MEDENUS

Gas Pressure Regulation

Gas Pressure Regulator R 50

Operating and Maintenance Instructions

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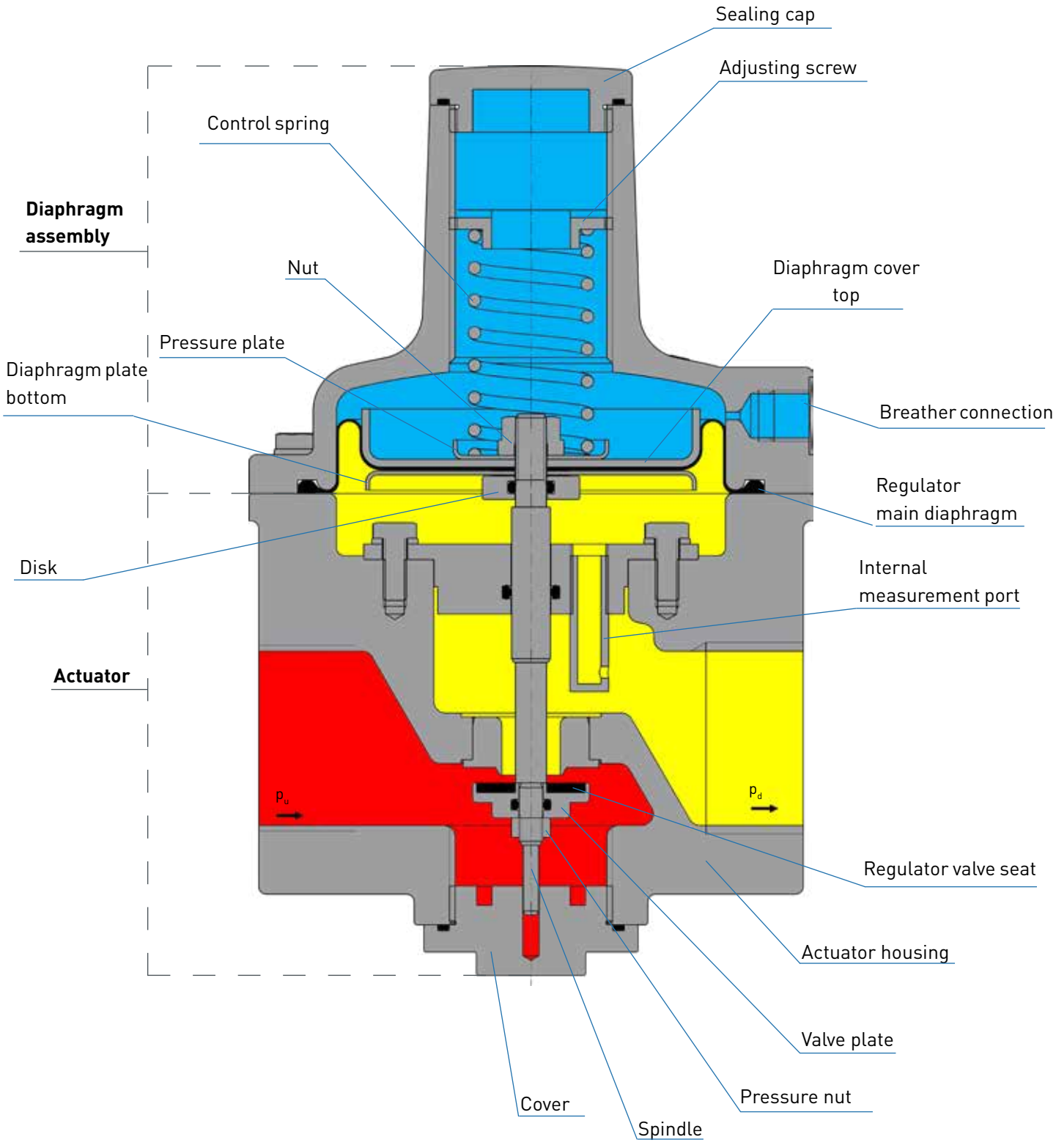
Design of the gas pressure regulator R50



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1 General Information

The personnel entrusted with installation, operation or maintenance of the safety relief valve must have completely read and understood beforehand the following documents:

- **Safety Relief Valve R 50 Product Information**
  The product information contains technical data, dimensions and a description of the design and the mode of operation.

- **Safety Relief Valve R 50 Operating and Maintenance Instructions**
  This document allows safe and efficient handling of the device and contains information on assembly, commissioning, maintenance, troubleshooting, and repair according to regulations.
  It is an integral part of the scope of delivery of the device, must be kept in close proximity of the device and must be readily accessible to personnel at any time.
  The basic prerequisite for safe working is compliance with all safety instructions and instructions for action given in this manual. Accordingly, the information and instructions must be observed when working on the device or on the gas line. In addition, the local occupational safety regulations and general safety regulations for the application range of the device shall apply.
  The figures in these instructions are provided for basic understanding and may differ from the actual design.
  The contents of these instructions are protected by copyright. They may be used as part of operating the device. Any other use and/or reproduction is not permitted without prior authorization by MEDENUS Gas-Druckregeltechnik GmbH.

