

Cirval

Medium-low pressure gas regulator



Revision E - Edition 12/2024

**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 REMARKS

All operating, maintenance instructions and recommendations described in this manual must be observed. In order to obtain the best performance and to keep the equipment in efficient condition, the manufacturer recommends that maintenance operations be carried out regularly.

It is of particular importance that the personnel responsible for the equipment be trained in its use, maintenance and application of the safety instructions and procedures indicated in this manual.

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1.1 - REVISION HISTORY

Revision index	Date
A	09/2022
B	03/2023
C	04/2023
D	10/2024
E	12/2024

Tab. 1.1.

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2 - GENERAL INFORMATION

2.1 - MANUFACTURER IDENTIFICATION

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

Tab. 2.2.

2.2 - IDENTIFICATION OF THE PRODUCT

Equipment	MEDIUM PRESSURE REGULATOR
Model	<ul style="list-style-type: none"> • CIRVAL 200 • CIRVAL 300

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 CIRVAL series described in this manual is designed, manufactured, tested and checked in compliance with the requirements of standard ANSI B109.4 on gas pressure regulators.

NOTICE!

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

2.4 - WARRANTY

PIETRO FIORENTINI S.P.A. guarantees that the equipment was manufactured using the best materials, with high quality workmanship, and complies with the quality requirements, specifications and performance set out in the order.




The warranty shall be considered null and void and PIETRO FIORENTINI S.P.A. shall not be liable for any damage and/or malfunctions:

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

NOTICE!

The warranty conditions are specified in the commercial contract.

2.5 - SYMBOLS USED IN THE MANUAL

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

Tab. 2.4.

HAZARD!

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

WARNING!

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

ATTENTION!

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

NOTICE!

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

2.6 - RECIPIENTS, SUPPLY AND STORAGE OF THE MANUAL

The instruction manual is intended for qualified technicians responsible for operating and managing the equipment throughout its service life.

It contains the necessary information to properly use the equipment and keep its functional and qualitative characteristics unchanged over time. All information and warnings for safe, correct use are also provided.

The manual, as well as the declaration of conformity and/or test certificate, is an integral part of the equipment and must always accompany it whenever it is moved or resold. It is up to the user to keep this documentation intact for reference throughout the lifespan of the equipment.

WARNING!

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

Keep the instruction manual near the equipment, in an accessible place known by all qualified technicians involved in using and running it.

PIETRO FIORENTINI S.p.A. shall not be held liable for any damage to people, animals and property caused by failure to adhere to the warnings and operating procedures described in this manual.

2.7 - LANGUAGE

The original instruction manual was drawn up in Italian.

Any translations into additional languages are to be made from the original instruction manual.

HAZARD!

The translations into other languages cannot be fully verified. If any inconsistency is found, please refer to the text of the original manual.

If inconsistencies are found or the text does not make sense:

- **stop any actions;**
- **immediately contact PIETRO FIORENTINI S.p.A. at the addresses specified in paragraph 2.1.**

WARNING!

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

2.8 - APPLIED RATING PLATES

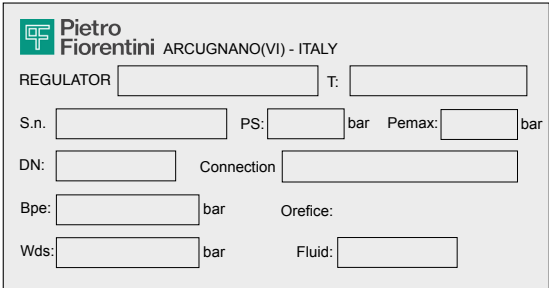
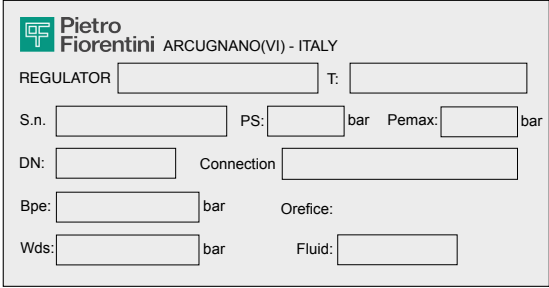


⚠ WARNING

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

The equipment and its accessories are provided with rating plates.

The rating plates specify identification details of the equipment and its accessories to be provided, if necessary, to PIETRO FIORENTINI S.p.A.

Tab. 2.5 shows the rating plates applied:

Id.	Type	Image
1	RATING PLATE REGULATOR	 <p>Pietro Fiorentini ARCUGNANO(VI) - ITALY REGULATOR <input type="text"/> T: <input type="text"/> S.n. <input type="text"/> PS: <input type="text"/> bar Pemax: <input type="text"/> bar DN: <input type="text"/> Connection <input type="text"/> Bpe: <input type="text"/> bar Orefice: Wds: <input type="text"/> bar Fluid: <input type="text"/></p>
2	RATING PLATE MONITOR BUILT-IN IFM	 <p>Pietro Fiorentini ARCUGNANO(VI) - ITALY REGULATOR <input type="text"/> T: <input type="text"/> S.n. <input type="text"/> PS: <input type="text"/> bar Pemax: <input type="text"/> bar DN: <input type="text"/> Connection <input type="text"/> Bpe: <input type="text"/> bar Orefice: Wds: <input type="text"/> bar Fluid: <input type="text"/></p>
3	RATING PLATE BUILT-IN IMD MONITOR	 <p>Pietro Fiorentini ARCUGNANO(VI) - ITALY S.n. <input type="text"/> IMD <input type="text"/> bar</p>
	RATING PLATE SLAM-SHUT VALVE	 <p>Pietro Fiorentini ARCUGNANO(VI) - ITALY TRIPPING UNIT <input type="text"/> S.n. <input type="text"/> Wdso <input type="text"/> bar TS <input type="text"/> Wdo <input type="text"/> bar AG max <input type="text"/> Wdsu <input type="text"/> bar AG min <input type="text"/> Wdu <input type="text"/> bar</p>

Tab. 2.5.

2.8.1 - GLOSSARY FOR RATING PLATES

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

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

Term	Description
Wdsu	Full setpoint range with regard to tripping caused by decreased pressure in the pressure switch built into the slam-shut valve. This range can be obtained by adjusting but not replacing the components.

Tab. 2.6.

2.9 - GLOSSARY OF UNITS OF MEASUREMENT

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

Tab. 2.7.

2.10 - QUALIFIED PROFESSIONAL FIGURES

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

Professional figure	Definition
Mechanical maintenance technician	<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, equipment checks, adjustments and settings. <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"> 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 deemed to be suitable (S.P.).</p> <p>For general requirements, refer to the IEC EN 50110-1:2014 standard.</p>
Worker in charge of transport, handling, unloading and placement on site	<p>Operator qualified to:</p> <ul style="list-style-type: none"> use lifting equipment; handle materials and equipment. <p>The equipment must be lifted and handled strictly in accordance with the instructions provided by the manufacturer as well as the regulations in force at the place where the equipment is installed.</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 authorized to use and manage the equipment for the activities for which it was supplied. They must:</p> <ul style="list-style-type: none"> be able to perform all operations required to properly run the equipment and the system, ensuring their own safety and that of any personnel on site; have proven experience in properly using the equipment similar to that described in this manual, and be trained, informed and instructed in this regard. <p>The technician may carry out maintenance only if authorised/qualified to do so.</p>

Tab. 2.8.

3 - SAFETY

3.1 - GENERAL SAFETY WARNINGS

WARNING!

The equipment described in this instruction manual is:

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

WARNING!

If the gas used is a combustible gas, the installation area of the equipment is defined as a “danger zone” as there are residual risks that potentially explosive atmospheres may be generated.

In “danger zones” and in close proximity thereto:

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

ATTENTION!

Authorised operators must not carry out operations or services on their own initiative that do not fall within their competence.

Never operate the equipment:

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

NOTICE!

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

Before installation, commissioning or maintenance, operators must:




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

3.2 - PERSONAL PROTECTIVE EQUIPMENT

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

Tab. 3.9.

WARNING!

Each licensed operator is obliged to:

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

3.3 - RESIDUAL RISKS

The risks associated with the equipment are assessed below and the principles adopted for their prevention are indicated, according to the following classification:

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

3.3.1 - TABLE SHOWING RESIDUAL RISKS DUE TO PRESSURE

Risk and hazard	Event and Cause	Effect and consequence	Solution and prevention
Pressurised gas leak. Projection of metallic and non-metallic pressurised parts.	<ul style="list-style-type: none"> Violent impact; Impact (also due to falling, improper handling, etc.). 	<ul style="list-style-type: none"> Deformation; Broken 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 guards and packaging.</p> <p>c. Information in the instructions for use and warning.</p>
Pressurised gas leak. Projection of metallic and non-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 leak. Projection of metallic and non-pressurised parts.	<ul style="list-style-type: none"> Operation at temperatures below the minimum permissible temperature. 	<ul style="list-style-type: none"> Embrittlement; Breakage; 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 leak. Projection of metallic and non-metallic pressurised parts. Explosion.	<ul style="list-style-type: none"> Overpressure or exceedance of the rated limit values (maximum pressure allowed) 	<ul style="list-style-type: none"> Explosion; Breaks; Cracks; Permanent deformations. 	<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; Breakage. 	<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 leak. Projection of metallic and non-pressurised parts.	<ul style="list-style-type: none"> Incorrect fastening of the equipment. 	<ul style="list-style-type: none"> Deformation; Breakage. 	<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 leak. 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 leak.	<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 running.</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 leak. Projection of metallic and non-pressurised parts.	<ul style="list-style-type: none"> External loads bearing on the device. 	<ul style="list-style-type: none"> Deformation; Cracking and fissure formation; If under pressure, 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 leak. Projection of metallic and non-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 leak. Projection of metallic and non-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:

- CIRVAL pressure regulator;
- of the built-in IFM monitor;
- of the built-in IMD monitor;
- the slam-shut LA valve.

Considering that the silencer does not have active functional parts, in this analysis it is considered an integral part of the CIRVAL 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 “danger zone” as there are residual risks that potentially explosive atmospheres may be generated.

There must be no effective sources of ignition in “danger zones” and in close proximity thereto.

Operating conditions	Potentially explosive atmosphere	Normative references	Management measures included in the instructions for use and warning
First start-up	No	<ul style="list-style-type: none"> • During the production cycle, the external sealing of the equipment is checked at a value of 1.1 PS. • Before commissioning, the external sealing of the system portion on which the equipment is installed is checked at a suitable pressure (in accordance with the provisions of standards EN 12186 and EN 12279). 	The instructions for use indicate the need to meet the requirements in Standards EN 12186 and EN 12279.
Operation under 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.
Breakage of the control head diaphragm (malfunction)	No	<p>This event must be considered 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>	The instructions for use indicate the need to meet the requirements of Standards EN 12186 and EN 12279.

Operating conditions	Potentially explosive atmosphere	Normative references	Management measures included in the instructions for use and warning
Breakage of other non-metallic parts (malfunctioning)	No	This type of malfunction is not reasonably expected as it involves static sealing (to the outside).	-
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. 	The instructions for use indicate the need to meet the requirements of Standards EN 12186 and EN 12279
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 sealing of the system portion on which the equipment is installed is checked at a suitable pressure (in accordance with the provisions of standards EN 12186 and EN 12279). 	The instructions for use indicate: <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.

It is mandatory to:



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

It is forbidden to:

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

3.5 - SAFETY PICTOGRAMS

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

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

Tab. 3.12.

 **HAZARD!**

It is absolutely forbidden to remove the pictograms and safety labels on the equipment.
The user is obliged to replace pictograms and safety labels that are illegible due to wear, removal or tampering.

3.6 - RISK LEVEL

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

 **ATTENTION!**

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

4 - DESCRIPTION AND OPERATION

4.1 - GENERAL DESCRIPTION

The equipment CIRVAL is a piloted pressure regulator for medium and low 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 (see Fig. 4.1.):

Pos.	Description	Pos.	Description
1	Plug	4	Spring
2	Stem	5	Main diaphragm
3	Lever mechanism	6	Balancing block

Tab. 4.13.

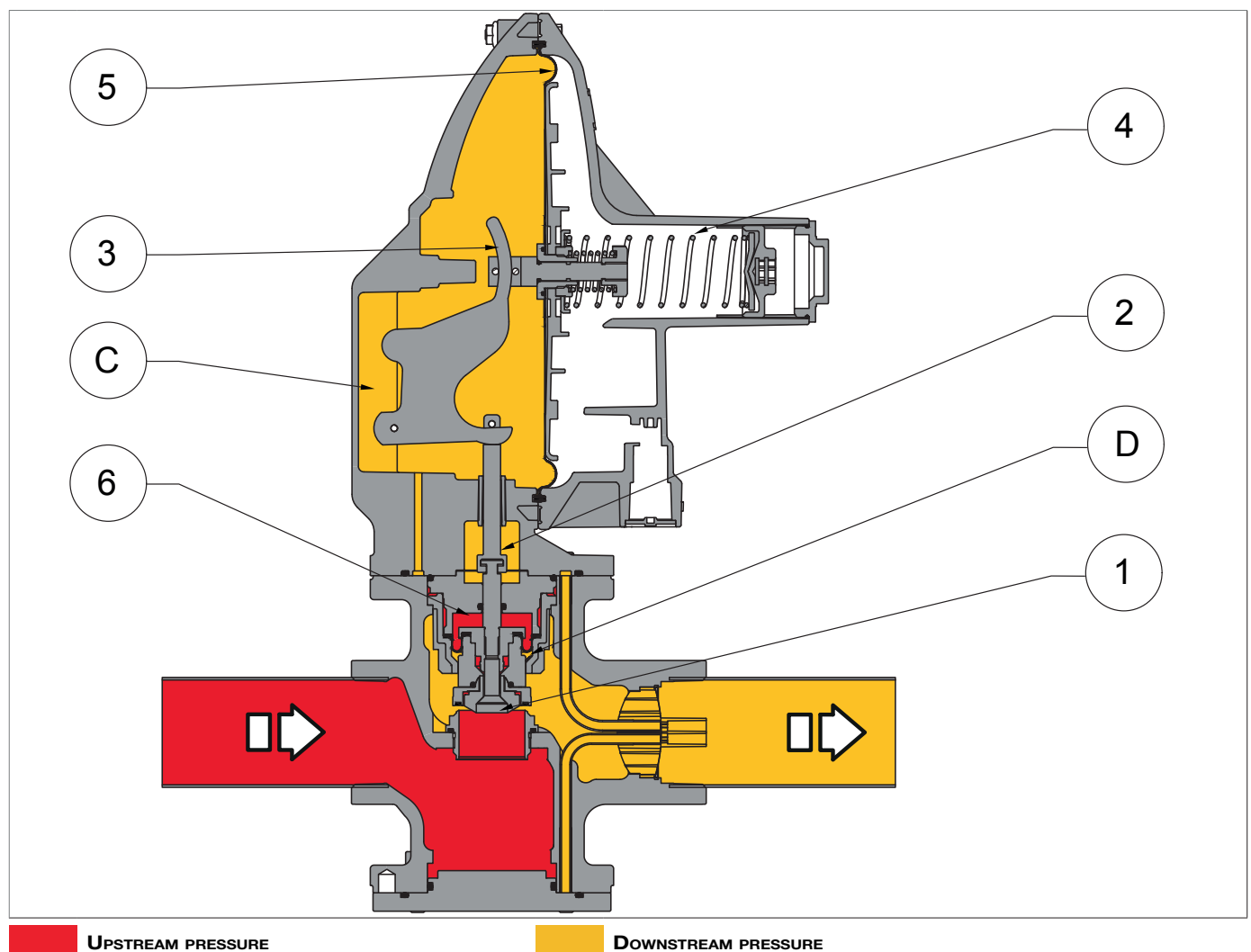


Fig. 4.1. General description CIRVAL

4.1.1 - REGULATOR REACTION MODES

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

- breakage of main diaphragm
- downstream pressure signal missing.

4.2 - OPERATION

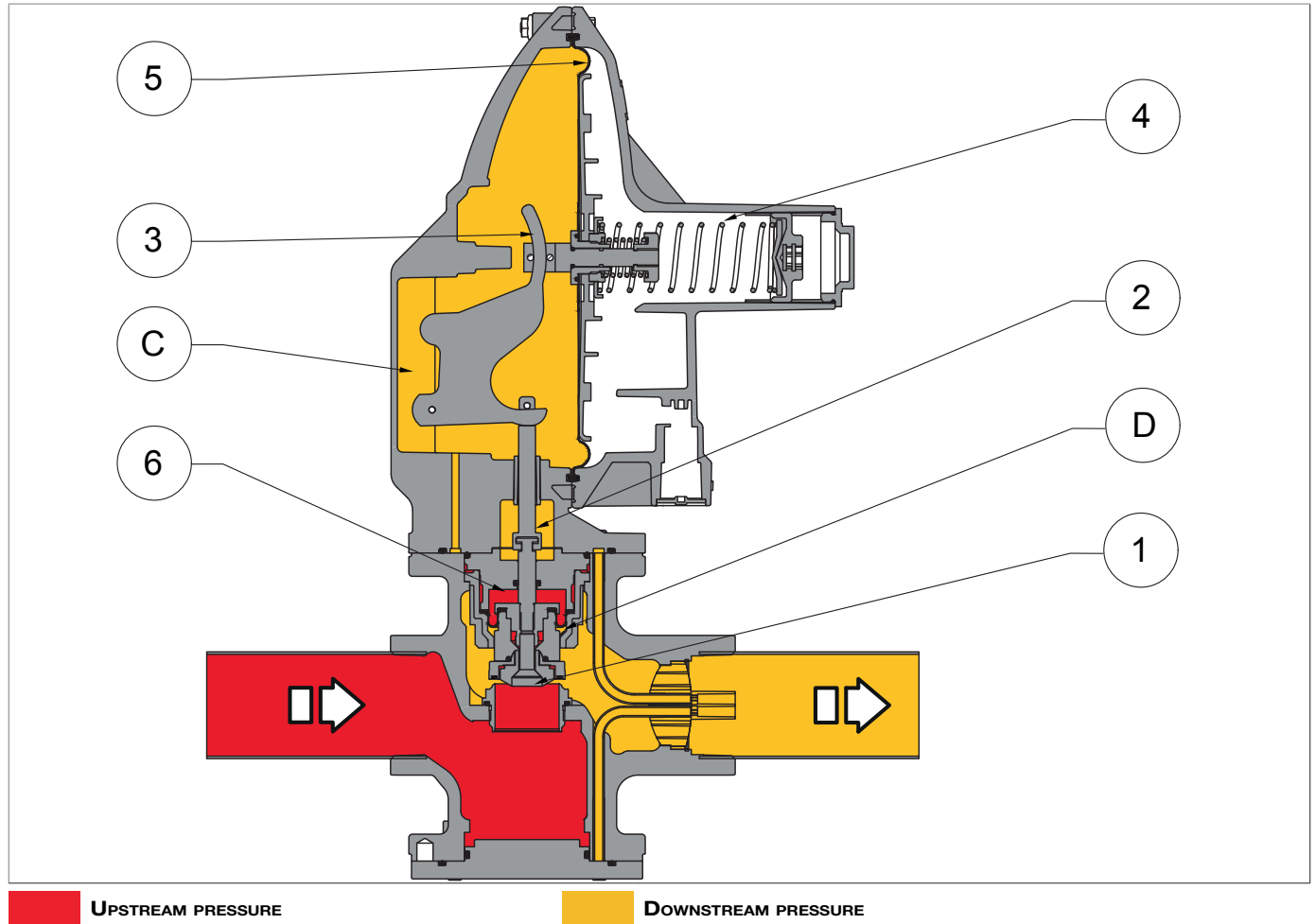


Fig. 4.2. Operation CIRVAL

In the absence of pressure, the plug (1) is held in the open position by the thrust of the spring (4), via the lever mechanism (3) connected to the stem (2).

The downstream pressure value (Pd) is regulated by comparing:

- the load of the setting spring (4)
- the thrust that the downstream pressure (Pd) itself exerts on the main diaphragm (5).

The main diaphragm (5) moves the stem (2) and the plug (1). The stem (2) moves perpendicularly with respect to the gas flow. In the case of zero flow, the plug (1) closes on the seat, preventing the downstream pressure from rising above the closing pressure value.

Under normal work conditions, the plug (1) positions itself so as to keep the pressure downstream (Pd) around the pre-established calibration value.

The position of the plug (1) is controlled by the movements of the main diaphragm (5). The forces which affect the position of the plug (1) are:

- towards the closed position: the thrust resulting from the downstream pressure (Pd) in the chamber (C) and in the chamber (D)
- towards the open position: the load of the setting spring (4).

Changes in the upstream pressure (Pu) do not substantially change the value of the downstream pressure (Pd) as the mobile equipment is balanced.

If, during operation, the following should occur:

Operating conditions	Operating consequences	Outcome
<p>Decrease in downstream pressure (Pd) for:</p> <ul style="list-style-type: none"> • rise in the requested flow rate; • drop in upstream pressure (Pu). 	<ul style="list-style-type: none"> • the thrust exerted on the main diaphragm (5) is less than the load of the setting spring (4) • the plug (1) moves to the open position 	<p>Increase in flow until the preset value of the downstream pressure (Pd) is restored.</p>
<p>Increased downstream pressure (Pd) due to:</p> <ul style="list-style-type: none"> • drop in the requested flow rate; • increase in upstream pressure (Pu). 	<ul style="list-style-type: none"> • the thrust exerted on the main diaphragm (5) is greater than the load of the setting spring (4) • the plug (1) moves to the closed position 	<p>Decrease in flow rate until the preset value of downstream pressure (Pd) is restored.</p>

Tab. 4.14.

4.3 - INTENDED USE

4.3.1 - ENVISAGED USE

The equipment in question is intended for:

Operation	Permitted	Not permitted	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 gas fuel 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 rating plate and according to the instructions and limits of use referred to in this manual.

Safe work conditions are as follows:

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

4.3.2 - REASONABLY FORESEEABLE MISUSE

Reasonably foreseeable misuse means the use of the equipment in a way not foreseen in the design phase but which can result from readily 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 equipment running under all circumstances;
- behaviour resulting from carelessness;
- behaviour resulting from the use of the equipment by unauthorised and unsuitable people;
- using the equipment in a manner other than that referred to under "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).

NOTICE!

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

4.4 - TECHNICAL FEATURES/PERFORMANCE

The CIRVAL equipment is a regulator for medium and low pressure. 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 8 bar
Ambient temperature range	-29 °C - +65 °C
Inlet gas temperature range	-20 °C + 60 °C
Inlet pressure range (bpu)	0.13 bar - 5.17 bar
Possible regulation range (Wd)	0.017 bar - 0.82 bar
Minimum differential pressure	0.12 bar
Accuracy class (AC)	up to 10 (depending on operating conditions)
Lock up pressure class (SG)	up to 20 (depending on operating conditions)
Orifice	<ul style="list-style-type: none"> • Cirval 200: 3/4" • Cirval 300: 1" 1/2
Connections	<ul style="list-style-type: none"> • Cirval 200: 1" 1/4, 1" 1/2 and 2" NPT according to ANSI B1.20.1 • Cirval 300: 2" NPT to ANSI B1.20.1, 2" S.125FF to ANSI B16.5

Tab. 4.16.

Cg and K1 coefficients		
Model	Cirval 200	Cirval 300
Coefficient Cg	200	759
Coefficient K1	89	96

Tab. 4.17.

4.5 - POSSIBLE CONFIGURATIONS

4.5.1 - REGULATOR MODELS

Table 4.18 lists the possible combinations of sizes and control heads for the CIRVAL equipment.

		Size		
		1" 1/4	1" 1/2	2"
M O D E L S	CIRVAL 300 BP	-	-	Yes
	CIRVAL 300 MP/TR	-	-	Yes
	CIRVAL 200 BP	Yes	Yes	Yes
	CIRVAL 200 MP/TR	Yes	Yes	Yes

Tab. 4.18.

