screw M16X70 UNI 5737	60	44
27	Screw M10X35 5739	45	33
29	Screw M6X14 UNI 5931	10	7
30	Screw M6X12 UNI 5931	10	7
31	Screw M12X35 UNI 5739	80	59

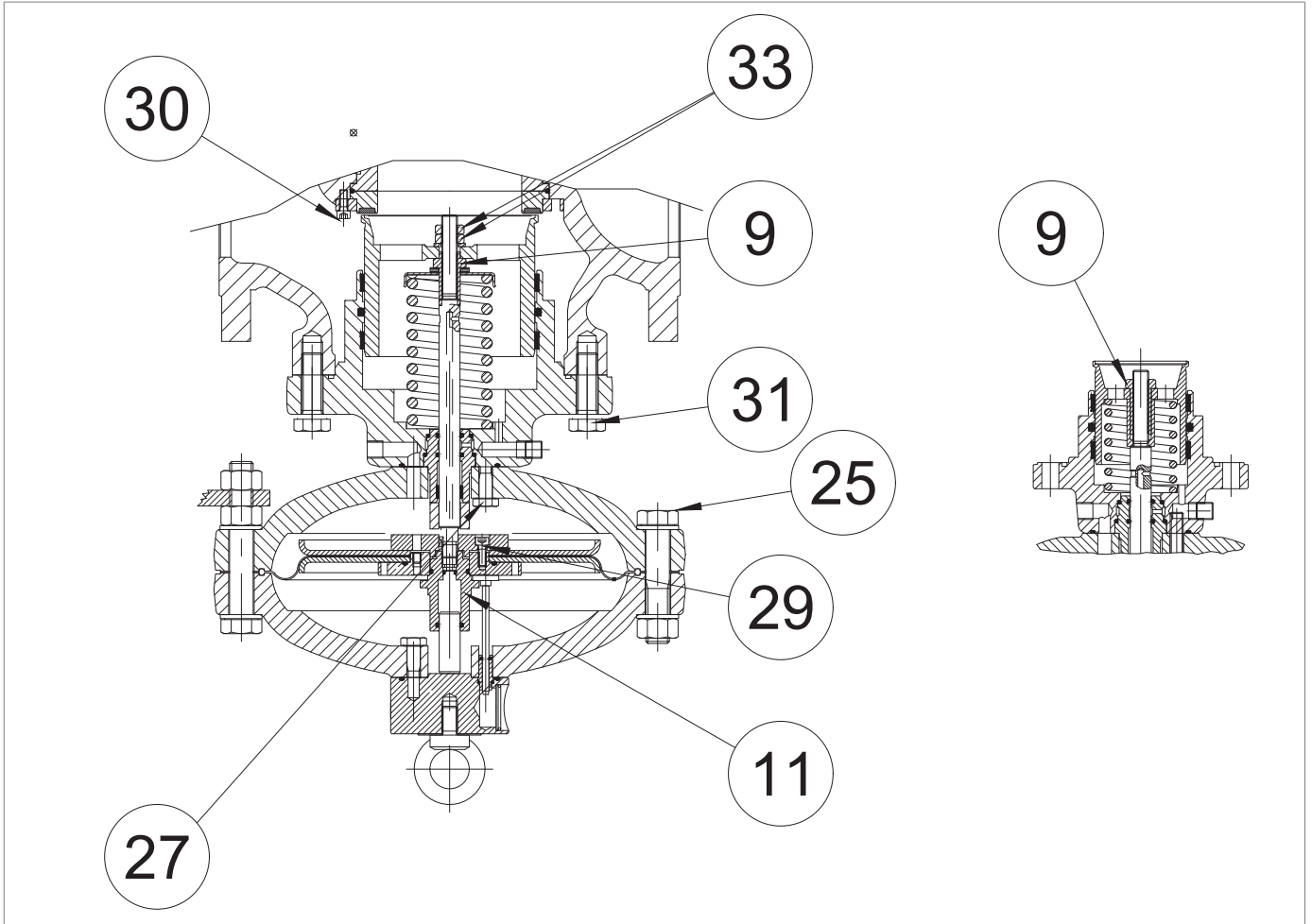
Tab. 9.90.
PM/819 DN 3"

Pos.	Description	Torque (nm)	Torque (ft - lb)
9	Nut M12	35	25
11	M12 balancing piston guide	35	25
25	Screw M18X90 UNI 5737	70	51
27	Screw M10X40 UNI 5737	45	33
29	Screw M6X14 UNI 5931	10	7
30	Screw M6X16 UNI 5931	10	7
31	Screw M12X40 UNI 5739	80	59
33	Nut M12 UNI 5589	35	25

Tab. 9.91.
PM/819 DN 4"

Pos.	Description	Torque (nm)	Torque (ft - lb)
9	Nut M12	35	25
11	M12 piston guide	35	25
25	Screw M18X90 UNI 5737	70	51
27	Screw M10X40 UNI 5737	45	33
29	Screw M6X14 UNI 5931	10	7
30	Screw M6X16 UNI 5931	10	7
31	Screw M16X50 UNI 5737	150	110
33	Nut M12 UNI 5589	35	25

Tab. 9.92.



Tightening torques for PM/819 built-in monitor

PM/819 DN 6"

Pos.	Description	Torque (nm)	Torque (ft - lb)
9	Nut M24	110	81
11	M18 balancing piston guide	110	81
25	Screw M22X120 UNI 5737	100	73
27	Screw M14X50 UNI 5737	115	84
29	Screw M6X16 UNI 5931	10	7
30	Screw M6X16 UNI 5931	10	7
31	Screw M20X60 UNI 5737	250	184
33	Nut M18 UNI 5589	110	81

Tab. 9.93.
PM/819 DN 8"

Pos.	Description	Torque (nm)	Torque (ft - lb)
9	Nut M24	110	81
11	M18 balancing piston guide	110	81
25	Screw M22X120 UNI 5737	100	73
27	Screw M14X50 UNI 5737	115	84
29	Screw M6X16 UNI 5931	10	7
30	Screw M6X16 UNI 5931	10	7
31	Screw M22X70 UNI 5737	280	206
33	Nut M18 UNI 5589	110	81

Tab. 9.94.
PM/819 DN 10"

Pos.	Description	Torque (nm)	Torque (ft - lb)
9	Nut M30	150	110
11	M18 balancing piston guide	150	110
25	Screw M27X150 UNI 5737	220	162
27	Screw M20X80 UNI 5737	250	184
29	Screw M6X16 UNI 5737	10	7
30	Screw M6X16 UNI 5931	10	7
31	Screw M22X70 UNI 5737	280	206
33	Nut M20 UNI 5589	150	110

Tab. 9.95.

9.4.1.5 - TIGHTENING TORQUES FOR PILOTS SERIES 200

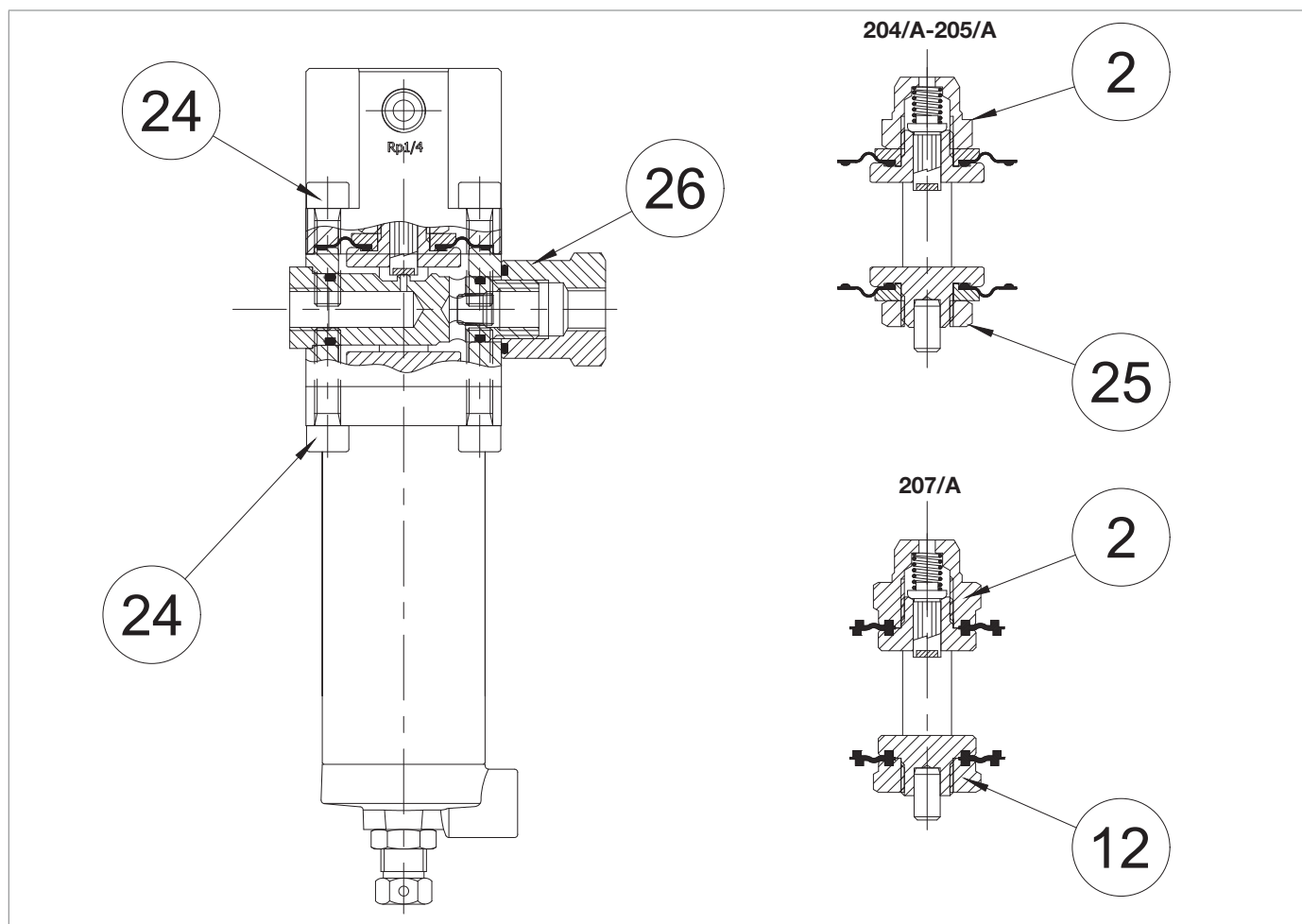


Fig. 9.40. Tightening torques for 204/A-205/A-207/A pilots

PILOTS 204/A-205/A

Pos.	Description	Torque (nm)	Torque (ft - lb)
2	Nut M16X1	25	18
24	Screw M8X30 UNI 5931 AISI	20	14
25	Nut M16X1.5	25	18
26	Nut M18X1.5	20	14

Tab. 9.96.

PILOT 207/A

Pos.	Description	Torque (nm)	Torque (ft - lb)
2	Nut M16X1	25	18
12	Nut M16X1	25	18
24	Screw M8X30 UNI 5931 AISI	20	14
26	Nut M18X1.5	20	14

Tab. 9.97.

9.4.1.6 - TIGHTENING TORQUES FOR PRE-REGULATORS R14/A

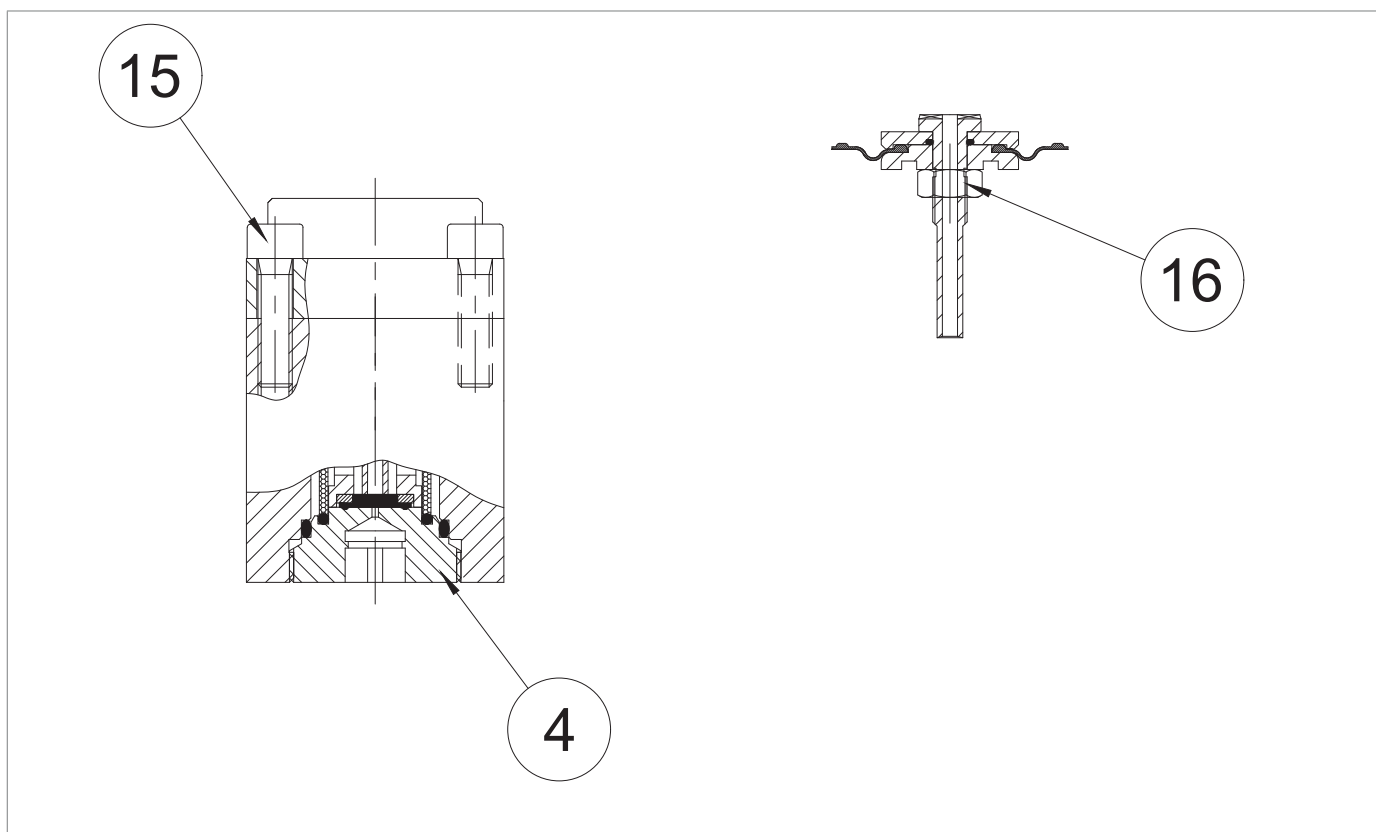


Fig. 9.41. Tightening torques for pre-regulator R14/A

PRE-REGULATOR R14/A			
Pos.	Description	Torque (nm)	Torque (ft - lb)
4	Cap	35	25
15	Nut M8X30 UNI 5931 AISI	20	14
16	Nut M8 UNI 5588	8	5

Tab. 9.98.

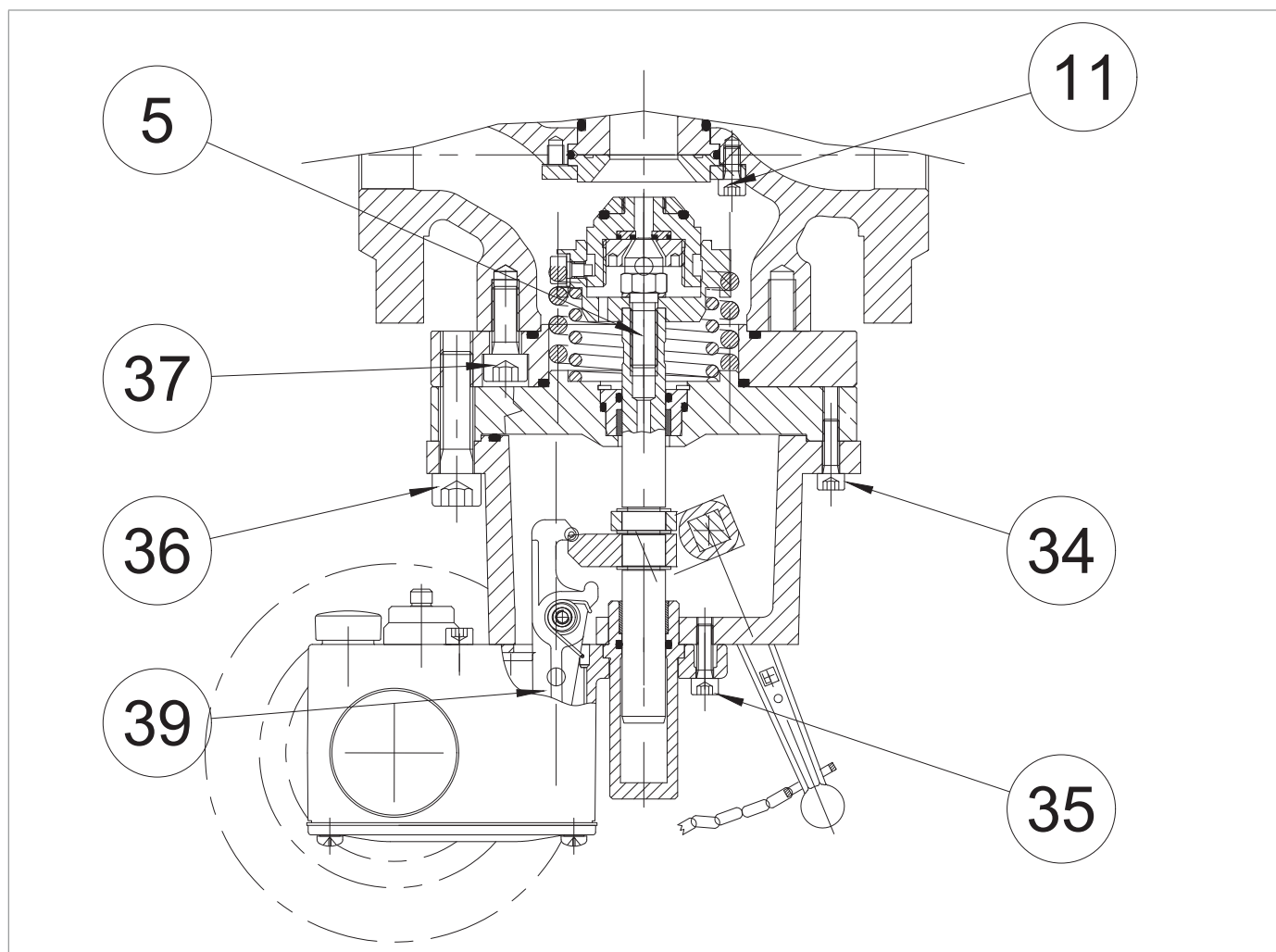
9.4.1.7 - TIGHTENING TORQUES FOR SB/82 BUILT-IN SLAM-SHUT VALVE


Fig. 9.42. Tightening torques for SB/82 DN 1" built-in slam-shut valve

SB/82 DN 1"			
Pos.	Description	Torque (nm)	Torque (ft - lb)
5	Safety valve screw M10	40	29
11	Screw M6X12 UNI 5931	10	7
34	Screw M6X20 UNI 5931	10	7
35	Screw M6X20 UNI 5931	10	7
36	Screw M12X45 UNI 5931	80	59
37	Screw M10X25 UNI 5931	45	33
39	Screw M6X20 UNI 5931	10	7

Tab. 9.99.

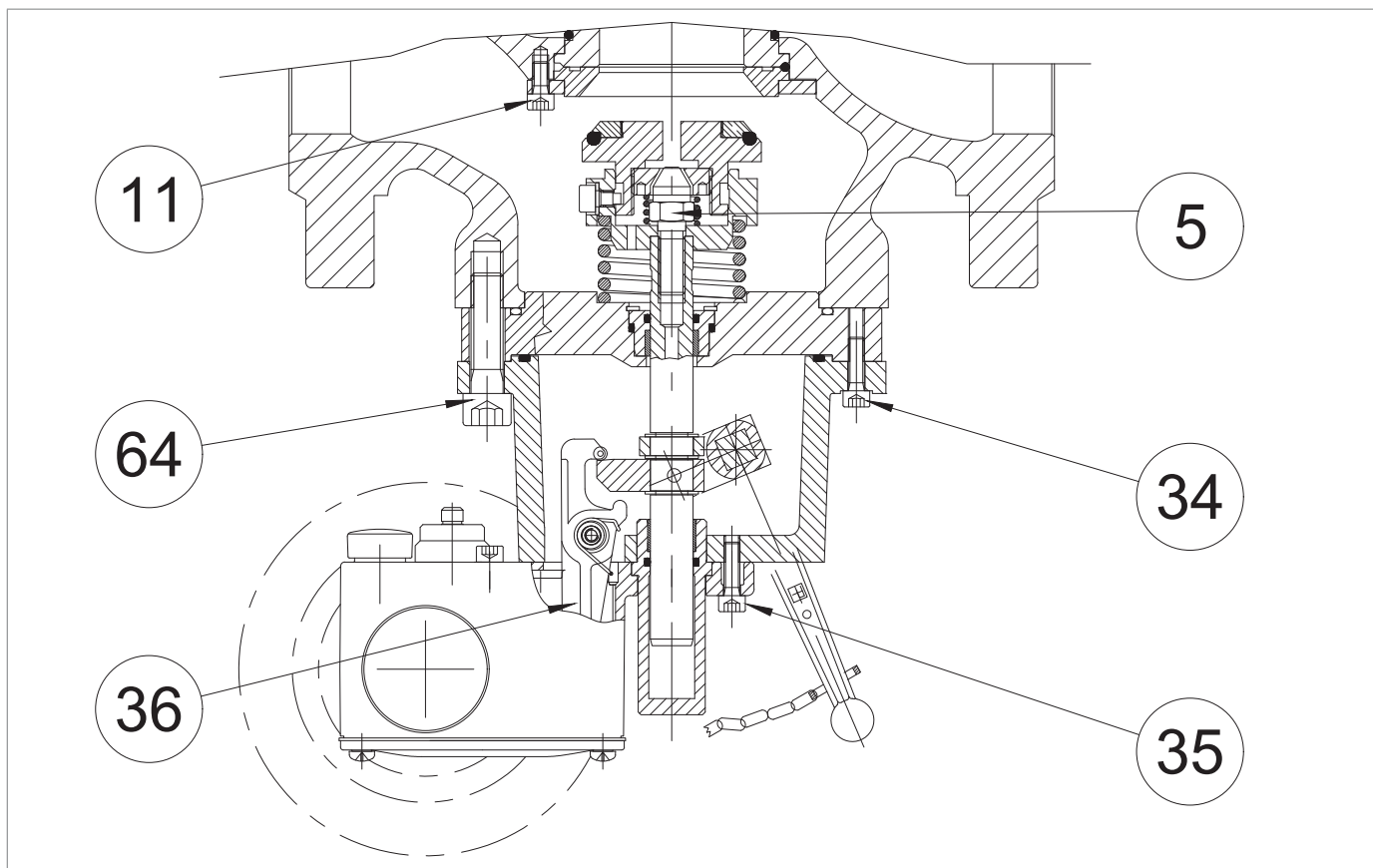


Fig. 9.43. Tightening torques for SB/82 DN 2" built-in slam-shut valve

SB/82 DN 2"			
Pos.	Description	Torque (nm)	Torque (ft - lb)
5	Safety valve screw M10	40	29
11	Screw M6X12 UNI 5931	10	5
34	Screw M6X20 UNI 5931	10	5
35	Screw M6X20 UNI 5931	10	5
36	Screw M6X20 UNI 5931	10	5
64	Screw M12X45 UNI 5931	80	59

Tab. 9.100.

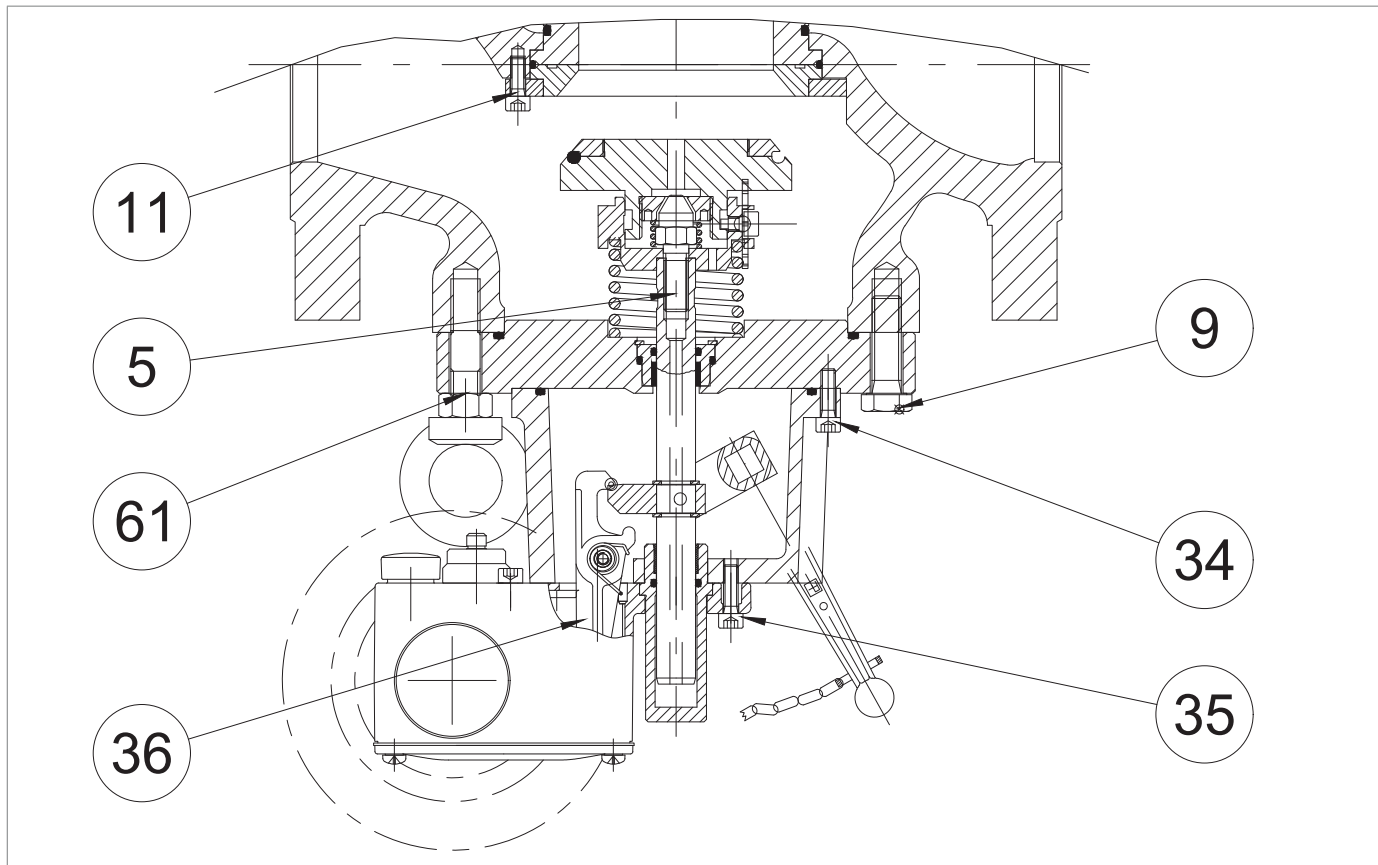


Fig. 9.44. Tightening torques for SB/82 DN 3"-DN 4" built-in slam-shut valve

SB/82 DN 3"			
Pos.	Description	Torque (nm)	Torque (ft - lb)
5	Safety valve screw M10	40	29
9	Screw M12X40 UNI 5739	80	59
11	Screw M6X12 UNI 5931	10	5
34	Screw M6X20 UNI 5931	10	5
35	Screw M6X20 UNI 5931	10	5
36	Screw M6X20 UNI 5931	10	5
61	Nut M12 UNI 5588	80	59

Tab. 9.101.

SB/82 DN 4"			
Pos.	Description	Torque (nm)	Torque (ft - lb)
5	Safety valve screw M10	40	29
9	Screw M16X50 UNI 5737	150	110
11	Screw M6X16 UNI 5931	10	5
33	Screw M6X14 UNI 5934	10	5
34	Screw M6X20 UNI 5931	10	5
35	Screw M6X14 UNI 5933	10	5
36	Screw M6X20 UNI 5931	10	5

Tab. 9.102.

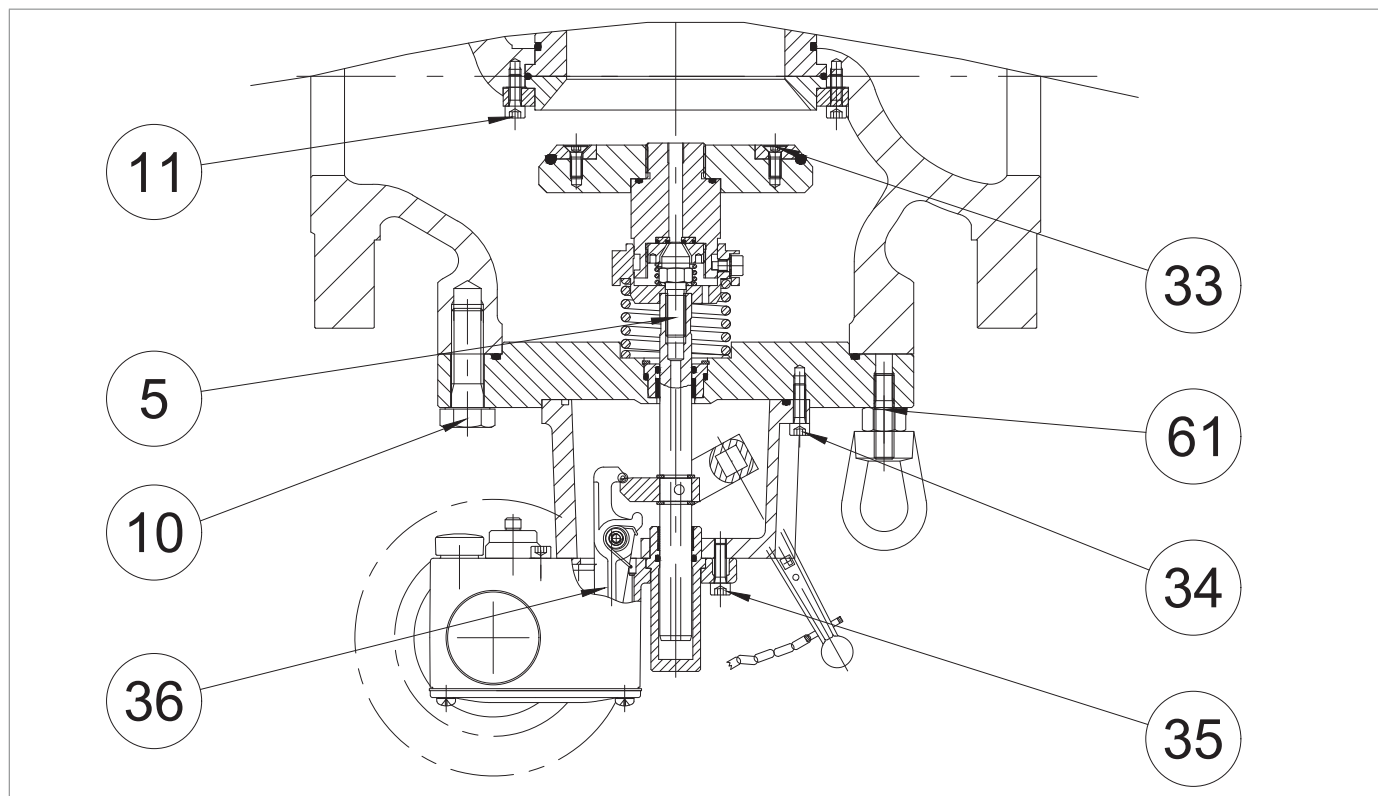


Fig. 9.45. Tightening torques for SB/82 DN 6"-DN 8" built-in slam-shut valve

SB/82 DN 6"			
Pos.	Description	Torque (nm)	Torque (ft - lb)
5	Safety valve screw	40	29
10	Screw M14X50 UNI 5737	115	84
11	Screw M6X16 UNI 5931	10	5
33	Screw M6X10 UNI 5931	10	5
34	Screw M8X25 UNI 5931	20	14
35	Screw M6X40 UNI 5931	10	5
36	Screw M6X20 UNI 5931	10	5
61	Nut M14 UNI 5588	115	84

Tab. 9.103.

SB/82 DN 8"			
Pos.	Description	Torque (nm)	Torque (ft - lb)
5	Safety valve screw M10	40	29
10	Screw M14X50 UNI 5737	115	84
11	Screw M6X16 UNI 5931	10	5
33	Screw M6X10 UNI 5931	10	5
34	Screw M8X25 UNI 5931	20	14
35	Screw M6X40 UNI 5931	10	5
36	Screw M6X20 UNI 5931	10	5
61	Nut M14 UNI 5588	115	84

Tab. 9.104.

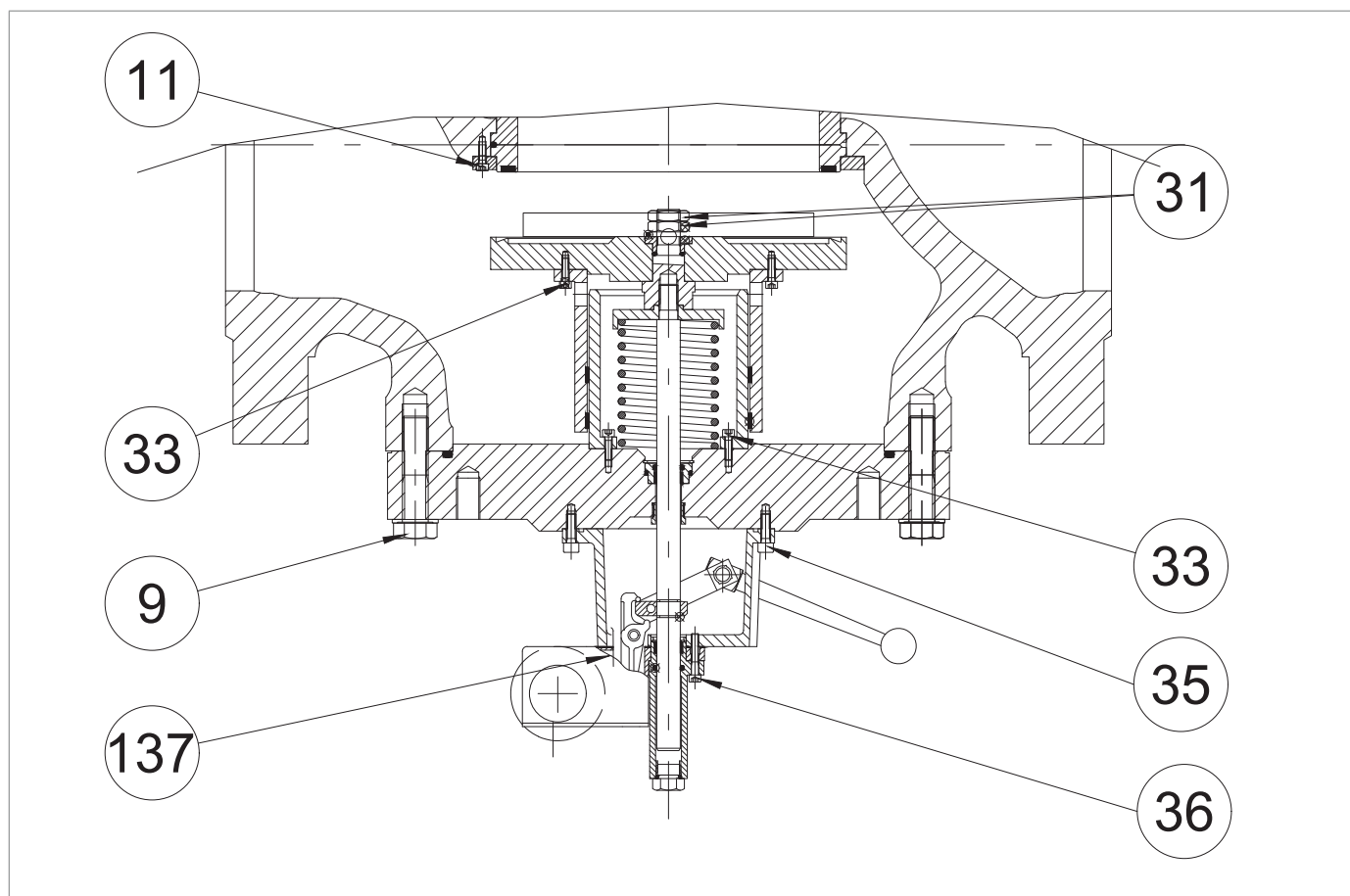


Fig. 9.46. Tightening torques for SB/82 DN 10" built-in slam-shut valve

SB/82 DN 10"			
Pos.	Description	Torque (nm)	Torque (ft - lb)
9	Screw M16X90 UNI 5737	150	110
11	Screw M6X16 UNI 5931	10	5
31	Nut M20 UNI 5589	250	184
33	Screw M6X20 UNI 5931	10	5
35	Screw M8X25 UNI 5931	20	14
36	Screw M6X35 UNI 5931	10	5
137	Screw M6X20 UNI 5931	10	5

Tab. 9.105.

9.4.1.8 - TIGHTENING TORQUES FOR PRESSURE SWITCHES MODELS 102M/102MH - 105M/105MH

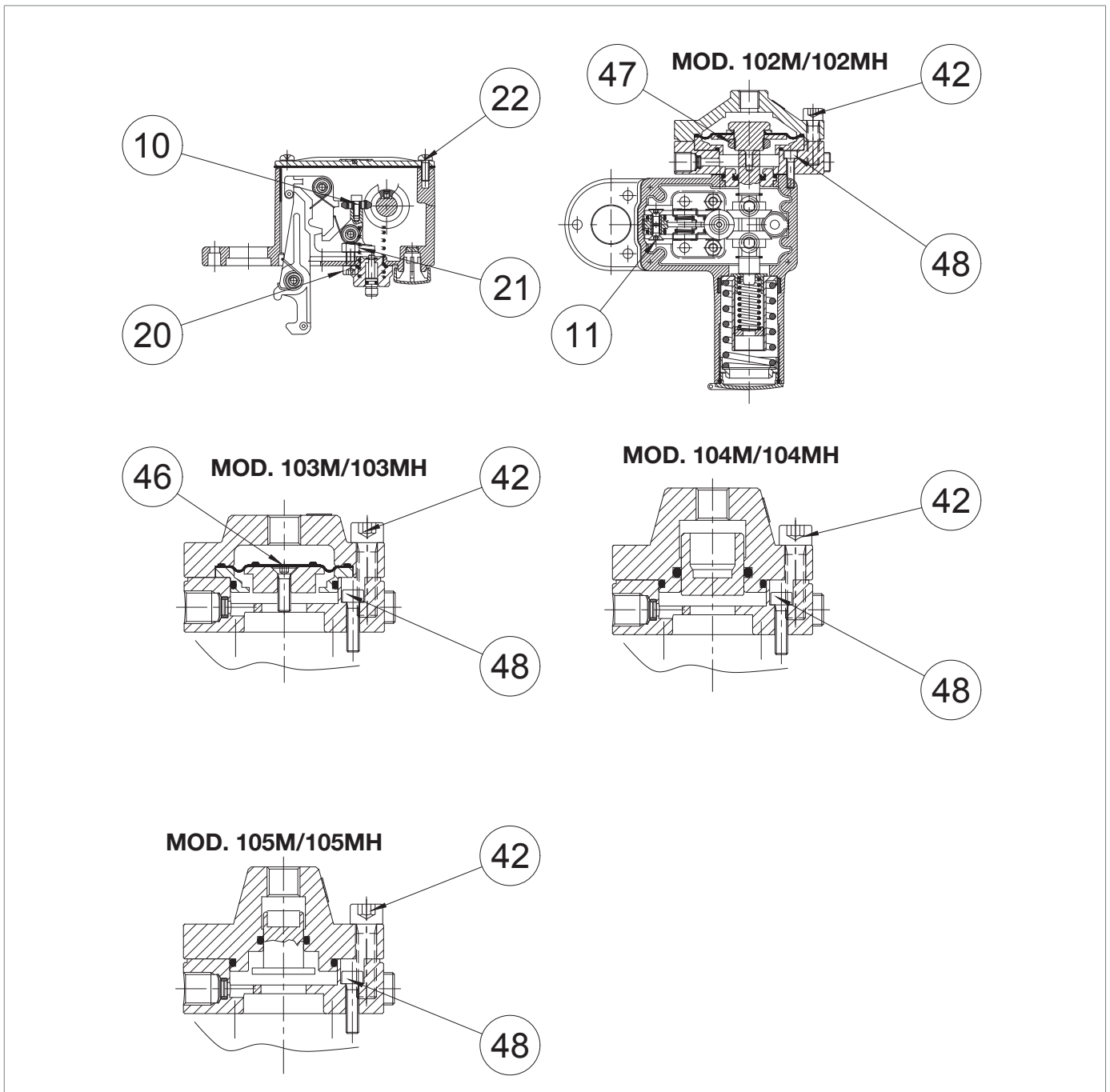


Fig. 9.47. Tightening torques for pressure switches models 102M/102MH - 105M/105MH

MOD. 102M/102MH

Pos.	Description	Torque (nm)	Torque (ft - lb)
10	SCREW M4X10 UNI 5931	3	2.21
11	SCREW M5X10 UNI 5933	5	3.68
20	SCREW M6X16 UNI 5931	10	7.37
21	NUT M6 UNI 5588	10	7.37
22	SCREW M5X15 UNI 8112	5	3.68
42	SCREW M6X25 UNI 5931	16	11.80
47	NUT M20X1	8	5.90
48	SCREW M5X16 UNI 5931	5	3.68

Tab. 9.106.
MOD. 103M/103MH

Pos.	Description	Torque (nm)	Torque (ft - lb)
10	SCREW M4X10 UNI 5931	3	2.21
11	SCREW M5X10 UNI 5933	5	3.68
20	SCREW M6X16 UNI 5931	10	7.37
21	NUT M6 UNI 5588	10	7.37
22	SCREW M5X15 UNI 8112	5	3.68
42	SCREW M8X30 UNI 5931	16	11.80
46	SCREW M5X18 UNI 5931	8	5.90
48	SCREW M5X20 UNI 5931	5	3.68

Tab. 9.107.
MOD. 104M/104MH - 105M/105MH

Pos.	Description	Torque (nm)	Torque (ft - lb)
10	SCREW M4X10 UNI 5931	3	2.21
11	SCREW M5X10 UNI 5933	5	3.68
20	SCREW M6X16 UNI 5931	10	7.37
21	NUT M6 UNI 5588	10	7.37
22	SCREW M5X15 UNI 8112	5	3.68
42	SCREW M8X30 UNI 5931	16	11.80
48	SCREW M5X20 UNI 5931	5	3.68

Tab. 9.108.

9.4.1.9 - TIGHTENING TORQUES FOR HB/97 BUILT-IN SLAM-SHUT VALVE WITH LINE-OFF

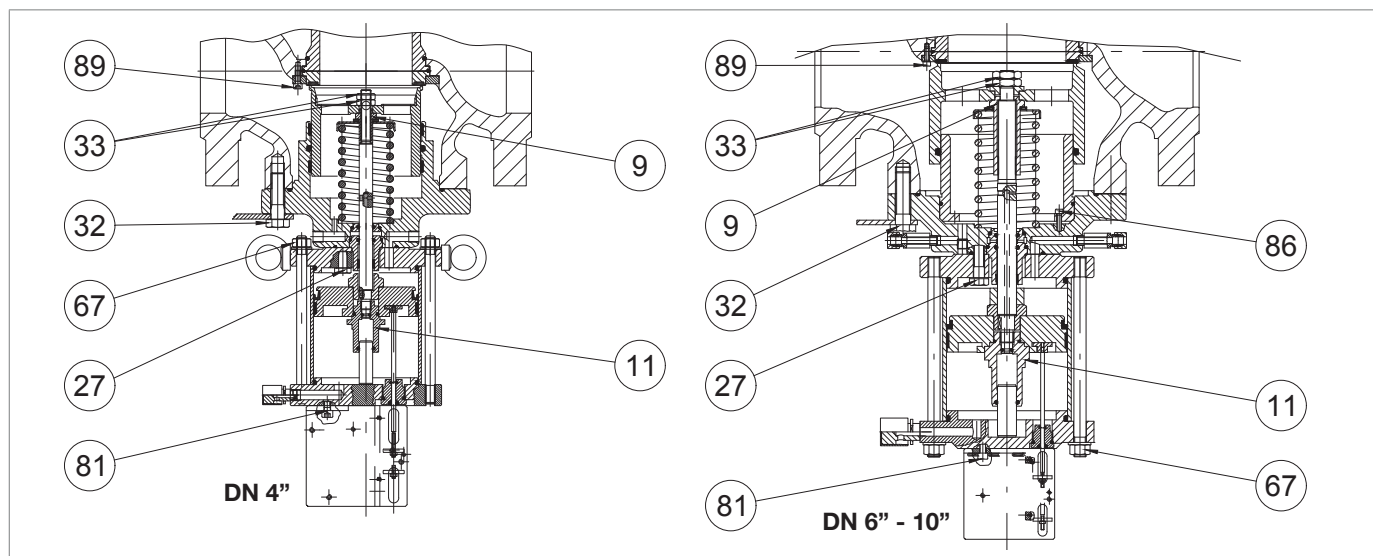


Fig. 9.48. Tightening torques for HB/97 built-in slam-shut valve with LINE OFF

HB/97 DN 4"			
Pos.	Description	Torque (nm)	Torque (ft - lb)
9	Locking nut M12X1.25	35	25
11	Balancing piston guide M12X1.25	35	25
27	Screw M10X40 UNI 5737	45	33
33	Nut M12X1.25 UNI 5589	35	25
67	Nut M12 UNI 5588	80	59
81	Screw M8X16 UNI 5931	20	14
87	Screw M6X16 UNI 5931	10	7

Tab. 9.109.

HB/97 DN 6"			
Pos.	Description	Torque (nm)	Torque (ft - lb)
9	Locking nut M24X1.5	110	81
11	Balancing piston guide M18X1.5	110	81
27	Screw M14X50 UNI 5737	115	84
33	Nut M18X1.5 UNI 5589	110	81
67	Nut M16 UNI 5588	200	147
81	Screw M8X20 UNI 5931	20	14
86	Screw M6X25 UNI 5931	10	7
89	Screw M6X16 UNI 5931	10	7

Tab. 9.110.

HB/97 DN 8"

Pos.	Description	Torque (nm)	Torque (ft - lb)
9	Locking nut M24X1.5	110	81
11	Balancing piston guide M18X1.5	110	81
27	Screw M14X50 UNI 5737	115	84
33	Nut M18X1.5 UNI 5589	110	81
67	Nut M16 UNI 5588	200	147
81	Screw M8X20 UNI 5931	20	14
86	Screw M6X25 UNI 5931	10	7
89	Screw M6X16 UNI 5931	10	7

Tab. 9.111.
HB/97 DN 10"

Pos.	Description	Torque (nm)	Torque (ft - lb)
9	Locking nut M30X1.5	150	110
11	M22X1.5 balancing piston guide	150	110
27	Screw M20X70 UNI 5931	250	184
33	Nut M20X1.5 UNI 5589	150	110
67	Nut M16 UNI 5588	200	147
81	Screw M8X20 UNI 5931	20	14
86	Screw M6X25 UNI 5931	10	7
89	Screw M6X16 UNI 5931	10	7

Tab. 9.112.

9.4.1.10 - TIGHTENING TORQUES FOR HP2/2 BYPASS DEVICE

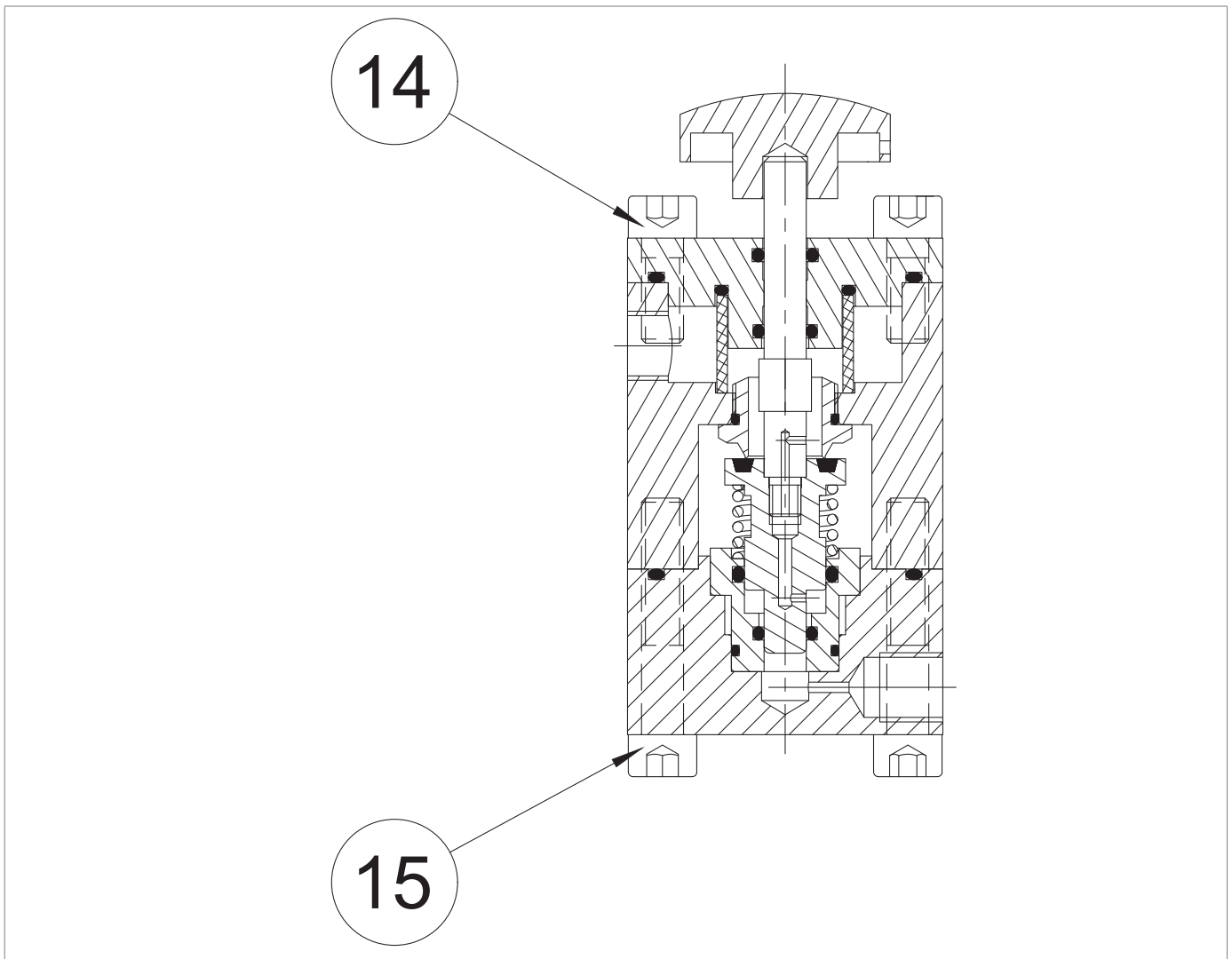


Fig. 9.49. Tightening torques for HP2/2 bypass device

HP/22			
Pos.	Description	Torque (nm)	Torque (ft - lb)
14	Screw M8X20 UNI 5931	16	11
15	Screw M8X45 UNI 5931	16	11

Tab. 9.113.

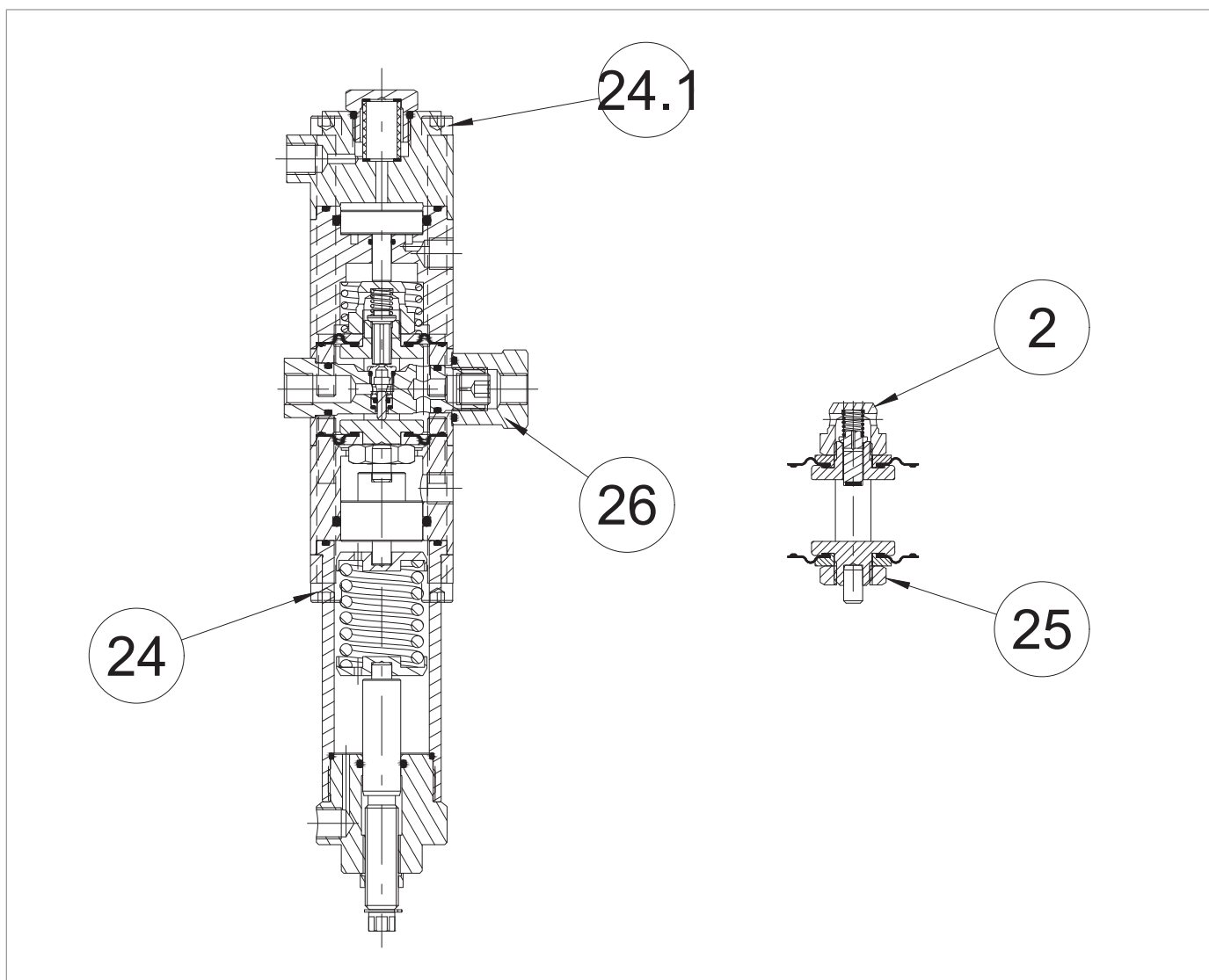
9.4.1.11 - TIGHTENING TORQUES FOR R44/SS REGULATOR


Fig. 9.50. Tightening torques for R44/SS regulator

R44/SS			
Pos.	Description	Torque (nm)	Torque (ft - lb)
2	Nut M16X1	25	18
24	Screw M8X110 UNI 5931	16	11
24.1	Screw M8X70 UNI 5931	16	11
25	Nut M16X1.5	25	18
26	Nut M18X1.5	20	14

Tab. 9.114.

9.4.2 - REPLACING ELEMENTS SUBJECT TO WEAR AND ABRASION

9.4.2.1 - INITIAL OPERATIONS

! 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 following from the regulator: <ul style="list-style-type: none"> the installed series 300 pilot; the AR100 lamination valve.

! NOTE!
To replace the components of the piloting unit, refer to paragraphs 9.4.3 and 9.4.6.

Tab. 9.115.

9.4.2.2 - CROSS DIAGRAM FOR TIGHTENING SCREWS

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

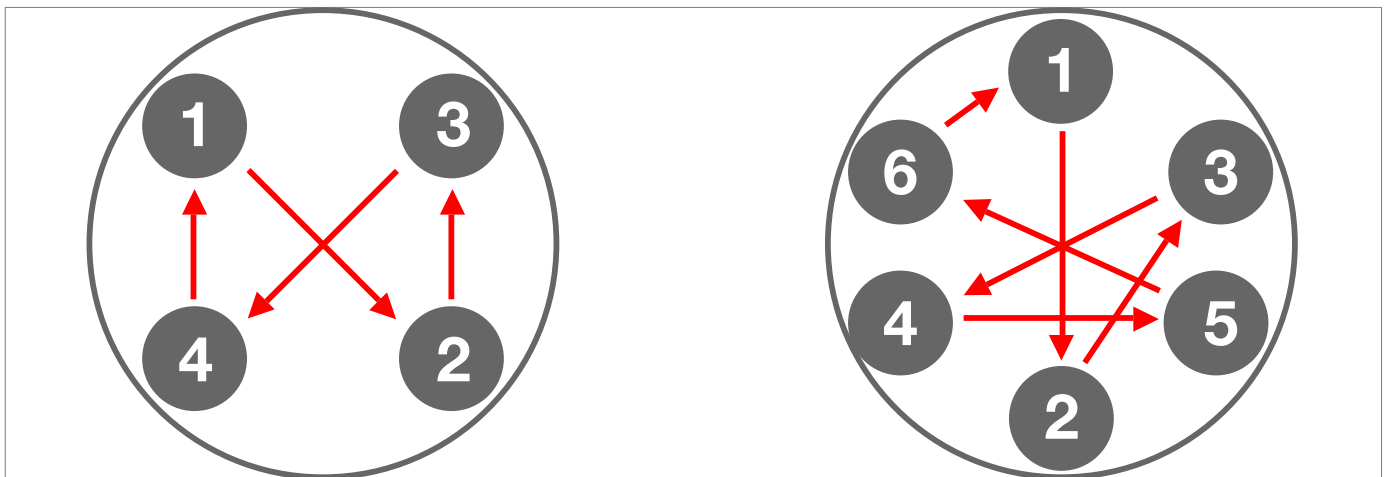


Fig. 9.51. Cross diagram

9.4.3 - REGULATOR APERFLUX 851 DN 1" - 3"

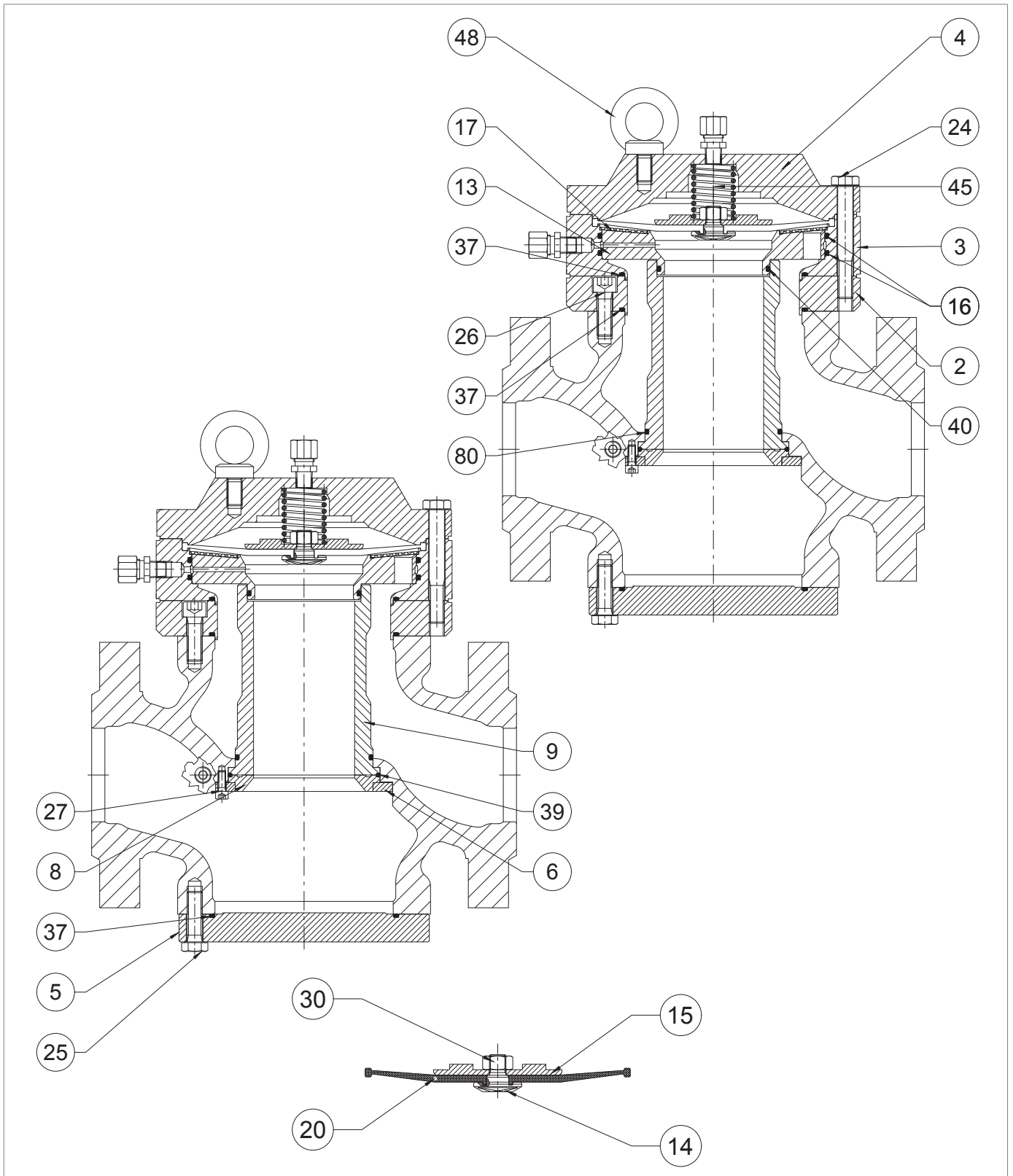
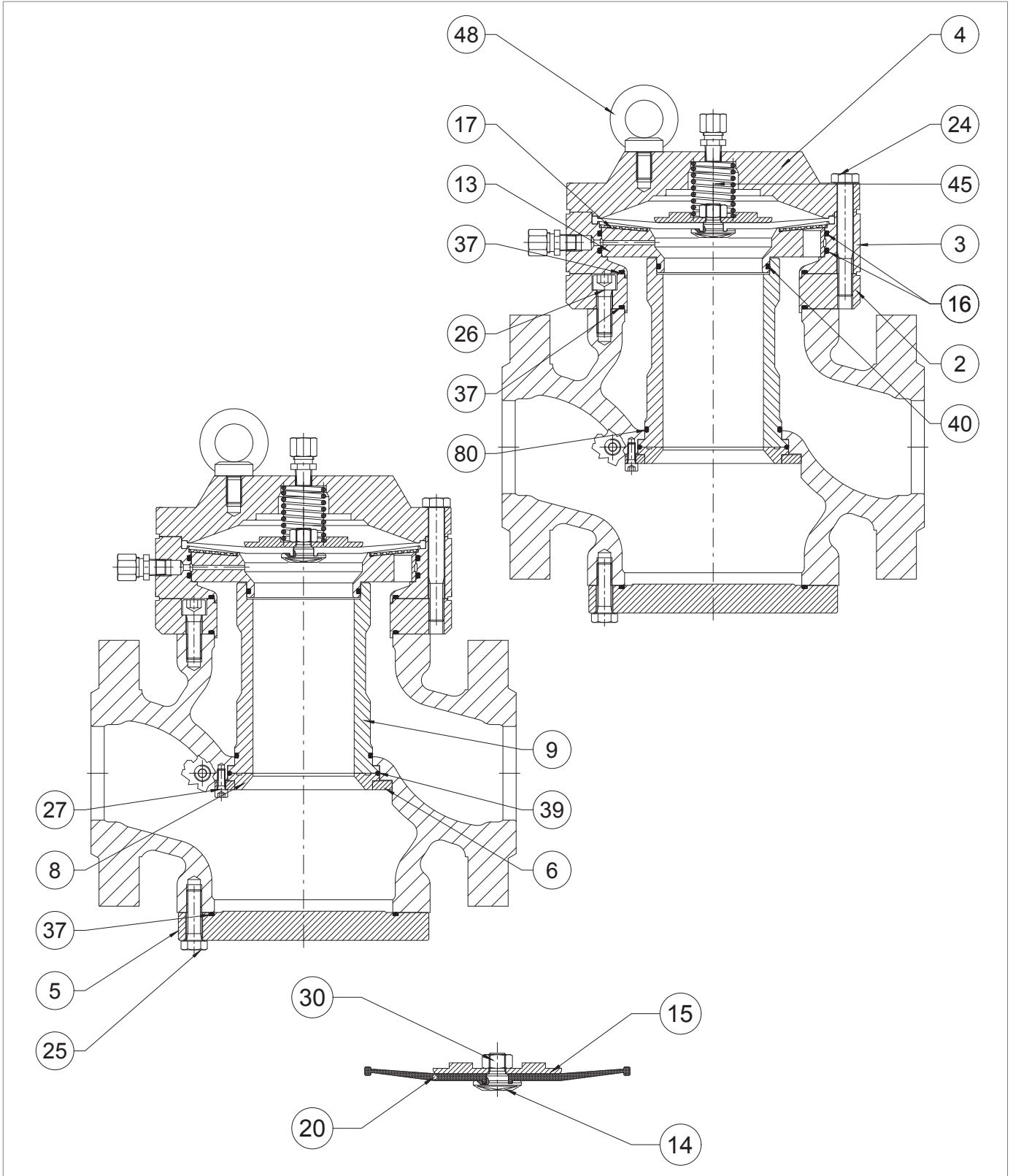


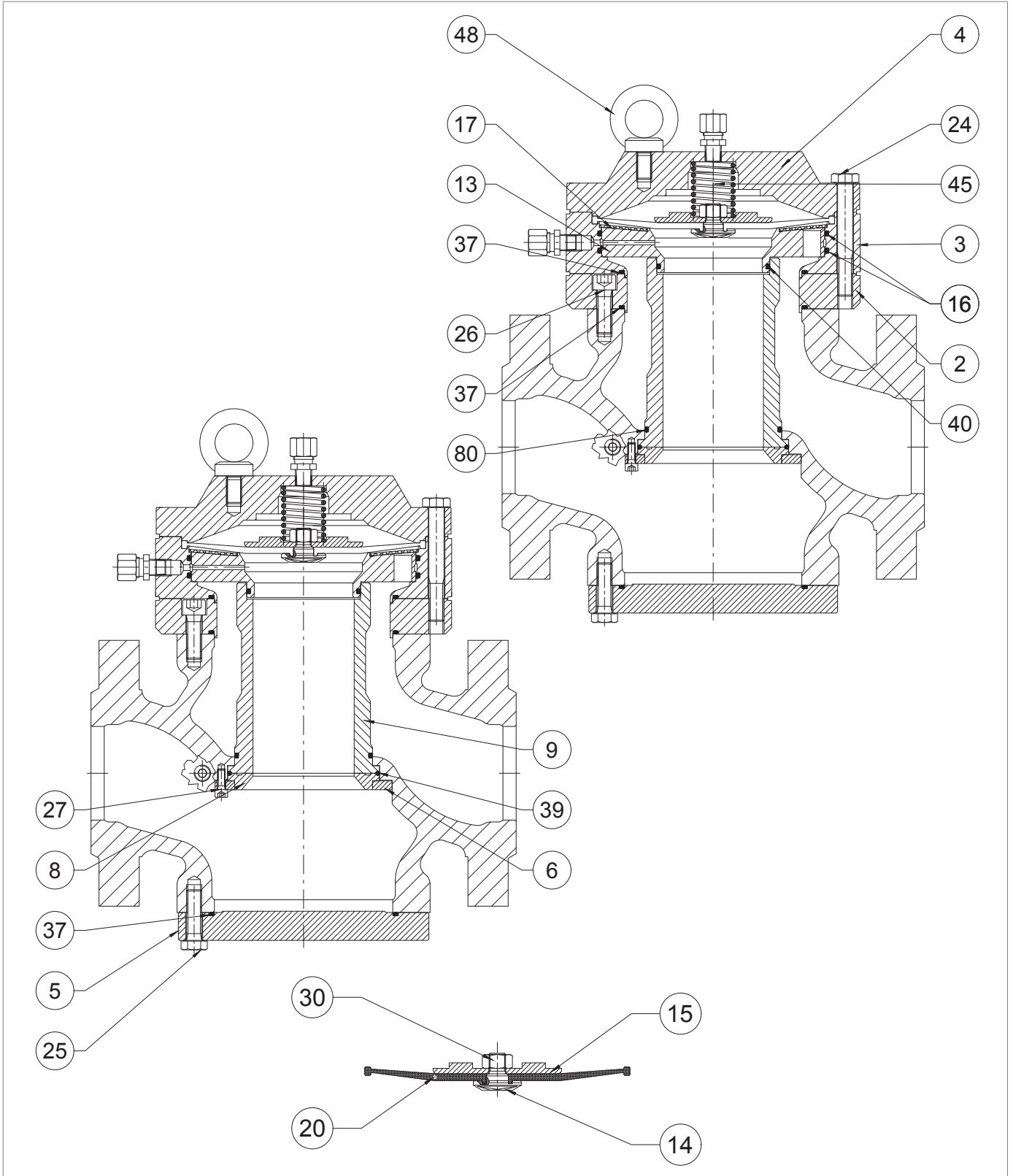
Fig. 9.52. Regulator APERFLUX 851 DN 1" - 3"

Step	Action
1	Loosen the fixing screws (24).
2	Remove the upper lid (4).
3	Remove the spring (45).
4	Take out the diaphragm unit (14, 15, 20, 30).
5	Loosen and remove the nut (30)
6	Remove the diaphragm protection disc (15).
7	Remove and replace the diaphragm (20) from the screw (14), taking care to lubricate the lanyard with synthetic grease.
8	Assemble the diaphragm unit, placing the diaphragm (20) in the screw (14). NOTE! Carefully place the diaphragm O-ring (20) into the screw slot (14)
9	Fit the diaphragm protection disc (15).
10	Fix the nut (30) according to the following tightening torques: <ul style="list-style-type: none"> • DN 1" > tab. 9.72; • DN 2" > tab. 9.73; • DN 3" > tab. 9.74.
11	Remove the diaphragm protection grid (17).
12	Remove the intermediate flange (3) together with the valve seat (13).
13	Turn the intermediate flange (3) upside down.
14	Press and take out the valve seat (13). NOTE! Place it on an anti-shock surface to simplify the operation and for protection in case of falls.
15a	APPLICABLE TO DN 3" ONLY Remove the O-ring (40) from the valve seat (13) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
15b	Remove the O-rings (16) from the intermediate flange (3) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution
16	Remove the O-ring (37) from the intermediate flange (3) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution
17a	APPLICABLE TO DN 3" ONLY Undo the screws (26) and remove the flange (2).
17b	Remove the screw (25) and the blind flange (5). NOTE! Support the flange to prevent it from falling.