1.1 Warranty and Liability

Claims under warranty or liability for personal injury and material damage are generally void,
if one or several of the following **conditions are not observed**:

- Work on the device during the warranty period may only be performed in consultation with the manufacturer
- Designated use of the device in accordance with the established conditions of use
- Proper installation, commissioning, operation and maintenance of the device
- Operation of the device with properly installed and functioning safety devices only
- Operating and maintenance instructions of the device or of the system
- Compliance with the maintenance instructions
- Properly performed repairs
- Supply lines without defects
- The use of original MEDENUS© spare parts and lubricants listed in these instructions or
- Force majeure

It is generally prohibited

- To perform constructive modifications on the device
- To keep using the device despite the detection of a defect

1.2 Symbols, Notes

The instructions contain safety instructions marked with symbols to indicate possible consequences in case of non-observance:

This combination of symbol and signal word indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, damage to the device, the breakdown of the system, and material or environmental damage.

ATTENTION

This combination of symbol and signal word indicates an imminent hazardous situation which, if not avoided, will result in death or serious injury.

DANGER

This signal word highlights useful tips, recommendations, and information for efficient and trouble-free operation.

Note

1.3 Terms, Abbreviations

Terms and abbreviations are explained below:

ATC	Acceptance test certificate	SSV	Safety shut-off valve
DN	Nominal width	SRV	Safety relief valve
GPR	Gas pressure regulator		
MOP	Maximum operating pressure in a system		

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2 Application, Characteristics

2.1 Application

Gas pressure regulator (GDR), direct-acting (operating without auxiliary power), for systems acc. to DVGW work sheets G 491 (A) and G 600 (A) (TRGI)
Particularly suitable for dynamic regulation sections (e.g. natural gas supply systems, low flow regulators, burner circuits, gas motor operation)
Can be used as an equipment component on gas consumption facilities as defined in Regulation (EU) 2016/426.
Can be used for the gases defined in DVGW work sheets G 260 / G 262 and neutral non-aggressive gases. (other gases on request)

2.2 Characteristics

- Integral pressure-tight model (IS)
- Diaphragm assembly with internal or external measuring line
- Open-air model

2.3 Types of Models (Options)

- Oxygen model
- HD2 model
- Hydrogen model

3 Avoidance of Foreseeable Misuse

- The regulators must not be used to control liquids.
- The regulators must not be used in temperature ranges below -20 °C or above 60 °C
- The regulators must not be used for pressure ranges higher than the pressure "PS" indicated on the nameplate.

- The regulators may only be used for the gases specified under item 2.1 Application in these operating instructions.

  Other gases, such as oxygen or hydrogen, must be explicitly stated on the nameplate.
  Please consult the manufacturer before use.
- The regulators must not be used in high-temperature areas (HTB) without an upstream HTB fuse.

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4 Safety Instructions

National accident prevention regulations and the system operator's safety regulations are not superseded by these operating and maintenance instructions and must be taken into consideration with priority (in Germany, see, among others, DVGW work sheets G 600, G 459/II, G 491 and G 495).

When performing work on the device, the current general and specific safety regulations must be observed.
The application limits of the device with respect to the medium, operating pressure and operating temperature can be found on the nameplate affixed to the device or on the acceptance test certificate.
Using the device under different operating conditions must be agreed upon in consultation with
MEDENUS Gas-Druckregeltechnik GmbH.

The mechanical components of the device do not have any potential ignition sources of their own nor any hot surfaces and are thus not covered by the scope of 2014/34/EU (ATEX). The electronic accessories used comply with the ATEX requirements.

4.1 Hazards of Handling the Device

MEDENUS© devices conform with current standards and directives, the recognized technical rules and the recognized safety rules.

However, improper use can result in hazards to the user or to third parties. This can also result in damage to the device or to the system.

This is why the device may only be used:

- in accordance with its designated use
- in perfect condition
- while observing the notes given in these operating and maintenance instructions, and inspection and maintenance regulations, which apply to the functioning and safety of the overall system.

Malfunctions or faults must be eliminated immediately.

4.2 Personnel Requirements

The device may only be mounted by qualified personnel.
Only authorized personnel with the required qualification is allowed to perform settings or repairs on the device.

4.3 Country-Specific Requirements

The rules and regulations applicable at the place of use must be observed and complied with. They apply to:

- gas lines, installation of the gas system
- gas supply
- work on the gas system
- accident prevention

4.4 Handover of the Operating and Maintenance Instructions

The supplier of the system shall hand over these operating and maintenance instructions to the operator of the system no later than during commissioning and training of the operating personnel with the reminder to carefully store these instructions.

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4.5 Safety in Operation

The device may only be used when all protective devices on the device or in the system are fully functional.

At least once a year, the device must be inspected for externally visible damage and for proper functioning by a representative of the manufacturer or by a qualified person.
A more frequent inspection may become necessary, depending on the system conditions.

4.6 What to Do in Case of Danger

Information on what is to be done in case of danger and in case of accidents can be found in the respective operator's or specialist companies' work instructions.

5 Responsibility of the Operator

Operator

An operator is a person who operates the device himself/herself for commercial or economic purposes or leaves it to a third party for use/application and is legally responsible for the safety of the user, the personnel or third parties during operation.

