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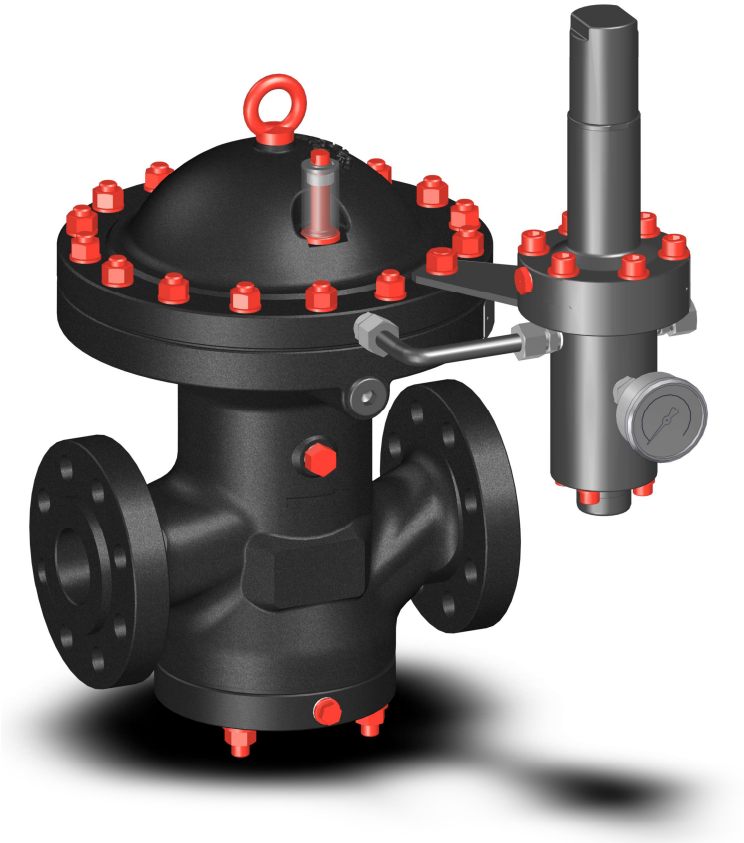

HON R100NG

Gas pressure regulator with HON P095NG pilot

User and maintenance manual

Maintenance parts

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Contents

Revision record

Revision	Description	Date	Revised by
A	Updated with FO version and general text updates	12-Jun-2020	A. Shen
B	Updated with adjustable restriction pictures and text updates	24-Dec-2020	A. Shen / A.Vermaat
C	Quadring size updated	06-Oct-2022	A.Vermaat

1 General considerations

Contents

1.1 About this user manual

Validity and purpose

This user manual applies to HON R100NG gas pressure regulators featuring an HON P095NG pilot.

This user manual provides all individuals with the information required for the safe handling about the following tasks:

- Transport
- Installation
- Start-up
- Set-up
- Maintenance
- Decommissioning, disassembly, renewed start-up, storage and disposal

Target group

This user manual is intended for anyone working with the product:

- Transportation personnel
- Installation personnel
- Set-up and operating personnel
- Maintenance and service personnel

Illustration

Honeywell offers products with identical functions in a number of different sizes. For this reason, we are unable to guarantee that illustrations in this user manual coincide with the dimensions of your product. In these cases, the illustrations should be viewed as a concept sketch.

Safety

Failing to observe the information provided in this document may lead to injuries, including death and material damages.

To ensure the safety, any persons handling the product must have read and understood the following parts of this document before they start with any work involving it:

- the chapter entitled Safety
- the chapters that describe the work to be done

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Details about the manufacturer's liability

The manufacturer is not liable for damages and malfunctions arising from non-observance of this user manual and the other applicable documents.

Constructive changes

The written approval from Honeywell Gas Technologies GmbH, Kassel, is required for any modifications and additions to the product. Any violation will void the legal liability for consequences arising thereof.

1.2 About the safety notices

Meaning

The information contained in the safety notices is intended to prevent personal injury. Safety notices contain the following information:

- Nature and source of the danger
- Possible consequences associated with the non-observance of the notice
- Procedures for the prevention of personal injury

Types of safety notices

This document contains the following types of safety notices:

Type of safety notice	Description	Sign
Basic safety notices	Superordinate safety notices not relating to a specific task: ▪ They contain a summarized description of hazards, risks and safety procedures associated with the handling of the device. ▪ Their purpose is to inform and educate the user about an existing danger and about practicing behavioral safety. ▪ They are suitable as safety instruction for all employees handling the device.	Recognizable by the heading of the chapter
Instruction-related safety notices	Safety notices containing specific instructions relating to the entire manual or a group of manuals	⚠DANGER ⚠WARNING ⚠CAUTION

Type of safety notice	Description	Sign
Step-related safety notices	Safety notices containing specific instructions relating only to the step	**DANGER** **WARNING** **CAUTION**
Additional safety notice	Instruction to observe certain safety notices regarding a location in the document where safety notices containing specific information about dangers, risks and specific instructions for safety procedures can be found	

Danger levels

The safety notices containing specific instructions are identified with a signal word. The signal word represents a certain danger level:

Danger level	If you fail to follow the instruction, then ...	And the consequence is ...
DANGER	an accident will happen	serious bodily injury or death.
WARNING	an accident may happen	possible serious bodily injury or death.
CAUTION	an accident may or will happen.	minor or moderate bodily injury.

Warnings about material damages

Warnings about possible material damages are identified with the word **Attention** in this document.

2 Description

Contents

2.1 Intended use

Intended use

HON R100NG gas pressure regulators featuring a HON P095NG pilot can be used to maintain the outlet pressure of a gas constant within a regulating line regardless of the influence of disturbance variables such as inlet pressure changes and/or discharge changes. In addition, these gas pressure regulators can be used to implement an active-monitor regulator configuration. It can be used in transfer stations of gas transportation networks, in power plants and industrial plants. HON R100NG gas pressure regulators featuring a HON P095NG pilot are suitable for use with natural gas or dry, non-aggressive industrial gases.

Note: The utilization limits of the device about the medium, operating pressure and operating temperature can be gathered from the type plate attached on the device or the technical specifications.

The use under different operating conditions must be coordinated in consultation with the manufacturer.

Limitations of use

Please observe the following limitations of use:

- Do not use the device for any media other than those mentioned in the intended use or those discussed with and approved by the manufacturer.
- Do not use the device in any installation position other than the one documented in this user manual.
- Do not use the device against the direction of flow specified on the device and in the user manual.
- When replacing defective parts, only use original spare parts or manufacturer-approved standard parts.
- Do not attempt to modify or remodel the device on your own.

2.2 Device models

Gas pressure regulator versions

Gas pressure regulators consisting of an HON R100NG regulator unit combined with an HON P095NG pilot are available in several versions. These versions are derived from the various possible combinations between the various pilot and regulator versions.

HON R100NG models

The HON R100NG regulator is available in two designs. In addition to the two basic configurations – the standard version and the fail-open version – an active monitor regulator circuit can be set up as well. The table below shows the different characteristics of these designs:

HON R100NG	HON R100NG-FO
Standard version	
fail-closed	fail-open
1", 2", 3", 4", 6", 8" nominal inlet sizes	1", 2", 3", 4", 6", 8" nominal inlet sizes
ANSI class 150 to class 600 pressure ratings	ANSI class 150 to class 600 pressure ratings

HON P095NG pilot models

The following table shows which models are available:

Description	Design	Set point range
HON P095NG-MP	Medium-pressure model (medium pressure)	1 to 12 bar (2.25 to 174 psi)
HON P095NG-HP	High-pressure model (high pressure)	8 to 60 bar (116 to 860 psi)

The only structural difference between the two versions is the upper diaphragm unit's design, meaning that you can switch between the versions by changing the diaphragm unit.

Versions and designs in this user manual

The *technical specifications* (see page 18) and the *Maintenance* (see page 46) section, as well as the spare parts lists and spare parts drawings in the *appendix* (see page 83), describe all the gas pressure regulator versions and all the models corresponding to the standard for this device type.

The remaining sections in this user manual use the version with the HON P095NG pilot as a reference.

If you have trouble understanding the information in this documentation, contact the manufacturer before starting any work on the device.

2.3 Labels/Markings

Illegible labels

⚠WARNING

Illegible information on the device poses a risk of injury due to resulting erroneous operation, use, or installation.

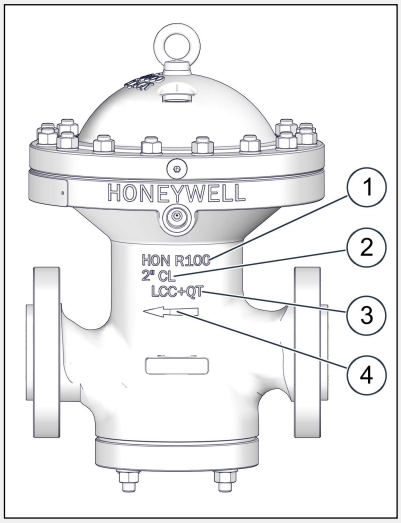
Labels, as well as inscriptions and stamping on the device, can eventually become soiled or otherwise unrecognizable to such an extent that users will not be warned effectively of hazards and may be unable to follow required operating instructions. This will pose a risk of injury.

⇨ Make sure to always keep all relevant labels in good condition so that they will be easily legible.

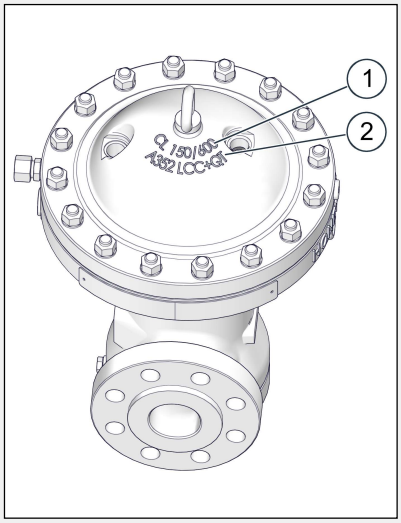
⇨ Immediately replace damaged and missing labels.

Labels on the HON R100NG

The following labels/markings can be found on the front of the regulator:

Figure	No.	Meaning
	**1**	Name of the device
	2	Nominal size and pressure rating
	3	Body section materials
	4	Arrow indicating the direction of flow

The following labels/markings can be found at the top of the regulator:

Figure	No.	Meaning
	**1**	ANSI pressure rating
	2	Material

Nameplate

For a detailed list of the information on the nameplate and what it means:

Identifying the device (see page 10)

Labels on connection lines

Small labels must be used to color-code and explicitly name the regulator's connection lines based on what the lines are intended for and their minimum nominal size.

2.4 Identifying the device

Identifying the gas pressure regulator

Make sure you have the right manual for your gas pressure regulator.

Use the nameplates to identify the regulator and the pilot.

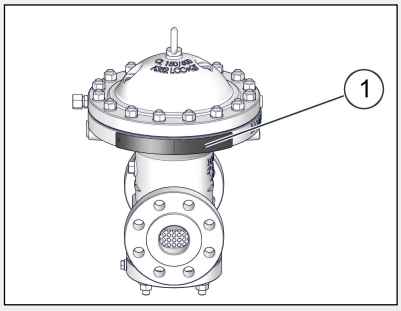
Verifying the technical specifications

Make sure that the on-site conditions match the information on the nameplates with the technical specifications.