4.5.2 - ACCESSORIES

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

- Regulator with monitor function
- Built-in IFM monitor
- Built-in IMD monitor
- Built-in LA slam-shut valve.

The possible configurations are listed in Table 4.19:

CIRVAL	Regulator- monitor	IFM	IMD	LA
Regulator-monitor	-	No	No	Yes
IFM	No	-	No	No
IMD	No	No	-	No
Built-in LA slam-shut valve	Yes	No	No	-

Tab. 4.19.

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

NOTICE!

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

4.5.3 - REGULATOR IN MONITOR FUNCTION

The regulator with monitor function (1) is used to keep the downstream pressure value (P_d) within the preset limits in case of failure of the main regulator.

The regulator with monitor function is installed upstream of the main pressure regulator.

A regulator with a monitor function is a regulator that has a different, application-specific balancing device.

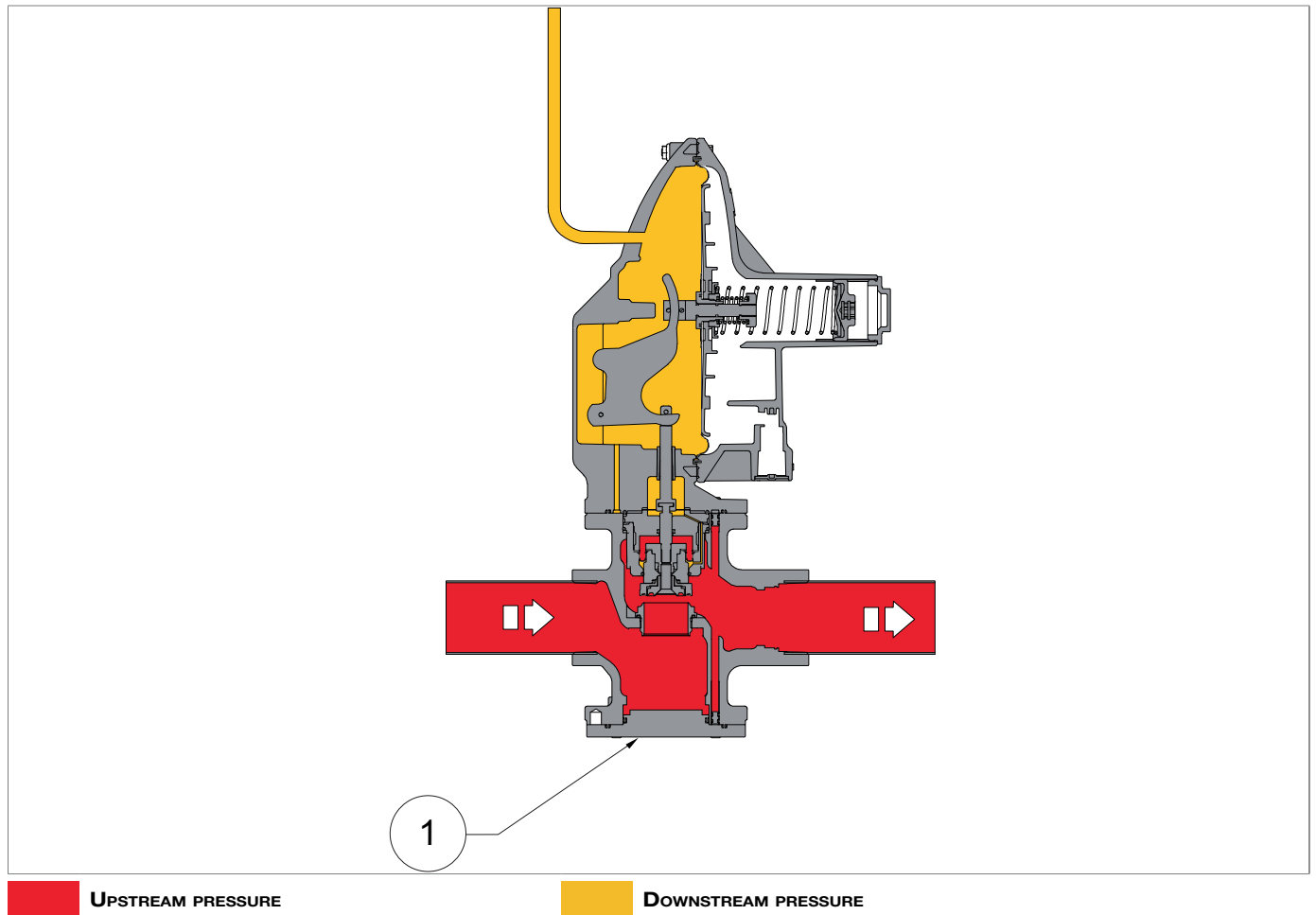


Fig. 4.3. Regulator with monitor function

OPERATION IN STAND-BY CONDITIONS

The regulator with monitor function is open during normal operation since it is calibrated higher than the setting of the main regulator (2).

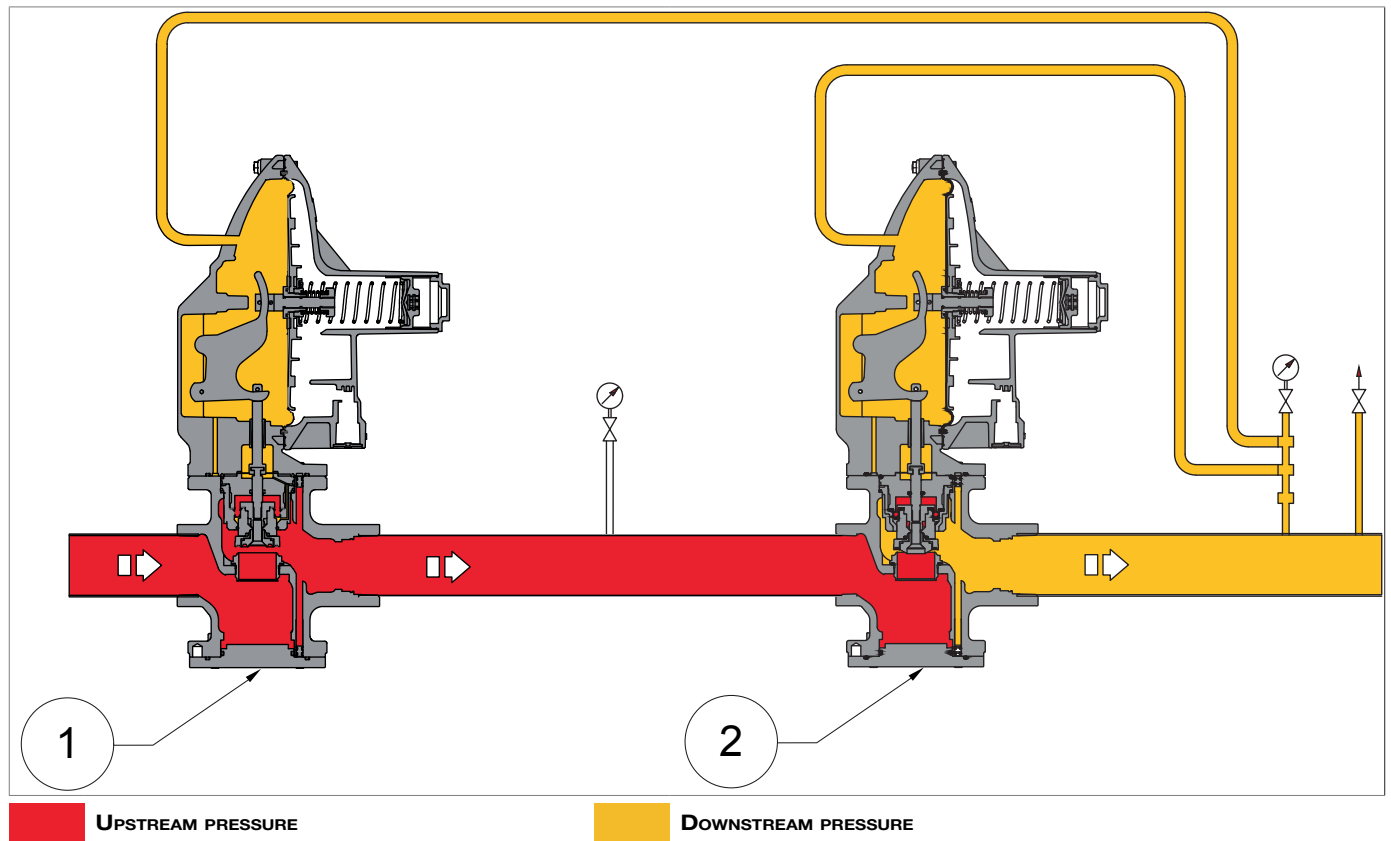


Fig. 4.4. In-line operation of regulator-monitor in stand-by conditions

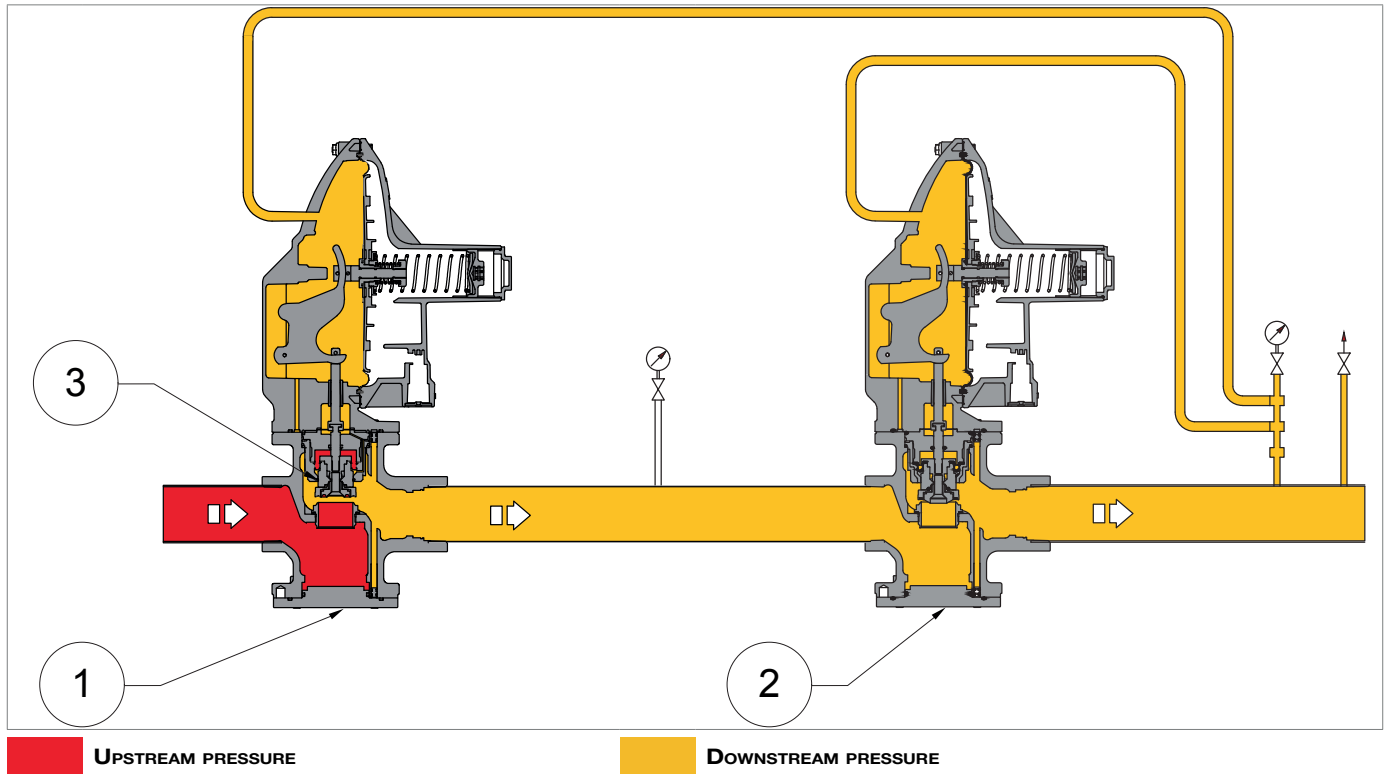
OPERATION IN THE EVENT OF FAILURE OF THE MAIN REGULATOR


Fig. 4.5. Operation of regulator-monitor with main regulator in faulty conditions

In the event of failure of the main regulator (2), the regulator with monitor function (1) will intervene maintaining the downstream pressure value (P_d) within the established limit for its calibration.

If, during operation, the following should occur:

Operating conditions	Operating consequences	Outcome
Drop in downstream pressure (P_d) for: <ul style="list-style-type: none"> rise in the requested flow rate; drop in upstream pressure (P_u). 	Imbalance that causes the plug (3) to open.	Increase in the flow rate until the pre-established calibration value of the downstream pressure (P_d) is restored.
Increased downstream pressure (P_d) due to: <ul style="list-style-type: none"> drop in the requested flow rate; increase in upstream pressure (P_u). 	Unbalance that causes the plug (3) to close.	Drop in the flow rate until the pre-established calibration value of the downstream pressure (P_d) is restored.

Tab. 4.20.

4.5.4 - BUILT-IN MONITOR

The built-in monitor (1) is installed upstream of the main regulator (2) in a fully open position during normal operation.

The built-in monitor (1) is used to keep the pressure value downstream of the main regulator (2) within the pre-set limits in case of failure.

The equipment CIRVAL can include the following built-in monitors:

- IFM
- IMD

4.5.4.1 - BUILT-IN IFM MONITOR

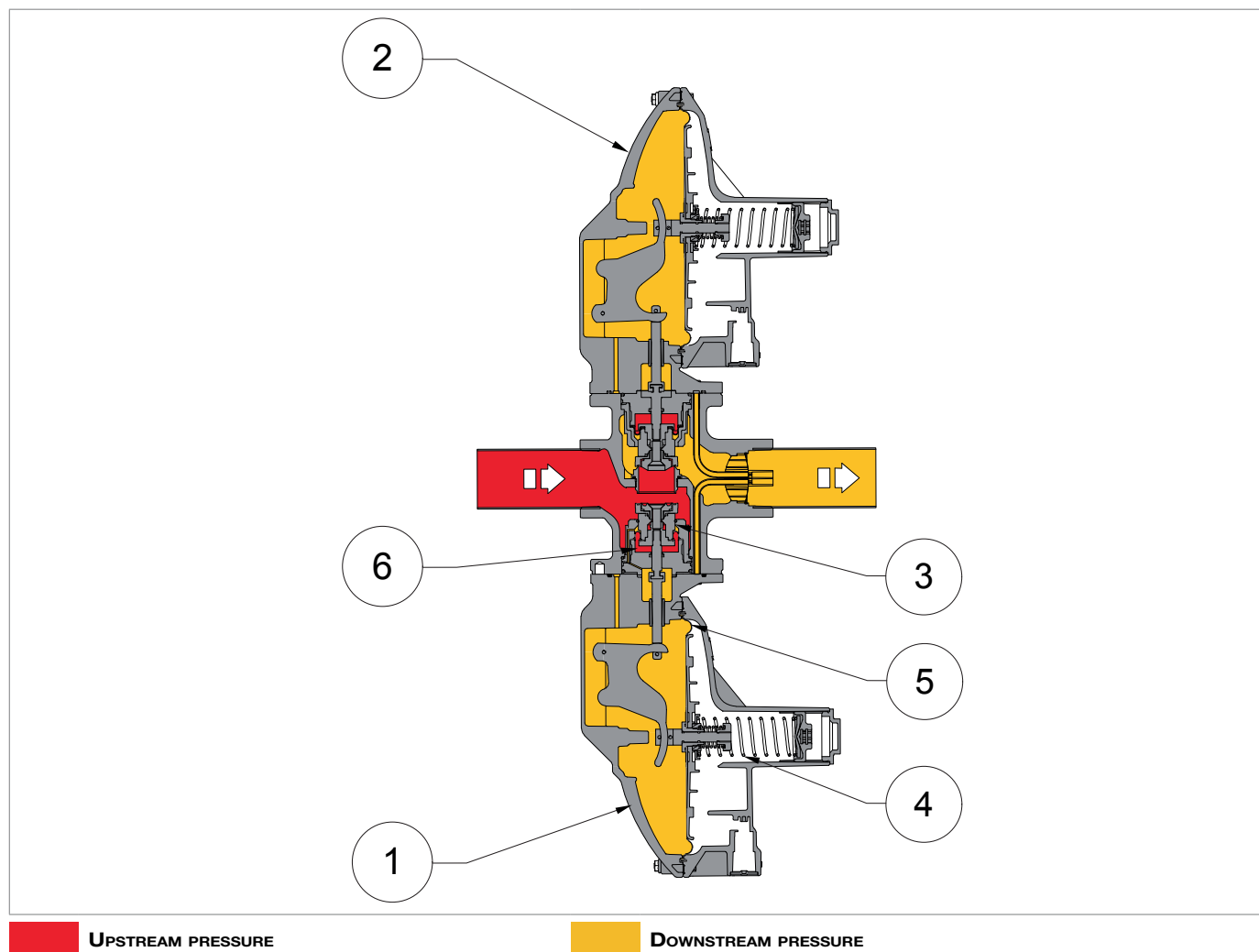


Fig. 4.6. Built-in IFM monitor

During normal operation, the plug (3) is held in the open position by the load of the setting spring (4).

In the event of a failure of the main regulator (2), the downstream pressure (P_d) is controlled by comparing the load of the setting spring (4) with the force that the downstream pressure itself exerts on the diaphragm (5).

The upstream pressure (P_u), although variable, does not affect regulation because the plug (3) is balanced by the force of the balancing chamber (6).

NOTICE!

Refer to Table 4.21 for the operating conditions of the built-in IFM monitor.

4.5.4.2 - BUILT-IN IMD MONITOR

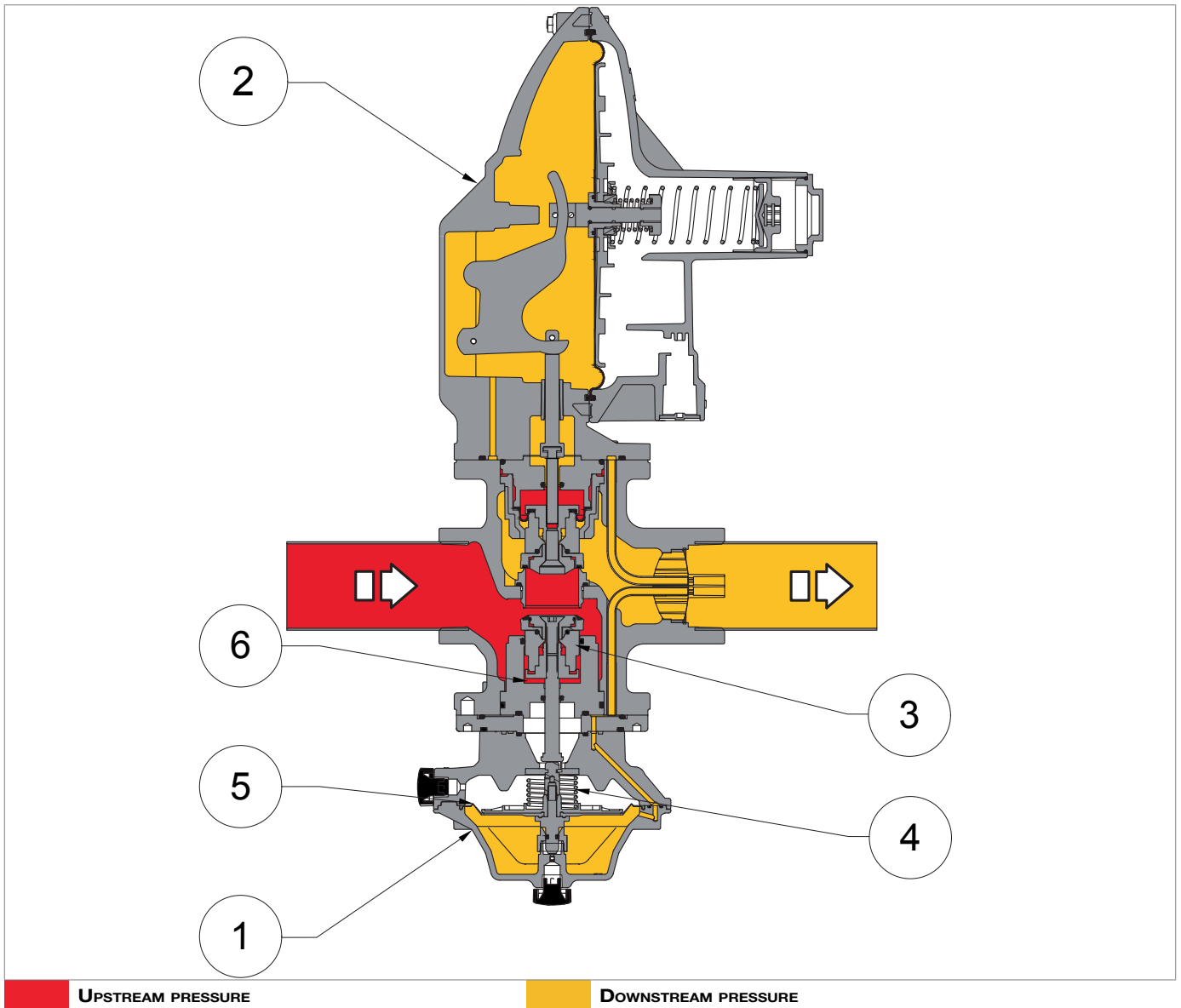


Fig. 4.7. Built-in IMD monitors

During normal operation, the plug (3) is held in the open position by the load of the setting spring (4).

In the event of a failure of the main regulator (2), the downstream pressure (P_d) is controlled by comparing the load of the setting spring (4) with the force that the downstream pressure itself exerts on the diaphragm (5).

The upstream pressure (P_u), although variable, does not affect regulation because the plug (3) is balanced by the force of the balancing chamber (6).

! NOTICE!

Refer to Table 4.21 for the operating conditions of the built-in IMD monitor.

If, during operation, the following should occur:

Operating conditions	Operating consequences	Outcome
Drop in downstream pressure (Pd) for: <ul style="list-style-type: none"> • rise in the requested flow rate; • drop in upstream pressure (Pu). 	<ul style="list-style-type: none"> • the force it exerts on the diaphragm (5) is less than the spring load (4); • the diaphragm lowers, • the plug (3) moves to the open position 	Increase in the flow rate until the pre-established calibration value of the downstream pressure (Pd) is restored.
Increased downstream pressure (Pd) due to: <ul style="list-style-type: none"> • drop in the requested flow rate; • increase in upstream pressure (Pu). 	<ul style="list-style-type: none"> • the force it exerts on the diaphragm (5) is greater than the spring load (4); • the diaphragm rises • the plug (3) moves to the closed position 	Drop in the flow rate until the pre-established calibration value of the downstream pressure (Pd) is restored.

Tab. 4.21.

4.5.5 - 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 built-into the regulator consists of:

- a control system;
- the slam-shut device mechanism.

In the event of tripping, the slam-shut valve shuts off the supply to the regulator.

4.5.5.1 - BUILT-IN LA SLAM-SHUT VALVE

The built-in LA slam-shut valve can be operated:

- by the intervention spring
- manually.

The main features of the built-in LA slam-shut valve are:

- tripping due to downstream pressure increase and/or decrease;
- design pressure: 20 bar for all accessory components;
- local close button (can be omitted on request).

Slam-shut valve type		Set	Operating range (bar)	AG
LA	BP	max	0.03 - 0.18	10
		min	0.006 - 0.06	30
LA	MP	max	0.14 - 0.179	10
			0.18 - 0.45	5
		min	0.01 - 0.059	30
			0.06 - 0.24	10
LA	TR	max	0.25 - 1.29	10
			1.3 - 5.5	5
		min	0.1 - 3.5	10

Tab. 4.22.