Operator duties

The device is used in the commercial sector. The operator of the device is therefore subject to the legal obligations for occupational safety. In addition to the safety instructions contained in these instructions, the established maintenance intervals must be observed, taking into account the respective national standard (alarm and hazard prevention plan).

In particular, the following applies:

- The operator is obliged to perform work on MEDENUS© devices during the warranty period only after consultation with the manufacturer. Otherwise the claims under warranty will become void.
- The operator must obtain information on the current occupational safety regulations and determine additional hazards resulting from the special work conditions at the place of use of the device in a risk assessment. The owner must implement the results in the form of operating instructions for the device.
- During the entire time of use of the device, the operator must check whether the operating instructions issued by him/her conform to the current state of the regulations and, if necessary, adapt them.
- The operator must clearly regulate and define the responsibilities for installation, operation, troubleshooting, maintenance and cleaning.
- The operator must ensure that all persons handling the device have read and understood these instructions. In addition, the owner must train the personnel at regular intervals and inform them about the hazards.
- The operator must make available to the personnel the required protective equipment and oblige them to wear the required protective equipment.
- Moreover, the operator is responsible for the device always being in technically perfect condition.

Therefore, the following applies:

- The operator must make sure that the maintenance intervals described in these instructions are observed.
- The operator must have all safety devices checked regularly for functionality and completeness.

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6 Transport, Storage and Packaging

6.1 Transport

Note

The device must be handled carefully and secured against impacts and knocks.
In case of transport damage, we will require the following information from the nameplate affixed to the device:

- Device type
- Device model
- Year of construction/fabrication number

6.2 Storage

Equipment and spare parts must be stored under the following conditions:

- Do not store outdoors.
- Store in a dry and dust-free location.
- Store on a flat surface.
- Do not expose to aggressive media.
- Do not expose to ozone or ionizing radiation.
- Do not store adjacent to direct heat sources.
- Avoid mechanical vibrations.
- Storage temperature: 0 to 25 °C.
- Relative air humidity: < 55 %.

Spare parts:

- Components susceptible to corrosion must be provided with a suitable preservative.
- Do not store O-rings and seals for more than 5 years even if stored properly.
- Spare parts must be stored in their original packaging until use.

Storage period for devices:

- Storage of the device for up to one year:
  Store the safety relief valve in its original packaging and its original condition as delivered. All protective caps of the device must remain mounted.
- Storage of the device for more than 1 year (e.g. as a spare device):
  Store the device in its original packaging and its original condition as delivered and check it for damage once a year. Check the housing surface for dirt, damage and corrosion. If necessary, clean all external parts. After 5 years, all O-rings and seals must be replaced.

6.3 Packaging

- The individual packaged items have been packaged in view of the transport conditions to be expected.
- The symbols on the packaging must be observed during transport and storage.
- Only environmentally friendly materials have been used for packaging.
- The packaging is designed for protecting the individual components from transport damage, corrosion and other damage until mounting. This is why the packaging must not be destroyed and only removed just prior to mounting.

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7 Mounting and Commissioning

7.1 Safety Instructions and Preparation

Prior to starting work on pressurized components:

DANGER

- Close all connections to the gas line.
- Depressurize all pressurized components. Also discharge residual energies.
- Defective components charged with pressure in operation must be replaced immediately by an appropriate expert.

Note

Prior to starting work, ensure sufficient clearance for mounting.
Before installing the device, check whether the performance data (nameplate) and the scope of delivery coincide with the order or the system data, i.e., make sure that the provided devices are suitable for their intended purpose. In particular, the inlet pressure of the system must be lower than the maximum allowable pressure of the device, or the system must be declared to be differential pressure-resistant.

Note

Direct contact of gas valves and fittings, i.e., the control system, with hardening masonry, concrete walls or floors is not permitted. Provide suitable supports, working materials and protective equipment.
Take into account the minimum clearances for maintenance as stated in the product information.
Before installing the device in the pipeline, check whether a shut-off device that interrupts the gas flow supply to the device has been mounted upstream of the device to be installed.

DANGER

Prior to commissioning, make sure that all installation work has been carried out and completed in accordance with the data and information given in these instructions and that no unauthorized persons stay in the danger zone.

7.2 Mounting

- Remove the packaging, flange protection caps and shipping braces.
- Check the device for wear and damage.

Note

- Make sure that the device is installed free of stress (see DVGW info gas no. 19).
  Make sure to observe the direction of flow i.e., the arrow on the housing must point in the direction of flow.

Note

Note

- All breather lines (items 7.04 / 7.07) must be vented to the outside atmosphere.
- The breather line (item 7.04) may not be required if breather valves are used

Tightening torques M_A*)

Gas pressure regulators

Screw size	Screw tightening torque M_A
M6	8Nm
M8	18 Nm
M10	36 Nm
M12	62 Nm

Flange tightening torques

Screw size	Screw tightening torque M_A
M12	60 Nm
M16	120 Nm
M20	190 Nm

*) For the assembly of the flange connections, the maximum torques specified by the flange and gasket manufacturers must be observed. The values indicated here should be considered as approximate values.