Technical specifications are found on the nameplate.

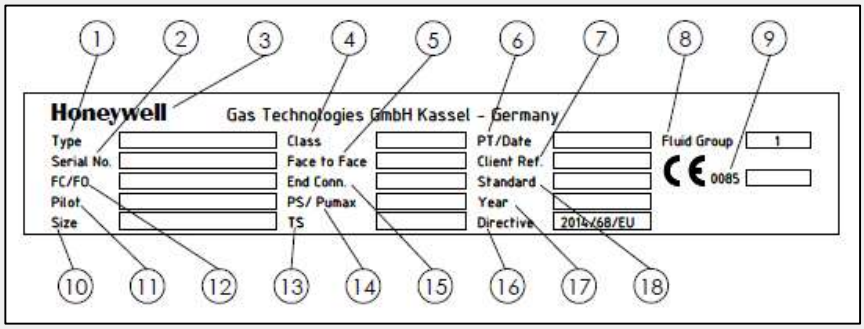
Locating the nameplate of the regulator

The type plate of the regulator can be found here:

Figure	No.	Description
	**1**	Nameplate

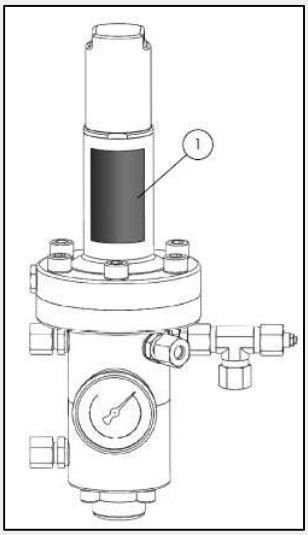
Interpreting the name plate of the regulator

The details on the type plate have the following meaning:

No.	Meaning	No.	Meaning
			
1	Model name	**10**	Nominal size
2	Serial number of the device	**11**	Type of pilot
3	Manufacturer	**12**	Default position (open / closed)
4	ANSI class	**13**	Temperature range
5	Face to face length	**14**	Maximum allowable pressure
6	Manufacturing date	**15**	Pressure rating
7	Customer Reference No.	**16**	PED Directive
8	Fluid group	**17**	Manufacturing date (year)
9	CE marking	**18**	In conformity with standard, e.g., DIN EN 334

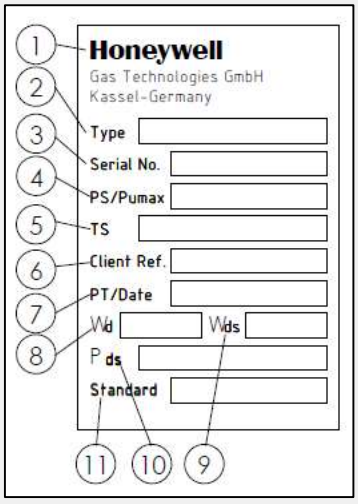
Locating the type plate of the pilot

The nameplate can be found in the location shown below:

Figure	No.	Description
	**1**	Front of the pilot

Interpreting the type plate of the pilot

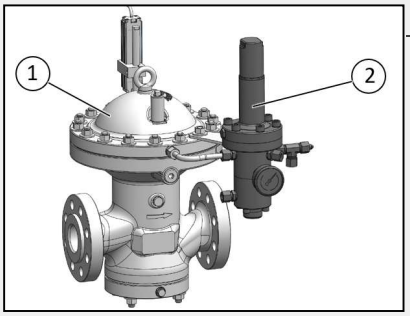
The details on the type plate have the following meaning:

Figure	No.	Meaning
	**1**	Manufacturer
	2	Name of the device
	3	Serial number
	4	Maximum inlet pressure
	5	Temperature range
	6	Customer Reference No.
	7	Manufacturing date
	8	Set point range
	9	Specific set range
	10	Set point
	11	In conformity with standard, e. g., DIN EN 334

2.5 Layout and operation

Assemblies

The gas pressure regulator is made up of the following assemblies:

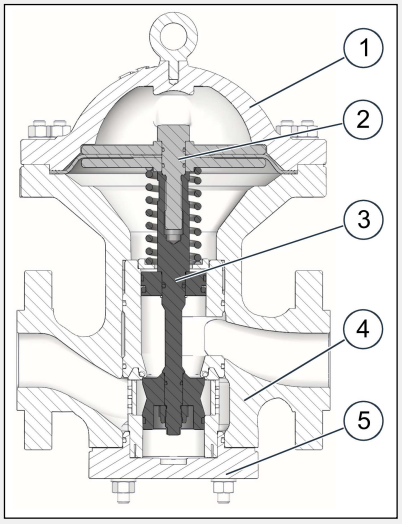
Figure	No.	Description
	**1**	HON R100NG regulator
	2	HON P095NG pilot

How it works

- Gas pressure regulators consisting of an HON R100NG regulator combined with an HON P095NG pilot can be used to maintain the outlet pressure of a gas constant within set limits within a regulating line regardless of the influence of disturbance variables such as inlet pressure changes and/or discharge changes.
- The downstream pressure that needs to be regulated is fed to the pilot. The diaphragm system in the pilot determines the pressure process value as a force on the measuring diaphragm and compares it with the force of the pilot spring, which is used as reference variable. If control deviations are detected based on the results from this comparison, the opening position of the regulator's regulating diaphragm will be changed by adjusting the motorization pressure so that the pressure being regulated (process value) will change to match the set point. When there is zero pressure flow, the device seals tightly.

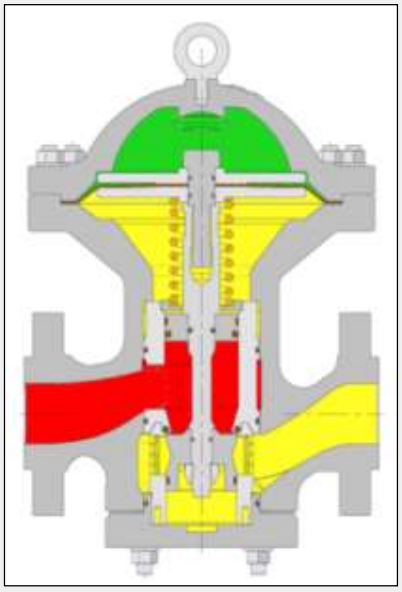
Regulator configuration

Regulator configuration:

Figure	No.	Description
	**1**	Dome
	2	Diaphragm unit
	3	Moving parts
	4	Valve housing
	5	Bottom cover

The parts (3) that move with the diaphragm unit (2) are shown in dark grey.

Regulator pressure section - FC

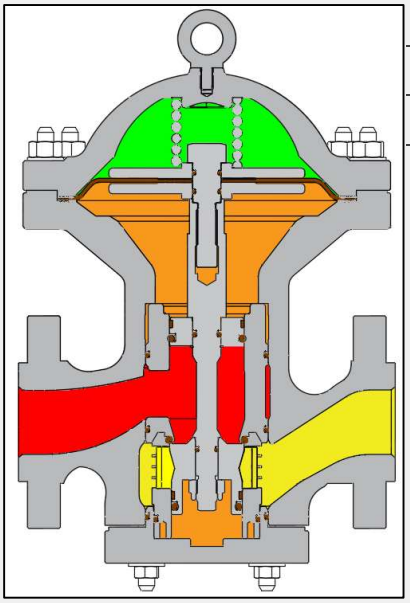
Figure	Color	Meaning
		Inlet pressure
		Outlet pressure
		Motorization pressure

The fail-close and fail-open version have different pressure chambers with different functions.

The tubing of both versions will differ accordingly.

The monitor or active can have a FC or FO characteristic, depending on system requirements.

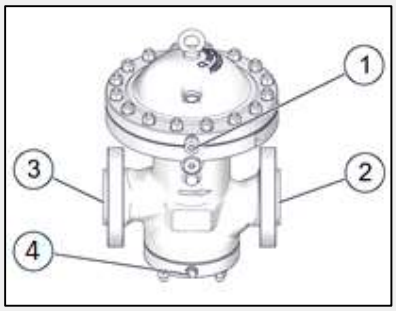
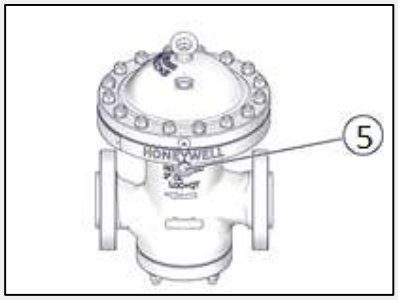
Regulator pressure section – FO

Figure	Color	Meaning
		Inlet pressure
		Outlet pressure
		Motorization pressure
		Auxiliary pressure

The FO version will run to fully open in case of failure. In normal conditions the valve will close when the downstream pressure is reached.

Regulator connection lines

The HON R100NG and HON R100NG-FO regulator versions feature the following ports:

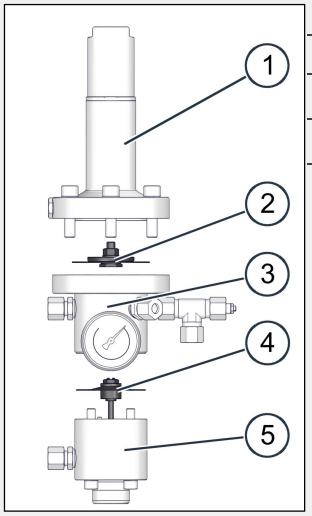
Figure	No.	Connection	
Front: 		**HON R100NG**	**HON R100NG-FO**
	1	Motorization pressure	Motorization pressure
	2	Outlet pressure	Outlet pressure
	3	Inlet pressure	Inlet pressure
	4	Outlet pressure	Auxiliary pressure
Back: 	**5**	Outlet pressure	Auxiliary pressure

How the regulator works

HON R100NG	HON R100NG-FO
▪ In a depressurized state, the compression spring will push the diaphragm upward so that the valve plate will close, creating a seal at the sharp edge of the valve plate and the O-ring of the closing member(fail-close). ▪ The motorization pressure will produce a force component that acts on the diaphragm from above. ▪ The force components are compared at the diaphragm. ▪ If the motorization pressure is greater than the compression spring and outlet pressure acting from below, the valve plate will be pushed downward. This will open a corresponding gap between the inlet pressure and outlet pressure areas.	▪ In a depressurized state, the compression spring will push the diaphragm downward, causing the valve plate to be pushed downward and opening a gap between the inlet pressure and outlet pressure areas (fail-open). ▪ The motorization pressure and the compression spring will produce force components that act on the diaphragm from above. ▪ The auxiliary pressure will produce a force component that acts on the diaphragm from below. ▪ Auxiliary pressure in the lower compensation chamber will also produce a force upwards. ▪ The force components are compared at the diaphragm. ▪ If the force of the spring and the motorization pressure is smaller than the upwards forces on the system, the valve plate will seal off the inlet pressure areas from each other. ▪ If the downward forces of spring and motorization pressure are greater, the valve plate will open a gap between inlet and outlet pressure