The built-in LA slam-shut valve consists of (see Fig. 4.8):

Pos.	Description	Pos.	Description
1	Plug pad	6	Tripping spring for pressure increase
2	Reset knob	7	Tripping spring for pressure decrease
3	Coupling device	8	Spring support
4	Stem	9	Control shaft
5	Diaphragm	10	Sensor

Tab. 4.23.

OPERATION

In the control head (C), the downstream pressure (Pd) acts on the diaphragm (5), which, integral with the control shaft (9), receives a counter force via the springs (6, 7), which causes the pressure to rise or fall.

In the event of tripping due to a pressure surge:

- the downstream pressure (Pd) exceeds the calibration value
- the load on the diaphragm (6) increases until the resistance of the spring (6) is overcome
- the movement to the open position of the drive shaft (9) moves the touch probe (10) via the cam, disengaging the lever mechanism.

In the event of tripping due to a pressure drop:

- the downstream pressure (P_d) drops below the calibration value
- the spring holder (7) stops the stroke
- the movement to the closed position of the drive shaft (9) moves the touch probe (10) via the cam, disengaging the lever mechanism.

To reset the LA slam-shut valve:

- pull the reset knob (2) downwards until the lever mechanism is reengaged
- wait for the upstream pressure (P_u) to pass downstream of the plug (1), balancing it
- press the reset knob (2) into its seat.

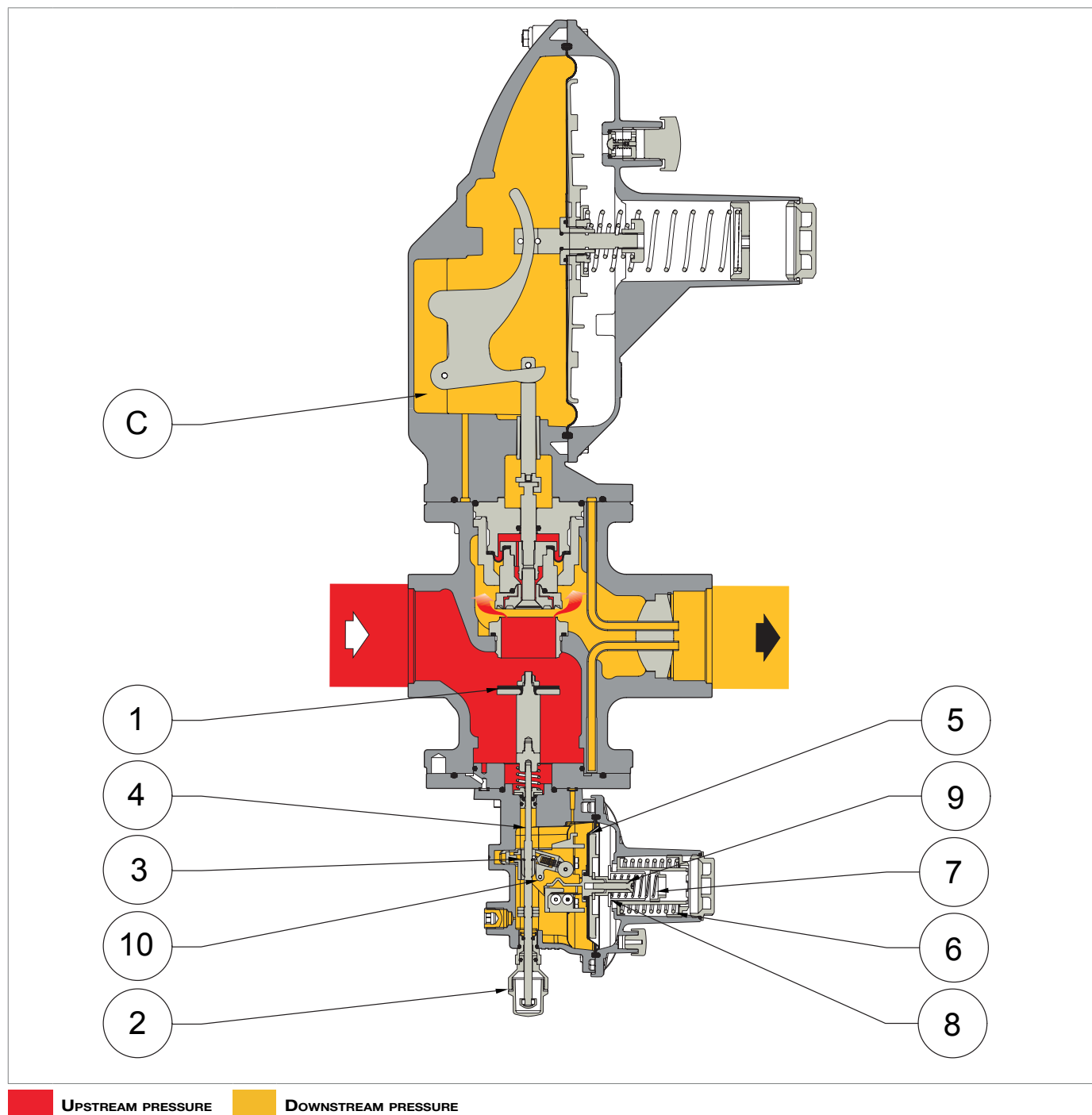


Fig. 4.8. CIRVAL with built-in LA slam-shut valve

5 - TRANSPORT AND HANDLING



5.1 - SPECIFIC WARNINGS FOR TRANSPORT AND HANDLING

NOTICE!

Transport and handling must be carried out in compliance with the regulations in force in the country of installation by personnel who are:

- qualified (specially trained);
- who are familiar with accident prevention and workplace safety regulations;
- authorised to use lifting 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 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>
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. 5.24.

5.1.1 - PACKAGING AND FASTENERS USED FOR TRANSPORT

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




Upon receiving the equipment:

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

! NOTICE!

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

Table 5.25 shows the types of packaging used:

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

Tab. 5.25.

5.2 - PHYSICAL CHARACTERISTICS OF THE EQUIPMENT

5.2.1 - CIRVAL

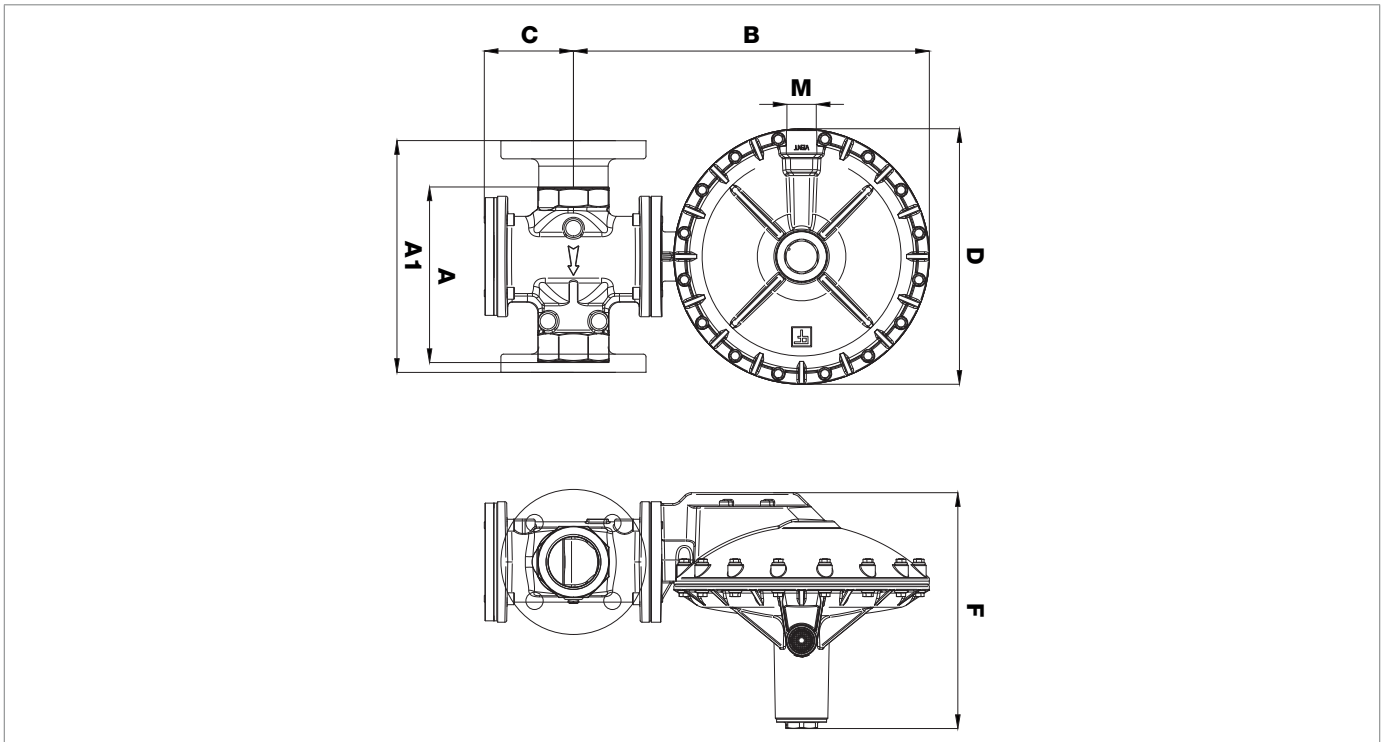


Fig. 5.9. Physical characteristics CIRVAL

Overall dimensions CIRVAL			
Model	Cirval 200	Cirval 300	Cirval 300 AU
A	167.7	193	193
A1	-	254	267*
B	259	391.2	391.2
C	66	99.1	99.1
D	185.4	279.4	279.4
F	177.8	256.5	256.5
M	3/4" NPT	3/4" NPT	3/4" NPT
Inlet	1-1/4"; 1-1/2"; 2" NPT	2" NPT; 2" S125FF	2" S150RF
Outlet	1-1/4"; 1-1/2"; 2" NPT	2" NPT; 2" S125FF	2" S150RF
Connecting pneumatic fittings	1/4" NPT x 3/8" O.D. Tubing		

Tab. 5.26.

Weight [lbs]			
NPT	5.4	11.8	-
FF/RF	-	16	18

Tab. 5.27.

5.2.2 - CIRVAL + IFM

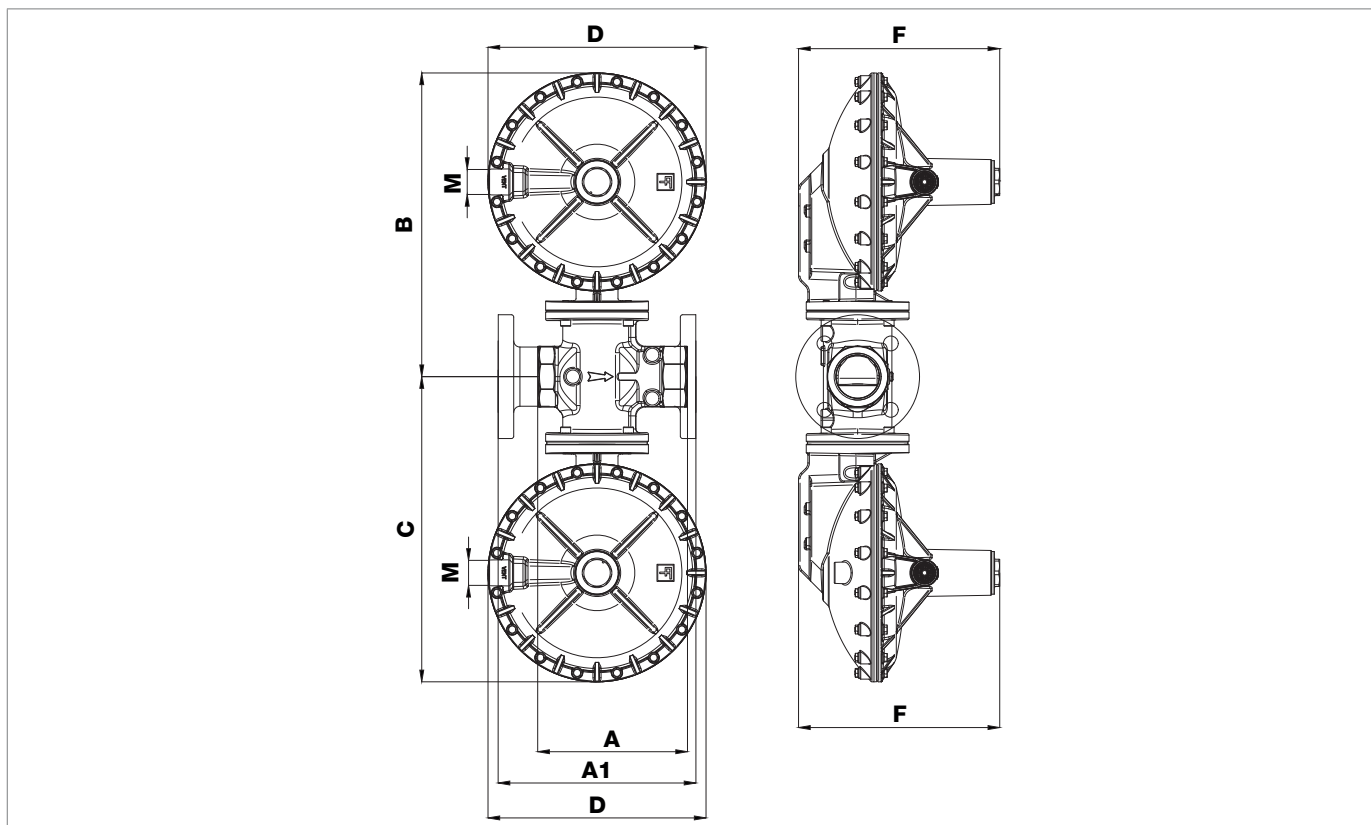


Fig. 5.10. Physical characteristics CIRVAL + IFM

Overall dimensions CIRVAL + IFM			
Model	Cirval 200	Cirval 300	Cirval 300 AU
A	167.7	193	193
A1	-	254	267*
B	259	391.2	391.2
C	259	391.2	391.2
D	185.4	279.4	279.4
F	177.8	256.5	256.5
M	3/4" NPT	3/4" NPT	3/4" NPT
Inlet	1-1/4"; 1-1/2"; 2" NPT	2" NPT; 2" S125FF	2" S150RF
Outlet	1-1/4"; 1-1/2"; 2" NPT	2" NPT; 2" S125FF	2" S150RF
Connecting pneumatic fittings	1/4" NPT x 3/8" O.D. Tubing		

Tab. 5.28.

Weight [lbs]			
NPT	7.1	16.8	-
FF/RF	-	21	23

Tab. 5.29.

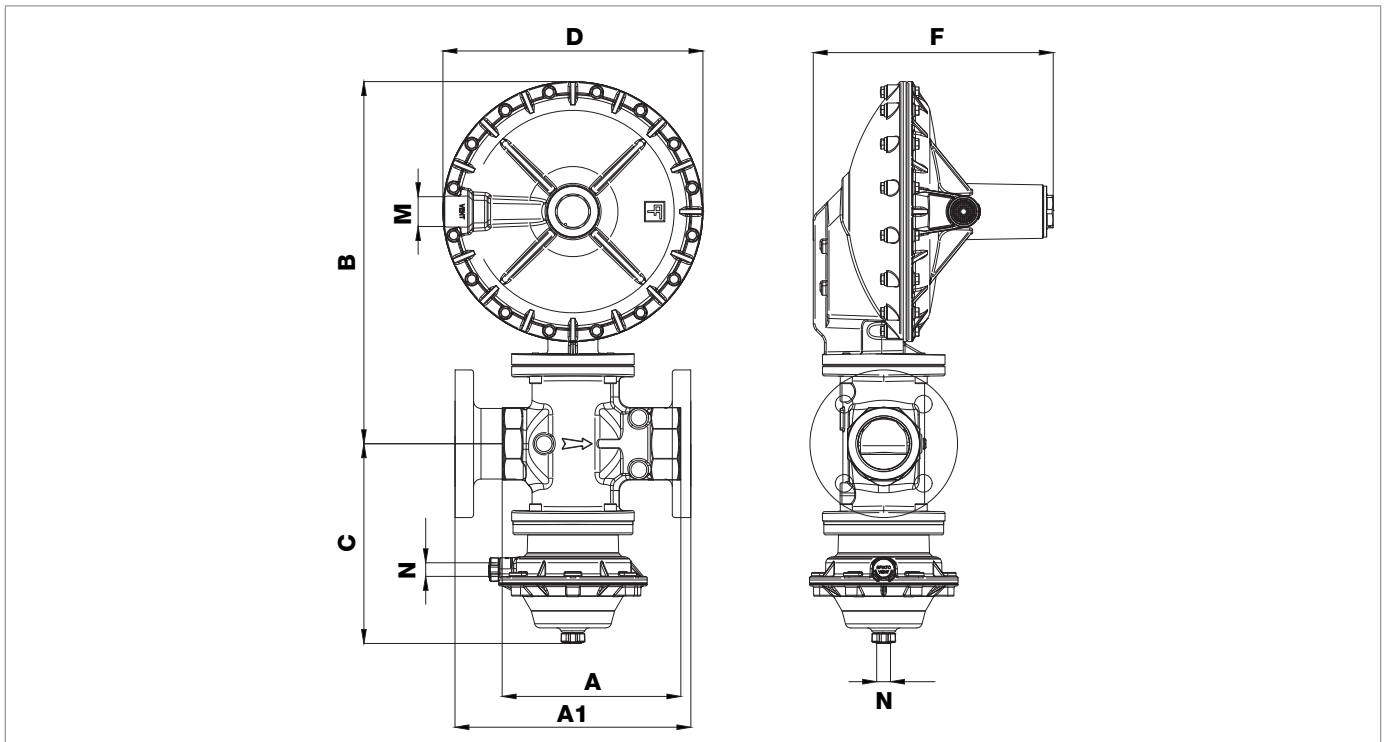
5.2.3 - CIRVAL + IMD


Fig. 5.11. Physical characteristics CIRVAL + IMD

Overall dimensions CIRVAL + IMD			
Model	Cirval 200	Cirval 300	Cirval 300 AU
A	167.7	193	193
A1	-	254	267*
B	259	391.2	391.2
C	165	213	213
D	185.4	279	279
F	177.8	256.5	256.5
M	3/4" NPT	3/4" NPT	3/4" NPT
N	1/4" NPT	1/4" NPT	1/4" NPT
Inlet	1-1/4"; 1-1/2"; 2" NPT	2" NPT; 2" S125FF	2" S150RF
Outlet	1-1/4"; 1-1/2"; 2" NPT	2" NPT; 2" S125FF	2" S150RF
Connecting pneumatic fittings	1/4" NPT x 3/8" O.D. Tubing		

Tab. 5.30.

Weight [lbs]			
NPT	6.6	13	-
FF/RF	-	17.2	19

Tab. 5.31.

5.2.4 - CIRVAL + LA

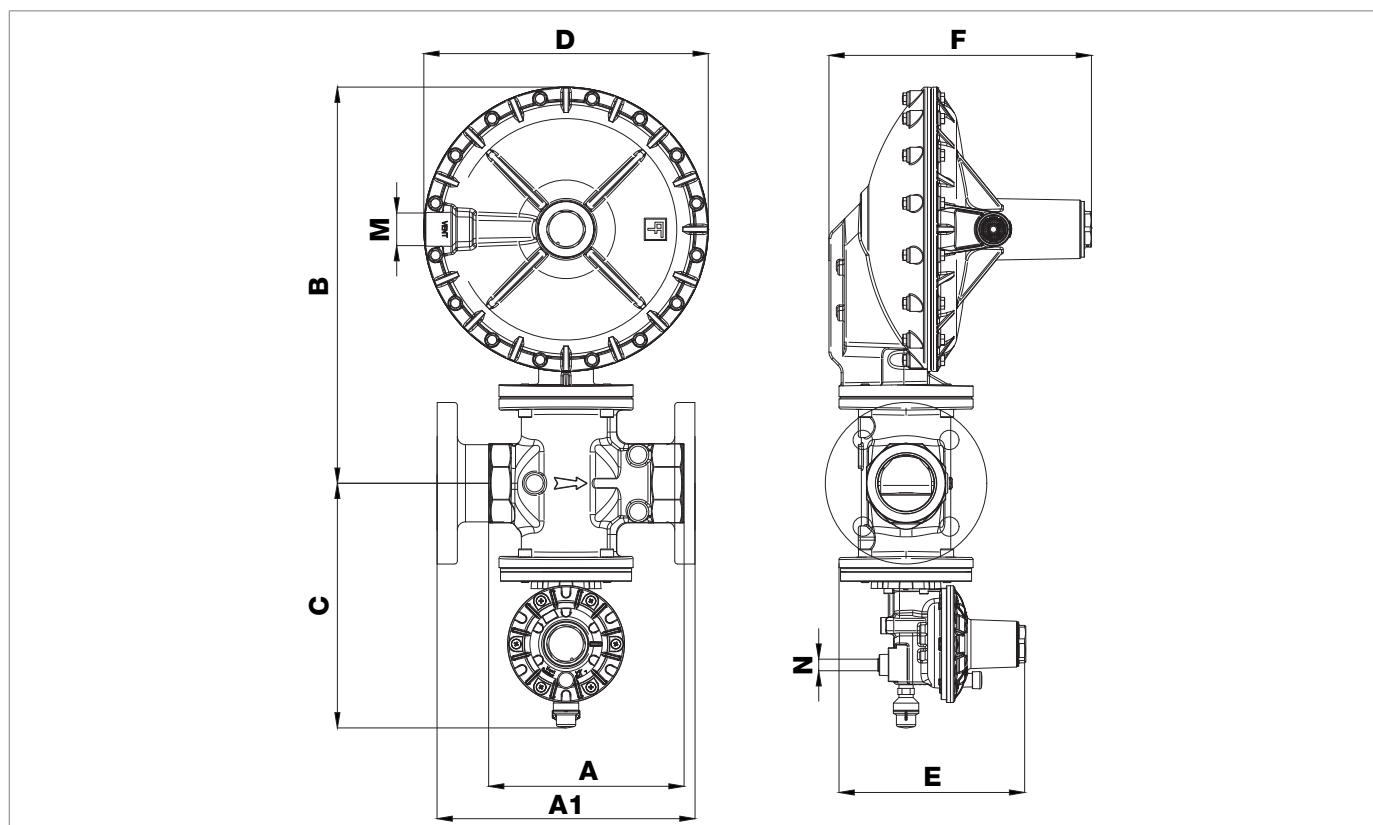


Fig. 5.12. Physical characteristics CIRVAL + LA

Overall dimensions CIRVAL + LA			
Model	Cirval 200	Cirval 300	Cirval 300 AU
A	167.7	193	193
A1	-	254	267*
B	259	391.2	391.2
C	208.3	241.3	241.3
D	185.4	279.4	279.4
E	165.1	185.4	185.4
F	177.8	256.5	256.5
M	3/4" NPT	3/4" NPT	3/4" NPT
N	1/4" NPT	1/4" NPT	1/4" NPT
Inlet	1-1/4"; 1-1/2"; 2" NPT	2" NPT; 2" S125FF	2" S150RF
Outlet	1-1/4"; 1-1/2"; 2" NPT	2" NPT; 2" S125FF	2" S150RF
Connecting pneumatic fittings	1/4" NPT x 3/8" O.D. Tubing		

Tab. 5.32.

Weight [lbs]			
NPT	6.4	12.8	-
FF/RF	-	17	19

Tab. 5.33.

5.3 - EQUIPMENT ANCHORING AND LIFTING METHOD

 **HAZARD!**

Before handling a load, make sure that its weight does not exceed the load capacity of the lifting equipment (and any other lifting tools) specified on the specific plate.