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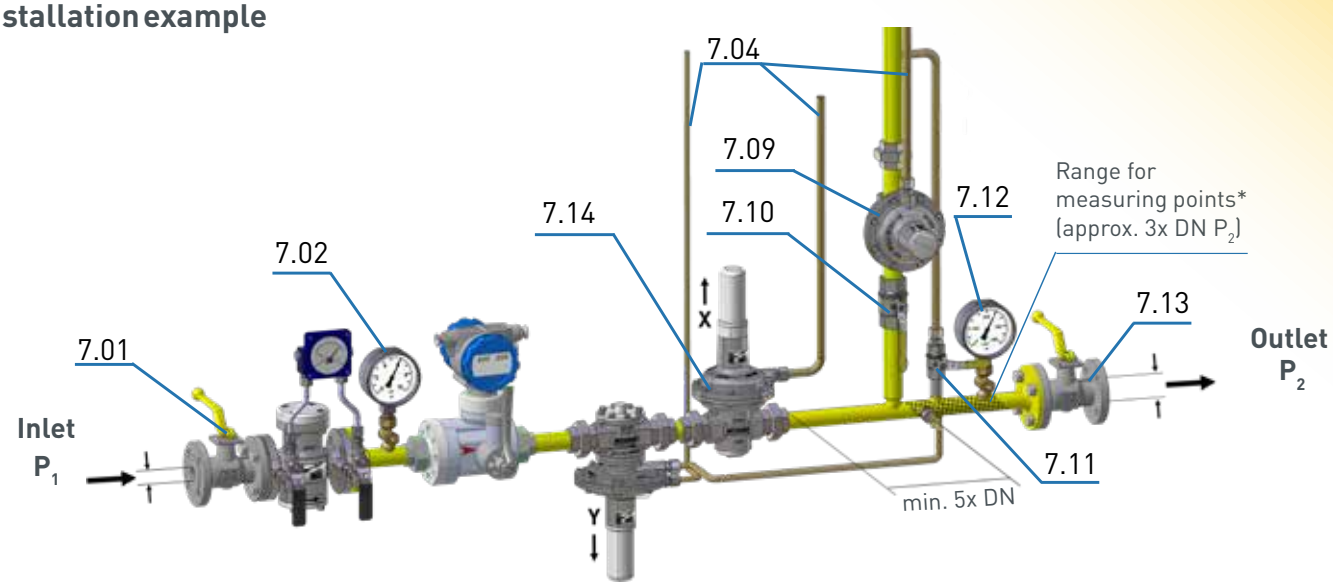
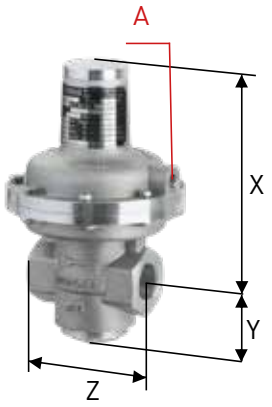
Installation example



Connection

Nennweite /nominal size			Abmessung / dimension (mm)				Anschluss Regler /connection Regulator	Anschluss Regler Öffnungsdurchmesser / connection Regulator opening diameter (mm)
	DN	Anschluss / connection	X	Y	Z	Ø	Atmungsleitung / breathing line (A)	Atmungsleitung / breathing line (A)
R50	25	RP 1"	173	53	100	145	RP1/4"	2
	40	RP 1½"	173	61	140			
	50	RP 2"	173	61	160			



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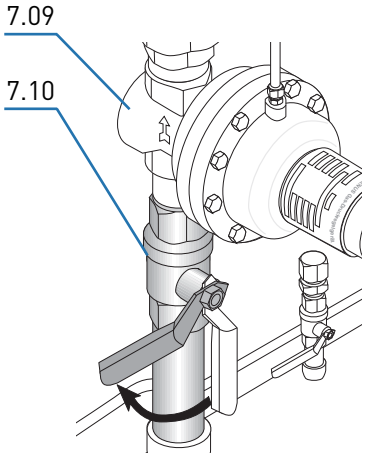
7.3 Leakage Test (Test for External Leakage)

The devices are subjected to a strength and leakage test ex works at MEDENUS Gas-Druckregeltechnik GmbH.

The leakage test in the fully assembled system must be performed prior to commissioning and following maintenance work.
For the external leakage test in the fully assembled system, the following applies

For Germany:
According to DVGW work sheet G 491, the fully assembled system must be subjected to a leakage test with air or an inert gas at the installation site, using 1.1 times the maximum operating pressure of the system (MOP).
An exception is the room between the actuator and the first shut-off valve on the outlet side. This room must be checked using the test pressure corresponding to the maximum permissible pressure in the system in case of a malfunction (1.1 MOP_d). In this test, all detachable connections must be checked using a foaming agent.

For other countries:
The relevant national and international standards shall apply



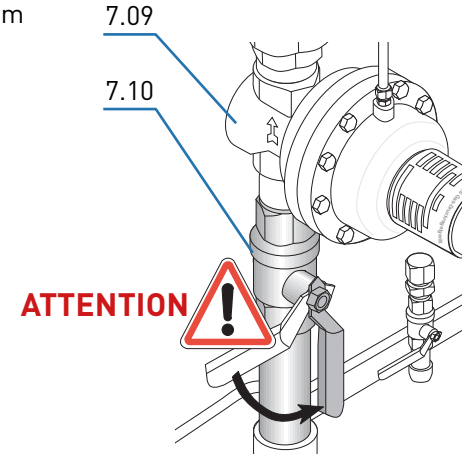
Procedure

- Close the ball valve upstream of the valves and fittings (item 7.01).
- Close the downstream shut-off devices (item 7.13) (ball valve, solenoid or pneumatic valve).
- Depressurize the system (item 7.11).
- Connect the testing device to measuring points upstream and downstream of the gas pressure regulator (items 7.02 / 7.12).
- Test the tightness of the safety relief valve (item 7.09) until the response pressure is reached and then close the line upstream of the SRV (item 7.10).
- Always increase the test pressure slowly and steadily.