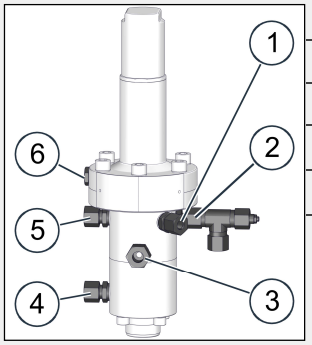
Pilot components

The HON P095NG pilot is made up of the following components and housing parts:

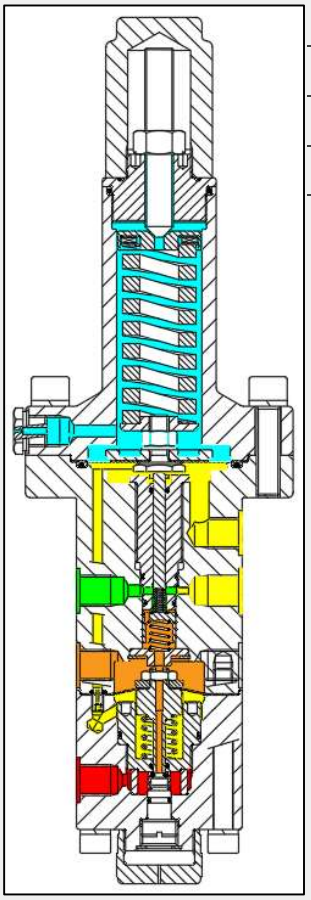
Figure	No.	Description
	1	Spring housing
	2	Upper diaphragm unit
	3	Second stage housing
	4	Lower diaphragm unit
	5	First stage housing

Pilot fittings

The HON P095NG pilot features the following fittings:

Figure	No.	Connection
	1	Outlet pressure (measuring line)
	2	Outlet pressure (discharging) adjustable restriction
	3	Pressure gauge (auxiliary pressure)
	4	Inlet pressure
	5	Motorization pressure (regulator)
	6	Vent line (ambient pressure compensation)

Pilot pressure sections

Figure	Color	Meaning
		Inlet pressure
		Loading pressure
		Motorization pressure
		Outlet pressure
		Atmospheric pressure

How the pilot works

- The pilot's set screw is used to tighten the pilot spring. The spring, in turn, produces a force component that acts on the upper diaphragm from above.
- The outlet pressure produces a force component that acts on the upper diaphragm from below.
- The force components acting on the upper diaphragm are used by the diaphragm to compare the set point and the process value. Depending on how the diaphragm moves, a larger or smaller gap between the valve and the motorization pressure stage will be opened. The motorization pressure is regulated with this gap.
- The inlet pressure is conveyed into the lower chamber of the upstream pressure stage. This pressure is conveyed into the chamber above the lower diaphragm through the valve. The pressure reduced by the valve is the auxiliary pressure, which produces a force component that acts on the lower diaphragm from above.
- The outlet pressure is conveyed into the pilot from the other side. This pressure is conveyed into the chamber below the lower diaphragm unit through a hole in the housing. There, the outlet pressure produces a force component that acts on the diaphragm from below.
- With the bottom screw connected to the seat of the 1st stage valve, the static auxiliary pressure (Orange) is set to 3 to 6bar higher than the outlet pressure (Yellow).
- When the upper diaphragm is pushed down, because the downstream pressure is low, the 2nd stage valve will open and creates motorization pressure from the auxiliary pressure. This will act on the regulator.

2.6 Technical specifications

Characteristic device values and materials

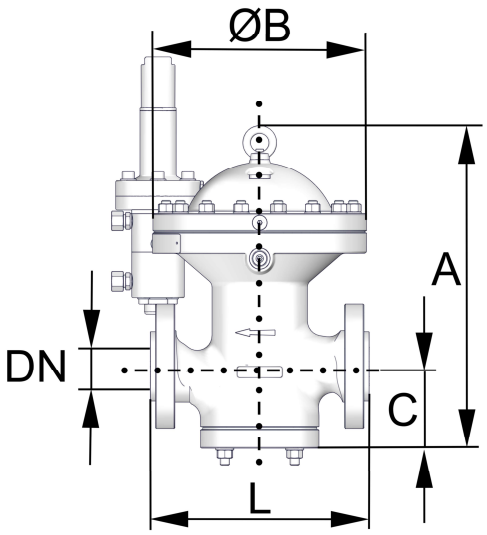
Criterion	Value
Inlet pressure	Up to 102 bar
Outlet pressure range (Wh)	Between 1 and 60 bar
Operating temperature	-4 °F to +140 °F (-20 °C to +60 °C)
Regulator materials	Cast steel, steel, NBR, PTFE
Pilot materials	Steel, brass, NBR, FKM

Pressure rating and flange facing standards

There are various flange facings for the nominal diameters of 1" (DN 25); 2" (DN 50); 3" (DN 80); 4" (DN 100); 6" (DN 150) and 8" (DN 200), as specified in the following standards:

- **ASME B16.5**
  Pressure rating as per Class 150; 300; 600 / Class 150 = 20 bar; Class 300 = 51 bar; Class 600 = 102 bar
  Flange facing: Raised face; ring joint
- **DIN EN 1759-1**
  Pressure rating as per Class 150; 300; 600 / Class 150 = 20 bar; Class 300 = 50 bar; Class 600 = 100 bar
  Flange facing: B flange; J flange

HON R100NG dimensions and weights when using HON P095NG pilot as an example



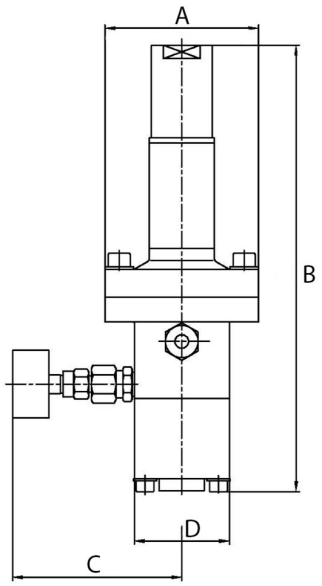
Size	Class	A inch (mm)	B inch (mm)	C inch (mm)	L inch (mm)	Weight* lbs (kg)
1" (DN 25)	300	12.21 (310)	9.57 (243)	3.19 (81)	8.50 (216)	60 (27)
1" (DN 25)	600					60 (27)
2" (DN 50)	300	16.93 (430)	11.22 (285)	4.33 (110)	11.50 (292)	135 (61)
2" (DN 50)	600					137 (62)
3" (DN 80)	300	20.04 (509)	13.78 (350)	4.88 (124)	14.02 (356)	247 (112)
3" (DN 80)	600					249 (113)
4" (DN 100)	300	25.16 (639)	16.69 (424)	6.65 (169)	17.01 (432)	408 (185)
4" (DN 100)	600					428 (194)
6" (DN 150)	300	36.10 (917)	24.80 (630)	9.57 (243)	22.01 (559)	1100 (499)
6" (DN 150)	600					1127 (511)
8" (DN 200)	300	39.69 (1008)	24.80 (630)	10.35 (263)	25.98 (660)	1420 (644)
8" (DN 200)	600					1486 (674)

*The HON P095NG pilot used in this example weighs: 17.6lbs (8 kg).

*Face to face length (L) is offered with raised face flange.

Pilot dimensions and weights

All specifications apply to both the MP and HP versions.



Imperial system:

Weight lbs (kg)	A in (mm)	B in (mm)	C in (mm)	D in (mm)
17.6 (8.0)	4.44 (113)	12.99 (330)	4.92 (125)	2.75 (70)

Accuracy class AC and look-up pressure class SG

The following classifications apply as defined in EN334:

Outlet pressure area Dp range [bar]	Accuracy class AC	Lock-up pressure class SG	Lock-up pressure zone SZ
P<14.5 <14.5 psi (1 bar to 3 bar)	2.5	10	2.5
Pd_d≥43.5 psi (3 bar)	1	2.5	2.5

Pilot springs

Design	Specific set range W_{ds}	Pilot spring No.	Color
MP	7.25 – 36.25 psi (1.0 – 2.5 bar)	850523ST12660	Green
	21.75 – 72.52 psi (1.5 – 5.0 bar)	850523ST12670	blue
	43.51 – 159.54 psi (3.0 – 11.0 bar)	850523ST12680	red
	87.02 – 217.56 psi (6.0 – 12 bar)	850523ST12690	Yellow
HP	145.04 – 507.63 psi (10.0 – 35.0 bar)	850523ST12680	red
	290.08 – 870.23 psi (20.0 – 60.0 bar)	850523ST12690	Yellow

Connection lines

An overview of the connection lines for the HON R100NG regulator and the HON P095NG pilot can be found in *Layout and operation* (see page 12).

The regulator's ports have the following sizes:

Device model	Connection	Size	Pipe diameter
HON R100NG HON R100NG-FO	Motorization pressure	G1/4"	10 mm, 12 mm, 1/2"
HON R100NG HON R100NG-FO	Outlet pressure feedback	G1/2"	10 mm, 12 mm, 16 mm, 1/2"
HON R100NG HON R100NG-FO	Outlet pressure	G1/4"	10 mm, 12 mm, 1/2"

The pilot's fittings have the following sizes:

Device model	Connection	Size	Pipe diameter
HON P095NG-MP HON P095NG-HP	Pressure gauge (loading pressure)	G1/4"	10mm, 12mm, 1/2"
HON P095NG-MP HON P095NG-HP	Inlet pressure	G1/4"	10mm, 12mm, 1/2"
HON P095NG-MP HON P095NG-HP	Outlet pressure (measuring line)	G1/4"	10mm, 12mm, 1/2"
HON P095NG-MP HON P095NG-HP	Outlet pressure (feedback)	G1/4"	10mm, 12mm, 1/2"
HON P095NG-MP HON P095NG-HP	Motorization pressure (regulator)	G1/4"	10mm, 12mm, 1/2"

Gas properties

The properties of the gas conveyed through the devices must meet the requirements specified by the DVGW German Technical and Scientific Association for Gas and Water in the latest version of DVGW Code of Practice G 260 (A).

ATEX specifications

The device's mechanical components do not contain any potential sources of ignition, and accordingly do not fall under the scope of ATEX 95 (94/9/EC). The electrical components used on the device meet all applicable ATEX requirements.

3 Safety

Contents

3.1 Basic safety rules

Target group of these rules

These rules are intended for any individuals handling the device.

Purpose of these rules

These rules are designed to make sure that any individuals handling the device obtain detailed information about the dangers and safety procedures and observe the safety notices contained in the user manual and on the device. If you do not follow these rules, there is a risk of injury including death and material damages.

Handling the user manual

Observe the following rules:

- Read the chapter entitled Safety and the chapters relating to your responsibilities in their entirety. It is vital that you have understood these contents.
- Always keep the user manual close by the device so that you can refer to it again.
- Include the user manual if you are giving the device away.

Handling the device

Observe the following rules:

- Only individuals who meet the requirements set forth in this user manual have permission to handle the device.
- The device's intended use includes its use in hazardous locations. All work with and on the device, must be carried out only after the presence of an explosive atmosphere has been fully ruled out.
- Only use the device for the intended purpose. Never use the device for any other, potentially logical purposes.
- Follow all safety procedures outlined in this user manual and on the device. Wear the mandatory personal protective gear.
- Only stay at the specified work places.
- Do not modify the device in any way, e. g. by removing parts or adding unapproved parts. You have no permission to modify or disable any safety contrivances.
- Adhere to the device maintenance intervals specified in this user manual.
- When replacing defective parts, only use original spare parts or manufacturer-approved standard parts.