 **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;
- make sure to have perfect visibility along the route.

5.3.1 - FORKLIFT HANDLING METHOD

HAZARD!

It is forbidden to:

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

WARNING!

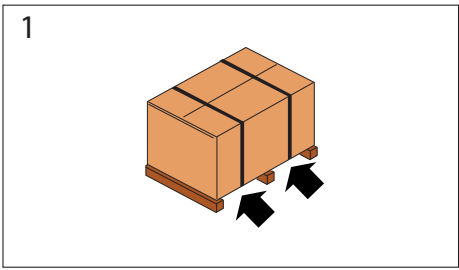
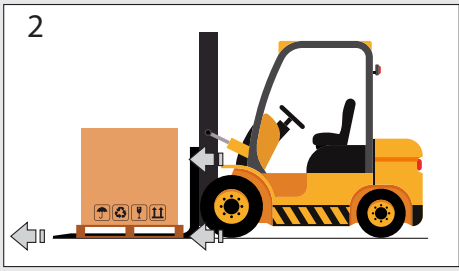
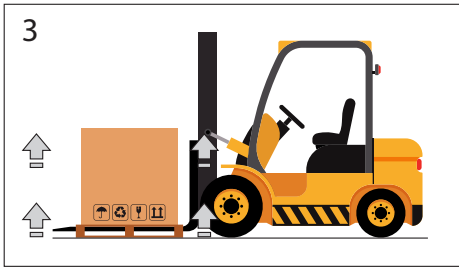
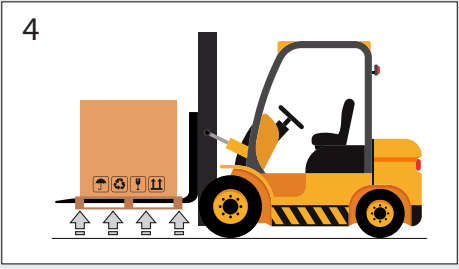
The following is not allowed on forklifts:

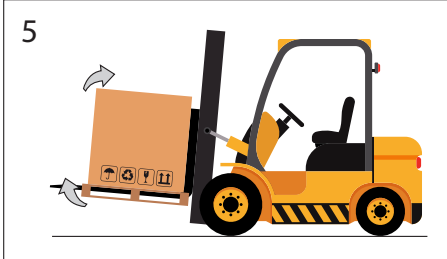
- carrying passengers;
- lifting people.

NOTICE!

Packaging must be always handled in a vertical position.

Proceed as described in tab. 5.34:

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

Step	Action	Image
5	Tilt the mast backwards (towards the driver's seat) to help the 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. ⚠ WARNING! In case of: <ul style="list-style-type: none"> • obstacles along the path; • particular operating situations; hinder operator visibility, the assistance of a ground operator is required, standing outside the range of action of the lifting equipment, with the task of signalling.	-
7	Place the load in the chosen installation area.	-

Tab. 5.34.

5.3.2 - CRANE HANDLING METHOD

WARNING!

It is mandatory to use CE marked chains, ropes and eyebolts or marked with conformity marks/markings in accordance with the regulations in force in the place of installation. Do not use chains connected to each other by bolts.

Always check that:

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


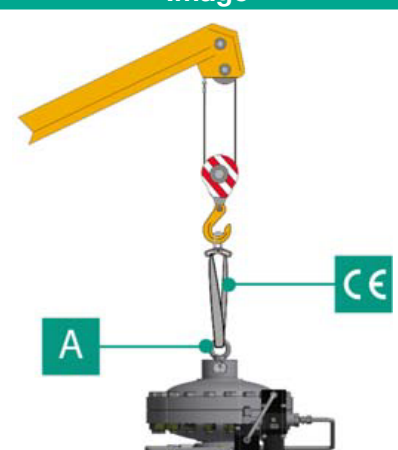

It is forbidden to:

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

NOTICE!


Packaging must be always handled in a vertical position.

The equipment must be handled using the lifting points provided on the equipment itself. To carry out the transport correctly, follow the following procedure in tab. 5.35:

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

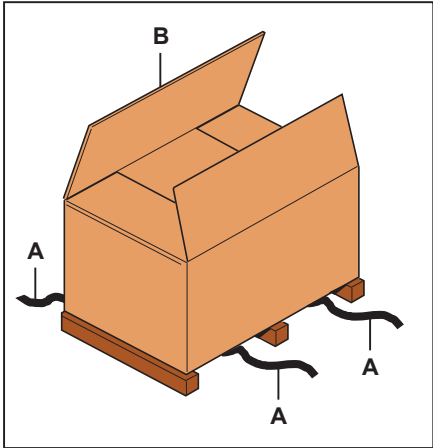
Tab. 5.35.

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	<div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <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. </div> </div>

Tab. 5.36.

To unpack the equipment in a cardboard box, proceed as described in tab. 5.37:

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	<p>Move the equipment from the base to the place intended for it.</p> <div style="border: 1px solid blue; padding: 5px;"> <p>⚠ NOTICE!</p> <p>Have at least 2 operators manually move the packages if required due to their dimensions/weight.</p> </div>	

Tab. 5.37.

⚠ NOTICE!

After removing all packaging materials, check for any anomalies.

If there are anomalies:

- do not install the equipment;
- contact PIETRO FIORENTINI S.p.A. and specify the details provided on the equipment rating plate.


5.4.1 - PACKAGING DISPOSAL

⚠ NOTICE!

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

5.5 - STORAGE AND ENVIRONMENTAL CONDITIONS


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

Conditions	Data
Maximum storage period	Maximum 3 years.
	<div style="border: 1px solid black; padding: 5px;">  NOTICE! For installations in later periods, see paragraph "pre-installation warnings after prolonged storage." </div>
Temperature	Not above 40°C
Humidity	Not above 70%
Radiation	Away from radiation sources according to UNI ISO 2230:2009

Tab. 5.38.

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.

<div style="border: 1px solid black; padding: 5px;">  NOTICE! PIETRO FIORENTINI S.p.A. recommends checking the condition of rubber parts in case of downtime or storage longer than 3 years. </div>

6 - INSTALLATION

6.1 - INSTALLATION PRE-REQUISITES

6.1.1 - ENVIRONMENTAL CONDITIONS ALLOWED

WARNING!

To safely use the equipment, in full respect of the allowed environmental conditions, follow the data shown on the regulator plate and on any accessories (refer to paragraph 2.8 “Rating plates 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 proper operator visibility during working on the equipment.

NOTICE!

The equipment must operate in places that are properly lit by artificial lighting suitable for the protection of the operator (in compliance with UNI EN 12464-1:2011 and UNI EN 12464-2:2014). For maintenance operations located in areas and/or parts that are not sufficiently illuminated, it is mandatory to use all the light sources of the installation facility.

6.1.2 - CHECKS BEFORE INSTALLATION

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

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

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

ATTENTION!



If the installation of the equipment requires the field application of compression fittings, these must be installed in accordance with the instructions of the manufacturer of the fittings themselves.

The choice of fittings must be compatible with:

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

Before installation, it must be ensured that:

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

Installation	
Operator qualification	Installer
PPE required	<div style="text-align: center;">  </div> <div style="background-color: #ff8c00; 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; • any information provided by the Safety Manager at the installation facility.
Equipment required	Refer to chapter 7 "Equipment for commissioning/maintenance".

Tab. 6.39.

6.2 - SPECIFIC SAFETY INSTRUCTIONS FOR THE INSTALLATION STEP

 **WARNING!**

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

 **WARNING!**

Installation may also take place in areas where there is a risk of explosion, which implies that all necessary prevention and protection measures have to be taken.

For these measures, please refer to the regulations in force at the place of installation.

6.3 - GENERAL INFORMATION ON CONNECTIONS

The equipment must be installed in-line with an arrow on the body pointing to the gas flow direction.
The online installation must include:

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

Tab. 6.40.

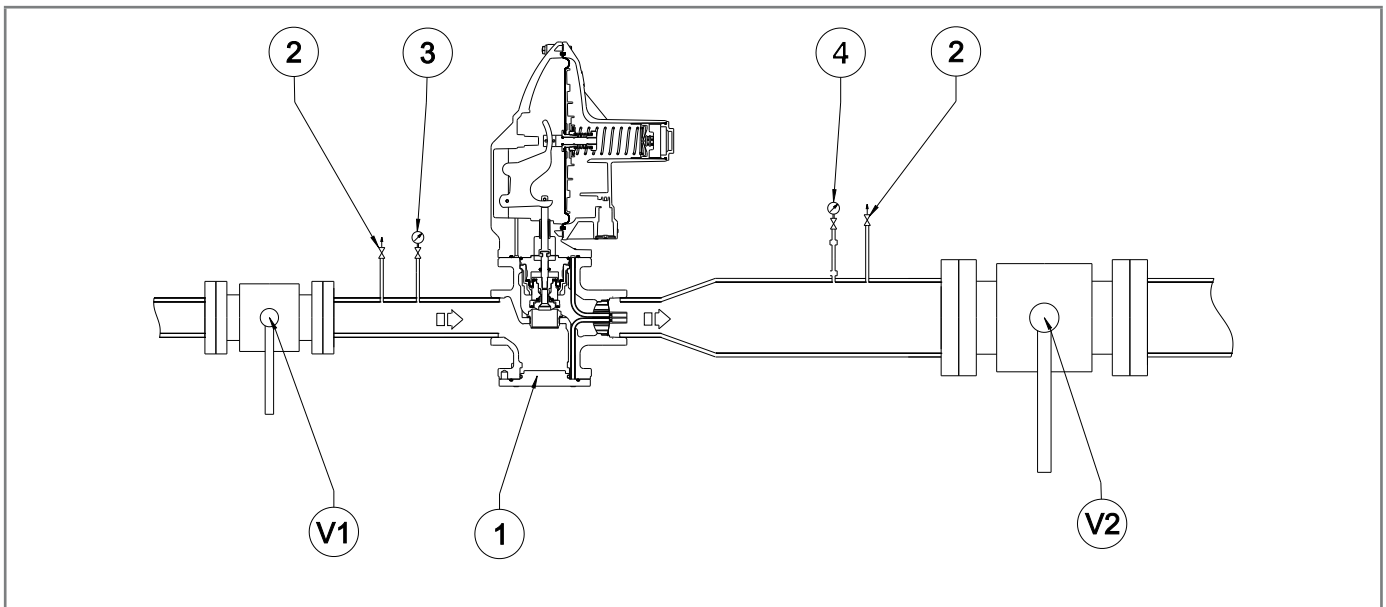


Fig. 6.13. In-line installation

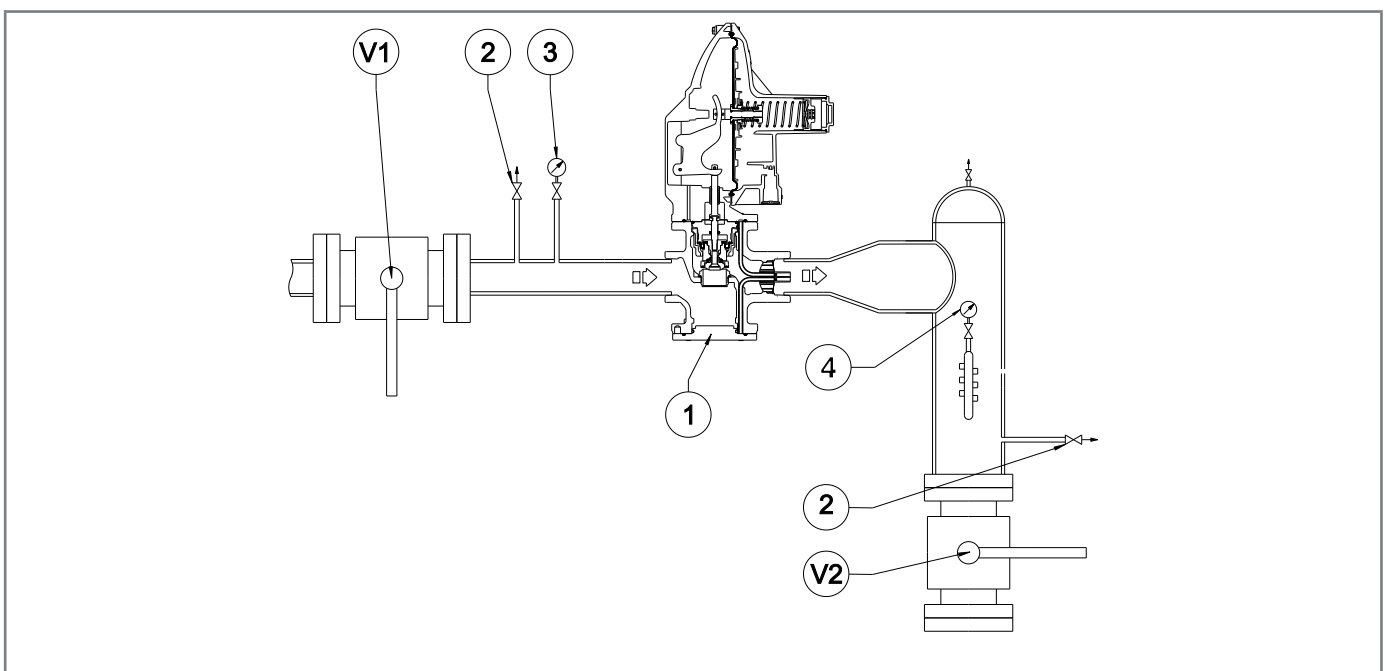


Fig. 6.14. Angle installation

! NOTICE!

When used in gas pressure reduction stations, the device must be installed at least according to the requirements of standards UNI EN 12186:2014 or UNI EN 12279:2007.

Equipment vents must be ducted in accordance with UNI EN 12186:2014 or UNI EN 12279:2007 or the standards in force at the place of installation of the equipment.

6.4 - REGULATOR INSTALLATION POSITIONS

Figure 6.15 and 6.16 illustrate typical regulator arrangements:

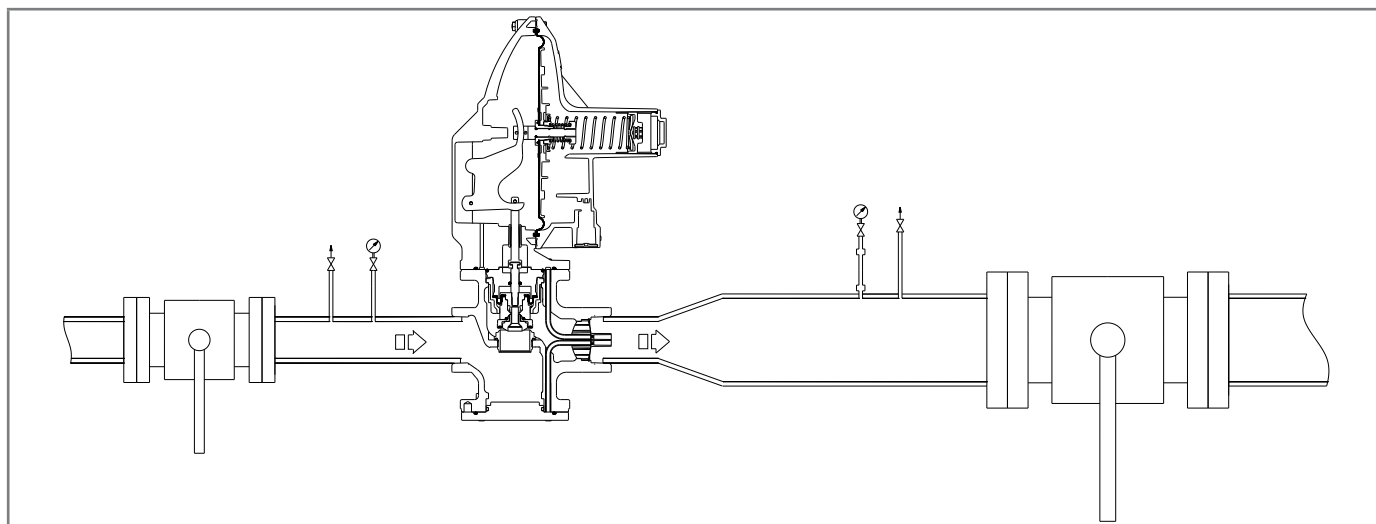


Fig. 6.15. Standard position

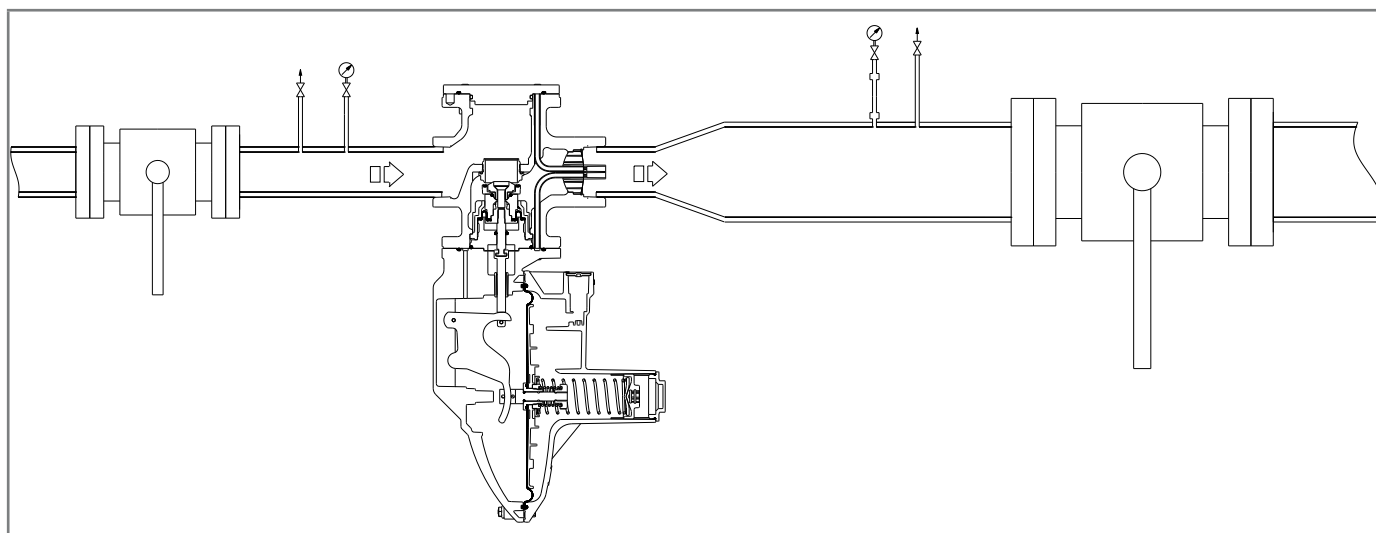


Fig. 6.16. Inverted position

6.5 - INSTALLATION PROCEDURES

6.5.1 - EQUIPMENT INSTALLATION PROCEDURE

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

Tab. 6.41.

NOTICE!

For installation after maintenance, replace the seals.

6.5.2 - CONNECTION OF THE SENSING LINES TO THE DOWNSTREAM PIPING

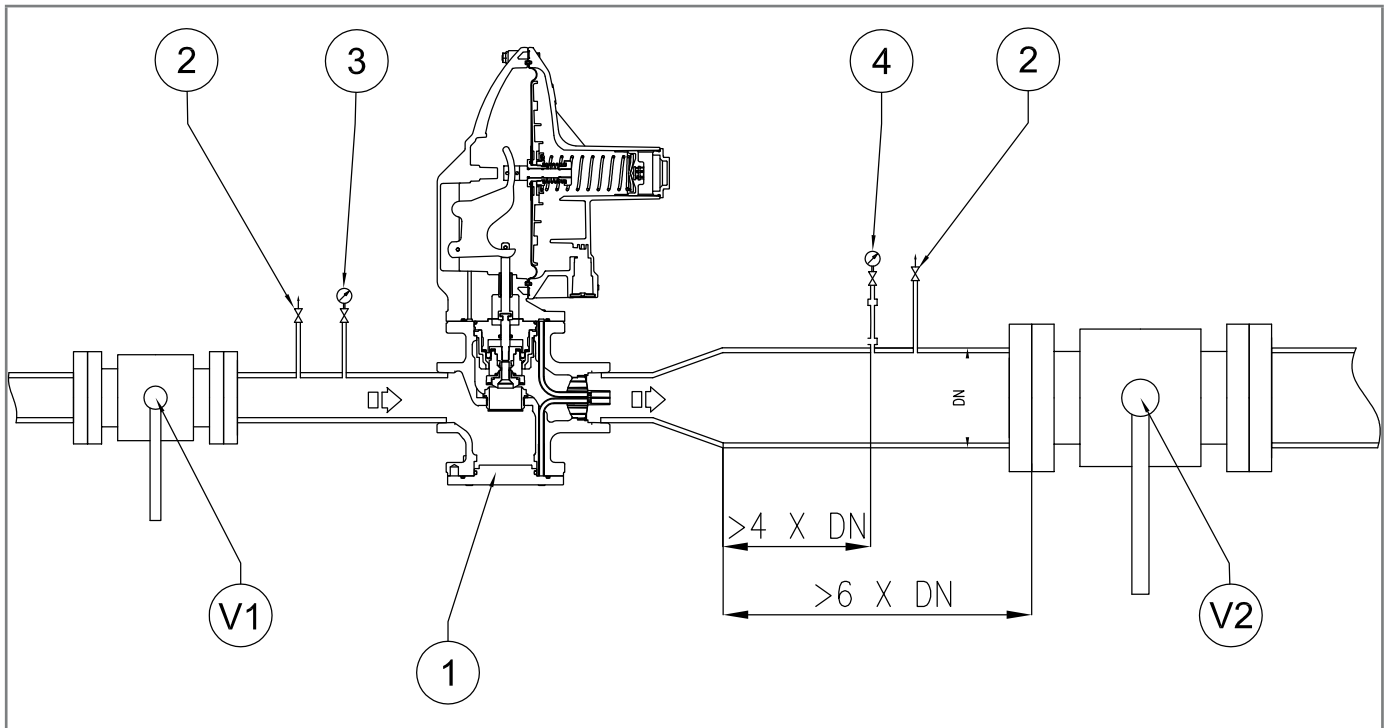


Fig. 6.17. Connection of sensing lines to the downstream piping

For proper adjustment, it is essential that:

- the downstream shut-off valve is placed at a distance of at least 6 times the nominal diameter of the pipe downstream of the regulator;
- if there are external downstream sensing lines, check that they are located on a straight section of pipe (of uniform diameter) having a length of at least 4 times the nominal diameter of the pipe;

For optimum performance, 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 $P_a < 5 \text{ bar}$

As a limit for use, the velocity of the fluid under pressure at the point of pick-up does not exceed the following value:

$V_{max} = 40 \text{ m/s}$ 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 Sm³/h

DN = nominal pipe diameter in mm

Dp = regulator outlet pressure in barg

! NOTICE!

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

To prevent the pneumatic connections of the sensing lines from collecting impurities and condensation, it is necessary that:

- the connections of the pneumatic connection are always welded to the top or horizontal axis of the pipe itself (refer to Fig. 6.18);
- the hole in the piping has no burrs or internal protrusions;
- the slope of the pneumatic connection is always 5-10% towards the downstream pipe connection.