While doing so, you must ensure:
Pressure in outlet chamber (item 7.12) ≤ pressure in inlet chamber (item 7.02)
Pressure build-up always from the inlet side (inlet chamber)
Pressure reduction always from the outlet side (outlet chamber)

- After leakage test:
  Open the ball valve in the SRV line (item 7.10) again.

Note



7.4 Initial Commissioning / Recommissioning

Initial commissioning of the system components shall be carried out by the operator. For commissioning, please refer to the documents listed under item 1 "General Information" and the system operator's work instruction.
The devices delivered by MEDENUS Gas-Druckregeltechnik GmbH are factory-set to the operating data specified by the customer. This data is listed on the Acceptance Test Certificate (ATC)* and the type plate.

Prior to commissioning of the system, a functional test must be performed on the gas pressure regulator (GPR), if applicable, and the safety shut-off and safety relief valves.

Procedure

- Close the ball valve upstream of the valves and fittings (item 7.01).
- Close the downstream shut-off devices (item 7.13) (ball valve, solenoid or pneumatic valve).
- Depressurize the system (item 7.11).
- Close the venting ball valve (item 7.11).
- Slowly open ball valve upstream of the valves and fittings (item 7.01).

If the inlet shut-off device is equipped with a bypass, the latter must be slowly opened for pressure compensation as step 1. After that, the inlet shut-off valve is slowly opened and the bypass is closed again. The same is true of the outlet shut-off valve.

7.5 Setpoint spring

Note

The setpoint spring ranges for the gas pressure regulator R 50 depend on the initial pressure.
For more detailed information, please contact the company MEDENUS Gas-Druckregeltechnik GmbH.
The contact data are given under item 10.

*) Acceptance Test Certificate (ATC) available optionally

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7.6 Decommissioning

For decommissioning, please refer to the documents listed under item 1 “General Information” and the system operator's work instruction.

Procedure

- Slowly close the outlet shut-off valve (item 7.13) or
- Slowly lower the outlet pressure via the setpoint setting screw until the reserve rail takes over the gas supply or
- Slowly raise the setpoint of the reserve rail until the operating rail is disabled.
- Close the ball valve upstream of the valves and fittings (item 7.01).
- Depressurize the system (item 7.11).
- Close the venting ball valve (item 7.11).

8 Maintenance

8.1 Maintenance Plan

The maintenance regulations of the system manufacturer must be observed. The following sections describe the maintenance work required for optimal and trouble-free operation of the device.
If increased wear is detected during regular inspections, the required maintenance intervals must be shortened in accordance with the actual wear.
For any questions on maintenance work and intervals, please contact the manufacturer.
The intervals for monitoring and maintenance work are strongly dependent on the operating situation and the condition of the gas. This is why no fixed intervals can be given. For Germany, it is recommended that the maintenance periods as specified in the DVGW work sheet G 495 are observed initially.
For each system, this must be followed by determining the maintenance interval independently on a medium-term basis.

During maintenance work, the components must be cleaned and subjected to a thorough visual inspection. This is also necessary if irregularities in the operating behavior have been detected during operation or during functional tests.

The check must cover the elastomers in particular.

Damaged parts and O-rings dismounted during dismantling must be replaced with new ones.

It is recommended to stock the parts listed in chapter 11.1 on page 19 for maintenance work.

Interval	Maintenance work	Personnel
According to the data given in the DVGW work sheet G 495 or if necessary	Replacing O-rings	Qualified person
	Replacing diaphragms	
	Replacing the valve plate	

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8.2 Maintenance Procedure

The maintenance procedure is described in detail step-by-step in our video tutorial and our pictorial descriptions. Instructions for our products can be found in the download area of our website. Should you have any problems, please feel free to contact us directly.

ATTENTION

If components have been removed, make sure they are mounted correctly, reinstall all fastening elements and observe the screw tightening torques.

Prior to recommissioning, observe the following:

DANGER

- Make sure that all maintenance work has been carried out and completed in accordance with the data and information given in these instructions.
- Make sure that no unauthorized persons stay in the danger zone.
- Make sure that all covers and safety devices have been installed and are working properly.