Regulator APERFLUX 851 DN 1" - 3"

Step	Action
18a	<p>APPLICABLE TO DN 3" ONLY Remove the O-ring (37) from the intermediate flange (2) and replace it, taking care to lubricate it with synthetic grease.</p> <p>NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
18b	<p>Remove the O-ring (37) from the blind flange (5) and replace it, taking care to lubricate it with synthetic grease.</p> <p>NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
19	Undo and remove the screws (27).
20	Remove the locking ring (6), the conical seat (8) and the O-ring (39).
21	<p>Remove the sleeve (9) from the top downwards, exerting slight pressure.</p> <p>NOTE! Be careful to support the lower part of the sleeve (9).</p>
22	<p>Remove the O-ring (80) from the sleeve (9) and replace it, taking care to lubricate it with synthetic grease.</p> <p>NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
23	Clean the upper and lower support surfaces of the body, the flanges, the contact surfaces between the sleeve (9), the conical seat (8) and the body.
24	<p>Put the sleeve (9) back in place from the top downwards, exerting slight pressure.</p> <p>NOTE! Take care not to damage the O-ring (80).</p>
25	Replace the O-ring (39) and lubricate it with synthetic grease.
26	Put the conical seat (8) back in place together with the O-ring (39), the locking ring (6).
27	<p>Insert and fix the screws (27) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 1" > tab. 9.72; • DN 2" > tab. 9.73; • DN 3" > tab. 9.74. <p>NOTE! Screw in according to the cross diagram in paragraph 9.4.2.2.</p>
28	Put the blind flange (5) back in place.



Regulator APERFLUX 851 DN 1" - 3"

Step	Action
29	Insert and fix the screws (25) according to the following tightening torques: <ul style="list-style-type: none"> • DN 1" > tab. 9.72; • DN 2" > tab. 9.73; • DN 3" > tab. 9.74. <div style="border: 1px solid black; padding: 5px;">  NOTE! Screw in according to the cross diagram in paragraph 9.4.2.2. </div>
30	Fit the valve seat (13) into the intermediate flange (3) from the top downwards.
31a	APPLICABLE TO DN 3" ONLY Fit the flange (2) and the screws (26), fixing them according to the following tightening torques: <ul style="list-style-type: none"> • DN 1" > tab. 9.72; • DN 2" > tab. 9.73; • DN 3" > tab. 9.74. <div style="border: 1px solid black; padding: 5px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
31b	Put the intermediate flange (3) back in place. <div style="border: 1px solid black; padding: 5px;">  NOTE! Make sure that the supply hole of the AR100 lamination valve faces the flow inlet side. </div>
32	Put the diaphragm protection grid (17) back in place.
33	Put the diaphragm unit (14, 15, 20, 30) back in place. <div style="border: 1px solid black; padding: 5px;">  NOTE! Take care to lubricate the retaining slots with synthetic grease. </div>
34	Put the spring (45) back in place.
35	Re-fit the upper lid (4).
36	Insert and fix the screws (24) according to the following tightening torques: <ul style="list-style-type: none"> • DN 1" > tab. 9.72; • DN 2" > tab. 9.73; • DN 3" > tab. 9.74. <div style="border: 1px solid black; padding: 5px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>

Tab. 9.116.

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.3.1 - REGULATOR APERFLUX 851 DN 4" - 8"

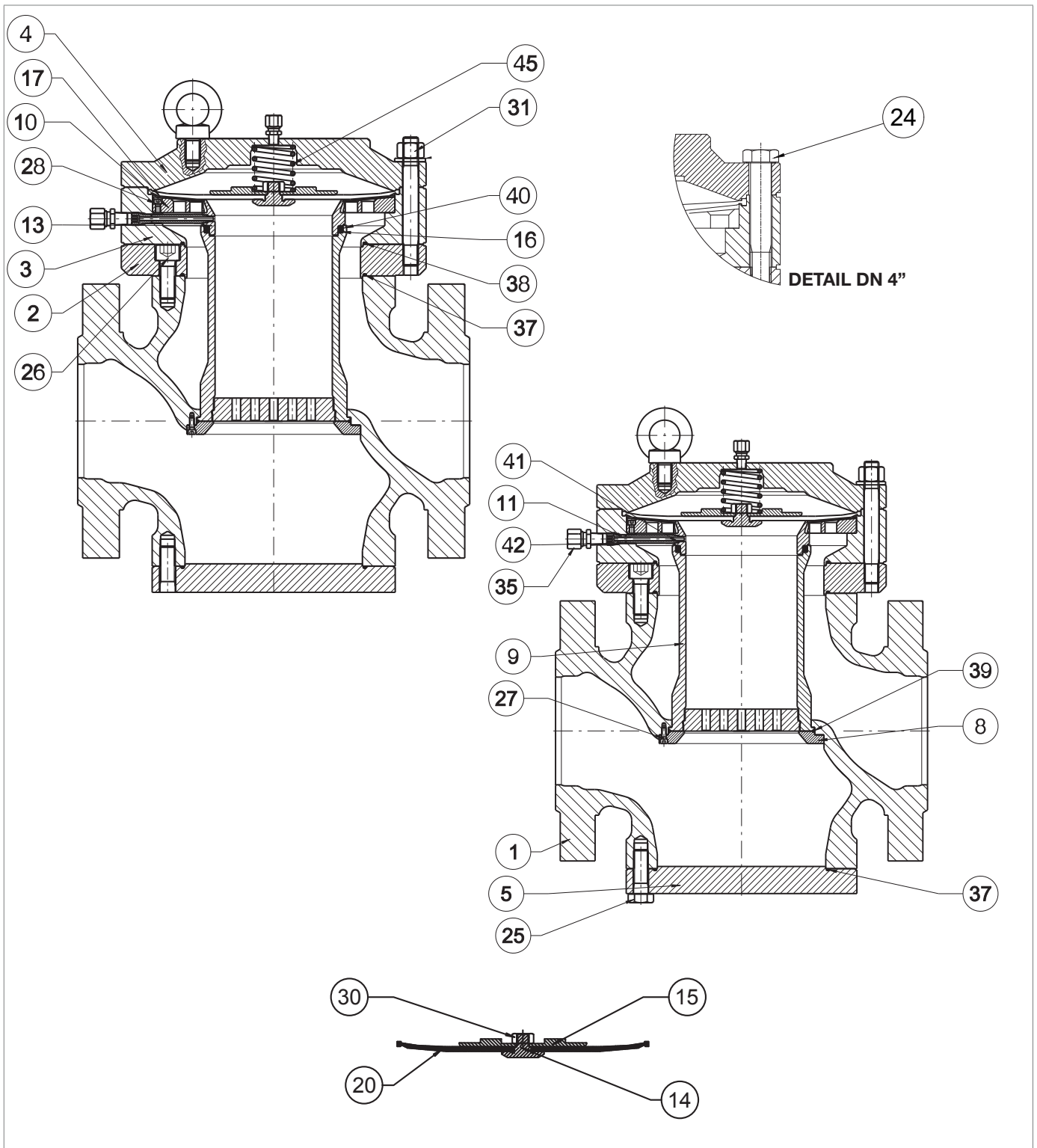
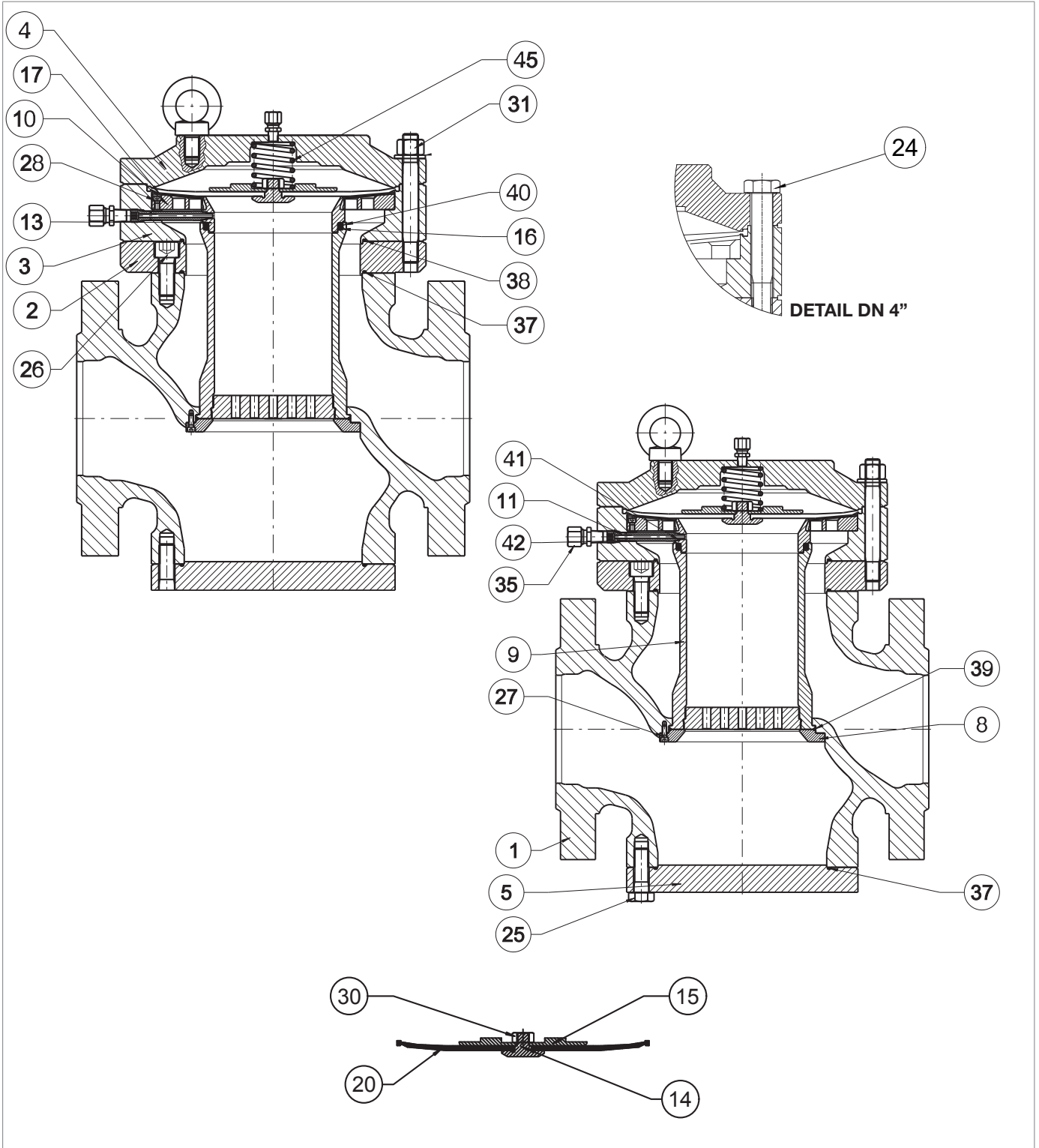


Fig. 9.53. Regulator APERFLUX 851 DN 4" - 8"

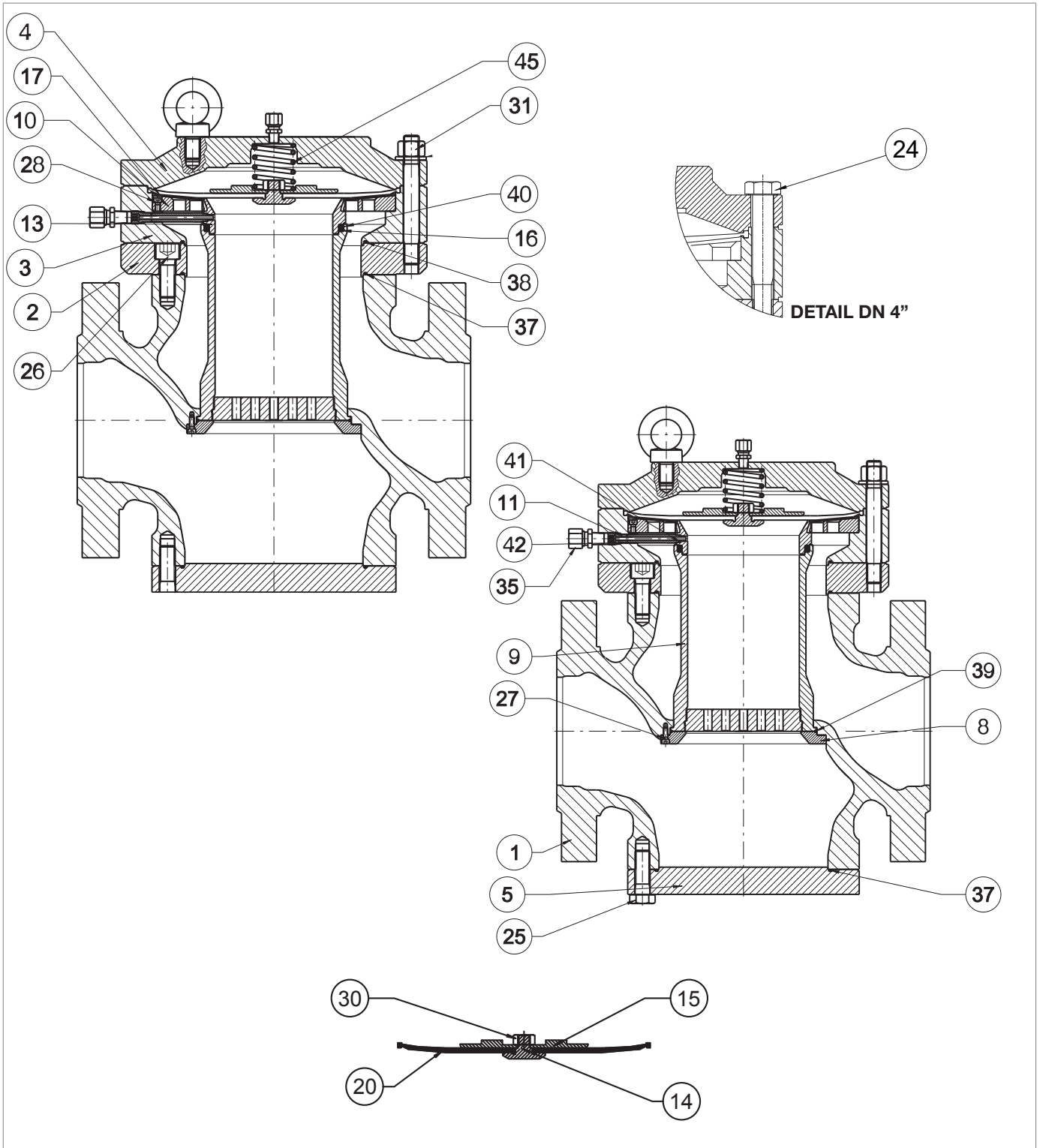
Step	Action
1a	APPLICABLE TO DN 4" ONLY Loosen the eyebolt and the fixing screws (24).
1b	APPLICABLE TO DN 6" - 8" ONLY Loosen the fixing nuts (31).
2	Remove the upper lid (4).
3	Remove the spring (45).
4	Take out the diaphragm unit (14, 15, 20, 30).
5	Loosen and remove the nut (30).
6	Remove the diaphragm protection disc (15).
7	Remove the diaphragm (20) and remove it from the screw (14). NOTE! Lubricate the lanyard with synthetic grease.
8	Fit the diaphragm protection disc (15).
9	Fix the nut (30) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.75; • DN 6" > tab. 9.76; • DN 8" > tab. 9.77
10	Unscrew and remove the supply fitting (35).
11	Unscrew and remove the fitting (11).
12	Remove the O-rings (41, 42) from the lid (11) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
13	Remove the diaphragm protection grid (17).
14	Undo and remove the screws (28).
15	Remove the grid (10).
16	Take out the valve seat (13). NOTE! Place it on an anti-shock surface to simplify the operation and for protection in case of falls.
17	Remove the O-ring (40) from the valve seat (13) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
18	Remove the spacer ring (16).
19	Remove the intermediate flange (3).



Regulator APERFLUX 851 DN 4" - 8"

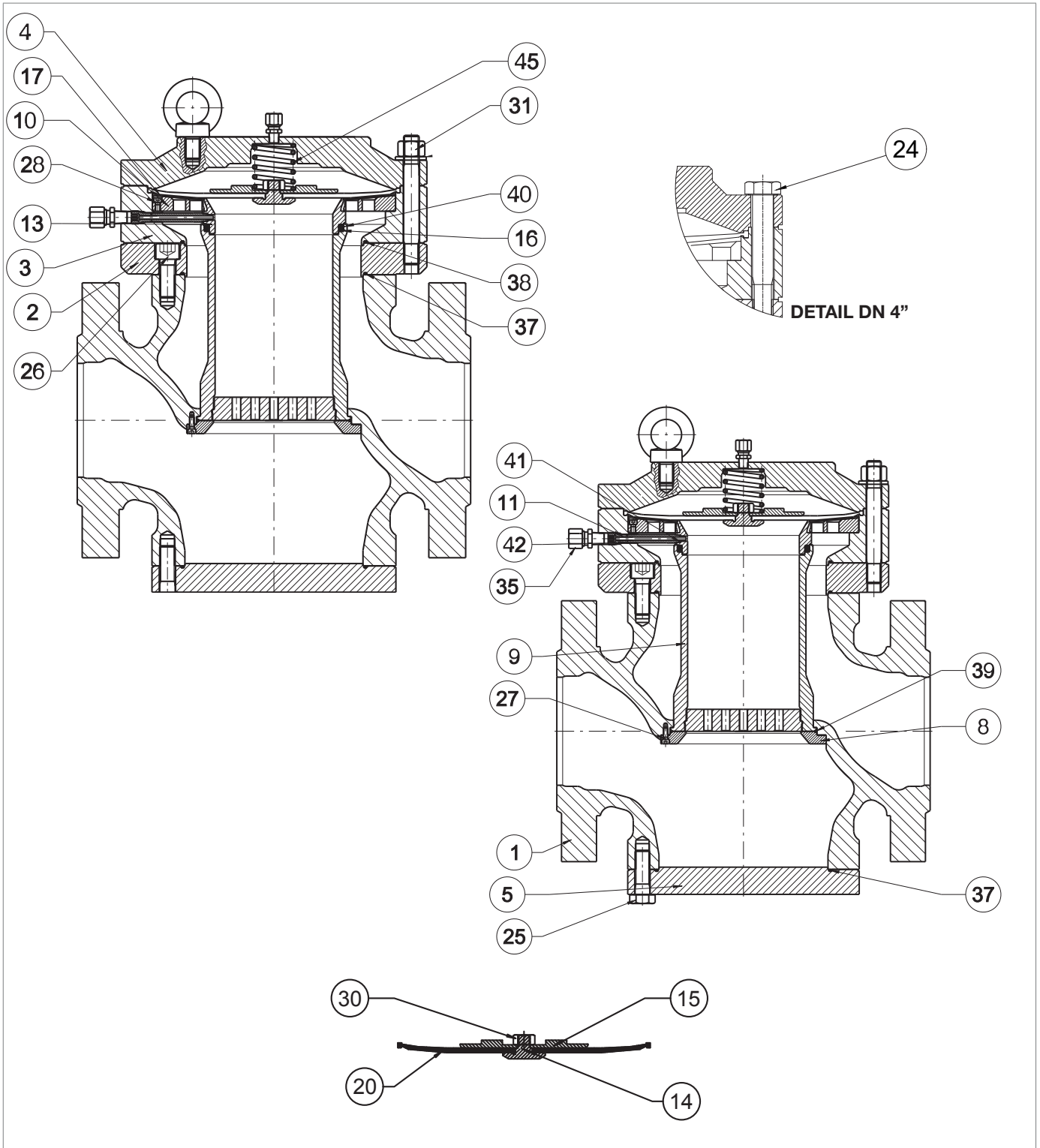
APERFLUX 851

Step	Action
20	Remove the O-ring (38) from the intermediate flange (3) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
21	Unscrew and remove the screws (26).
22	Remove the flange (2).
23	Remove the O-ring (37) from the flange (2) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
24	Undo the screws (25). NOTE! Support the flange to prevent it from falling.
25	Remove the blind flange (5).
26	Remove the O-ring (37) from the blind flange (5) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
27	WARNING! Support the sleeve during the next steps to prevent it from falling.
28	Undo and remove the screws (27).
29	Remove the conical seat (8) and the O-ring (39). NOTE! A reinforced gasket can be fitted instead of the conical seat.
30	Remove the sleeve (9) from the top downwards.
31	Clean the upper and lower support surfaces of the body (1), the flanges (2, 5), the contact surfaces between the sleeve (9), the conical seat (8) and the body.
32	Insert the sleeve (9) of the body from the bottom upwards.
33	Replace the O-ring (39) and lubricate it with synthetic grease.
34	Fit the conical seat (8).
35	Insert and fix the screws (27) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.75; • DN 6" > tab. 9.76; • DN 8" > tab. 9.77. NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
36	Fit the blind flange (5). NOTE! Support the flange to prevent it from falling.



Regulator APERFLUX 851 DN 4" - 8"

Step	Action
37	<p>Insert and fix the screws (25) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 4" > tab. 9.75; • DN 6" > tab. 9.76; • DN 8" > tab. 9.77. <div style="border: 1px solid black; padding: 5px;"> <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p> </div>
38	Fit the flange (2).
39	<p>Insert and fix the screws (26) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 4" > tab. 9.75; • DN 6" > tab. 9.76; • DN 8" > tab. 9.77. <div style="border: 1px solid black; padding: 5px;"> <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p> </div>
40	<p>Fit the intermediate flange (3).</p> <div style="border: 1px solid black; padding: 5px;"> <p>NOTE!</p> <p>Make sure that the supply hole of the AR100 lamination valve faces upstream.</p> </div>
41	Fit the ring (16) into the sleeve with the grooves facing downwards.
42	<p>Fit the valve seat (13) with the supply hole facing upstream.</p> <div style="border: 1px solid black; padding: 5px;"> <p>NOTE!</p> <p>Take care not to damage the O-ring (40).</p> </div>
43	<p>Insert and screw the fitting (11) into the hole, taking care not to damage the O-rings (41, 42), according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 4" > tab. 9.75; • DN 6" > tab. 9.76; • DN 8" > tab. 9.77. <div style="border: 1px solid black; padding: 5px;"> <p>NOTE!</p> <ul style="list-style-type: none"> • Fit the O-ring (41) of the fitting (11) into the hole of the valve seat (12) until it sits in place. • Be careful not to move the seat from its centring. </div>
44	Fit the supply fitting (35).
45	Fit the grid (10).
46	<p>Insert and fix the screws (28) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 4" > tab. 9.75; • DN 6" > tab. 9.76; • DN 8" > tab. 9.77. <div style="border: 1px solid black; padding: 5px;"> <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p> </div>
47	Fit the diaphragm protection grid (17).



Regulator APERFLUX 851 DN 4" - 8"

Step	Action
48	Put the diaphragm unit (14, 15, 20, 30) in place and lubricate the retaining slots with synthetic grease.
49	Fit the spring (45).
50	Fit the upper lid (4).
51	<p>APPLICABLE TO DN 4" ONLY</p> <p>Insert and fix the screws (24) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 4" > tab. 9.75; • DN 6" > tab. 9.76; • DN 8" > tab. 9.77. <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
52	<p>APPLICABLE TO DN 6" - 8 ONLY</p> <p>Insert and fix the nuts (31) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 4" > tab. 9.75; • DN 6" > tab. 9.76; • DN 8" > tab. 9.77. <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>

Tab. 9.117.

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.3.2 - REGULATOR APERFLUX 851 DN 10"

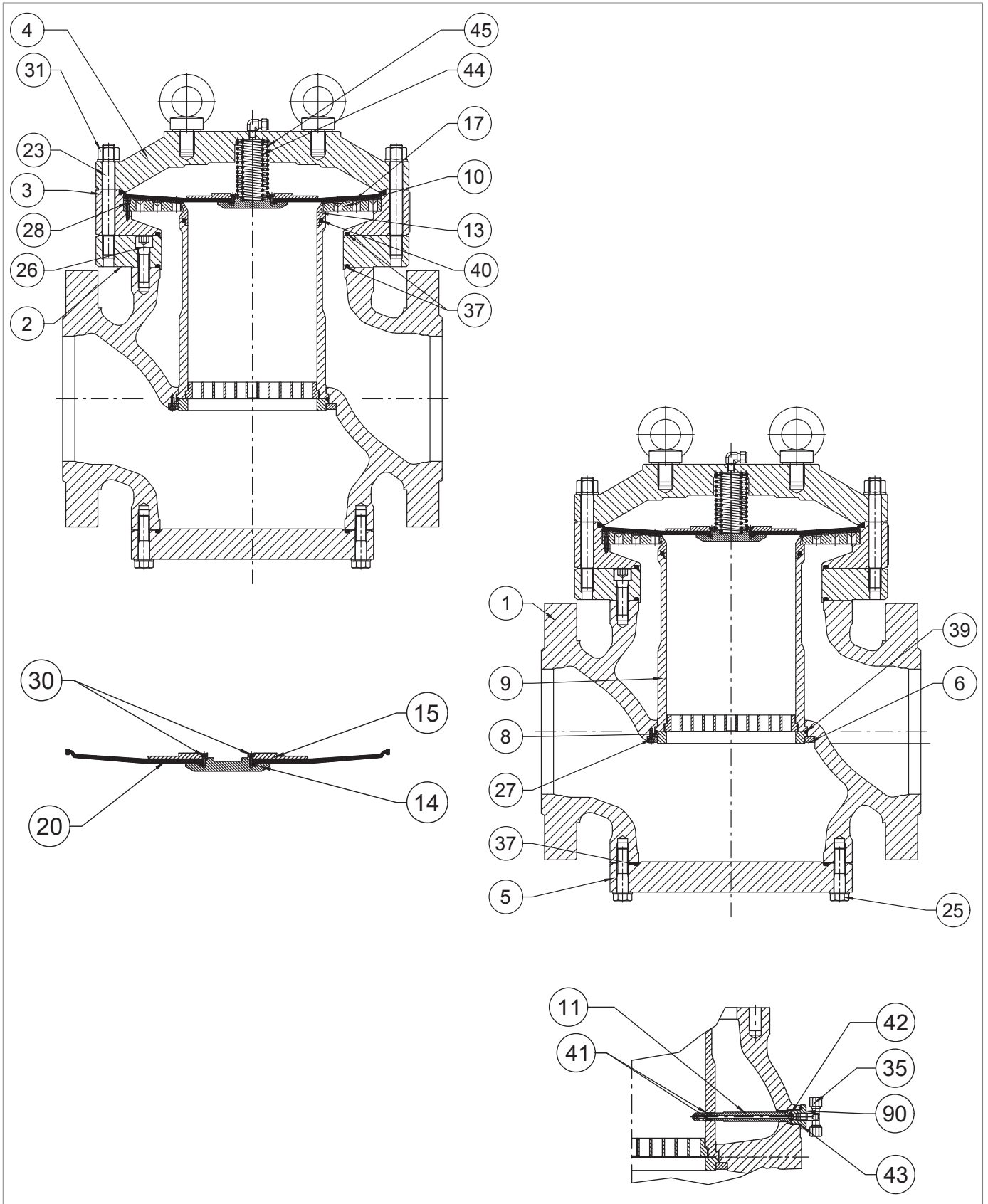


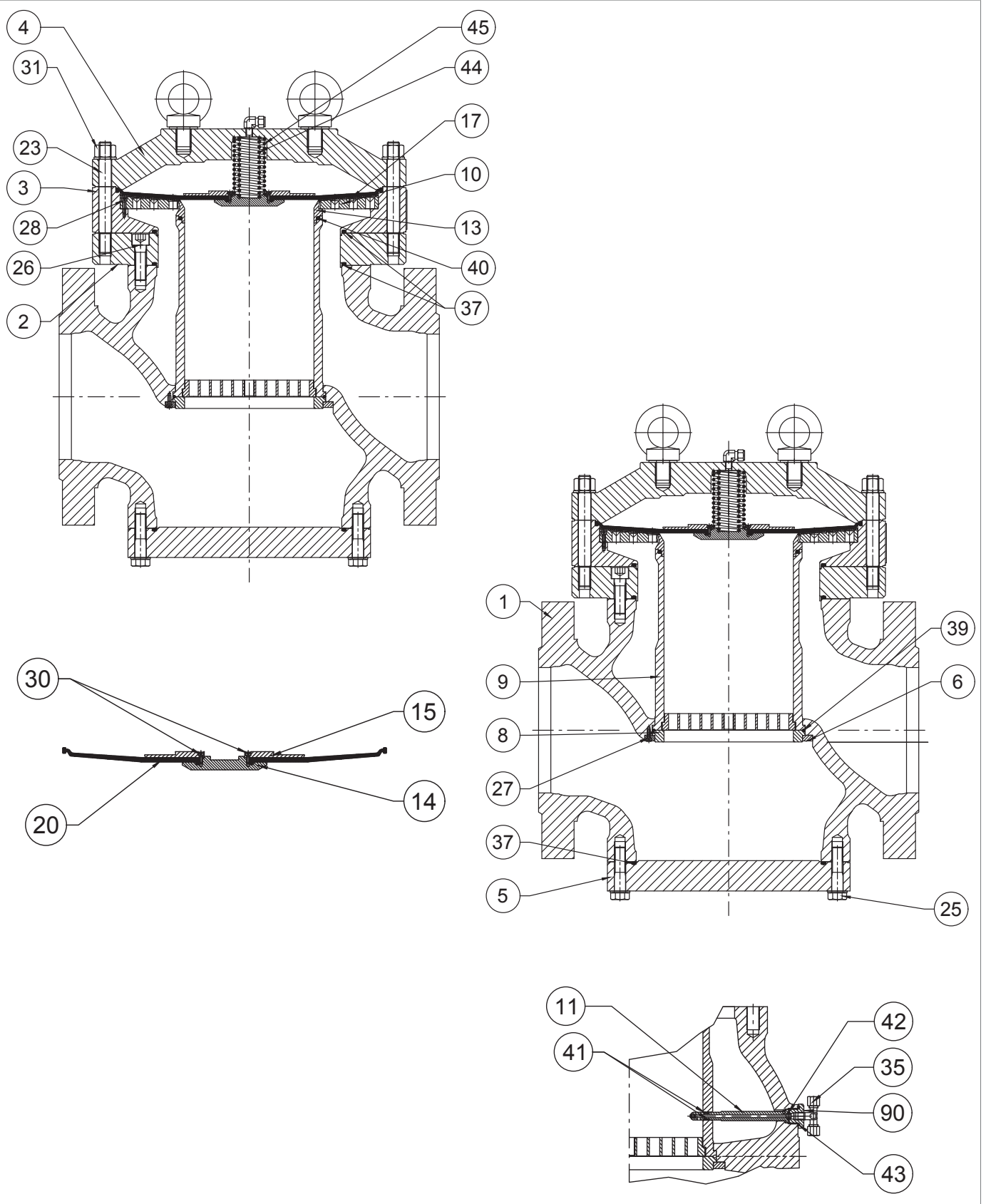










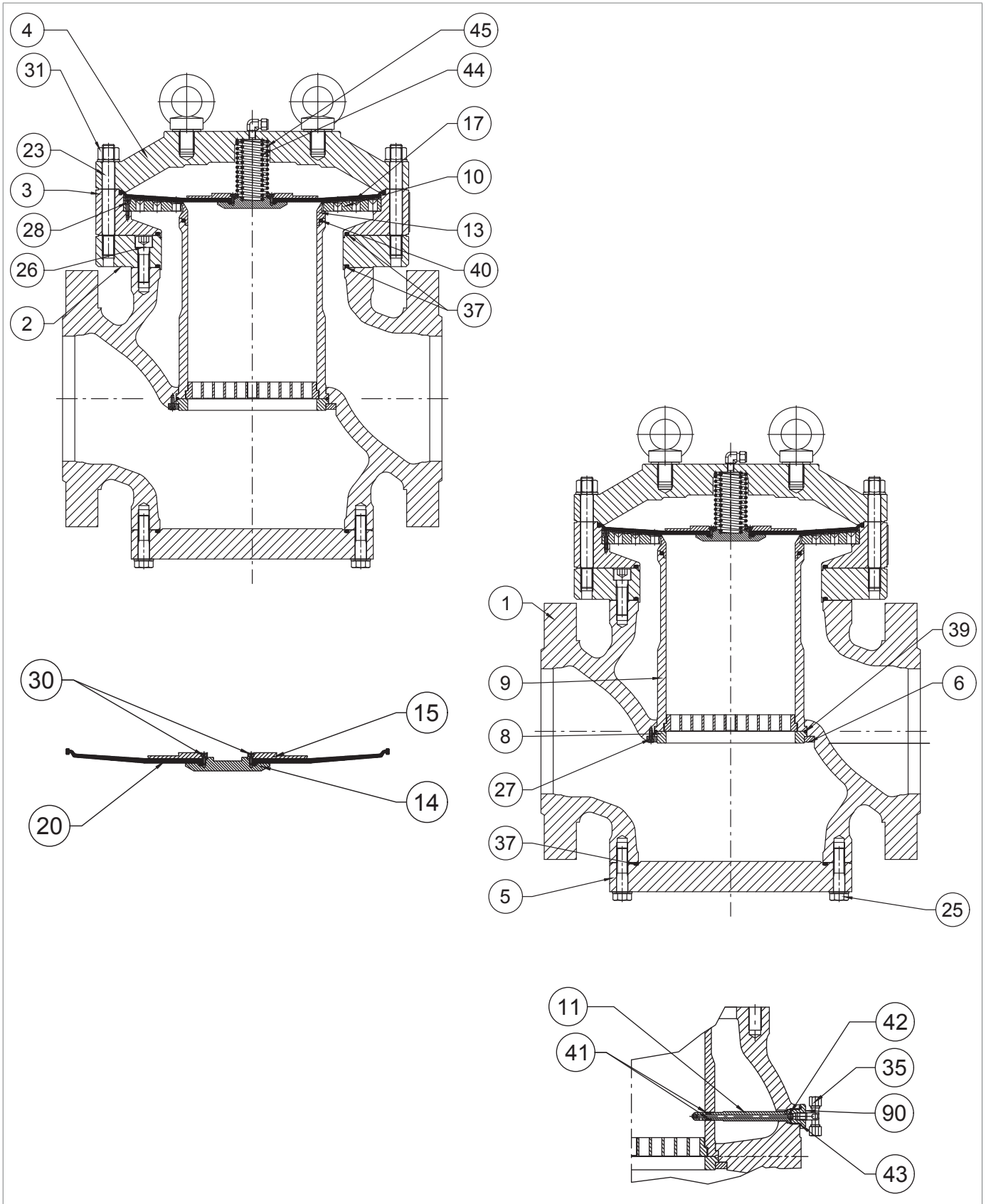
Fig. 9.54. Regulator APERFLUX 851 DN 10"

Step	Action
1	Loosen and remove the fixing nuts (31).
2	Remove the upper lid (4).
3	Remove the springs (44, 45).
4	Take out the diaphragm unit (14, 15, 20, 30).
5	Loosen and remove the screws (30)
6	Remove the diaphragm protection disc (15)
7	Remove the diaphragm (20) from the support (14)
	Replace the diaphragm (20).
8	 NOTE! Lubricate the lanyard with synthetic grease.
9	Fit the diaphragm (20) into the support (14)
10	Refit the protection disc (15)
11	Insert and fix the screws (30) according to the following tightening torques: <ul style="list-style-type: none"> • DN 10" > tab. 9.78
12	Remove the diaphragm protection grid (17).
13	Undo and remove the screws (28).
14	Remove the grid (10).
	Take out the valve seat (13).
15	 NOTE! Place it on an anti-shock surface to simplify the operation and for protection in case of falls.
	Remove the O-ring (40) from the valve seat (13) and replace it, taking care to lubricate it with synthetic grease.
16	 NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
17	Remove the intermediate flange (3).
	Remove the O-ring (37) from the intermediate flange (3) and replace it, taking care to lubricate it with synthetic grease.
18	 NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
19	Unscrew and remove the screws (26).
20	Remove the flange (2).
	Remove the O-ring (37) from the flange (2) and replace it, taking care to lubricate it with synthetic grease.
21	 NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
22	Undo and remove the screws (25).



Regulator APERFLUX 851 DN 10"

Step	Action
23	 WARNING! Support the flange to prevent it from falling
24	Remove the blind flange (5).
25	Remove the O-ring (37) from the blind flange (5) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
26	 WARNING! Support the sleeve during the next steps to prevent it from falling. Mark the sleeve for reference so as to properly refit it later.
27	Undo and remove the screws (27).
28	Remove the locking ring (6), the ring (8) and the O-ring (39).
29	Unscrew and remove the supply fitting (35).
30	Unscrew and remove the fitting (90).
31	Remove the fitting (11).
32	Remove the O-rings (41, 42) from the lid (11) and replace them, taking care to lubricate them with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
33	Remove the O-ring (43) from the fitting (90) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
34	Remove the sleeve (9) from the top downwards.
35	Clean the upper and lower support surfaces of the body (1), the flanges (2, 5), the contact surfaces between the sleeve (9), the conical seat (8) and the body.
36	Insert the sleeve (9) from the bottom upwards.  NOTE! Be careful to match the hole in the sleeve (9) with the hole in the body.
37	Insert the fitting (11).  NOTE! <ul style="list-style-type: none"> • Use the fitting (11) as a guide to align the sleeve hole with the body hole. • Take care not to damage the O-rings (41, 42).
38	Replace the O-ring (39) and lubricate it with synthetic grease.
39	Put the ring (8) and the locking ring (6) in place.
40	Insert and fix the screws (27) according to the following tightening torque: <ul style="list-style-type: none"> • DN 10" > tab. 9.78  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.



Regulator APERFLUX 851 DN 10"

Step	Action
41	Screw in and fix the fitting (90).
42	Screw and fix the supply fitting (35), ensuring its tightness in the thread.
43	<p>NOTE!</p> <p>For the next action, carefully support the flange to prevent it from falling.</p>
44	Fit the blind flange (5).
45	<p>Insert and fix the screws (25) according to the following tightening torque:</p> <ul style="list-style-type: none"> DN 10" > tab. 9.78 <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
46	Fit the flange (2)
47	<p>Insert and fix the screws (26) according to the following tightening torque:</p> <ul style="list-style-type: none"> DN 10" > tab. 9.78 <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
48	<p>Fit the intermediate flange (3).</p> <p>NOTE!</p> <p>Make sure that the supply hole of the AR100 lamination valve faces upstream.</p>
49	<p>Fit the valve seat (13) into the sleeve (9).</p> <p>NOTE!</p> <p>Take care not to damage the O-ring (40).</p>
50	Fit the grid (10).
51	<p>Insert and fix the screws (28) according to the following tightening torque:</p> <ul style="list-style-type: none"> DN 10" > tab. 9.78 <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
52	Fit the diaphragm protection grid (17).
53	Put the diaphragm unit (14, 15, 20, 30) in place and lubricate the retaining slots with synthetic grease.
54	Fit the springs (44, 45).
55	Fit the upper lid (4).
56	<p>Insert and fix the nuts (31) together with the tie rods (23) according to the following tightening torque:</p> <ul style="list-style-type: none"> DN 10" > tab. 9.78 <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>

Tab. 9.118.

WARNING!
Ensure that all parts have been fitted correctly.

9.4.4 - MAINTENANCE OF THE 300/A SERIES PILOT + AR100 LAMINATION VALVE

9.4.4.1 - 300/A SERIES PILOT DISCONNECTION

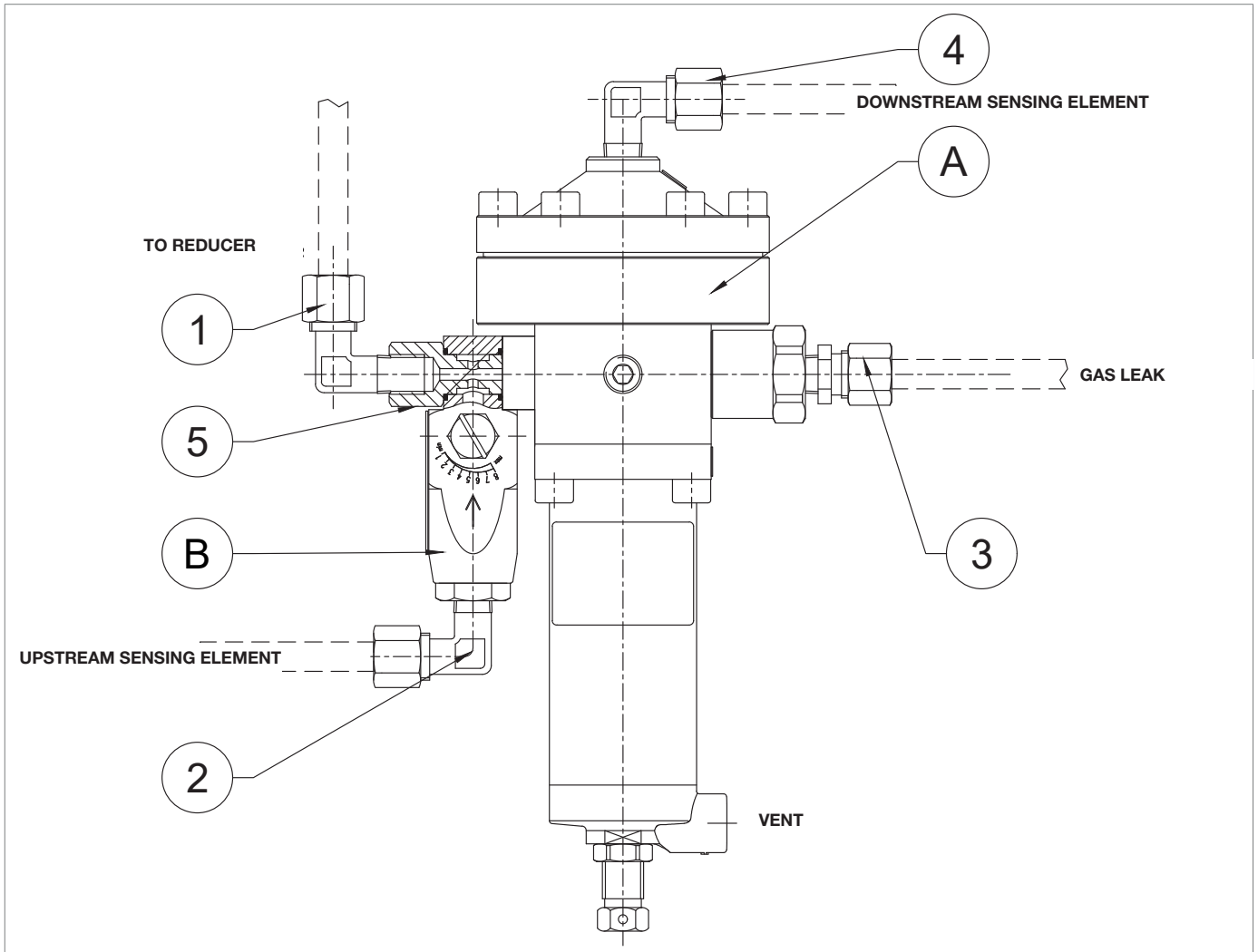


Fig. 9.55. 300/A series pilot

To disconnect the pilot, proceed as follows:

Step	Action
1	Disconnect the sensing lines between the 300/A pilot and the regulator by acting on the fittings (1, 2, 3, 4).
2	Unscrew and remove the fixing screw to remove the pilot from the regulator.
3	Unscrew and remove the screw (5) to separate the AR100 lamination valve from the pilot.

Tab. 9.119.

To reconnect the pilot, proceed as follows:

Step	Action
1	Insert and secure the screw (5) into the AR100 lamination valve to connect it to the pilot.
2	Insert and fix the fixing screw to connect the pilot to the regulator.
3	Connect the sensing lines between the 300/A pilot and the regulator by acting on the fittings (1, 2, 3, 4).

Tab. 9.120.

9.4.4.2 - PILOT 302/A

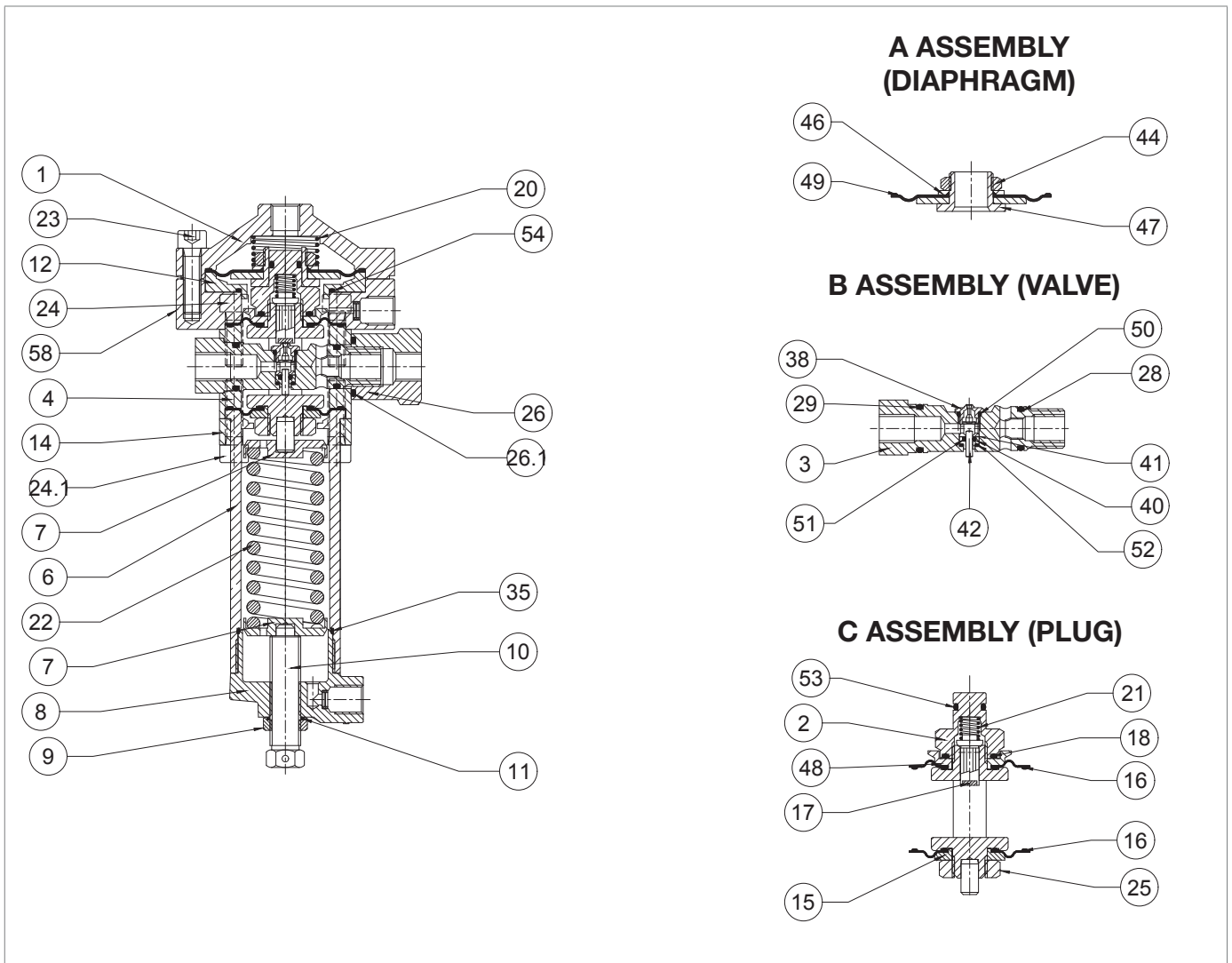





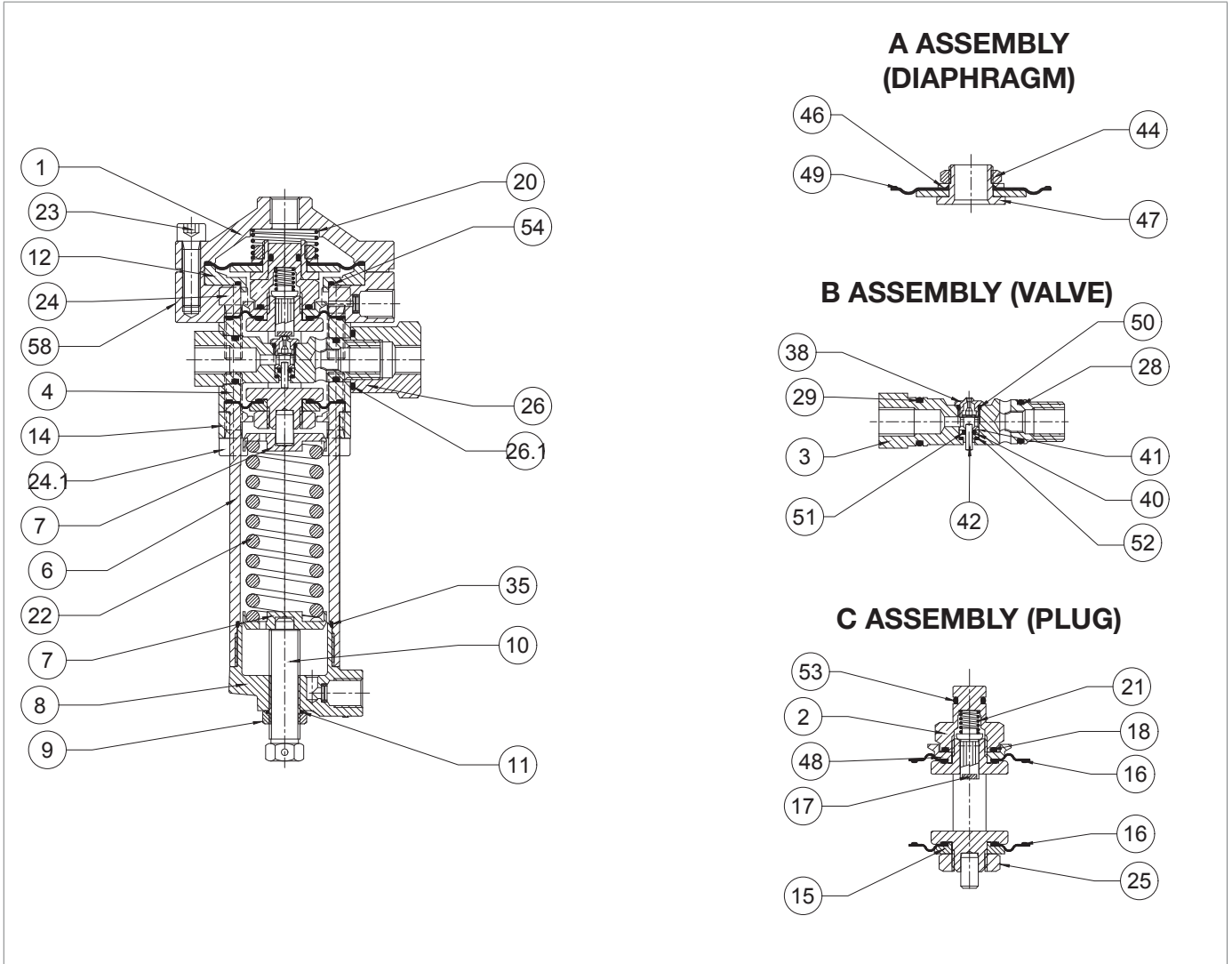


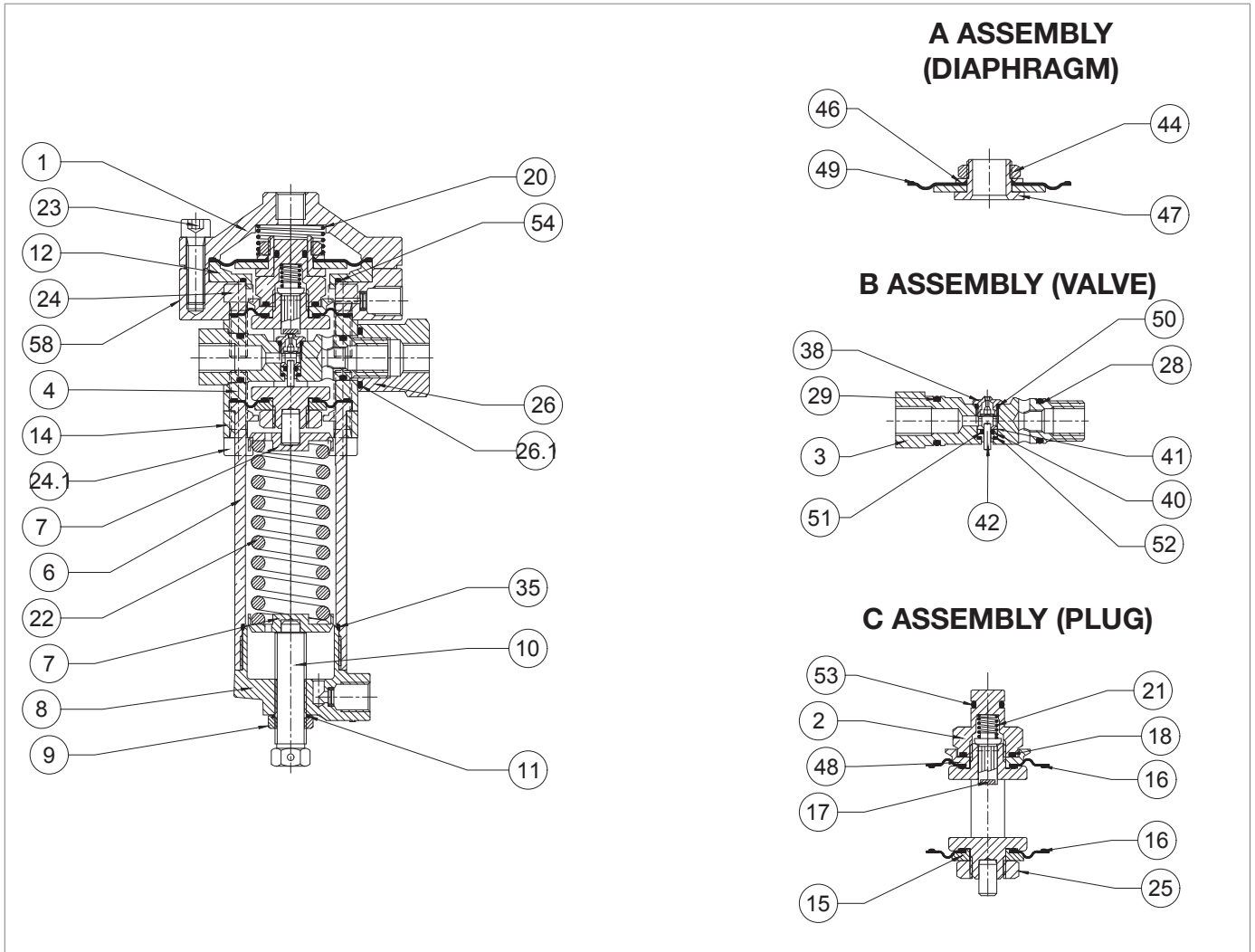
Fig. 9.56. Pilot 302/A

Step	Action
1	Loosen the nut (9).
2	Completely release the spring (22) by turning the adjustment screw (10).
3	Remove the adjustment screw (10) together with the cap (9).
4	Remove the cap (8).
5	Remove the O-ring (35) from the cap (8) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
6	Remove the spring (22) and the spring supports (7).
7	Undo and remove the screws of the lower section (24.1).
8	Remove the bracket (14) from the sleeve (6).
9	Remove the sleeve (6).
10	Undo and remove the screws of the upper section (23).
11	Remove the pilot lid (1).
12	Remove the spring (20).
13	Remove assembly "A" (diaphragm).
14	Unscrew the nut (44).
15	Remove the ring (46).
16	Remove and replace the diaphragm (49) from its support (47), taking care to lubricate the lanyards with synthetic grease.
17	Fit the ring (46).
18	Tighten assembly "A" (diaphragm) with the nut (44) according to the following tightening torque.
19	Unscrew and remove the nut (26).
20	Remove the O-ring (26.1) from the nut (26) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
21	Remove the ring (12).
22	Remove the O-ring (54) from the nut (12) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
23	Remove assembly "B" (valve).
24	Unscrew the valve seat (38). <div style="border: 1px solid black; padding: 5px;">  NOTE! Take care not to damage the surfaces </div>
25	Remove the O-ring (50) from the valve seat (38) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>







Pilot 302/A

Step	Action
26	Remove the bush (41)
27	Remove the balancing piston (42).
28	Take out the piston guide (40).
29	Remove the O-ring (51) from the piston guide (40) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
30	Remove the O-ring (52) from the valve seat (3) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
31	Remove the O-rings (28, 29) from the valve seat (3) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
32	Fit the piston guide (40) and balancing piston (42).
33	Insert the bush (41) into the pilot seat (3) so that the wider stop rests on the O-ring (51).
34	Insert and fix the valve seat (38). NOTE! Take care not to damage the valve seat profile (38) and the O-ring (50).
35	Remove the screws (24) together with the flange (58).
36	Remove assembly "C" (plug) from the valve body (4).
37	Remove the O-ring (53) from the pilot nut (2) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
38	Unscrew and remove the pilot nut (2).
39	Remove the O-rings (18) from the pilot nut (2) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
40	Remove the spring (21).
41	Remove and replace the plug (17).
42	Remove the protective disc (48).
43	Remove and replace the upper diaphragm (16), taking care to lubricate the lanyards with synthetic grease. NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.
44	Unscrew and remove the nut (25).
45	Remove the protective disc (15).



Pilot 302/A

Step	Action
46	Remove and replace the lower diaphragm (16), taking care to lubricate the lanyards with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution. </div>
47	Fit the protection disc (15).
48	Fix the nut (25) according to the following tightening torque: <ul style="list-style-type: none"> • Pilot 302 > tab. 9.79
49	Fit the plug (17) and the spring (21).
50	Fit the protection disc (48).
51	Fix the nut (2) according to the following tightening torque: <ul style="list-style-type: none"> • Pilot 302 > tab. 9.79.
52	Insert assembly “C” (plug) from the top downwards into the valve body (4). <div style="border: 1px solid black; padding: 5px;">  NOTE! <ul style="list-style-type: none"> • Take care not to damage the diaphragms (16) during this step • The marking on the lower section of the headframe must be parallel to the axis of the hole for inserting the seat (3) into the valve body (4). </div>
53	Insert assembly “B” (valve) into the valve body (4). <div style="border: 1px solid black; padding: 5px;">  NOTE! Take care not to damage the O-rings (28, 29) and the valve seat (3). </div>
54	Screw in the nut (26) according to the following tightening torque: <ul style="list-style-type: none"> • Pilot 302 > tab. 9.79
55	Insert the flange (58).
56	Insert and fix the screws (24) according to the following tightening torque: <ul style="list-style-type: none"> • Pilot 302 > tab. 9.79
57	Fit the ring (12).
58	Fit assembly “A” (diaphragm).
59	Fit the spring (20).
60	Fit the lid (1).
61	Insert and fix the screws (23) according to the following tightening torque: <ul style="list-style-type: none"> • Pilot 302 > tab. 9.110
62	Fit the sleeve (6) and the bracket (14).
63	Insert and fix the screws (24.1) according to the following tightening torque: <ul style="list-style-type: none"> • Pilot 302 > tab. 9.79
64	Fit the spring (22) and the spring supports (7).
65	Unscrew the cap (8).
66	Remove the O-ring (11) from the nut (9) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
67	Fit the adjustment screw (10) together with the cap (9).

Tab. 9.121.