Operator's duties opposite the employees

In your capacity as the company operating the device, you must ensure the following:

- All personnel must meet the requirements corresponding to their duties.
- All personnel must read and understand this user manual before working with/on the device.
- All occupational health and safety regulations that apply in your country must be complied with.
- Hazards resulting from specific working conditions at the location where the device is being used must be determined by means of a risk assessment and rendered avoidable by means of appropriate operating instructions.
- All personnel must be provided with the personal protective equipment required for their work. This personal protective equipment must be in good condition.
- All personnel must wear the personal protective equipment required for their work.

Conduct in the event of accidents

The device is designed and built such that the employees can work with it without being at risk. Despite all the precautions, accidents can happen under unfavorable circumstances. Always consult the directives of your company concerning the protection of the workforce.

3.2 Requirements concerning the workforce, personal protective gear, workplaces

Requirements concerning the workforce

Individuals tasked with handling the device must meet the following requirements:

Personnel	Responsibilities	Required qualification
Skilled person or expert	Any work on and with the device	▪ Professional training and experience operating pressure equipment and systems ▪ Knowledge of the relevant standards and regulations ▪ Ability to identify and avoid dangers autonomously
Certified, independent competent person	Safety checks	▪ Professional training ▪ Knowledge of the relevant standards and regulations ▪ Ability to identify and avoid dangers autonomously
Carrier	Company-to-company transport	▪ Professional training and experience transporting pressure equipment and systems ▪ Knowledge of the relevant standards and regulations ▪ Ability to identify and avoid dangers autonomously ▪ Knowledge with securing hauling distances ▪ Knowledge with the use of hoisting equipment
Transportation personnel	Intra-company transport	Professional training and experience with the transport using stackers, etc.

Personnel	Responsibilities	Required qualification
Mechanical fitter	Mechanical installation	▪ Professional training and experience operating pressure equipment and systems ▪ Knowledge of the relevant standards and regulations ▪ Ability to identify and avoid dangers autonomously
Tasked with the commissioning	▪ Initial start-up ▪ Renewed start-up	▪ Professional training and experience operating pressure equipment and systems ▪ Knowledge of the relevant standards and regulations ▪ Ability to identify and avoid dangers autonomously
Tasked with the installation	Set-up	▪ Professional training and experience operating pressure equipment and systems ▪ Knowledge of the relevant standards and regulations ▪ Ability to identify and avoid dangers autonomously
Mechanical maintenance personnel	Involving mechanical parts: ▪ Fault finding ▪ Maintenance ▪ Repairs	▪ Professional training and experience operating pressure equipment and systems ▪ Knowledge of the relevant standards and regulations ▪ Ability to identify and avoid dangers autonomously
Inspector	Safety check	Qualified inspector with adequate knowledge of gas pressure regulators
Tasked with the disposal	Disposal of the device	▪ Professional training and experience with the disposal of pressure equipment and systems ▪ Knowledge of the relevant standards and regulations ▪ Ability to identify and avoid dangers autonomously

Requirements for the personal protective gear

Any persons handling the device must be equipped with the following personal protective gear:

Task	Required personal protective gear
Start-up, operation (including partial), cleaning, maintenance, search and remedy of errors	▪ Industrial protective helmet ▪ Protective clothing ▪ Safety harness ▪ Ear protection ▪ Safety boots with protection for electrostatic discharge (ESD) ▪ Safety goggles ▪ Safety gloves

Workplace requirements

To ensure the safe handling of the device, the personnel must remain at the workplaces intended for performing their tasks.

The workplaces for performing the various tasks are at the following locations:

Task	Workplaces
▪ Installation ▪ Start-up ▪ Set-up ▪ Maintenance, repairs ▪ Decommissioning	All around the device, depending on the task

4 Basics for installing the device in a pipe

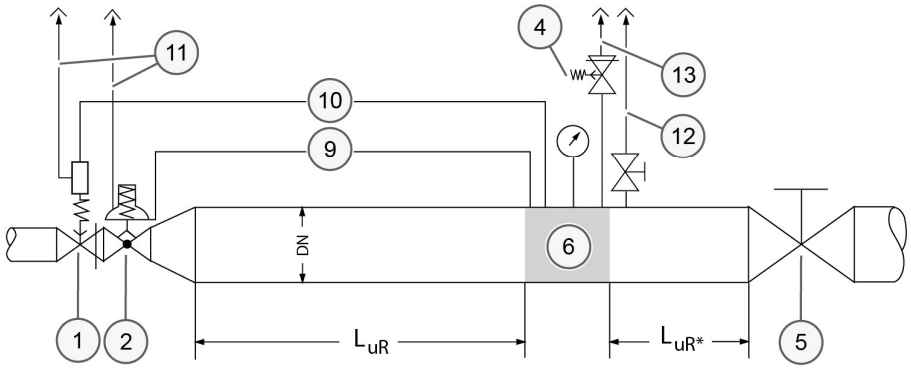
Contents

4.1 Installation examples

Gas pressure regulating line - example 1

Configuration:

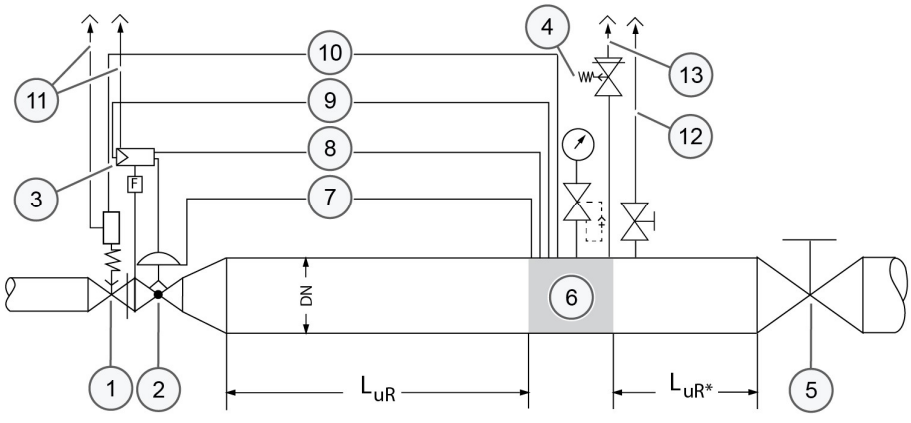
- Direct acting gas pressure regulator (non-piloted)
- With expander without noise reduction element downstream of the gas pressure regulator



Gas pressure regulating line - example 2

Configuration:

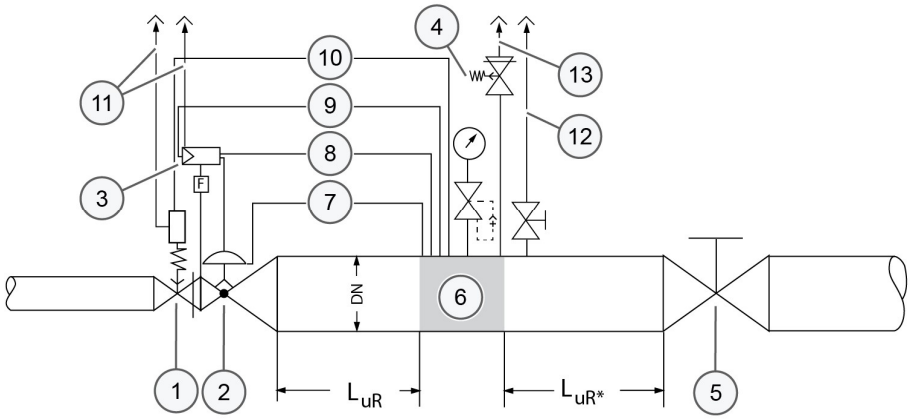
- Indirect acting gas pressure regulator (pilot-operated)
- With expander without noise reduction element downstream of the gas pressure regulator
- Outlet pressure gauge with protection against overpressure



Gas pressure regulating line - example 3

Configuration:

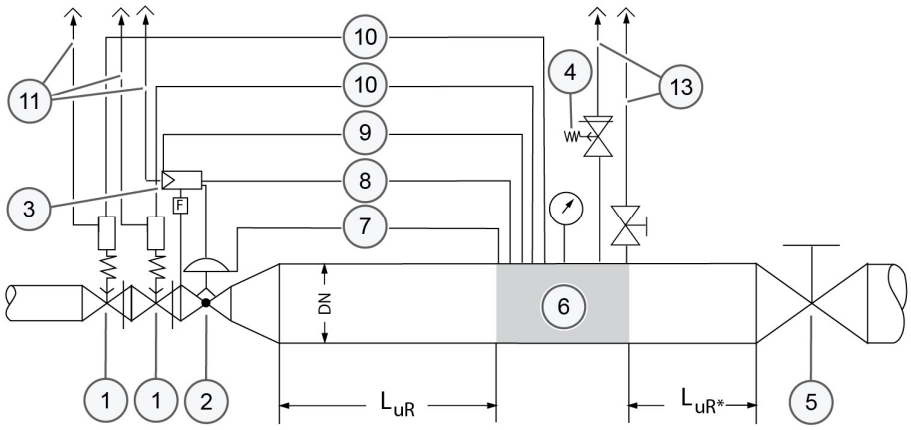
- Indirect acting gas pressure regulator (pilot-operated)
- With expander and integrated noise reduction element
- Outlet pressure gauge with protection against overpressure



Gas pressure regulating line - example 4

Configuration:

- Indirect acting gas pressure regulator (pilot-operated)
- Indirect acting slam-shut device (pilot-operated) (two)
- With expander without noise reduction element downstream of the gas pressure regulator



Legend

The numbers have the following meaning:

No.	Meaning
1	Safety Shut-Off Valve
2	Gas pressure regulator
3	Pilot
4	Safety relief valve
5	Outlet stop valve armature
6	Sensing point for connection lines (gray area)
7	Feedback line
8	Discharging line
9	Gas pressure regulator measuring line
10	Slam-shut device measuring line

No.	Meaning
11	Vent line
12	Relief line
13	Blowdown line

Following is the meaning of the acronyms:

Acr.	Meaning
DN	Nominal size of pipe
L_{uR}	Undisturbed length of pipe

* Shut-off device with undisturbed flow pattern (ball valve) can be incorporated

4.2 Meter run characteristics

Standards used as a basis

The following recommendations are based on the measuring line connection conditions set forth in standards (DIN) EN 334 and (DIN) EN 14382. The company operating the system is the sole party responsible for the meter run working properly.

Conditions for the meter run

- A pipe area with a steady flow pattern must be selected for the sensing point. There must not be any components that disturb the flow directly upstream and downstream of the sensing point, e.g., orifice plates, expanders, bends, junctions, shut-off devices, etc.
- The flow rate at the sensing point should not exceed approx. 25 m/s, depending on the system conditions.
- In the case of specific system circuits (such as gas regulating lines for gas engines) and in the case of gas burners, flow rates higher than 25 m/s may be allowed following consultation with the manufacturer.
- Within a low-pressure range of up to approx. 250 mbar, a maximum flow rate of approx. 15 to 20 m/s is recommended at the sensing point. On a case-by-case basis, and following consultation with the manufacturer, even lower flow rates may be allowed.