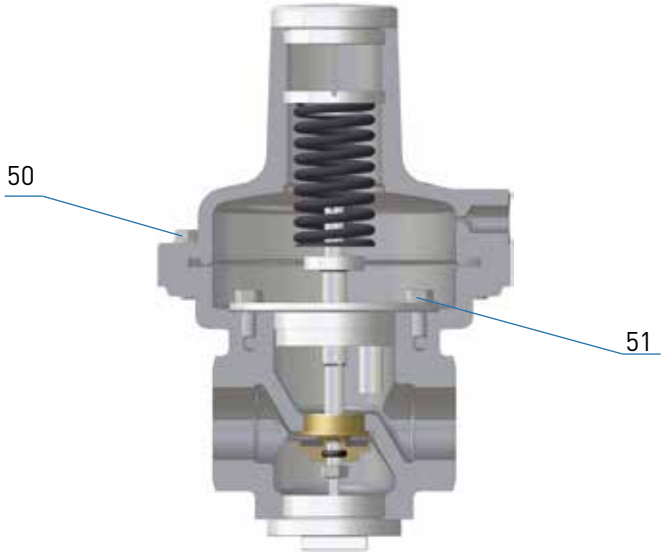
For recommissioning, please refer to the relevant manufacturer's documentation of the gas pressure regulator installed in the system, the work instructions of the system operator, and the other safety regulations of the system in which the safety relief valve has been installed.

To guarantee smooth operation, we recommend always keeping a maintenance set in reserve.

Note

8.3 Table of Screw Tightening Torques M_A

Item no.	R50 / G 1“ R50 / G 1 1/2“ R50 / G 2“
50	M6 / 8 Nm
51	M6 / 8 Nm



8.4 Lubricants Table

Components (apply a thin layer)	Lubricants	Article no.
All O-rings	Syntheso Proba 270	SYNTHESO-PROBA-270
All fastening and locking screws	Anti Seize AS 450	AS-450

Oxygen model

ATTENTION

For oxygen models, a suitable grease which is approved for the use with oxygen must be used.

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9 Troubleshooting

9.1 Gas Pressure Regulator

Description of the error	Possible cause	Elimination
Closing pressure too high No closing pressure	Actuator dirty or damaged	Check valve plate (seal) and valve seat for damage and dirt, replace valve plate, if necessary
	Static sealing elements defective	Replace O-rings
	Clamping of the compensating diaphragm has come off Compensating membrane is damaged or mounted incorrectly	Check compensating diaphragm for fastening, damage, and correct fit, replace it, if necessary
	Valve plate has become disconnected from the valve stem	Tighten nut under the valve plate
	Valve plate dirty	Clean the valve plate (use exclusively NBR-compatible cleaning agent)
Unstable outlet pressure curve (vibrations, pulsation)	Device is working in the closing pressure range	Check regulator design
	Vibration resonance in the control system	Install restrictor plate in breather line Install baffle plate in measuring line Continue closing restrictor in measuring line by turning clockwise * Install a harder spring (setpoint spring of the next higher control range) Check setting of gas consumption devices Use of throttle valve RSD2 (optional accessory)
Control deviation too large	Unfavorable connection of the measuring line	Select a measuring point with steady flow, check measuring point
	Sluggishness of the device due to dirt	Subject device to maintenance
	Main diaphragm or compensating diaphragm defective or mounted incorrectly	Check diaphragm and replace it, if necessary
	Wrong regulator size selected Wrong setpoint spring selected	Check regulator design Check setpoint spring and replace it, if necessary
	Inlet pressure supply is insufficient (pressure losses in the supply line too high)	Increase inlet pressure Check pipeline cross-section Check built-in filter
Inadmissible pressure peak Dynamic closing pressure too high	Damping of the device too high Control system too dynamic	Remove baffle plate from measuring line Remove restrictor plate from breather line Check breather lines, choose a larger diameter, if necessary Replace breather valve with breather line
	Closing speed of downstream shut-off devices too high	Reduce closing speed of shut-off valve
Noise	Gas velocity too high	Check regulator design
	Sluggishness of the device due to dirt / wear	Perform maintenance on actuator If worn-out mechanically, replace it, if necessary
Gas escapes through breather line	Fastening of the main diaphragm has come off Main diaphragm is damaged or has been mounted incorrectly	Check diaphragm for fastening, damage, and correct fit

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10 Replacement and Disposal

After the device has reached the end of its useful life, it must be dismounted and disposed of in an environmentally friendly manner.

ATTENTION

During dismounting, components that may present a risk of injury by contamination, depending on the medium, are removed. The components must be properly decontaminated depending on the processed medium. Diffusible components (diaphragm, O-ring, etc.) may have to be taken to a special disposal unit, depending on the medium used.
If no return or disposal agreement has been signed, disassembled components should be recycled:

- Metals should be scrapped
- The remaining components should be disposed of after sorting according to material.

Alternatively, scrapping by MEDENUS can be agreed with the service. The return is at your own expense, the disposal by MEDENUS is free of charge.

For technical information, please contact our customer service:

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D-57462 Olpe

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Fax +49 (0) 2761 / 82788-9

E-mail service@medenus.de
Internet www.medenus.de

Note

In addition, we are always interested in information, suggestions and experience resulting from the application and which can be valuable for improving our products.