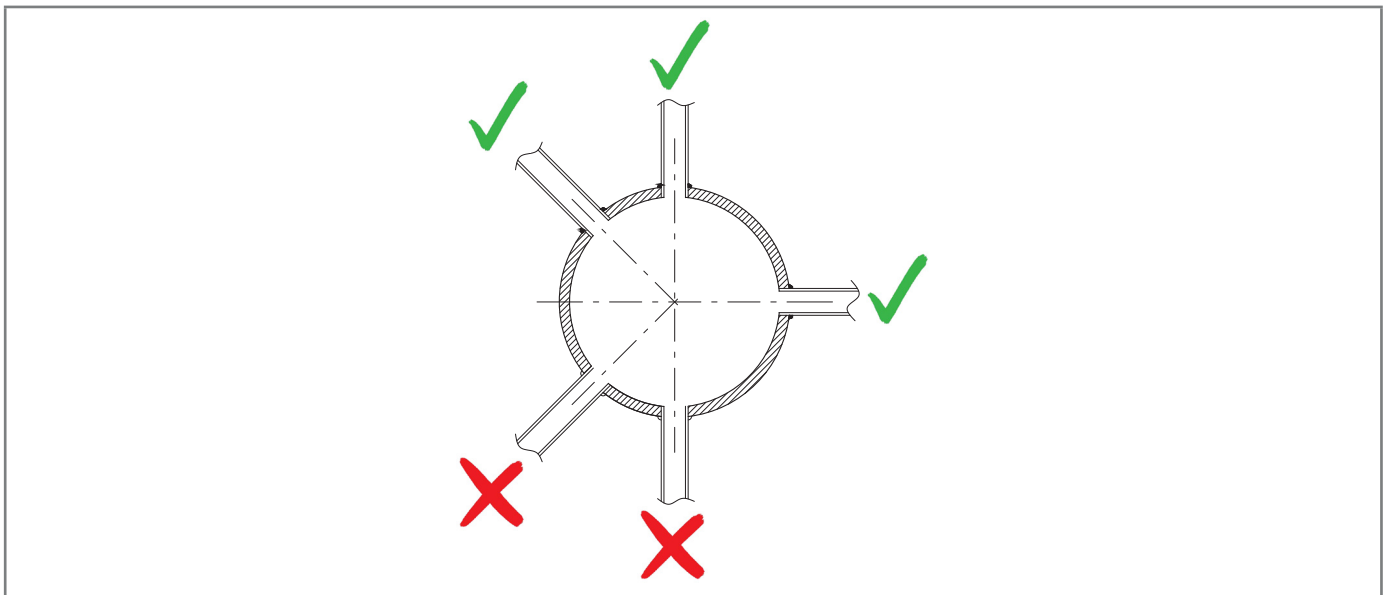


Fig. 6.18. Welded pipe connections

If there is a multiple sensing line, connect the equipment connections as shown below:

- 1 and 2 to the sensing line of the control head of the main regulator and of the regulator with monitor function or built-in monitors;
- 3 and 4 free lines;
- 5 and 6 to the sensing line of the slam-shut valve when present.

! NOTICE!

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

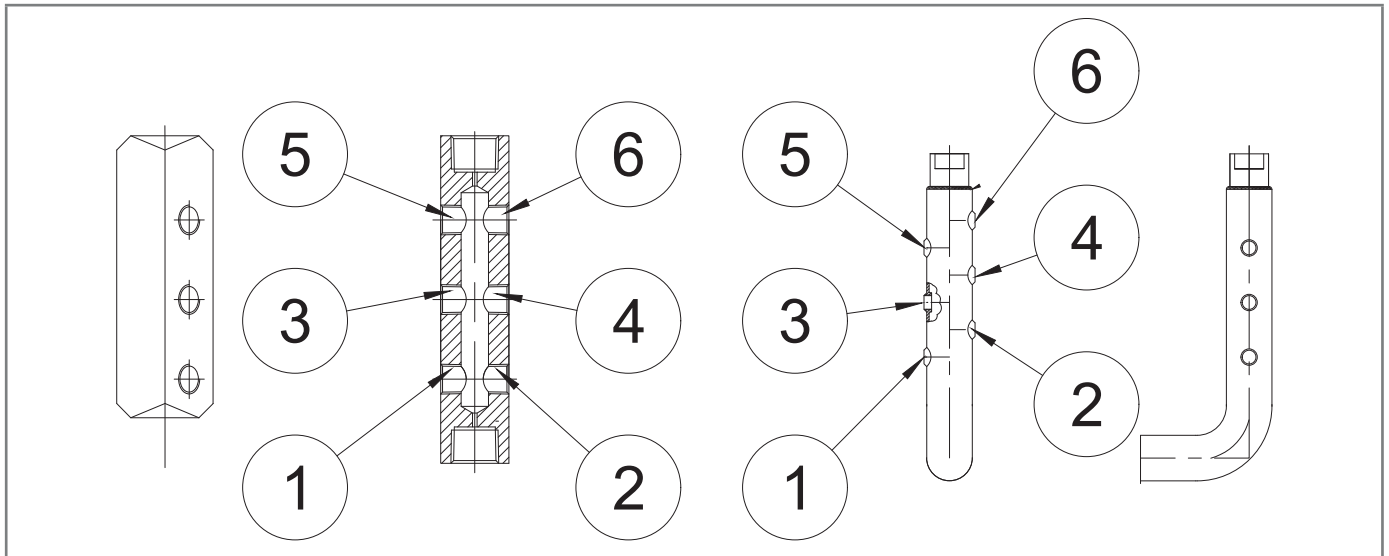


Fig. 6.19. Equipment connections


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.



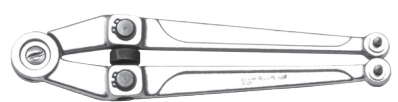



7 - COMMISSIONING/MAINTENANCE EQUIPMENT

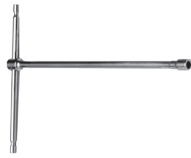




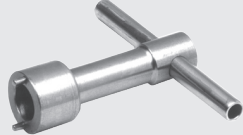
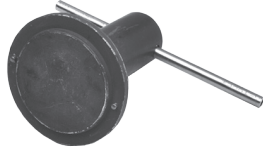

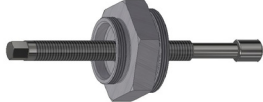

7.1 - LIST OF EQUIPMENT

Use of commissioning/maintenance equipment	
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;">  </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; • any information provided by the Safety Manager at the installation facility.

Tab. 7.42.

The types of equipment required to commission and service the equipment are described in table 7.43:

Ref.	Equipment type	Image
A	Combination wrench	
B	Adjustable wrench	
C	Compass wrench	
D	Double ended bi-hex tubular socket wrench	
E	Bent male hex wrench	
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	
Q	Special key for IFM, IMD monitors	
R	Torx key	

Tab. 7.43.

7.2 - EQUIPMENT NEEDED FOR THE DIFFERENT CONFIGURATIONS

Each table is distinguished by:

Term	Description
K./Wr.	Key, with reference to the equipment indicated in tab. 7.43.
Code	Code, referring to the equipment.
DN	Indicates the Nominal Diameter of the reference configuration.
L.	Length, referred to the equipment.
Ref.	Reference to the equipment.
Type	Type (size) or code of the equipment.

Tab. 7.44.

CIRVAL (+ CIRVAL with monitor function)			
Equipment		Model	
Ref.	Type	CIRVAL 200	CIRVAL 300
D	K./Wr.	6 - 17 - 20 - 26	6 - 24 - 26 - 10 - 46
E	K./Wr.	3 - 5	5 - 6

Tab. 7.45.

CIRVAL + IFM			
Equipment		Model	
Ref.	Type	CIRVAL 200	CIRVAL 300
D	K./Wr.	6 - 17 - 20 - 26	6 - 24 - 26 - 10 - 46
E	K./Wr.	3 - 5	5 - 6

Tab. 7.46.

CIRVAL + IMD			
Equipment		Model	
Ref.	Type	CIRVAL 200	CIRVAL 300
A	K./Wr.	10 - 14 - 19	
D	K./Wr.	6 - 17 - 20 - 26	6 - 24 - 26 - 10 - 46
E	K./Wr.	3 - 5	5 - 6
I	L.	65 x 100	

Tab. 7.47.

CIRVAL + LA			
Equipment		Model	
Ref.	Type	CIRVAL 200	CIRVAL 300
A	K./Wr.	7 - 13 - 14	
D	K./Wr.	6 - 8 - 17 - 20 - 26	6 - 8 - 10 - 24 - 26 - 46
E	K./Wr.	3 - 5	5 - 6
R	Type	T25 - T20	

Tab. 7.48.

8 - COMMISSIONING

8.1 - GENERAL WARNINGS

8.1.1 - SAFETY REQUIREMENTS FOR COMMISSIONING

HAZARD!

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

HAZARD!

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

WARNING!

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

NOTICE!

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

The equipment is delivered already calibrated.

Even if the equipment is fitted with a built-in LA slam-shut valve and pressure switches will already be calibrated.



NOTICE!

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

Before commissioning the equipment, it is necessary to check that:

- all shut-off valves (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>
Equipment required	Refer to chapter 7 "Equipment for commissioning/maintenance".

Tab. 8.49.

8.2 - PRELIMINARY PROCEDURES FOR COMMISSIONING

HAZARD!

Before commissioning the equipment, it must be ensured that any risk of explosion or ignition source has been eliminated.

WARNING!

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


ATTENTION!

To protect the equipment from damage, never:

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

Commissioning can be carried out using two different procedures:

Commissioning types

Injection of an inert fluid	Pressurising the equipment by injecting an inert fluid (e.g. nitrogen) to avoid potentially explosive mixtures for services with combustible gases. <div data-bbox="343 918 1476 974" style="background-color: #f4a460; padding: 5px;">  WARNING! </div> <p>During pressurisation, always check that the equipment has no leaks.</p>
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. 8.50.

8.3 - CHECKING THE OUTER SEAL

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

8.4 - SETTING OF EQUIPMENT AND OF INCLUDED ACCESSORIES

NOTICE!

To properly calibrate the equipment and accessories present, refer to the accuracy class indicated on the rating plates (see section 2.8).

8.5 - REGULATOR COMMISSIONING PROCEDURE

In the application consisting of two pressure adjusting lines, it is advisable to commission one line at a time, starting with the line with the lowest set point.

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

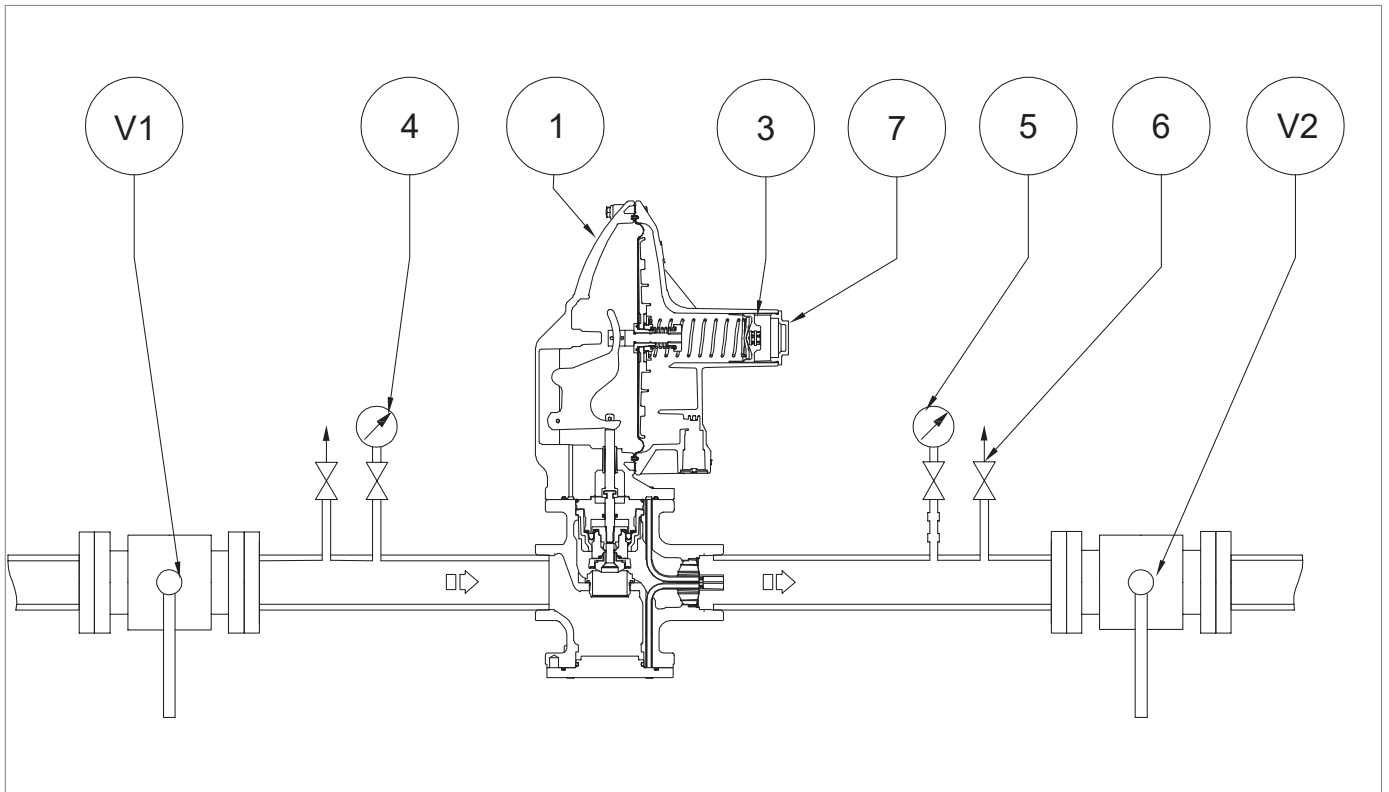






Fig. 8.20. Commissioning the CIRVAL regulator

Step	Action
1	Partially open the bleed cock (6).
2	<p>Open the upstream shut-off valve (V1) very slowly.</p> <div style="border: 1px solid blue; padding: 5px;">  NOTICE! Check the pressure by referring to the pressure gauge (4) located upstream. </div>
3	Check the pressure of the line inlet pipe by referring to the upstream pressure gauge (4).
4	<p>To calibrate the regulator (1) to the required setting value, turn the setting ring nut (3):</p> <ul style="list-style-type: none"> • clockwise to increase the pressure value • counterclockwise to decrease the pressure value <div style="border: 1px solid blue; padding: 5px;">  NOTICE! Check the pressure referring to the pressure gauge (5) located upstream. </div>
5	Position and secure the shut-off cap (7).
6	Close the bleed cock (6).
7	<p>Check that the downstream pressure, after an increase phase, does not exceed the shut-off pressure value (refer to the SG value on the rating plate, see par. 2.8).</p> <div style="border: 1px solid blue; padding: 5px;">  NOTICE! If the downstream pressure exceeds the closing pressure value, refer to chapter 9 “Trouble-shooting” to clear the causes of the malfunctions. </div>
8	Using a foaming agent, check all the joints between shut-off valves (V1, V2) for proper sealing.
9	<p>Open the downstream shut-off valve (V2) very slowly until the piping has been filled completely.</p> <div style="border: 1px solid blue; padding: 5px;">  NOTICE! <ul style="list-style-type: none"> • If the pressure of the downstream pipeline is lower than the calibration pressure, partially open the downstream shut-off valve (V2) so as to not to exceed the maximum flow rate value of the installation. • Check the pressure referring to the downstream pressure gauge (5). </div>

Tab. 8.51.

8.6 - COMMISSIONING PROCEDURE FOR THE REGULATOR CIRVAL AND THE REGULATOR IN MONITOR FUNCTION

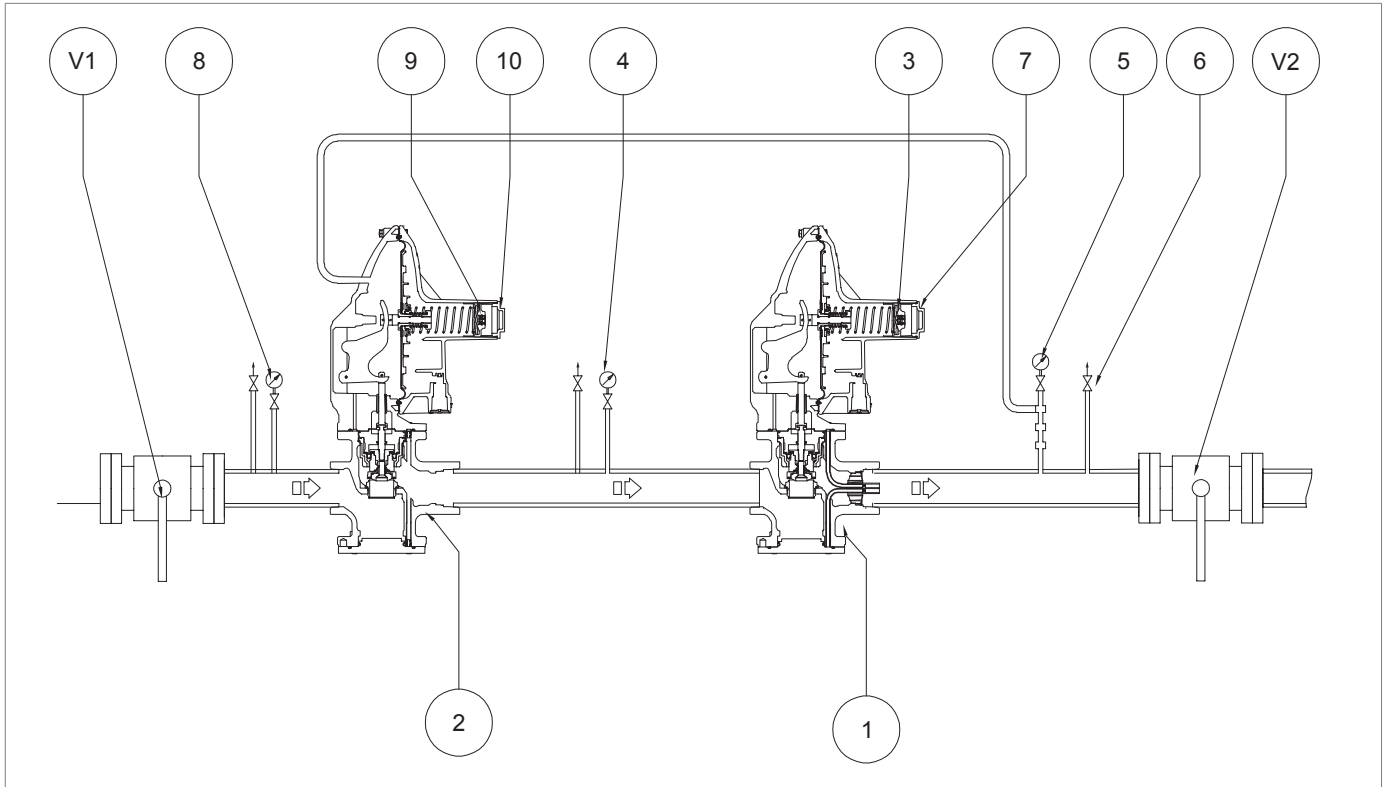


Fig. 8.21. Commissioning of CIRVAL regulator + regulator in monitor function

Step	Action
1	Remove the cap (7) from the main regulator (1).
2	Remove the cap (10) from the regulator in inline monitor function (2).
3	Partially open the bleed cock (6).
4	Very slowly open the upstream shut-off valve (V1), checking that the downstream pressure (Pd) indicated on the downstream pressure gauge (5) does not exceed the required calibration value by more than 50%.
5	Check the pressure of the line inlet pipe by referring to the upstream pressure gauge (8).
6	Insert and screw the R key (tab. 7.43) into the slot of the cap (7) to open the main regulator (1) completely.
7	To calibrate the regulator with inline monitor function (2) to the required setting value, turn the setting ring nut (9): <ul style="list-style-type: none"> • clockwise to increase the pressure value • counterclockwise to decrease the pressure value <div style="border: 1px solid blue; padding: 5px; margin-top: 5px;"> <p>NOTICE! Check the pressure referring to the pressure gauge (5) located upstream.</p> </div>
8	Close the bleed cock (6).
9	Check that the downstream pressure (Dp), after an increment phase, does not exceed the closing pressure value (refer to the SG value displayed on the plate, see par. 2.8).
10	Partially open the bleed cock (6).
11	Unscrew and remove the R key (tab. 7.43) from the cap slot (7).
12	Check that the calibration pressure of the main regulator (1) is as pre-established by referring to the pressure value indicated on the downstream pressure gauge (5).

Step	Action
13	<p>Check that the regulator with in-line monitor function (2) is fully open (100%).</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTICE!</p> <p>The main regulator (1) is fully open, when the pressure indicated on the intermediate pressure gauge (4) is the same as the upstream pressure gauge (8).</p> </div>
14	Close the bleed cock (6).
15	Check that the downstream pressure (Dp), after an increment phase, does not exceed the closing pressure value (refer to the SG value displayed on the plate, see par. 2.8).
16	Insert the cap (7) into the main regulator (1).
17	Insert the cap (10) into the regulator with monitor function (2).
18	Using a foaming agent, check all the joints between shut-off valves (V1, V2) for proper sealing.
19	<p>Open the downstream shut-off valve (V2) slowly until the piping has been filled completely.</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTICE!</p> <ul style="list-style-type: none"> • If the pressure of the downstream pipeline is lower than the calibration pressure, partially open the downstream shut-off valve (V2) so as to not to exceed the maximum flow rate value of the installation. • Check the pressure referring to the downstream pressure gauge (5). </div>

Tab. 8.52.

8.7 - START-UP PROCEDURE OF THE REGULATOR + BUILT-IN IFM MONITOR

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.