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.4.3 - PILOTS 304/A - 305/A

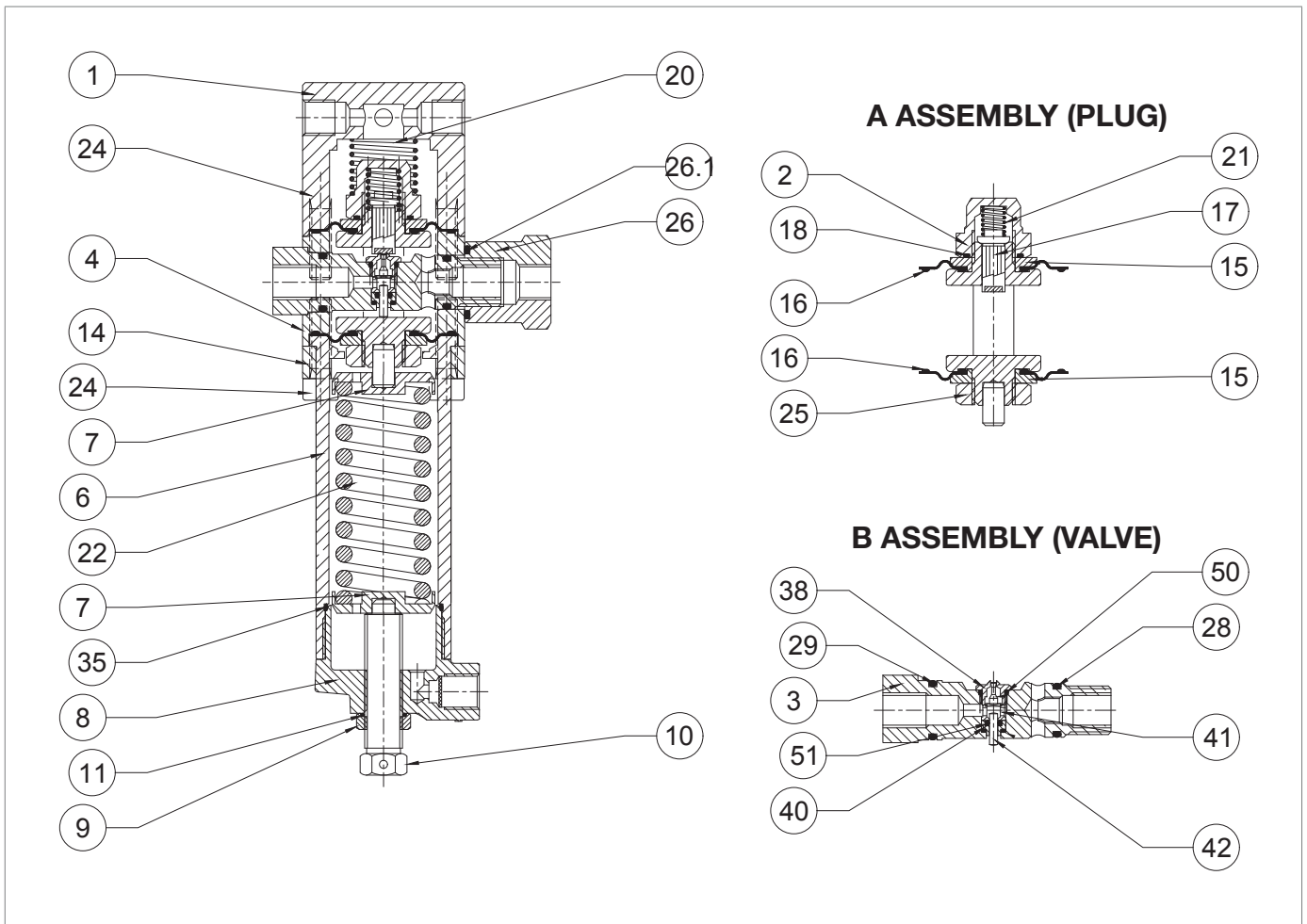






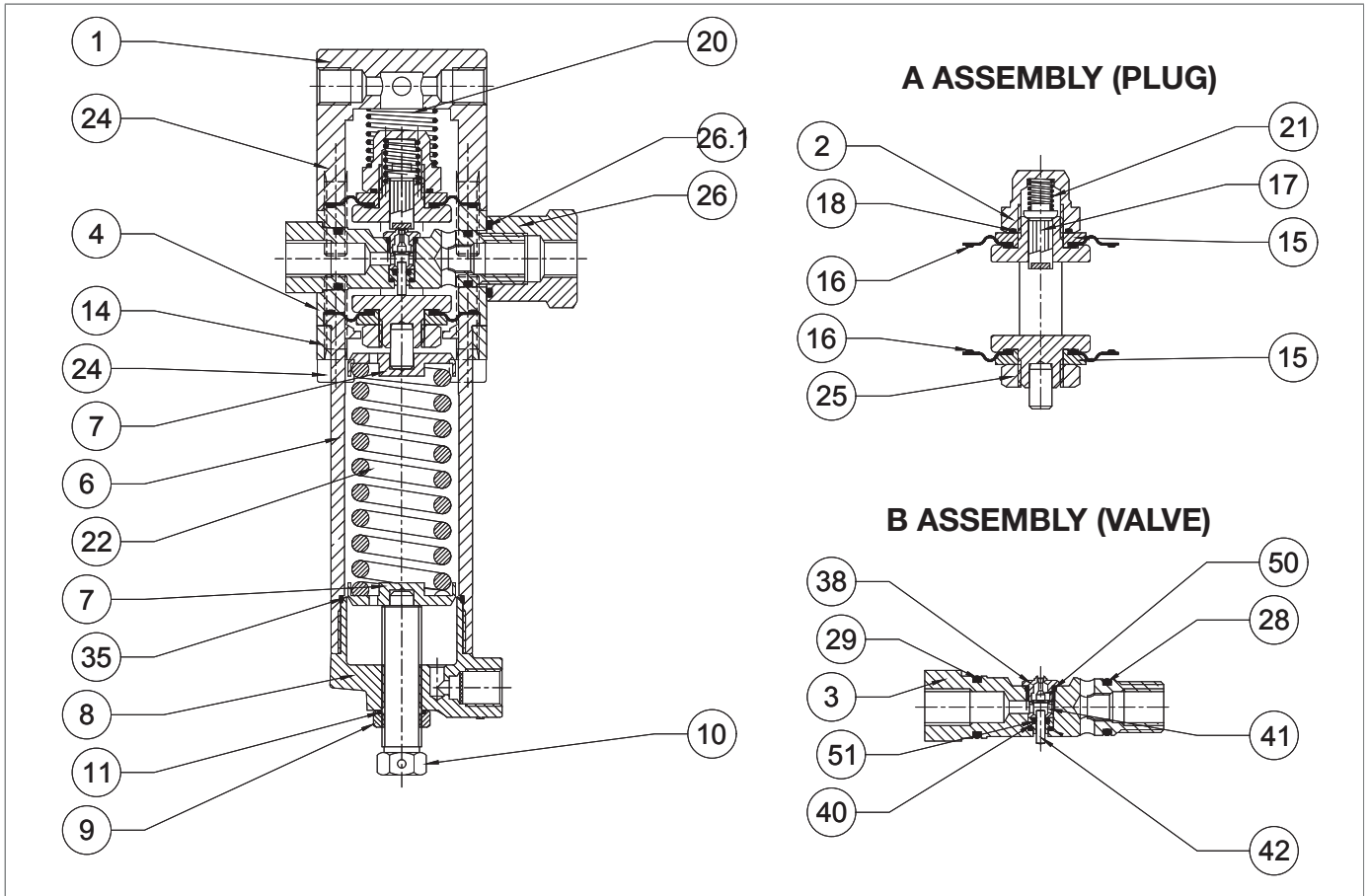


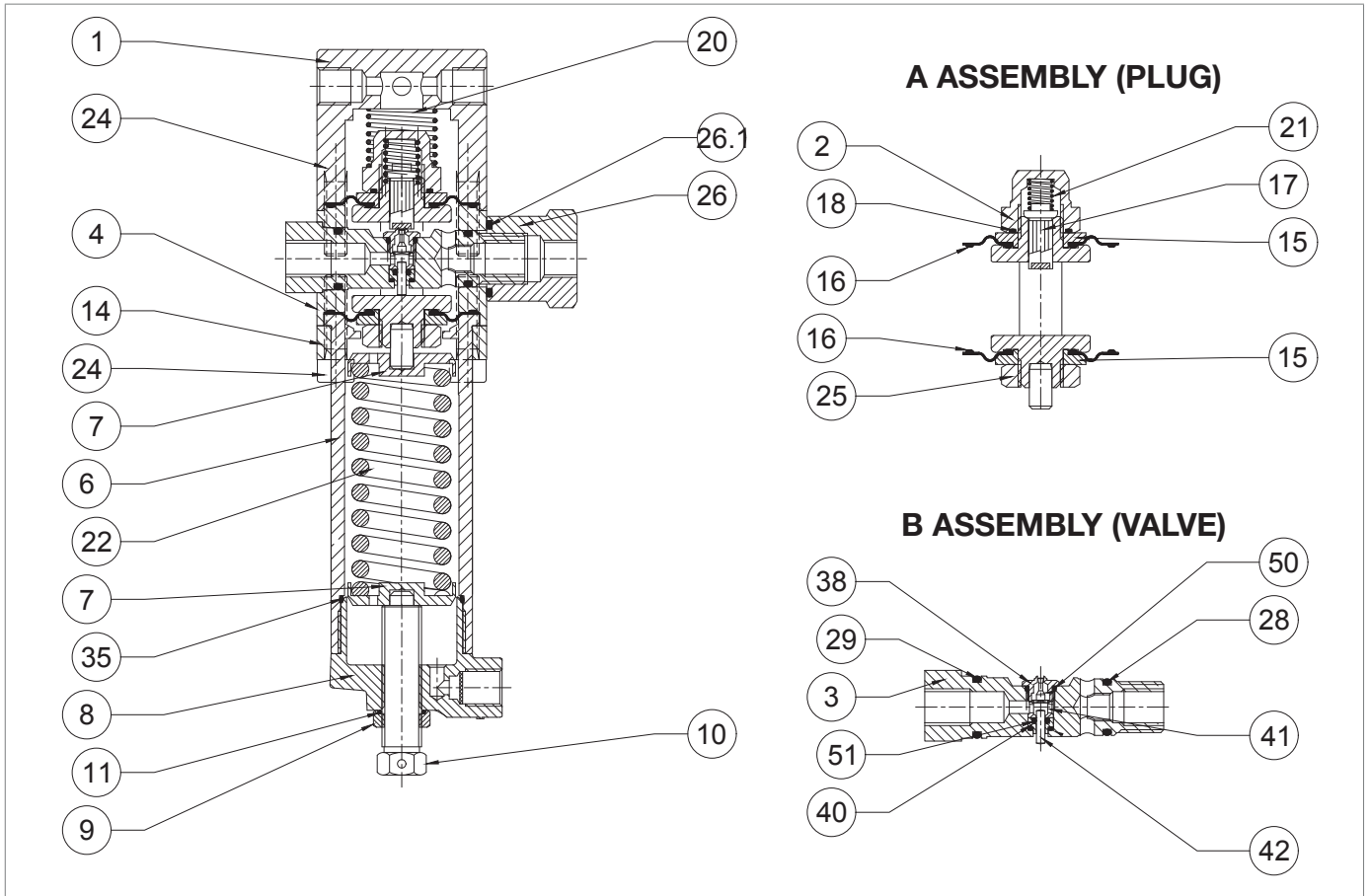
Fig. 9.57. Pilots 304/A - 305/A

Step	Action
1	Loosen the nut (9).
2	Completely release the spring (22) by turning the adjustment screw (10).
3	Remove the adjustment screw (10) together with the cap (9).
4	Unscrew and remove the cap (8).
5	Remove the O-ring (35) from the cap (8) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
6	Remove the spring (22) and the spring supports (7).
7	Undo and remove the screws of the lower section (24).
8	Remove the bracket (14) from the sleeve (6).
9	Remove the sleeve (6).
10	Undo and remove the screws of the upper section (24).
11	Remove the pilot lid (1).
12	Remove the spring (20).
13	Unscrew and remove the nut (26).
14	Remove the O-ring (26.1) from the nut (26) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
15	Remove assembly "B" (valve).
16	Unscrew the valve seat (38). <div style="border: 1px solid black; padding: 5px;">  NOTE! Take care not to damage the surfaces. </div>
17	Remove the O-ring (50) from the valve seat (38) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
18	Remove the bush (41).
19	Remove the balancing piston (42).
20	Take out the piston guide (40).
21	Remove the O-ring (51) from the piston guide (40) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
22	Remove the O-rings (28, 29) from the valve seat (38) and replace them, taking care to lubricate them with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
23	Fit the piston guide (40) and balancing piston (42).



Pilots 304/A - 305/A

Step	Action
24	Insert the bush (41) into the pilot seat (3) so that the wider stop rests on the O-ring (51).
25	Insert and fix the valve seat (38). NOTE! Take care not to damage the valve seat profile (38) and the O-ring (50)
26	Remove assembly "A" (plug) from the valve body (4) by pushing it from the bottom upwards.
27	Unscrew and remove the pilot nut (2).
28	Remove the O-ring (18) of the pilot nut (2) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
29	Remove the spring (21).
30	Remove and replace the plug (17).
31	Remove the upper protection disc (15).
32	Remove and replace the upper diaphragm (16), taking care to lubricate the lanyards with synthetic grease. NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.
33	Unscrew and remove the nut (25).
34	Remove the lower protection disc (15)
35	Remove and replace the lower diaphragm (16), taking care to lubricate the lanyards with synthetic grease. NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.
36	Fit the lower protection disc (15).
37	Fix the nut (25) according to the following tightening torque: <ul style="list-style-type: none"> • Pilots 304-305 > tab. 9.80
38	Fit the plug (17) and the spring (21).
39	Fit the upper protection disc (15).
40	Fix the pilot nut (2) according to the following tightening torque: <ul style="list-style-type: none"> • Pilots 304-305 > tab. 9.80
41	Insert assembly "A" (plug) from the top downwards into the valve body (4). NOTE! <ul style="list-style-type: none"> • Take care not to damage the diaphragms (16) during this step. • The marking on the lower section of the headframe must be parallel to the axis of the hole for inserting the seat (38) into the valve body (4).
42	Insert assembly "B" (valve) into the valve body (4). NOTE! <ul style="list-style-type: none"> • Take care not to damage the O-rings (28, 29) and the valve seat (38). • Insert the assembly with the valve seat (38) facing upwards.
43	Screw in the nut (26) according to the following tightening torque: <ul style="list-style-type: none"> • Pilots 304-305 > tab. 9.80



Pilots 304/A - 305/A

Step	Action
44	Fit the spring (20).
45	Fit the lid (1).
46	Insert and fix the screws of the upper section (24) according to the following tightening torque: <ul style="list-style-type: none"> • Pilots 304-305 > tab. 9.80
47	Fit the sleeve (6) and the bracket (14).
48	Insert and fix the screws of the lower section (24) according to the following tightening torque: <ul style="list-style-type: none"> • Pilots 304-305 > tab. 9.80
49	Fit the spring (22) and the spring supports (7).
50	Unscrew the cap (8).
51	Remove the O-ring (11) from the nut (9) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>! NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p> </div>
52	Fit the adjustment screw (10) together with the cap (9).

Tab. 9.122.

! WARNING!

Ensure that all parts have been fitted correctly.

9.4.4.4 - PILOT 307/A

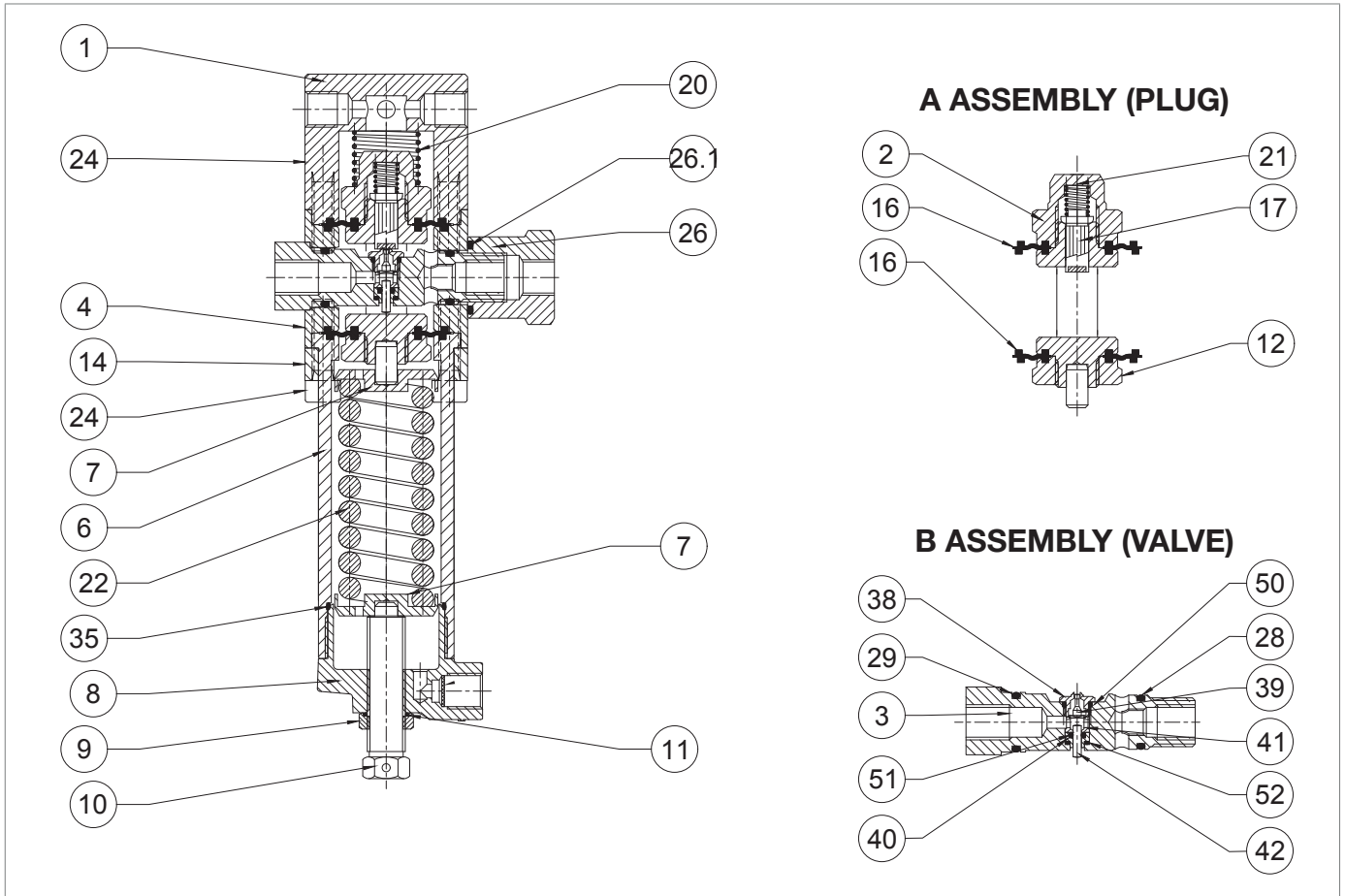





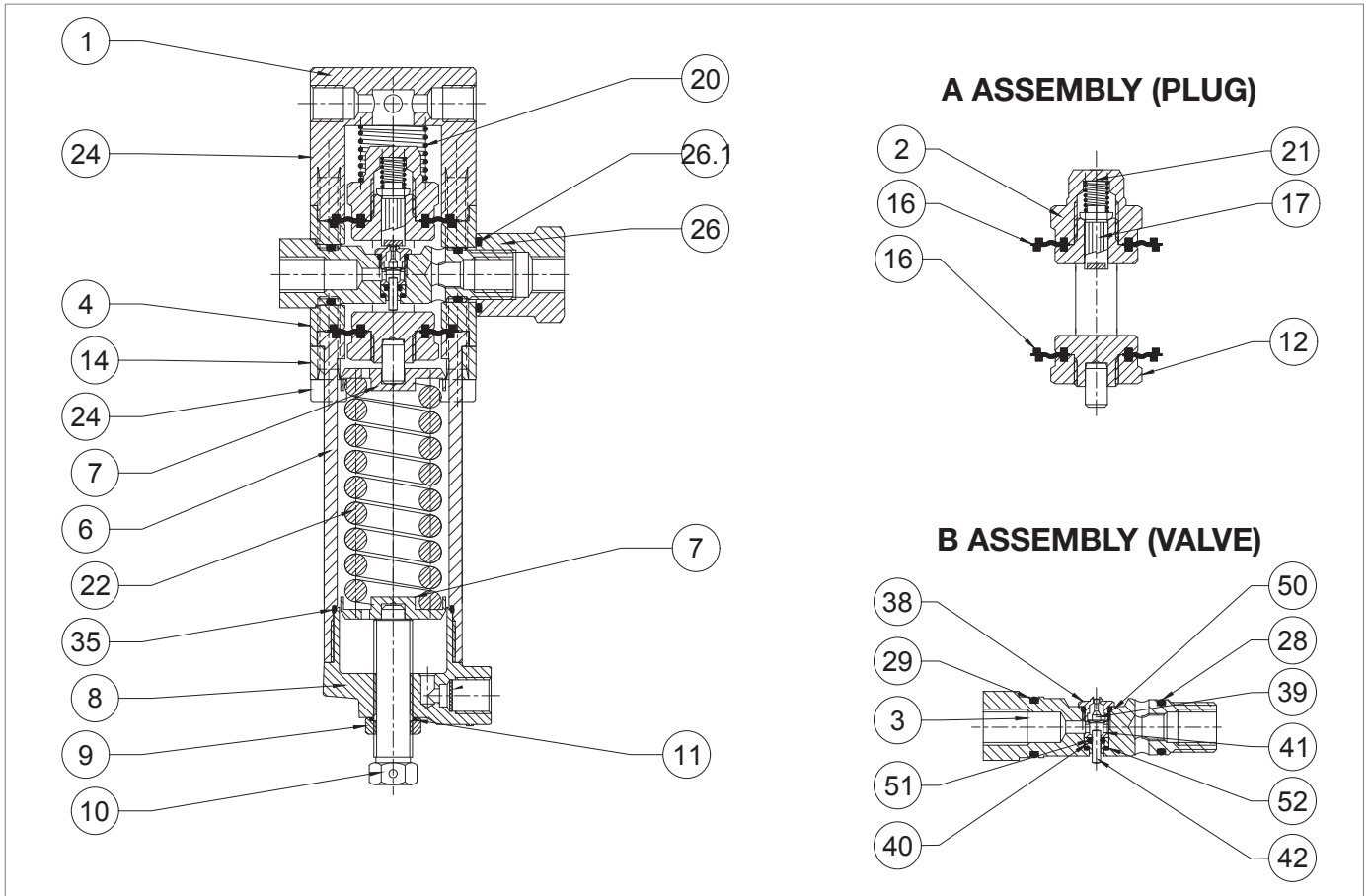


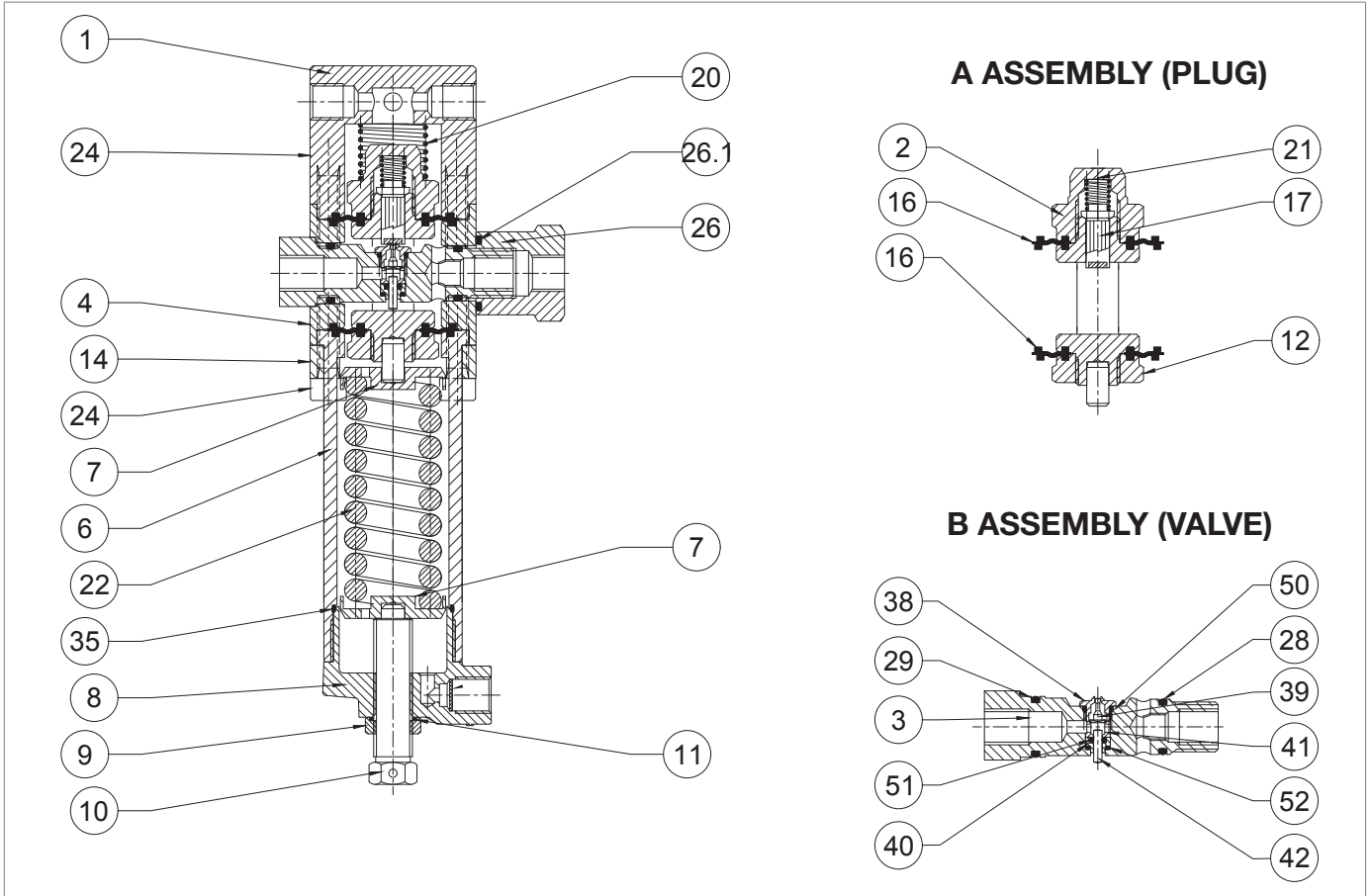
Fig. 9.58. Pilot 307/A

Step	Action
1	Loosen the nut (9).
2	Completely release the spring (22) by turning the adjustment screw (10).
3	Remove the adjustment screw (10) together with the cap (9).
4	Unscrew and remove the cap (8).
5	Remove the O-ring (35) from the cap (8) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 2px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
6	Remove the spring (22) and the spring supports (7).
7	Undo and remove the screws of the lower section (24).
8	Remove the bracket (14) from the sleeve (6).
9	Remove the sleeve (6).
10	Undo and remove the screws of the upper section (24).
11	Remove the pilot lid (1).
12	Remove the spring (20).
13	Unscrew and remove the pilot nut (2).
14	Remove the spring (21).
15	Remove and replace the plug (17).
16	Remove and replace the upper diaphragm (16).
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. <div style="border: 1px solid black; padding: 2px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
19	Remove assembly "B" (valve).
20	Unscrew the valve seat (38). <div style="border: 1px solid black; padding: 2px;">  NOTE! Take care not to damage the surfaces </div>
21	Remove the O-ring (50) from the valve seat (38) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 2px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
22	Remove the bush (41).
23	Remove the balancing piston (42).
24	Take out the piston guide (40).
25	Remove the O-ring (51) from the piston guide (40) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 2px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>



Pilot 307/A

Step	Action
26	Remove the O-ring (52) from the valve seat (3) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
27	Remove the O-rings (28, 29) from the valve seat (3) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
28	Fit the piston guide (40) and balancing piston (42).
29	Insert the bush (41) into the pilot seat (3) so that the wider stop rests on the O-ring (51).
30	Insert and fix the valve seat (38). NOTE! Take care not to damage the valve seat profile (38) and the O-ring (50).
31	Remove assembly "A" (plug) from the valve body (4) by pushing it from the top downwards.
32	Unscrew and remove the nut (12).
33	Remove and replace the lower diaphragm (16), taking care to lubricate the lanyards with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
34	Place and fix the nut (12) according to the following tightening torque: • Pilots 307 > tab. 9.80
35	Insert assembly "A" (plug) the bottom upwards into the valve body (4). NOTE! • Take care not to damage the diaphragms (16) during this step; • The marking on the lower section of the headframe must be parallel to the axis of the hole for inserting the seat (3) into the valve body (4).
36	Insert assembly "B" (valve) into the valve body (4). NOTE! Take care not to damage the O-rings (28, 29) and the valve seat (38).
37	Screw in the nut (26) according to the following tightening torque: • Pilots 307 > tab. 9.80
38	Put the upper diaphragm (16) in place, taking care to lubricate the lanyards with synthetic grease. NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.
39	Fit the plug (17) and the spring (21).
40	Place and fix the pilot nut (2) according to the following tightening torque: • Pilots 307 > tab. 9.80
41	Fit the spring (20).
42	Fit the lid (1).



Pilot 307/A

Step	Action
43	Insert and fix the screws of the upper section (24) according to the following tightening torque: <ul style="list-style-type: none"> • Pilots 307 > tab. 9.80
44	Fit the sleeve (6) and the bracket (14).
45	Insert and fix the screws of the lower section (24) according to the following tightening torque: <ul style="list-style-type: none"> • Pilots 307 > tab. 9.80
46	Fit the spring (22) and the spring supports (7).
47	Unscrew the cap (8).
48	Remove the O-ring (11) from the nut (9) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p> </div>
49	Fit the adjustment screw (10) together with the cap (9).

Tab. 9.123.

WARNING!

Ensure that all parts have been fitted correctly.

9.4.4.5 - 300/A SERIES PILOT RECONNECTION

NOTE!

To reconnect the pilot to the regulator, refer to table 9.120.

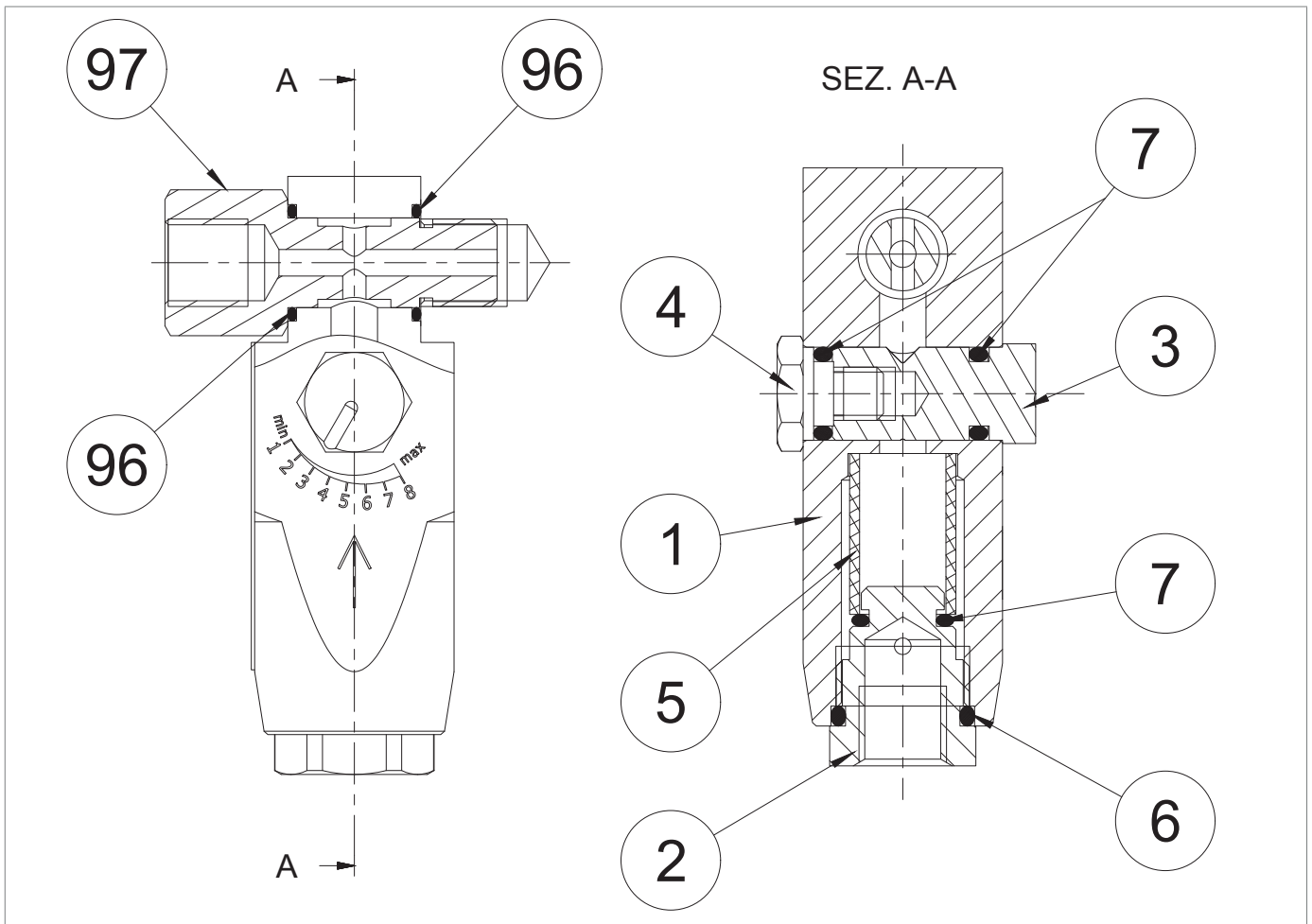
9.4.4.6 - AR100 LAMINATION VALVE


Fig. 9.59. AR100 lamination valve

Step	Action
1	Unscrew and remove the locking screw (97).
2	Remove the O-rings (96) from the AR100 lamination valve body (1) and replace them, taking care to lubricate them with synthetic grease.
3	Unscrew and remove the locking screw (4).
4	Remove the O-ring (7) from the closing screw (4) and replace it, taking care to lubricate it with synthetic grease.
5	Remove the adjustment screw (3).
6	Remove the O-ring (7) from the adjustment screw (3) and replace it, taking care to lubricate it with synthetic grease.
7	Unscrew and remove the cap (2).

Step	Action
8	Remove the O-rings (6, 7) from the cap (2) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
9	Remove and replace the filter (5).
10	Fit and fix the cap (2) according to the following tightening torque: • AR100 > tab. 9.81 NOTE! Take care not to damage the O-rings (6, 7).
11	Insert the adjustment screw (3), taking care not to damage the O-ring (7).
12	Fit and fix the closing screw (4) according to the following tightening torque: • AR100 > tab. 9.81 NOTE! Take care not to damage the O-ring (7).
13	Insert the locking screw (97) with the valve ports in line with the AR100 lamination valve (1) body.

Tab. 9.124.

WARNING!

Ensure that all parts have been fitted correctly.

9.4.4.7 - ASSEMBLING THE PILOTING UNIT

Step	Action
1	Screw the conical seal fittings to connect the sockets between the series 300 pilot and the AR100 lamination valve.

Tab. 9.125.

9.4.4.8 - FINAL OPERATIONS

Step	Action
1	Fit the Series 300 Pilot + AR100 Lamination Valve assembly on the regulator.
2	Fix the nut of the pilot support bracket to the regulator.
3	Screw in the conical seal fittings to reconnect all power outlets and sensing lines for the pilot and regulator.

Tab. 9.126.

9.4.5 - DB/851 SILENCER MAINTENANCE

9.4.5.1 - SILENCER DB/851 DN 1" - 3"

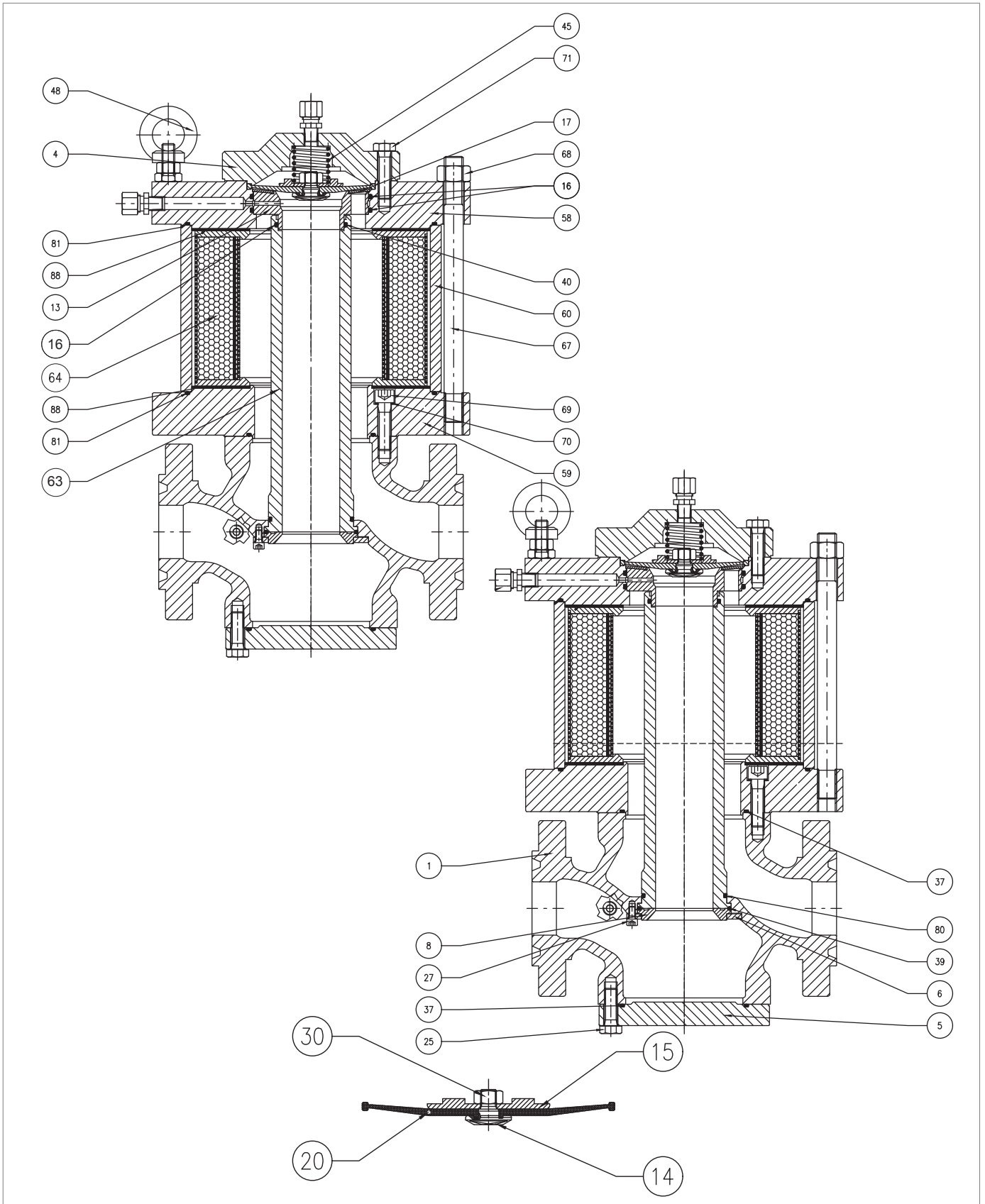
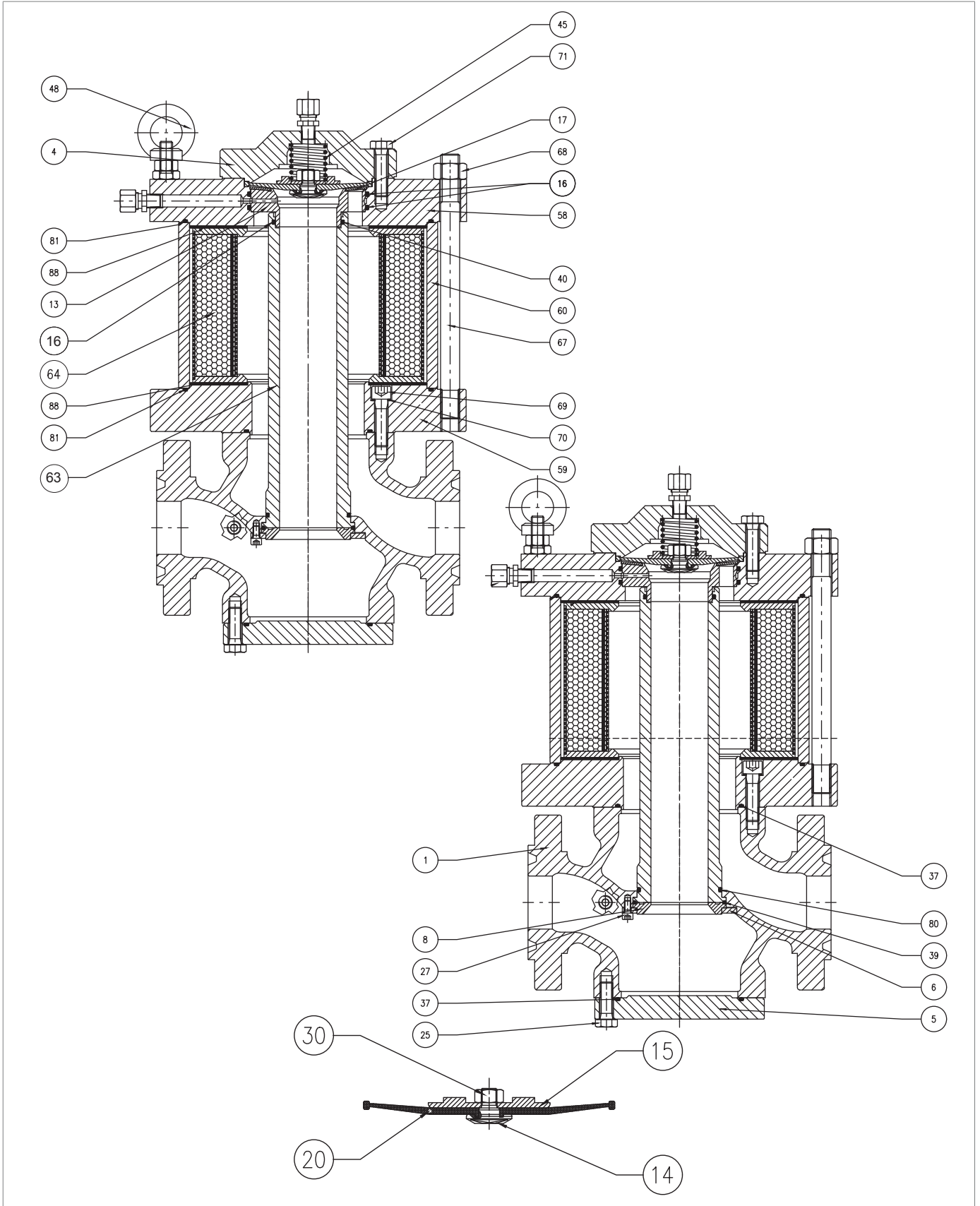


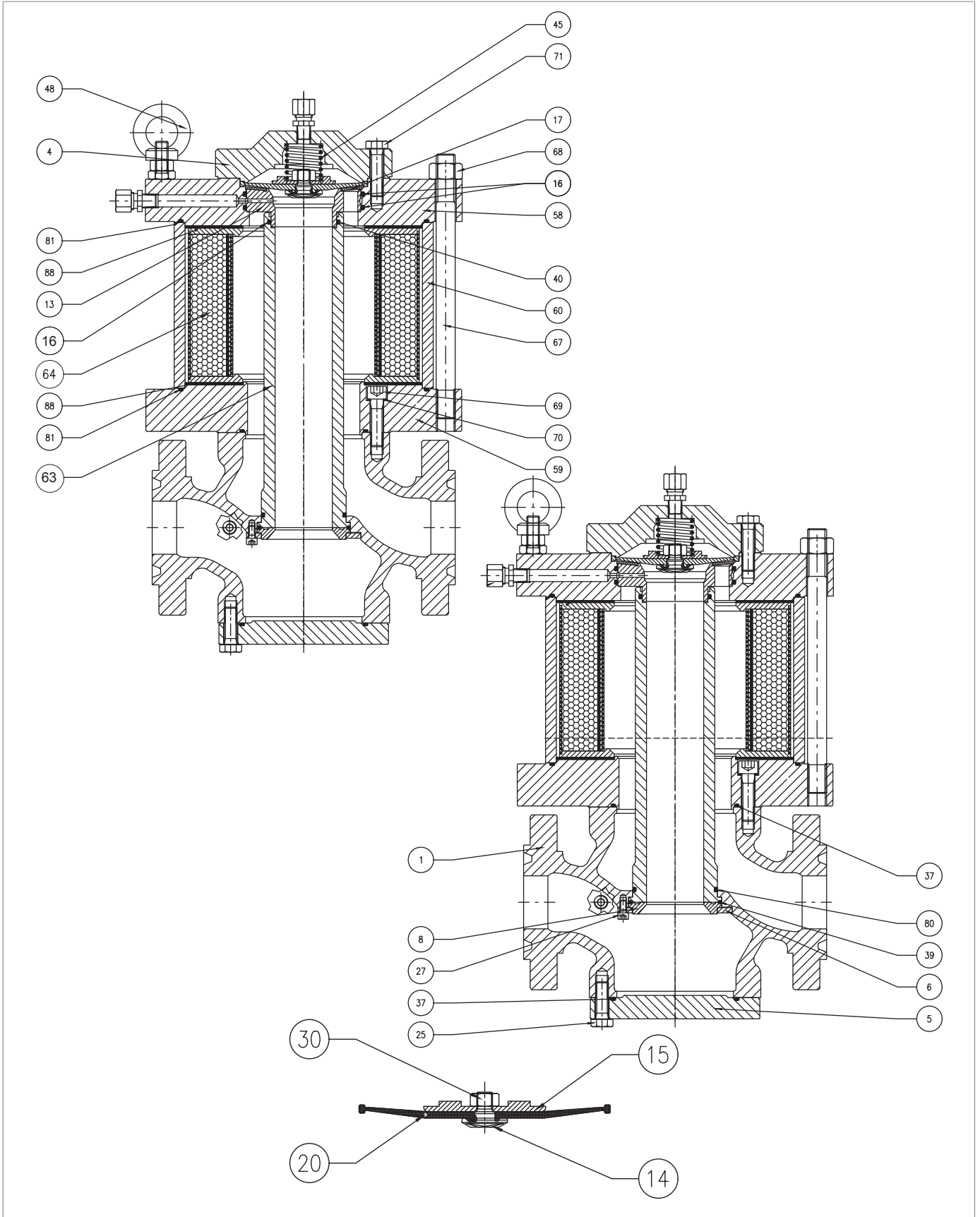
Fig. 9.60. Silencer DB/851 DN 1" - 3"

Step	Action
1	Loosen the eyebolt (48) and the fixing screws (71).
2	Remove the upper lid (4).
3	Remove the spring (45).
4	Take out the diaphragm unit (14, 15, 20, 30).
5	Remove the diaphragm protection grid (17).
6	Unscrew and remove the nut (68).
7	Remove the upper flange (58) together with the valve seat (13).
8	Turn the upper flange (58) upside down.
9	Take out the valve seat (13). NOTE! Place it on an anti-shock surface to simplify the operation and for protection in case of falls.
10	Remove the O-rings (16) from the upper flange (58) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
11	Remove the O-ring (81) from the upper flange (58) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
12	Remove and replace the upper anti-oil gasket (88).
13	Remove the basket (64).
14	Remove the plating (60).
15	Remove the O-ring (81) from the lower flange (59) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
16	Remove and replace the lower anti-oil gasket (88).
17	Undo the screws (69) together with the washers (70).
18	Remove the lower flange (59) together with the tie rods (67).
19	Remove the O-ring (37) from the lower flange (59) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
20	Undo and remove the screws (25).
21	Remove the blind flange (5) or any built-in accessory (SB/82 slam-shut valve or PM/819 monitor).







Silencer DB/851 DN 1''- 3''

Step	Action
22	<p>Remove and replace the O-ring (37) from the blind flange (5) or from any built-in accessory (SB/82 slam-shut valve or PM/819 monitor), taking care to lubricate it with synthetic grease.</p> <p>NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
23	<p>Undo and remove the screws (27).</p> <p>NOTE! During this operation, be careful to support the sleeve</p>
24	Remove the locking ring (6) together with the conical seat (8).
25	Remove the sleeve (63) from the top downwards.
26	<p>Remove the O-ring (39) from the valve seat (8) and replace it, taking care to lubricate it with synthetic grease.</p> <p>NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
27	<p>Remove the O-rings (40, 80) from the sleeve (63) and replace them, taking care to lubricate them with synthetic grease.</p> <p>NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.</p>
28	Clean the upper and lower support surfaces of the body (1) and the flanges (2, 5) as well as the contact surfaces between the sleeve (63), the conical seat (8) and the body.
29	Put the sleeve (63) back in place into the body from the bottom upwards, supporting it
30	<p>Put the conical seat (8) back in place together with the O-ring (39) and the locking ring (6).</p> <p>NOTE! As an alternative to the conical seat (8), a reinforced gasket may be present, based on the built-in accessory.</p>
31	<p>Insert and fix the screws (27) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 1" > tab 9.82; • DN 2" > tab. 9.83; • DN 3" > tab. 9.84. <p>NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
32	Fit the blind flange (5) or any accessory.
33	<p>Insert and fix the screws (25) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 1" > tab 9.82; • DN 2" > tab. 9.83; • DN 3" > tab. 9.84. <p>NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
34	Fit the lower flange (59) together with the tie rods (67).
35	<p>NOTE! Replace the washers (70) before performing this operation.</p>



Silencer DB/851 DN 1''- 3''

Step	Action
36	Insert the washers (70) and lubricate them with synthetic grease.
37	Insert and fix the screws (69) according to the following tightening torques: <ul style="list-style-type: none"> • DN 1" > tab. 9.82; • DN 2" > tab. 9.83; • DN 3" > tab. 9.84. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
38	Fit the lower anti-oil gasket (88).
39	Fit the plating (60).
40	Fit the basket (64).
41	Fit the upper anti-oil gasket (88).
42	Fit the upper flange (58). <div style="border: 1px solid black; padding: 5px; margin-top: 5px;">  NOTE! Make sure that the AR100 power supply connection is facing upstream. </div>
43	Fit and fix the nuts (68) according to the following tightening torques: <ul style="list-style-type: none"> • DN 1" > tab. 9.82; • DN 2" > tab. 9.83; • DN 3" > tab. 9.84. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
44	Fit the valve seat (13) into the upper flange (58).
45	Fit the diaphragm protection grid (17).
46	Put the diaphragm unit (14, 15, 20, 30) in place.
47	Fit the spring (45).
48	Fit the lid (4).
49	Fit and fix the screws (71) according to the following tightening torques: <ul style="list-style-type: none"> • DN 1" > tab. 9.82; • DN 2" > tab. 9.83; • DN 3" > tab. 9.84. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
50	Put the eyebolt (48) back in place.

Tab. 9.127.

 **NOTE!**

To replace the O-rings not mentioned in this procedure, refer to maintenance table "APERFLUX 851 1" - 3".

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.5.2 - SILENCER DB/851 DN 4"- 10"

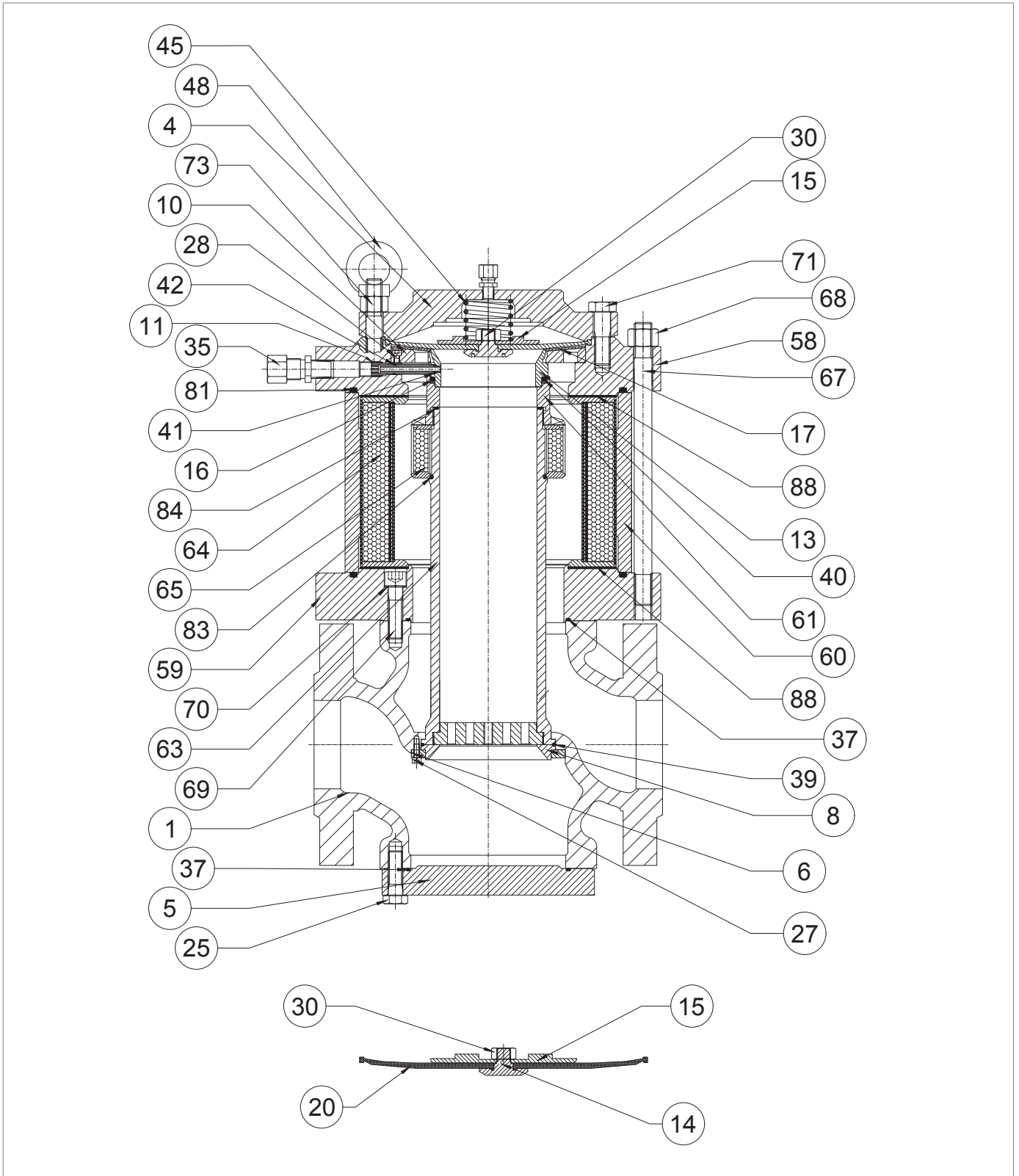
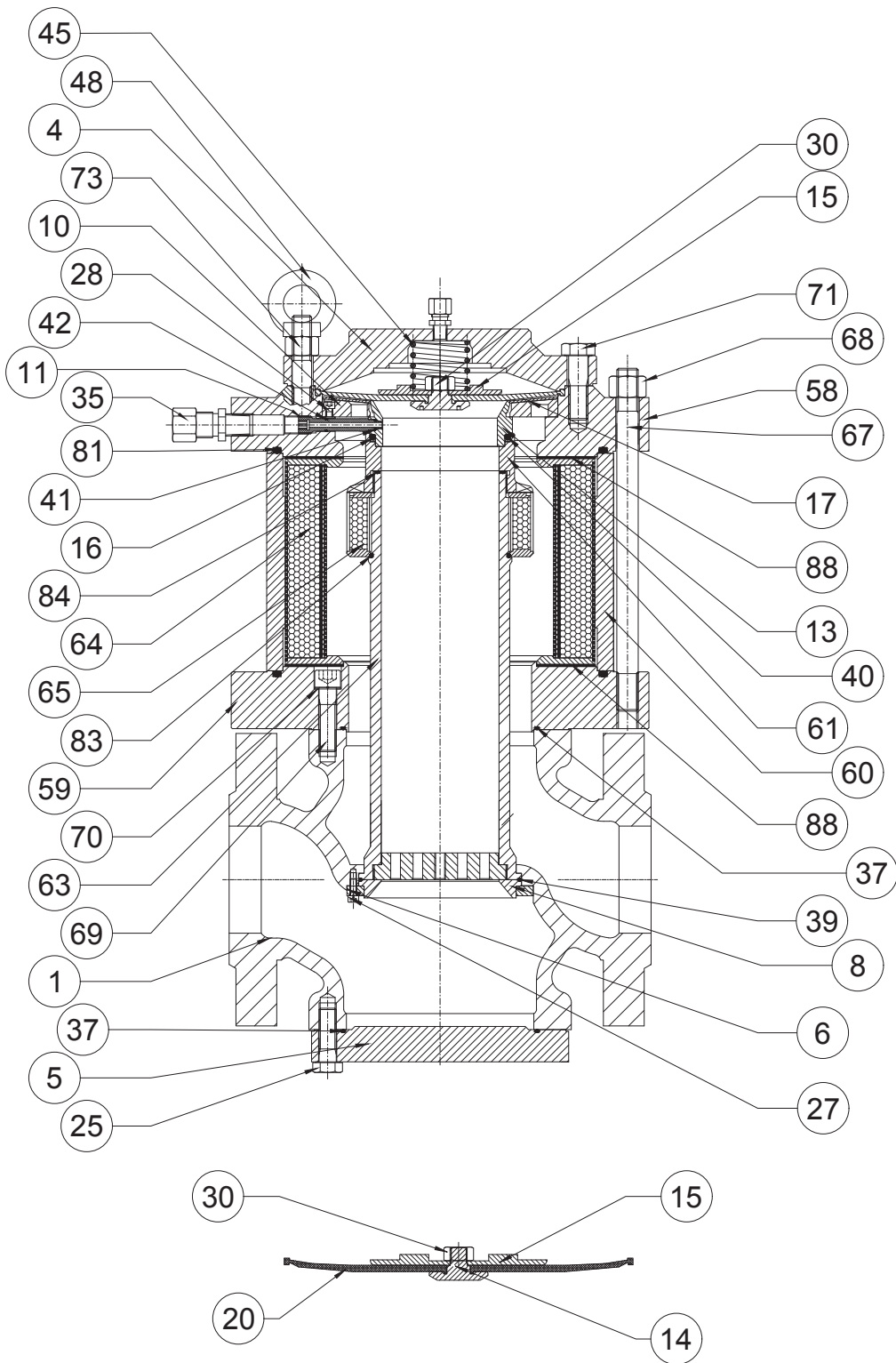


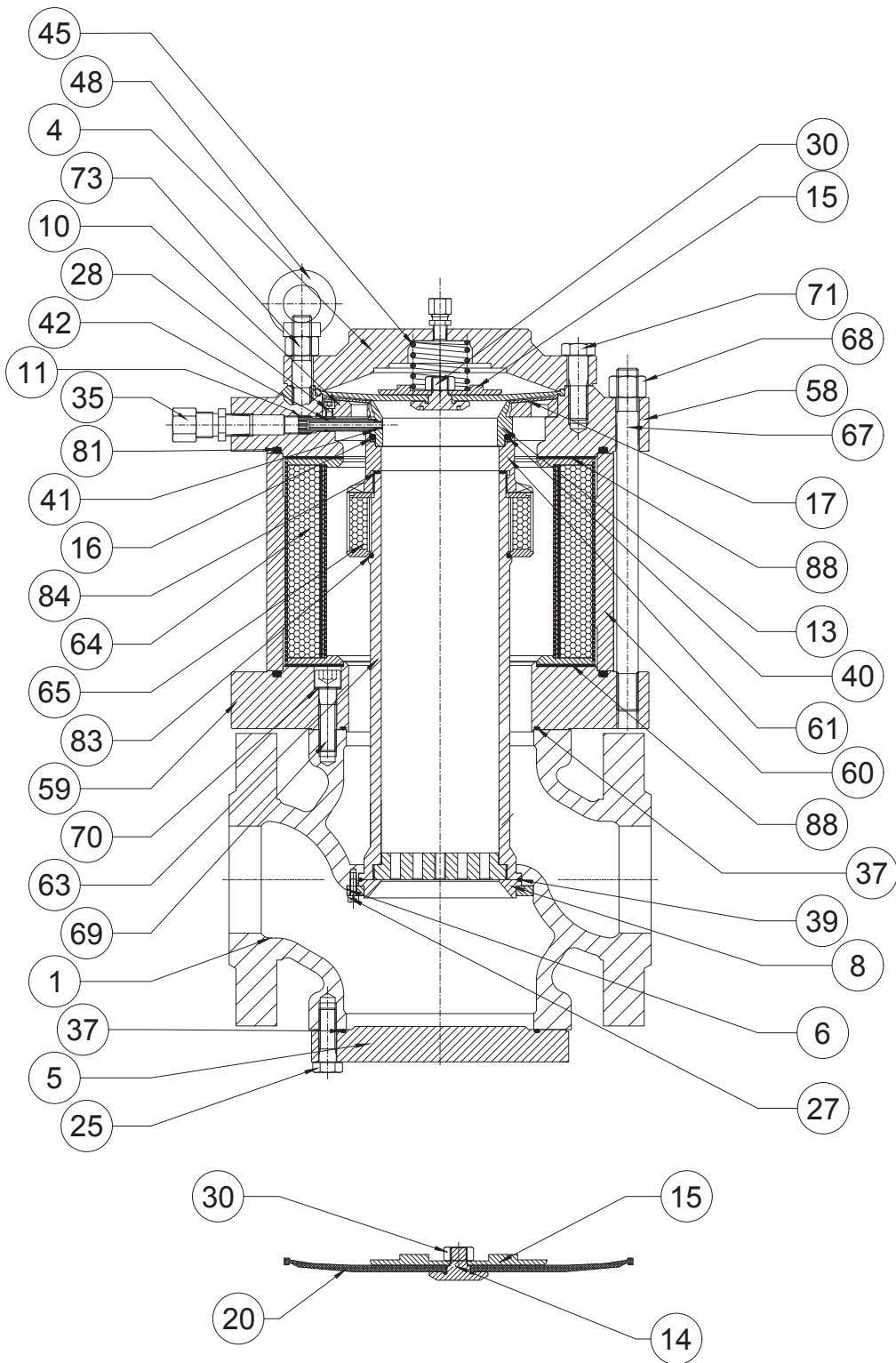
Fig. 9.61. Silencer DB/851 DN 4"- 10"

Step	Action
1a	APPLICABLE TO DN 4" ONLY Undo the screws (71), eyebolts (48), nut (73).
1b	APPLICABLE TO DN 6" - 10" ONLY Loosen the screws (71) and remove the washers (33).
2	Remove the upper lid (4).
3a	APPLICABLE TO DN 4" - 8" Remove the spring (45).
3b	APPLICABLE TO DN 10" ONLY Remove the springs (44, 45).
4	Take out the diaphragm unit (14, 15, 20, 30).
5	Unscrew and remove the supply fitting (35).
6	Unscrew and remove the fitting (11).
7	APPLICABLE TO DN 10" ONLY Unscrew and remove the fitting (90).
8	Remove the O-rings (41, 42) from the lid (11) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
9	Remove the diaphragm protection grid (17).
10	Undo and remove the screws (28).
11	Remove the grid (10).
12	Take out the valve seat (13). NOTE! Place it on an anti-shock surface to simplify the operation and for protection in case of falls.
13	Remove the O-ring (40) from the seat (13) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
14	Remove the spacer ring (16).
15	Unscrew and remove the nut (68).
16	Remove the upper flange (58).
17	Remove the O-ring (81) from the upper flange (58) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
18	Remove the upper anti-oil gasket (88).
19	Remove the external basket (64).
20	Remove the plating (60).
21	Unscrew and remove the valve seat support (61).



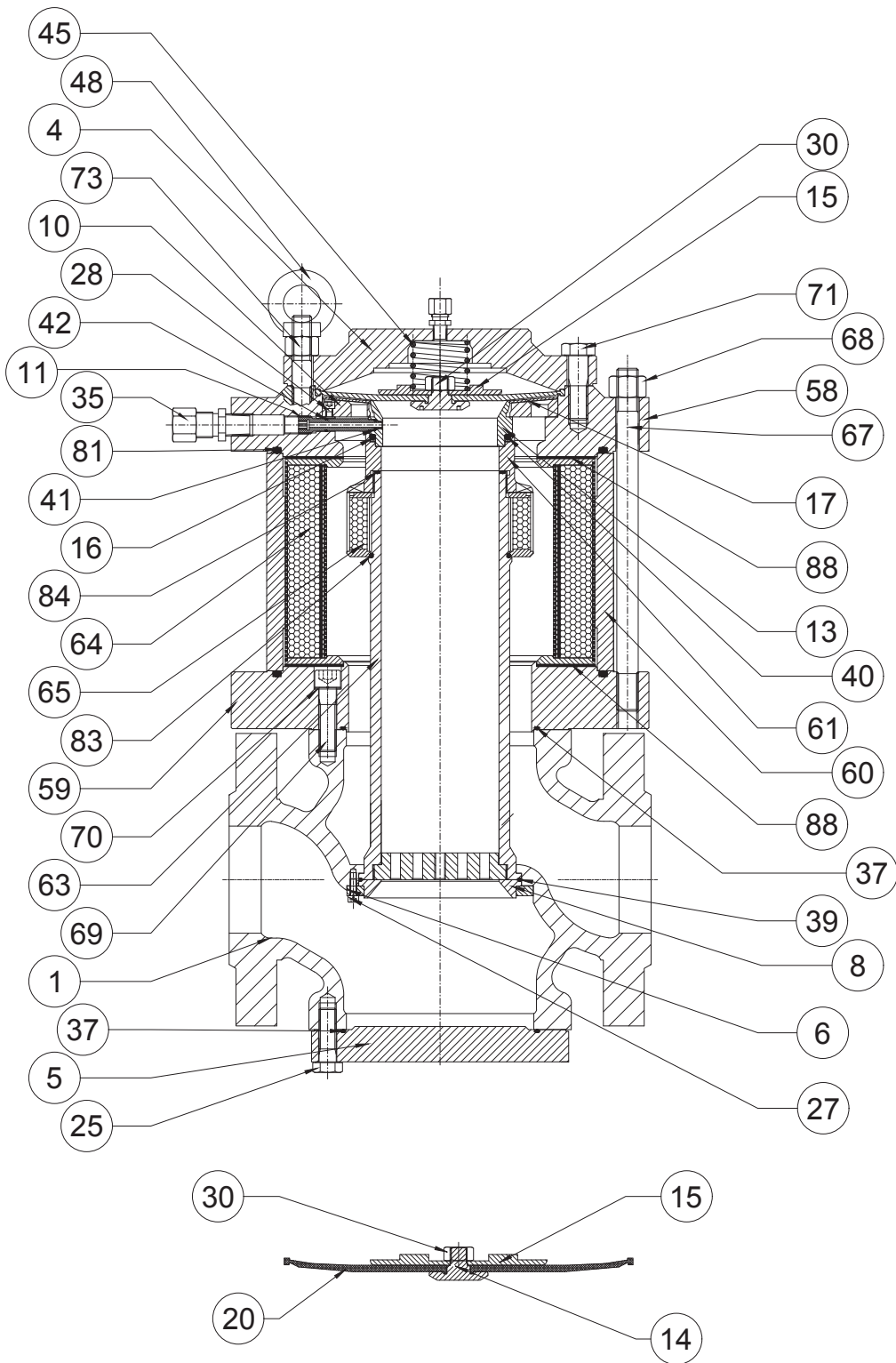
Silencer DB/851 DN 4''- 10''

Step	Action
22	Remove the O-ring (84) from the sleeve (63) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
23	Remove the internal basket (65). NOTE! To do so, use tool ref. O, tab. 48 of paragraph 7.1 "List of equipment".
24	Remove and replace the lower anti-oil gasket (88).
25a	APPLICABLE TO DN 4" - 8" Undo and remove the screws (69) and the washers (70).
25b	APPLICABLE TO DN 10" ONLY Undo and remove the screws (69).
25	Remove the lower flange (59) together with the tie rods (67).
26	Remove the O-ring (37) from the lower flange (59) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
27	APPLICABLE TO DN 10" ONLY Remove the O-ring (85) from the lower flange (59) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
28	WARNING! Support the flange or any accessory to prevent it from falling
29	Undo and remove the screws (25).
30	Remove the blind flange (5) or any built-in accessory (SB/82, HB/97 slam-shut valve or PM/819 monitor).
31	Remove the O-ring (37) from the blind flange (5) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
32	WARNING! Support the sleeve (63) during the next steps to prevent it from falling.
33	Undo and remove the screws (27), the locking ring (6) and the conical seat (8).
34	Remove the sleeve (63) from the top downwards.
35	Remove and replace the O-ring (83) in the sleeve (63). NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.