Upstream of the sensing point

Depending on the specific system design, the L_{uR} lengths of the undisturbed pipes upstream of the sensing point must be (2.5 to 5) x DN of the pipe, with the specifics depending on the gas pressure regulator model and whether there is a pipe expander downstream:

If ...	and...	then...
A gas pressure regulator with an expander that is part of the device is used	The nominal size of the pipe is equal to the outlet-side nominal size of the gas pressure regulator	L_{uR} min. 2.5 x DN
	The nominal size of the pipe is the next larger standard nominal size	L_{uR} min. 3 x DN
	The nominal size of the pipe is two standard nominal size increments larger	L_{uR} min. 4 x DN
	The nominal size of the pipe is more than two standard nominal size increments larger	L_{uR} min. 5 x DN
A gas pressure regulator with the same outlet nominal size as the inlet nominal size is used	The nominal size of the pipe is the next larger standard nominal size	L_{uR} min. 4 x DN
	The nominal size of the pipe is two standard nominal size increments larger	L_{uR} min. 5 x DN

Downstream of the sensing point

Depending on the specific system design, the L_{uR} lengths of the undisturbed pipes downstream of the sensing point must be (1.5 to 4) x DN of the pipe:

Undisturbed length of pipe	for
L_{uR} min. 1.5 x DN	Thermowells
L_{uR} min. 1.5 x DN	Reducers and expanders, depending on the specific system conditions
L_{uR} min. 3 x DN	Shut-off devices (gate valves, check valves, and reduced bore ball valves)
L_{uR} min. 4 x DN	Tees

Details

- Shut-off devices with an undisturbed flow pattern (such as full-bore ball valves) and, if applicable, pipe bends (depending on the design) are non-disturbing elements in terms of measuring line connections.
- For gas meters (turbine gas meters including quantometers, ultrasonic gas meters, and vortex flow meters, but NOT rotary piston gas meters), there are no restrictions in terms of measuring line configurations, as these meters are not considered to be flow-disturbing within this context.
- The following applies to rotary piston gas meters: Minimum distance between gas pressure regulator or reducer / expander and gas meter: **L_{uR} min. 3 x DN**.
- Measuring line connections downstream of gas meters must be at a distance of **L_{uR} min. 2 x DN**.
- If shut-off valves are used (reduced bore), the recommended distance downstream of a measuring line is **L_{uR} min. 3 x DN**.
- Gas meter pressure losses must be considered, based on system conditions if applicable.

4.3 Operating and measuring lines

Connection lines between device and gas regulating line

The lines must be arranged and sized in such a way that the devices' intended function will be ensured.

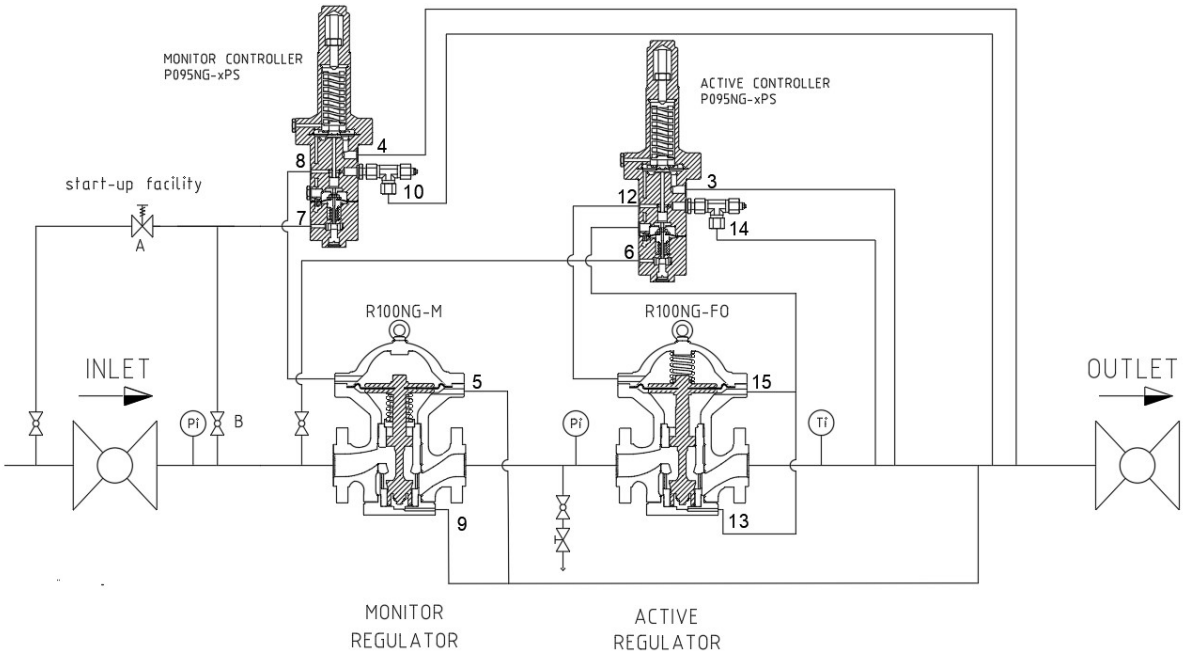
- **Measuring line**
  - The measuring line transmits the pressure process value from the sensing point to the measuring diaphragm of a controller or the pilot of a gas pressure regulator or safety relief valve or to the measuring diaphragm of the monitoring device of a slam-shut device. It needs to be connected to the pipe sideways or upwards separately for each device. In the case of safety equipment, the measuring line must be connected upstream of the first outlet-side shut-off device in such a way that it cannot be shut off. If the measuring line is additionally connected downstream of the first outlet-side shut-off device, 3-way ball valves with negative overlap must be used for switching. These ball valves do not have a valve position in which both measuring lines can be fully closed at the same time.
- **Vent line**
  - The vent line is used to connect a measuring diaphragm to the atmosphere. If the measuring unit becomes damaged (e.g., diaphragm rupture), it can start conveying gas. Under certain operating conditions, and following consultation with the manufacturer, vent lines can be omitted if vent valves (HON 915) or safety diaphragm configurations can be used instead.
- **Blowdown line**
  - The blowdown line in a safety relief valve is used to divert gas (leaking gas, for example) into the atmosphere.

Grouping vent lines or blowdown lines (into a header) is permissible if it does not have a negative impact on the individual devices' operation. Within this context, it is recommended to have the cross-sectional area of the header be at least five times as large as the total of the individual lines' cross-sectional areas.

For primary slam-shut devices, it is recommended to route the slam-shut devices' vent lines separately. Vent lines must not be grouped together with blowdown lines.

- **Discharging line**
  - When using indirect acting (pilot-operated) slam-shut devices, the discharging line is used to divert the exhaust gas from the pilot into the system's outlet chamber. On certain devices, the discharging line will be grouped with the feedback line.
- **Feedback line**
  - When using indirect acting (pilot-operated) slam-shut devices, the feedback line is used to return the outlet pressure to the actuator.

4.4 Alternative application example: Active monitor regulator



The numbers have the following meaning:

No.	Meaning
1	HON R100NG regulator with HON P095NG pilot (monitor regulator unit)
2	HON R100NG-FO regulator with HON P095NG pilot (active regulator unit)
3	Outlet pressure measuring line
4	Outlet pressure measuring line
5	Outlet pressure feedback
6	Pilot inlet pressure (active regulator unit)
7	Pilot inlet pressure (monitor regulator unit)
8	Gas pressure regulator (1) motorization pressure
9	Outlet pressure
10	Outlet pressure discharging
11	3-way ball valve
12	Gas pressure regulator (2) motorization pressure
13	Loading pressure
14	Outlet pressure discharging
15	Loading pressure

Note

*The recommendation is to connect all tubing separate from each other to the main line.

	*If there are limited tubing connections available, the following lines can be combined. The operator is to assess the functionality and take responsibility. - line 5 and line 9
How it works	A standard fail-close regulator is first installed in the pipe run in the direction of flow. The device is then connected to the HON P095NG pilot, which in turn is also connected to the regulating line's inlet and outlet pressures. Together, the regulator and the pilot make up the monitor regulator unit. Downstream of this setup, a fail-open regulator is installed with a HON P095NG pilot as well. Together with the HON P095NG pilot, this second regulator makes up the active regulator unit. The outlet pressure is monitored by the upstream monitor regulator unit in addition to the active regulator unit. The set point on the monitor regulator unit is set to a value higher than the set point for the active regulator unit, which ensures that the monitor regulator unit will normally be fully open. In the event of malfunction, the active regulator unit opens according to the fail-open principle. As soon as the set target value of the monitor regulator unit has been reached, it starts regulating the outlet pressure.

5 Transport, installation and start-up

Contents

5.1 Transporting the gas pressure regulator

Heavy transport units

⚠WARNING

Risk of serious injury posed by heavy loads when using cranes for transportation

Transporting heavy devices or components with a crane may result in serious impact and crush injuries if the loads start moving in an uncontrolled manner.

- ⇨ Loads may only be transported with a crane by a duly qualified person.
- ⇨ Markings and information about the center of gravity of the load (if applicable) must be observed.
- ⇨ Loads may only be moved under supervision.

Suspended loads

⚠WARNING

Risk of serious injury if load handling attachments break while holding a suspended load

Heavy loads picked up or transported with hoisting and slinging gear may result in serious impact and crush injuries if the load handling attachments fail.

- ⇨ Only fasten the device at the positions intended for the transport.
- ⇨ The load-bearing capacity of the appropriate hoisting equipment must correspond at least to the weight of the load to be transported.
- ⇨ Always stand clear of suspended loads.
- ⇨ Ensure that no person is within the danger zone.

Selecting the hoisting equipment and slings

A mobile workshop crane is suitable for use as hoisting equipment. A pallet jack or forklift is also suitable for onsite transportation.

The following are adequate for use as slings:

- Ropes
- Belts
- Chains

The hoisting equipment and slings must meet the following criteria:

- The load capacity must be sufficient for the gas pressure regulator's weight.
- The hoisting height is adequate for the mounting position at the installation site.

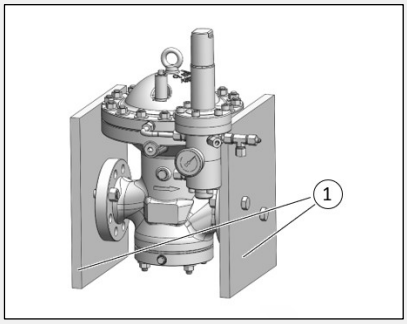
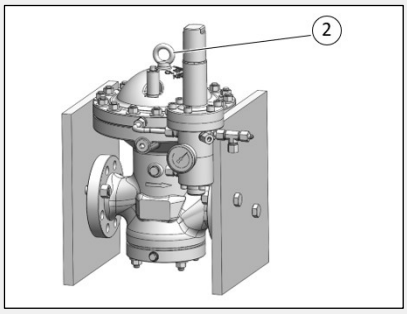
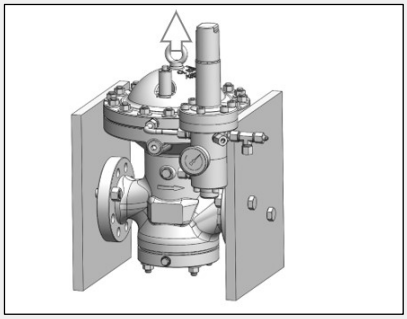
Preparing for transportation

Make sure that the following requirements are met before transportation:

- You have seen and considered all instructions on the packaging regarding the orientation of the packed device, the center of gravity, and attachment points.
- The transport route is clear of obstacles and other barriers, and there is enough space available for the dimensions of the packed device and the handling equipment. Make sure to measure all the package's dimensions!
- The transport route will be able to handle the load exerted by the total weight of the handling equipment and the load being transported.
- There is enough space for unpacking and installing the device at the installation location.