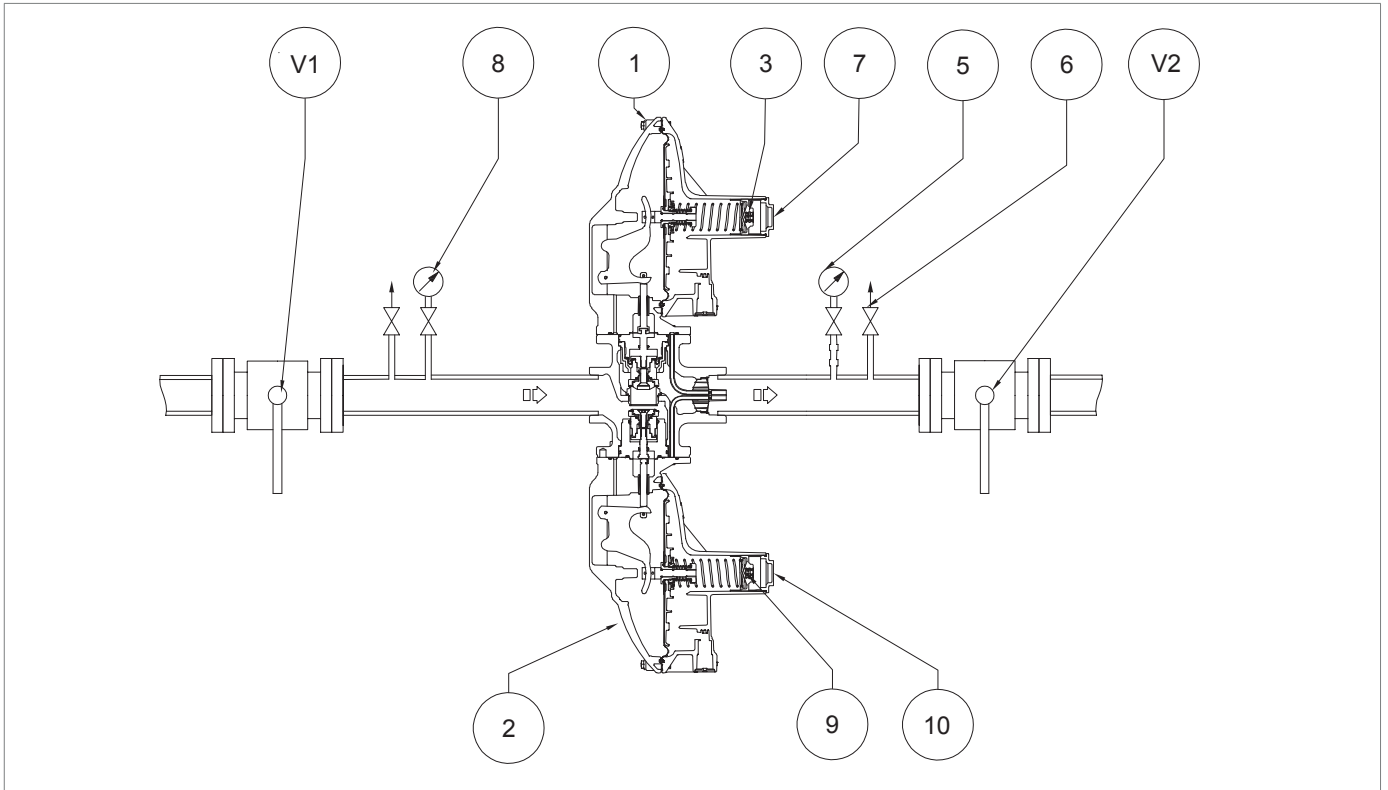


Fig. 8.22. Commissioning of the regulator CIRVAL + built-in IFM monitor

Step	Action
1	Remove the cap (7) from the main regulator (1).
2	Remove the cap (10) from the built-in IFM monitor (2).
3	Partially open the bleed cock (6).
4	Very slowly open the upstream shut-off valve (V1), checking that the downstream pressure (Pd) indicated on the downstream pressure gauge (5) does not exceed the required calibration value by more than 50%.
5	Check the pressure of the line inlet pipe by referring to the upstream pressure gauge (8).
6	Insert and screw the R key (tab. 7.43) into the slot of the cap (7) to open the main regulator (1) completely.
7	<p>To calibrate the built-in IFM monitor (2) to the required setting value, turn the setting ring nut (9):</p> <ul style="list-style-type: none"> • clockwise to increase the pressure value • counterclockwise to decrease the pressure value <div style="border: 1px solid black; padding: 5px;"> <p>! NOTICE!</p> <p>Check the pressure referring to the pressure gauge (5) located upstream.</p> </div>
8	Close the bleed cock (6).
9	Check that the downstream pressure (Pd), after an increase phase, does not exceed the closing pressure value of the built-in IFM monitor (2) (refer to the SG value on the rating plate, see par. 2.8).
10	Partially open the bleed cock (6).
11	Unscrew and remove the R key (tab. 7.43) from the cap slot (7).
12	Check that the calibration pressure of the main regulator (1) is as pre-established by referring to the pressure value indicated on the downstream pressure gauge (5).
13	Close the bleed cock (6).
14	Check that the downstream pressure (Pd), after an increment phase, does not exceed the closing pressure value of the main regulator (1) (refer to the SG value displayed on the plate, see par. 2.8).
16	Insert the cap (7) into the main regulator (1).
16	Insert the cap (10) into the built-in IFM monitor (2).
17	Using a foaming agent, check all the joints between shut-off valves (V1, V2) for proper sealing.
18	<p>Open the downstream shut-off valve (V2) slowly until the piping has been filled completely.</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTICE!</p> <ul style="list-style-type: none"> • If the pressure of the downstream pipeline is lower than the calibration pressure, partially open the downstream shut-off valve (V2) so as to not to exceed the maximum flow rate value of the installation. • Check the pressure referring to the downstream pressure gauge (5). </div>

Tab. 8.53.

8.8 - START-UP PROCEDURE OF THE REGULATOR + BUILT-IN IMD MONITOR

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.

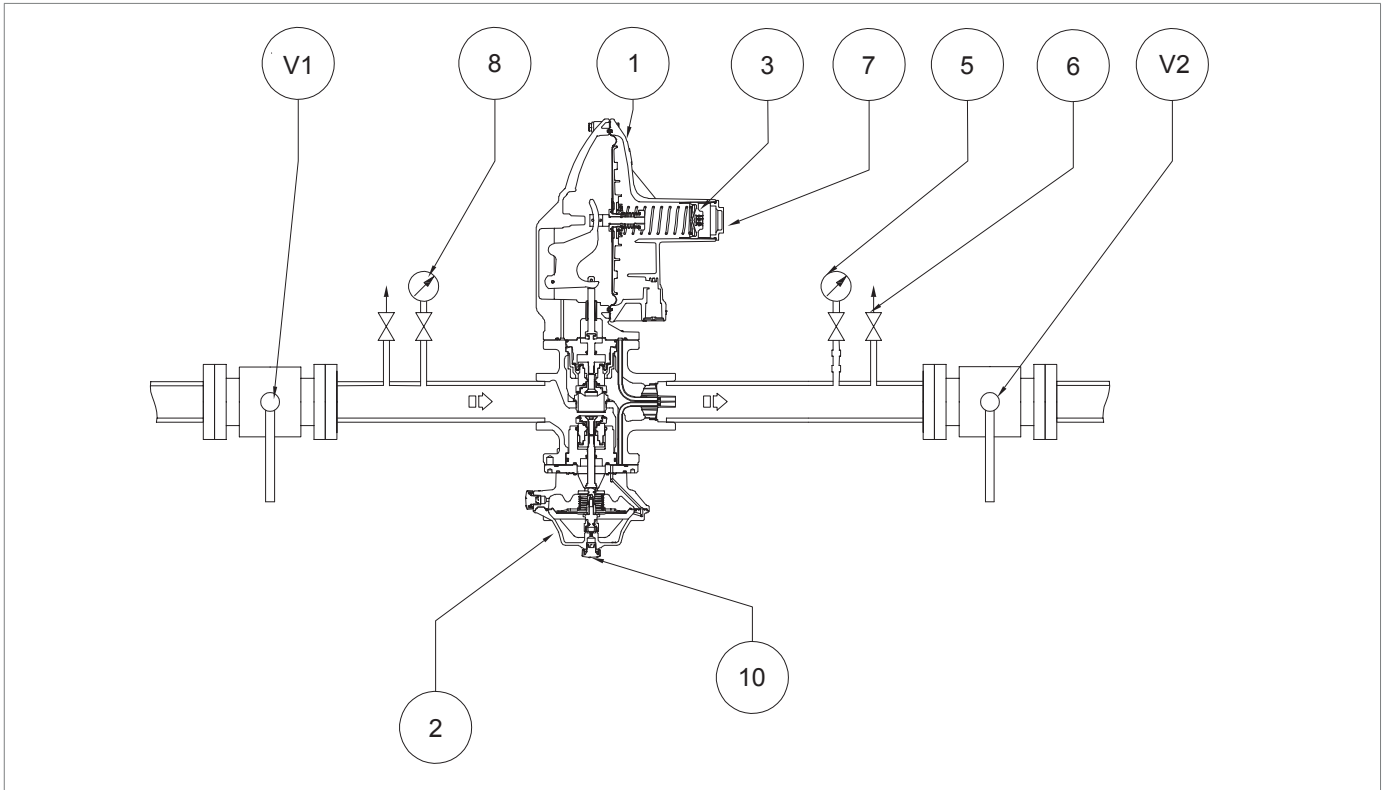


Fig. 8.23. Commissioning of the regulator CIRVAL + built-in IMD monitor

Step	Action
1	Remove the cap (7) from the main regulator (1).
2	Partially open the bleed cock (6).
3	Very slowly open the upstream shut-off valve (V1), checking that the downstream pressure (Pd) indicated on the downstream pressure gauge (5) does not exceed the required calibration value by more than 50%.
4	Check the pressure of the line inlet pipe by referring to the upstream pressure gauge (8).
5	Insert and screw the R key (tab. 7.43) into the slot of the cap (7) to open the main regulator (1) completely.
6	Check the calibration value of the built-in IMD monitor (2) by referring to the downstream pressure gauge (5).
7	Check the controlled release of gas from the vent (10). ! NOTICE! Check with foaming solution.
8	Close the bleed cock (6).
9	Check that the downstream pressure (Pd), after an increase phase, does not exceed the closing pressure value of the built-in IMD monitor (2) (refer to the SG value on the rating plate, see par. 2.8).
10	Check the controlled release of gas from the vent (10). ! NOTICE! Check with foaming solution.
11	Partially open the bleed cock (6).
12	Unscrew and remove the R key (tab. 7.43) from the cap slot (7).
13	Check that the calibration pressure of the main regulator (1) is as pre-established by referring to the pressure value indicated on the downstream pressure gauge (5). ! NOTICE! To calibrate the main regulator (1), proceed as follows: <ul style="list-style-type: none"> • turn the ring nut (3) clockwise to increase the calibration value • turn the ring nut (3) anti-clockwise to decrease the calibration value
14	Close the bleed cock (6).
15	Check that there is no gas escaping from the vent (10). ! NOTICE! <ul style="list-style-type: none"> • Check with foaming solution • If there is a gas leak, refer to Chapter 9 'Troubleshooting' to remove the causes of malfunctions
16	Check that the downstream pressure (Pd), after an increment phase, does not exceed the closing pressure value of the main regulator (1) (refer to the SG value displayed on the plate, see par. 2.8).
17	Using a foaming agent, check all the joints between shut-off valves (V1, V2) for proper sealing.
18	Open the downstream shut-off valve (V2) slowly until the piping has been filled completely. ! NOTICE! <ul style="list-style-type: none"> • If the pressure of the downstream pipeline is lower than the calibration pressure, partially open the downstream shut-off valve (V2) so as to not to exceed the maximum flow rate value of the installation. • Check the pressure referring to the downstream pressure gauge (5).

Tab. 8.54.

8.9 - COMMISSIONING PROCEDURE FOR THE CIRVAL REGULATOR + LA SLAM-SHUT VALVE

8.9.1 - INTERNAL TIGHTNESS CHECK OF LA SLAM-SHUT VALVE

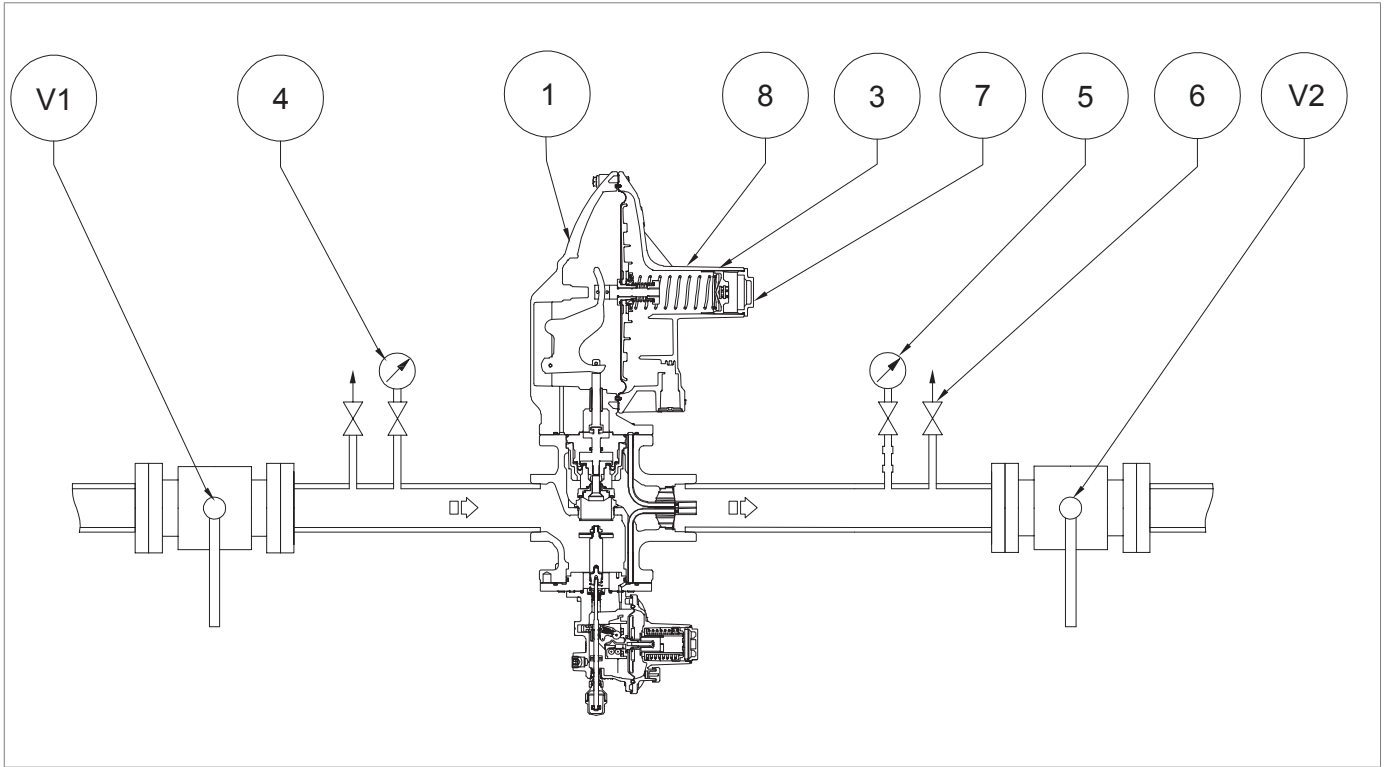


Fig. 8.24. Commissioning of the CIRVAL regulator with LA slam-shut valve

Step	Action
1	Check that the slam-shut valve is in the shut-off position.
2	Open the bleed cock (6) to fully discharge the downstream section.
3	Slowly open the upstream shut-off valve (V1).
4	Check the internal tightness of the slam-shut valve by means of the bleed cock (6). <div style="border: 1px solid black; padding: 5px;"> <p>NOTICE!</p> <ul style="list-style-type: none"> • Check with foaming solution • If there is a gas leak, refer to Chapter 9 'Troubleshooting' to remove the causes of malfunctions </div>

Tab. 8.55.

8.9.2 - COMMISSIONING OF THE CIRVAL REGULATOR + LA SLAM-SHUT VALVE

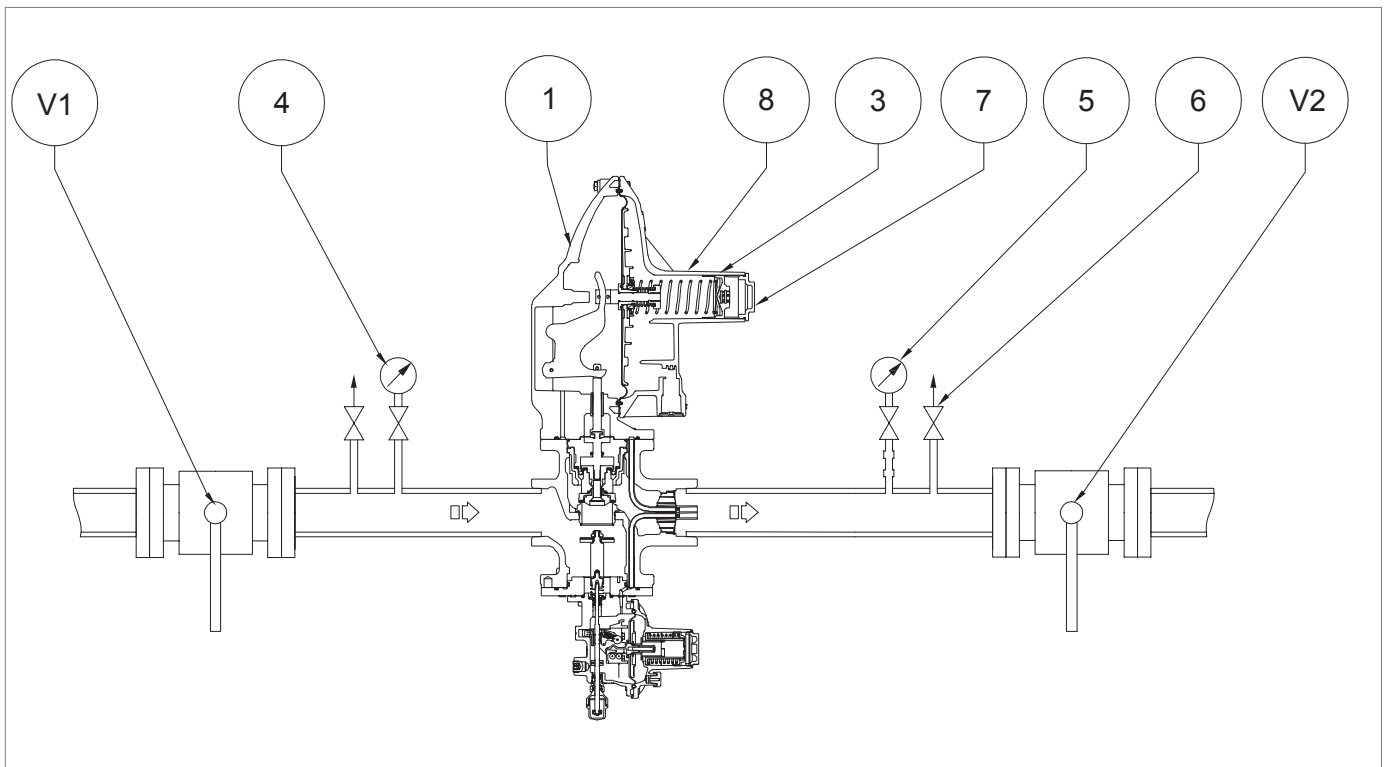


Fig. 8.25. Commissioning of the CIRVAL regulator with LA slam-shut valve

Step	Action
1	Make sure that the bleed cock (6) is partially open.
2	Check that the LA slam-shut valve is in the shut-off position.
3	Partially open the upstream shut-off valve (V1), checking the pressure indicated by the upstream pressure gauge (4).
4	Perform the internal tightness check of the LA slam-shut valve, referring to chapter 8.9.1.
4	<div style="border: 1px solid blue; padding: 5px;"> <p>! NOTICE!</p> <p>In case of leaks, refer to chapter 9 "Troubleshooting" to clear the causes of the malfunctions.</p> </div>
5	Slowly pressurise the control line, acting on the knob of the LA slam-shut valve (refer to the "Operation" section in par. 4.5.5.1), checking that the downstream pressure (Pd) indicated by the downstream pressure gauge (5) does not exceed the required calibration value by more than 50%.
6	When the regulator is put into service, the pressure on the downstream pressure gauge (5) will be equal to the calibration value of the main regulator.
6	<div style="border: 1px solid blue; padding: 5px;"> <p>! NOTICE!</p> <p>In the first line pressurisation phase, the pressure on the downstream pressure gauge (5) could exceed the required calibration value, depending on the response time of the regulator.</p> </div>
7	Open the upstream shut-off valve (V1) completely.
8	Check the settings of the pressure switch of the LA slam-shut valve by referring to paragraph 8.9.3.

Step	Action
9	<p>If the pressure downstream (Pd) is not at the required calibration value, proceed as follows:</p> <ul style="list-style-type: none"> downstream pressure value (Pd) lower than required calibration value: load the setting spring by turning the adjustment ring nut clockwise (3) downstream pressure value (Pd) higher than required calibration value: load the setting spring by turning the adjustment ring nut anti-clockwise (3)
10	Check the downstream pressure (Pd) referring to the downstream pressure gauge (5).
11	Close the bleed cock (6).
12	<p>Check that the downstream pressure (Pd), after an increase phase, does not exceed the closing pressure value (SG 20).</p> <div style="border: 1px solid blue; padding: 5px;"> <p>! NOTICE!</p> <p>If the pressure in the pipe section between the regulator and the downstream shut-off valve (V2) exceeds the closing pressure value, consult chapter 9 “Troubleshooting” to clear the causes of the malfunctions.</p> </div>
13	Check the tightness of all connections between the shut-off valves (V1, V2) with a foaming substance.
14	If external leaks are found, eliminate the leak points and repeat the procedure from step 7.
15	<p>Open downstream shut-off valve (V2) very slowly until the pipeline fills completely.</p> <div style="border: 1px solid blue; padding: 5px;"> <p>! NOTICE!</p> <ul style="list-style-type: none"> If the pressure of the downstream pipeline is lower than the calibration pressure, partially open the downstream shut-off valve (V2) so as to not to exceed the maximum flow rate value of the installation. Check the pressure referring to the downstream pressure gauge (5). </div>

Tab. 8.56.

8.9.3 - SETTING PROCEDURE FOR THE LA SLAM-SHUT VALVE (LA-BP, LA-MP, LA-TR)

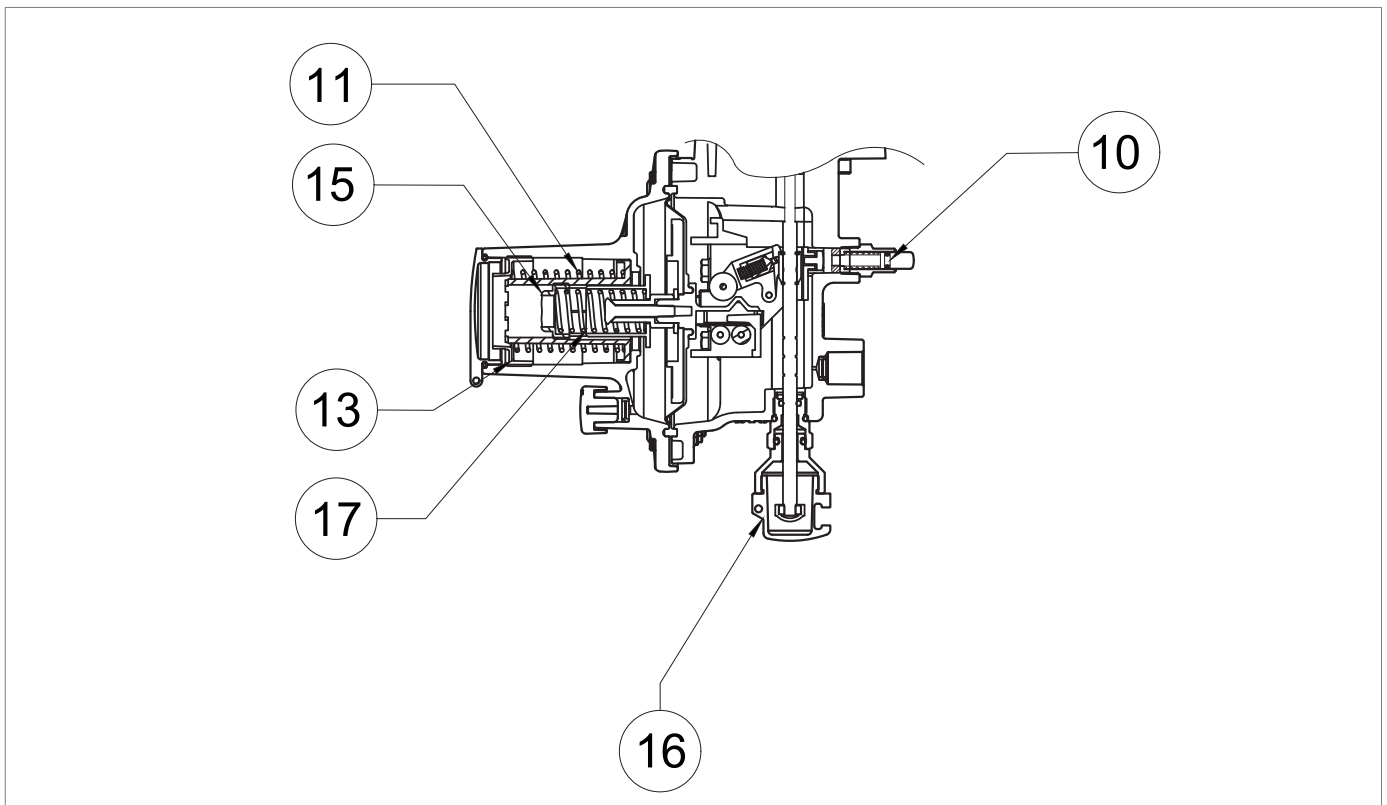


Fig. 8.26. Setting of the LA slam-shut valve

SPRING SETTING FOR MAXIMUM PRESSURE TRIPPING

Step	Action
1	<p>Increase the downstream pressure to the slam-shut valve's tripping value by connecting an external pressure source to the drain cock (fig. 8.20, ref. 6) located on the downstream pipe.</p> <div style="border: 1px solid blue; padding: 5px;"> <p>! NOTICE!</p> <p>Check the pressure referring to the pressure gauge (fig. 8.20, ref. 5) downstream of the main regulator.</p> <p>If the slam-shut valve:</p> <ul style="list-style-type: none"> • trips before the expected pressure value: screw in (clockwise) the adjustment screw (13) so as to further compress the spring (11); • does not trip at the expected pressure value: unscrew (anti-clockwise) the adjustment screw (13) so as to relieve the spring (11). </div>
2	By opening the drain cock (fig.8.20, ref. 6), decrease the pressure in the downstream section to the calibration value of the main regulator.
3	Close the bleed cock (fig. 8.20, ref. 6).
4	Reset the slam-shut valve by turning the reset knob (16).
5	<p>Repeat steps 2-3-4 at least three times.</p> <div style="border: 1px solid blue; padding: 5px;"> <p>! NOTICE!</p> <p>The calibration value must comply with the operating limits specified on the plate.</p> </div>
6	Disconnect the external pressure source from the bleed cock (fig. 8.20, ref. 6).