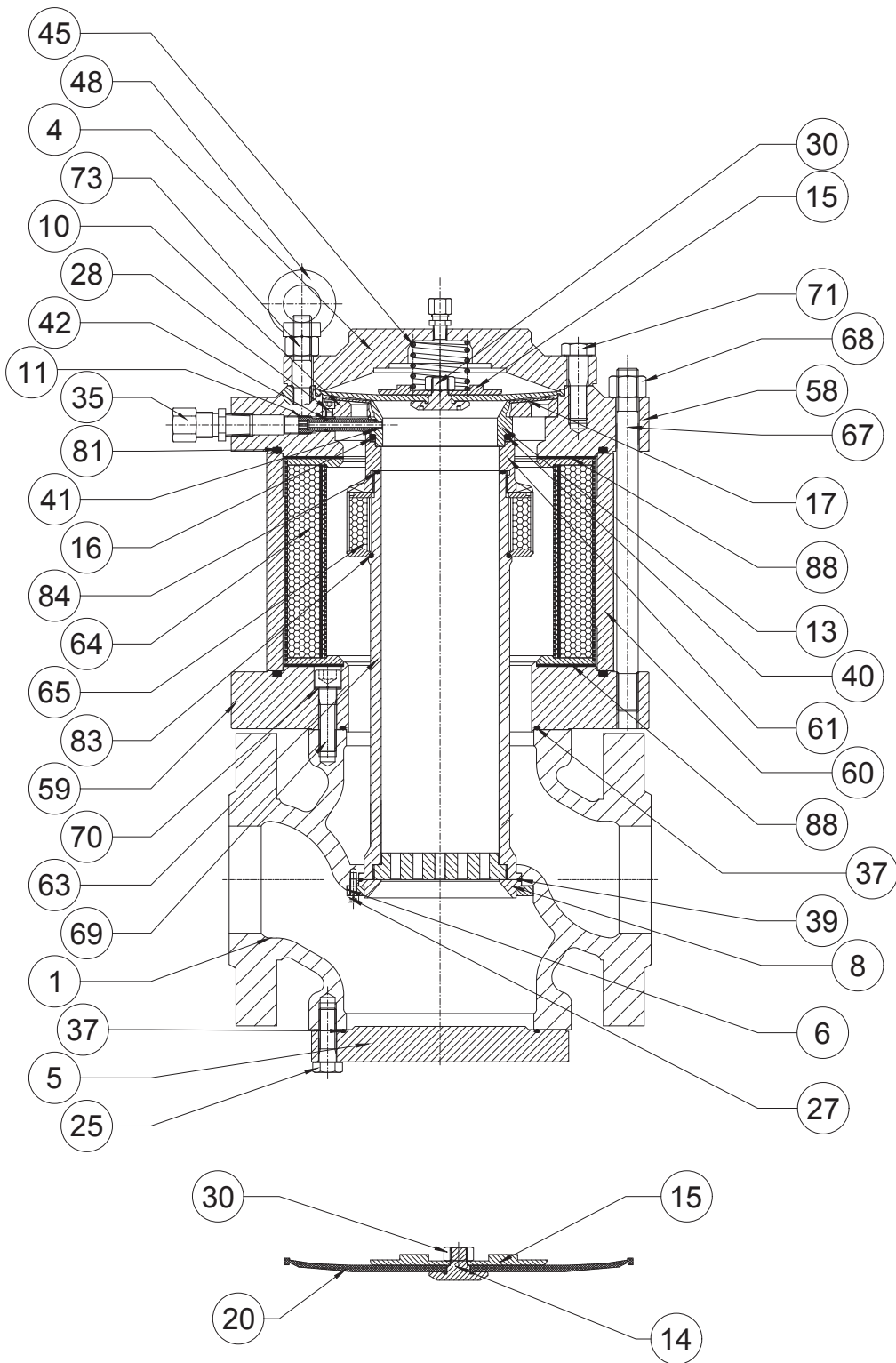
Silencer DB/851 DN 4''- 10''

Step	Action
36	Remove the O-ring (39) from the valve seat (8) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
37	Clean the upper and lower support surfaces of the body (1) and the flanges (2, 5) as well as the contact surfaces between the sleeve (63), the conical seat (8) and the body.
38a	APPLICABLE TO DN 4" - 8" Put the sleeve (9) back in place into the body from the bottom upwards.
38b	APPLICABLE TO DN 10" ONLY Put the sleeve (9) back in place into the body from the bottom upwards. NOTE! Align holes.
39	Put the conical seat (8) back in place together with the O-ring (39) and the locking ring (6). NOTE! As an alternative to the conical seat (8), a reinforced gasket may be present, based on the built-in accessory.
40	Insert and fix the screws (27) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.85; • DN 6" > tab. 9.86; • DN 8" > tab. 9.87; • DN 10" > tab. 9.88. NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
41	WARNING! Support the flange or any accessory to prevent it from falling
42	Fit the blind flange (5) or any accessory.
43	Insert and fix the screws (25) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.85; • DN 6" > tab. 9.86; • DN 8" > tab. 9.87; • DN 10" > tab. 9.88. NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
44	Fit the lower flange (59) together with the tie rods (67).
45	NOTE! Replace the washers (70) before performing this operation.
46	APPLICABLE TO DN 4" - 8" Insert the washers (70) and lubricate them with synthetic grease.





Silencer DB/851 DN 4'' - 10''

Step	Action
47	Insert and fix the screws (69) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab 9.85; • DN 6" > tab. 9.86; • DN 8" > tab. 9.87; • DN 10" > tab. 9.88. <div style="border: 1px solid black; padding: 5px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
48	Fit the lower anti-oil gasket (88).
49	Fit the plating (60).
50	Fit the external basket (64).
51	Fit the internal basket (65). <div style="border: 1px solid black; padding: 5px;">  NOTE! To do so, use tool ref. O, tab. 48 of paragraph 7.1 "List of equipment". </div>
52	Screw the valve seat support (61) to the sleeve.
53	Fit the new upper anti-oil gasket (88).
54	Fit the upper flange (58). <div style="border: 1px solid black; padding: 5px;">  NOTE! Make sure that the AR100 power supply connection is facing upstream. </div>
55	Insert and fix the nuts (68) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab 9.85; • DN 6" > tab. 9.86; • DN 8" > tab. 9.87; • DN 10" > tab. 9.88.
56	Fit the ring (16) into the sleeve with the grooves facing downwards.
57a	APPLICABLE TO DN 4" - 8" ONLY Insert the valve seat (13) into the sleeve (9) with the hole towards that in the intermediate flange (3). <div style="border: 1px solid black; padding: 5px;">  NOTE! Take care not to damage the O-ring (40). </div>
57b	APPLICABLE TO DN 10" ONLY Place the valve seat (13) in the upper flange (58).
58a	APPLICABLE TO DN 4" - 8" ONLY Insert and screw the fitting (11) inside the hole. <div style="border: 1px solid black; padding: 5px;">  NOTE! <ul style="list-style-type: none"> • Take care not to damage the O-rings (41, 42); • Fit the O-ring (41) of the fitting (11) into the hole of the valve seat (12) until it sits in place, so as not to move the seat from its centring. </div>
58b	APPLICABLE TO DN 10" ONLY Put the fitting (90) in place and secure it.
59	Fit the supply fitting (35).
60	Fit the grid (10).



Silencer DB/851 DN 4'' - 10''

Step	Action
61	Fit and fix the screws (28) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.85; • DN 6" > tab. 9.86; • DN 8" > tab. 9.87; • DN 10" > tab. 9.88. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
62	Fit the diaphragm protection grid (17).
63	Put the diaphragm unit (14, 15, 20, 30) in place and lubricate the retaining slots with synthetic grease.
64a	APPLICABLE TO DN 4" - 8" ONLY Fit the spring (45).
64b	APPLICABLE TO DN 10" ONLY Fit the springs (44, 45).
65	Fit the upper lid (4).
66	Insert and fix the screws (71) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.85; • DN 6" > tab. 9.86; • DN 8" > tab. 9.87; • DN 10" > tab. 9.88. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
67	APPLICABLE TO DN 4" ONLY Fit and fix the nut (73) and the eyebolt (48).

Tab. 9.128.

 **NOTE!**

To replace the O-rings not mentioned in this procedure, refer to the maintenance schedule "APERFLUX 851 4" - 8".

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.6 - PM/819 BUILT-IN MONITOR OPERATION

9.4.6.1 - BUILT-IN MONITOR PM/819 DN 1"- 2"

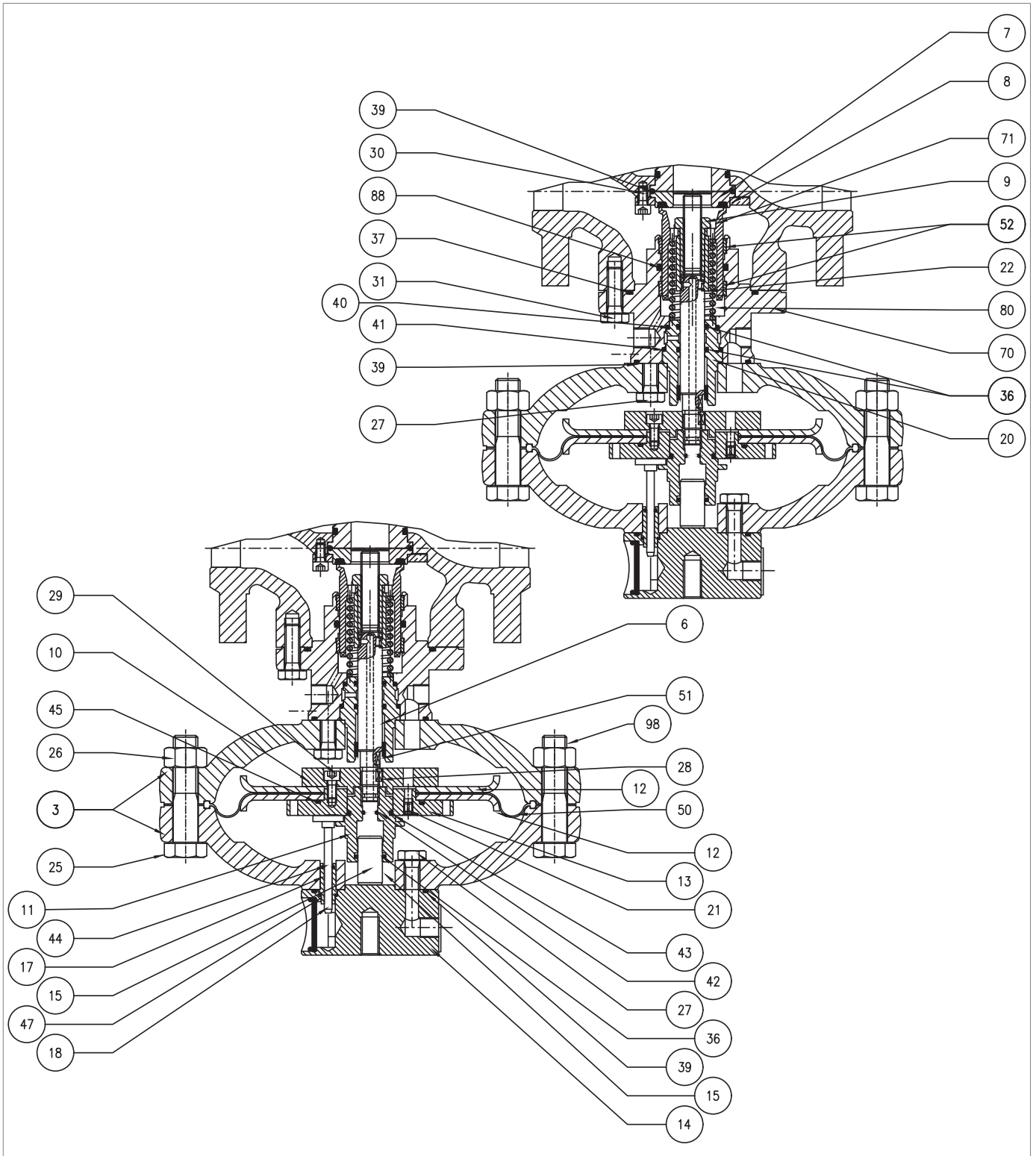
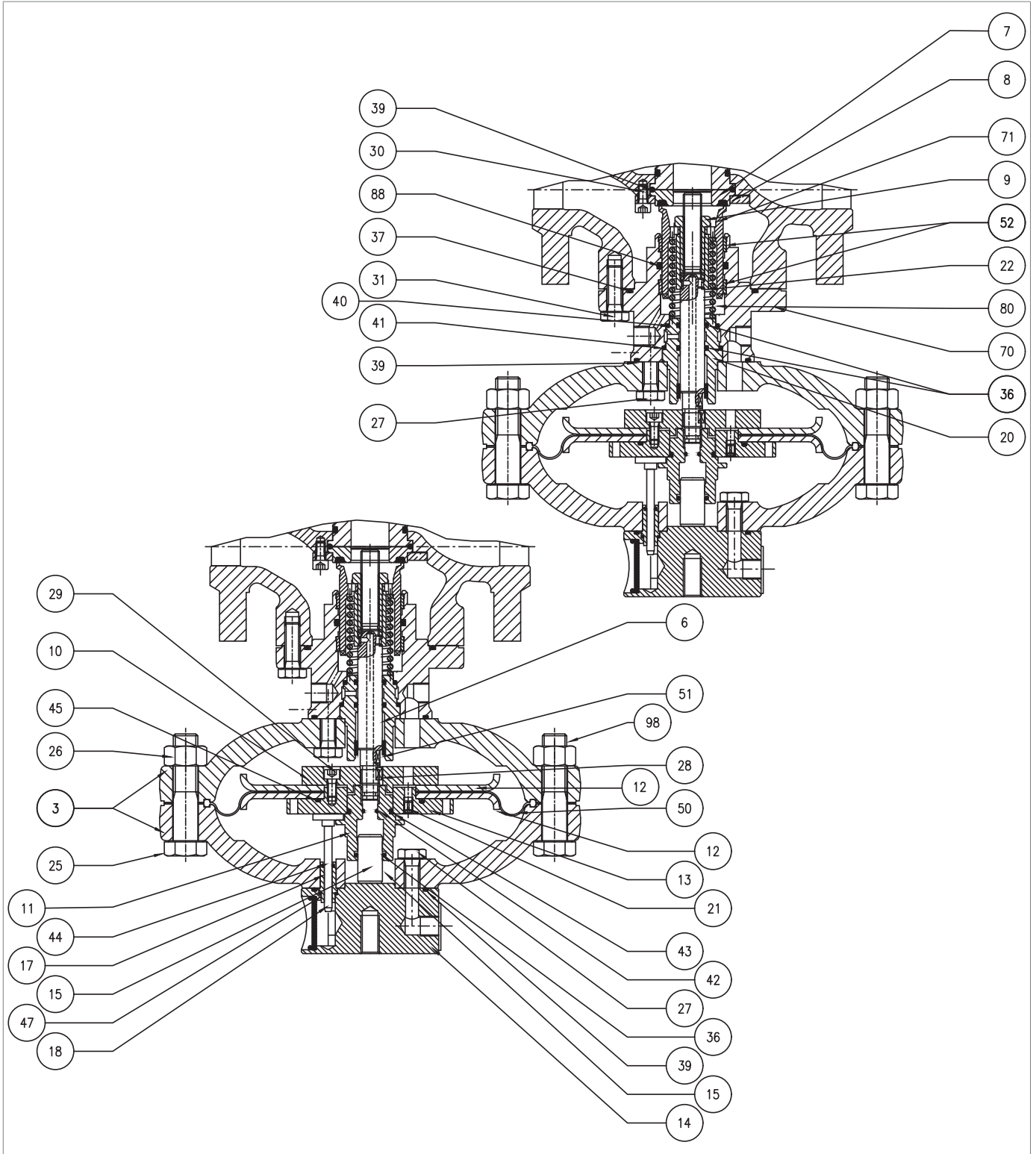


Fig. 9.62. Built-in monitor PM/819 DN 1"- 2"

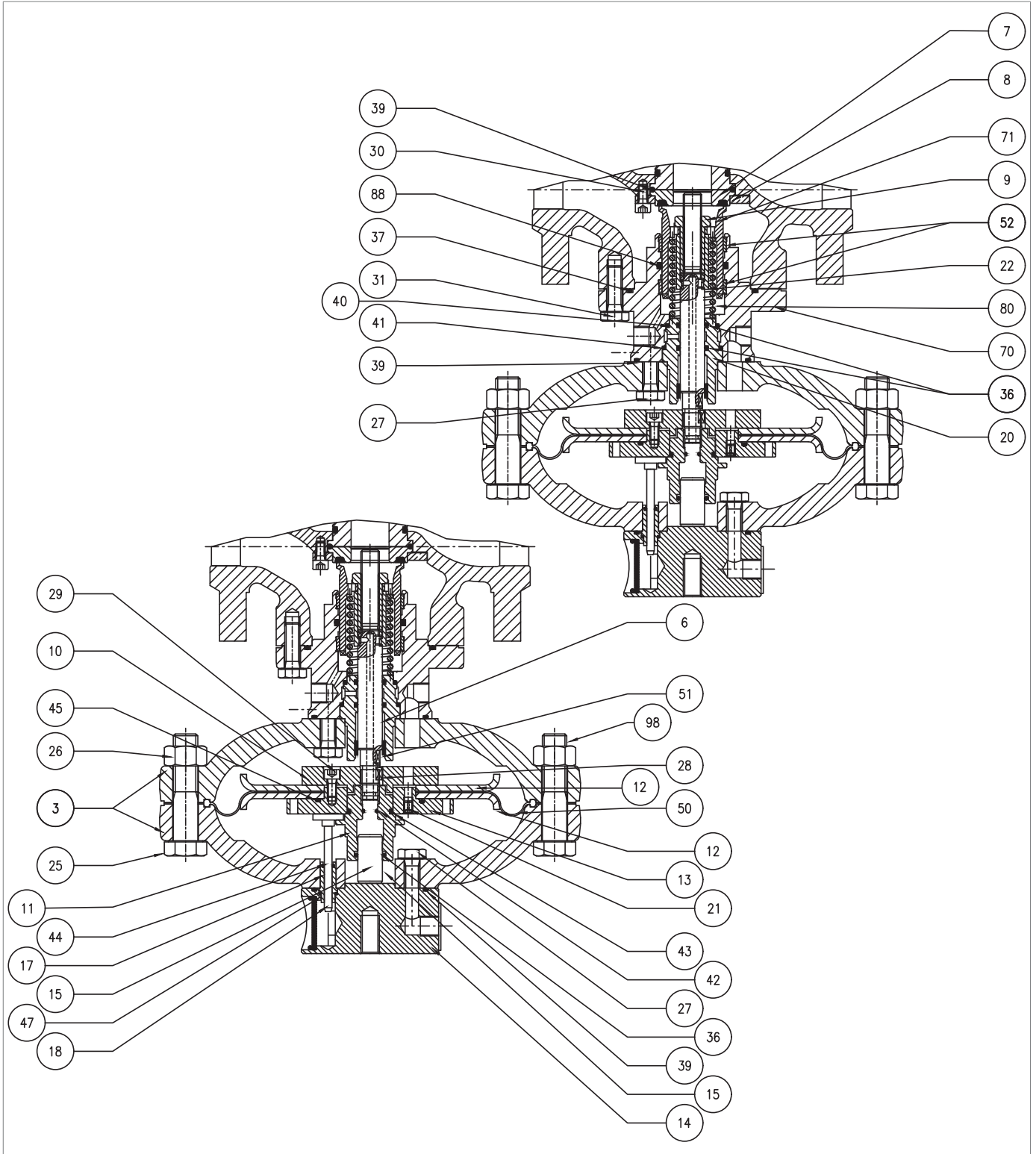
Step	Action
1	Disconnect the connection pipes between the regulator, the monitor and their pilot units, including the downstream pressure outlets.
2	Undo and remove the screws (31). NOTE! Support the head assembly during this step to avoid falls.
3	Remove the reduction unit and place it on its side, on an anti-shock surface. NOTE! Take care not to damage the plug profile (71).
4	Remove the O-ring (37) from the plug (70) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
5	Undo and remove the screws (30), the locking ring (8), the reinforced gasket (7) and the O-ring (39), preventing them from falling. NOTE! Make sure that the sleeve does not fall (only for aperflux and app. with DB).
6	Remove the O-ring (39) from the reinforced gasket (7) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
7	Position the reinforced gasket (7) and the locking ring (8).
8	Insert and fix the screws (30) according to the following tightening torque: <ul style="list-style-type: none"> • DN 1" > tab. 9.86; • DN 2" > tab. 9.87. NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
9	Unscrew the lock nut (9). NOTE! Take care not to damage the plug profile (71).
10	Remove the plug (71) and place it on an anti-shock surface.
11	Remove the spring (80) and the spacer (22).
12	Remove and replace the I/DWR rings (52) from the plug guide (70). NOTE! Before inserting the replacement I/DWR rings, clean the retaining slots with a cleaning solution.
13	Remove the O-ring (88) from the plug (70) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
14	Clean the plug (71) and the plug guide (70) lubricating with silicone grease.



Built-in monitor PM/819 DN 1" - 2"

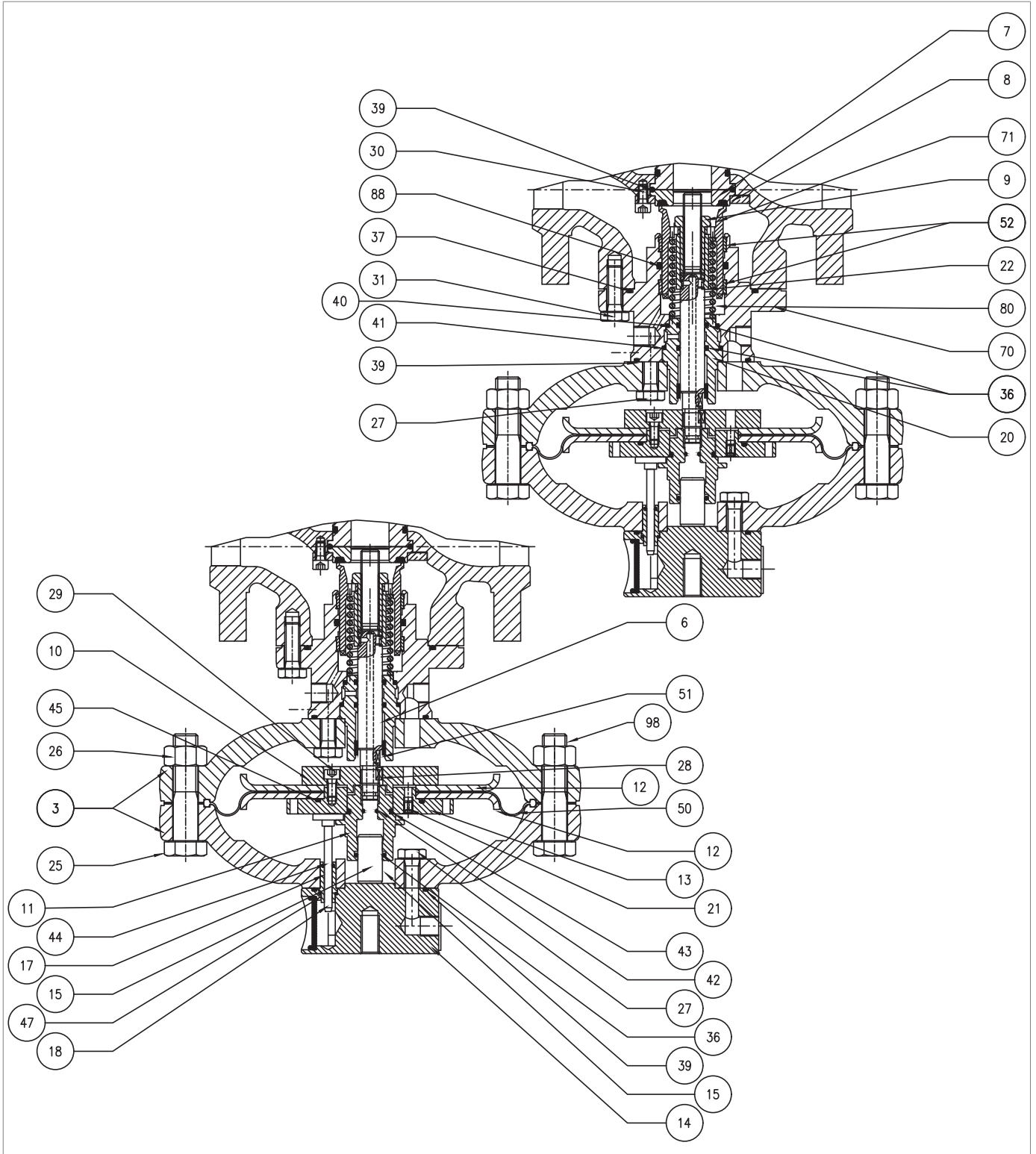
Step	Action
15	Unscrew and remove the nuts (26) together with the screws (25, 98).
16	Remove the upper lid (3).
17	Remove the indicator rod (18) from the rod guide (17).
18	Undo and remove the screws of the upper section (27).
19	Separate the upper lid (3) from the eyebolt flange (14).
20	Take out the rod guide (17).
21	Remove the O-rings (39, 47) from the eyebolt flange (14) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
22	Remove the O-ring (44) from the rod guide (17) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
23	Place the rod guide (17) in the eyebolt flange (14).
24	Assemble the eyebolt flange (14) with the lid (3).
25	Insert and fix the screws of the upper section (27) according to the following tightening torque: <ul style="list-style-type: none"> • DN 1" > tab. 9.89 • DN 2" > tab. 9.90 NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
26	Insert the indicator rod (18) into the rod guide (17).
27	Unscrew and remove the piston guide (11). NOTE! In this step, keep the diaphragm unit still, fitting the compass wrench into the holes in the upper diaphragm support (13).
28	Remove the balancing piston (15) from the piston guide (11).
29	Remove the O-rings (36, 43) from the eyebolt flange (11) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
30	Place the balancing piston (15) in the piston guide (11).
31	Take out the diaphragm unit.
32	Unscrew and remove the screws (29) from the lower diaphragm support (10).
33	Remove the diaphragm support (10) and the lower diaphragm protection disc (12).
34	Remove the diaphragm (50).
35	Remove the upper diaphragm support (13) from the lower diaphragm protection disc (12).

Step	Action
36	<p>Remove and replace the O-ring (45) from the upper diaphragm support (13), lubricating it with synthetic grease.</p> <p>NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
37	<p>Put the upper diaphragm support (13) back in place into the upper diaphragm protection disc (12).</p> <p>NOTE! Check that the hole on the nozzle (21) is free from dirt or foreign bodies.</p>
38	<p>Fit the new diaphragm (50).</p> <p>NOTE! Fit the diaphragm so that its convulsion is oriented towards the loading chamber.</p>
39	<p>Put the diaphragm protection disc (12) and the lower diaphragm support (10) in place.</p> <p>NOTE! Check that the nozzle hole on the upper diaphragm support (13) is aligned with the hole on the lower diaphragm support (10).</p>
40	<p>Apply thread locking glue to insert and fix the screws (29) according to the following tightening torque:</p> <ul style="list-style-type: none"> • DN 1" > tab. 9.89 • DN 2" > tab. 9.90. <p>NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
41	Undo and remove the screws of the lower section (27).
42	Remove the lower lid (3).
43	<p>Remove the O-ring (39) from the plug (70) and replace it, taking care to lubricate it with synthetic grease.</p> <p>NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
44	Remove the rod guide (20), the rod (6) and the key (28).
45	<p>Remove and replace the I/DWR ring (51) from the stem guide (20).</p> <p>NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
46	<p>Remove the O-ring (36) from the stem guide (20) and replace it, taking care to lubricate it with synthetic grease.</p> <p>NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
47	<p>Remove the O-rings (40, 41) from the stem guide (20) and replace them, taking care to lubricate them with synthetic grease.</p> <p>NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.</p>



Built-in monitor PM/819 DN 1" - 2"

Step	Action
48	<p>Remove the O-ring (42) from the stem (6) and replace it, taking care to lubricate it with synthetic grease.</p> <p>NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
49	<p>Remove the stem guide (20), the stem (6) and the key (28).</p> <p>NOTE! Lubricate the rod surface with silicone grease; make sure that the key (28) is in the correct position in the stem (6).</p>
50	<p>Put the lower lid (3) in place and fix it on the plug guide (70).</p> <p>NOTE! Match the hole for the passage of the loading pressure to the similar one on the plug guide.</p>
51	<p>Insert and fix the screws of the lower section (27) according to the following tightening torque:</p> <ul style="list-style-type: none"> • DN 1" > tab. 9.89 • DN 2" > tab. 9.90. <p>NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
52	Put the diaphragm unit in place.
53	<p>Insert and fix the piston guide (11) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 1" > tab. 9.89 • DN 2" > tab. 9.90. <p>NOTE! In this step, keep the diaphragm unit still, fitting the compass wrench into the holes in the upper diaphragm support (13).</p>
54	<p>Put the upper lid (3) in place, taking care to fit the indicator rod (18) into the gap between the upper diaphragm support (13) and the piston guide (11).</p> <p>NOTE!</p> <ul style="list-style-type: none"> • The indicator rod (18) must not obstruct the hole on the upper diaphragm support (13); • The flange stroke indicator is perpendicular to the gas flow and is visible.
55	Place the pilot support screw (98).
56	Fix the nut (26).
57	<p>Insert and fix the screws (25) with the nuts (26) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 1" > tab. 9.89 • DN 2" > tab. 9.90.
58	<p>Put the spacer (22) and the spring (80) in place.</p> <p>NOTE! Fit the spacer (22) so that the stop with the narrower hole rests on the surface of the stem (6).</p>
59	Insert the plug (71).



Built-in monitor PM/819 DN 1" - 2"

Step	Action
60	<p>Insert the locking nut (9) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 1" > tab. 9.89 • DN 2" > tab. 9.90. <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Before fixing the lock nut (9), check that the spring (80) is well seated in the appropriate centring stop on the plug guide (70).</p> </div>
61	<p>Position the reduction unit, supporting it carefully.</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Lubricate the rod surface with silicone grease; make sure that the key (28) is in the correct position in the stem (6).</p> </div>
62	<p>Fit and fix the screws (31) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 1" > tab. 9.89 • DN 2" > tab. 9.90. <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p> </div>
63	<p>Connect the connection pipes between the regulator, the monitor and their pilot units, including the downstream pressure outlets.</p>

Tab. 9.129.

! WARNING!

Ensure that all parts have been fitted correctly.

9.4.6.2 - BUILT-IN MONITOR PM/819 DN 3" - 4"

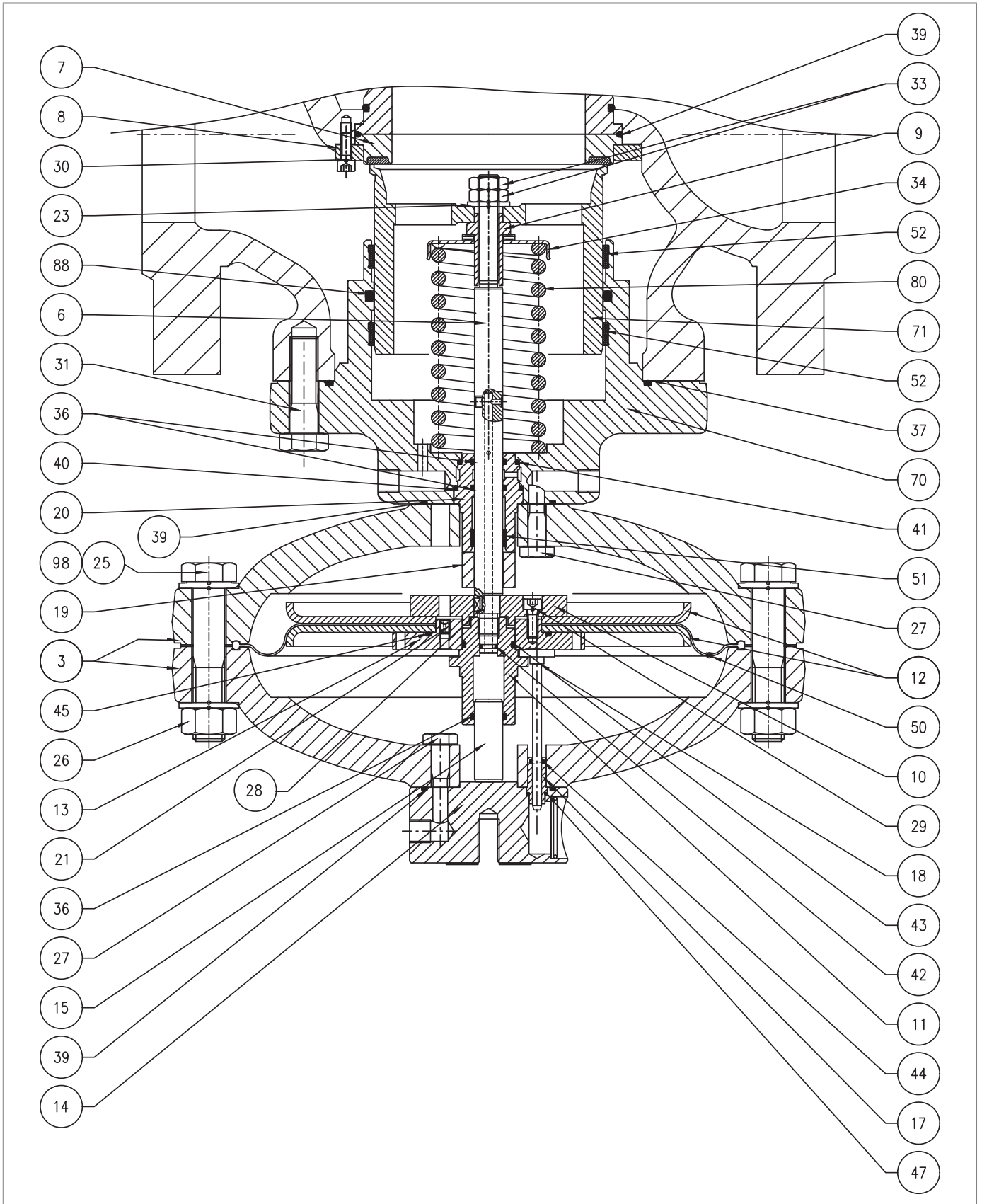
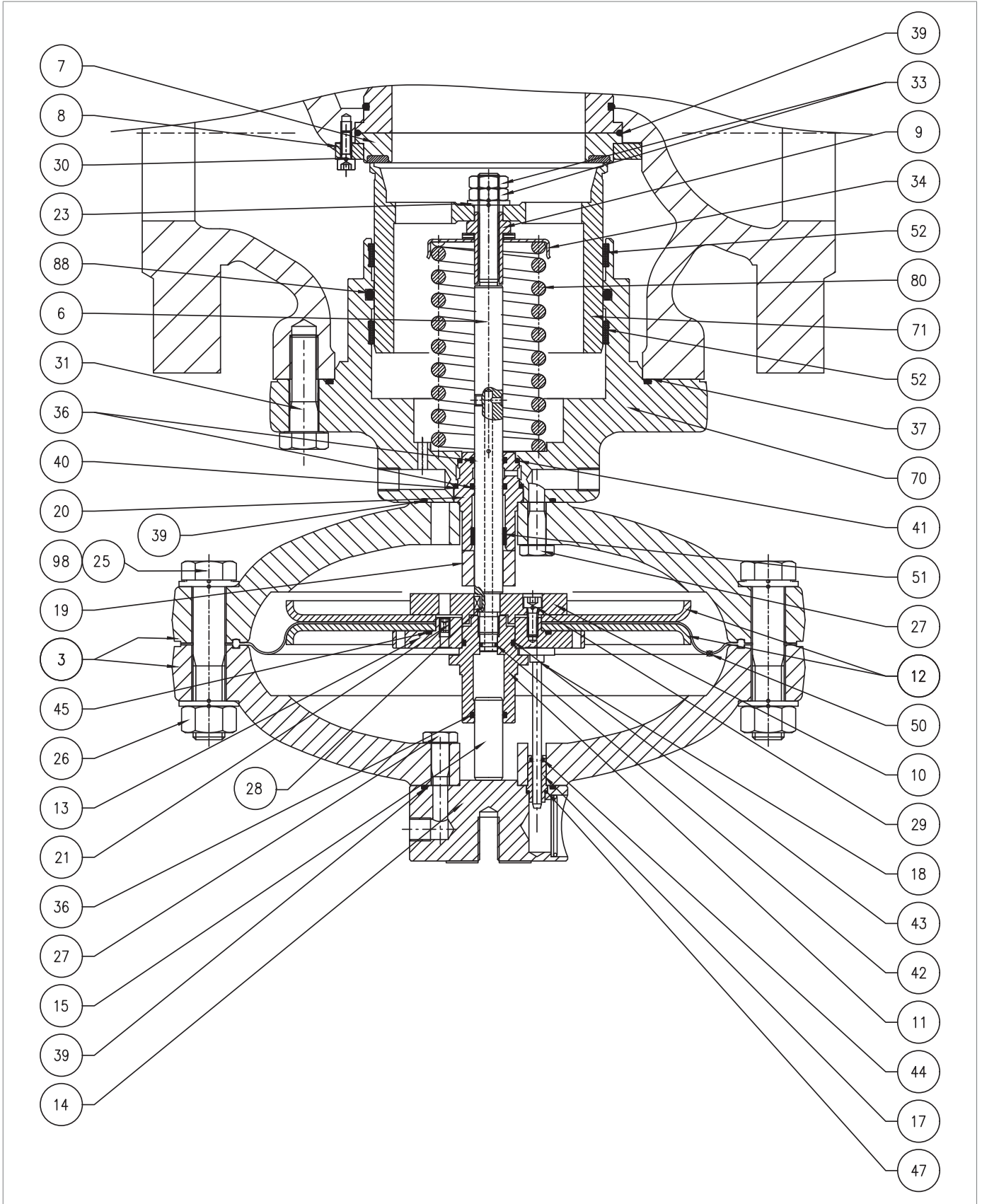


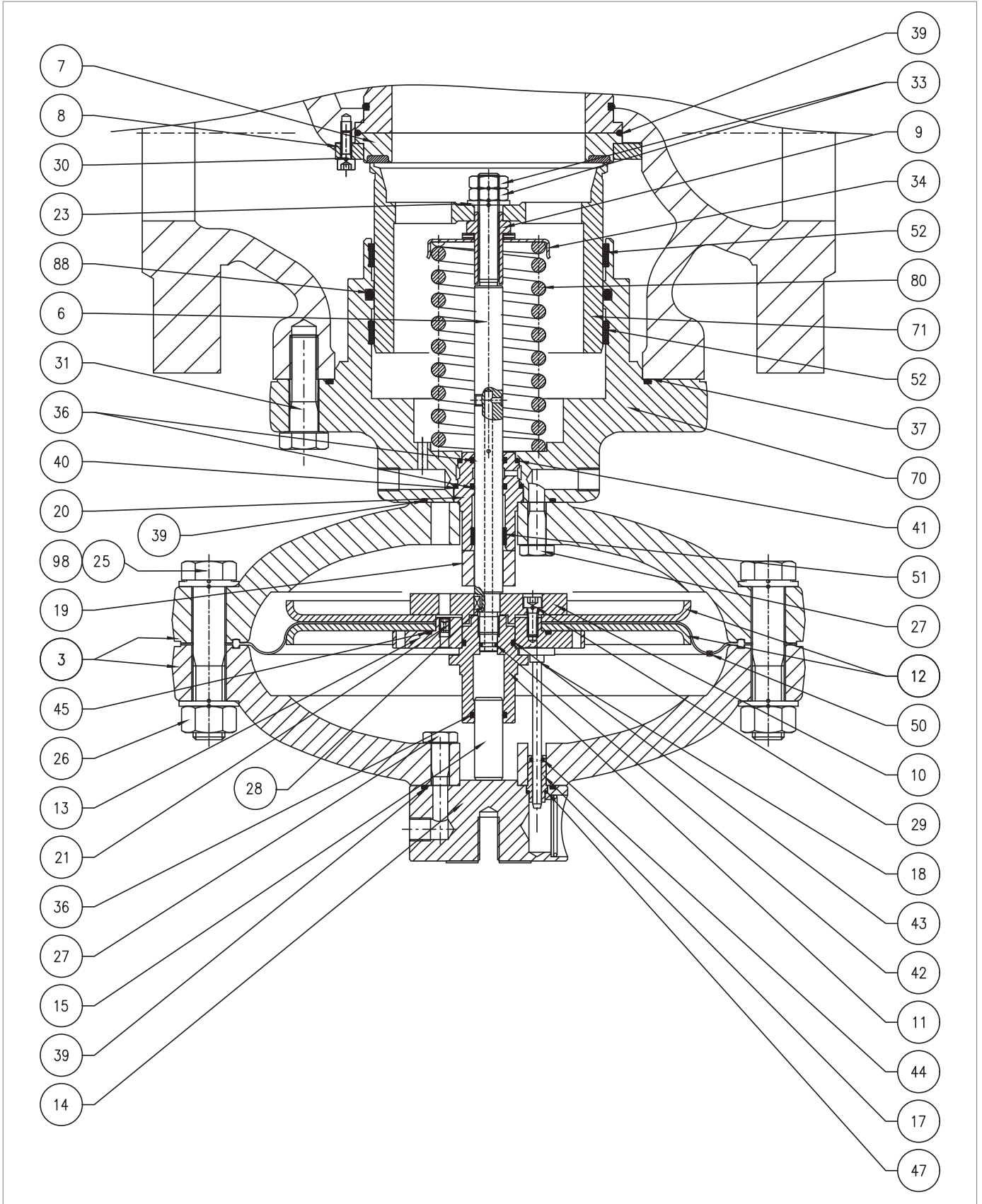
Fig. 9.63. Built-in monitor PM/819 DN 3" - 4"

Step	Action
1	Disconnect the connection pipes between the regulator, the monitor and their pilot units, including the downstream pressure outlets.
2	Undo and remove the screws (31). NOTE! Support the head assembly during this step to avoid falls.
3	Remove the reduction unit and place it on its side, on an anti-shock surface. NOTE! Take care not to damage the plug profile (71).
4	Remove the O-ring (37) from the plug (70) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
5	Unscrew and remove the screws (30), the locking ring (8) and the reinforced gasket (7), preventing them from falling. NOTE! Carefully prevent the sleeve from falling.
6	Remove the O-ring (39) from the reinforced gasket (7) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
7	Position the reinforced gasket (7) and the locking ring (8).
8	Insert and fix the screws (30) according to the following tightening torques: <ul style="list-style-type: none"> • DN 3" > tab. 9.91; • DN 4" > tab. 9.92. NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
9	Unscrew and remove the nuts (33) together with the washer (23).
10	Remove the plug (71) and place it on an anti-shock surface.
11	Unscrew the lock nut (9).
12	Remove the spring (80) and the spring support (34).
13	Remove and replace the I/DWR rings (52) from the plug guide (70). NOTE! Before inserting the replacement I/DWR rings, clean the retaining slots with a cleaning solution.
14	Remove the O-ring (88) from the plug (70) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
15	Clean the plug (70) and the plug guide (71), lubricating with silicone grease.
16	Unscrew and remove the nuts (26) together with the screws (25, 98).
17	Remove the upper lid (3).



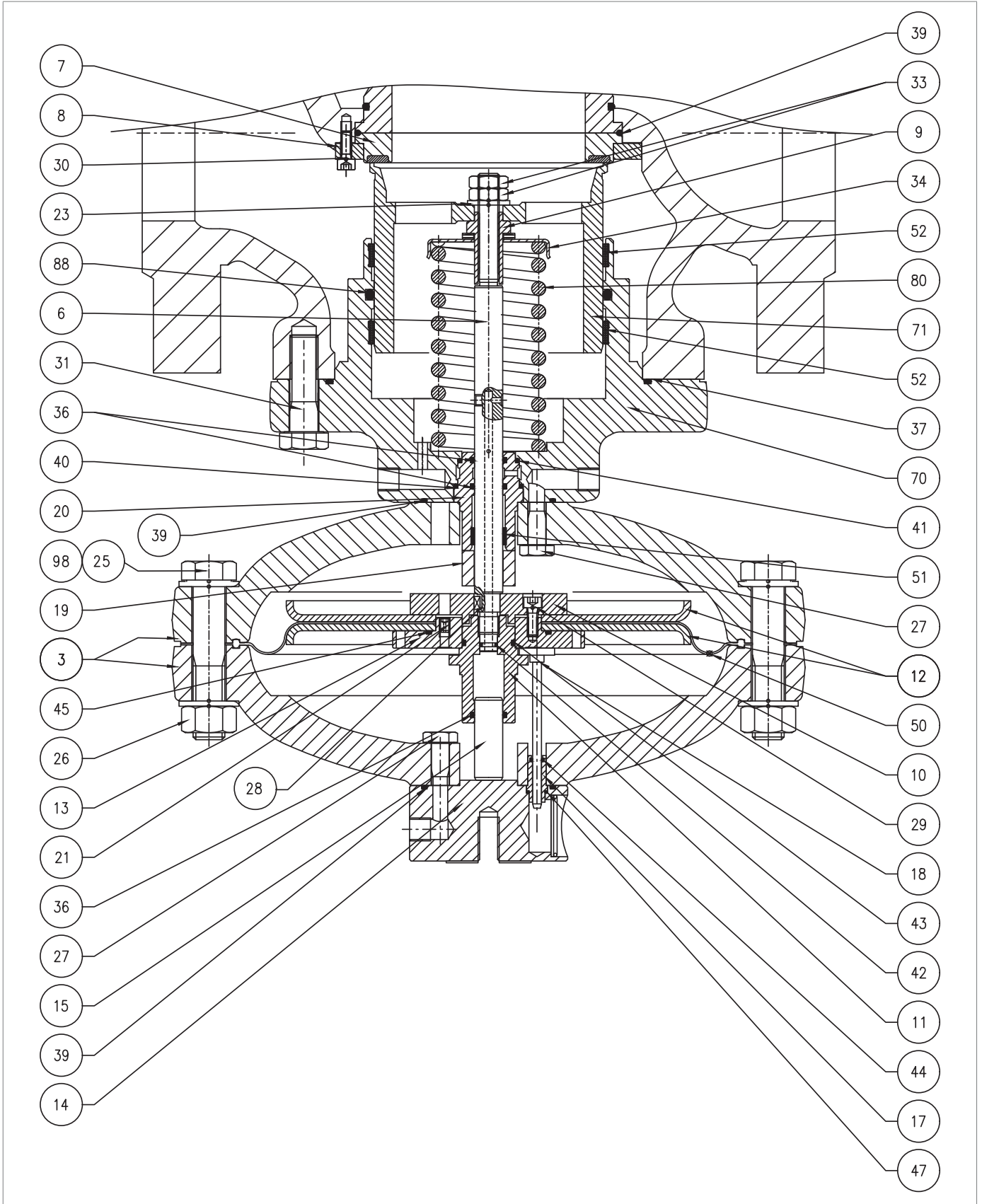
Built-in monitor PM/819 DN 3" - 4"

Step	Action
18	Remove the indicator rod (18) from the rod guide (17).
19	Undo and remove the upper screws (27).
20	Separate the upper lid (3) from the eyebolt flange (14).
21	Take out the rod guide (17).
22	Remove the O-rings (39, 47) from the eyebolt flange (14) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
23	Remove the O-ring (44) from the rod guide (17) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
24	Place the rod guide (17) in the eyebolt flange (14).
25	Assemble the eyebolt flange (14) with the upper lid (3).
26	Insert and fix the upper screws (27) according to the following tightening torques: <ul style="list-style-type: none"> • DN 3" > tab. 9.91; • DN 4" > tab. 9.92. NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
27	Insert the indicator rod (18) into the rod guide (17).
28	Unscrew and remove the piston guide (11). NOTE! In this step, keep the diaphragm unit still, fitting the compass wrench into the holes in the upper diaphragm support (13).
29	Remove the balancing piston (15) from the piston guide (11).
30	Remove the O-rings (36, 43) from the eyebolt flange (11) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
31	Place the balancing piston (15) in the piston guide (11).
32	Take out the diaphragm unit.
33	Undo and remove the screws (29) from the lower diaphragm support (10).
34	Remove the diaphragm support (10) and the lower diaphragm protection disc (12).
35	Remove the diaphragm (50).
36	Remove the upper diaphragm support (13) from the upper diaphragm protection disc (12).
37	Remove and replace the O-ring (45) from the upper diaphragm support (13), lubricating it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.



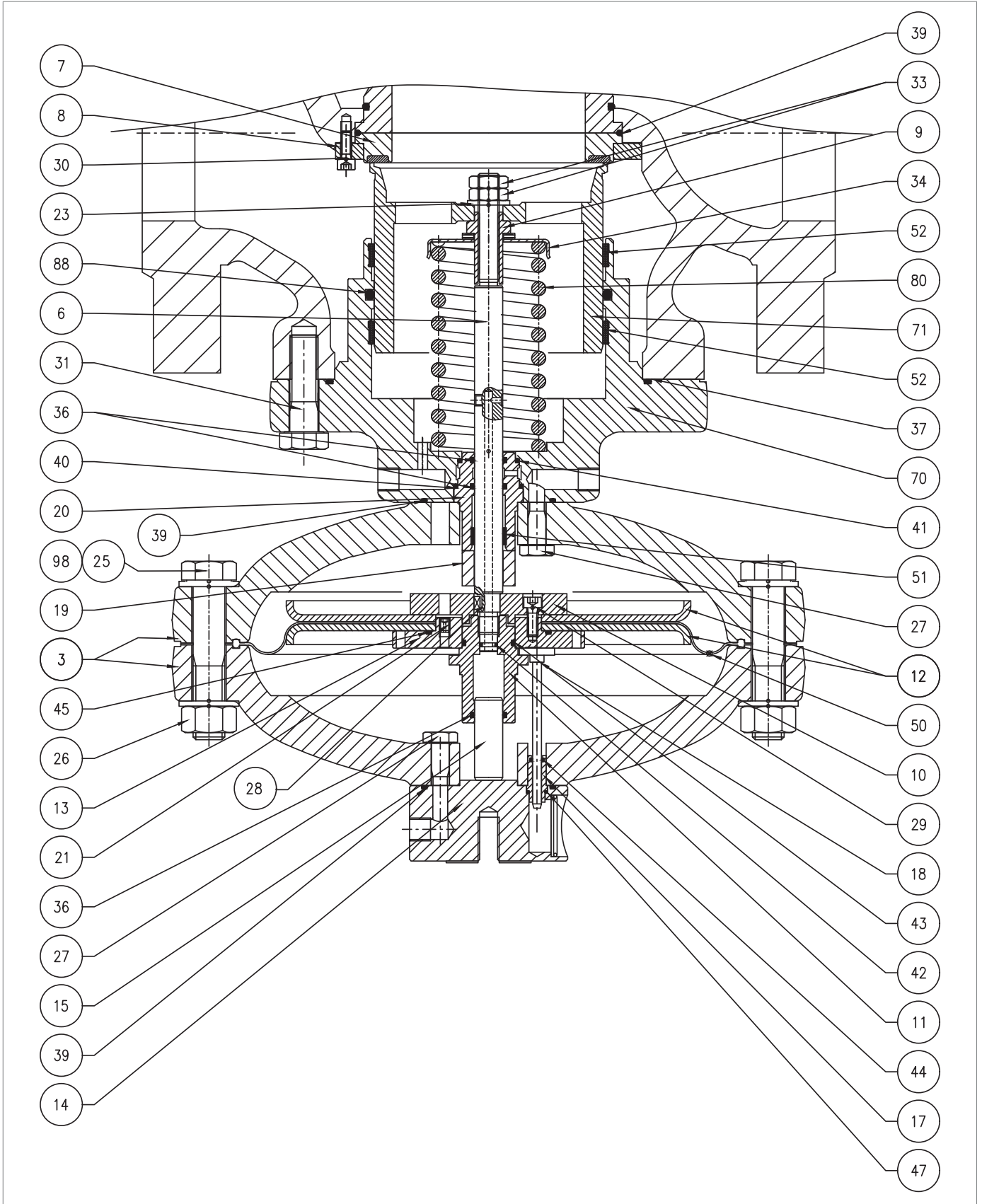
Built-in monitor PM/819 DN 3" - 4"

Step	Action
38	<p>Put the upper diaphragm support (13) back in place into the upper diaphragm protection disc (12).</p> <p>NOTE!</p> <p>Check that the hole on the nozzle (21) is free from dirt or foreign bodies.</p>
39	<p>Fit the new diaphragm (50).</p> <p>NOTE!</p> <p>Fit the diaphragm so that its convulsion is oriented towards the loading chamber.</p>
40	<p>Put the lower diaphragm protection disc (12) and the lower diaphragm support (10) in place.</p> <p>NOTE!</p> <p>Check that the nozzle hole on the upper diaphragm support (13) is aligned with the hole on the lower diaphragm support (10).</p>
41	<p>Apply thread locking glue to insert and fix the screws (29) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 3" > tab. 9.91; • DN 4" > tab. 9.92. <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
42	Undo and remove the lower screws (27).
43	Remove the lower lid (3).
44	<p>Remove the O-ring (39) from the plug (70) and replace it, taking care to lubricate it with synthetic grease.</p> <p>NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
45	Remove the spacer (19), the stem guide (20) the stem (6) and the key (28).
46	<p>Remove and replace the I/DWR ring (51) from the stem guide (20).</p> <p>NOTE!</p> <p>Before inserting the replacement I/DWR, clean the retaining slots with a cleaning solution.</p>
47	<p>Remove the O-rings (36) from the stem guide (20) and replace them, taking care to lubricate them with synthetic grease.</p> <p>NOTE!</p> <p>Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.</p>
48	<p>Remove the O-rings (40, 41) from the stem guide (20) and replace them, taking care to lubricate them with synthetic grease.</p> <p>NOTE!</p> <p>Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.</p>
49	<p>Remove the O-ring (42) from the stem (6) and replace it, taking care to lubricate it with synthetic grease.</p> <p>NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>





Built-in monitor PM/819 DN 3" - 4"

Step	Action
50	<p>Remove the stem guide (20), the stem (6) the spacer (19) and the key (28).</p> <p>NOTE!</p> <ul style="list-style-type: none"> • Lubricate the rod surface with silicone grease; • Make sure that the key (28) is in the correct position in the stem (6).
51	<p>Put the lower lid (3) in place and fix it on the plug guide (70).</p> <p>NOTE!</p> <p>The hole for the passage of the loading pressure must match the similar one on the plug guide.</p>
52	<p>Insert and fix the lower screws (27) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 3" > tab. 9.91; • DN 4" > tab. 9.92. <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
53	<p>Put the diaphragm unit in place.</p> <p>NOTE!</p> <p>Before inserting the diaphragm unit, clean the retaining slots of the lids (3) with a cleaning solution.</p>
54	<p>Insert and fix the piston guide (11) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 3" > tab. 9.91; • DN 4" > tab. 9.92. <p>NOTE!</p> <p>In this step, keep the diaphragm unit still, fitting the compass wrench into the holes in the upper diaphragm support (13).</p>
55	<p>Put the upper lid (3) in place, taking care to fit the indicator rod (18) into the gap between the upper diaphragm support (13) and the piston guide (11).</p> <p>NOTE!</p> <ul style="list-style-type: none"> • The indicator rod (18) must not obstruct the hole on the upper diaphragm support (13) • The eyebolt flange stroke indicator (14) must be perpendicular to the gas flow and visible.
56	<p>Insert and fix the screws (25, 98) with the nuts (26) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 3" > tab. 9.91; • DN 4" > tab. 9.92. <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
57	<p>Put the spring (80) and spring support back (34) back in place.</p>
58	<p>Insert the lock nut (9) together with the radial bearing (30) according to the tightening torques:</p> <ul style="list-style-type: none"> • DN 3" > tab. 9.91; • DN 4" > tab. 9.92. <p>NOTE!</p> <p>Before fixing the lock nut (9), check that the spring (80) is well seated in the appropriate centring stop on the plug guide (70).</p>
59	<p>Fit the plug (71) lubricating the surface with silicone grease.</p>



Built-in monitor PM/819 DN 3" - 4"

Step	Action
60	Position the washer (23) and the nuts (33), fixing them to the tightening torque indicated in the relative table. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before fitting the external nut (33), apply thread locking glue. </div>
61	Position the reduction unit, supporting it carefully.
62	Fit and fix the screws (31) according to the following tightening torques: <ul style="list-style-type: none"> • DN 3" > tab. 9.91; • DN 4" > tab. 9.92. <div style="border: 1px solid black; padding: 5px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
63	Connect the connection pipes between the regulator, the monitor and their pilot units, including the downstream pressure outlets.

Tab. 9.130.

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.6.3 - BUILT-IN MONITOR PM/819 DN 6" - 10"

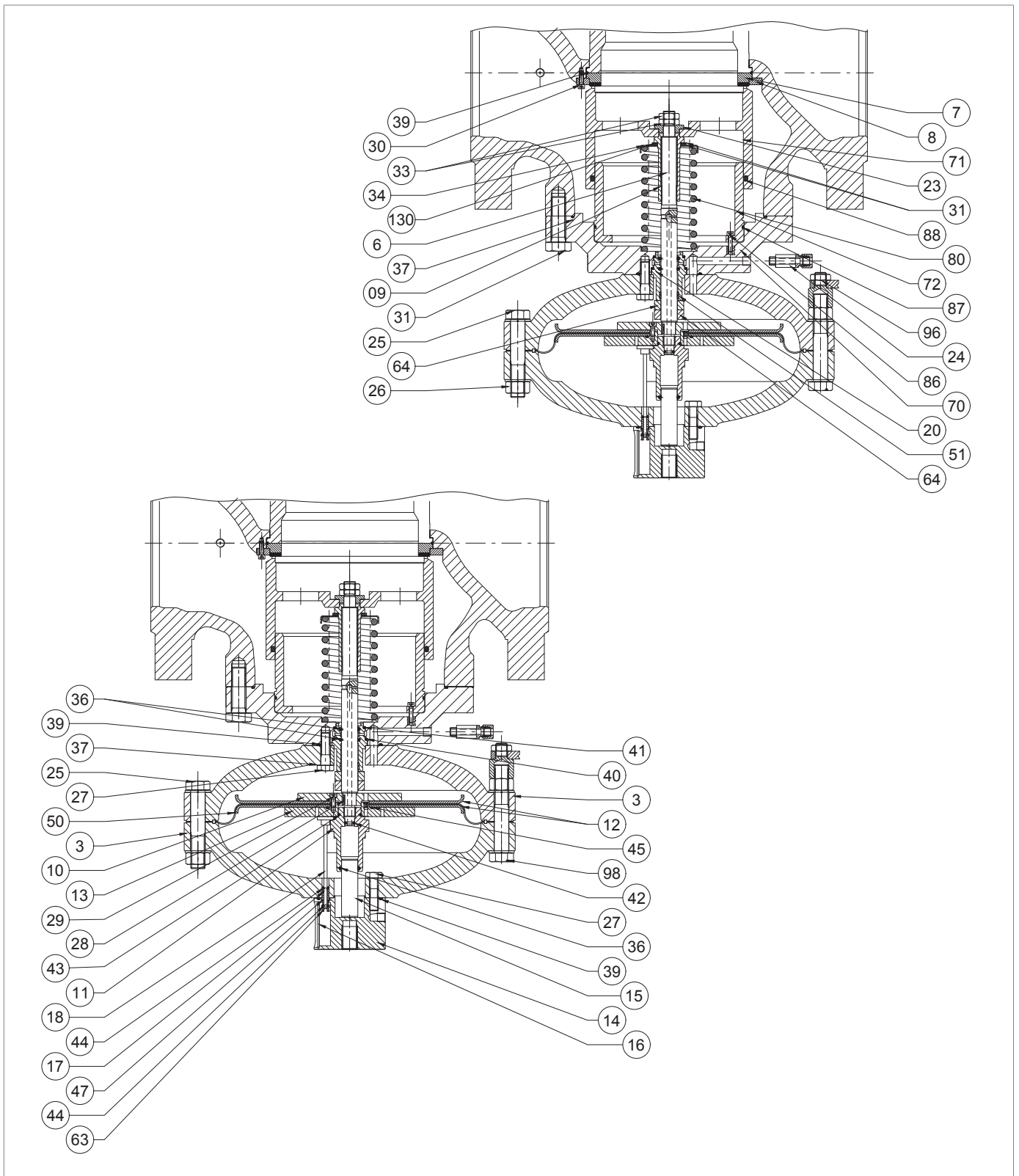
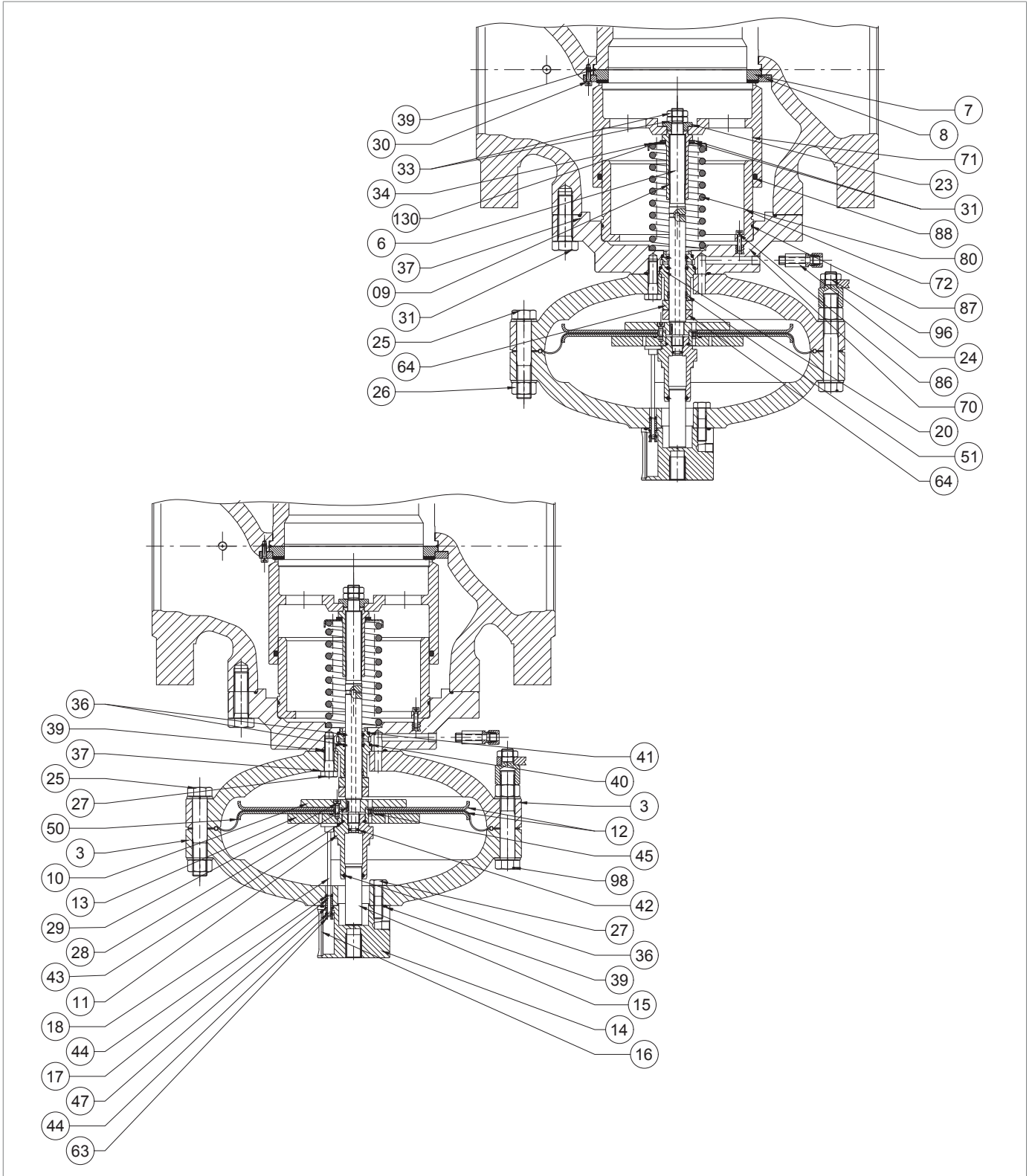








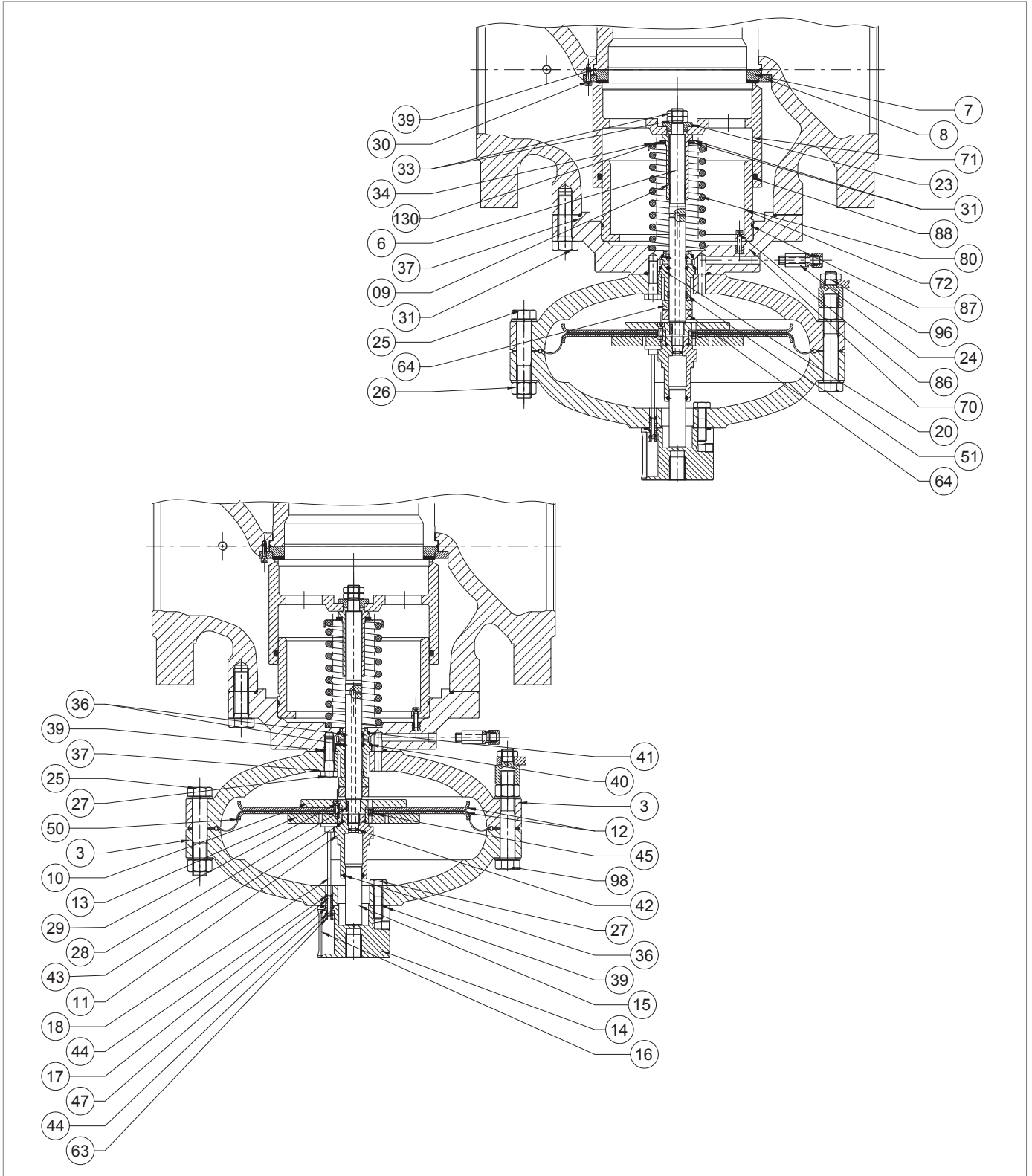
Fig. 9.64. Built-in monitor PM/819 DN 6" - 10"

Step	Action
1	Disconnect the connection pipes between the regulator, the monitor and their pilot units, including the downstream pressure outlets.
2	Undo and remove the screws (31). NOTE! Support the head assembly during this step to avoid falls.
3	Remove the reduction unit and place it on its side and on an anti-shock surface. NOTE! Take care not to damage the plug profile (71).
4	Remove the O-ring (37) from the plug (70) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
5	Unscrew and remove the screws (30), the locking ring (8) and the reinforced gasket (7), preventing them from falling. NOTE! Carefully prevent the sleeve from falling.
6	Remove the O-ring (39) from the reinforced gasket (7) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
7	Position the reinforced gasket (7) and the locking ring (8).
8	Insert and fix the screws (30) according to the following tightening torques: <ul style="list-style-type: none"> • DN 6" > tab. 9.93; • DN 8" > tab. 9.94; • DN 10" > tab. 9.95. NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
9	Unscrew and remove the nuts (33) and the washer (23).
10	Remove the plug (71) and place it on an anti-shock surface.
11	Remove the O-ring (88) from the plug guide (71) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
12	Unscrew and remove the locking nut (9).
13	Remove the radial bearing (130), the spring support (34) and the spring (80).
14	Undo and remove the screws (86).
15	Take out the plug guide (72). NOTE! In this step, tighten some M6x50 screws into the threaded holes of the plug guide. Then screw them for vertical extraction, so that the plug guide always remains aligned.
16	Remove the screws M6x50.