Transporting the device

Proceed as follows:

Figure	Step	Description
	**1**	Leave the transport panels (1) on the gas pressure regulator during transport.
	**2**	Rig the sling to the eye bolt (2).
	**3**	Lift the gas pressure regulator. Slowly and carefully transport the gas pressure regulator to the location where it will be installed.

5.2 Installing the gas pressure regulator

Preparing the materials

Prepare the following materials:

- Flange gaskets
- Threaded bolts
- Washers
- Nuts

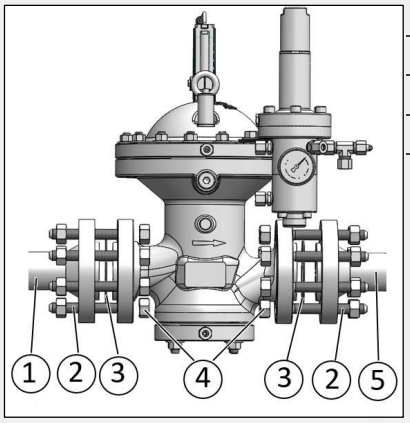
The quantity and size are dependent on the following criteria:

- Design and size of the flange

Assessing the situation

Assess the installation situation.

The numbers have the following meaning:

Figure	No.	Meaning
	1	Gas regulating line inlet
	2	Studs and washers
	3	Flange gasket
	4	Nuts and washers
	5	Gas regulating line outlet

Mounting the regulator

Proceed as follows:

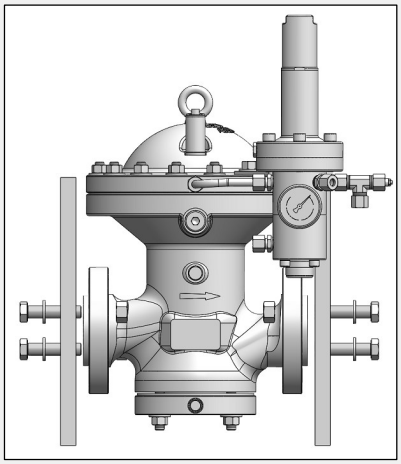
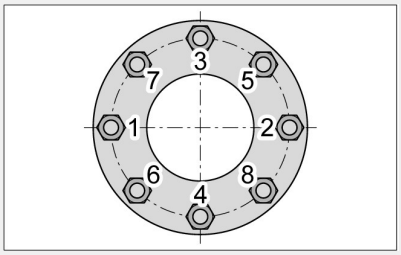
Figure	Step	Description
	1	Remove the protective plates from the flange.
	2	Transport the device to the location where it will be installed. ▪ The device needs to be installed in the piping in a horizontal and level position. If you want to use a different installation position, consult with the manufacturer first. ▪ Pay attention to the direction of flow for the gaseous fluid as marked on the body.
	3	Secure and support the device's position in such a way that the device can be installed in the piping without any stress and that the piping's weight will be supported as well.
	4	Install the flange gaskets.

Figure	Step	Description
	**5**	Screw down the flange crosswise in the specified order. When doing so, make sure to observe the torques specified by the flange gaskets' manufacturer.

Final inspection

Conduct a final inspection to check whether the following criteria are met:

- All screwed connections on the device and supply lines are securely fastened.

If ...	then ...
at least one criterion is not met,	you should correct the error before proceeding with the next task.
all criteria are met,	you may proceed with the next task.

Next task

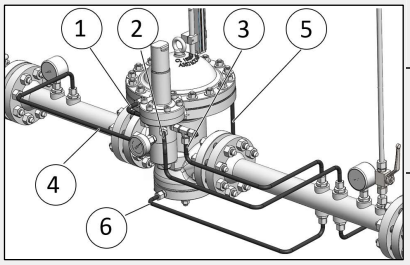
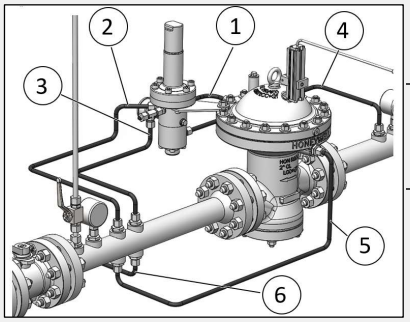
Proceed as follows:

Installing the device connections (see page 36)

5.3 Installing the device connections

Operating and measuring lines that are pre-installed and that need to be installed

Some of the measuring impulse lines will come pre-installed:

Figure	No.	Designation, category, installation condition
Front: 	**1**	Motorization line Operating line pre-installed
	2	Outlet pressure measuring line Operating line needs to be installed
	3	Outlet pressure discharging line Operating line needs to be installed
Back: 	**4**	Inlet pressure line Operating line needs to be installed
	5	Outlet pressure feedback line Operating line needs to be installed
	6	Outlet pressure line Operating line needs to be installed

Preparing the materials

Prepare the following materials:

- Pipes, connecting pieces, and fittings as per the specifications in the *Technical specifications* (see page 18)

- Shut-off devices for the operating and measuring lines, as well as other accessories, as required, as per the *Basics for installing the device in a pipe* (see page 26) section.

Installing the operating and measuring lines

The installation of the operating and measuring lines depends on the local conditions and the gas regulating line in which the gas pressure regulator is being used. Please refer to the *Basics for installing the device in a pipe* (see page 26) section for more information on what needs to be ensured in the corresponding design and implementation.

The minimum distance for impulse to the regulator needs to be taken in to account.

Final inspection

Conduct a final inspection to check whether the following criteria are met:

- All screwed connections on the device and supply lines are securely fastened.

If …	then …
at least one criterion is not met	you should correct the error before proceeding with the next task.
all criteria are met	you may proceed with the next task.

Next task

Proceed as follows:

Checking the system for leaks (see page 38)

5.4 Checking the system for leaks

Leak test conducted by the manufacturer

Prior to delivery, the manufacturer conducted a pressure and leak test on the gas pressure regulator as specified in DIN EN 334.

Leak test at the set-up location (in Germany)

The gas pressure regulator installed in the system must be subjected to a leak test at the setup location as follows:

Normative basis	DVGW Code of Practice G 491
Test method	Leak test method
Test medium	Air or inert gas
Scope of the test	All detachable pipe joints
Test equipment	Foam-generating leakage medium
Test pressure	1.1 times the operating pressure (MOP)

Leak test at the set-up location (in other countries)

The device installed into the system must undergo a leak test at the set-up location in accordance with applicable international and national standards.

Pressurized parts

⚠WARNING

Risk of serious injury posed by pressurized components moving in an uncontrolled manner when handled improperly.

If not handled properly or in the event of a defect, gas can escape from pressurized components under high pressure and cause serious injuries and even death. Before you start working on these components:

⇨ Close all connections leading to the gas-carrying line.

⇨ Establish a depressurized status. Residual amounts of energy must be depressurized as well.

Pressurized parts

⚠WARNING

Risk of injury posed by bursting parts in the event that they are subjected to pressure in the wrong direction

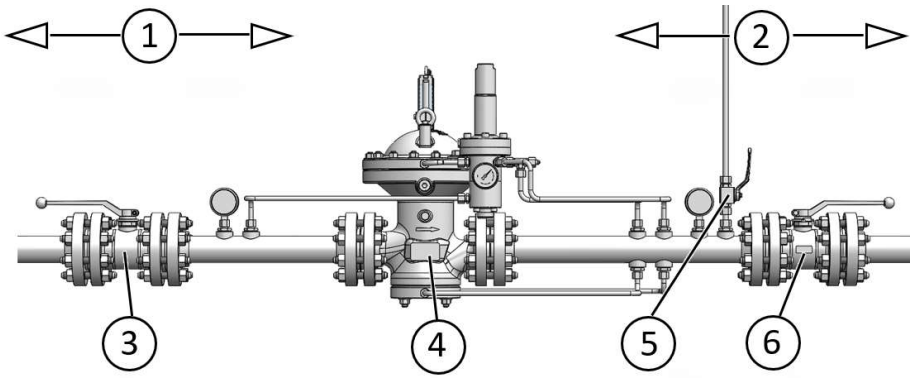
The device has been designed for a specific direction of flow, which is labeled on the device. Subjecting the device to pressure in the wrong direction may result in serious injury caused by bursting parts.

⇨ Pressurize the system only on the inlet side.

Details about the operating pressure can be found in the *technical specifications* (see page 18).

Test configuration

The test configuration is as follows (concept sketch):



The numbers have the following meaning:

No.	Meaning
1	Inlet chamber
2	Outlet chamber
3	Inlet stop valve armature
4	Gas pressure regulator
5	Blowdown line shut-off device
6	Outlet stop valve armature

Checking the system for leaks

Proceed as follows:

Step	Description
1	Slowly close the outlet stop valve armature.
2	Apply the test medium to all detachable pipe joints.
3	Observe the test medium on all detachable pipe joints for several minutes.

If ...	then ...
no foam or bubbles are formed,	▪ the system is leak-proof. ▪ the system may be put into operation.
Foam or bubbles are formed,	▪ the affected pipe joint is leaking. ▪ the system may **not** be put into operation. ▪ Proceed with step 4.

Step	Description
4	Slowly close the inlet stop valve armature.
5	Depressurize the inlet chamber and the outlet chamber.
6	Seal the leaking pipe joints.
7	Repeat the leak test starting with step 1.

5.5 Starting up the gas pressure regulator

Pressurized parts

⚠WARNING

Risk of injury posed by bursting parts in the event that they are subjected to pressure in the wrong direction

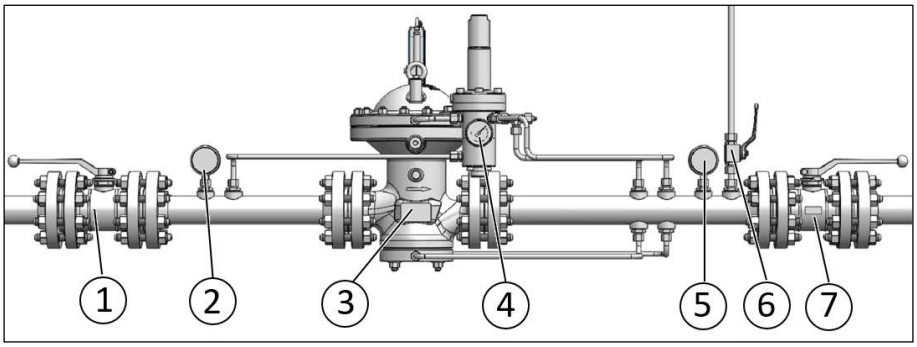
The device has been designed for a specific direction of flow, which is labeled on the device. Subjecting the device to pressure in the wrong direction may result in serious injury caused by bursting parts.