Tab. 8.57.

SPRING SETTING FOR MINIMUM PRESSURE TRIPPING (IF PRESENT)

Step	Action
1	Partially open the drain cock (fig. 8.20, ref. 6) to the atmosphere and keep it open for the next steps.
2	Turn the adjustment ring nut (fig. 8.20, ref. 3) of the regulator anti-clockwise to decrease the downstream pressure (Pd) to the minimum pressure required for tripping of the slam-shut valve.
3	<p>If the required minimum pressure value is not reached, remove the adjustment ring nut (fig. 8.20, ref. 3) and remove the adjustment spring (fig. 8.24, ref. 8).</p> <div style="border: 1px solid black; padding: 5px;"> <p>! NOTICE!</p> <p>Check the tripping pressure value of the slam-shut valve indicated on the downstream pressure gauge (fig. 8.20, ref. 5).</p> </div>
4	<p>If the slam-shut valve:</p> <ul style="list-style-type: none"> trips before the set pressure value: unscrew (anticlockwise) the adjustment ring nut (fig. 8.20, ref. 3) so as to relieve the spring (fig. 8.26, ref. 17); does not trip at the specified pressure value: screw the adjustment ring nut (fig. 8.20, ref. 3) in a clockwise direction in order to compress the spring more (fig. 8.26, ref. 17).
5	<p>After having checked that the slam-shut valve trips at the preset value, proceed as follows:</p> <ol style="list-style-type: none"> Close the air vent valve (fig. 8.20, ref. 6) Position the adjustment spring (fig. 8.24, ref. 8), the end cap (fig. 8.24, ref. 7), adjustment screw (fig. 8.20, ref. 3) Slowly open the upstream shut-off valve (V1) until the downstream pressure value (Pd) reaches the calibration value of the regulator, referring to the downstream pressure gauge (fig. 8.20, ref. 5) Close the upstream shut-off valve (V1) Slowly and partially open the air vent valve (fig. 8.20, ref. 6) to decrease the downstream pressure by referring to the downstream pressure gauge (fig. 8.20, ref. 5) until the minimum pressure trip value is reached Check the minimum pressure spring for proper calibration by repeating steps 3-4-5 at least three times Calibrate the main regulator referring to par. 8.5
6	Open the slam-shut valve by turning the reset knob (fig. 8.26, ref. 16) and hold it open manually.
7	Turn the adjustment screw (fig. 8.20, ref. 3) clockwise to increase the downstream pressure up to the calibration value of the regulator.
8	Set the slam-shut valve by acting on the reset knob (fig. 8.26, ref. 16).
9	Close the bleed cock (fig. 8.20, ref. 6).

Tab. 8.58.

COMMISSIONING THE REGULATOR

! NOTICE!

Refer to paragraph 8.5 "Regulator commissioning procedure" in this chapter.

SLAM-SHUT VALVE SETTING RANGE

! NOTICE!

Refer to chapter 13 'Setting tables'.

8.10 - COMMISSIONING PROCEDURE OF REGULATION LINE CIRVAL, IN LINE REGULATOR WITH MONITOR FUNCTION + LA SLAM-SHUT VALVE

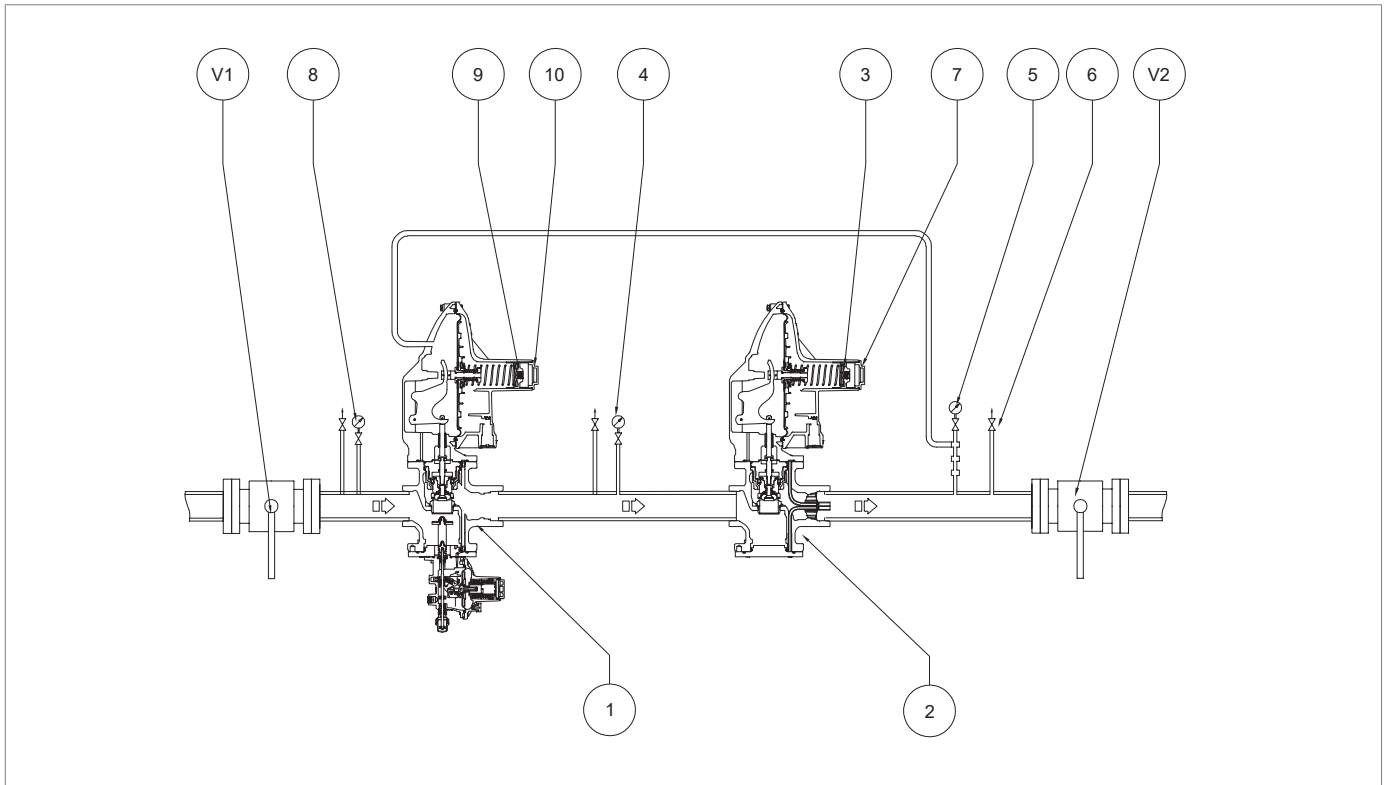







Fig. 8.27. Commissioning of CIRVAL regulator + regulator with in-line monitor function + LA

Step	Action
1	Partially open the bleed cock (6).
2	Remove the cap (7) from the main regulator (2).
3	Remove the cap (10) from the regulator with inline monitor function (1).
4	Insert and screw the R key (tab. 7.43) into the slot of the cap (7) to open the main regulator (1) completely.
5	Open the inlet shut-off valve (V1) very slowly and partially. NOTICE! Check the pressure by referring to the pressure gauge (8) located upstream.
6	Perform the internal tightness check of the LA slam-shut valve, referring to chapter 8.9.1. NOTICE! In case of leaks, refer to chapter 9 "Troubleshooting" to clear the causes of the malfunctions.
7	Slowly pressurise the control line, acting on the knob of the LA slam-shut valve (refer to the "Operation" section in par. 4.5.5.1), checking that the downstream pressure (Pd) indicated by the downstream pressure gauge (5) does not exceed the required calibration value by more than 50%.
8	When the regulator is put into service, the pressure on the downstream pressure gauge (5) will be equal to the calibration value of the main regulator
9	Open the upstream shut-off valve (V1) completely.
10	Check the settings of the pressure switch of the LA slam-shut valve by referring to paragraph 8.9.3.

Step	Action
11	<p>Pull the reset stem of the slam-shut valve outwards until the LA slam-shut valve engages.</p> <div style="border: 1px solid blue; padding: 5px;">  NOTICE! </div> <p>Check the calibration pressure of the regulator with inline monitor function in the pressure gauge (5) after inserting the cap (10) into the regulator with inline monitor function (1).</p>
12	<p>If the pressure downstream (Pd) is not at the required calibration value, proceed as follows:</p> <ul style="list-style-type: none"> • downstream pressure value (Pd) lower than required setting value: load the setting spring by turning the adjustment ring nut clockwise (9) • downstream pressure value (Pd) higher than required setting value: load the setting spring by turning the adjustment ring nut anti-clockwise (9) <div style="border: 1px solid blue; padding: 5px;">  NOTICE! </div> <p>Check the pressure referring to the pressure gauge (5) located upstream.</p>
13	Close the bleed cock (6).
14	Check the closing pressure (refer to the SG value on the rating plate, see 2.8).
15	Partially open the bleed cock (6).
16	Unscrew and remove the R key (tab. 7.43) from the cap slot (7)
17	<p>Verify that the regulator with inline monitor function (1) is fully open (100%).</p> <div style="border: 1px solid blue; padding: 5px;">  NOTICE! </div> <p>The regulator with in-line monitor function (1) is fully open, when the pressure indicated on the intermediate pressure gauge (4) is the same as the upstream pressure gauge (8).</p>
18	Close the bleed cock (6).
19	<p>Check that the downstream pressure, after an increase phase, does not exceed the closing pressure value (SG 20).</p> <div style="border: 1px solid blue; padding: 5px;">  NOTICE! </div> <ul style="list-style-type: none"> • If the downstream pressure exceeds the closing pressure value, refer to chapter 9 “Troubleshooting” to clear the causes of the malfunctions. • Check the pressure referring to the pressure gauge (5) located upstream.
20	Using a foaming agent, check all the joints between shut-off valves (V1, V2) for proper sealing.
21	<p>Open the downstream shut-off valve (V2) very slowly until the pipeline fills completely.</p> <div style="border: 1px solid blue; padding: 5px;">  NOTICE! </div> <ul style="list-style-type: none"> • If the pressure of the downstream pipeline is lower than the calibration pressure, partially open the downstream shut-off valve (V2) so as to not to exceed the maximum flow rate value of the installation. • Check the pressure referring to the downstream pressure gauge (5).

Tab. 8.59.

SLAM-SHUT VALVE SETTING

 **NOTICE!**

Refer to paragraph 8.9.3 'Pressure switch calibration procedure for the LA slam-shut valve'.

9 - 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.

9.1 - GENERAL WARNINGS

HAZARD!

Maintenance work must be carried out by qualified personnel:

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

WARNING!







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

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

NOTICE!

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

9.2 - 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: 10px;">      </div> <div style="background-color: #f4a460; padding: 5px; margin-top: 5px;">  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>
Necessary equipment	Refer to chapter 7 “Equipment for commissioning/maintenance”.

Tab. 9.60.

9.3 - TROUBLESHOOTING PROCEDURES

For proper troubleshooting, proceed as follows:

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

9.4 - TROUBLESHOOTING TABLES

9.4.1 - TROUBLESHOOTING CIRVAL REGULATOR

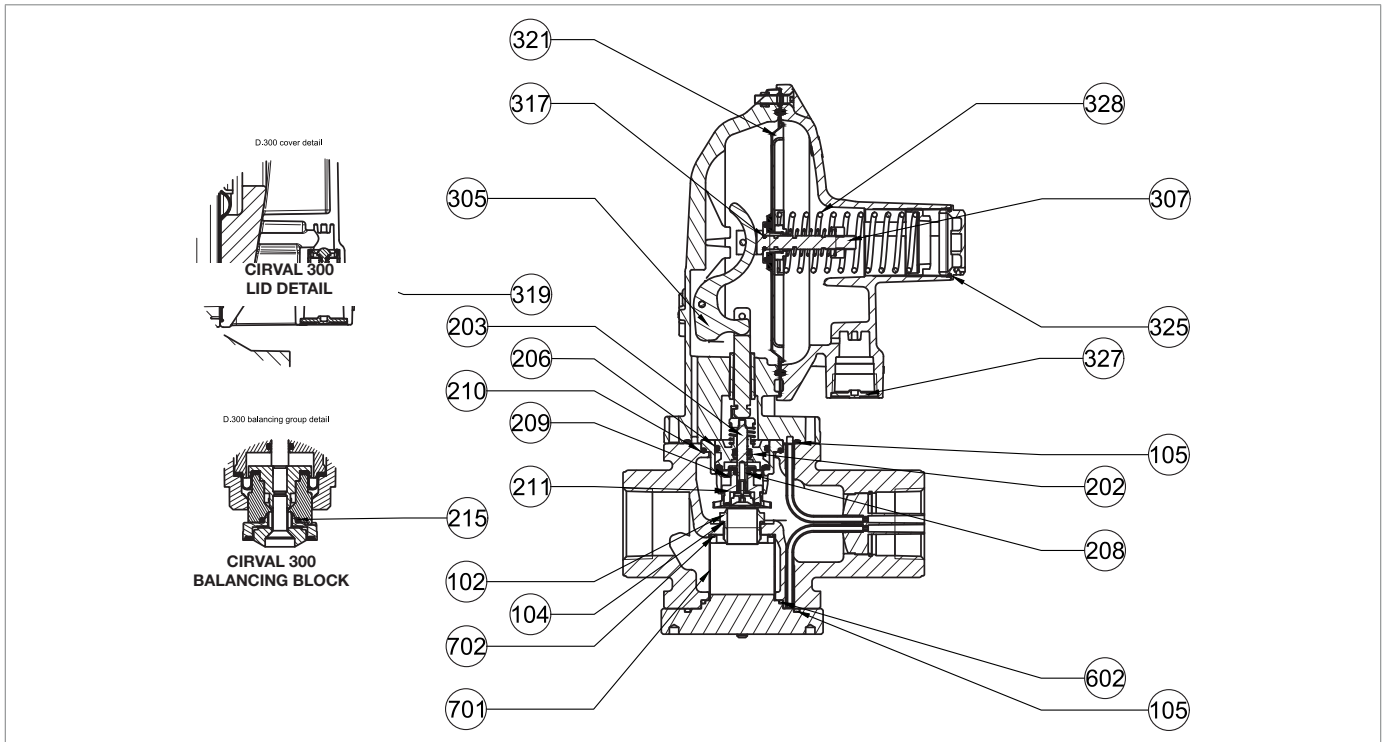


Fig. 9.28. Troubleshooting CIRVAL

Failure	Possible causes	Intervention
Leakage from regulator vent in delivery	Broken main diaphragm (321)	Replace
	Relief valve (307) not calibrated	Repeat calibration
	Dirty or worn relief valve O-ring (317)	Clean and replace if needed
Leakage from regulator vent in static	Broken main diaphragm (321)	Replace
	Relief valve (307) not calibrated	Repeat calibration
	Dirty or worn relief valve O-ring (317)	Clean and replace if needed
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Damaged valve seat (102)	Replace
	Damaged valve seat O-ring (104)	Replace
	ONLY VALID FOR CIRVAL 300	
	Damaged O-ring (215) of reinforced gasket	Replace
	Damaged stem O-ring (202)	Replace
Damaged balancing diaphragm (209)	Replace	
Downstream pressure (Pd) increases in dynamic	Broken main diaphragm (321)	Replace
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Damaged balancing diaphragm (209)	Replace

Failure	Possible causes	Intervention
Downstream pressure (Pd) increases in static	Relief valve (307) not calibrated	Repeat calibration
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Damaged valve seat (102)	Replace
	Damaged valve seat O-ring (104)	Replace
	ONLY VALID FOR CIRVAL 300	
	Damaged O-ring (215) of reinforced gasket	Replace
	Damaged stem O-ring (202)	Replace
Downstream pressure (Pd) decreases in dynamic	Damaged balancing diaphragm (209)	Replace
	Collapsed spring (328)	Replace
	Insufficient upstream pressure (Pu)	Check upstream pressure values (Pu)
	Blocked stem (203)	Clean
	Clogged filter (701)	Clean
	Blocked lever (305)	Clean
Downstream pressure (Pd) decreases in static	Ice formation on the diaphragm (321)	Increase the regulator inlet temperature
	Broken main diaphragm (321)	Replace
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Blocked stem (203)	Clean
	Damaged valve seat (102)	Replace
	Damaged valve seat O-ring (104)	Replace
	Damaged O-ring (215) of reinforced gasket	Replace
	Damaged stem O-ring (202)	Replace
	Blocked lever (305)	Clean
	ONLY VALID FOR CIRVAL 300	
Clogged anti-pumping valve (319)	Clean	
Clogged anti-freezing device	Clean	

Tab. 9.61.

9.4.2 - TROUBLESHOOTING REGULATOR CIRVAL WITH MONITOR FUNCTION

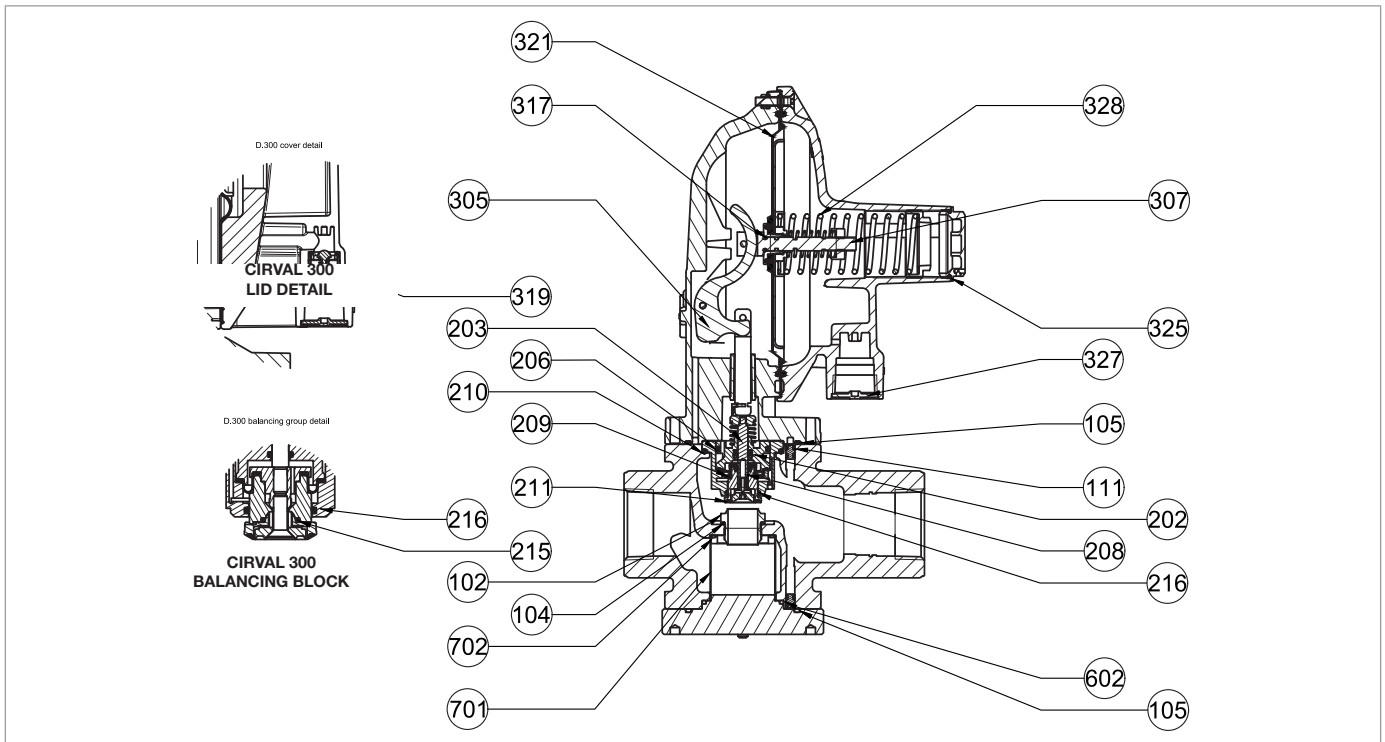


Fig. 9.29. Troubleshooting CIRVAL in monitor function

Failure	Possible causes	Intervention
Leakage from regulator vent in delivery	Broken main diaphragm (321)	Replace
	Relief valve (307) not calibrated	Repeat calibration
	Dirty or worn relief valve O-ring (317)	Clean and replace if needed
Leakage from regulator vent in static	Broken main diaphragm (321)	Replace
	Relief valve (307) not calibrated	Repeat calibration
	Dirty or worn relief valve O-ring (317)	Clean and replace if needed
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Damaged valve seat (102)	Replace
	Damaged valve seat O-ring (104)	Replace
	ONLY VALID FOR CIRVAL 300	
	Damaged O-ring (215) of reinforced gasket	Replace
	Damaged stem O-ring (202)	Replace
	Damaged balancing diaphragm (209)	Replace
Downstream pressure (Pd) increases in dynamic	Broken main diaphragm (321)	Replace
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Damaged balancing diaphragm (209)	Replace

Failure	Possible causes	Intervention
Downstream pressure (Pd) increases in static	Relief valve (307) not calibrated	Repeat calibration
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Damaged valve seat (102)	Replace
	Damaged valve seat O-ring (104)	Replace
	ONLY VALID FOR CIRVAL 300	
	Damaged O-ring (215) of reinforced gasket	Replace
	Damaged stem O-ring (202)	Replace
Downstream pressure (Pd) decreases in dynamic	Damaged balancing diaphragm (209)	Replace
	Collapsed spring (328)	Replace
	Insufficient upstream pressure (Pu)	Check upstream pressure values (Pu)
	Blocked stem (203)	Clean
	Clogged filter (701)	Clean
	Blocked lever (305)	Clean
Downstream pressure (Pd) decreases in static	Ice formation on the diaphragm (321)	Increase the regulator inlet temperature
	Broken main diaphragm (321)	Replace
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Blocked stem (203)	Clean
	Damaged valve seat (102)	Replace
	Damaged valve seat O-ring (104)	Replace
	Damaged O-ring (215) of reinforced gasket	Replace
	Damaged stem O-ring (202)	Replace
	Blocked lever (305)	Clean
	ONLY VALID FOR CIRVAL 300	
Clogged anti-pumping valve (319)	Clean	
Monitor locked in fully open position	Clogged anti-freezing device	Clean
	O-ring (111) not sealing	Clean and replace if needed
	O-ring (216) not sealing	Clean and replace if needed

Tab. 9.62.