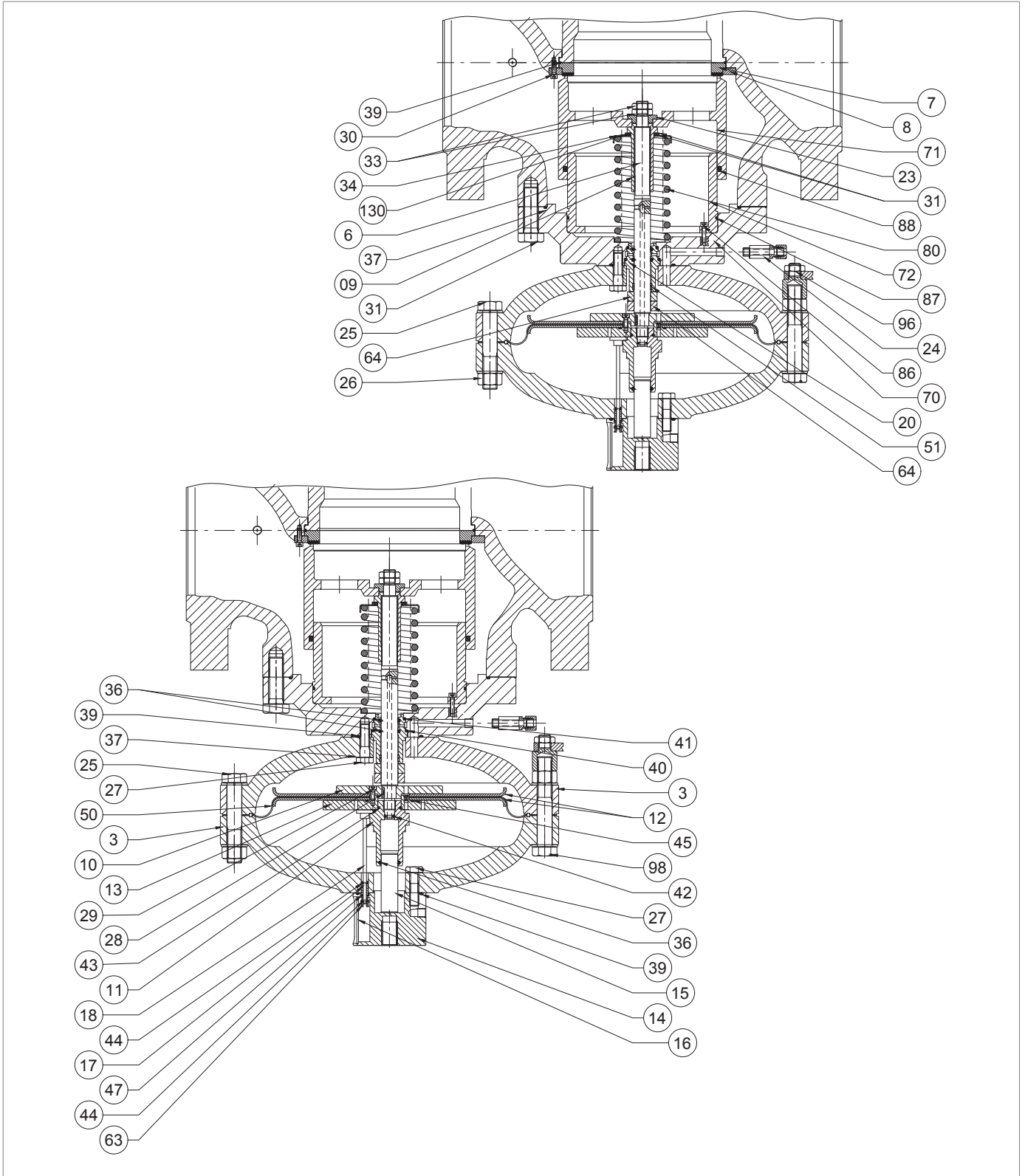
Built-in monitor PM/819 DN 6" - 10"

Step	Action
17	Remove the O-ring (87) from the plug guide (72) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
18	Put the plug guide (72) back in place.
19	Insert and fix the screws (86).
20	Remove the screws (57) together with the sight glass (16).
21	Remove the bush (63).
22	Remove the O-ring (44) from the bush (63) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
23	Unscrew and remove the nuts (26) together with the screws (25, 98).
24	Remove the upper lid (3).
25	Remove the indicator rod (18) from the rod guide (17).
27	Undo and remove the screws of the upper section (27).
28	Separate the upper lid (3) from the eyebolt flange (14).
29	Take out the rod guide (17).
30	Remove the O-rings (39, 47) from the eyebolt flange (14) and replace them, taking care to lubricate them with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution. </div>
31	Remove the O-ring (44) from the rod guide (17) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
32	Place the rod guide (17) in the eyebolt flange (14).
33	Assemble the eyebolt flange (14) with the upper lid (3).
34	Insert and fix the screws of the upper section (27) according to the following tightening torques: <ul style="list-style-type: none"> • DN 6" > tab. 9.93; • DN 8" > tab. 9.94; • DN 10" > tab. 9.95. <div style="border: 1px solid black; padding: 5px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
35	Insert the indicator rod (18) into the rod guide (17).
36	Unscrew and remove the piston guide (11). <div style="border: 1px solid black; padding: 5px;">  NOTE! In this step, keep the diaphragm unit still, fitting the compass wrench into the holes in the upper diaphragm support (13). </div>
37	Remove the balancing piston (15) from the piston guide (11).



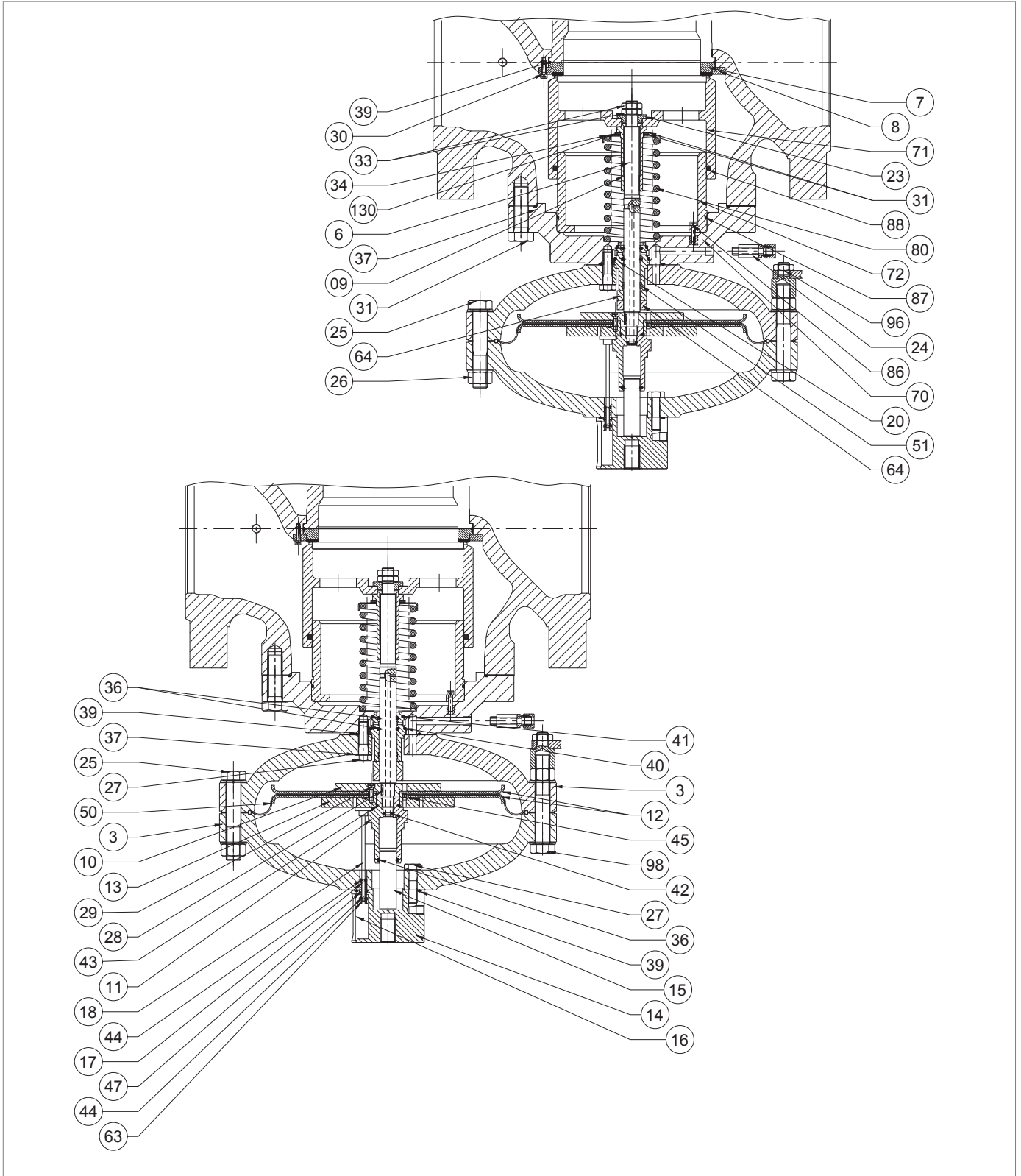
Built-in monitor PM/819 DN 6" - 10"

Step	Action
38	<p>Remove the O-rings (36, 43) from the eyebolt flange (11) and replace them, taking care to lubricate them with synthetic grease.</p> <p>NOTE!</p> <p>Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.</p>
39	Place the balancing piston (15) in the piston guide (11).
40	Take out the diaphragm unit.
41	Undo and remove the screws (29) from the lower diaphragm support (10).
42	Remove the lower diaphragm support (10) and the lower diaphragm protection disc (12).
43	Remove the diaphragm (50).
44	Remove the upper diaphragm support (13) from the upper diaphragm protection disc (12).
45	<p>Remove and replace the O-ring (45) from the upper diaphragm support (13), lubricating it with synthetic grease.</p> <p>NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
46	<p>Put the upper diaphragm support (13) back in place into the upper diaphragm protection disc (12).</p> <p>NOTE!</p> <p>Check that the hole on the nozzle (21) is free from dirt or foreign bodies.</p>
47	<p>Fit the new diaphragm (50).</p> <p>NOTE!</p> <p>Fit the diaphragm so that its convulsion is oriented towards the loading chamber.</p>
48	<p>Put the lower diaphragm protection disc (12) and the lower diaphragm support (10) in place.</p> <p>NOTE!</p> <p>Check that the nozzle hole on the upper diaphragm support (13) is aligned with the hole on the lower diaphragm support (10).</p>
49	<p>Apply thread locking glue to insert and fix the screws (29) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 6" > tab. 9.93; • DN 8" > tab. 9.94; • DN 10" > tab. 9.95. <p>NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
50	Remove the spacers (19, 64).
51	Undo and remove the screws of the lower section (27).
52	Remove the lower lid (3).
53	<p>Remove the O-ring (39) from the plug (70) and replace it, taking care to lubricate it with synthetic grease.</p> <p>NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
54	Remove the rod guide (20), the rod (6) and the key (28).



Built-in monitor PM/819 DN 6" - 10"

Step	Action
55	<p>Remove the O-ring (41) from the plug guide (70) and replace it, taking care to lubricate it with synthetic grease.</p> <p>! NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
56	<p>Remove the O-ring (40) from the stem guide (20) and replace it, taking care to lubricate it with synthetic grease.</p> <p>! NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
57	<p>Remove and replace the I/DWR ring (51) from the stem guide (20).</p> <p>! NOTE!</p> <p>Before inserting the replacement I/DWR, clean the retaining slots with a cleaning solution.</p>
58	<p>Remove the O-rings (36) from the stem guide (20) and replace them, taking care to lubricate them with synthetic grease.</p> <p>! NOTE!</p> <p>Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.</p>
59	<p>Remove the O-ring (42) from the stem (6) and replace it, taking care to lubricate it with synthetic grease.</p> <p>! NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
60	<p>Remove the stem guide (20), the stem (6) and the key (28).</p> <p>! NOTE!</p> <ul style="list-style-type: none"> • Lubricate the rod surface with silicone grease; • Make sure that the key (28) is in the correct position in the stem (6).
61	<p>Put the lower lid (3) in place and fix it on the plug guide (70).</p> <p>! NOTE!</p> <p>The hole for the passage of the loading pressure must match the similar one on the plug guide.</p>
62	<p>Insert and fix the screws of the lower section (27) according to the following tightening torque:</p> <ul style="list-style-type: none"> • DN 6" > tab. 9.93; • DN 8" > tab. 9.94; • DN 10" > tab. 9.95. <p>! NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
63	<p>Place the spacers (19, 64).</p>
64	<p>Put the diaphragm unit in place.</p> <p>! NOTE!</p> <p>Before inserting the diaphragm unit, clean the retaining slots with a cleaning solution.</p>



Built-in monitor PM/819 DN 6" - 10"

Step	Action
65	<p>Insert and fix the piston guide (11) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 6" > tab. 9.93; • DN 8" > tab. 9.94; • DN 10" > tab. 9.95. <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>In this step, keep the diaphragm unit still, fitting the compass wrench into the holes in the upper diaphragm support (13).</p> </div>
66	<p>Put the upper lid (3) in place, taking care to fit the indicator rod (18) into the gap between the upper diaphragm support (13) and the piston guide (11).</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <ul style="list-style-type: none"> • The indicator rod (18) must not obstruct the hole on the upper diaphragm support (13); • The eyebolt flange stroke indicator (14) must be perpendicular to the gas flow and visible. </div>
67	<p>Insert and fix the screws (25, 98) with the nuts (26) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 6" > tab. 9.93; • DN 8" > tab. 9.94; • DN 10" > tab. 9.95. <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p> </div>
68	Put the spring (80) and spring support back (34) back in place.
69	<p>Insert and fix the lock nut (9) together with the radial bearing (130) according to the tightening torques:</p> <ul style="list-style-type: none"> • DN 6" > tab. 9.93; • DN 8" > tab. 9.94; • DN 10" > tab. 9.95. <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Before fixing the lock nut (9), check that the spring (80) is well seated in the appropriate centring stop on the plug guide (70).</p> </div>
70	Put the plug (71) in place lubricating the surface with silicone grease.
71	<p>Apply thread locking glue to insert and fix the washer (23) and the nuts (33) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 6" > tab. 9.93; • DN 8" > tab. 9.94; • DN 10" > tab. 9.95.
72	Position the reduction unit, supporting it carefully.
73	<p>Fit and fix the screws (31) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 6" > tab. 9.93; • DN 8" > tab. 9.94; • DN 10" > tab. 9.95. <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p> </div>
74	Refit the connection pipes between the regulator, the monitor and their pilot units, including the downstream pressure outlets.

Tab. 9.131.

! WARNING!

Ensure that all parts have been fitted correctly.

9.4.7 - 200/A SERIES PILOT MAINTENANCE + R14/A PRE-REDUCER

9.4.7.1 - 200/A SERIES PILOT DISCONNECTION

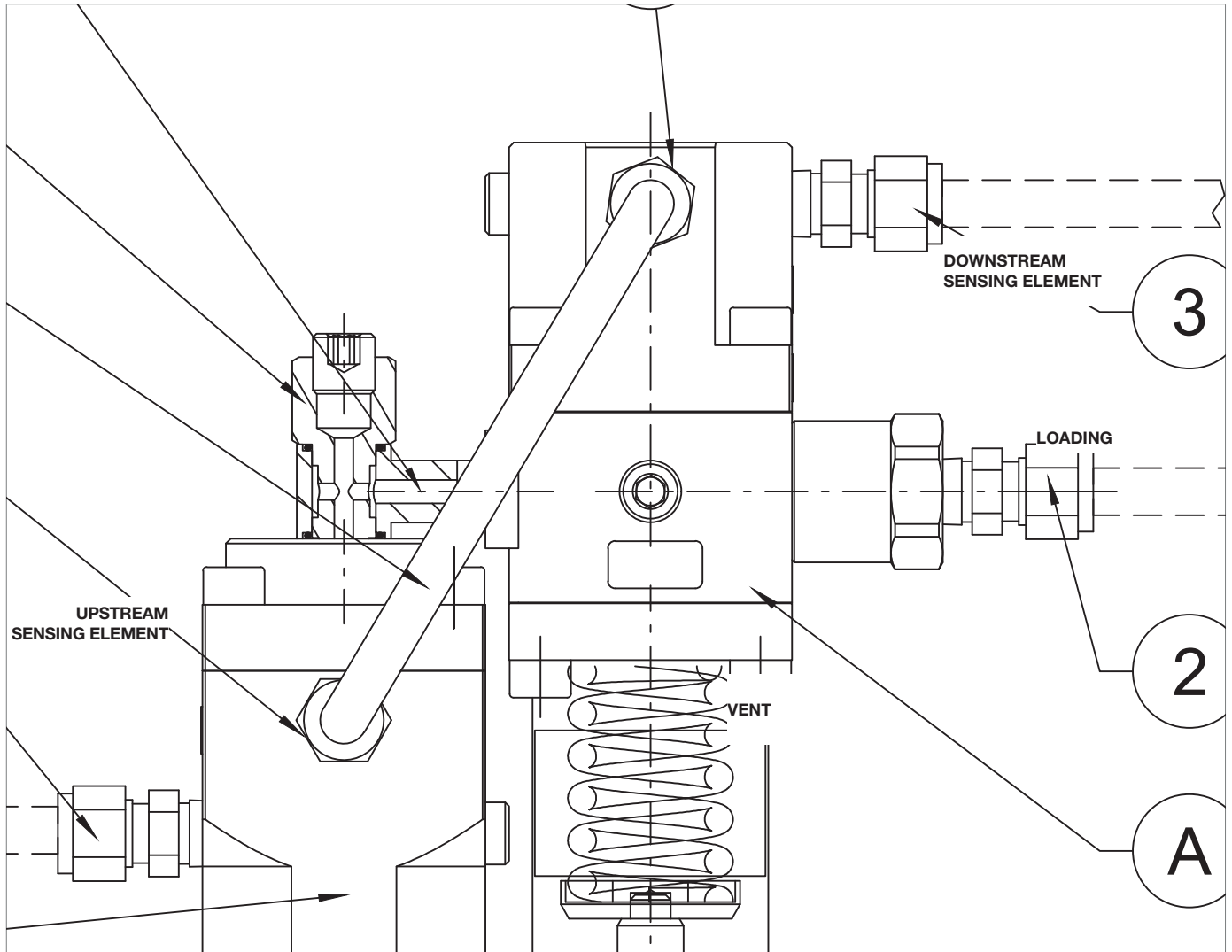


Fig. 9.65. Pilot 200/A

To disconnect the pilot, proceed as follows:

Step	Action
1	Disconnect the sensing lines between the 200/A pilot and the regulator by acting on 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 acting on the fittings (4, 5).
4	Unscrew and remove the screw (6) to separate the R14/A pre-reducer from the pilot.
5	Undo and remove the screw (7) from pilot 200/A.

Tab. 9.132.

To reconnect the pilot, proceed as follows:

Step	Action
1	Insert and fix the screw (7) to the 200/A pilot.
2	Insert and fix the screw (6) to connect the R14/A pre-reducer to the 200/A pilot.
3	Connect the pipe (20) by acting on 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 acting on the fittings (1, 2, 3).

Tab. 9.133.

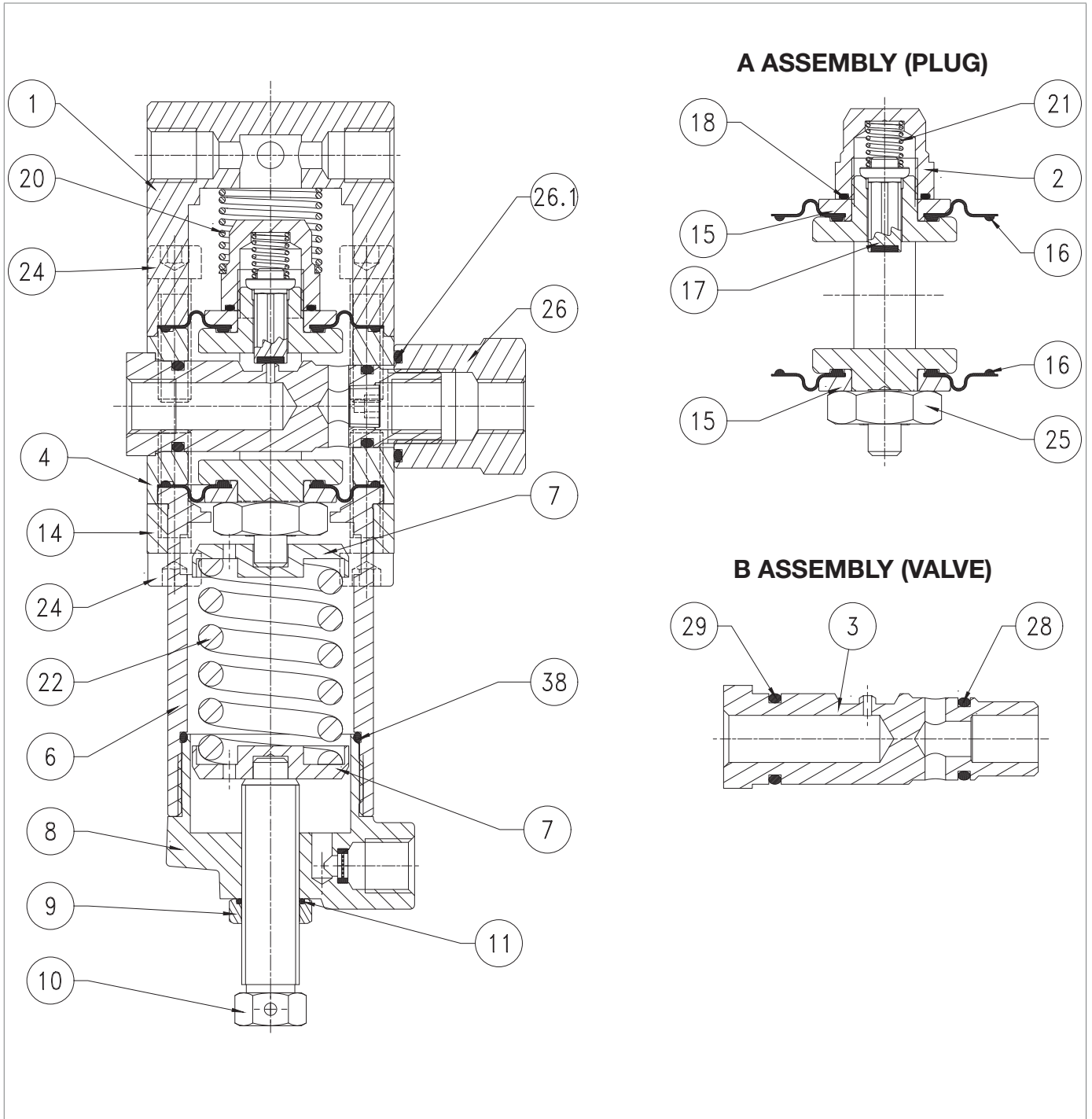


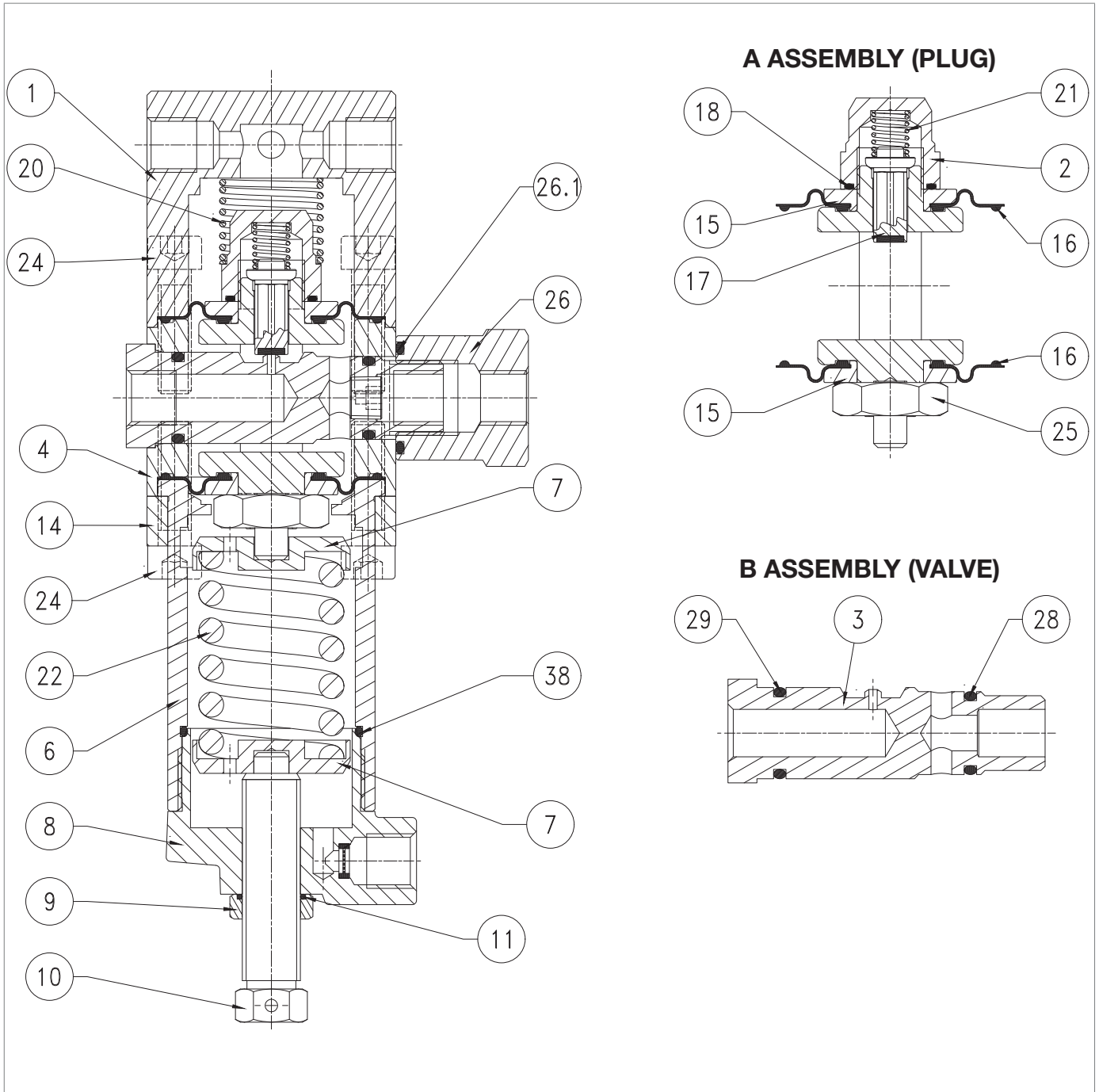


Fig. 9.66. Pilot 204/A - 205/A

Step	Action
1	Loosen the nut (9).
2	Completely release the spring (22) by turning the adjustment screw (10).
3	Remove the adjustment screw (10) together with the cap (9).
4	Remove the cap (8).
5	Remove the O-ring (38) from the cap (8) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 2px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
6	Remove the spring (22) and the spring supports (7).
7	Undo and remove the screws of the lower section (24).
8	Remove the bracket (14) from the sleeve (6).
9	Remove the sleeve (6).
10	Undo and remove the screws of the upper section (24).
11	Remove the pilot lid (1).
12	Remove the spring (20).
13	Unscrew and remove the nut (26).
14	Remove the O-ring (26.1) from the nut (26) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 2px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
15	Remove assembly "B" (valve).
16	Remove the O-rings (28, 29) from the valve seat (3) and replace them, taking care to lubricate them with synthetic grease. <div style="border: 1px solid black; padding: 2px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
17	Remove assembly "A" (plug) from the valve body (4) by pushing it from the bottom upwards.
18	Unscrew and remove the pilot nut (2).
19	Remove the O-ring (18) of the pilot nut (2) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 2px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
20	Remove the spring (21).
21	Remove and replace the plug (17).
22	Remove the upper protection disc (15).
23	Remove and replace the upper diaphragm (16), taking care to lubricate the lanyards with synthetic grease. <div style="border: 1px solid black; padding: 2px;">  NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution. </div>
24	Unscrew and remove the nut (25).
25	Remove the lower protection disc (15).



Pilot 204/A - 205/A

Step	Action
26	Remove and replace the lower diaphragm (16), taking care to lubricate the lanyards with synthetic grease. NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.
27	Fit the lower protection disc (15).
28	Fix the nut (25) according to the following tightening torque: • Pilot 204/A-205/A > tab. 9.96.
29	Fit the plug (17) and then the spring (21).
30	Fit the upper protection disc (15).
31	Fix the pilot nut (2) according to the following tightening torque: • Pilot 204/A-205/A > tab. 9.96.
32	Insert assembly "A" (plug) from the top downwards into the valve body (4) NOTE! • 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).
33	Insert assembly "B" (valve) into the valve body (4). NOTE! Take care not to damage the O-rings (28, 29) and the valve seat (3).
34	Screw in the nut (26) according to the following tightening torque: • Pilot 204/A-205/A > tab. 9.96
35	Fit the spring (20).
36	Fit the lid (1).
37	Insert and fix the screws of the upper section (24) according to the following tightening torque: • Pilot 204/A-205/A > tab. 9.96.
38	Fit the sleeve (6) and the bracket (14).
39	Insert and fix the screws of the lower section (24) according to the following tightening torque: • Pilot 204/A-205/A > tab. 9.96.
40	Fit the spring (22) and the spring supports (7).
41	Unscrew the cap (8).
42	Remove and replace the O-ring (11) in the nut (9). NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
43	Fit the adjustment screw (10) together with the cap (9).

Tab. 9.134.

WARNING!

Ensure that all parts have been fitted correctly.

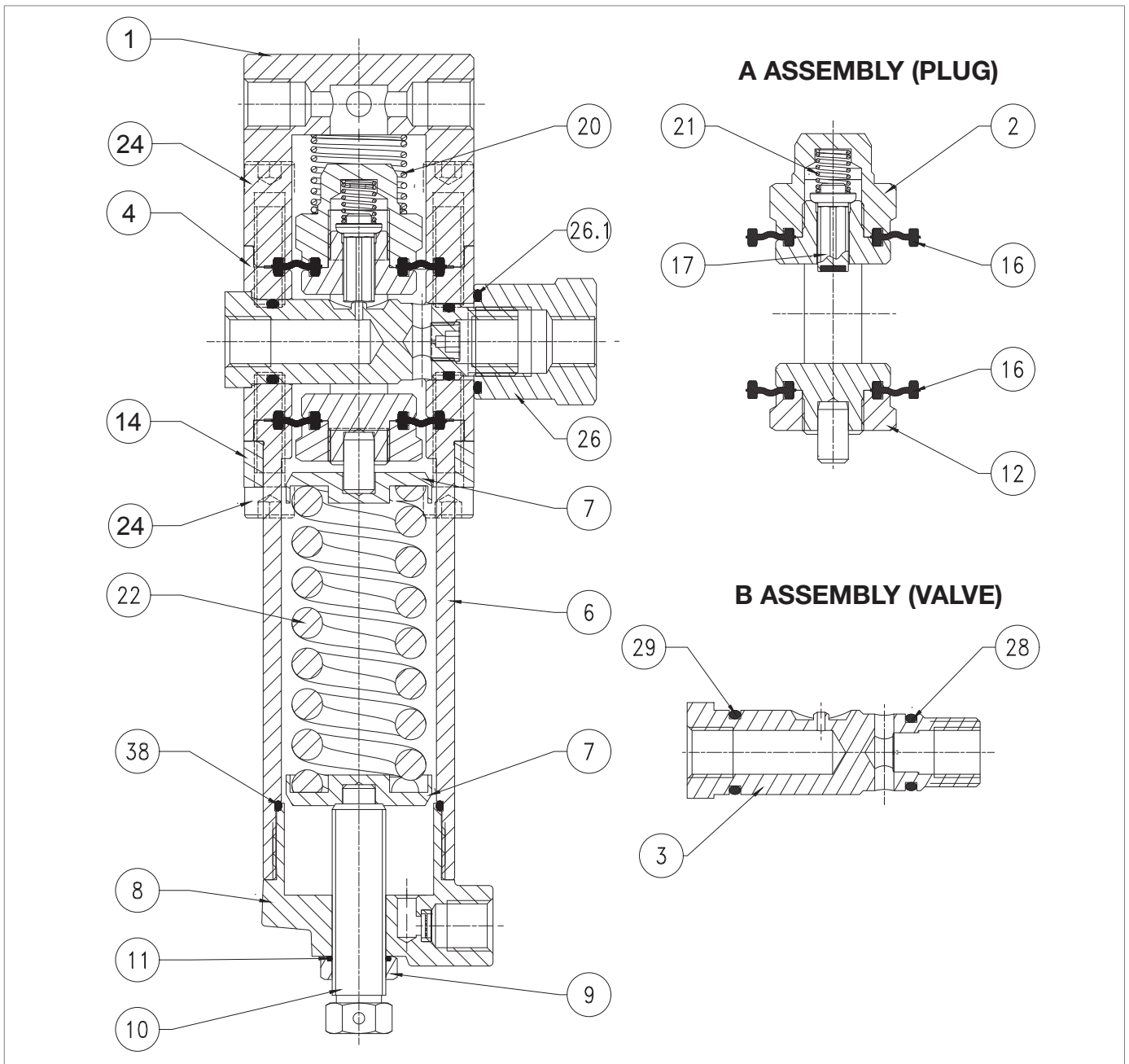




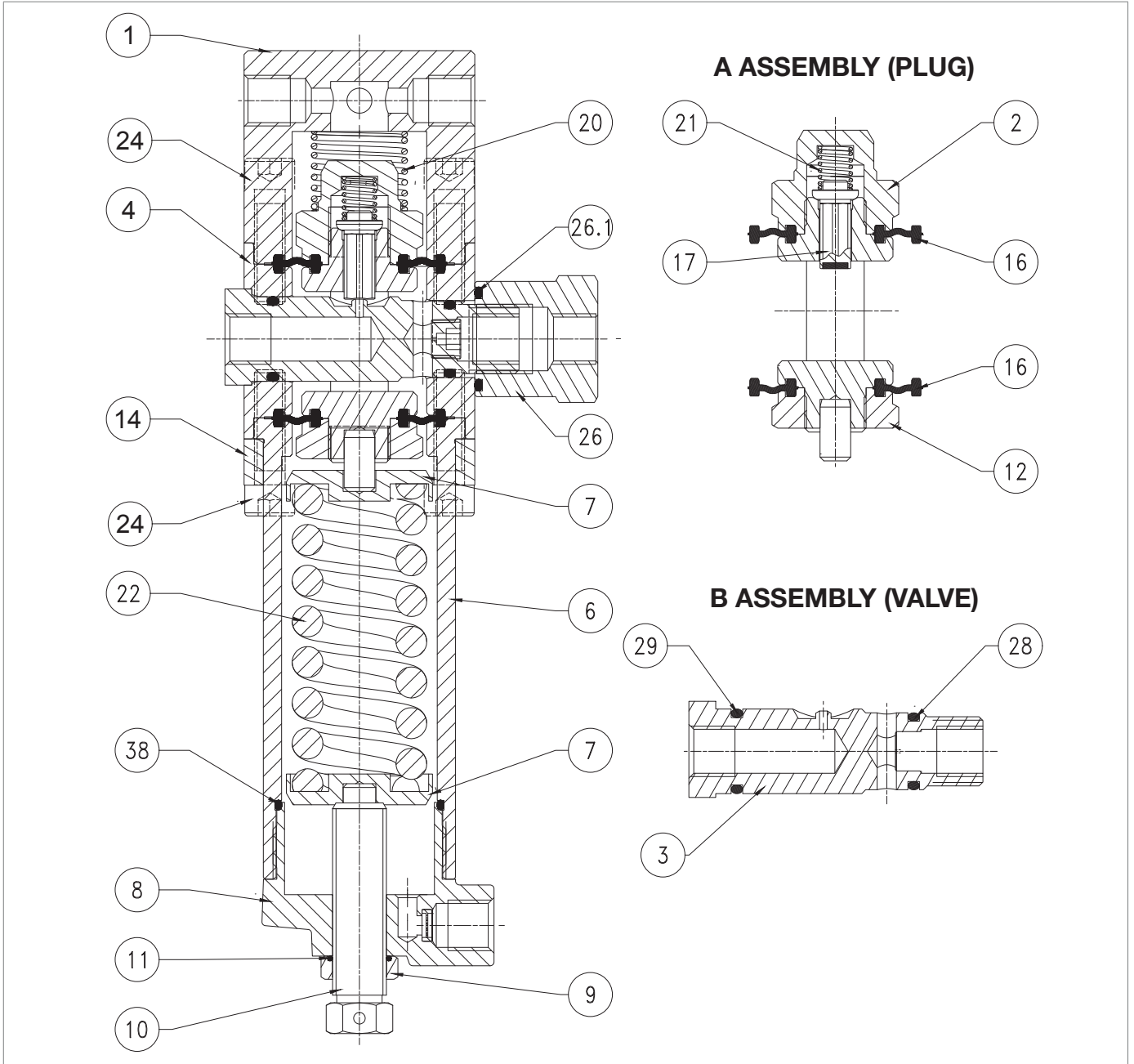






Fig. 9.67. Pilot 207/A

Step	Action
1	Loosen the nut (9).
2	Completely release the spring (22) by turning the adjustment screw (10).
3	Remove the adjustment screw (10) together with the cap (9).
4	Remove the cap (8).
5	Remove the O-ring (38) from the cap (8) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
6	Remove the spring (22) and the spring supports (7).
7	Undo and remove the screws of the lower section (24).
8	Remove the bracket (14) from the sleeve (6).
9	Remove the sleeve (6).
10	Undo and remove the screws of the upper section (24).
11	Remove the pilot lid (1).
12	Remove the spring (20).
13	Unscrew and remove the nut (26).
14	Remove the O-ring (26.1) from the nut (26) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
15	Unscrew and remove the pilot nut (2).
16	Remove the spring (21).
17	Remove and replace the plug (17).
18	Remove and replace the upper diaphragm (16).
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. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution. </div>
21	Remove assembly "A" (plug) from the valve body (4) by pushing it from the top downwards
22	Unscrew and remove the nut (12).
23	Remove and replace the lower diaphragm (16), taking care to lubricate the lanyards with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution. </div>
24	Place and fix the nut (12) according to the following tightening torque: <ul style="list-style-type: none"> Pilot 207/A > tab. 9.97



Pilot 207/A

Step	Action
25	Insert assembly "A" (plug) the bottom upwards into the valve body (4). <div style="border: 1px solid black; padding: 5px;">  NOTE! <ul style="list-style-type: none"> • 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). </div>
26	Insert assembly "B" (valve) into the valve body (4). <div style="border: 1px solid black; padding: 5px;">  NOTE! <p>Take care not to damage the O-rings (28, 29) and the valve seat (3).</p> </div>
27	Screw in the nut (26) according to the following tightening torque: <ul style="list-style-type: none"> • Pilot 207/A > tab. 9.97
28	Put the upper diaphragm (16) back in place, taking care to lubricate the lanyards with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! <p>Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.</p> </div>
29	Put the plug (17) and then the spring (21) back in place.
30	Refit and fix the pilot nut (2) according to the following tightening torque: <ul style="list-style-type: none"> • Pilot 207/A > tab. 9.97
31	Fit the spring (20).
32	Fit the lid (1).
33	Insert and fix the screws of the upper section (24) according to the following tightening torque: <ul style="list-style-type: none"> • Pilot 207/A > tab. 9.97
34	Fit the sleeve (6) and the bracket (14).
35	Insert and fix the screws of the lower section (24) according to the following tightening torque: <ul style="list-style-type: none"> • Pilot 207/A > tab. 9.97
36	Fit the spring (22) and the spring supports (7).
37	Unscrew the cap (8).
38	Remove and replace the O-ring (11) in the nut (9). <div style="border: 1px solid black; padding: 5px;">  NOTE! <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p> </div>
39	Fit the adjustment screw (10) together with the cap (9).

Tab. 9.135.

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.7.4 - 200/A SERIES PILOT RECONNECTION

 **NOTE!**

To reconnect the pilot to the regulator, refer to table 9.133.

9.4.7.5 - PRE-REGULATOR R14/A

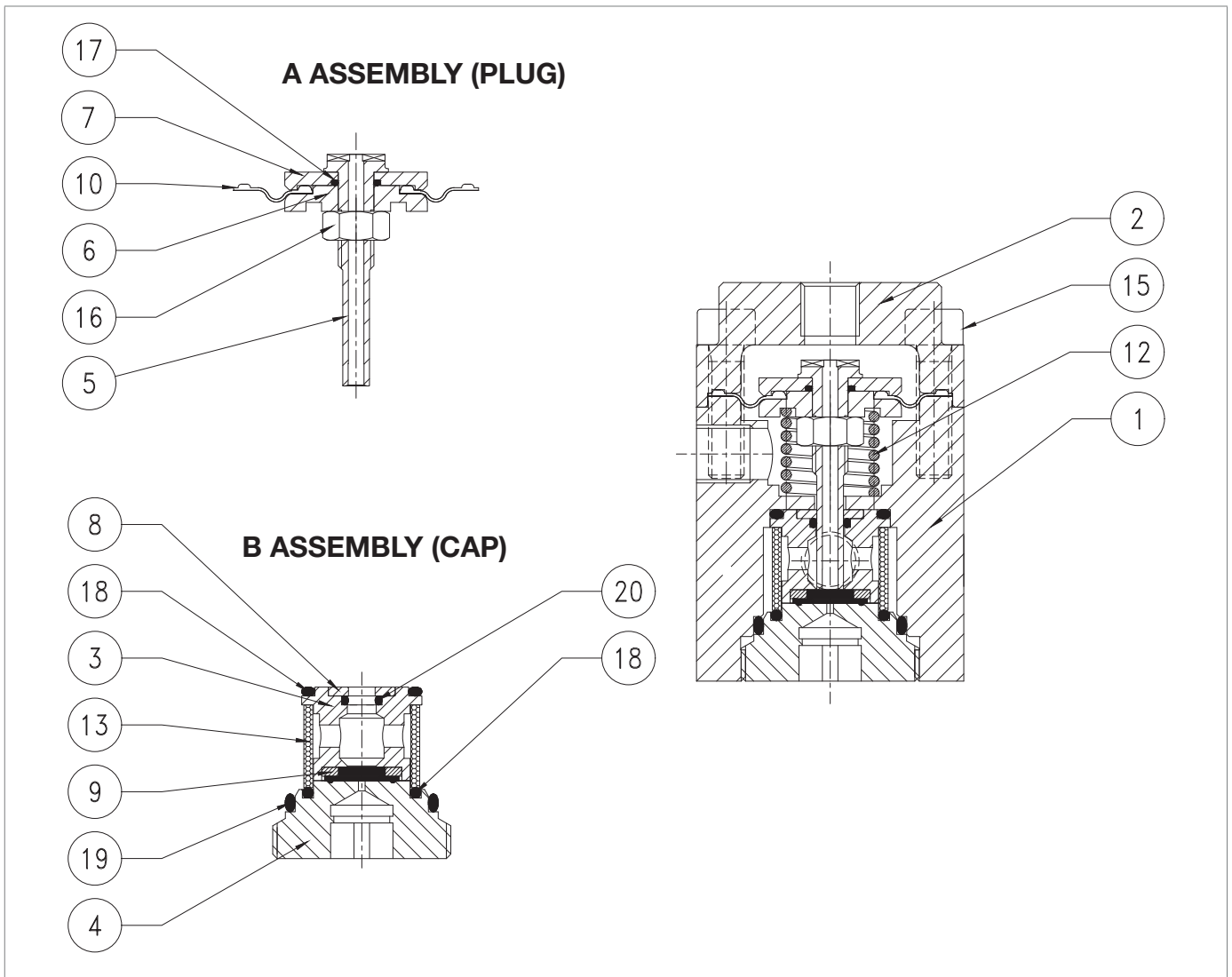
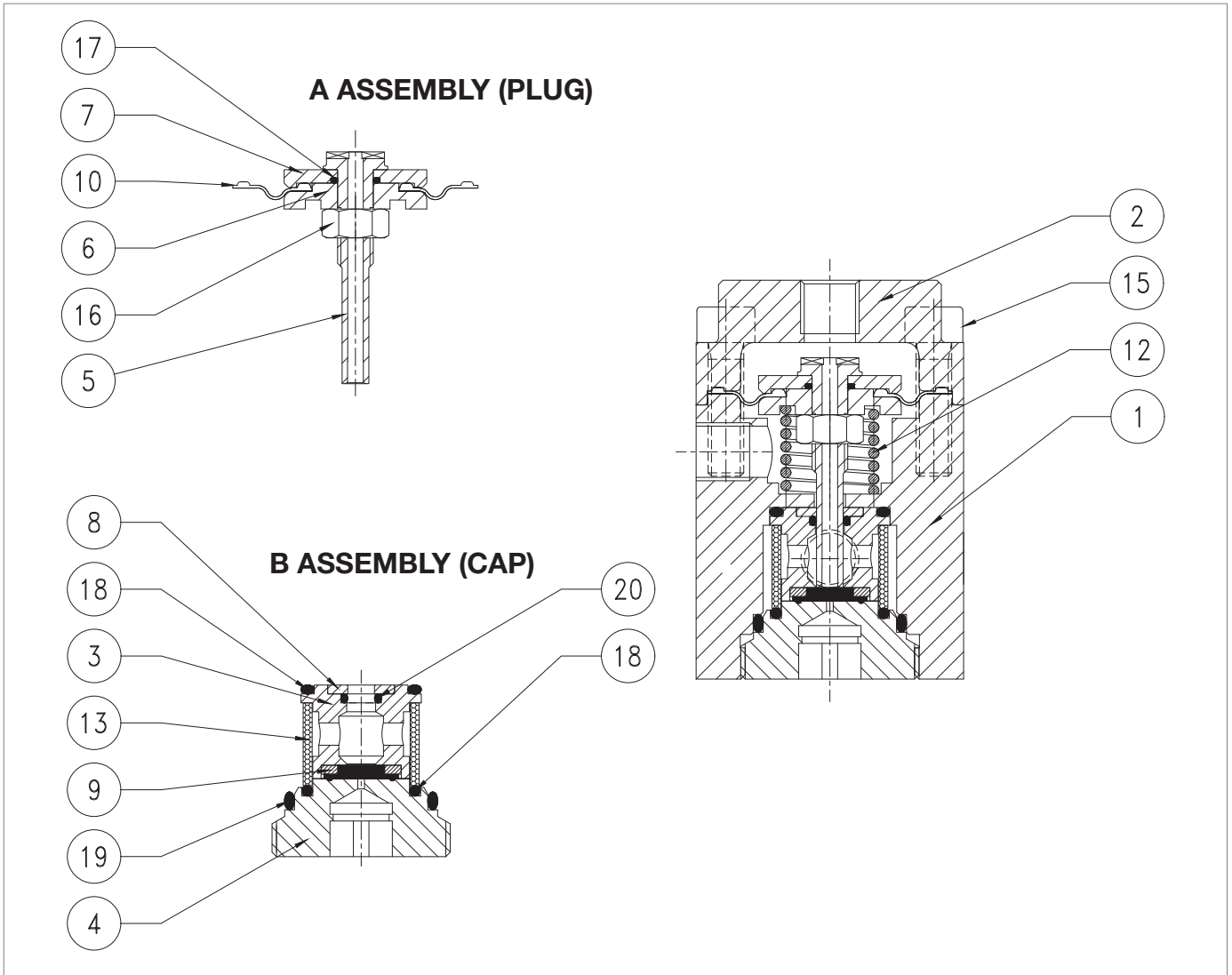


Fig. 9.68. Pre-regulator R14/A

Step	Action
1	Undo and remove the screws (15).
2	Remove the lid (2)
3	Remove assembly "A" (plug).
4	Remove the spring (12).
5	Unscrew and remove the nut (16).
6	Insert the diaphragm protection disc (6) and the diaphragm (10).
7	Remove and replace the O-ring (17) from the diaphragm protection disc (7), lubricating it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
8	Remove and replace the gasket (10). <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution. </div>
9	Fit the diaphragm protection disc (7).
10	Fit and fix the nut (16) of the plug (5) according to the following tightening torque: <ul style="list-style-type: none"> • R14/A > tab. 9.98
11	Unscrew and remove assembly "B" (cap) by acting on the cap (4).
12	Take out the plug guide (3).
13	Remove the O-ring (18) from the plug guide (3) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
14	Remove the ring (8).
15	Remove the O-ring (20) from the plug guide (3) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
16	Remove and replace the reinforced gasket (9). <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
17	Remove and replace the filter (13).
18	Remove the O-rings (18, 19) from the cap (4) and replace them, taking care to lubricate them with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution. </div>
19	Put the filter (13) and the plug guide (3) in place.



Pre-regulator R14/A

Step	Action
20	Fit the ring (8).
21	Position and secure the assembly " B " (cap). NOTE! Take care not to damage the O-rings (18, 19) during this step.
22	Fit the spring (12).
23	Insert assembly " A " (plug) into the body (1). NOTE! Before inserting the plug unit, lubricate the plug surface with silicone grease.
24	Fit the lid (2).
25	Insert and fix the screws (15) according to the following tightening torque: • R14/A > tab. 9.98 NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.

Tab. 9.136.

WARNING!

Ensure that all parts have been fitted correctly.

9.4.7.6 - REASSEMBLY OF THE PILOTING UNIT

Step	Action
1	Connect the sockets between the 200/A series pilot and the R14/A pre-regulator by screwing in the conical seal fittings.

Tab. 9.137.

WARNING!

Ensure that all parts have been fitted correctly.

9.4.8 - M/A ACCELERATING VALVE MAINTENANCE

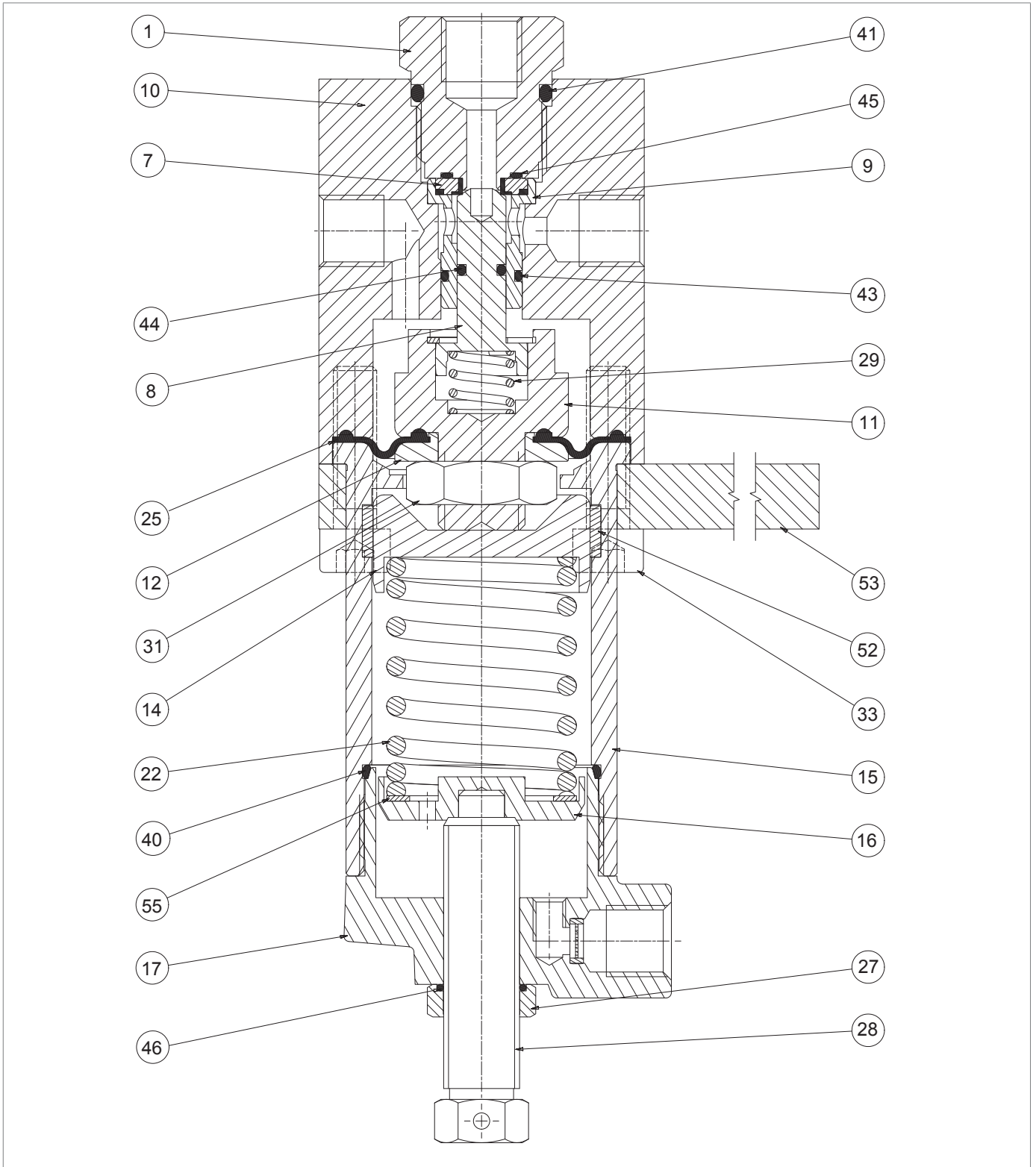

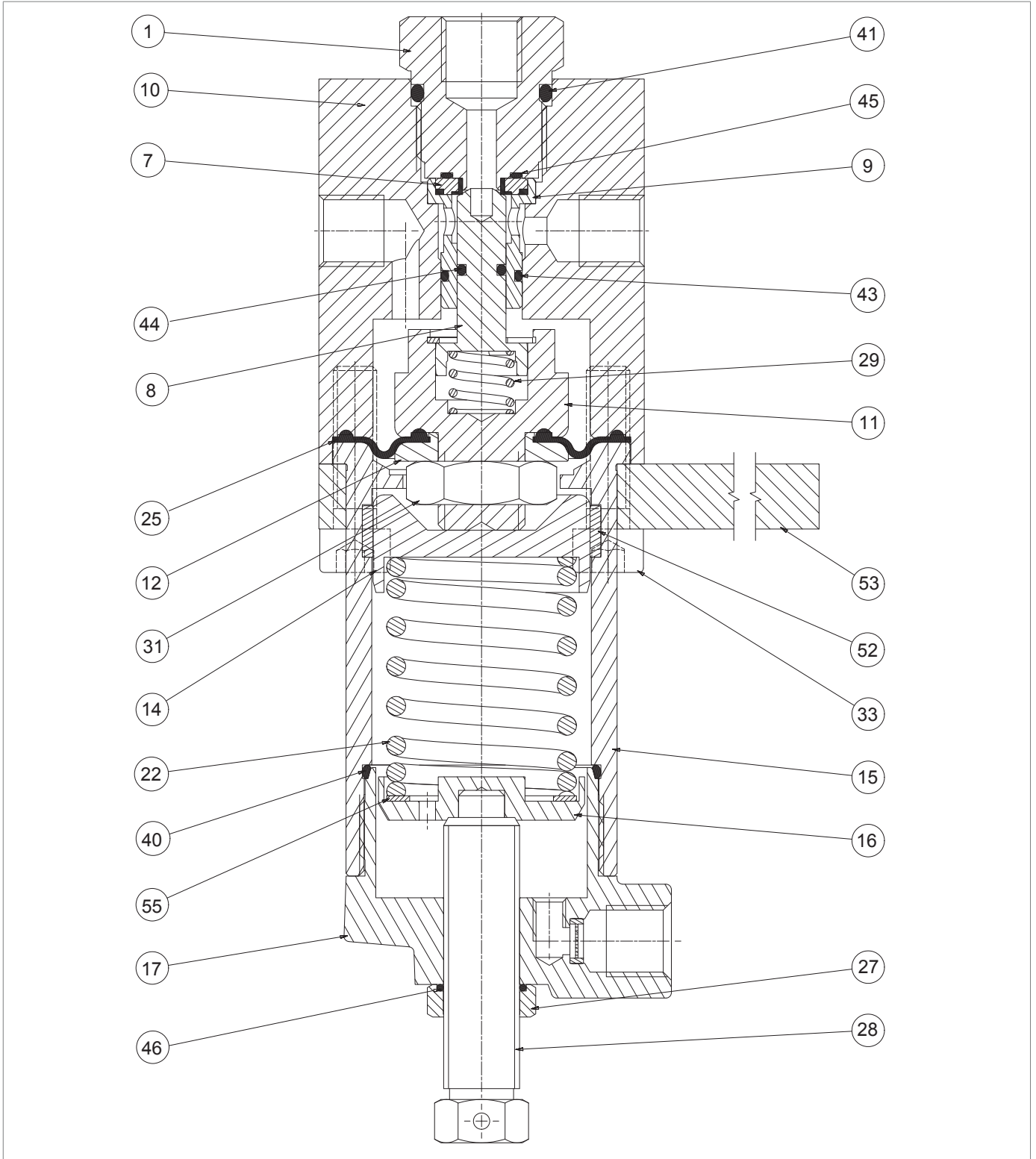






Fig. 9.69. M/A accelerating valve

Step	Action
1	Loosen the nut (27).
2	Completely release the spring (22) by turning the adjustment screw (28).
3	Remove the adjustment screw (28) together with the nut (27).
4	Remove the cap (17).
5	Remove the O-ring (40) from the cap (17) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
6	Remove the lower spring support (16) together with the ring (55).
7	Remove the spring (22).
8	Remove the upper spring support (14).
9	Undo and remove the screws of the lower section (33).
10	Remove the bracket (53) from the sleeve (15).
11	Remove the sleeve (15).
12	Remove and replace the I/DWR (52) from the sleeve (15). <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement I/DWR, clean the retaining slots with a cleaning solution. </div>
13	Take out the diaphragm/plug unit (8, 11, 12, 25, 29, 31).
14	Unscrew and remove the nut (31).
15	Remove the diaphragm protection disc (12).
16	Remove and replace the diaphragm (25). <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution. </div>
17	Put the diaphragm protection disc (12) back in place.
18	Refit and secure the nut (31).
19	Remove the O-ring (44) from the plug (8) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
20	Unscrew and remove the gasket support (1).
21	Remove the O-rings (41, 45) from the gasket support (1) and replace them, taking care to lubricate them with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution. </div>
22	Take out the plug guide (9).
23	Remove and replace the reinforced gasket (7) from the plug guide (9).



Accelerating valve M/A

Step	Action
24	Remove the O-ring (43) from the plug guide (9) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 2px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
25	Fit the plug guide (9) together with the reinforced gasket (7).
26	Place the gasket support (1) in the body (10).
27	Take out the diaphragm/plug unit (8, 11, 12, 25, 29, 31). <div style="border: 1px solid black; padding: 2px;">  NOTE! Before inserting the diaphragm/plug unit, lubricate the plug (8) surface with silicone grease. </div>
28	Fit the sleeve (15) and the bracket (53).
29	Insert and fix the screws (33). <div style="border: 1px solid black; padding: 2px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
30	Position the upper spring support (14) together with the spring (22).
31	Fit the lower spring support (16) together with the ring (55).
32	Fit and secure the cap (17).
33	Remove and replace the O-ring (46) in the nut (27). <div style="border: 1px solid black; padding: 2px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
34	Fit the adjustment screw (28) together with the nut (27).

Tab. 9.138.