⇨ Pressurize the system only on the inlet side.

Basic pointers

After being in a depressurized state, the adjustment process for the gas pressure regulator will be relatively sluggish (slow). During commissioning, always make sure to wait between the individual steps until the desired state is reached.

Gas regulating line components



The numbers have the following meaning:

No.	Meaning
1	Inlet stop valve armature (isolation or block valve)
2	Inlet pressure gauge (upstream)
3	Gas pressure regulator
4	Auxiliary pressure gauge on pilot
5	Outlet pressure gauge (downstream)
6	Purge line , blow down line or relief line
7	Outlet stop valve armature (isolation or block valve)

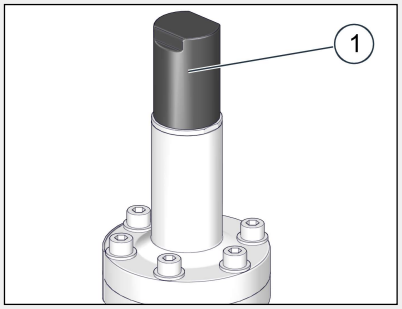
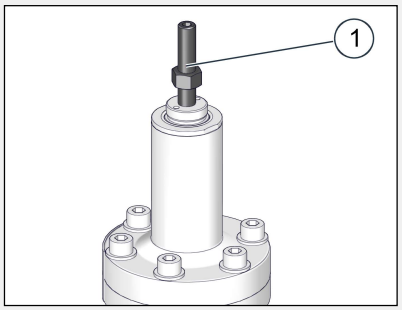
Requirements

Make sure that the following requirements are met:

- The system has been checked, is fully functional, and has no leaks.
- The inlet and outlet shut-off devices for the gas regulating line section are closed.
- The shut-off devices (ball valve 6)for the blowdown lines are closed.
  The inlet pressure is present upstream of the inlet shut-off device. Details about the operating pressure can be found in the *technical specifications* (see page 18).
- The system is depressurized between the inlet shut-off device and the outlet shut-off device.

Loosening the set screw on the pilot

Loosen the set screw on the pilot as follows:

Figure	Step	Description
	**1**	Unscrew the cap (1).
	**2**	Check whether the set screw (1), including the hex nut, has been loosened. If it has not, loosen it.

Adjusting the gas pressure regulator

Proceed as follows:

Step	Description
1	Open the inlet shut-off device. (1)
2	Slowly turn the pilot's set screw counterclockwise to screw it in until the outlet pressure **almost** matches the set point.
3	Open the blowdown line's shut-off device.
4	Slowly screw in the pilot's set screw further until the outlet pressure matches the set point **exactly**.
5	Now secure the set screw's position by tightening the hex nut. **Important!** Make sure that the set screw does not turn as you tighten the hex nut!
6	Screw the cap back on.
7	The regulating system has now been adjusted. Now slowly open the outlet shut-off device to put the system into operation.
8	Close the relief valve's shut-off device.

If problems occur during commissioning, please refer to the *Malfunctions* (see page 44) chapter for more information.

6 Adjusting the settings of the device

Contents

6.1 Setting the target pressure

Pressure set point adjustments

The following sections show how the gas pressure regulator's operating pressure can be adjusted with the pilot set screw after commissioning has been completed.

For adjustments during commissioning, please refer to *Starting up the gas pressure regulator* (see page 40).

Requirements

- The system is pressurized with the operating pressure.
- A pressure gauge is connected in front of the outlet valve.

Setting the target pressure

Proceed as follows:

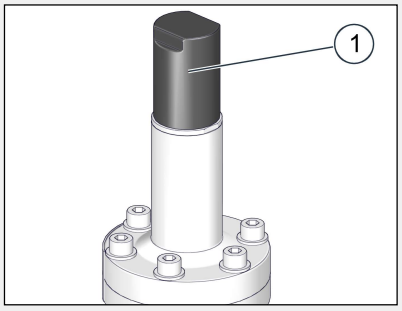
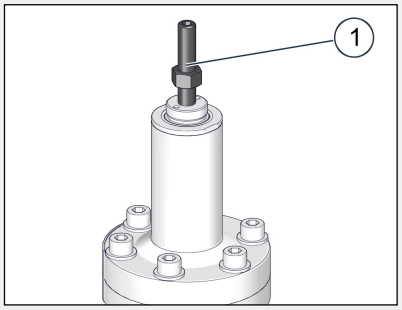
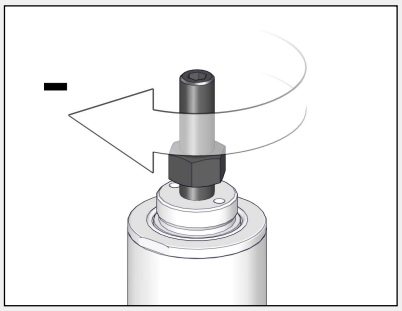
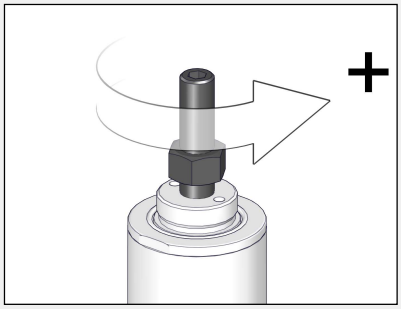
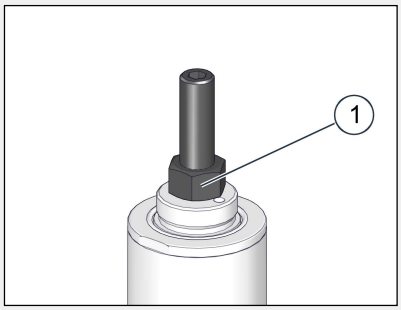
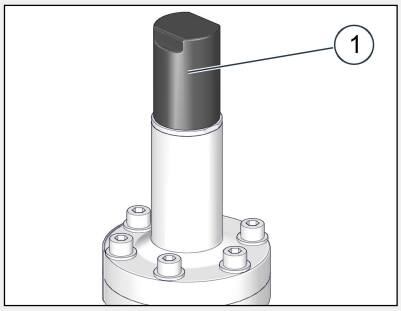
Figure	Step	Description
	**1**	Unscrew the cap (1).
	**2**	Loosen the lock nut of the set screw (1). **Important!** Make sure that the set screw does not turn as you loosen the nut!
	**3a**	To raise the operating pressure, screw the set screw in. Adjust the screw position until the operating pressure you want is reached.

Figure	Step	Description
	**3b**	To lower the operating pressure, unscrew the set screw. Adjust the screw position until the operating pressure you want is reached.
	**4**	Now secure the set screw's position by tightening the hex nut (1). **Important!** Make sure that the set screw does not turn as you tighten the hex nut!
	**5**	Screw the cap (1) back on.

7 Malfunctions

Contents

7.1 Malfunctions

Pressurized parts

⚠WARNING

If not handled properly, pressurized parts can move and cause serious injuries. If not handled properly or in the event of a defect, gas can escape from pressurized components under high pressure and cause serious injuries and even death. Before you start working on these components:

⇨ Close all connections leading to the gas-carrying line.

⇨ Establish a depressurized status. Residual amounts of energy must be depressurized as well.

Cases in which after-sales service is required

Always contact the manufacturer's After-Sales Service Department for troubleshooting if one of the following occurs:

- You are not sure what the exact fault is.
- The fault that occurred is not described in the table below.
- The possible cause behind the fault is not listed in the table below.
- Despite your troubleshooting attempts, the fault persists.

Malfunctions and abnormalities

The following table contains a description of malfunctions and abnormalities that may occur during the operation and lists procedures to correct them:

Malfunction	Possible causes	Correction
Outlet pressure too high	The setting for the active regulator's pilot is too high.	Unscrew the pilot's pilot spring a bit until the desired pressure is reached.
	The active regulator has failed and the monitor regulator is operating.	Determine what the problem with the active regulator is.
	Only in case of a very low ambient/operating temperature: The pilot heater has failed.	Restore the heating function.
Outlet pressure too low	The setting for the active regulator's pilot is too low.	Screw in the pilot's pilot spring a bit until the desired pressure is reached.
	The pressure difference between the inlet and outlet is too small.	Increase the upstream pressure if possible.
	The valve is open all the way. The system is unable to deliver enough pressure.	Heavy soiling in the relief chamber.
	There is no upstream pressure.	Check whether the safety shut-off valve or the monitor regulator has closed, as well as the reason for this.
	The loading pressure is too low.	Check the filter insert for soiling.
	Only in case of a very low ambient/operating temperature: The pilot heater has failed.	Restore the heating function.
The monitor regulator is active during normal operation.	The chosen pressure difference between the monitor regulator and the active regulator is too small.	Either screw in the monitor pilot's set screw a bit more or unscrew the regulator pilot's set screw a bit.
The safety valve responds before the monitor regulator intervenes.	The monitor pilot's set point is too high or is too close to the safety valve's set point.	Lower the monitor pilot's set point or raise the safety valve's set point.

Malfunction	Possible causes	Correction
The outlet pressure increases during zero flow.	A component is leaking.	Perform maintenance.
High-frequency fluctuations at the set pressure. Recognized as: Outlet pressure fluctuation < 0.2 sec.	If this fluctuation does not disappear as the discharge increases, the cause can be traced back to the interaction between the process and the regulator.	Check the regulator settings.
Low-frequency fluctuations at the set pressure. Recognized as: Outlet pressure fluctuation > 0.2 sec.	Interaction between the process and the regulator.	Solution 1: Check the regulator settings.
		Solution 2: If solution 1 does not fix the problem, you can try to replace the pilot spring with a stiffer one (so that you can set a higher outlet pressure).
	The maintenance intervals are too long.	Solution 3: Another possible reason for the fluctuations is increased friction between the regulating system's moving parts. This includes factors such as the dynamic seals aging and dirt accumulating in the guides, this can only be detected by performing maintenance on a regular basis. In certain cases, there will be an audible indication when guides are soiled or unable to move freely, i.e., in the form of noise.

8 Maintenance

Contents

8.1 Maintenance schedule

Meaning

The maintenance schedule provides an overview of the periodically required maintenance and repairs and refers to the appropriate instructions.

Note: The maintenance intervals specified below are recommendations only. Since the intervals for maintenance work depend heavily on the system's operating conditions and on the gas' properties, the maintenance intervals specified below may have to be adjusted as necessary.

Gas property specifications: *Technical specifications* (see page 18).