11 Spare Parts

11.1 Parts for Maintenance Work

O-Rings and Sealing Rings

Item no.	Name	Quantity pcs.	Exception	R50 / G 1“ R50 / G 1 1/2“ R50 / G 2“
4	O-ring	1		O-013
7	O-ring	1		O-006
11	O-ring	1		O-007
14	NBR ring	1		N-001
17	O-ring	1		O-008
20	O-ring	1		O-013
		2	HD2	O-013
O-ring set order number:				**OS-051**

Valve Plate / Diaphragm

Item no.	Name	Quantity	R50 / G 1“ R50 / G 1 1/2“ R50 / G 2“
6	Valve plate	1	**VT-012**
16	Diaphragm	1	**M-111**

Example:

Gas pressure regulator: R50 / G1“
Spare parts according to tables in 11.1
Valve plate: **VT-012**
Diaphragm: **M-111**
O-ring and sealing ring set: **OS-051**

Info: The allocation of individual parts is done according to the item no. in the tables in 11.1, conforming to the spare parts drawings in 11.2.

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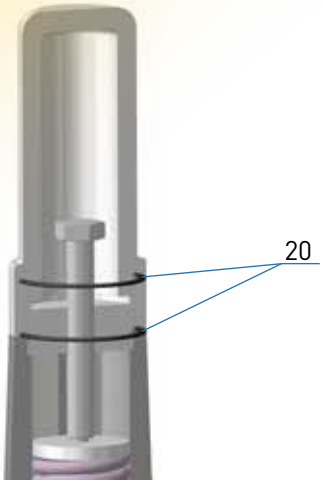
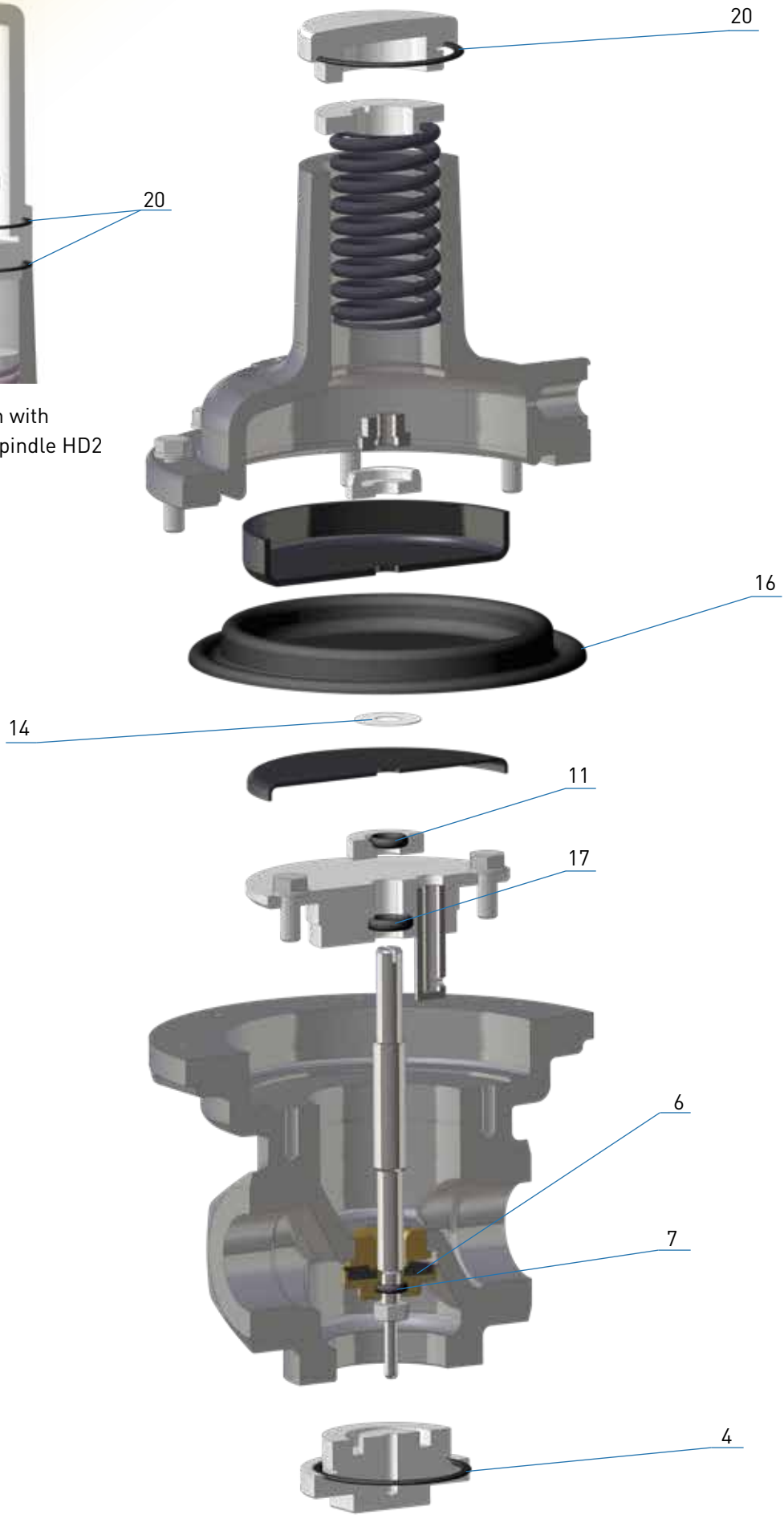
11.2 Spare Parts Drawing R50



R50 shown with
high-pressure spindle HD2



12 Accessories / Options

12.1 AV 530 breather valve

12.1.1 Use

- On SSV control devices
- On regulators (pilots)
- With low-dynamic regulation sections (one full stroke)
- On the SRV