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.9 - SEALING OF THE SB/82 BUILT-IN SLAM-SHUT VALVE

9.4.9.1 - BUILT-IN SLAM-SHUT VALVE SB/82 DN 1"

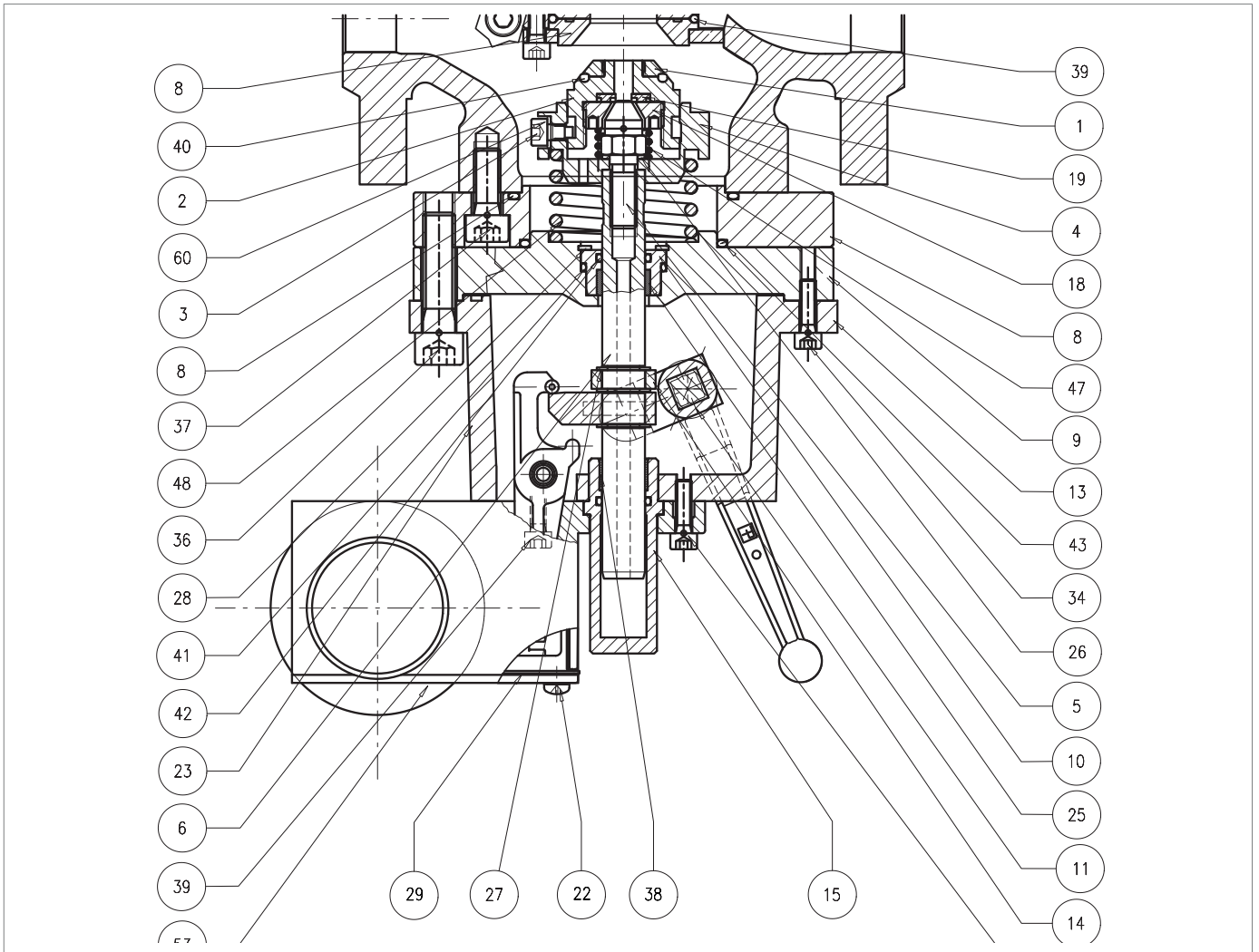


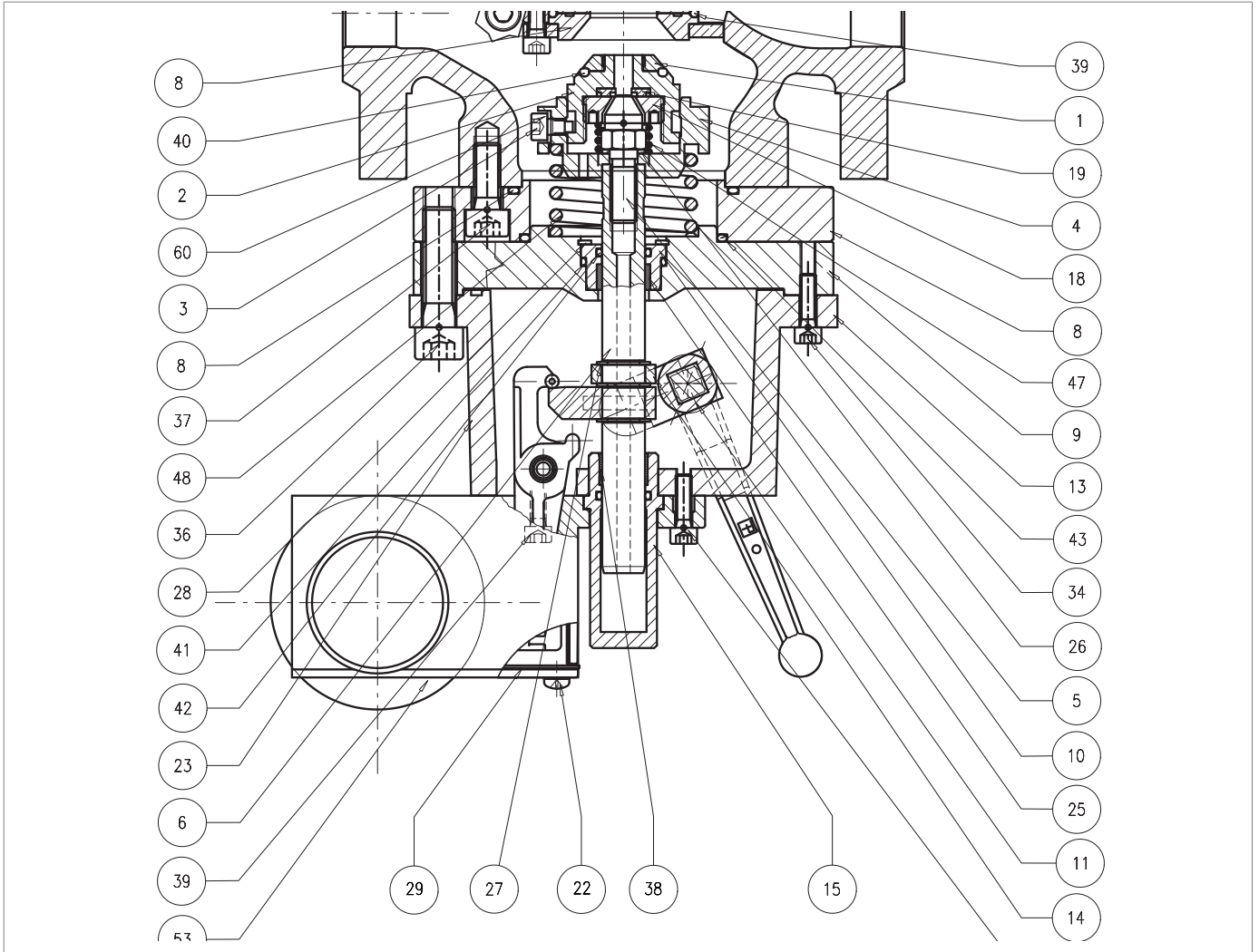






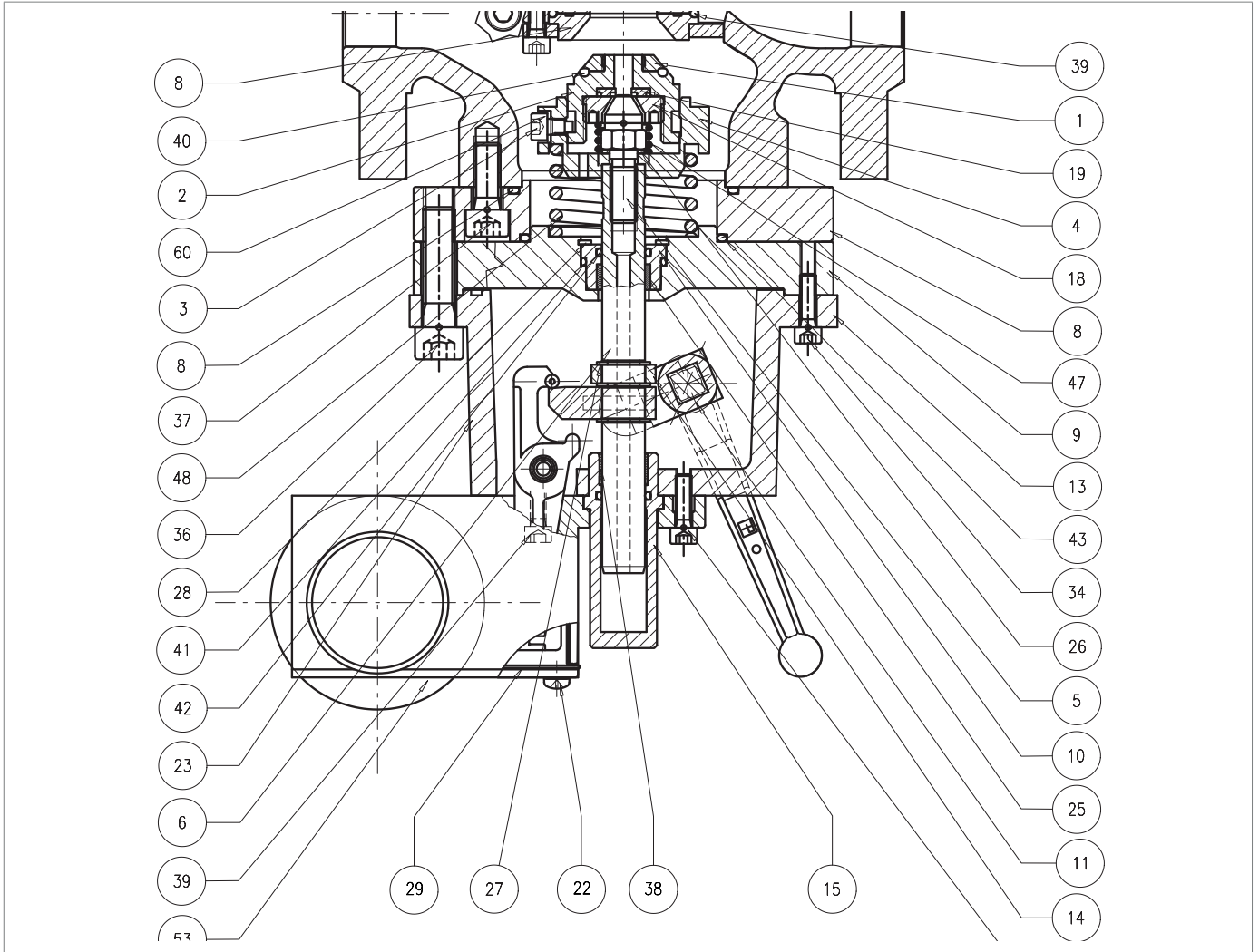
Fig. 9.70. Built-in slam-shut valve SB/82 DN 1"

Step	Action
1	 WARNING! In this step, support the built-in SB/82 slam-shut valve.
2	Undo and remove the screws (36).
3	Remove the built-in SB/82 slam-shut valve and place it on an anti-shock surface.
4	Undo the screws (137).
5	Remove the flange (8).
6	Remove the O-ring (43) from the flange (8) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
7	Remove the O-ring (37) from the flange (8) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
8	Undo and remove the screws (3).
9	Undo and remove the toothed washers (60).
10	Take out the plug unit.
11	Remove the spring (47).
12	Unscrew and remove the ring nut (18) with the appropriate tool.  NOTE! Refer to table 7.48 of paragraph 7.1 “List of equipment”.
13	Remove and replace the pad (19).
14	Fit and fix the ring nut (18) with the appropriate tool.  NOTE! Refer to table 7.48 of paragraph 7.1 “List of equipment”.
15	Unscrew and remove the ring nut (1).
16	Remove the O-ring (40) from the plug (2) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
17	Refit and secure the ring nut (1).
18	Undo the plug screw (5).
19	Remove the washer (26).
20	Remove the spring (48) and the spring support (4).
21	Undo and remove the screws (22) of the pressure switch.
22	Remove the lid (119) together with the gasket (29).
23	Undo the side screws (39) inside the box.



Built-in slam-shut valve SB/82 DN 1"

Step	Action
24	Undo the screws (35).
	Take out the pressure switch unit.
25	 NOTE! For the maintenance procedure of the pressure switch unit, refer to the relative table.
26	Remove the cup (15).
	Remove the O-ring (42) from the cup (15) and replace it, taking care to lubricate it with synthetic grease.
27	 NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
28	Undo and remove the screws (34).
29	Remove the intermediate body (13) from the flange (9).
30	Extract the stem (6) taking care not to damage it.
31	Remove the seeger ring (28) from the flange (9).
32	Remove the bush (10).
	Remove the O-ring (41) from the bush (10) and replace it, taking care to lubricate it with synthetic grease.
33	 NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
	Remove the I/DWR ring (25) from the bush (10) and replace it, taking care to lubricate it with synthetic grease.
34	 NOTE! Before inserting the replacement I/DWR ring, clean the retaining slots with a cleaning solution.
	Fit the bush (10).
35	 NOTE! Take care not to damage the O-ring (41).
36	Fit the seeger ring (28).
	Fit the stem (6).
37	 NOTE! Lubricate the stem surface with silicone grease.
38	Fit the intermediate body (13).
39	Fit the cup (15).
40	Fit the pressure switch unit.
41	Insert and fix the screws (35) according to the following tightening torque: <ul style="list-style-type: none"> • DN 1" > tab. 9.99
42	Insert and fix the side screws (39) into the pressure switch according to the following tightening torque: <ul style="list-style-type: none"> • DN 1" > tab. 9.99
43	Fit the gasket (29) and the lid (119).
44	Insert and fix the screws (22).
45	Put the spring (48) and spring support (4) in place.



Built-in slam-shut valve SB/82 DN 1"

Step	Action
46	Fit the washer (26) NOTE! Before inserting the screw (5), apply thread locking glue.
47	Fix the plug screw (5).
48	Fit the spring (47).
49	Fit the plug unit.
50	Insert the serrated washers (60). NOTE! Before inserting the screw (3), apply thread locking glue.
51	Insert and fix the screws (3) according to the following tightening torque <ul style="list-style-type: none"> • DN 1" > tab. 9.99 NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
52	Fit the flange (8) on the body.
53	Fix the screws (137) according to the following tightening torque <ul style="list-style-type: none"> • DN 1" > tab. 9.99 NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
54	Put the SB/82 built-in slam-shut valve in place.
55	Insert and fix the screws (36) according to the following tightening torque <ul style="list-style-type: none"> • DN 1" > tab. 9.99 NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.

Tab. 9.139.

WARNING!

Ensure that all parts have been fitted correctly.

9.4.9.2 - BUILT-IN SLAM-SHUT VALVE SB/82 DN 2" - 3"

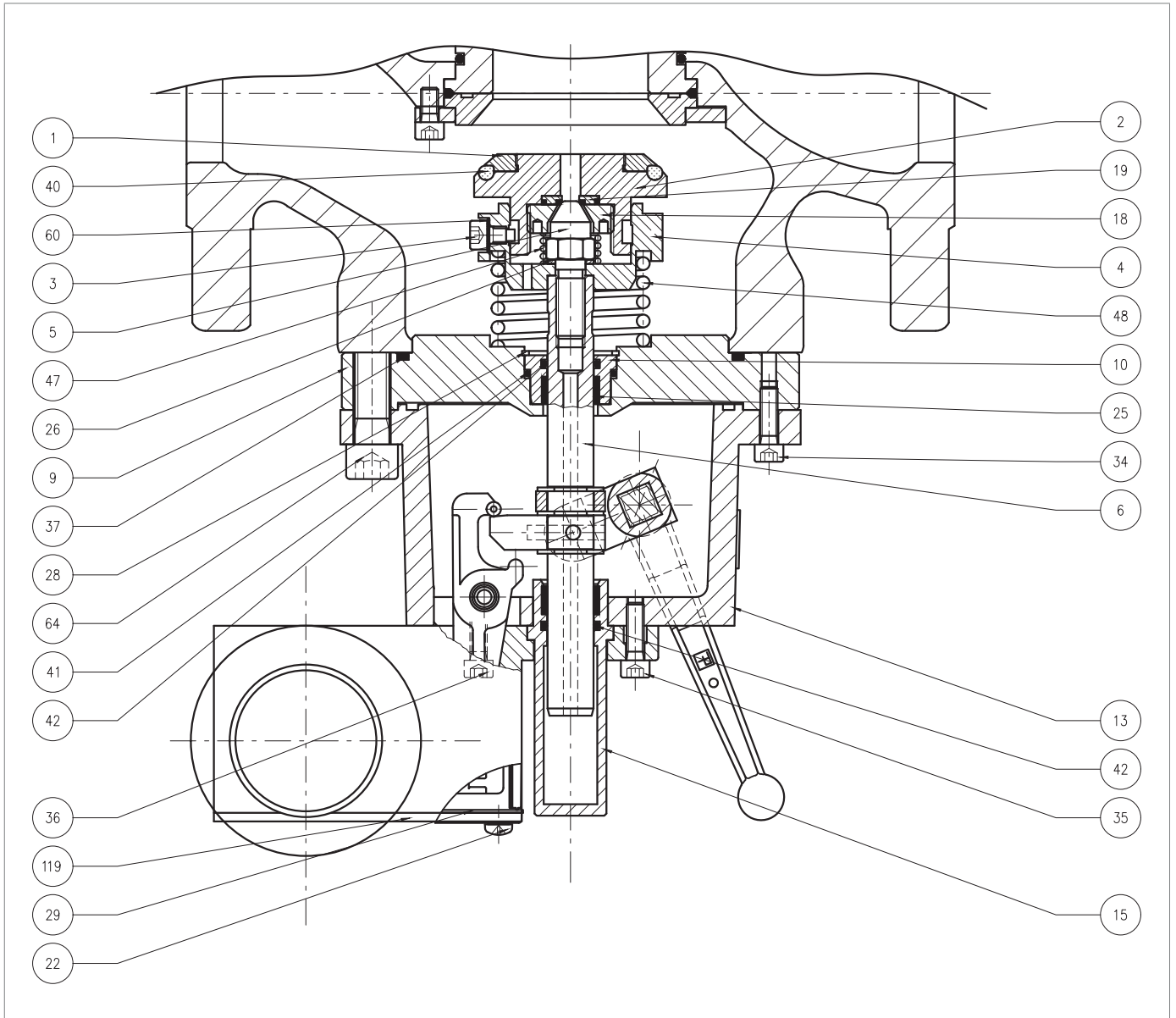
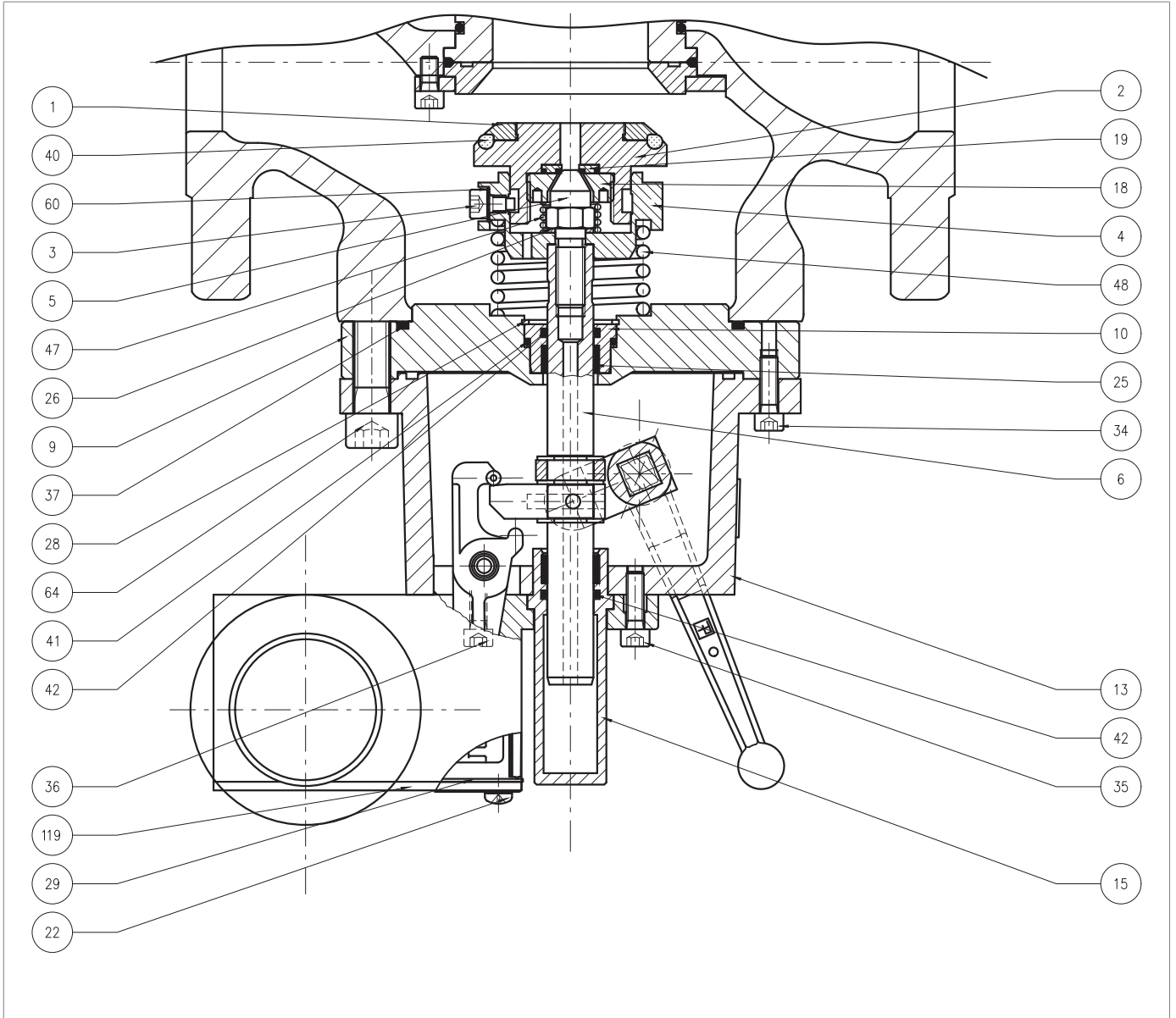








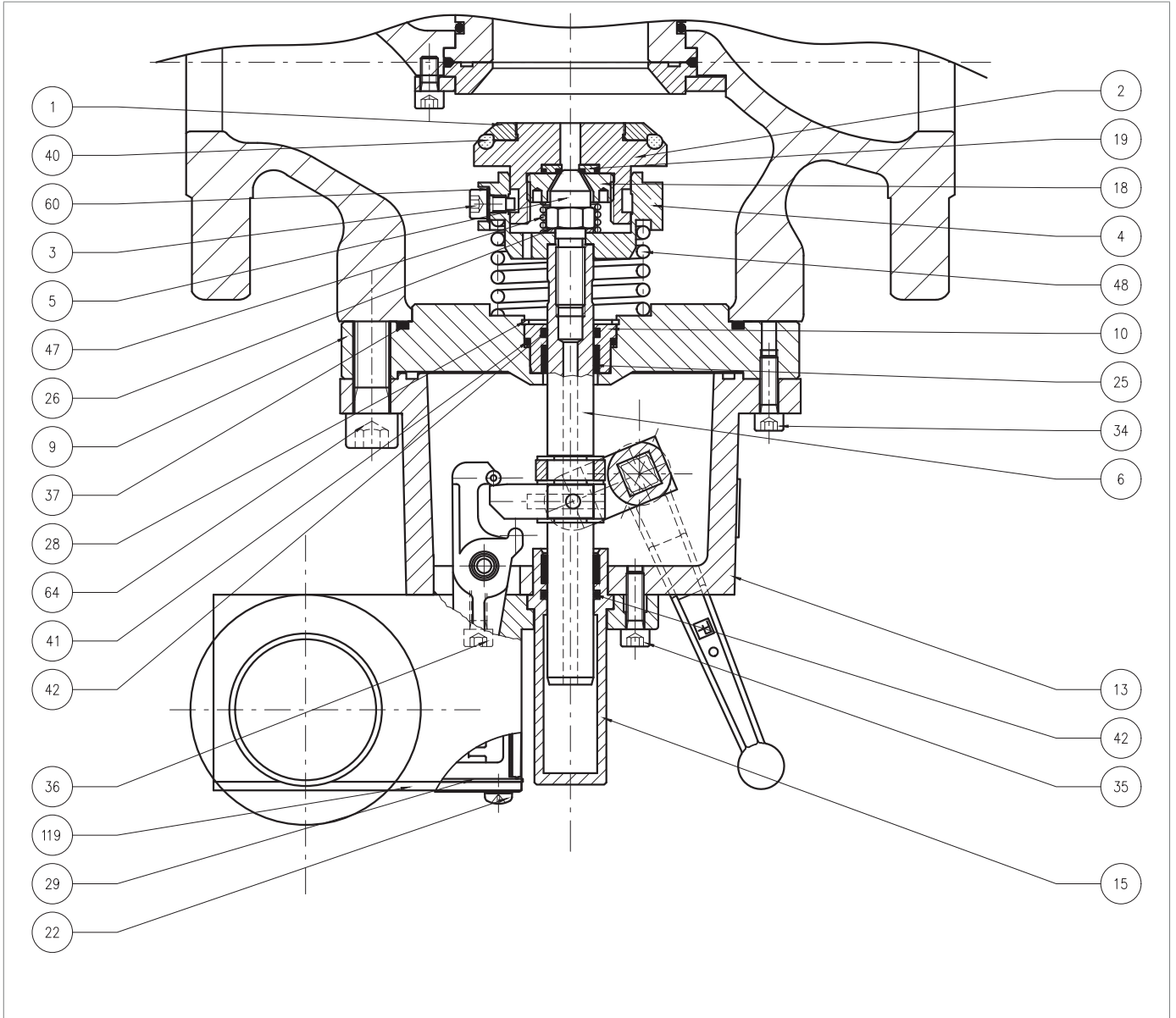
Fig. 9.71. Built-in slam-shut valve SB/82 DN 2"- 3"

Step	Action
1	Undo and remove the screws (64). NOTE! In this step, support the built-in SB/82 slam-shut valve.
2	Remove the O-ring (37) from the flange (9) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
3	Undo the screws (3) together with the toothed washers (60).
4	Take out the plug unit.
5	Remove the spring (47).
6	Unscrew and remove the ring nut (18) with the appropriate tool. NOTE! Refer to table 7.48 of paragraph 7.1 "List of equipment".
7	Remove and replace the pad (19).
8	Fit and fix the ring nut (18) with the appropriate tool. NOTE! Refer to table 7.48 of paragraph 7.1 "List of equipment".
9	Unscrew and remove the ring nut (1).
10	Remove the O-ring (40) from the plug (2) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
11	Refit and secure the ring nut (1).
12	Undo the plug screw (5).
13	Remove the washer (26).
14	Remove the spring (48) and the spring support (4).
15	Undo and remove the screws (22) of the pressure switch.
16	Remove the lid (119) together with the gasket (29).
17	Undo the side screws (36) inside the control pressure switch.
18	Undo the external screws (35).
19	Take out the pressure switch unit. NOTE! For the maintenance procedure of the pressure switch unit, refer to the relative table.
20	Remove the cup (15).
21	Remove the O-ring (42) from the cup (15) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.



Built-in slam-shut valve SB/82 DN 2" - 3"

Step	Action
22	Undo and remove the screws (34).
23	Remove the intermediate body (13)
24	Extract the stem (6) taking care not to damage it.
25	Remove the seeger ring (28) from the flange (9).
26	Remove the bush (10).
27	Remove the O-ring (41) from the flange (9) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
28	Remove the O-ring (42) from the bush (10) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
29	Remove the I/DWR ring (25) from the bush (10) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement I/DWR ring, clean the retaining slots with a cleaning solution. </div>
30	Fit the valve seat (10), taking care not to damage the O-ring (41).
31	Place the seeger ring (28) in the flange (9).
32	Place the stem (6) in the bush (10). <div style="border: 1px solid black; padding: 5px;">  NOTE! Lubricate the stem surface with silicone grease. </div>
33	Fit the intermediate body (13).
34	Insert and fix the screws (34).
35	Fit the cup (15).
36	Fit the pressure switch unit.
37	Insert and fix the screws (35) according to the following tightening torque: <ul style="list-style-type: none"> • DN 2" > tab. 9.100 • DN 3" > tab. 9.101 <div style="border: 1px solid black; padding: 5px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
38	Insert and fix the side screws (36) according to the following tightening torque: <ul style="list-style-type: none"> • DN 2" > tab. 9.100 • DN 3" > tab. 9.101 <div style="border: 1px solid black; padding: 5px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
39	Fit the gasket (29) together with the lid (119).
40	Insert and fix the screws (22).
41	Put the spring (48) and spring support (4) in place.
42	Fit the washer (26).



Built-in slam-shut valve SB/82 DN 2" - 3"

Step	Action
43	Insert and fix the plug screws (5) according to the following tightening torque: <ul style="list-style-type: none"> • DN 2" > tab. 9.100 • DN 3" > tab. 9.101 <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <ul style="list-style-type: none"> • Before inserting the screw (5), apply thread locking glue; • Tighten the screws according to the cross diagram in paragraph 9.4.2.2 </div>
44	Fit the spring (47).
45	Fit the plug unit.
46	Insert the screws (3) together with the toothed washers (60). <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Before inserting the screw (3), apply thread locking glue.</p> </div>
47	Fasten the screws (3), holding down the plug unit to compress the spring (47) in the plug guide (4).
48	Put the SB/82 built-in slam-shut valve in place.
49	Insert and fix the screws (64) according to the following tightening torque: <ul style="list-style-type: none"> • DN 2" > tab. 9.100 • DN 3" > tab. 9.101 <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p> </div>

Tab. 9.140.

! WARNING!

Ensure that all parts have been fitted correctly.

9.4.9.3 - BUILT-IN SLAM-SHUT VALVE SB/82 DN 4" - 8"

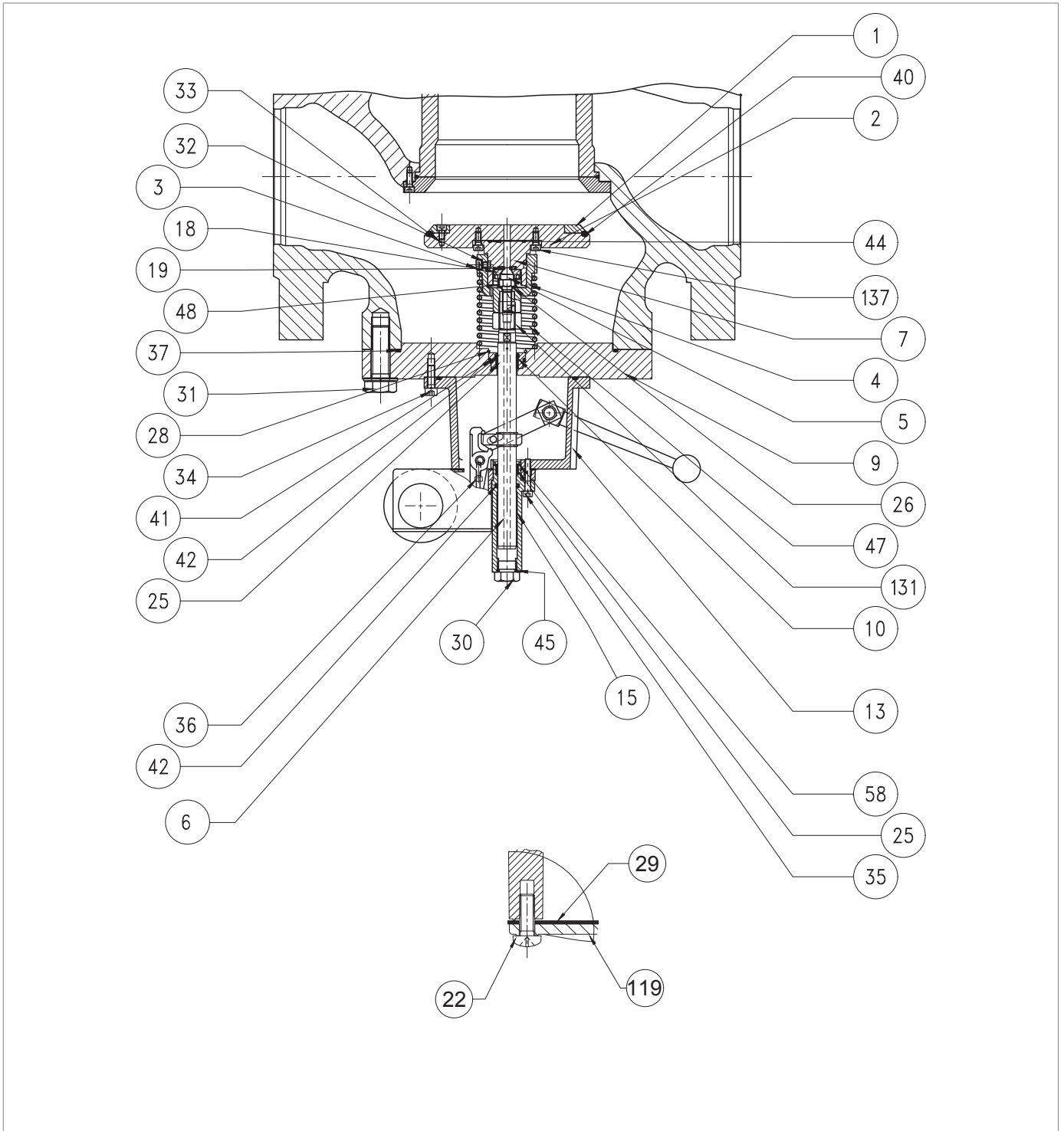







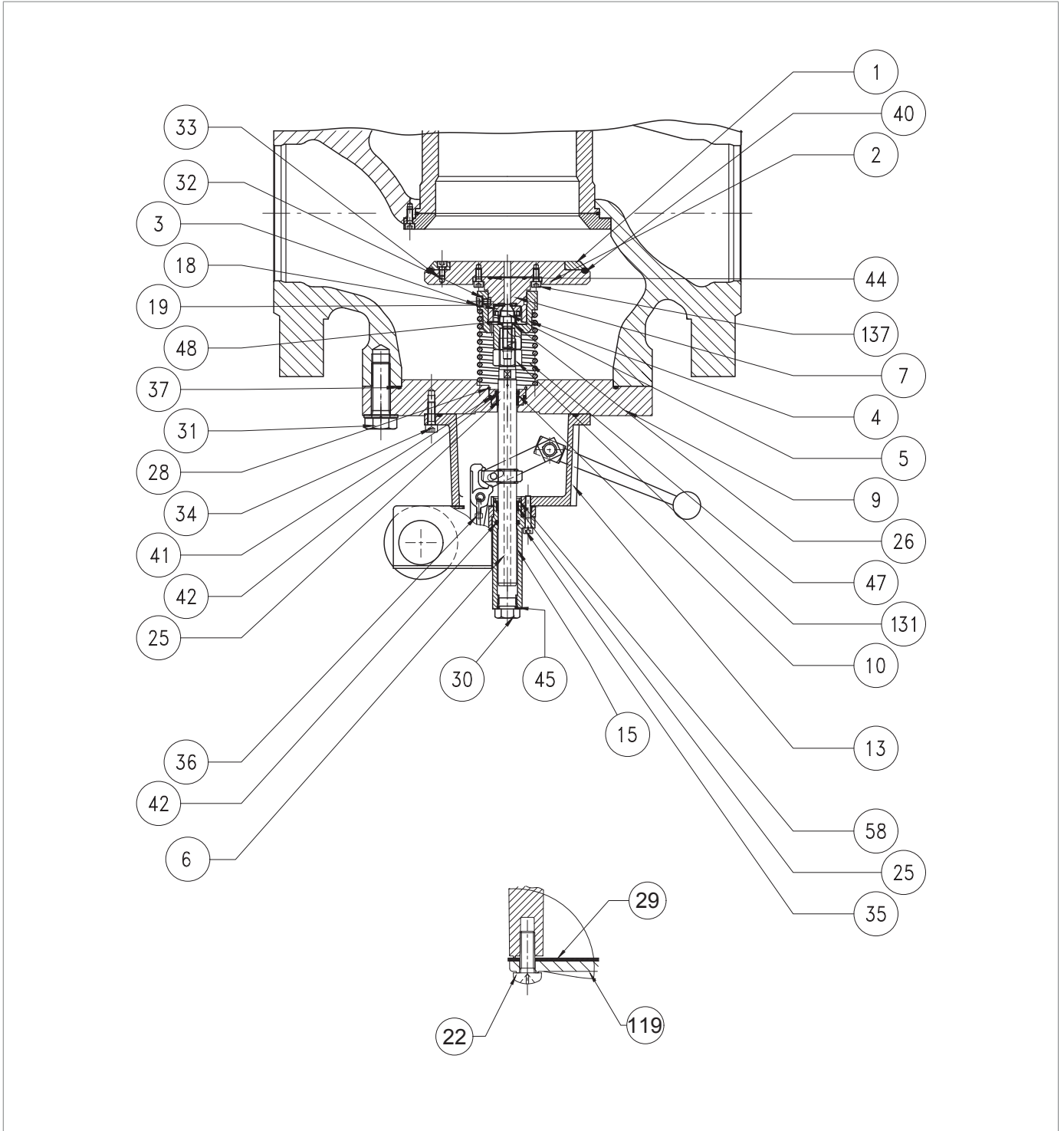






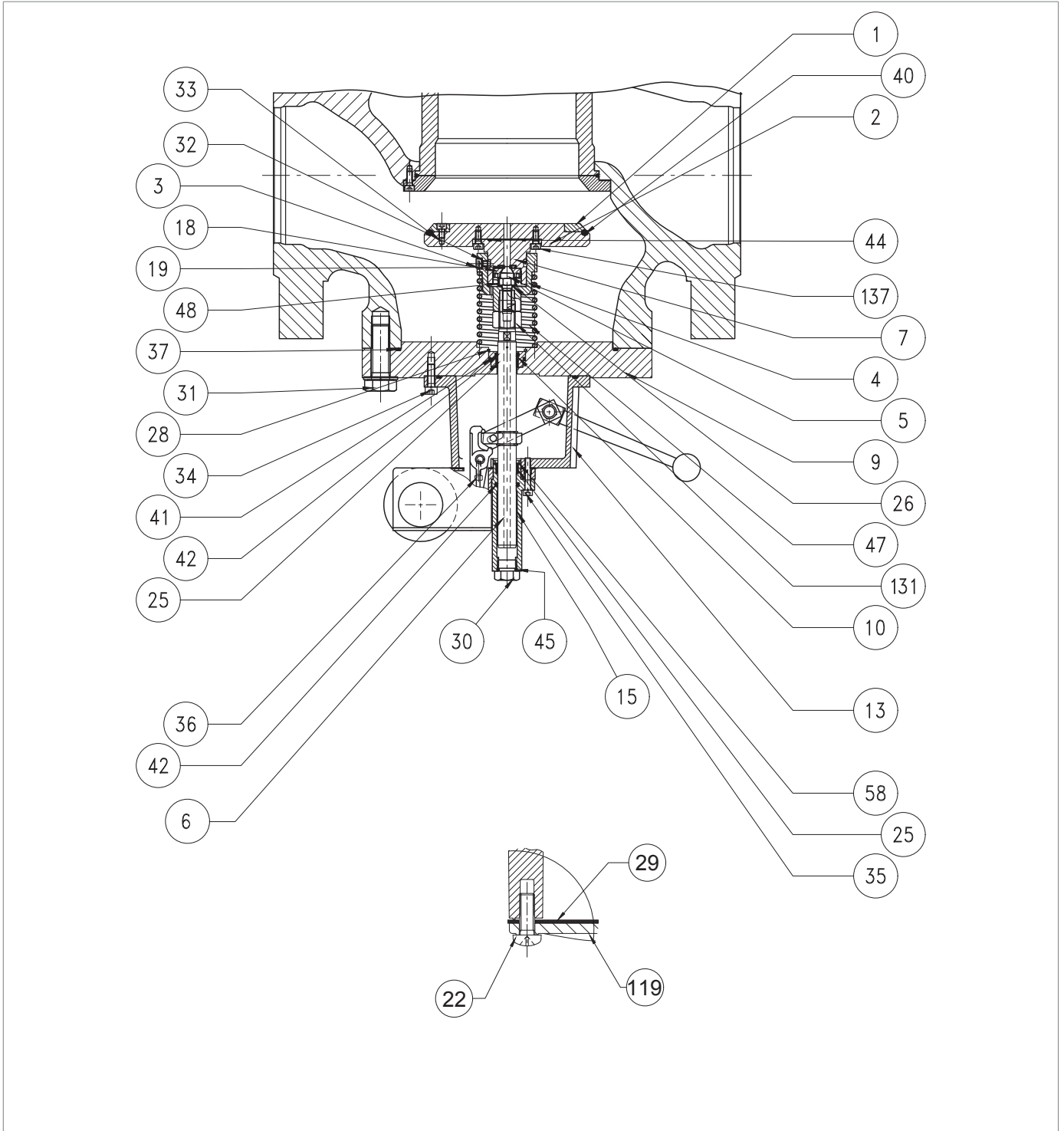
Fig. 9.72. Built-in slam-shut valve SB/82 DN 4" - 8"

Step	Action
1	 WARNING! In this step, support the built-in SB/82 slam-shut valve.
2	Undo and remove the screws (31).
3	Remove the O-ring (37) from the flange (9) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
4	Undo the screws (3) together with the toothed washers (32).
5	Take out the plug unit.
6	Remove the spring (47).
7	Unscrew and remove the ring nut (18) with an appropriate tool.  NOTE! Refer to table 7.48 of paragraph 7.1 “List of equipment”.
8	Remove and replace the pad (19).
9	Fit and fix the ring nut (18) with the appropriate tool.
10	Undo and remove the screws (137).
11	Remove the O-ring (44) from the plug support (7) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
12	Undo the screws (33).
13	Remove the ring nut (1).
14	Remove the O-ring (40) from the plug (2) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
15	Fit the ring nut (1).
16	Insert and fix the screws (33) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.102; • DN 6" > tab. 9.103 • DN 8" > tab. 9.104  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
17	Place the plug (2) on the plug support (7).
18	Insert and fix the screws (137) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.102; • DN 6" > tab. 9.103 • DN 8" > tab. 9.104.  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.



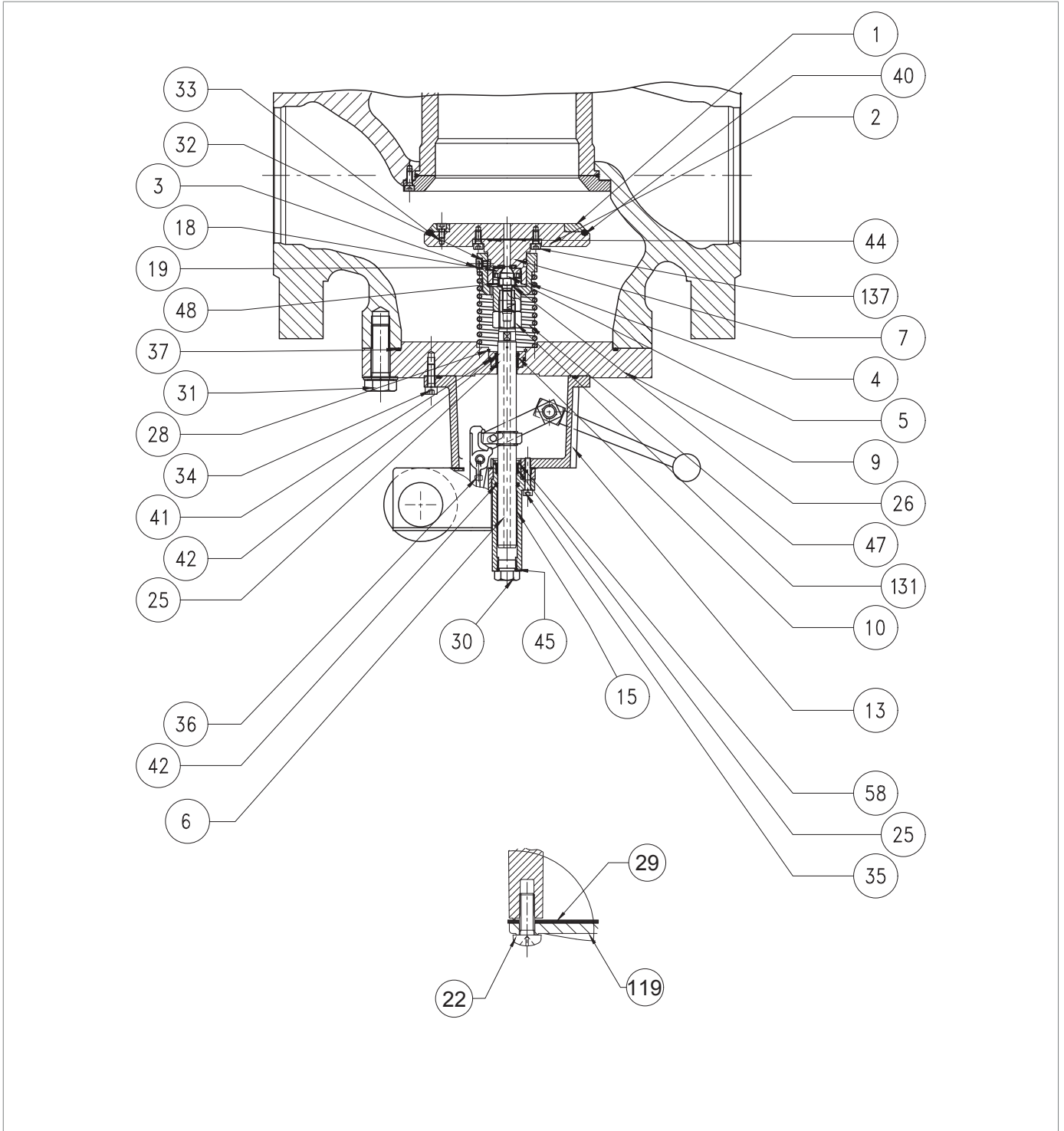
Built-in slam-shut valve SB/82 DN 4" - 8"

Step	Action
19	Undo the plug screw (5).
20	Remove the washer (26).
21	Remove the spring (48) and the spring support (4).
22	Unscrew and remove the nut (131).
23	Undo and remove the screws (22) of the pressure switch.
24	Remove the lid (119) and the gasket (29).
25	Undo the side screws (36) inside the control pressure switch.
26	Undo the screws (35).
27	Remove the cup (15).
28	Remove the O-ring (42) from the cup (15) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
29	Remove the cap (30).
30	APPLICABLE TO DN 6"-8" ONLY Remove the O-ring (45) from the cap (30) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
31	Remove the seeger ring (58) from the cup (15).
32	Remove the I/DWR ring (25) from the cup (15) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement I/DWR ring, clean the retaining slots with a cleaning solution.
33	Place the seeger ring (58) in the cup (15).
34	Take out the pressure switch unit.  NOTE! For the maintenance procedure of the pressure switch unit, refer to the relative table.
35	Undo and remove the screws (34).
36	Remove the intermediate body (13).
37	Remove the seeger ring (28) from the flange (9).
38	Remove the bush (10).
39	Remove the O-ring (41) from the flange (9) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
40	Remove the O-ring (42) from the bush (10) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.



Built-in slam-shut valve SB/82 DN 4" - 8"

Step	Action
41	Remove the I/DWR ring (25) from the bush (10) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement I/DWR ring, clean the retaining slots with a cleaning solution.
42	Fit the valve seat (10), taking care not to damage the O-ring (41).
43	Place the seeger ring (28) in the flange (9).
44	Place the stem (6) in the bush (10). NOTE! Lubricate the stem surface with silicone grease.
45	Fit the intermediate body (13).
46	Insert and fix the screws (34) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.102; • DN 6" > tab. 9.103 • DN 8" > tab. 9.104. NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
47	Fit the pressure switch unit.
48	Fit the cup (15).
49	Insert and fix the screws (35) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.102; • DN 6" > tab. 9.103 • DN 8" > tab. 9.104. NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
50	Insert and fix the side screws (36) into the pressure switch according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.102; • DN 6" > tab. 9.103 • DN 8" > tab. 9.104. NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
51	Fit and fix the cap (30).
52	Fit the gasket (29) and the lid (119).
53	Insert and fix the screws (22). NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
54	Insert and fix the screws (131).
55	Put the spring (48) and spring support (4) in place.



Built-in slam-shut valve SB/82 DN 4" - 8"

Step	Action
56	Fit the washer (26).
57	<p>Apply thread locking glue to insert and fix the plug screws (5) according to the following tightening torque:</p> <ul style="list-style-type: none"> • DN 4" > tab. 9.102; • DN 6" > tab. 9.103; • DN 8" > tab. 9.104. <p>NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
58	Fit the spring (47).
59	Fit the plug unit.
60	<p>Insert the screws (3) together with the toothed washers (60).</p> <p>NOTE! Before inserting the screw (3), apply thread locking glue.</p>
61	Fasten the screws (3), holding down the plug unit to compress the spring (47) in the plug guide (4).
62	<p>WARNING! During the next steps, support the SB/82 slam-shut valve so as to prevent any falls.</p>
63	Put the SB/82 built-in slam-shut valve in place.
64	<p>Insert and fix the screws (31) according to the following tightening torque:</p> <ul style="list-style-type: none"> • DN 4" > tab. 9.102; • DN 6" > tab. 9.103; • DN 8" > tab. 9.104. <p>NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>

Tab. 9.141.

WARNING!

Ensure that all parts have been fitted correctly.

9.4.9.4 - BUILT-IN SLAM-SHUT VALVE SB/82 DN 10"

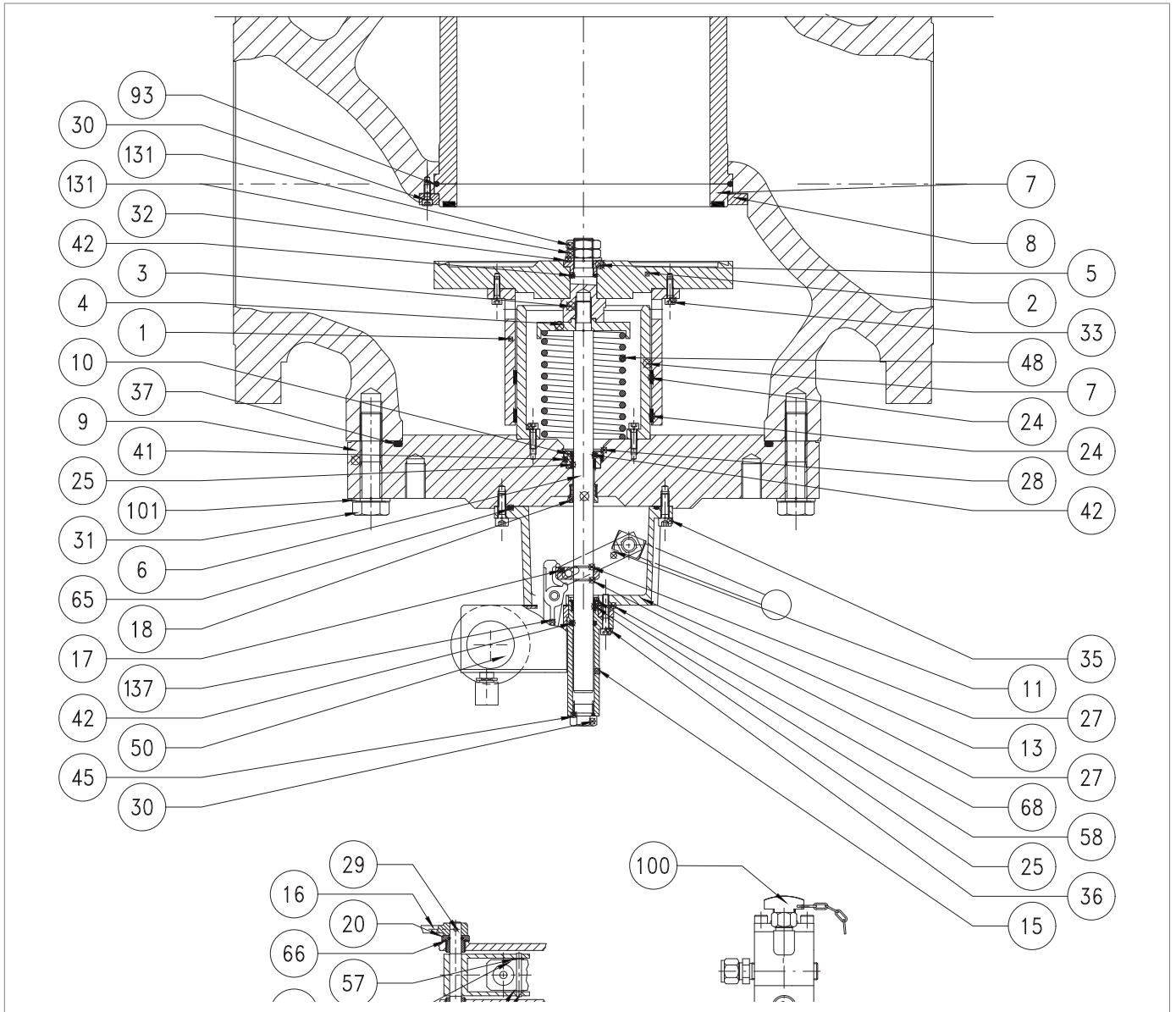

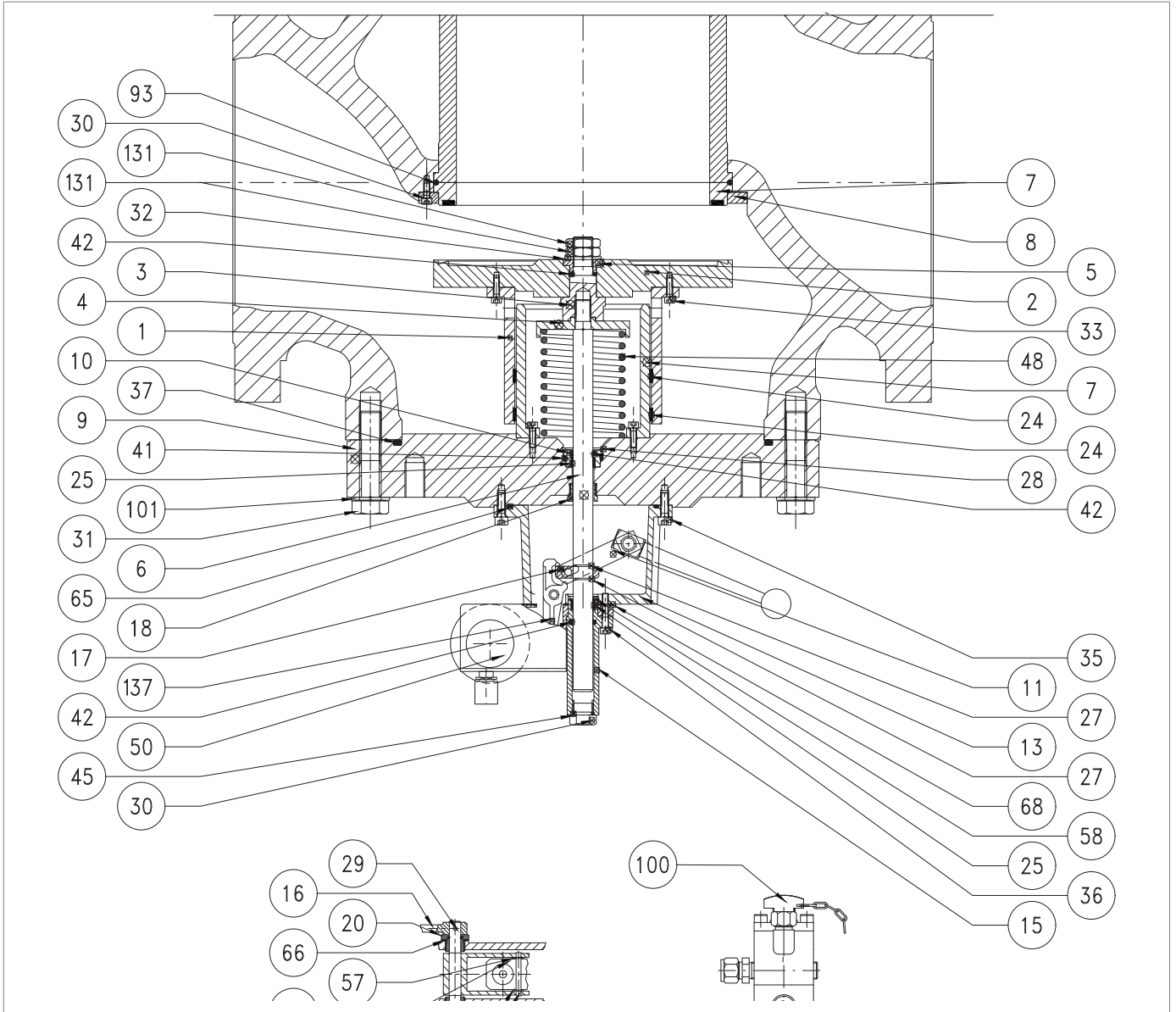


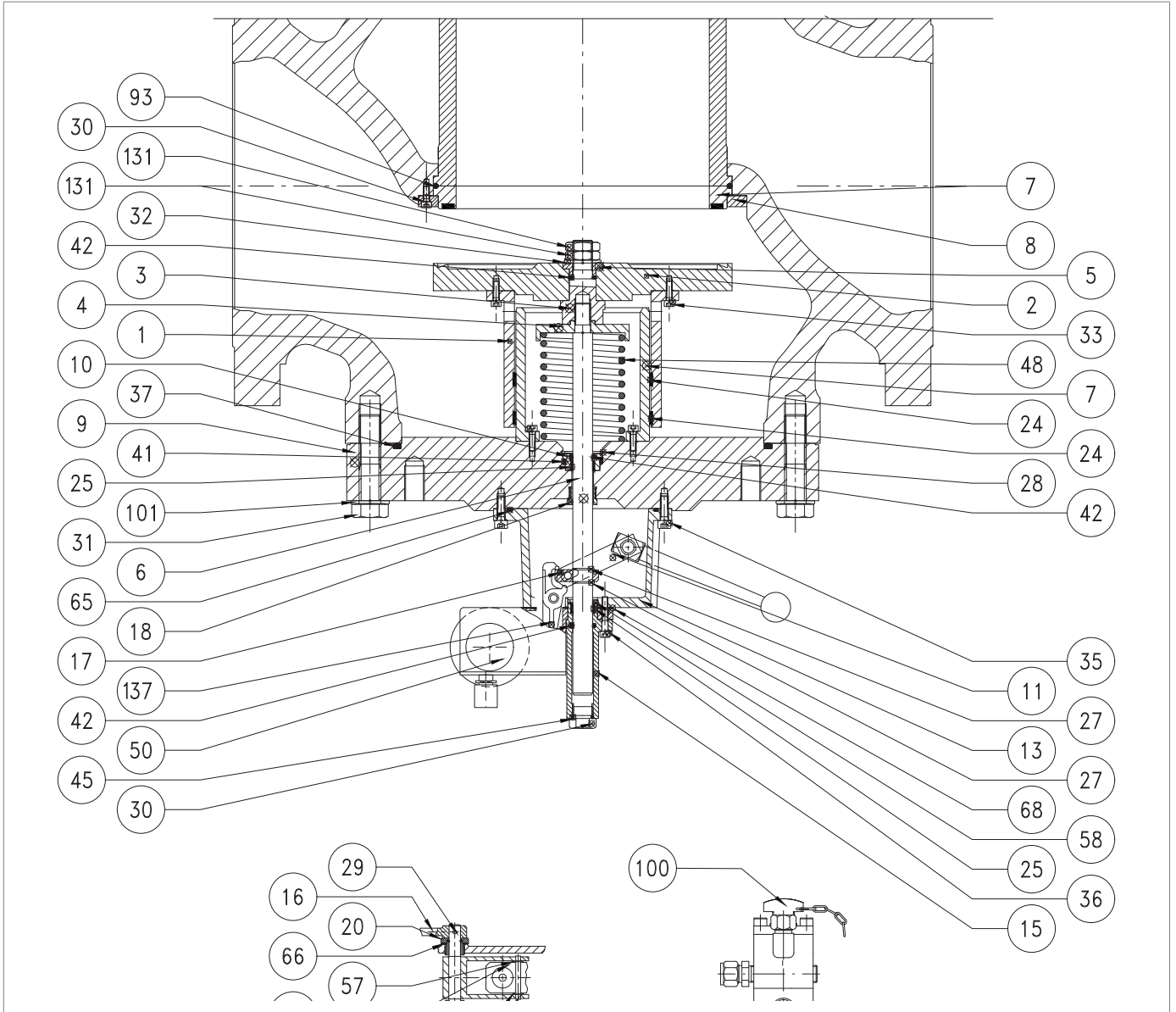
Fig. 9.73. Built-in slam-shut valve SB/82 DN 10"

Step	Action
1	 WARNING! In this step, support the built-in SB/82 slam-shut valve.
2	Undo and remove the screws (31).
3	Remove the SB/82 built-in slam-shut valve and place it on a shock-proof surface.
4	Remove the O-ring (37) from the flange (9) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
5	Unscrew and remove the nuts (131) together with the washer (32).
6	Remove the plug (2) together with the plug sleeve (1) and the bush (5).
7	Remove the bush (5).
8	Remove the O-ring (42) from the bush (5) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
9	Undo and remove the screws (33).
10	Separate the plug (2) from the plug sleeve (1).
11	Remove the I/DWR rings (24) from the plug sleeve (1) and replace them, taking care to lubricate them with synthetic grease.  NOTE! Before inserting the replacement I/DWR ring, clean the retaining slots with a cleaning solution.
12	Unscrew and remove the extension (3) from the stem (6).
13	Remove the spring (48) and the spring support (4).
14	Undo and remove the screws (22) of the pressure switch.
15	Remove the lid (19) and the gasket (29).
16	Undo the side screws (137) inside the control pressure switch.
17	Undo the screws (36).
18	Remove the cup (15).
19	Remove the O-ring (42) from the cup (15) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
20	Remove the cap (30).
21	Remove the O-ring (45) from the cap (30) and replace it, taking care to lubricate it with synthetic grease.  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
22	Remove the seeger ring (58) from the cup (15).







Built-in slam-shut valve SB/82 DN 10"

Step	Action
23	Remove the I/DWR ring (25) from the cup (15) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement I/DWR ring, clean the retaining slots with a cleaning solution.
24	Place the seeger ring (58) in the cup (15).
25	Take out the pressure switch unit. NOTE! For the maintenance procedure of the pressure switch unit, refer to the relative table.
26	Undo and remove the screws (35).
27	Remove the intermediate body (13).
28	Remove the stem (6) taking care not to damage it.
29	Remove the seeger ring (28) from the flange (9).
30	Remove the bush (10).
31	Remove the O-ring (41) from the flange (9) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
32	Remove the O-ring (42) from the bush (10) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
33	Fit the valve seat (10), taking care not to damage the O-ring (41).
34	Place the seeger ring (28) in the flange (9).
35	Place the stem (6) in the bush (10). NOTE! Lubricate the stem surface with silicone grease.
36	Fit the intermediate body (13).
37	Fit the pressure switch unit.
38	Insert and fix the screws (35) according to the following tightening torque: • DN 10" > tab. 9,105 NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.
39	Fit the cup (15).
40	Insert and fix the side screws (137) into the pressure switch according to the following tightening torque: • DN 10" > tab. 9,105 NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.



Built-in slam-shut valve SB/82 DN 10"

Step	Action
41	Insert and fix the screws (36) according to the following tightening torque: <ul style="list-style-type: none"> • DN 10" > tab. 9,105 <div style="border: 1px solid black; padding: 5px;">  NOTE! </div> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
42	Fit and secure the cap (30).
43	Fit the gasket (29) and the lid (19).
44	Insert and fix the screws (22).
45	Place the plug sleeve (1) on the plug (2) and
46	Insert and fix the screws (33) according to the following tightening torque: <ul style="list-style-type: none"> • DN 10" > tab. 9,105 <div style="border: 1px solid black; padding: 5px;">  NOTE! </div> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
47	Fit the bush (5) in the plug (2).
48	Put the spring (48) and spring support (4) in place.
49	Position and screw the extension (3).
50	Remove the plug (2) together with the plug sleeve (1).
51	Position and secure the nuts (31), together with the washer (32).
52	<div style="background-color: #f4a460; padding: 5px;">  WARNING! </div> <p>During the next steps, support the SB/82 slam-shut valve so as to prevent any falls.</p>
53	Put the SB/82 built-in slam-shut valve in place.
54	Insert and fix the screws (31) according to the following tightening torque: <ul style="list-style-type: none"> • DN 10" > tab. 9,105 <div style="border: 1px solid black; padding: 5px;">  NOTE! </div> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>

Tab. 9.142.

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.10 - HP2/2 BYPASS DEVICE MAINTENANCE PROCEDURE

 **NOTE!**

For further information refer to the relevant table.