9.4.3 - BUILT-IN IFM MONITOR TROUBLESHOOTING

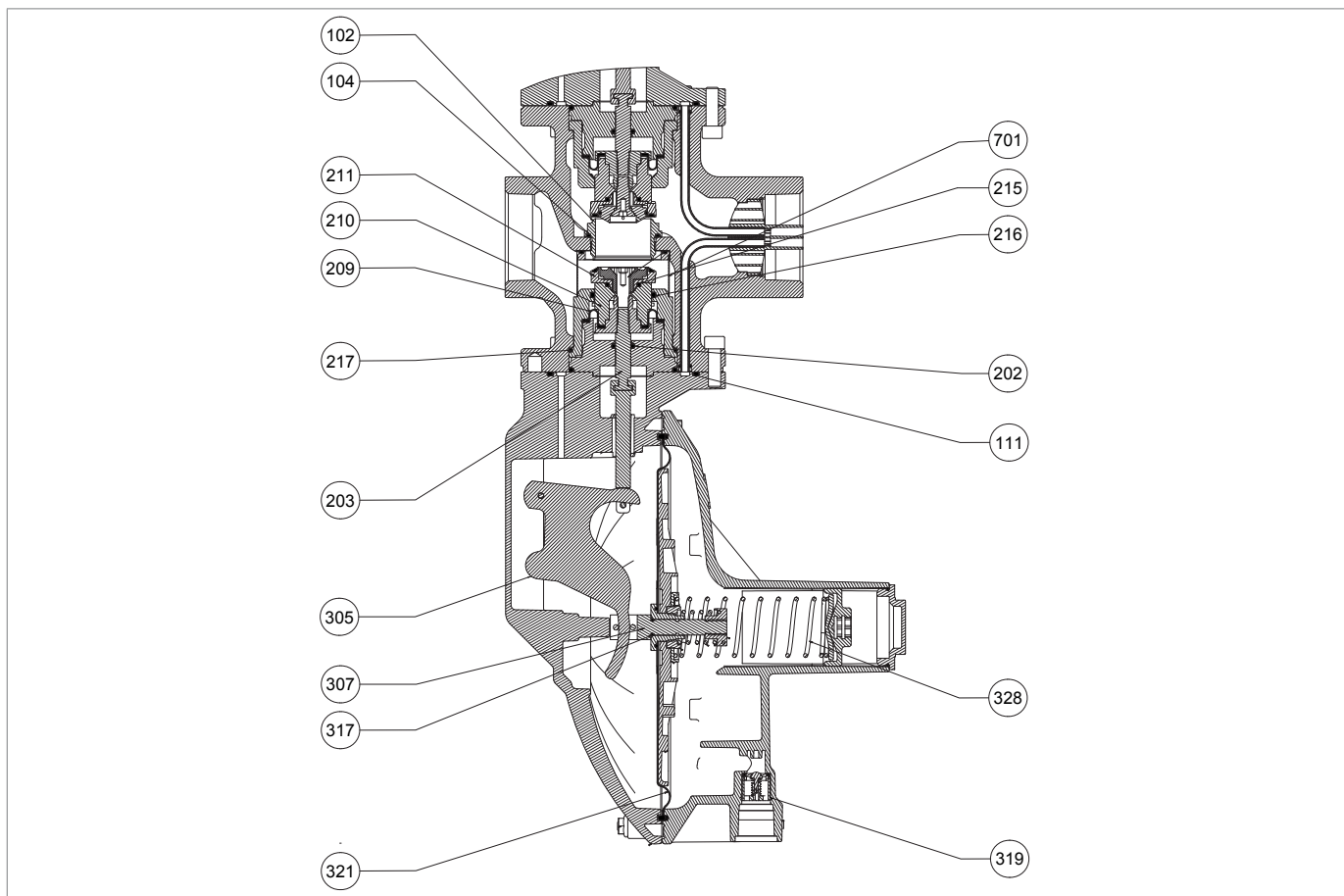


Fig. 9.30. Built-in IFM monitor troubleshooting

Failure	Possible causes	Intervention
Leakage from regulator vent in delivery	Broken main diaphragm (321)	Replace
	Relief valve (307) not calibrated	Repeat calibration
	Dirty or worn relief valve O-ring (317)	Clean and replace if needed
	ONLY VALID FOR CIRVAL 300	
	Dirty or worn O-ring (216, 217)	Clean and replace if needed
	VALID ONLY FOR CIRVAL 200	
	Dirty or worn O-ring (210, 216)	Clean and replace if needed

Failure	Possible causes	Intervention
Leakage from regulator vent in static	Broken main diaphragm (321)	Replace
	Relief valve (307) not calibrated	Repeat calibration
	Dirty or worn relief valve O-ring (317)	Clean and replace if needed
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Damaged valve seat (102)	Replace
	Damaged valve seat O-ring (104)	Replace
	ONLY VALID FOR CIRVAL 300	
	Damaged O-ring (215) of reinforced gasket	Replace
	Damaged stem O-ring (202)	Replace
Downstream pressure (Pd) increases in dynamic	Damaged balancing diaphragm (209)	Replace
	Broken main diaphragm (321)	Replace
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Damaged balancing diaphragm (209)	Replace
	ONLY VALID FOR CIRVAL 300	
	Dirty or worn O-ring (216, 217)	Clean and replace if needed
Downstream pressure (Pd) increases in static	VALID ONLY FOR CIRVAL 200	
	Dirty or worn O-ring (210, 216)	Clean and replace if needed
	Relief valve (307) not calibrated	Repeat calibration
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Damaged valve seat (102)	Replace
	Damaged valve seat O-ring (104)	Replace
	ONLY VALID FOR CIRVAL 300	
	Damaged O-ring (215) of reinforced gasket	Replace
	Damaged stem O-ring (202)	Replace
	Damaged balancing diaphragm (209)	Replace
	ONLY VALID FOR CIRVAL 300	
Dirty or worn O-ring (216, 217)	Clean and replace if needed	
Downstream pressure (Pd) decreases in dynamic	VALID ONLY FOR CIRVAL 200	
	Dirty or worn O-ring (210, 216)	Clean and replace if needed
	Collapsed spring (328)	Replace
	Insufficient upstream pressure (Pu)	Check upstream pressure values (Pu)
	Blocked stem (203)	Clean
	Clogged filter (701)	Clean
	Blocked lever (305)	Clean
Ice formation on the diaphragm (321)	Increase the regulator inlet temperature	

Failure	Possible causes	Intervention
Downstream pressure (Pd) decreases in static	Broken main diaphragm (321)	Replace
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Blocked stem (203)	Clean
	Damaged valve seat (102)	Replace
	Damaged valve seat O-ring (104)	Replace
	Damaged O-ring (215) of reinforced gasket	Replace
	Damaged stem O-ring (202)	Replace
	Blocked lever (305)	Clean
	ONLY VALID FOR CIRVAL 300 Clogged anti-pumping valve (319)	Clean
	Clogged anti-freezing device	Clean
Monitor locked in fully open position	O-ring (111) not sealing	Clean and replace if needed
	O-ring (216) not sealing	Clean and replace if needed

Tab. 9.63.

9.4.4 - BUILT-IN IMD MONITOR TROUBLESHOOTING

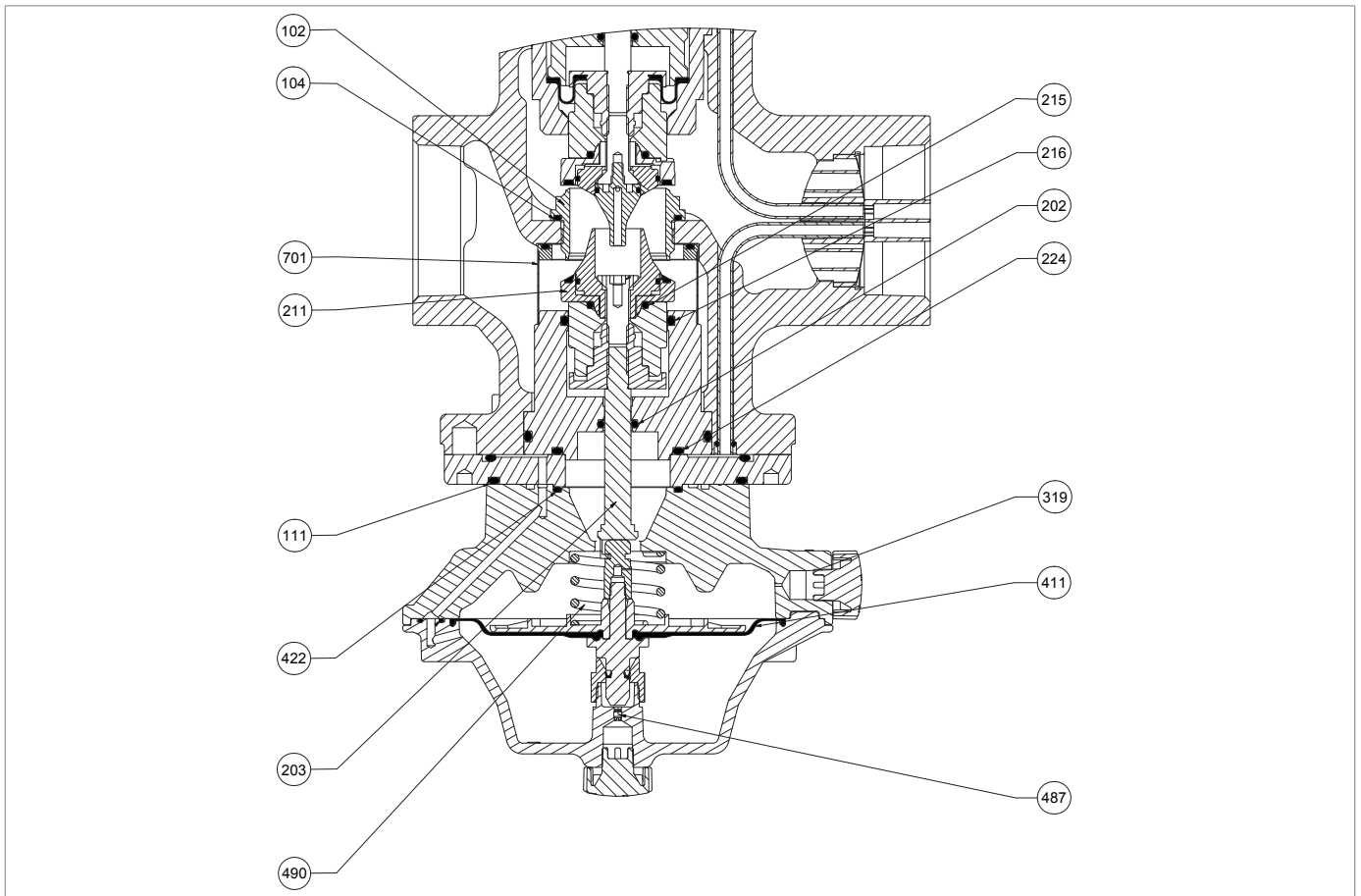


Fig. 9.31. Built-in IMD monitor troubleshooting

Failure	Possible causes	Intervention
Leakage from the built-in IMD monitor vent in delivery	Broken diaphragm (411)	Replace
	Dirty or worn balancing block O-ring (202)	Clean and replace if needed
	Dirty or worn balancing block O-ring (224)	Clean and replace if needed
	Dirty or worn flange O-ring (422)	Clean and replace if needed
Leakage from the built-in IMD monitor vent in static	Broken diaphragm (411)	Replace
	Dirty or worn balancing block O-ring (202)	Clean and replace if needed
	Dirty or worn balancing block O-ring (224)	Clean and replace if needed
	Dirty or worn flange O-ring (422)	Clean and replace if needed
Downstream pressure (Pd) increases in dynamic	Broken diaphragm (411)	Replace
	Dirty or worn balancing block O-ring (202)	Clean and replace if needed
	Dirty or worn balancing block O-ring (224)	Clean and replace if needed
	Dirty or worn flange O-ring (422)	Clean and replace if needed

Failure	Possible causes	Intervention
Downstream pressure (Pd) increases in static	Broken diaphragm (411)	Replace
	Dirty or worn balancing block O-ring (202)	Clean and replace if needed
	Dirty or worn balancing block O-ring (224)	Clean and replace if needed
	Dirty or worn flange O-ring (422)	Clean and replace if needed
	Clogged nozzle (487)	Clean and replace if needed
Downstream pressure (Pd) decreases in dynamic	Collapsed spring (490)	Replace
	Insufficient upstream pressure (Pu)	Check upstream pressure values (Pu)
	Locked block stem (203)	Clean and replace if needed
	Clogged filter (701)	Clean and replace if needed
	Ice formation on the diaphragm (411)	Increase the regulator inlet temperature
Downstream pressure (Pd) decreases in static	Broken main diaphragm (411)	Replace
	Dirty or worn reinforced gasket (211)	Clean and replace if needed
	Blocked stem (203)	Clean
	Damaged valve seat (102)	Replace
	Damaged valve seat O-ring (104)	Replace
	Damaged O-ring (215) of reinforced gasket	Replace
	Damaged stem O-ring (202)	Replace
	Clogged anti-freezing device	Clean
Monitor locked in fully open position	O-ring (111) not sealing	Clean and replace if needed
	O-ring (216) not sealing	Clean and replace if needed

Tab. 9.64.

9.4.5 - LA SLAM-SHUT VALVE TROUBLESHOOTING

⚠ WARNING!

If the built-in slam-shut valve has tripped, close the upstream and downstream shut-off valves (V1 and V2) of the line before any operation and relieve the pressure.

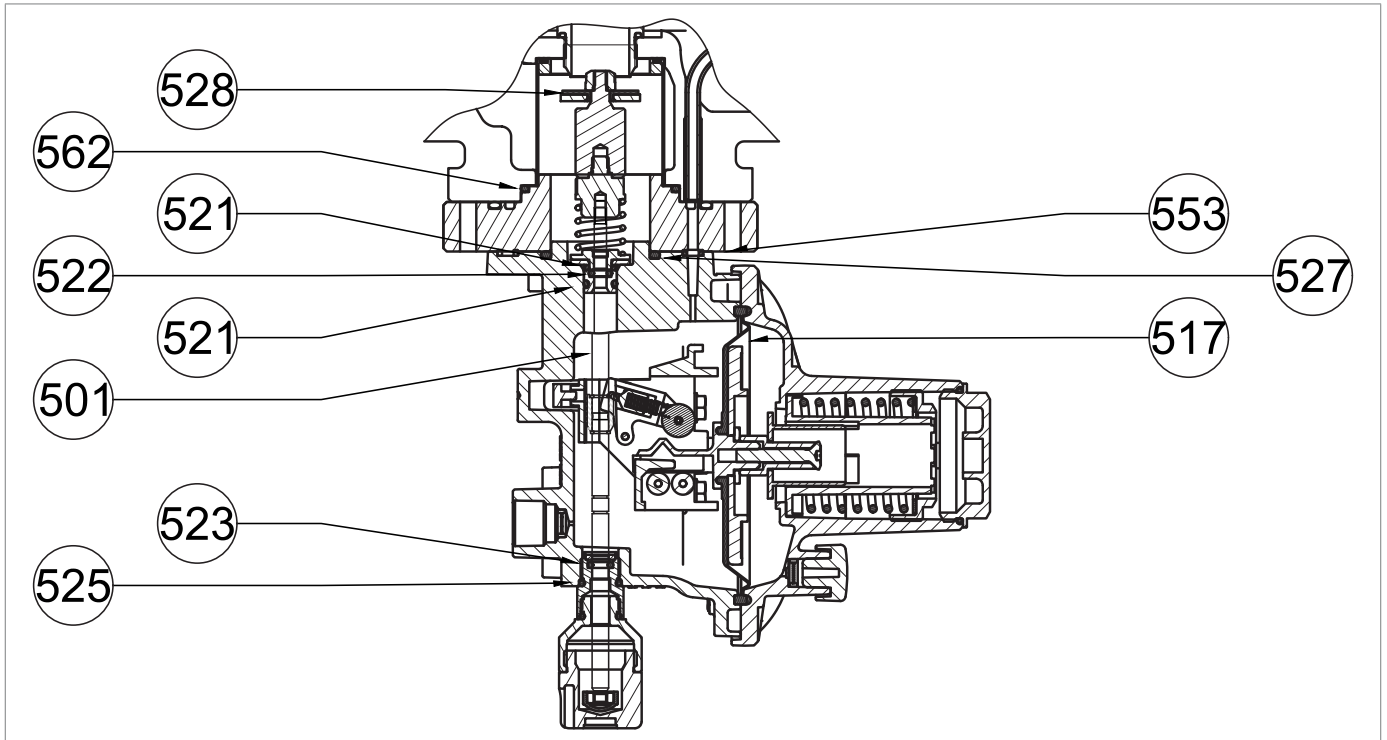


Fig. 9.32. Troubleshooting of the LA slam-shut valve

Failure	Possible causes	Intervention
Slam-shut valve failed to trip	Stem (501) locked in opening	Clean and reposition if needed
External leak	Broken diaphragm (517)	Replace
Downstream pressure (Pd) increases in open valve position	O-ring (521) not sealing	Replace
	O-ring (523) not sealing	Replace
	Damaged stem (501)	Replace
Downstream pressure (Pd) increases in closed valve position	O-ring (521) not sealing	Replace
	Damaged stem (501)	Replace
	Damaged reinforced gasket (528)	Replace
	Damaged valve seat (102)	Replace
	Damaged valve seat O-ring (104)	Replace
Slam-shut valve failed to trip due to pressure increase	Broken diaphragm (517)	Replace
Slam-shut valve failed to trip due to pressure decrease	Broken diaphragm (517)	Replace

Tab. 9.65.

10 - UNINSTALLATION AND DISPOSAL

10.1 - 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.

10.2 - QUALIFICATION OF THE OPERATORS IN CHARGE

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; • <u>any information provided by the Safety Manager at the installation facility.</u>
Necessary equipment	Refer to chapter 7 “Equipment for commissioning/maintenance”.

Tab. 10.66.

10.3 - UNINSTALLATION

ATTENTION!

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

NOTICE!

To uninstall the equipment, refer to the installation steps (see chapter 6 “Installation”) and proceed in reverse order.

10.4 - INFORMATION REQUIRED IN CASE OF RE-INSTALLATION

NOTICE!

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

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

10.5 - DISPOSAL INFORMATION

NOTICE!

Bear in mind that the laws in force in the country of installation must be complied with.

Illegal or improper disposal involves the application of the penalties provided for by the legislation in force in the country of installation.

NOTICE!

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

The equipment was manufactured with materials that can be recycled by specialised companies.

For proper disposal of the equipment, proceed as specified in tab. 10.67:

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. 10.67.

The equipment in any configuration consists of the following materials:

Material	Disposal/recycling indications
Plastic	It must be dismantled and disposed of separately.
Lubricants/Oils	They must be collected and delivered to the appropriate specialised and authorised collection and disposal centres.
Steel/Cast Iron	Disassemble and collect separately. It must be recycled through the specific collection centres.
Stainless 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. 10.68.

11 - RECOMMENDED SPARE PARTS

11.1 - GENERAL WARNINGS

 **NOTICE!**

If non-original spare parts 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.

11.2 - HOW TO REQUEST SPARE PARTS

 **NOTICE!**

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

12 - CALIBRATION TABLES

12.1 - CALIBRATION TABLE CIRVAL 200

The spring setting ranges for the CIRVAL regulator are shown in the tables below:

CIRVAL 200 BP							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470137RO	Red	1.8	115	34	0.013	0.016
	64470024BI	White	1.3	45	15		
2	64470068GI	Yellow	2	110	34	0.017	0.024
	64470024BI	White	1.3	45	15		
3	64470139NE	Black	2.2	115	34	0.025	0.035
	64470024BI	White	1.3	45	15		
4	64470140MA	Brown	2.7	106	34	0.036	0.061
	64470024BI	White	1.3	45	15		
5	64470071GR	Grey	2.8	115	34	0.062	0.104
	64470031RO	Red	1.7	40	15		

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.69.

CIRVAL 200 MP							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470141VE	Green	3.2	120	34	0.101	0.165
	64470031RO	Red	1.7	40	15		
2	64470338BL	Blue	3.8	110	34	0.166	0.365
	64470031RO	Red	1.7	40	15		

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.70.

CIRVAL 200 TR							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470143BI	White	4.5	97	34	0.36	0.5
	64470031RO	Red	1.7	40	15		
2	64470144VI	Purple	5	100	34	0.501	0.827
	64470031RO	Red	1.7	40	15		

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.71.

CIRVAL 200 BP - IFM

Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470139NE	Black	2.2	115	34	0.015	0.026
	64470024BI	White	1.3	45	15		
2	64470140MA	Brown	2.7	106	34	0.027	0.05
	64470024BI	White	1.3	45	15		
3	64470071GR	Grey	2.8	115	34	0.051	0.08
	64470031RO	Red	1.7	40	15		

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.72.

CIRVAL 200 MP - IFM

Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470141VE	Green	3.2	120	34	0.081	0.147
	64470031RO	Red	1.7	40	15		
2	64470338BL	Blue	3.8	110	34	0.148	0.322
	64470031RO	Red	1.7	40	15		

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.73.

CIRVAL 200 TR - IFM

Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470143BI	White	4.5	97	34	0.32	0.55
	64470031RO	Red	1.7	40	15		
2	64470144VI	Purple	5	100	34	0.551	0.83
	64470031RO	Red	1.7	40	15		

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.74.

12.2 - CALIBRATION TABLE CIRVAL 300

CIRVAL 300 BP							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470382NE	Black	2.5	160	39	0.014	0.027
	2700525	Orange	2	40	22		
2	64470301GI	Yellow	2.8	145	39	0.028	0.04
	2700645	Red	2.3	40	22		
3	64470302VI	Purple	3.8	140	39	0.041	0.083
	2700999	Grey	3	37	22		

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.75.

CIRVAL 300 MP							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470262AR	Orange	4.5	140	39	0.08	0.165
	2700999	Grey	3	37	22		
2	64470398AZ	Light blue	5	140	39	0.166	0.29
	2700999	Grey	3	37	22		
3	64470408RO	Red	5.5	140	40	0.291	0.503
	2700999	Grey	3	37	22		

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.76.

CIRVAL 300 TR							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470398AZ	Light blue	5	140	39	0.5	0.827
	2700999	Grey	3	37	22		

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.77.

12.3 - CALIBRATION TABLE FOR SLAM-SHUT VALVE

LA/BP "Max pressure"							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470112	Red	2.2	44	34	0.03	0.049
2	64470115	Grey	2.8	42	34	0.05	0.18

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.78

LA/BP "Min pressure"							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470024	White	1.3	45	15	0.006	0.06

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.79

LA/MP "Max pressure"							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470115	Grey	2.8	42	34	0.14	0.179
2	64470116	Yellow	3.2	40	34	0.18	0.279
3	64470051	White	3.2	50	34	0.28	0.45

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.80

LA/MP "Min pressure"							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470024	White	1.3	45	15	0.01	0.059
2	64470038	Yellow	2	40	15	0.06	0.24

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.81

LA/TR "Max pressure"							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470116	Yellow	3.2	40	34	0.25	0.549
2	64470051	White	3.2	50	34	0.55	0.849
3	64470057	Blue	3.5	50	34	0.85	1.399
4	64470058	Orange	4	50	34	1.4	2.499
5	64470059	Light blue	4.5	50	34	2.5	3.999
6	64470060	Black	5	48	34	4	5.5

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.82

LA/TR "Min pressure"							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470038	Yellow	2	40	34	0.1	0.499
2	64470045	Brown	2.4	41	34	0.5	0.999
3	64470046	Blue	3	40	34	1	1.999
4	64470149	Black	3.2	43	34	2	3.5

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.83

LA/BP (LP) "Max pressure"							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470112	Red	2.2	44	34	0.02	0.49
2	64470115	Grey	2.8	42	34	0.05	0.18

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.84

LA/BP (LP) "Min pressure"							
Pos.	Spring item code	Spring colour	d	Lo	De	Min.	Max.
1	64470024	White	1.3	45	15	0.006	0.06

d = Wire Diameter (mm) **Lo** = Spring Length (mm) **De** = External Diameter (mm) **Min./Max.** = pressure (bar)

Tab. 12.85

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