12.1.2 Application / Function

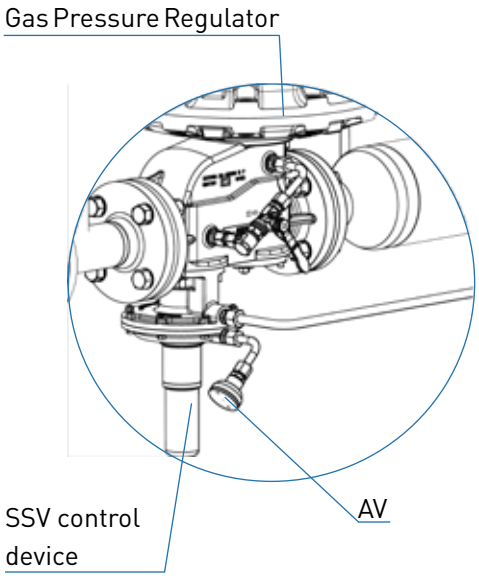
The breather valve is used as replacement for the costly and time-consuming laying of breather lines and for securing the installation room against inadmissible escape of gas from diaphragm comparator compartments of gas pressure regulators and safety shut-off valves.

Safety shut-off valves (SSV) of functional class A are triggered automatically and seal gas-tight.

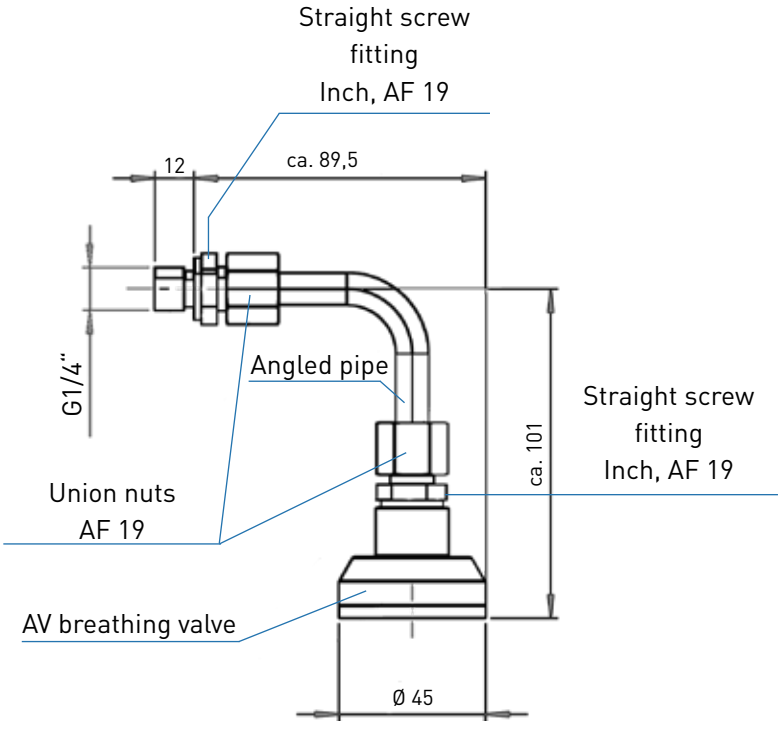
In compliance with EN 12186:2014, the use of the AV guarantees that in case of a defect of the working diaphragm, escape of gas from the breather connection of the gas pressure regulator or of the safety shut-off valve of more than 30 l/h is prevented.

12.1.3 Technical Data

- **Type** AV
- **Max. allowable pressure PS** 25 bar
- **Max. operating pressure p_{max}** 25 bar
- **Max. allowable flow rate** 30 l/h
- **Connection type** Male thread G 1/4“
- **Temperature range class 2** (operating/ambient temperature) -20 °C to +60 °C



Application example on the SSV



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Declaration of Conformity

Manufacturer: Medenus Gas-Druckregeltechnik GmbH
Address: Im Langen Feld 3
D-57462 Olpe

declares under sole responsibility that the product:
R51 Pressure regulator (spring-loaded proportional regulator)

have been subjected to an EC-type examination and conform to the basic requirements of the directives GAR (EU) 2016/426 EC-Gas Appliances Regulation and 2014/68/EU A III B EC-Pressure Equipment Directive in the respective current version.

Marking (PIN) according to Pressure Equipment Directive and Gas Appliances Regulation

CE-0085CR0137 model R 51

Notified body (EU type examination: Module B)	DVGW CERT GmbH Josef Wirmer Straße 1-3 D-53123 Bonn, Germany Notified Body number: 0085

The basis of the EC type examination are the harmonized European standards and / or national standards, as well as the European directives and / or regulations:

2014/68/EU A III B EC Pressure Equipment Directive	(15.04.2014)
GAR (EU) 2016/426 A III B EC Gas Appliances Regulation	(09.03.2016)
DIN EN 334	(01.11.2019)

Monitoring of the EC quality assurance system (module D)	DVGW CERT GmbH Notified Body number: 0085

Registration No. Pressure Equipment Directive **SD-0085BQ0510**
Registration No. Gas Appliances Regulation **SE-0085BQ0510**

Olpe,
07.08.2023

Alexander Christiani
Managing Director

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Notes

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