9.4.11 - MAINTENANCE PROCEDURE FOR 102M/102MH - 105M/105MH PRESSURE SWITCHES

9.4.11.1 - PRESSURE SWITCH MOD. 102M/102MH

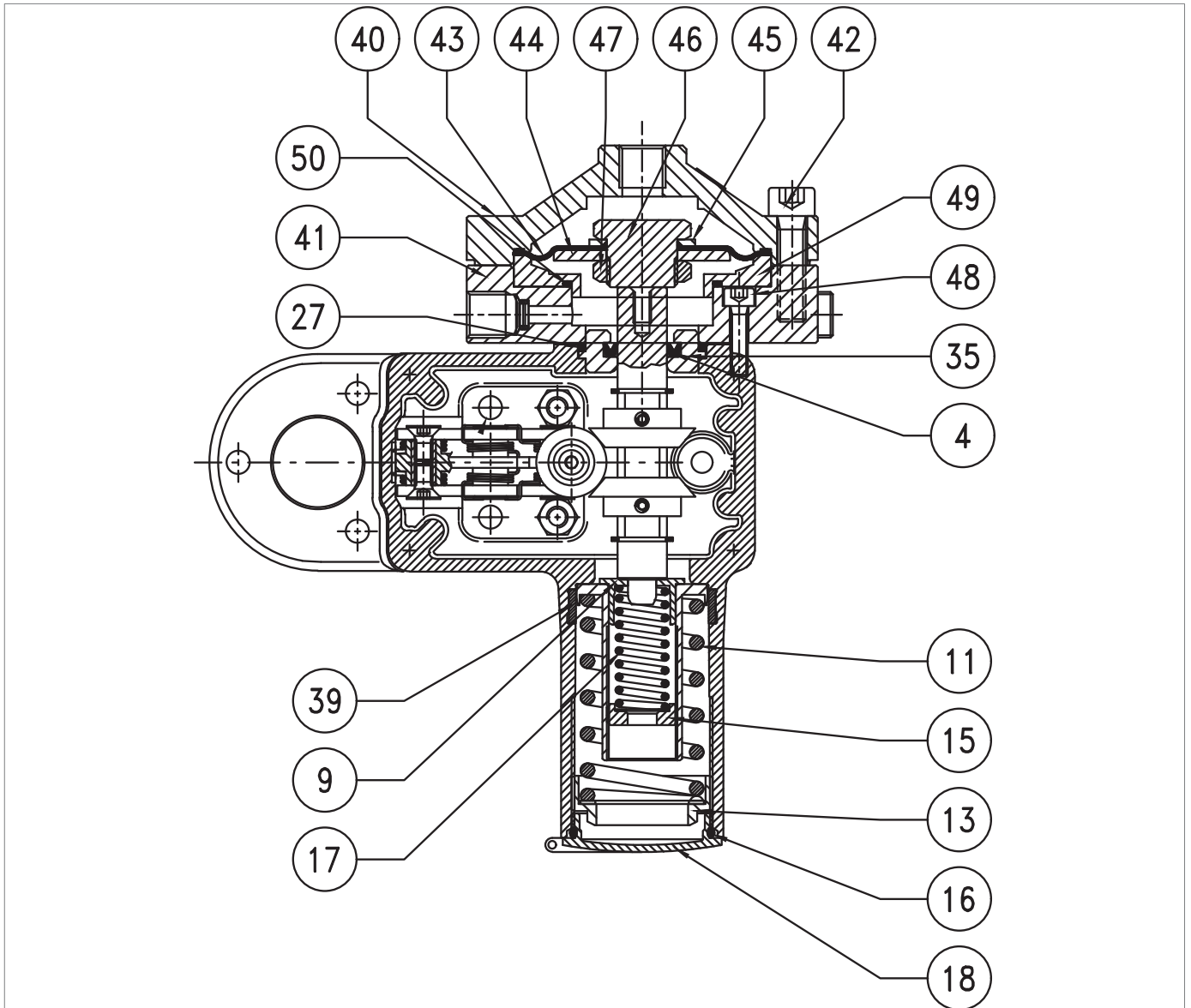
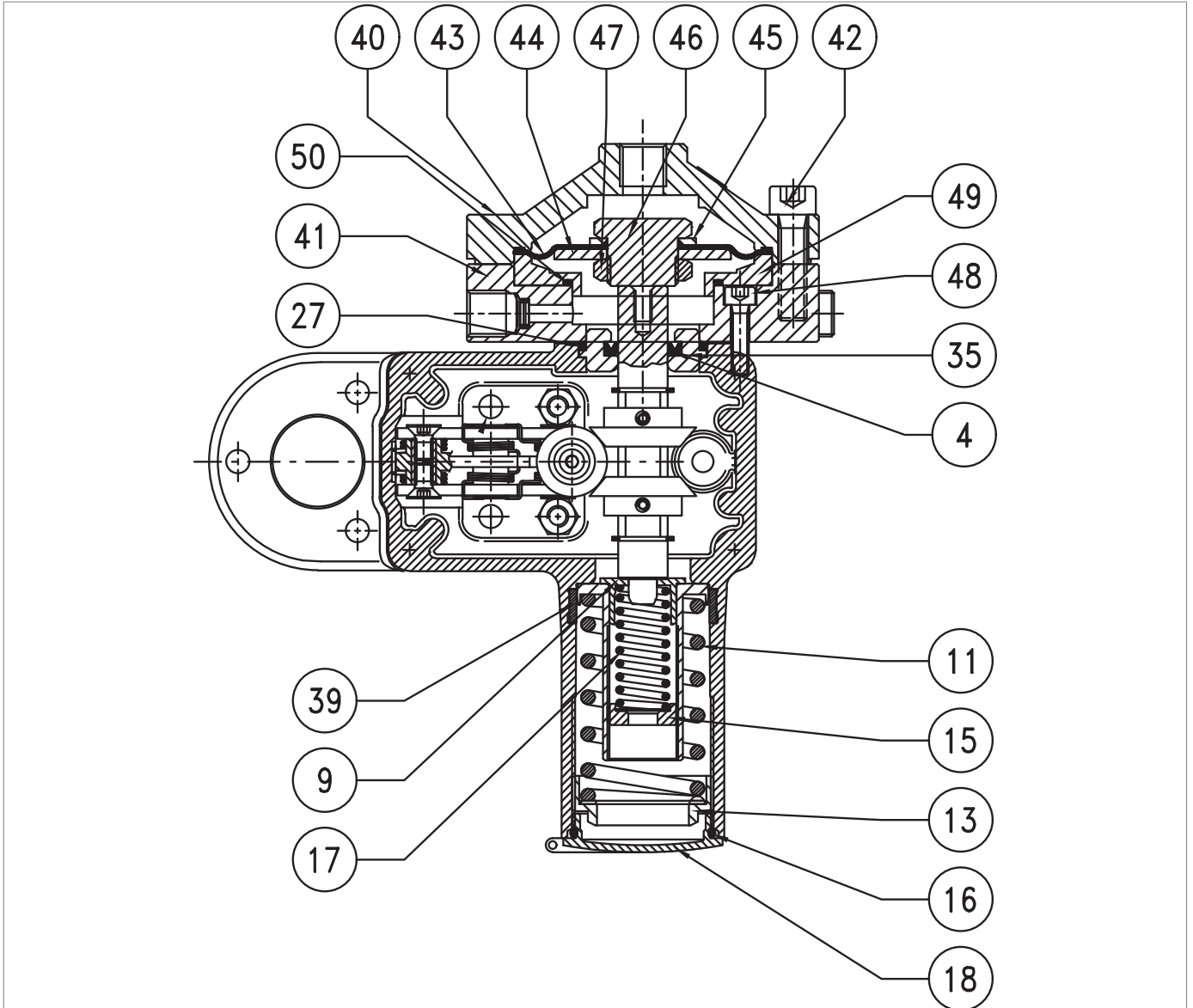


Fig. 9.74. Pressure switch Mod. 102M/102MH

Step	Action
1	Unscrew and remove the cap (18).
2	Remove the O-ring (16) from the lid (18) and replace it, taking care to lubricate it with synthetic grease. ! NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
3	Completely release the spring (11) by turning the ring nut (13).
4	Completely release the minimum pressure spring (17) by adjusting the ring nut (15). ! NOTE! There might not be a minimum pressure spring.
5	Remove the ring nut (13), the spring (11) and the spring support (17).
6	Remove the I/DWR ring (39) from the pressure switch sleeve and replace it, taking care to lubricate it with synthetic grease. ! NOTE! Before inserting the replacement I/DWR ring, clean the retaining slots with a cleaning solution.
7	Undo and remove the screws (42).
8	Remove the upper lid (40).
9	Take out the diaphragm unit (43, 44, 45, 46, 47).
10	Unscrew the nut (47).
11	Remove the diaphragm protection disc (44).
12	Remove and replace the diaphragm (43), taking care to lubricate the lanyard with synthetic grease. ! NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.
13	Fit the diaphragm protection disc (44).
14	Place and fix the nut (47) according to the following tightening torque: • Mod. 102 > tab. 9,106
15	Remove the ring (49).
16	Undo and remove the screws (48).
17	Remove the lower lid (41).
18	Remove the O-ring (50) from the nut (49) and replace it, taking care to lubricate it with synthetic grease. ! NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
19	Remove the bush (35).
20	Remove the O-ring (27) from the bush (35) and replace it, taking care to lubricate it with synthetic grease. ! NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.



Pressure switch Mod. 102M/102MH

Step	Action
21	<p>Remove the U-shaped ring (4) from the bush (35) and replace it, taking care to lubricate it with synthetic grease.</p> <p>NOTE! Before inserting the replacement U-ring, clean the retaining slots with a cleaning solution.</p>
22	<p>Position the bush (35) together with the O-ring (27).</p> <p>NOTE! Before inserting the bush (35), lubricate the inner surface with silicone grease.</p>
23	<p>Fit the lower lid (41).</p> <p>NOTE! Make sure there is a gasket between the lower lid and the pressure switch body.</p>
24	<p>Insert and fix the screws (48) according to the following tightening torque:</p> <ul style="list-style-type: none"> • Mod. 102 > tab. 9,106 <p>NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
25	Put the diaphragm unit in place (43, 44, 45, 46, 47).
26	Fit the lid (40).
27	<p>Insert and fix the screws (42) according to the following tightening torque:</p> <ul style="list-style-type: none"> • Mod. 102 > tab. 9,106 <p>NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>

Tab. 9.143.

! WARNING!

Ensure that all parts have been fitted correctly.

9.4.11.2 - PRESSURE SWITCH MOD. 103M/103MH

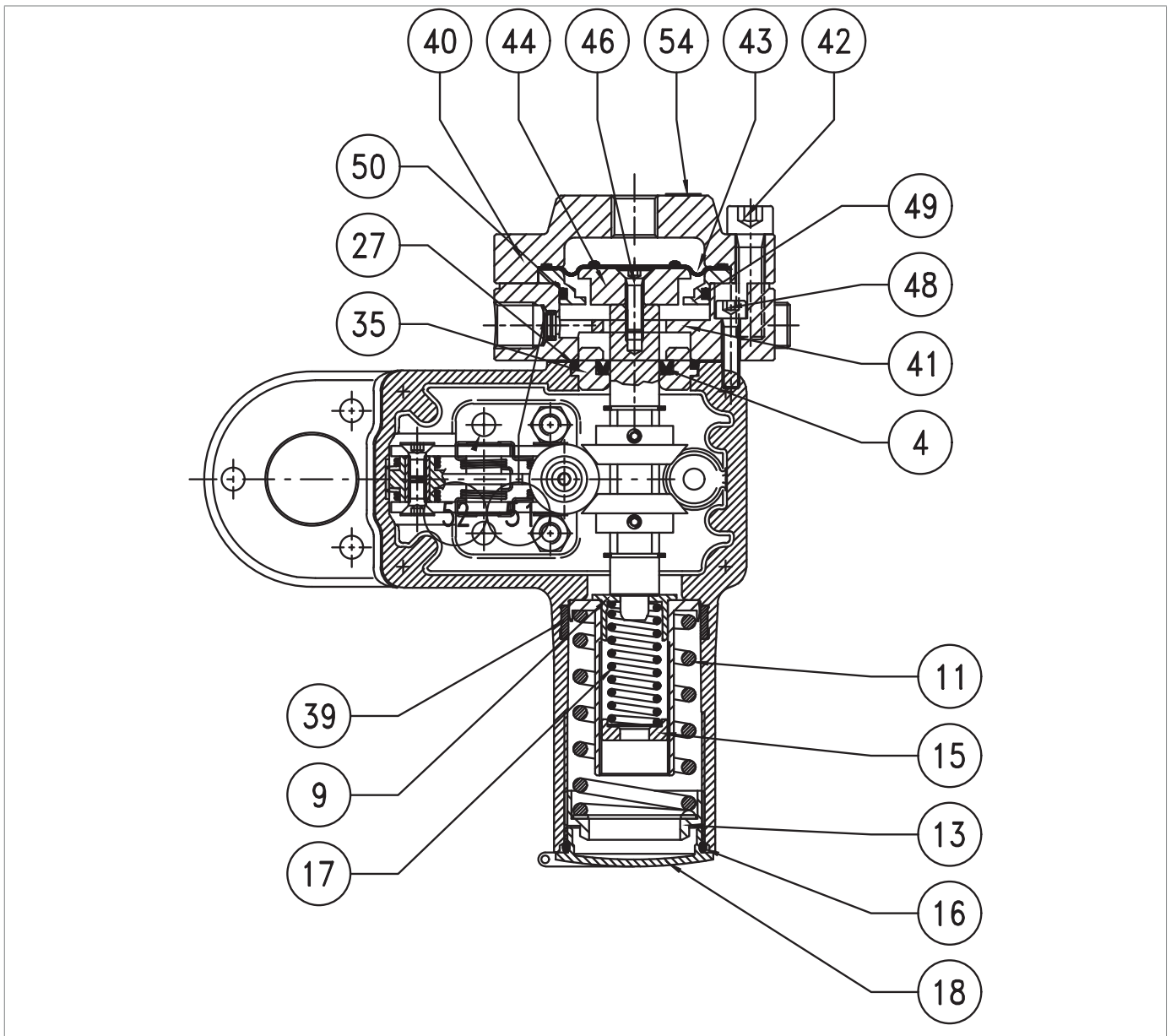
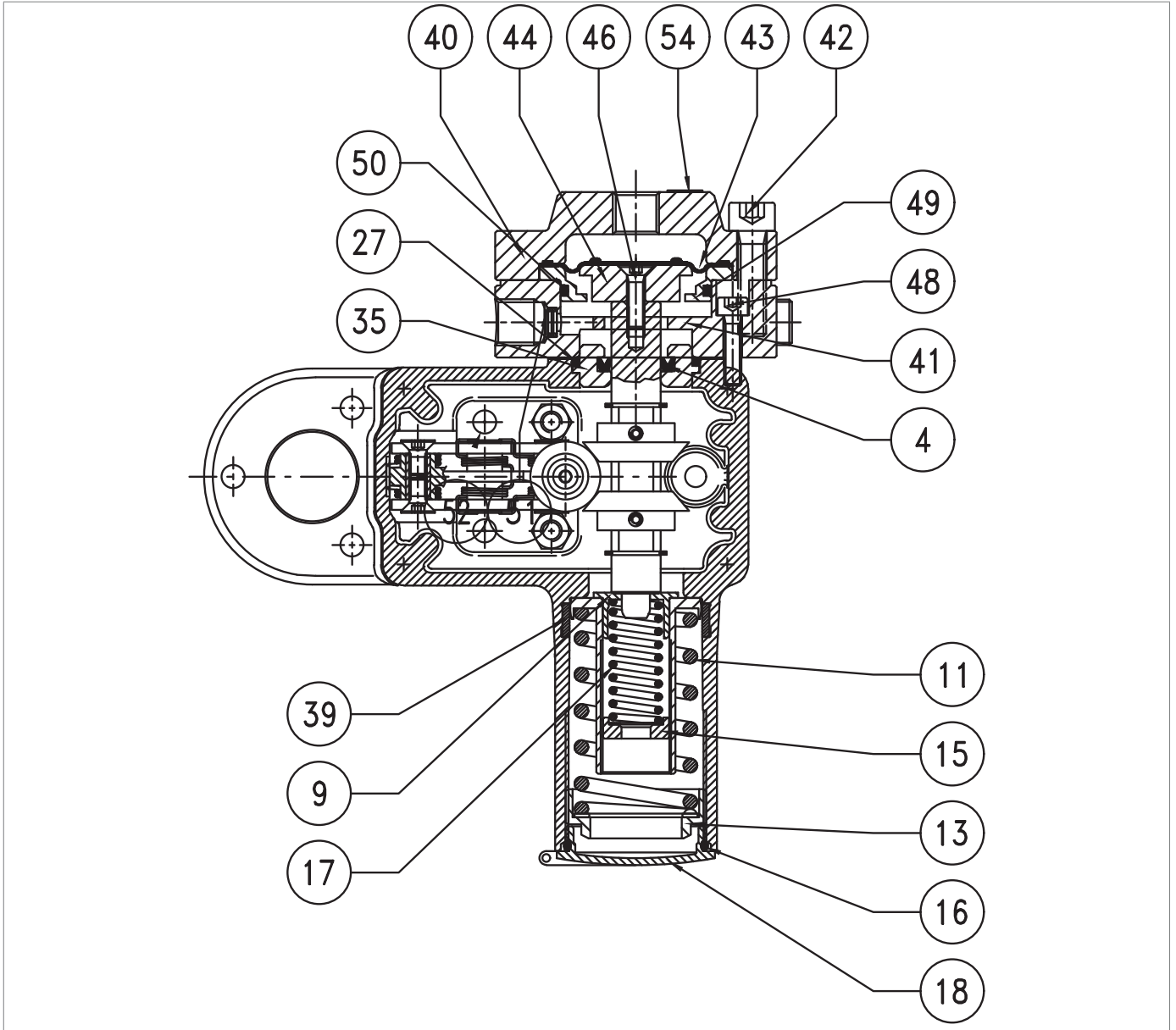


Fig. 9.75. Pressure switch Mod. 103M/103MH

Step	Action
1	Unscrew and remove the cap (18).
2	Remove the O-ring (16) from the lid (18) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
3	Completely release the spring (11) by turning the ring nut (13).
4	Completely release the minimum pressure spring (17) by adjusting the ring nut (15). NOTE! There might not be a minimum pressure spring.
5	Remove the ring nut (13), the spring (11) and the spring support (17).
6	Remove the I/DWR ring (39) from the pressure switch sleeve and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement I/DWR ring, clean the retaining slots with a cleaning solution.
7	Undo and remove the screws (42).
8	Remove the upper lid (40).
9	Remove and replace the diaphragm (43), taking care to lubricate the lanyard with synthetic grease. NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution.
10	Undo and remove the screws (46).
11	Remove the ring (49).
12	Remove the O-ring (50) from the ring (49) and replace it. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
13	Undo and remove the screws (48).
14	Remove the lower lid (41).
15	Remove the bush (35).
16	Remove the O-ring (27) from the bush (35) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
17	Remove the U-shaped ring (4) from the bush (35) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement U-ring, clean the retaining slots with a cleaning solution.
18	Position the bush (35) together with the O-ring (27). NOTE! Before inserting the bush (35), lubricate the inner surface with silicone grease.



Pressure switch Mod. 103M/103MH

Step	Action
19	Remove the lower lid (41)
20	Insert and fix the screws (48) according to the following tightening torque: <ul style="list-style-type: none"> • Mod. 103 > tab. 9.107 <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <ul style="list-style-type: none"> • Tighten the screws according to the cross diagram in paragraph 9.4.2.2; • Make sure there is a gasket between the lower lid and the pressure switch body. </div>
21	Fit the diaphragm protection disc (44), then insert and secure the screw (46). <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Before inserting the screw (46), apply thread locking glue.</p> </div>
22	Insert and fix the screws (46) according to the following tightening torque: <ul style="list-style-type: none"> • Mod. 103 > tab. 9.107 <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <ul style="list-style-type: none"> • Tighten the screws according to the cross diagram in paragraph 9.4.2.2; • Before inserting the screw (46), apply thread locking glue. </div>
23	Fit the diaphragm (43).
24	Fit the lid (40).
25	Insert and fix the screws (42) according to the following tightening torque: <ul style="list-style-type: none"> • Mod. 103 > tab. 9.107 <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p> </div>

Tab. 9.144.

! WARNING!

Ensure that all parts have been fitted correctly.

9.4.11.3 - PRESSURE SWITCH MOD. 104M/104MH - 105M/105MH

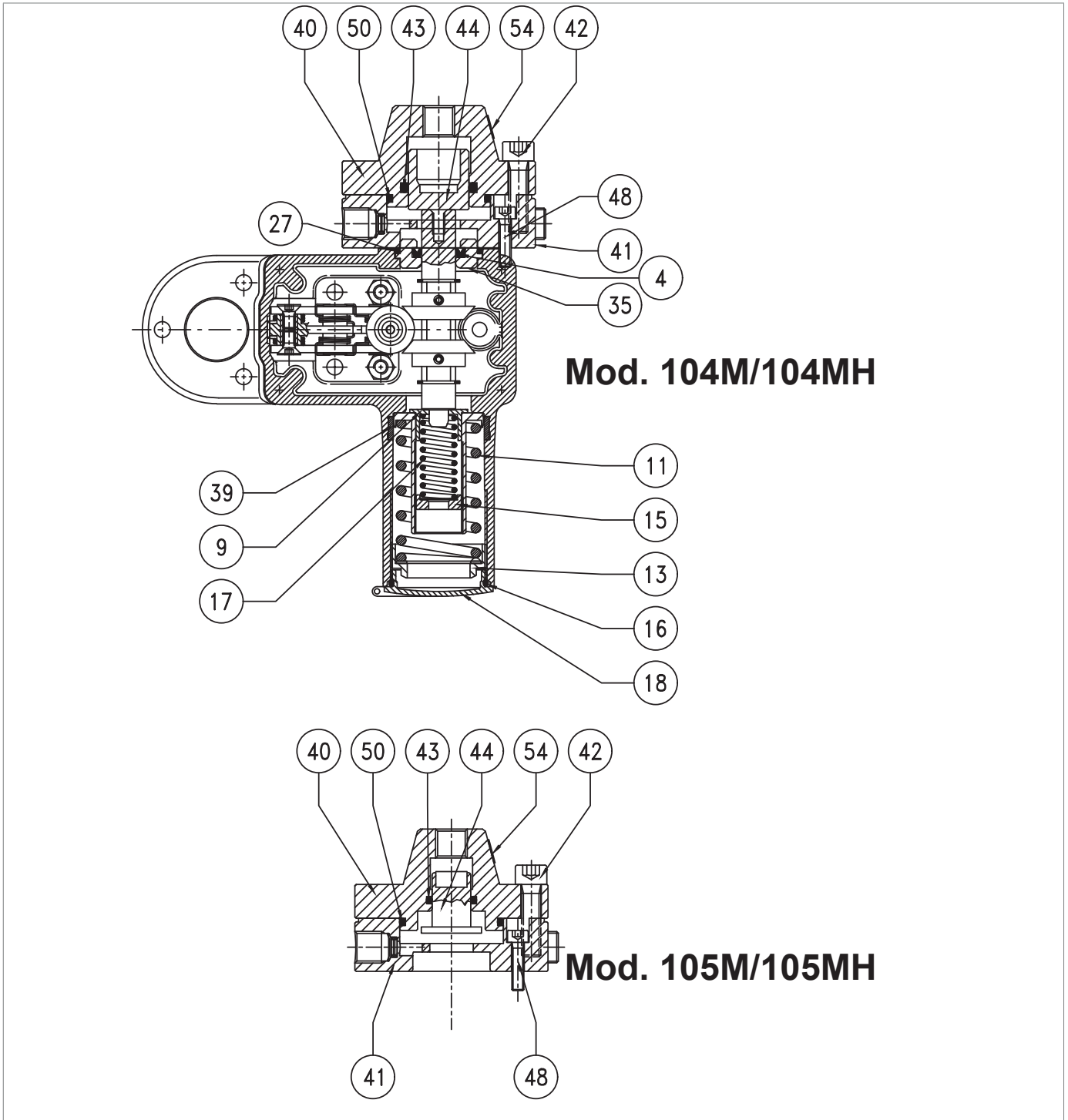
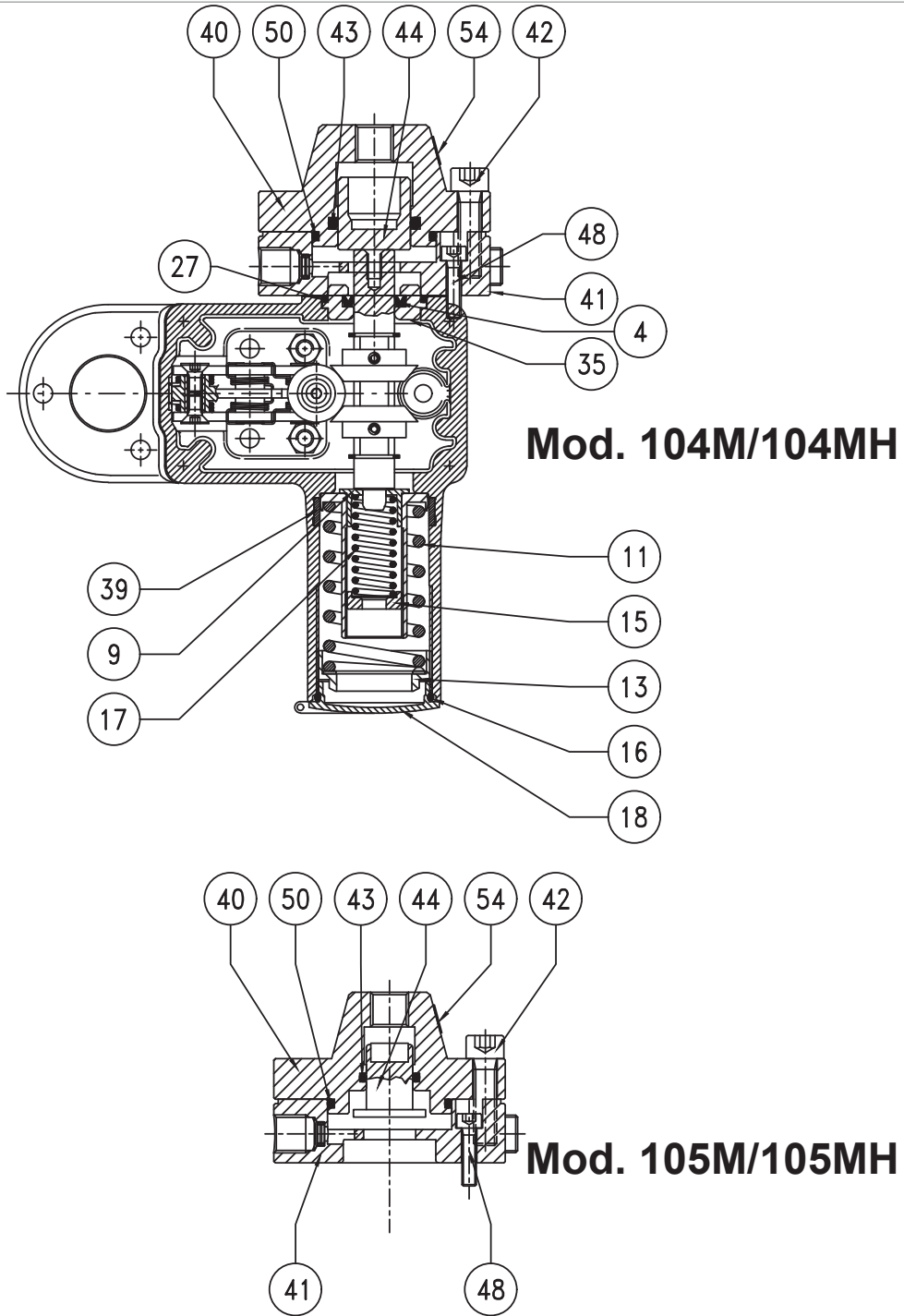





Fig. 9.76. Pressure switch Mod. 104M/104MH - 105M/105MH

Step	Action
1	Unscrew and remove the cap (18).
2	Remove the O-ring (16) from the lid (18) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
3	Completely release the spring (11) by turning the ring nut (13).
4	Completely release the minimum pressure spring (17) by adjusting the ring nut (15). NOTE! There might not be a minimum pressure spring.
5	Remove the ring nut (13), the spring (11) and the spring support (17).
6	Remove the I/DWR ring (39) from the pressure switch sleeve and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement I/DWR ring, clean the retaining slots with a cleaning solution.
7	Undo and remove the screws (42).
8	Remove the upper lid (40) together with the piston (44).
9	Pull the piston (44) out of the upper lid (40).
10	Remove the O-rings (43, 50) from the upper lid (40) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
11	Refit the piston (44) into the upper lid (40).
12	Undo and remove the screws (48).
13	Remove the lower lid (41).
14	Remove the bush (35).
15	Remove the O-ring (27) from the bush (35) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
16	Remove the U-shaped ring (4) from the bush (35) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement U-ring, clean the retaining slots with a cleaning solution.
17	Position the bush (35) together with the O-ring (27). NOTE! Before inserting the bush (35), lubricate the inner surface with silicone grease.



Pressure switch Mod. 104M/104MH - 105M/105MH

Step	Action
18	Fit the lower lid (41). <div style="border: 1px solid blue; padding: 5px; margin-top: 10px;">  NOTE! Make sure there is a gasket between the lower lid and the pressure switch body. </div>
19	Insert and fix the screws (48) according to the following tightening torques: <ul style="list-style-type: none"> • Mod. 104-105 > tab. 9.108. <div style="border: 1px solid blue; padding: 5px; margin-top: 10px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
20	Fit the upper lid (40).
21	Insert and fix the screws (42) according to the following tightening torques: <ul style="list-style-type: none"> • Mod. 104-105 > tab. 9.108. <div style="border: 1px solid blue; padding: 5px; margin-top: 10px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>

Tab. 9.145.

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.12 - HB/97 BUILT-IN SLAM-SHUT VALVE MAINTENANCE PROCEDURE

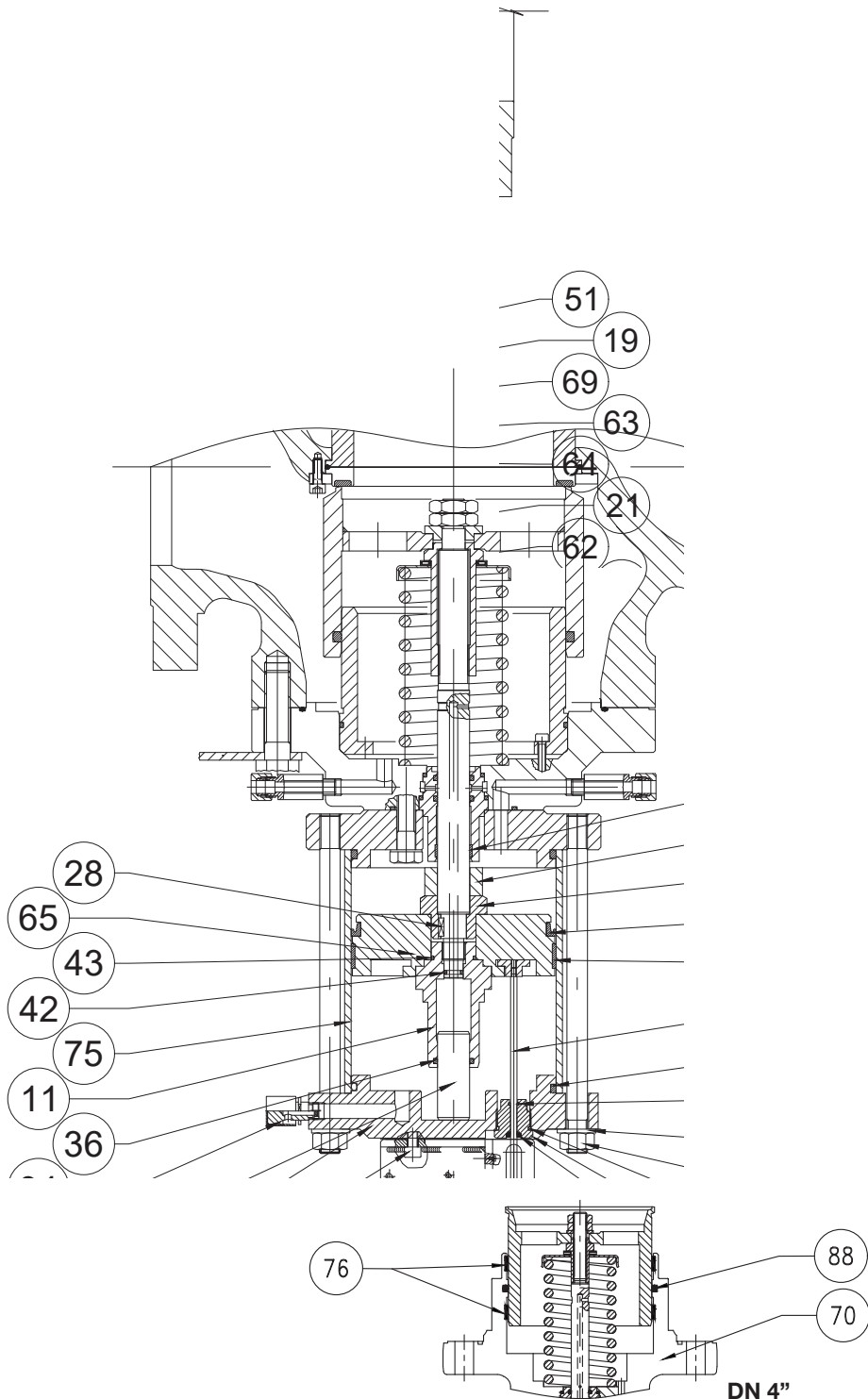
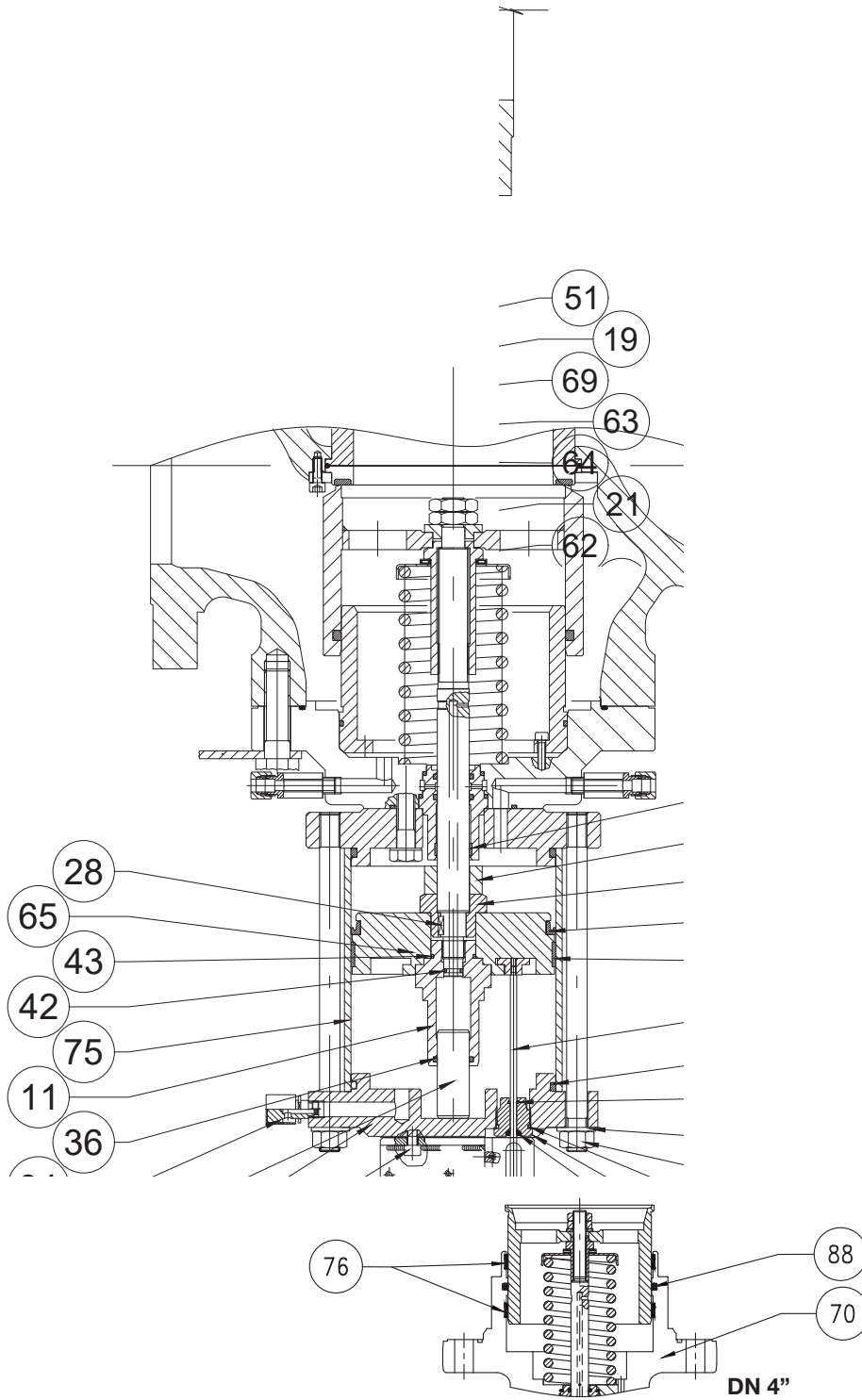








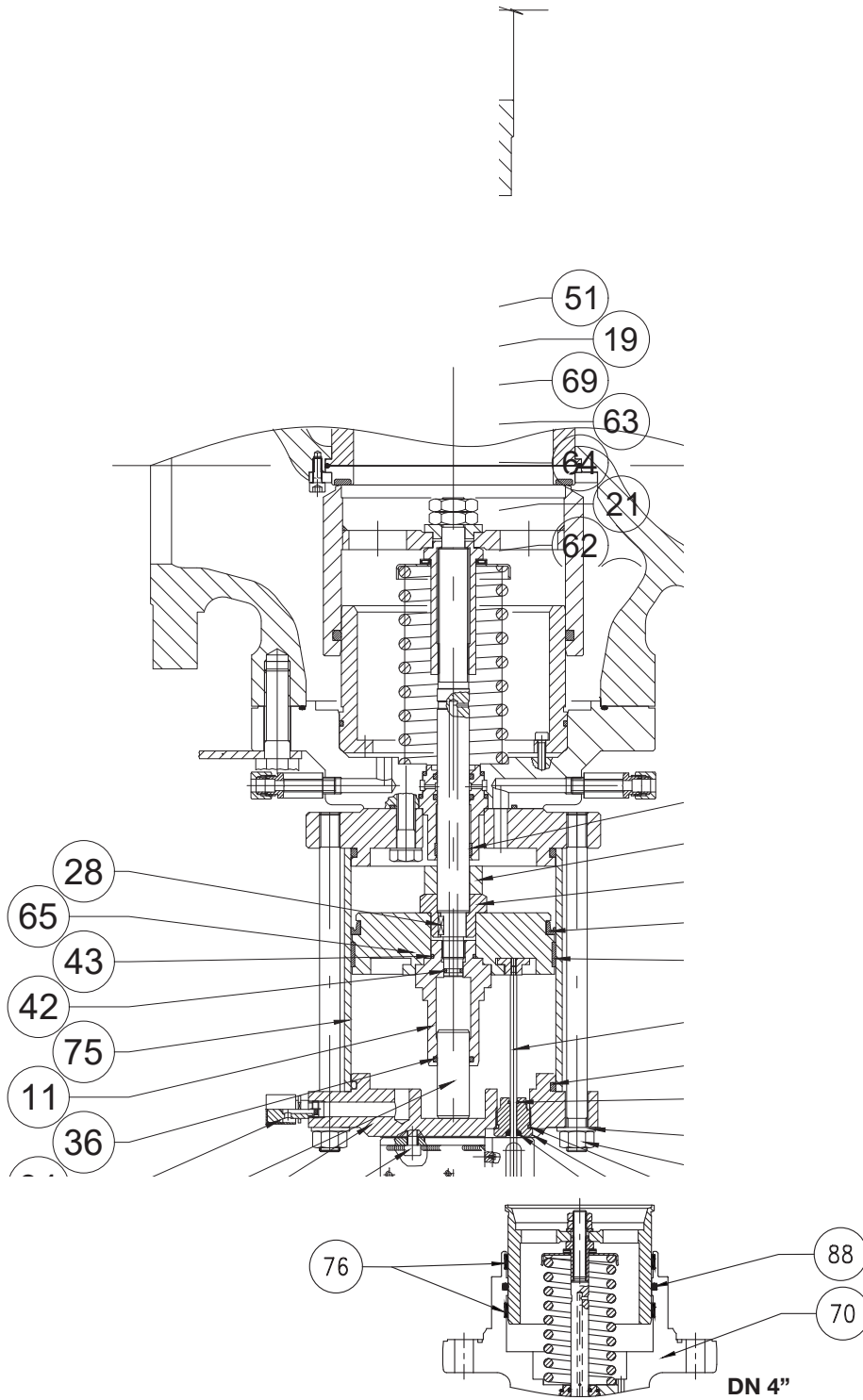
Fig. 9.77. HB/97 built-in slam-shut valve

Step	Action
1	<p>! NOTE!</p> <p>To disconnect the LINE OFF 2.0 device, refer to paragraph 9.4.13.1.</p>
2	Undo and remove the screws (81).
3	Remove the bracket (82).
4	Unscrew and remove the nut (59) together with the indicator disc (60).
5	Unscrew and remove the nut (17).
6	Pull out the indicator rod (21).
7	<p>Remove the guide O-ring (45) from the nut (17) and replace it, taking care to lubricate it with synthetic grease.</p> <p>! NOTE!</p> <p>Before inserting the replacement guide ring, clean the retaining slots with a cleaning solution.</p>
8	<p>Remove the O-rings (46, 47) from the nut (17) and replace them, taking care to lubricate them with synthetic grease.</p> <p>! NOTE!</p> <p>Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.</p>
9	<p>Undo and remove the screws (35).</p> <p>! NOTE!</p> <p>In this step, support the built-in SB/97 slam-shut valve to prevent any falls.</p>
10	Remove the HB/97 built-in slam-shut valve and fit it vertically with the plug (71) on an anti-shock surface.
11	Unscrew and remove the nuts (67) together with the washers (68).
12	<p>Remove the flange (74).</p> <p>! NOTE!</p> <p>Check that the vent (94) is not clogged by dirt.</p>
13	<p>Remove the O-ring (62) from the flange (74) and replace it, taking care to lubricate it with synthetic grease.</p> <p>! NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
14	Remove the plating (75).
15	Fit the HB/97 built-in slam-shut valve sideways.
16	Unscrew and remove the nuts (33) together with the washer (23).
17	Remove the plug (71) and place it on an anti-shock surface.
18	<p>APPLICABLE TO DN 4" ONLY</p> <p>Remove the O-ring (88) from the plug guide (70) and replace it, taking care to lubricate it with synthetic grease.</p> <p>! NOTE!</p> <p>Before inserting the O-ring, clean the retaining slots with a cleaning solution.</p>



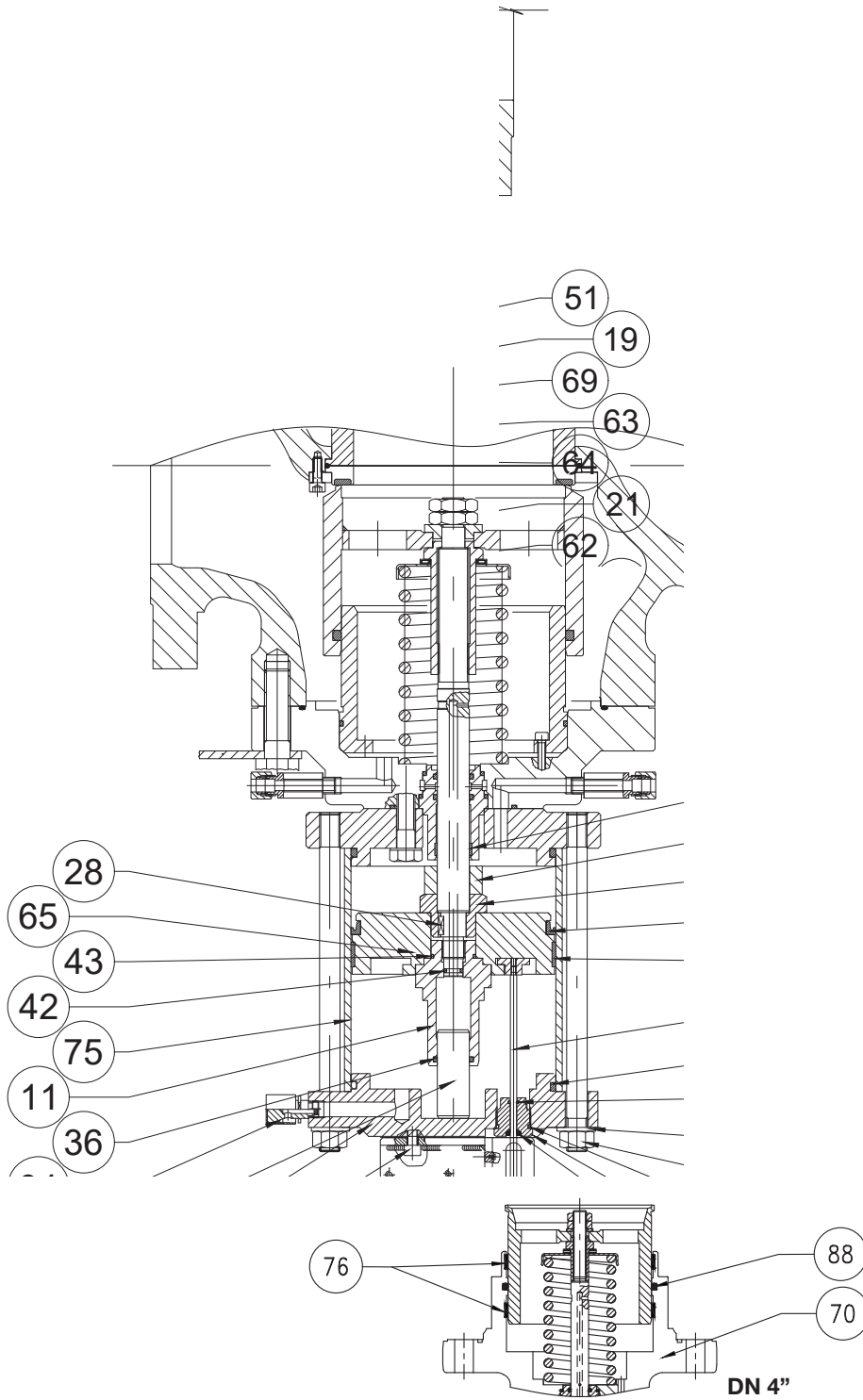
HB/97 built-in slam-shut valve

Step	Action
19	APPLICABLE TO DN 4" ONLY Remove the I/DWR rings (76) from the plug guide (70) and replace it, taking care to lubricate it with synthetic grease.
	<div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the I/DWR rings, clean the retaining slots with a cleaning solution. </div>
20	Remove the O-ring (88) from the plug (71) and replace it, taking care to lubricate it with synthetic grease.
	<div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
21	While keeping the nut (69) in place, unscrew and remove the lock nut (9).
	<div style="background-color: #f4a460; padding: 5px;">  WARNING! By unscrewing the lock nut (9), the spring (80) is released. </div>
22	Remove the radial bearing (30).
23	Remove the spring support (34) and the spring (80).
24	While keeping the nut (69) in place, unscrew and remove the balancing piston guide (11).
25	Remove the balancing piston (15) from the balancing piston guide (11).
26	Remove the O-rings (36, 43) from the balancing piston guide (11) and replace them, taking care to lubricate them with synthetic grease.
	<div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution. </div>
27	Fit the balancing piston (15) from the balancing piston guide (11).
28	Take out the piston (65).
29	Remove the U-shaped ring (63) from the bush (65) and replace it, taking care to lubricate it with synthetic grease.
	<div style="border: 1px solid black; padding: 5px;">  NOTE! <ul style="list-style-type: none"> • Before inserting the replacement U-ring, clean the retaining slots with a cleaning solution. • The concave part must face the flange (73). </div>
30	Remove the I/DWR ring (64) from the piston (65) and replace it, taking care to lubricate it with synthetic grease.
	<div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement I/DWR ring, clean the retaining slots with a cleaning solution. </div>
31	Take out the nut (69).
32	APPLICABLE TO DN 6" - 10" ONLY Remove the spacer (19).
	33
34	Remove the flange (73).








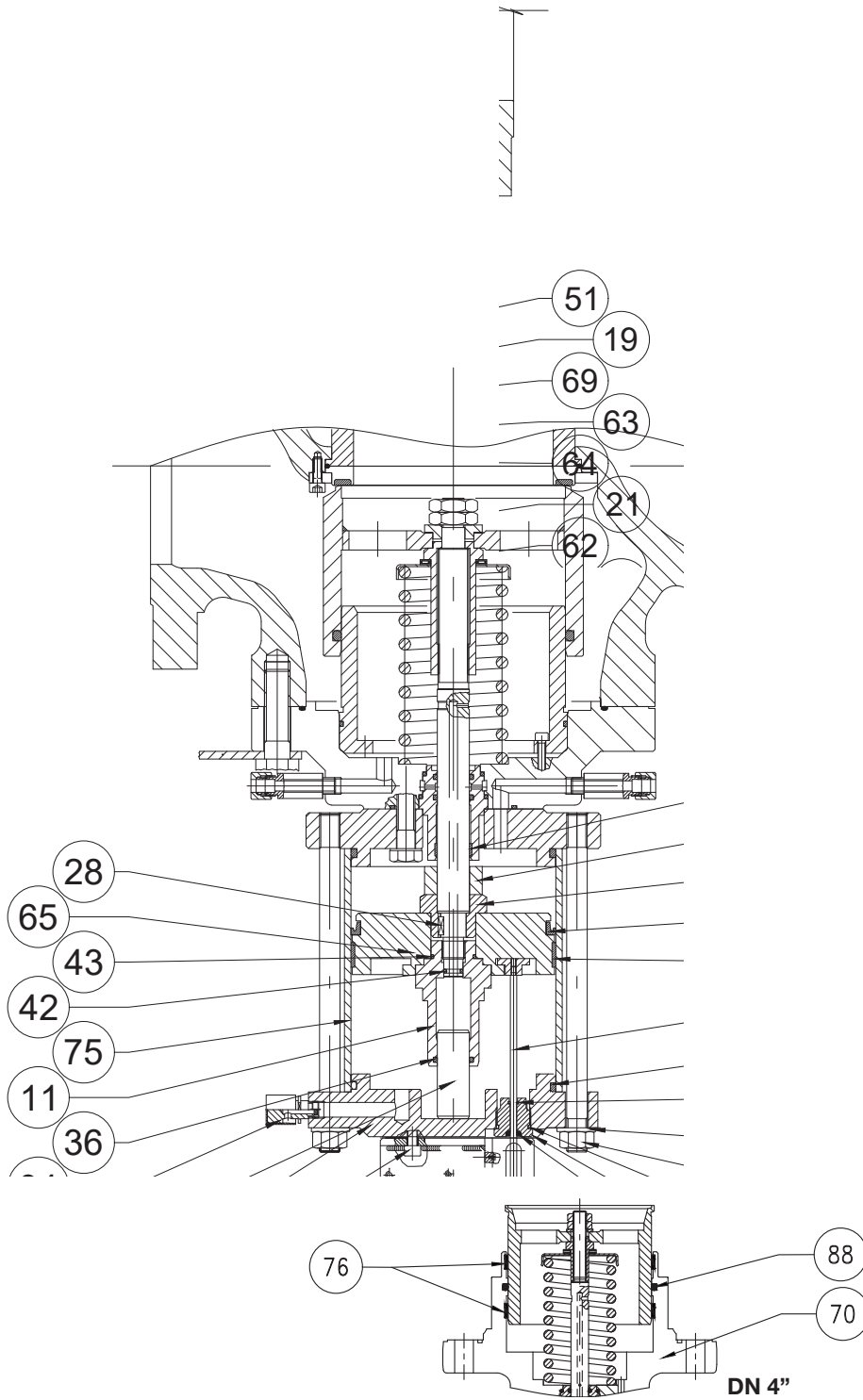
HB/97 built-in slam-shut valve

Step	Action
35	Remove the O-ring (62) from the flange (73) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
36	Remove the stem guide (20) together with the stem (6) and the key (28).
37	Remove the stem (6) from the stem guide (20).
38	Remove the I/DWR ring (51) from the stem guide (20) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement I/DWR ring, clean the retaining slots with a cleaning solution.
39	Remove the O-rings (36) from the stem guide (20) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
40	Remove the O-rings (40, 41) from the stem guide (20) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
41	Remove the O-ring (42) from the stem (6) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
42	APPLICABLE TO DN 6"- 10" ONLY Undo and remove the screws (86).
43	APPLICABLE TO DN 6"- 10" ONLY Take out the plug guide (72). NOTE! In this step, tighten some M6x50 screws into the threaded holes of the plug guide to remove it vertically.
44	Remove the screws M6x50.
45	APPLICABLE TO DN 6"- 10" ONLY Remove the O-ring (87) from the plug guide (72) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
46	APPLICABLE TO DN 6"- 10" ONLY Put the plug guide (72) in place.



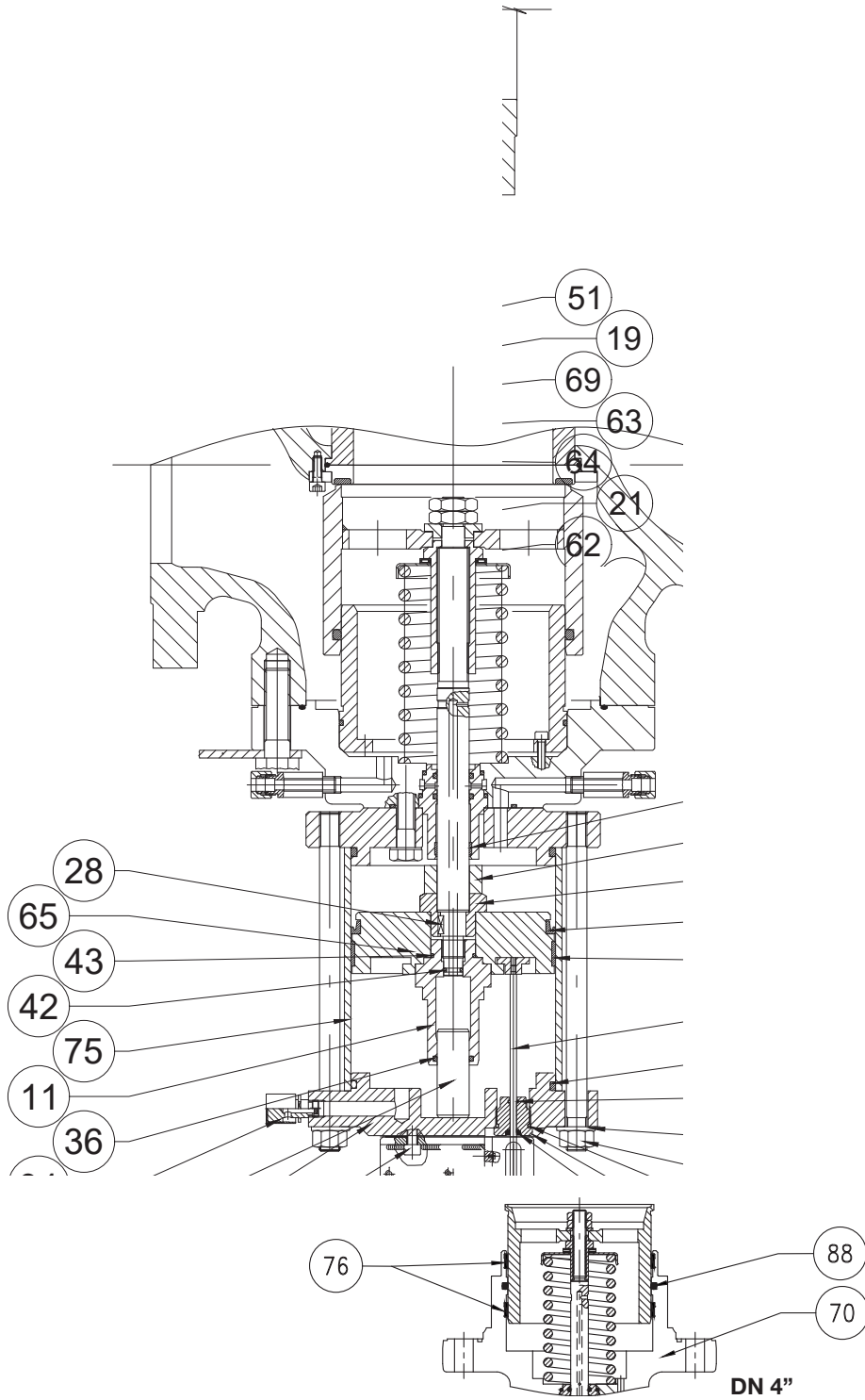
HB/97 built-in slam-shut valve

Step	Action
47	APPLICABLE TO DN 6" - 10" ONLY Insert and fix the screws (86) according to the following tightening torques: <ul style="list-style-type: none"> • DN 6" > tab. 9.110; • DN 8" > tab. 9.111; • DN 10" > tab. 9.112.
	<div style="border: 1px solid black; padding: 5px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
48	Insert the stem (6) together with the key (28) in the stem guide (20).
	<div style="border: 1px solid black; padding: 5px;">  NOTE! Clean and lubricate the stem surface with silicone grease; make sure that the key (28) is in the correct position in the stem (6). </div>
49	Insert the stem guide (20) together with the stem (6) into the plug guide (70).
50	Fit the flange (73).
	<div style="border: 1px solid black; padding: 5px;">  NOTE! Match the chamber pressurisation hole with the plug guide hole (70) </div>
51	Insert and fix the screws (27) together with the washers (137) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.109; • DN 6" > tab. 9.110; • DN 8" > tab. 9.111; • DN 10" > tab. 9.112.
	<div style="border: 1px solid black; padding: 5px;">  NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2. </div>
52	APPLICABLE TO DN 6" - 10" ONLY Insert the spacer (19).
53	Insert the nut (69).
	<div style="border: 1px solid black; padding: 5px;">  NOTE! Make sure that the key (28) is present and correctly positioned in the stem (6). </div>
54	Fit the piston (65).
55	Keeping the nut (69) in position, insert and fix the balancing piston guide (11) according to the tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.109; • DN 6" > tab. 9.110; • DN 8" > tab. 9.111; • DN 10" > tab. 9.112.
	56
57	Keeping the nut (69) in position, insert and fix the nut (9) according to the following tightening torques: <ul style="list-style-type: none"> • DN 4" > tab. 9.109; • DN 6" > tab. 9.110; • DN 8" > tab. 9.111; • DN 10" > tab. 9.112.
	58




HB/97 built-in slam-shut valve

Step	Action
59	<p>Fit the nut (23) together with the nuts (33) and fix them according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 4" > tab. 9.109; • DN 6" > tab. 9.110; • DN 8" > tab. 9.111; • DN 10" > tab. 9.112. <p>NOTE! Before fitting the external nut (33), apply some thread locking glue.</p>
60	<p>Fit the plating (75).</p> <p>NOTE! Before refitting the plating (75), clean and lubricate the internal surface with silicone grease.</p>
61	<p>Fit the upper flange (74).</p> <p>NOTE! The stroke indicator hole must be perpendicular to the flow and visible in the in-line installation.</p>
62	<p>Insert and fix the nuts (67) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 4" > tab. 9.109; • DN 6" > tab. 9.110; • DN 8" > tab. 9.111; • DN 10" > tab. 9.112.
63	<p>Remove the O-ring (37) from the flange (70) and replace it, taking care to lubricate it with synthetic grease.</p> <p>NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
64	<p>Put the HB/97 built-in slam-shut valve back in place.</p> <p>NOTE! During this step, support the slam-shut device to prevent any falls.</p>
65	<p>Insert and fix the screws (35).</p> <p>NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
66	<p>Insert the indicator rod (21).</p> <p>NOTE! The rod must be fitted into the slot in the piston (65).</p>
67	<p>Insert and fix the screws (17).</p>
68	<p>Put the bracket (82) in place.</p>
69	<p>Insert and fix the screws (81) according to the following tightening torques:</p> <ul style="list-style-type: none"> • DN 4" > tab. 9.109; • DN 6" > tab. 9.110; • DN 8" > tab. 9.111; • DN 10" > tab. 9.112. <p>NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>



HB/97 built-in slam-shut valve

Step	Action
70	Fit and set the indicator washer (59) to "0".
71	Insert and fix the screws (60).
72	<div style="border: 1px solid blue; padding: 5px;">  NOTE! To reconnect the LINE OFF 2.0, refer to table 9.148. </div>
<i>Tab. 9.146.</i>	

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.13 - LINE OFF 2.0 MAINTENANCE PROCEDURE

9.4.13.1 - LINE OFF 2.0 DISCONNECTION

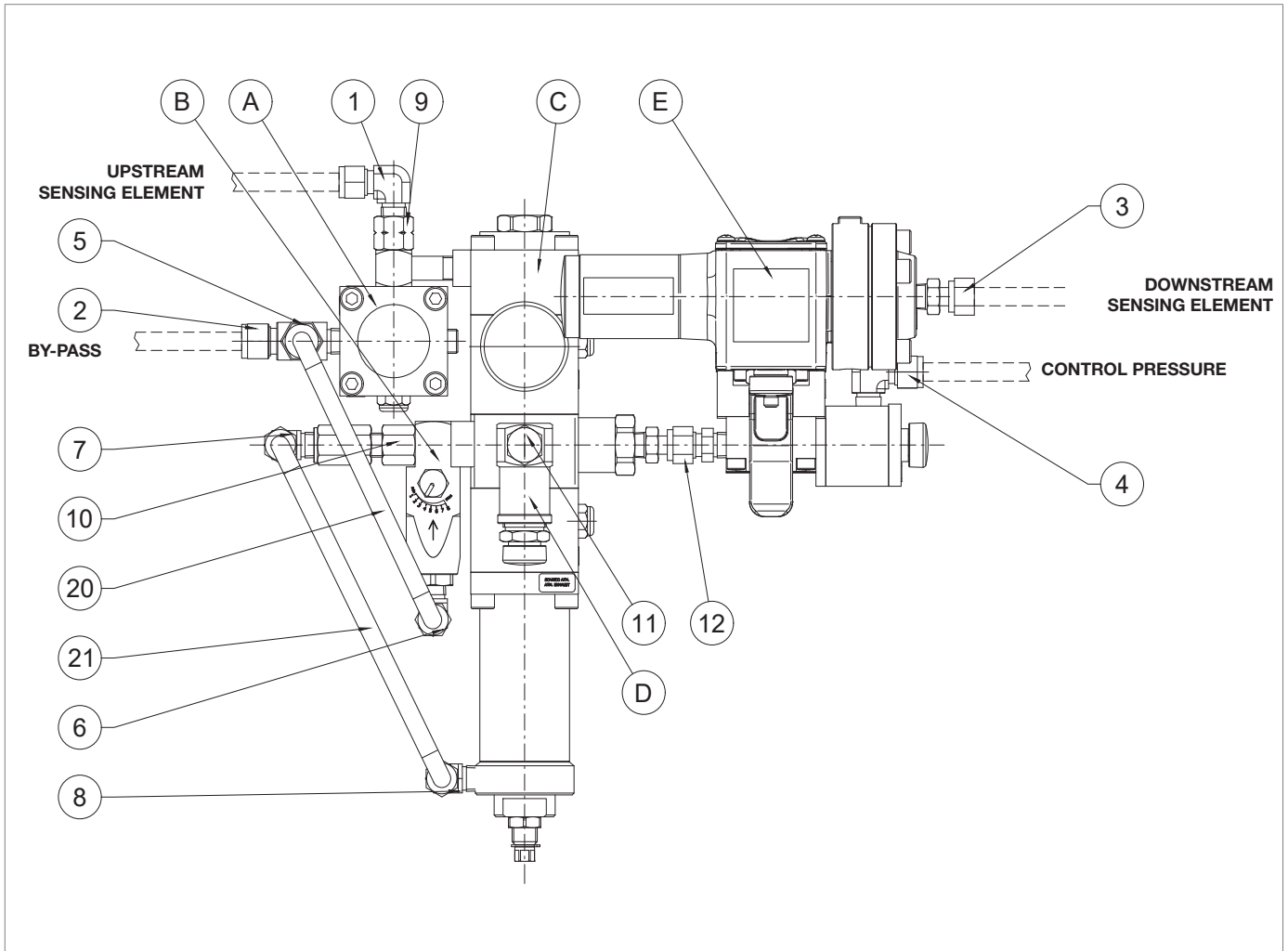


Fig. 9.78. LINE OFF 2.0

To disconnect, proceed as follows:

Step	Action
1	Disconnect the pipes from the fittings (1, 2, 3, 4).
2	Unscrew and remove the fixing screw to disconnect the LINE OFF 2.0.
3	Disconnect the pipe (20) from the fittings (5, 6).
4	Disconnect the pipe (21) from the fittings (7, 8).
5	Remove assembly "A" (bypass device HP2/2) and adjust the fitting (9).
6	Remove assembly "B" (lamination valve AR100) and adjust the fitting (10).
7	Remove assembly "D" (safety valve VS/FI) and adjust the fitting (11).
8	Remove assembly "E" (valve 3/2 and control pressure switch) from assembly "C" (regulator R44/SS) and adjust the fitting (12).

Tab. 9.147.

To disconnect, proceed as follows:

Step	Action
1	Remove assembly "E" (valve 3/2 and control device) from assembly "C" (regulator R44/SS) together with the fitting (12).
2	Remove assembly "D" (safety valve VS/FI) together with the fitting (11).
3	Remove assembly "B" (lamination valve AR100) together with the fitting (10).
4	Remove assembly "A" (bypass device HP2/2) together with the fitting (9).
5	Reconnect the pipe (21) together with the fittings (7, 8).
6	Reconnect the pipe (20) together with the fittings (5, 6).
7	Insert and tighten the fixing screw to put the LINE OFF 2.0 in place.
8	Reconnect the pipes together with the fittings (1, 2, 3, 4).

Tab. 9.148.

9.4.13.2 - HP2/2 BYPASS DEVICE

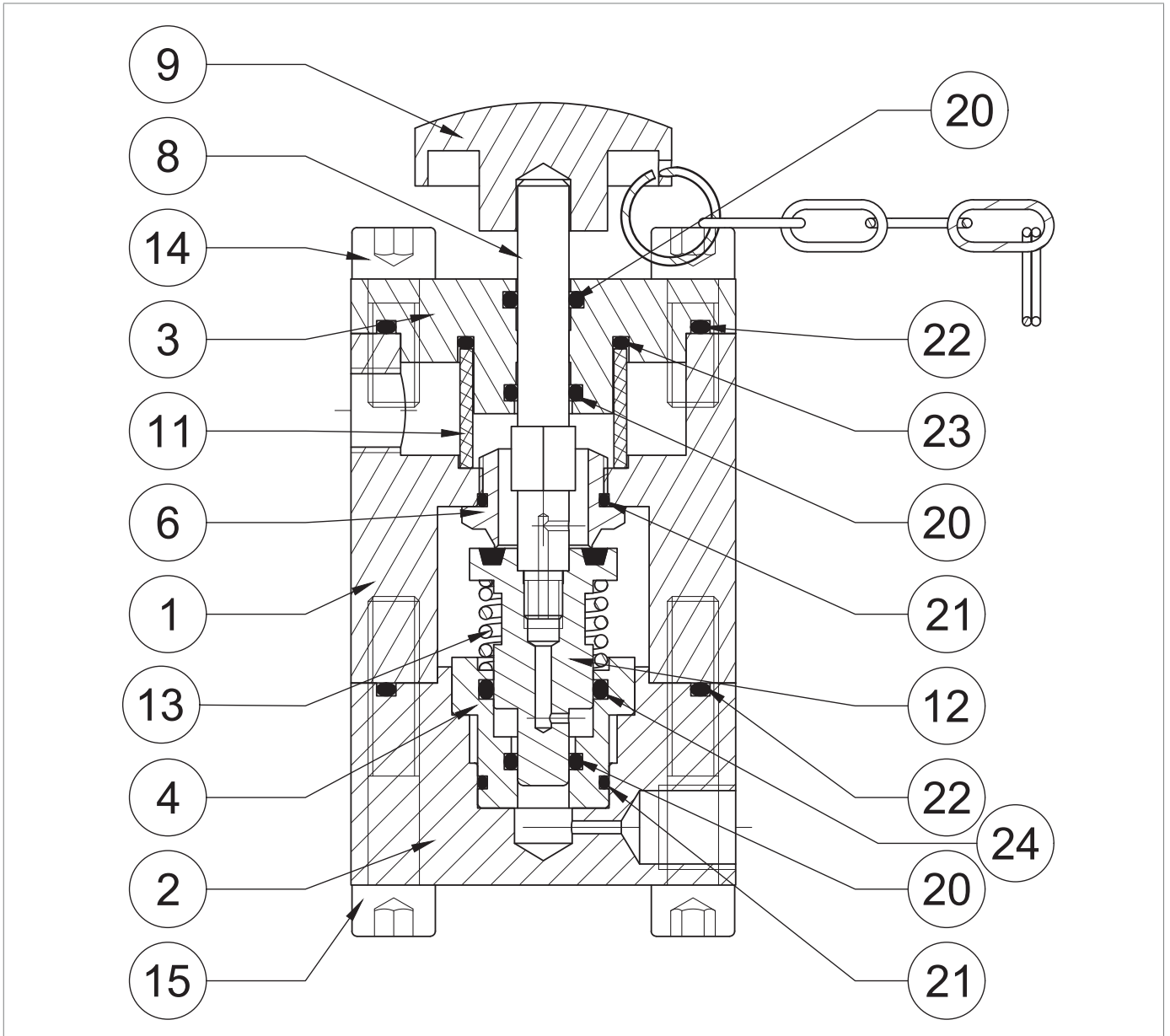
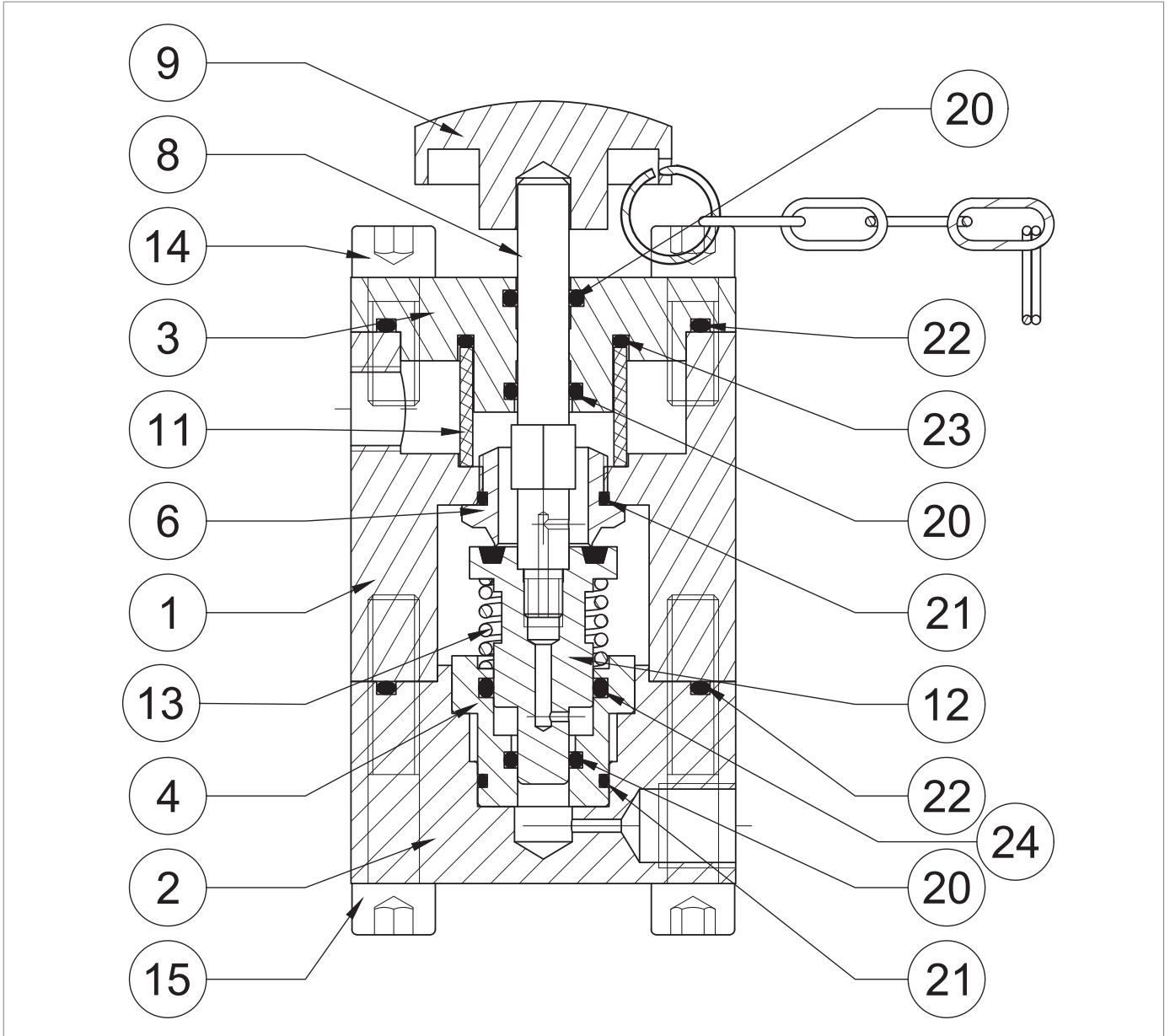


Fig. 9.79. HP2/2 bypass device

Step	Action
1	Remove the knob (9).
2	Undo and remove the screws (15).
3	Remove the lid (2) together with the bush (4), spring (13), plug (12) and stem (8).
4	Remove the bush (4), together with the spring (13), plug (12), stem (8) from the lid (2).
5	Remove the O-ring (22) from the lid (2) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
6	Fit the plug (12) together with the stem (8).
7	Separate the stem (8) from the plug (12).
8	Replace the plug (12).
9	Remove the O-rings (20, 21, 24) from the bush (4) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
10	Undo and remove the screws (6). NOTE! Attention do not to ruin the seat profile during this step.
11	Remove the O-ring (21) from the seat (6) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
12	Undo and remove the screws (14).
13	Remove the flange (3).
14	Remove the O-rings (22, 23) from the flange (3) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
15	Remove the O-rings (20) from the flange (3) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
16	Remove and replace the filter (11).
17	Put the flange (3) back in place.
18	Insert and fix the screws (14) according to the following tightening torque: • HP2/2 > tab. 9.113. NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.



HP2/2 bypass device

Step	Action
19	Fit and fix the seat (6) in the body (1). NOTE! Care must be taken not to ruin the seat profile during this step.
20	Fit the bush (4) in the lid (2).
21	Screw the stem (8) into the plug (12). NOTE! Before fitting the stem (8), apply thread locking glue.
22	Fit the spring (13).
23	Fit the plug (12) together with the stem (8) into the bush (4).
24	Fit the lid (2) together with the bush (4).
25	Insert and fix the screws (15) according to the following tightening torque: • HP2/2 > tab. 9.113. NOTE! Tighten the screws according to the cross diagram in paragraph 9.4.2.2.

Tab. 9.149.

WARNING!

Ensure that all parts have been fitted correctly.

9.4.13.3 - AR100 LAMINATION VALVE

NOTE!

For more information, refer to Maintenance Procedure 9.4.4 "Maintenance of Series 300/A Pilot + AR100 Lamination Valve".

9.4.13.4 - PRESSURE REGULATOR R44/SS

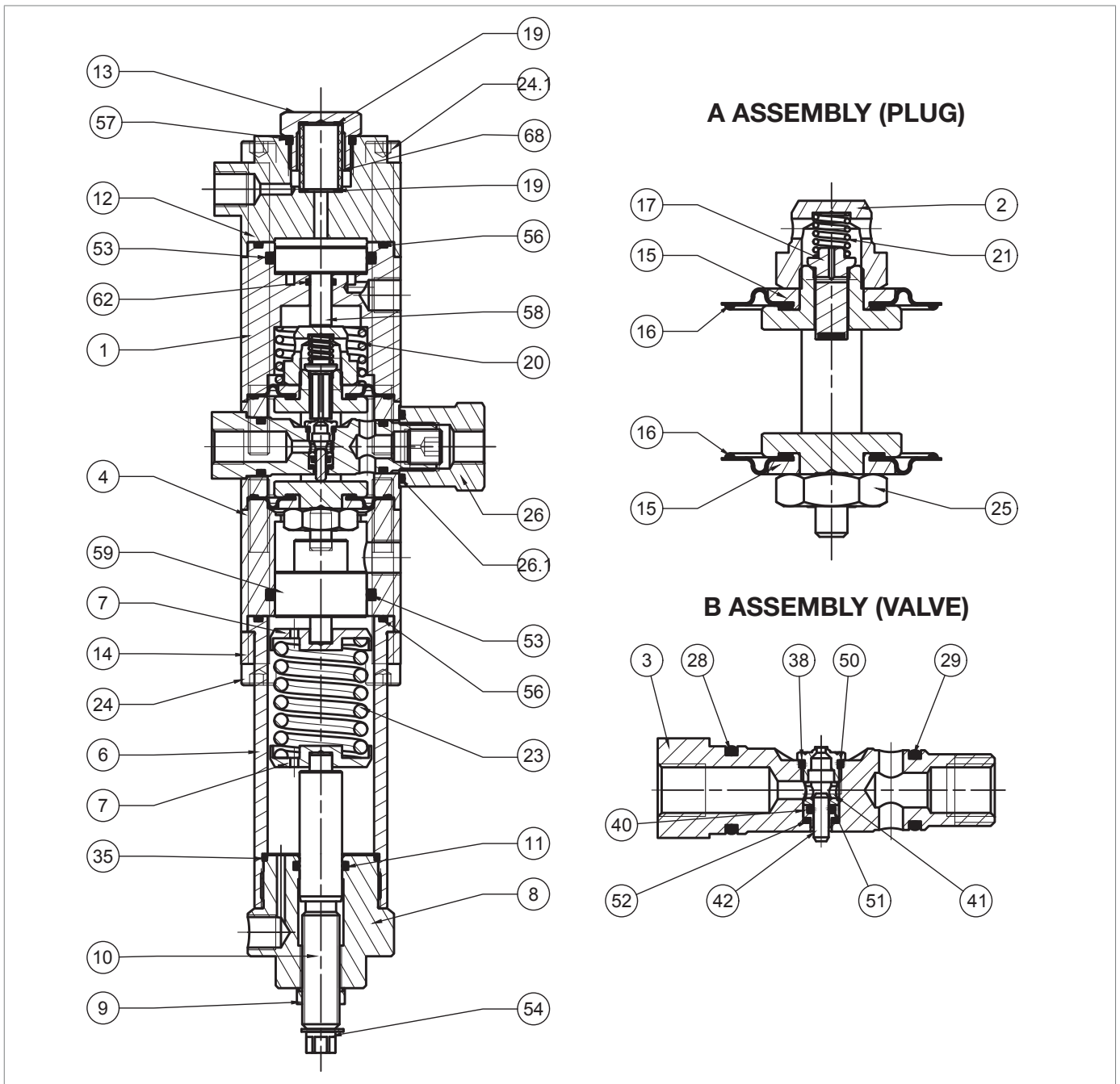





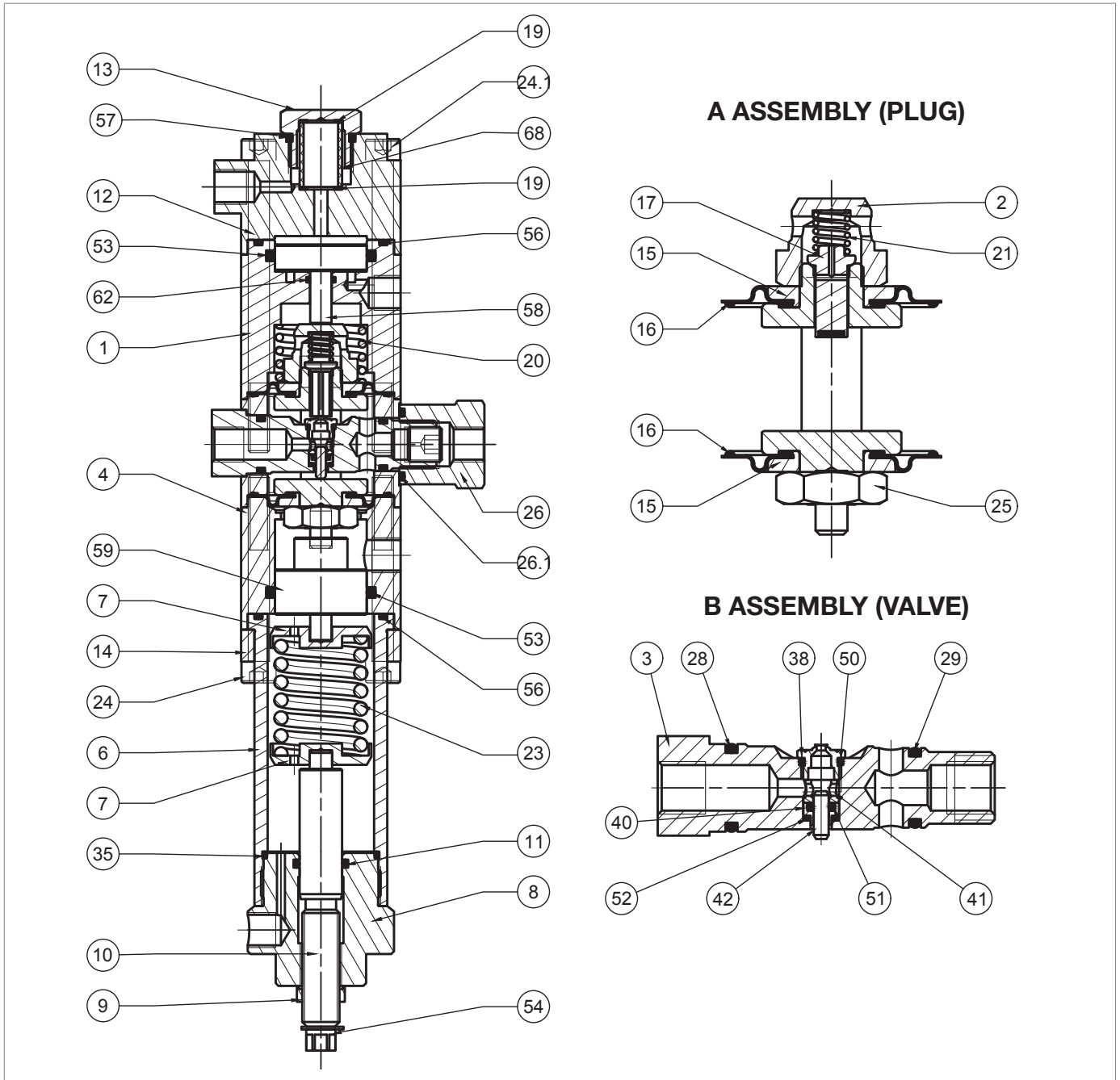


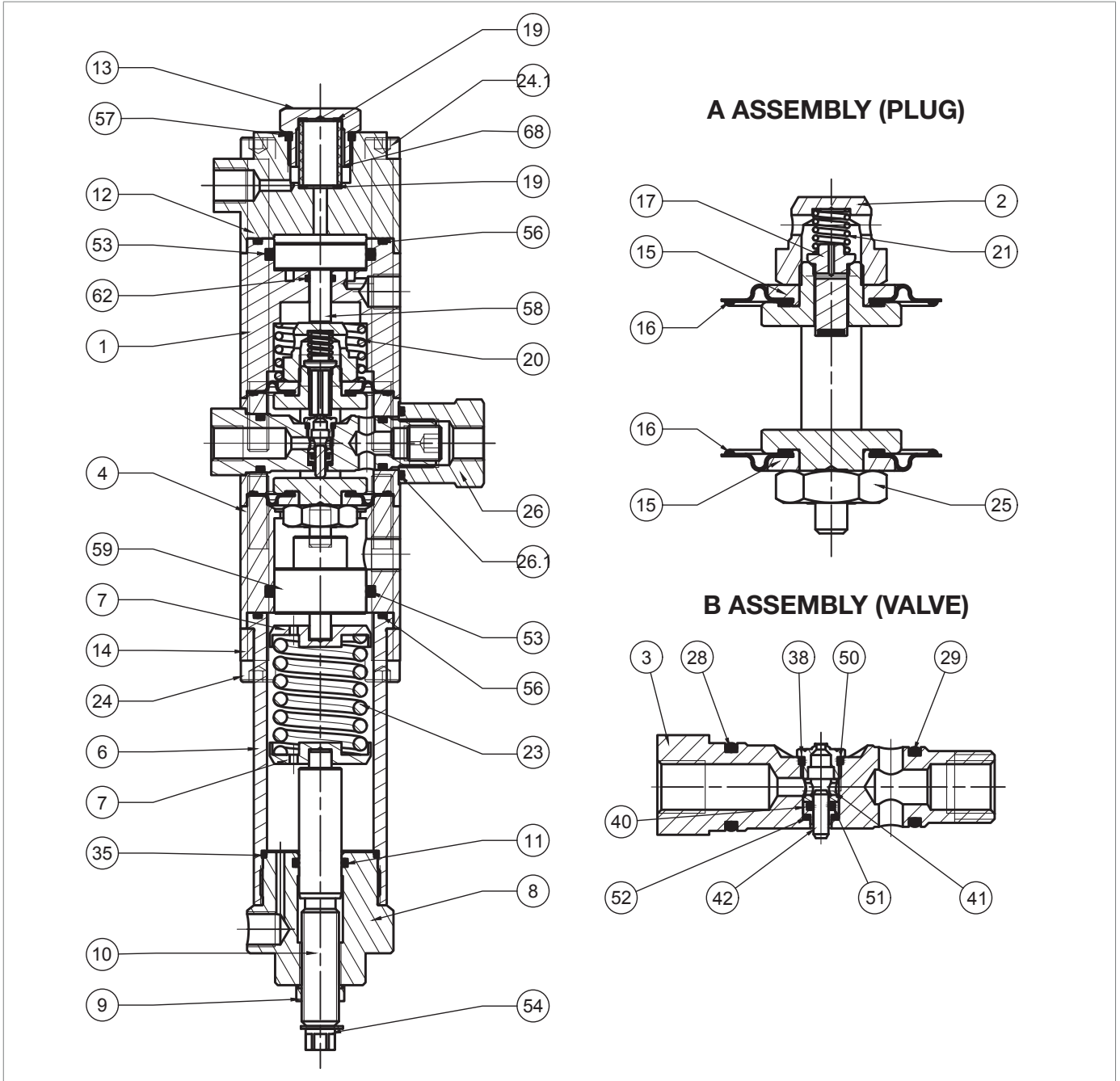
Fig. 9.80. Pressure regulator R44/SS

Step	Action
1	Remove the seeger ring (54).
2	Unscrew the nut (9).
3	Completely release the spring (23) by turning the adjustment screw (10)
4	Unscrew and remove the cap (8).
5	Remove the spring (23) and the spring supports (7).
6	Remove the screw (10) from the cap (8) clockwise, from the inside to the outside.
7	Remove the O-ring (11) from the cap (8) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
8	Insert the screw (10) into the cap (8) anti-clockwise, from the outside to the inside.
9	Insert the nut (9).
10	Fit the seeger ring (54).
11	Undo the screws (24).
12	Remove the bracket (14).
13	Remove the sleeve (6).
14	Remove the O-ring (56) from the sleeve (6) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
15	Remove the O-ring (35) from the sleeve (6) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
16	Remove the spacer (4).
17	Take out the piston (59).
18	Remove the O-ring (53) from the spacer (4) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
19	Unscrew and remove the cap (13).
20	Remove the O-ring (57) from the cap (13) and replace it, taking care to lubricate it with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution. </div>
21	Remove and replace the filter (68).
22	Remove and replace the gaskets (19).
23	Undo and remove the screws (24.1).
24	Remove the lid (12).
25	Remove the lid (1).
26	Take out the piston (58).








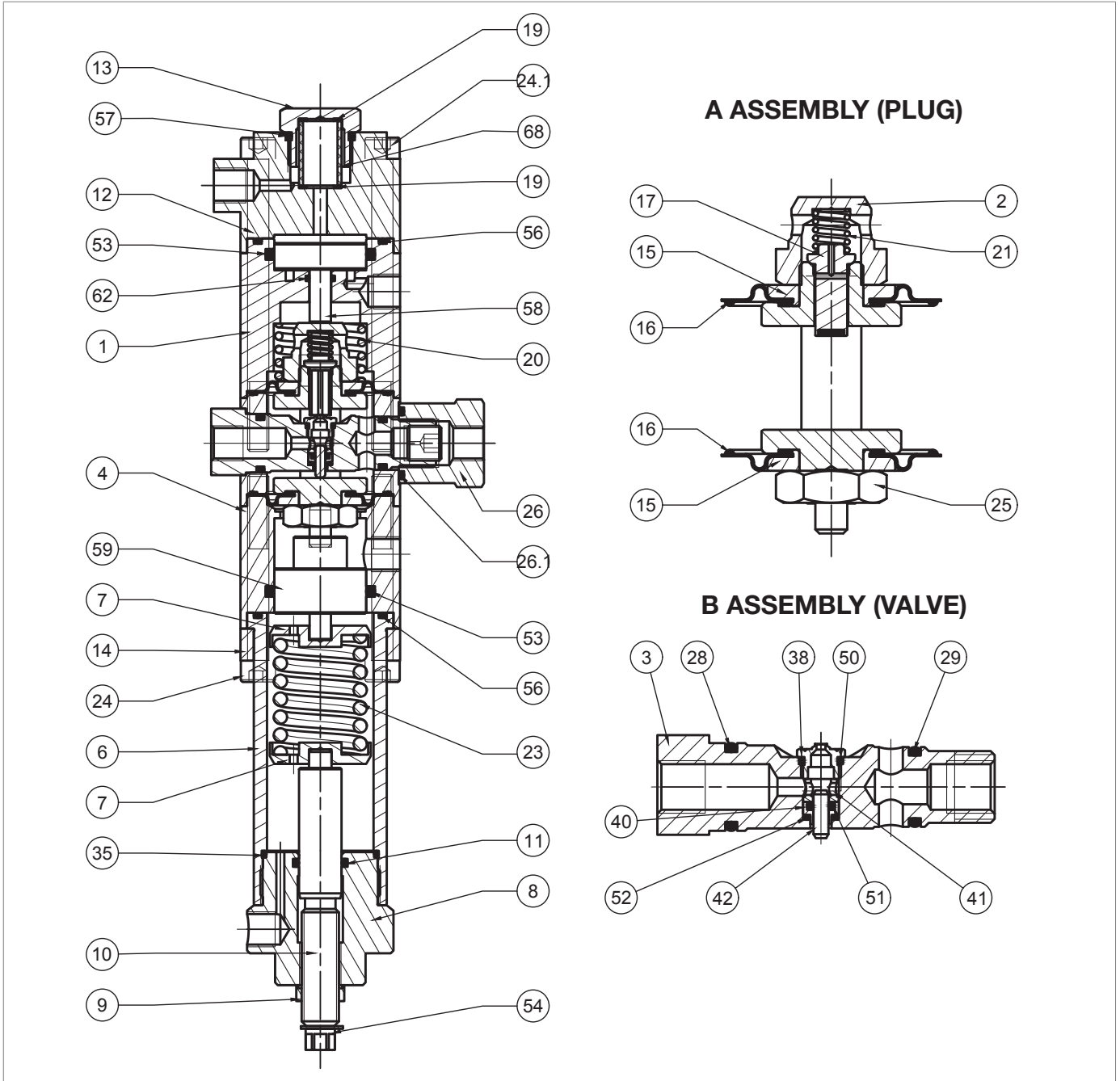
Pressure regulator R44/SS

Step	Action
27	Remove the O-ring (56) from the lid (1) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
28	Remove the O-rings (53, 62) from the lid (1) and replace it, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
29	Remove the spring (20).
30	Unscrew the nut (26).
31	Remove the O-ring (26.1) from the nut (26) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
32	Remove assembly "B" (valve).
33	Unscrew the valve seat (38). NOTE! Take care not to damage the surfaces.
34	Remove the O-ring (50) from the valve seat (38) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
35	Remove the bush (41).
36	Remove the balancing piston (42).
37	Take out the piston guide (40).
38	Remove the O-ring (51) from the piston guide (40) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
39	Remove the O-ring (52) from the valve seat (3) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
40	Remove the O-rings (28, 29) from the valve seat (3) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.
41	Fit the piston guide (40) and balancing piston (42).
42	Insert the bush (41) into the pilot seat (3) so that the wider stop rests on the O-ring (51).






Pressure regulator R44/SS

Step	Action
43	Insert and fix the valve seat (38). <div style="border: 1px solid black; padding: 5px;">  NOTE! Take care not to damage the valve seat profile (38) and the O-ring (50). </div>
44	Remove assembly “A” (plug) from the valve body (4).
45	Unscrew and remove the pilot nut (2).
46	Remove the spring (21).
47	Remove and replace the plug (17).
48	Remove the upper protection disc (15)
49	Remove and replace the upper diaphragm (16), taking care to lubricate the lanyards with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution. </div>
50	Unscrew and remove the nut (25).
51	Remove the lower protection disc (15).
52	Remove and replace the lower diaphragm (16), taking care to lubricate the lanyards with synthetic grease. <div style="border: 1px solid black; padding: 5px;">  NOTE! Before inserting the replacement diaphragm, clean the retaining slots with a cleaning solution. </div>
53	Fit the lower protection disc (15).
54	Insert and fix the screws (25) according to the following tightening torque: <ul style="list-style-type: none"> • R44/SS > tab. 9.114.
55	Fit the upper protection disc (15).
56	Fit the plug (17).
57	Fit the spring (21).
58	Insert and fix the pilot nut (2) according to the following tightening torque: <ul style="list-style-type: none"> • R44/SS > tab. 9.114.
59	Insert assembly “A” (plug) from the top downwards into the valve body (4). <div style="border: 1px solid black; padding: 5px;">  NOTE! <ul style="list-style-type: none"> • Take care not to damage the diaphragms (16) during this step; • The marking on the lower section of the headframe (5) must be parallel to the axis of the hole for inserting the seat (3) into the valve body (4). </div>
60	Insert assembly “B” (valve) into the valve body (4). <div style="border: 1px solid black; padding: 5px;">  NOTE! <ul style="list-style-type: none"> • Insert the assembly with the valve seat (38) facing upwards; • Take care not to damage the O-rings (28, 29) and the valve seat (38). </div>
61	Screw in the nut (26) as far as it will go.
62	Fit the spring (20).
63	Insert the piston (58) into the lid (1).
64	Fit the lids (1 and 12).



Pressure regulator R44/SS

Step	Action
65	Insert and fix the screws (24.1) according to the following tightening torque: <ul style="list-style-type: none"> R44/SS > tab. 9.114. <div style="border: 1px solid black; padding: 5px;">  NOTE! </div> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
66	Fit the gaskets (19) and the filter (68).
67	Fit and secure the nut (13)
68	Fit the piston (59) into the spacer (4).
69	Fit the sleeve (6).
70	Put the bracket (14) back in place.
71	Insert and fix the screws (24) according to the following tightening torque: <ul style="list-style-type: none"> R44/SS > tab. 9.114. <div style="border: 1px solid black; padding: 5px;">  NOTE! </div> <p>Tighten the screws according to the cross diagram in paragraph 9.4.2.2.</p>
72	Insert the spring (23) together with the spring supports (7). <div style="border: 1px solid black; padding: 5px;">  NOTE! </div> <p>Make sure that the piston pin (59) is inside the spring support (7).</p>
73	Fit and secure the cap (8) to the sleeve (6).

Tab. 9.150.

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.13.5 - SAFETY VALVE VS/FI FOR LINE OFF 2.0

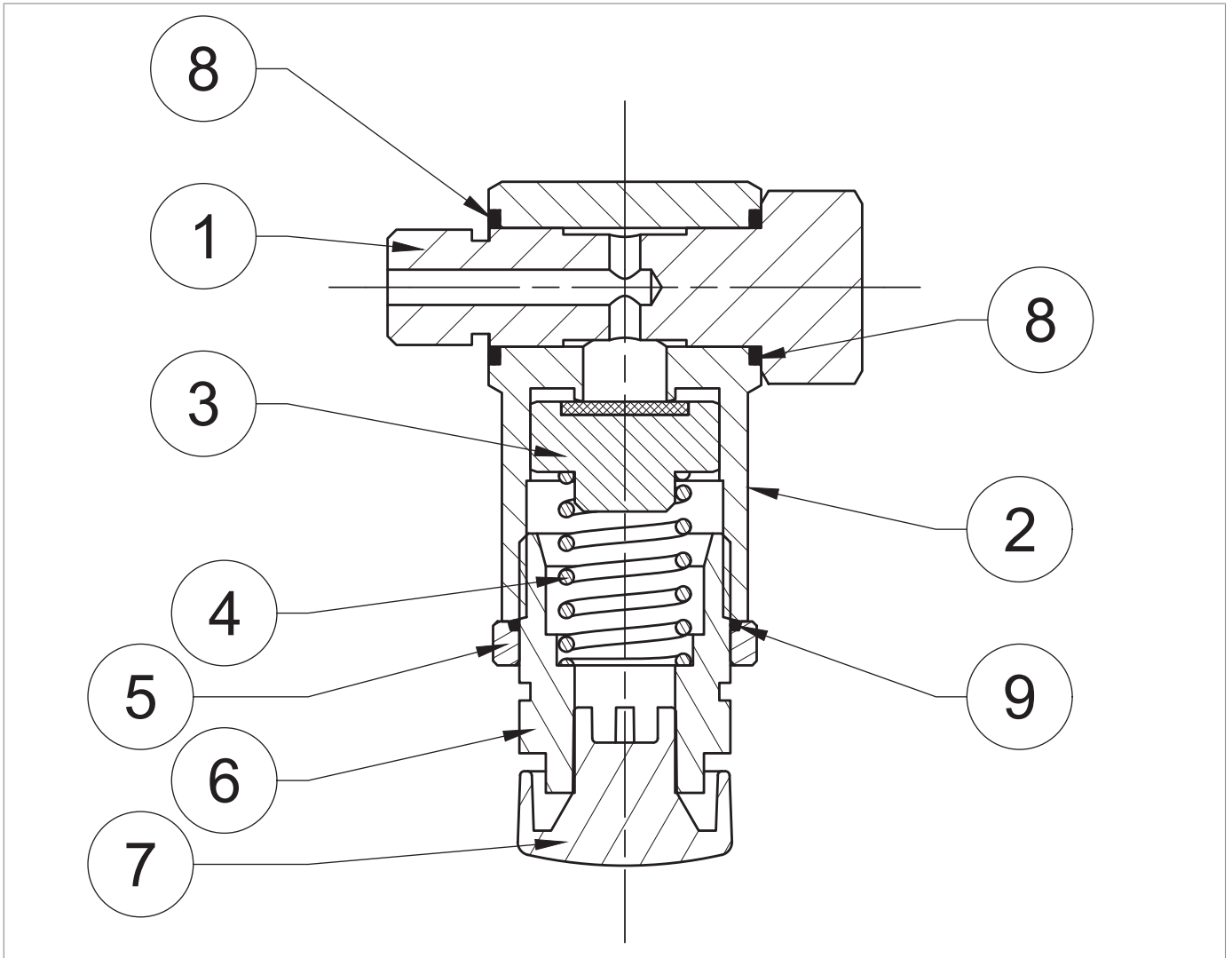


Fig. 9.81. Safety valve VS/FI for LINE OFF 2.0

Step	Action
1	Pull out the locking screw (1).
2	Remove the O-rings (8) from the body (2) and replace them, taking care to lubricate them with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
3	Remove the vent plug (7) and make sure that it is not obstructed by any dirt.
4	Loosen the ring nut (5).
5	Unscrew and remove the cap (6).
6	Remove the O-ring (9) from the ring nut (5) and replace it, taking care to lubricate it with synthetic grease. NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.
7	Remove the spring (4).
8	Remove and replace the plug (3).
9	Insert the plug (3) and the spring (4).
10	Insert and screw in the cap (6).
11	Fit the vent cap (7).
12	Insert the locking screw (1).

Tab. 9.151.

! WARNING!

Ensure that all parts have been fitted correctly.

9.4.13.6 - PRESSURE SWITCHES MODELS 102 - 105

! NOTE!

For further information, please refer to chapter 9.4.11 "Maintenance of pressure switches mod. 102 - 105".

9.4.13.7 - VALVE 3/2

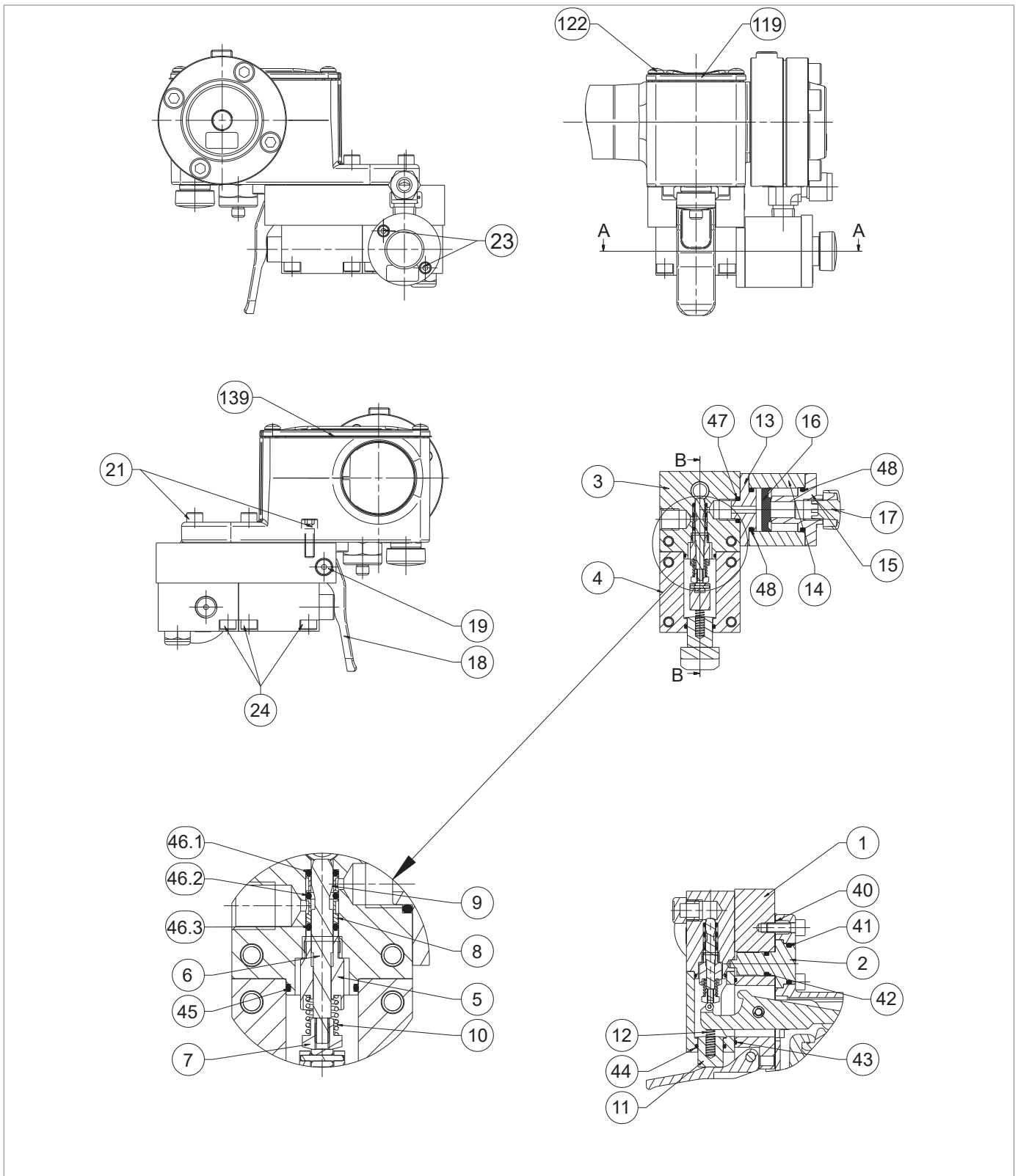
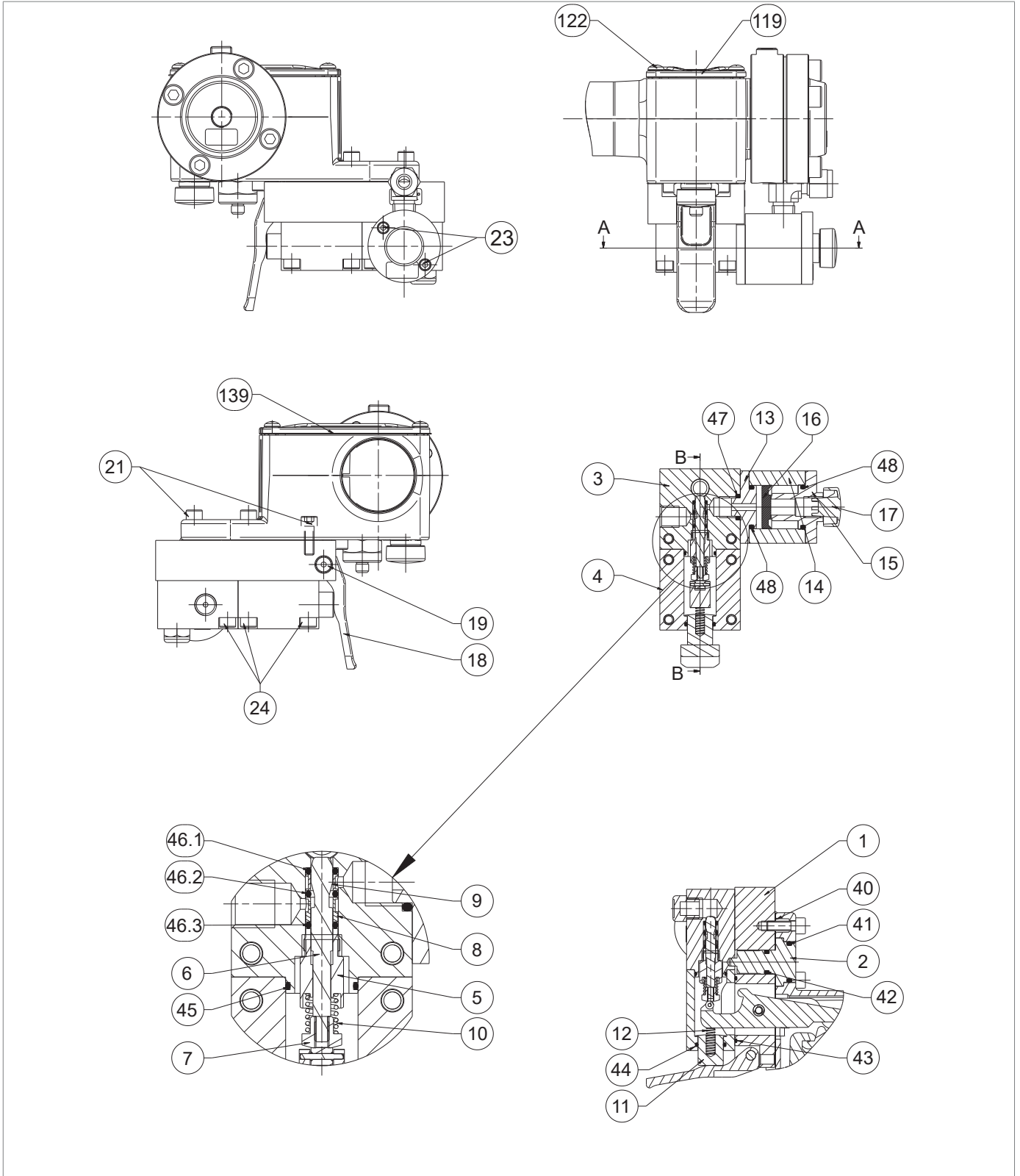




Fig. 9.82. Valve 3/2

Step	Action
1	<p>! NOTE!</p> <p>Make sure the slam-shut device is set to “OFF”.</p>
2	Undo and remove the screws (122) of the pressure switch lid (119).
3	Remove the pressure switch lid (119) together with the gasket (139).
4	Turn the device upside down.
5	Unscrew and remove the screw (19) and the lever (18).
6	Undo and remove the screws (23).
7	Remove the quick discharge assembly (13, 14, 15, 17).
8	Remove the O-ring (47) from the valve body (3) and lubricate it with synthetic grease.
	<p>! NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
9	Remove the locking flange (15).
10	Remove the O-ring (48) from the closing flange (15) and replace it, taking care to lubricate it with synthetic grease.
	<p>! NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
11	Remove and replace the gasket (16), lubricating it with synthetic grease.
	<p>! NOTE!</p> <p>Orient the lip of the seal (16) towards the lid (15).</p>
12	Remove the intermediate flange (13).
13	Remove the O-ring (48) from the intermediate flange (13) and replace it, taking care to lubricate it with synthetic grease.
	<p>! NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
14	Undo and remove the screws (24).
15	Lift the valve body (3) together with the valve lid (4).
16	Separate the valve body (3) from the valve lid (4).
17	Remove the O-ring (45) from the valve lid (3) and lubricate it with synthetic grease.
	<p>! NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
18	Pull out the button (11) together with the spring (12),
19	Remove the O-ring (44) from the valve lid (4) and lubricate it with synthetic grease.
	<p>! NOTE!</p> <p>Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p>
20	Fit the button (11) together with the spring (12).
21	Unscrew and remove the stem assembly (5, 6, 7, 8, 9, 10).



Valve 3/2

Step	Action
22	Remove the O-ring (46.3) and the bush (8).
23	Remove the O-ring (46.2) and the bush (9).
24	Take out the O-ring (46.1).
25	<p>Replace the O-rings (46.1, 46.2 and 46.3) and lubricate them with synthetic grease.</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.</p> </div>
26	<p>Insert the O-ring (46.1) and the perforated bush (9).</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE! Use the equipment (P) referred to in table 7.48.</p> </div>
27	<p>Insert the O-ring (46.2) and the perforated bush (8).</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE!</p> <ul style="list-style-type: none"> • Use the equipment (P) referred to in table 7.48. • Align the bush (8) as shown in detail (C) </div>
28	<p>Insert the o-ring (46.3).</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE! Use the equipment (P) referred to in table 7.48.</p> </div>
29	Insert and press the equipment (P) together with the O-rings (46.1, 46.2, 46.3) and the perforated bushes (8, 9) into the valve body (3).
30	Remove the equipment (P).
31	Insert and screw the stem assembly (5, 6, 7, 8, 9, 10).
32	<p>Remove the O-ring (43) from the valve bracket (1) and replace it, taking care to lubricate it with synthetic grease.</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE! Before inserting the replacement O-ring, clean the retaining slots with a cleaning solution.</p> </div>
33	Turn the device upside down.
34	Undo and remove the outer screws (21).
35	Undo and remove the inner screws (21).
36	Lift the pressure switch.
37	Remove the centring pin (2).
38	<p>Remove the O-rings (41, 42) from the centring pin (2) and replace them, taking care to lubricate them with synthetic grease.</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTE! Before inserting the replacement O-rings, clean the retaining slots with a cleaning solution.</p> </div>
39	Remove and replace the gasket (40).
40	Fit the centring pin (2) on the valve bracket (1).
41	Assemble the pressure switch to the valve bracket (1).
42	Insert and fix the external screws (21).
43	Insert and fix the internal screws (21).
44	Turn the device upside down.

Step	Action
45	Insert the valve lid (4) so that the spring (12) rests on the lever of the pressure switch. <div style="border: 1px solid black; padding: 2px;">  NOTE! Keep the valve lid (4) tilted for easier assembly. </div>
46	Push and tilt the valve lid upwards (4).
47	Insert the valve body (3) together with the stem assembly (5, 6, 7, 8, 9, 10) into the valve lid (4). <div style="border: 1px solid black; padding: 2px;">  NOTE! The valve body (3) must be centred with the centring pin (2). </div>
48	Fasten the screws (24) of the valve body (3).
49	Fasten the screws (24) of the valve lid (4).
50	Fit the lever (18).
51	Insert and fix the screws (19).
52	Insert the flange (15) into the cylinder (14).
53	Insert the gasket (16) into the cylinder (14) with the flat side facing upwards.
54	Insert the flange (13) into the cylinder (14).
55	Insert the screws (23).
56	Fit the quick discharge assembly (13, 14, 15, 17) into the valve body (3).
57	Fix the screws (23).
58	Fit the lid (119) together with the gasket (139).
59	Insert and fix the screws (122) of the pressure switch.
<i>Tab. 9.152.</i>	

 **WARNING!**

Ensure that all parts have been fitted correctly.

9.4.13.8 - LINE OFF 2.0 RECONNECTION

 **NOTE!**

To reconnect the LINE OFF 2.0 refer to table 9.148.

9.4.14 - PROCEDURE FOR RECOMMISSIONING AFTER MAINTENANCE

 **NOTE!**

For the recommissioning procedure, refer to the relevant paragraph.

10 - TROUBLESHOOTING

Below is a list of the cases (causes and services) that may occur over time in the form of malfunctions of various kinds. 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.

NOTE!

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	<ul style="list-style-type: none"> • Mechanical maintenance technician; • Electrical maintenance technician; • Installer; • Name of the user.
PPE required	<div style="display: flex; align-items: center; gap: 5px;">      </div> <div style="background-color: #f4a460; padding: 5px; margin-top: 5px;"> <p>⚠ WARNING!</p> <p>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:</p> <ul style="list-style-type: none"> • the regulations in force in the country of installation; • <u>any information provided by the Safety Manager at the installation facility.</u> </div>
Necessary equipment	Refer to chapter 7 “Equipment for commissioning/maintenance”.

Tab. 10.153.

10.3 - TROUBLESHOOTING PROCEDURES

For proper troubleshooting, proceed as follows:

- close the downstream shut-off valves;
- refer to the troubleshooting tables listed below.

10.4 - TROUBLESHOOTING TABLES



Refer to chapter 9 “Maintenance and functional checks” for the pictures of the APERFLUX 851 regulator and its accessories.

10.4.1 - APERFLUX 851 REGULATOR TROUBLESHOOTING

Failure	Appliance	Possible causes	Service
Operation faults	LAMINATION VALVE AR100	Unsuitable feed pressure to the regulator	Adjust the flow rate of the AR100 lamination valve
	SERIE 300 PILOTS	Diaphragm holder (16) friction	Centre the hole, assembly and shaft movement
		Balancing pin friction	Lubricate O-ring (51)
		Worn diaphragms (16)	Replace
		Diaphragm (49) worn (for 302/A pilot only)	Replace
		Spring (22) collapsed or out of level	Refit and replace if needed
	REGULATOR	Dirty or worn diaphragm (20)	Clean and replace if needed
		Diaphragm (20) out of level	Refit
		Unsuitable spring (45)	Replace
Pumping	LAMINATION VALVE AR100	Unsuitable feed pressure to the regulator	Adjust the flow rate of the AR100 lamination valve
	SERIE 300 PILOTS	Operating frictions	Check the pilot
No sealing at zero flow	SERIE 300 PILOTS	Dirty or worn plug (17)	Clean and replace if needed
		O-ring (50) not sealing	Clean and replace if needed
		O-ring (51) not sealing	Clean and replace if needed
		O-ring (52) not sealing	Clean and replace if needed
		Upper diaphragm (16) worn (excluding 302/A pilot)	Replace
		O-ring (18) not sealing (for pilots 304/A-305/A only)	Clean and replace if needed
	REGULATOR	Dirty or worn diaphragm (20)	Clean and replace if needed
		Diaphragm (20) out of level	Replace
		O-ring (39) not sealing	Clean and replace if needed
		O-ring (40) not sealing	Clean and replace if needed
		O-ring (41) not sealing	Clean and replace if needed

Failure	Appliance	Possible causes	Service
Downstream pressure increases	LAMINATION VALVE AR100	Filter cartridge (11) clogging	Replace
	SERIE 300 PILOTS	Plug (17) worn	Replace
		Diaphragm (49) worn (for 302/A pilot only)	Replace
		Worn diaphragms (16)	Replace
	REGULATOR	Diaphragm (20) worn	Replace
	LAMINATION VALVE AR100	Incorrect adjustment	Adjust the flow rate of the AR100 lamination valve
Downstream pressure decreases	SERIE 300 PILOTS	Ice formation on the valve seat	Increase pilot circuit gas inlet temperature
		Clogging due to valve seat soiling	Clean and check
	REGULATOR	Breakage within the sealing edge of the control element (20)	Replace

Tab. 10.154.

10.4.2 - DB/851 SILENCER TROUBLESHOOTING

Failure	Appliance	Possible causes	Service
Increase in noise	DB/851 SILENCER	Breakage of the external basket (64)	Replace
No sealing Zero flow rate	DB/851 SILENCER	No O-ring (39) sealing	Clean and replace if needed
		No O-ring (84) sealing	Clean and replace if needed

Tab. 10.155.

10.4.3 - APM/819 BUILT-IN MONITOR TROUBLESHOOTING

Failure	Appliance	Possible causes	Service	
Operation faults	R14 PRE-REGULATOR	Dirty or worn plug (9)	Clean and replace if needed	
		Guide ring (8) worn	Replace	
	SERIE 200 PILOTS	Dirty or worn plug (17)	Clean and replace if needed	
		Diaphragm holder (16) friction	Centre the hole, assembly and shaft movement	
		Worn diaphragms (16)	Replace	
		Spring (22) collapsed or out of level	Refit and replace if needed	
		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	
	REGULATOR	Dirty or worn reinforced gasket	Clean and replace if needed	
		O-ring (35) friction	Lubricate and if needed replace	
		Stem guide O-ring (36) frictions	Lubricate and if needed replace	
		I/DWR (52) frictions	Lubricate and if needed replace	
		I/DWR (51) friction	Lubricate and if needed replace	
		Breakage of the diaphragm (50)	Replace	
		SG out of class due to dirty or worn reinforced gasket	Clean and replace if needed	
		No sealing Zero flow rate	R14 PRE-REGULATOR	No O-ring (17) sealing
	O-ring (18) not sealing			Clean and replace if needed
O-ring (20) not sealing	Clean and replace if needed			
Diaphragm (10) worn	Replace			
SERIE 200 PILOTS	Diaphragm (16 upper) worn		Replace	
	Dirty or worn plug (17)		Clean and replace if needed	
	Reinforced gasket (8) dirty or damaged		Clean and replace if needed	
	O-ring (35) not sealing		Clean and replace if needed	
	O-ring (36) not sealing balancing piston		Clean and replace if needed	
	O-ring (42) not sealing		Clean and replace if needed	
	O-ring (43) not sealing		Clean and replace if needed	

Failure	Appliance	Possible causes	Service
Downstream pressure increases	R14 PRE-REGULATOR	Plug (9) damaged	Replace
	SERIE 200 PILOTS	Plug (17) damaged	Replace
		Diaphragm holder (16) and plug (17) assembly locked in open position	Check and if needed clean
		Plug spring collapsed	Replace
		Downstream sensing line obstructed	Clean
	REGULATOR	Reinforced gasket (8) damaged	Replace
		Ice between reinforced gasket (8) and plug (71)	Increase the regulator gas inlet temperature
		Soiling between reinforced gasket (8) and plug (71)	Clean and check gas filtration
		Plug (71) locked	Clean and check the movements
		Control element assembly tightening defective	Tighten properly
		Transfer hole clogged	Clean
		Plug guide O-ring (35) damaged	Replace
		Stem guide O-ring (36) frictions	Lubricate and if needed replace
		I/DWR (52) frictions	Lubricate and if needed replace
		I/DWR (51) friction	Lubricate and if needed replace
Spring (80) collapsed	Replace		

Failure	Appliance	Possible causes	Service
Downstream pressure decreases	PRE-REGULATOR R14/A	Filter clogging (13)	Replace
		Plug (9) deformation	Replace
		Diaphragm (10) damaged	Replace
		Stem (5) locked in closing position	Clean and lubricate
		Stem (5) clogged	Clean
	SERIE 200 PILOTS	Plug (17) locked in closing position	Clean and lubricate
		Diaphragms (16) damaged	Replace
		Diaphragm holder (16) and plug (17) assembly locked in open position	Check and clean if needed
		Valve seat (3) clogged	Clean
		collapsed spring (22)	Replace
	PM 819 MONITOR	No upstream pressure	Check line filter cartridges for clogging
		Plug (71) locked	Clean and check the movements
		Dirty O-ring (35)	Clean and replace if needed
		Stem guide O-Ring (36) frictions	Lubricate and if needed replace
		I/DWR (52) frictions	Lubricate and if needed replace
I/DWR (51) friction		Lubricate and if needed replace	
Ice formation		Increase the regulator gas inlet temperature	
Diaphragm (50) damaged		Replace	
Nut (11) loosened	Tighten		

Tab. 10.156.

10.4.4 - SB/82 BUILT-IN SLAM-SHUT VALVE TROUBLESHOOTING

⚠ WARNING!

If the built-in slam-shut valve triggered, before any other operation, close the inlet and outlet valves (V1 and V2) of the line and discharge pressure.

Failure	Appliance	Possible causes	Service
Incorrect release pressure	SB/82 BUILT-IN SLAM-SHUT VALVE	Max. and min. pressure spring incorrect calibration	Repeat calibration by adjusting the ring nuts
		Leverages with friction	Clean and lubricate the levers and if needed replace the box
	PRESSURE SWITCHES MODELS 101 - 105	Springs (11,17) collapsed	Replace
Impossible to reset	SB/82 BUILT-IN SLAM-SHUT VALVE	Springs (11,17) out of level	Refit
		Incorrect max. and/or min. pressure spring calibration	Repeat calibration by adjusting the ring nuts
		The downstream pressure is not consistent with the min and/or max setting of the slam-shut device	Adjust the downstream pressure
	Lever broken or chipped	Change the standard box containing the whole assembly	
	PRESSURE SWITCHES MODELS 101 - 105	Diaphragm breakage (43) if a min. pressure spring is installed.	Replace
Failure to provide service	SB/82 BUILT-IN SLAM-SHUT VALVE	Manual release button locked	Clean and lubricate
		Stem (6) locked in opening position	Clean and lubricate
	PRESSURE SWITCHES MODELS 101 - 105	Blocked levers	Clean and lubricate
		Diaphragm breakage (43) if there is no min. pressure spring.	Replace

Failure	Appliance	Possible causes	Service
Downstream pressure increase with closing block	SB/82 BUILT-IN SLAM-SHUT VALVE DN 1" – 3"	O-ring (40) not sealing	Clean and replace if needed
		Die plug (19) pad	Clean and replace if needed
		Conical seat (8) damaged	Replace
		No O-ring (39) sealing	Clean and replace if needed
	BUILT-IN SLAM-SHUT VALVE SB/82 DN 4" – 8"	O-ring (40) not sealing	Clean and replace if needed
		Die plug (19) pad	Clean and replace if needed
		O-ring (44) not sealing	Clean and replace if needed
		Conical seat (8) damaged	Replace
	SB/82 BUILT-IN SLAM-SHUT VALVE DN 10"	No O-ring (39) sealing	Clean and replace if needed
		O-ring (42) not sealing	Clean and replace if needed
		Die reinforced gasket (8)	Clean and replace if needed
		Valve seat (2) damaged	Replace
	BYPASS DEVICE HP2/2	Pad O-ring (5) not sealing	Clean and replace if needed
		O-ring (15) not sealing	Clean and replace if needed
		Valve seat (6) damaged	Replace
		O-ring (20) not sealing	Clean and replace if needed

Tab. 10.157.

10.4.5 - HB/97 BUILT-IN SLAM-SHUT VALVE TROUBLESHOOTING

⚠ WARNING!

If the built-in slam-shut valve triggered, before any other operation, close the inlet and outlet valves (V1 and V2) of the line and discharge pressure.

Failure	Appliance	Possible causes	Service
Incorrect release pressure	PRESSURE SWITCHES MODELS 101 - 105	Incorrect max. and/or min. pressure spring calibration	Repeat calibration by adjusting the ring nuts
		Leverages with friction	Clean and lubricate the box if necessary
		Springs (11,17) collapsed	Replace
		Springs (11,17) out of level	Refit
Impossible to reset	HB/97 BUILT-IN SLAM-SHUT VALVE	Stem (6) blocked due to friction	Clean and lubricate
		Stem (6) locked in closing position	Clean and lubricate
		Plug (71) locked due to friction	Clean and lubricate
		Damaged "U-shaped" ring (63)	Replace
		Damaged I/DWR ring (64)	Replace
	PRESSURE SWITCHES MODELS 101 - 105	Max. and min. pressure spring incorrect calibration	Repeat calibration by adjusting the ring nuts
		The downstream pressure is not consistent with the min and/or max setting of the slam-shut device	Adjust the downstream pressure
		Leverages with friction	Clean and lubricate the levers and if needed replace the box
		Diaphragm breakage (43) if a min. pressure spring is installed.	Replace
		Manual release button locked	Clean and lubricate
	BYPASS DEVICE HP2/2	Filter (11) clogged	Replace

Failure	Appliance	Possible causes	Service
Closure intervention delay	LAMINATION VALVE AR100	Filter (5) clogged	Replace
	PRESSURE REGULATOR R44/SS	Lower diaphragm (16) breakage	Replace
		Lower diaphragm (16) breakage	Replace
		Upper O-ring (53) not sealing	Clean and replace if needed
		Lower O-ring (53) not sealing	Clean and replace if needed
		O-ring (11) not sealing	Clean and replace if needed
		O-ring (35) not sealing	Clean and replace if needed
		Balancing piston (42) locked	Clean and lubricate
		O-ring (62) not sealing	Clean and replace if needed
	SAFETY VALVE VS/FI	Die	Check and clean if necessary
	VALVE 3/2	Outer O-rings (46) not sealing	Clean and replace if needed
		O-ring (47) not sealing	Clean and replace if needed
		O-ring (48) not sealing	Clean and replace if needed
		Dirty or damaged pad (16)	Clean and replace if needed
	HB/97 BUILT-IN SLAM-SHUT VALVE	Stem (6) with friction	Clean and lubricate
		Plug (71) with friction	Clean and lubricate
		Balancing piston O-ring (36) not sealing	Clean and replace if needed
VALVE 3/2	Gasket (16) blocked	Clean and replace if needed	
	Clogged vents	Check and clean if necessary	
Failure to provide service	HB/97 BUILT-IN SLAM-SHUT VALVE	Stem (6) locked in opening position	Clean and lubricate
		Plug (71) locked in opening position	Clean and lubricate
		Die O-ring (36)	Clean and replace if needed
		I/DWR ring (64) damaged	replace
	PRESSURE SWITCHES MODELS 101 - 105	Breakage of the Diaphragm (43) if there is no min. pressure spring.	Replace
		Blocked levers	Check and if necessary clean and lubricate
	VALVE 3/2	Pin (6) locked	Check and if necessary clean and lubricate
		Lip pad (16) blocked	Clean and replace if needed
		Clogged vents	Check and clean if needed

Failure	Appliance	Possible causes	Service
Unintentional intervention	SLAM-SHUT VALVE HB/97 BUILT-IN SLAM-SHUT VALVE	O-ring (40) not sealing	Clean and replace if needed
		O-ring (36) not sealing	Clean and replace if needed
		No	Clean and replace if needed
		O-ring (39) sealing	Clean and replace if needed
		“U-shaped” ring O-ring (63) not sealing	Clean and replace if needed
		O-ring (43) not sealing	Clean and replace if needed
		Upper O-ring (62) not sealing	Clean and replace if needed
		O-ring (42) not sealing	Clean and replace if needed
	PRESSURE REGULATOR R44/SS	Lower diaphragm (16) not sealing	Clean and replace if needed
		O-ring (28) not sealing	Clean and replace if needed
		O-ring (29) not sealing	Clean and replace if needed
		O-ring (26.1) not sealing	Clean and replace if needed
	SAFETY VALVE VS/FI	Lack of Pad seal (3)	Clean and replace if needed
VALVE 3/2	Gasket (16) blocked	Clean and replace if needed	
	Outer O-rings (46) not sealing	Clean and replace if needed	
	O-ring (47) not sealing	Clean and replace if needed	
	O-ring (48) not sealing	Clean and replace if needed	
Downstream pressure increase with closing block	HB/97 BUILT-IN SLAM-SHUT VALVE	Reinforced gasket (8) dirty or damaged	Clean and replace if needed
		No	Clean and replace if needed
		O-ring (39) sealing	Replace
		Plug profile (71) damaged	Clean and replace if needed
		O-ring (88) not sealing	Clean and replace if needed
		O-ring (87) not sealing	Clean and replace if needed
	BYPASS DEVICE HP2/2	O-ring (21) not sealing	Clean and replace if needed
		Damaged seat profile (6)	Replace
		Dirty or damaged pad (12)	Clean and replace if needed
	O-ring (24) not sealing	Clean and replace if needed	

Tab. 10.158.

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 APPOINTED OPERATORS

Commissioning

Operator qualification	Installer
PPE required	 <p> WARNING!</p> <p>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:</p> <ul style="list-style-type: none"> • the regulations in force in the country of installation; • any information provided by the Safety Manager at the installation facility.
Necessary equipment	Refer to chapter 7 "Equipment for commissioning/maintenance".

Tab. 11.159.

11.3 - UNINSTALLATION

ATTENTION!

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

NOTE!

To uninstall the equipment, refer to the installation steps (see the "Installation" chapter) and proceed in reverse order.

11.4 - INFORMATION REQUIRED IN CASE OF RE-INSTALLATION

NOTE!

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

- "Installation";
- "Commissioning".

11.5 - DISPOSAL INFORMATION

NOTE!

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.

NOTE!

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 table 11.44:

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. 11.160.

The equipment in any configuration consists of the following materials:

Material	Disposal/recycling provisions
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. 11.161.

NOTE!

Refer to 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

 **NOTE!**

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

 **NOTE!**

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

13 - CALIBRATION TABLES

13.1 - 300 SERIES PILOT CALIBRATION TABLES

302/A							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2701800	Yellow	4.5	100	35	0.8	1.1
2	2702080	Orange	5			1.201	2.2
3	2702290	Red	5.5			2.201	3.5
4	2702460	Green	6			3.501	5.6
5	2702660	Black	6.5			5.601	7.3
d = Wire Diameter (mm) Lo = Spring Length (mm) De = External Diameter (mm)							

Tab. 13.162.

304/A							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
4	2702290	Red	5.5	100	35	7	10
5	2702460	Green	6			10.001	15
6	2702660	Black	6.5			15.001	22
7	2702820	Blue	7			22.001	33
8	2703045	Brown	7.5			33.001	43
d = Wire Diameter (mm) Lo = Spring Length (mm) De = External Diameter (mm)							

Tab. 13.163.

305/A							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
7	2702820	Blue	7	100	35	22.001	33
8	2703045	Brown	7.5			33.001	42
9	2703224	Grey	8			42.001	60
d = Wire Diameter (mm) Lo = Spring Length (mm) De = External Diameter (mm)							

Tab. 13.164.

13.2 - 200 SERIES PILOT CALIBRATION TABLES

The PM/819 monitor uses pilots 204/A, 205/A and 207/A.

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

Pilot 204/A							
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. 13.165.

Pilot 205/A							
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	Grey	8			44.001	60

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Tab. 13.166.

Pilot 207/A							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2703224	Grey	8	100	35	41	74

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Tab. 13.167.

13.3 - CALIBRATION TABLES FOR PRESSURE SWITCHES MODELS 102M/102MH - 105M/105MH

Below are the calibration tables for the pressure switches that may be installed in the built-in slam-shut valves:

Mod. 102M/102MH - Max pressure							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2701260	White	3.5	60	35	0.2	0.8
2	2701530	Yellow	4			0.801	1.6
3	2701790	Yellow/black	4.5			1.601	2.6
4	2702280	White/red	5.5			2.601	5.5
d = Wire Diameter (mm) Lo = Spring Length (mm) De = External Diameter (mm)							

Tab. 13.168.

Mod. 102M - Min pressure							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2700513	Red	2	40	15	0.05	0.199
2	2700713	Green	2.3			0.2	0.4
3	2700750	Black	2.5			0.401	0.8
4	2700985	Brown	3			0.801	2.8
d = Wire Diameter (mm) Lo = Spring Length (mm) De = External Diameter (mm)							

Tab. 13.169.

Mod. 102MH - Min pressure							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2700985	Brown	3	40	15	2.8	4.2
	2700980	Blue	3	35			
2	2700985	Brown	3	40		4.201	5.5
	2700985	Brown	3				
d = Wire Diameter (mm) Lo = Spring Length (mm) De = External Diameter (mm)							

Tab. 13.170.

Mod. 103M/103MH - Max pressure							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2701530	Yellow	4	60	35	2	4
2	2701790	Yellow/black	4.5	60		4.001	7.5
3	2702280	White/red	5.5	60		7.501	15
4	2702450	Red	6	60		15.001	22
d = Wire Diameter (mm) Lo = Spring Length (mm) De = External Diameter (mm)							

Tab. 13.171.

Mod. 103M - Min pressure

Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2700464	Orange	1.7	40	15	0.2	0.5
2	2700513	Red	2			0.501	0.8
3	2700713	Green	2.3			0.801	1.7
4	2700750	Black	2.5			1.701	4
5	2700985	Brown	3			4.001	8

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Tab. 13.172.
Mod. 103MH - Min pressure

Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2700985	Brown	3	40	15	8	13
	2700980	Blue	3	35			
2	2700985	Brown	3	40	15	13.001	19
	2700985	Brown	3				

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Tab. 13.173.
Mod. 104M/104MH - Max pressure

Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2702280	White/Red	5.5	60	35	15.001	30
2	2702450	Red	6	60		30.001	45

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Tab. 13.174.
Mod. 104M - Min pressure

Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2700713	Green	2.3	40	15	1.6	3
2	2700750	Black	2.5			3.001	8
3	2700985	Brown	3			8.001	18

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Tab. 13.175.
Mod. 104MH - Min pressure

Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2700985	Brown	3	40	15	18	30
	2700980	Blue	3	35			
2	2700985	Brown	3	40	15	30.001	41
	2700985	Brown	3				

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Tab. 13.176.

Mod. 105M/105MH - Max pressure

Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2702280	White/Red	5.5	60	35	30	65
2	2702450	Red	6	60		65.001	90

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Tab. 13.177.
Mod. 105M - Min pressure

Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max
1	2700713	Green	2.3	40	15	3	7
2	2700750	Black	2.5			7.001	16
3	2700985	Brown	3			16.001	44

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Tab. 13.178.
Mod. 105MH - Min pressure

Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max	
1	2700985	Brown	3	40	15	44	60	
	2700980	Blue	3	35				
2	2700985	Brown	3	40		15	60.001	90
	2700985	Brown	3					

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm)

Tab. 13.179.