Maintenance schedule

Perform the following maintenance and repairs within the specified time intervals:

Task	See section	Interval			
		as needed	every 3 months	every year	every 4 years
Maintaining the regulator	*Maintaining the regulator* (see page 52)			●	
Maintaining the pilot	*Maintaining the pilot* (see page 64)			●	
Setting the target pressure	*Setting the target pressure* (see page 42)	●			

8.2 Preparing for the maintenance

Preparation work for maintenance

Proceed as follows:

Step	Description	Explanation
1	Have the maintenance and servicing parts ready	Please refer to *Additional information regarding spare parts* (see page 83) to find out which spare parts correspond your specific gas pressure regulator and have the corresponding maintenance parts and servicing parts ready to go before maintenance.
		▪ The spare parts that are always required for the regulator's maintenance are listed in the spare parts kits for the regulator. ▪ The spare parts that are always required for the pilot's maintenance are listed in the spare parts kits for the pilot. ▪ Spare part drawings and bills of materials are listed in the *appendix* (see page 83).
		In addition to these maintenance parts, there are also servicing parts that need to be checked during maintenance to make sure that they are in working condition. If parts are damaged or are not working properly or at all due to heavy soiling that cannot be removed, contact the manufacturer to clarify the situation before putting the device back into operation. After clarifying the situation, you can order the relevant servicing parts from the manufacturer.
2	Have the required lubricants and thread lockers ready	For specifications concerning the lubricants that must be used, please refer to *Lubricants and thread lockers* (see page 90).

Sample maintenance instructions

The maintenance instructions below are provided as examples for the various gas pressure regulator models and versions. Use the bills of materials to make sure that you replace all the maintenance parts relevant to your specific device model during maintenance.

8.3 Starting maintenance

Pressurized parts

⚠WARNING

Risk of serious injury posed by pressurized components moving in an uncontrolled manner when handled improperly.

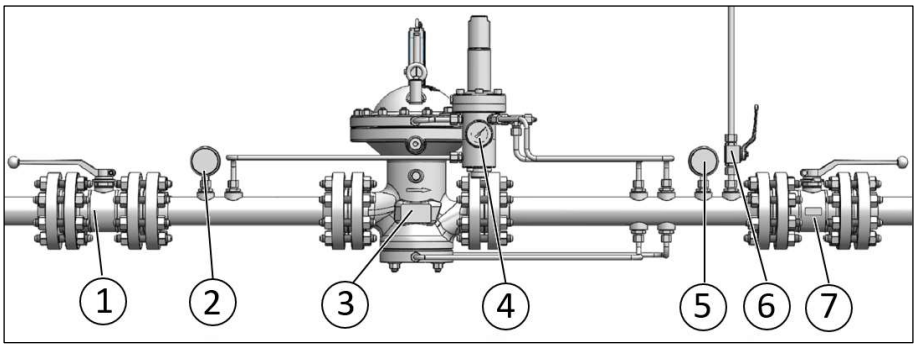
If not handled properly or in the event of a defect, gas can escape from pressurized components under high pressure and cause serious injuries and even death. Before you start working on these components:

⇨ Close all connections leading to the gas-carrying line.

⇨ Establish a depressurized status. Residual amounts of energy must be depressurized as well.

Overview

Schematic diagram:



The numbers have the following meaning:

No.	Meaning
1	Inlet stop valve armature
2	Inlet pressure gauge
3	Gas pressure regulator
4	Loading pressure gauge
5	Outlet pressure gauge
6	Blowdown line shut-off device (purge line ball valve)
7	Outlet stop valve armature

Establishing the depressurized status

Proceed as follows:

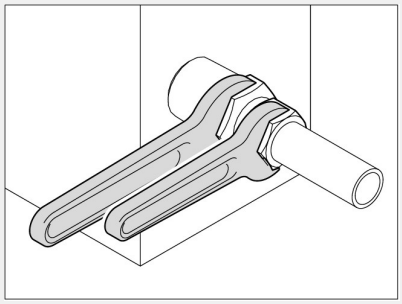
Step	Description
1	Close the inlet valve (1).
2	Close the outlet valve (7).
3	Depressurize the pilot. Turn the set screw on the pilot clockwise until the pressure in the regulator is equalized.
4	Open the blowdown line's (6) shut-off device to discharge the pressure between the inlet and the outlet.

Purging the lines with nitrogen

All the gas pressure regulator's lines must be purged with nitrogen before the device is removed.

Protecting the pipe connections from being twisted

When conducting work involving the pipework, please always observe the following:

Figure	Description
	Do not twist the pipe connections in the assemblies. Use a second spanner wrench for securing when loosening and tightening pipe joints.

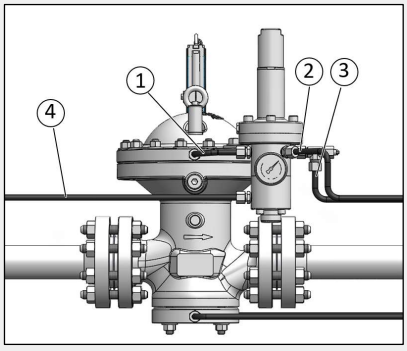
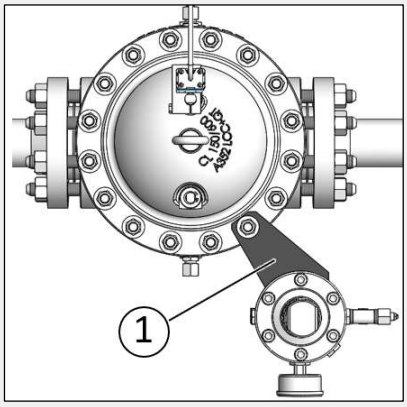
Removing components

If ...	then ...
You want to perform maintenance on the pilot only,	▪ The discharging line and the vent line on the pilot need to be uninstalled. ▪ The pilot needs to be removed from the regulator. ▪ The regulator, including the pipes, can remain in the gas regulating line.
You want to perform maintenance on the regulator only,	▪ The motorization line between the pilot and the regulator needs to be uninstalled. ▪ The pilot needs to be removed from the regulator. ▪ To determine whether the regulator can be left in the gas regulating line during maintenance, please refer to the following table.
You want to perform maintenance on both the regulator and the pilot,	▪ The discharging line and the vent line on the pilot need to be uninstalled. ▪ The motorization line between the pilot and the regulator needs to be uninstalled. ▪ The pilot needs to be removed from the regulator. ▪ To determine whether the regulator can be left in the regulating line during maintenance, please refer to the following table.

If ...	then ...
You are performing maintenance on a regulator with a nominal size of up to 3"	The regulator can remain in the line during maintenance.
You are performing maintenance on a regulator with a nominal size of 4" or more	The regulator must be removed from the line and disassembled for maintenance, as the individual components are heavy starting from this size.

Removing the pilot

Proceed as follows:

Figure	Step	Description
	**1**	Remove the pilot's motorization line (1), outlet pressure measuring line (2), outlet pressure discharging line (3), and inlet pressure line (4).
	**2**	Remove the connecting plate (1) between the pilot and the regulator.

Removing the regulator

Before you can remove the regulator, you must first remove the pilot.

Proceed as follows:

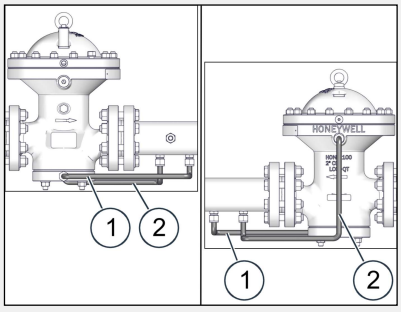
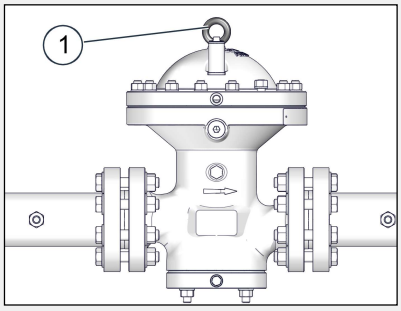
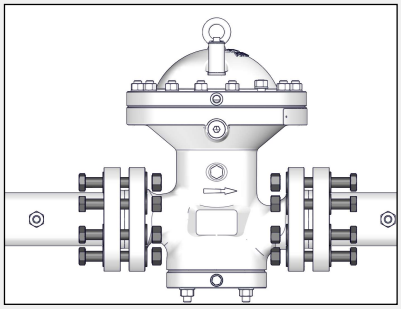
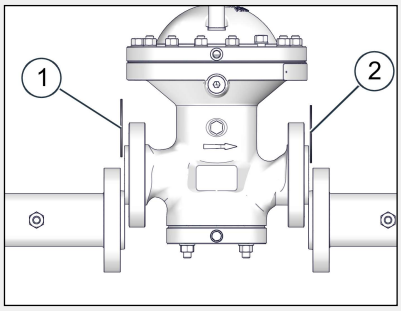
Figure	Step	Description
	**1**	Remove the regulator's outlet pressure line (1) and outlet pressure feedback line (2).
	**2**	If there is one, disconnect the electrical connection for the remote-control indicator.
	3	Stabilize the regulator in its installation position without using the fittings to do so.
	4	Rig the slings to the eye bolt (1).

Figure	Step	Description
	**5**	Unscrew the threaded joints on the connection flange. Make sure to follow a criss-cross sequence when doing so.
	**5**	Remove the regulator from the regulating line and remove the flange gaskets (1, 2).
	6	Slowly and carefully transport the regulator.

8.4 Maintaining the regulator

Contents

8.4.1 Maintaining the HON R100NG regulator

Falling components

⚠CAUTION

Crush and impact hazard posed by components falling or toppling over accidentally.

When working with heavy components that have been removed or are yet to be installed, injury may result if the components start moving in an uncontrolled manner, e.g., fall down from the working surface or topple over.

- ⇨ Place removed components exclusively on level, horizontal working surfaces with enough load-bearing capacity.
- ⇨ If necessary, secure removed components so that they will not fall or topple over.
- ⇨ Wear the required personal protective equipment.
- ⇨ Exercise caution when performing the relevant tasks.

Moving heavy weights

⚠WARNING

Risk of injury due to improper lifting

When lifting and handling device components, the weight of the components and assemblies can result in injury, especially in the torso area.

- ⇨ Make sure to always have enough people lifting heavy device components (guideline using metric units: 15 - max. 55 kg / guideline using imperial units: 30 - max. 120 lbs, depending on age and gender). Comply with all the occupational health and safety regulations and instructions that apply at the installation location!
- ⇨ Use suitable hoisting equipment and slings in order to handle heavy device components. Make sure to take into account the device components' center of gravity and to attach the slings only to the secure device component locations intended for this purpose.
- ⇨ Wear the required personal protective equipment.

Requirements

Make sure that the following requirements are met:

- The system is depressurized; see *Preparing for maintenance* (see page 46). **WARNING!** Mortal danger associated with pressurized components.

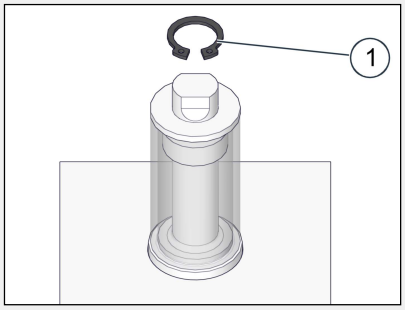
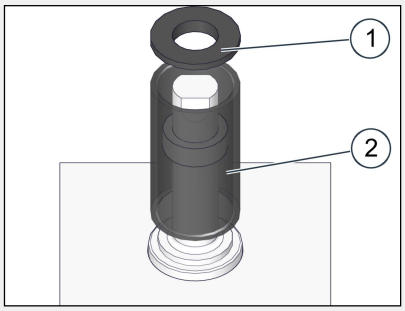
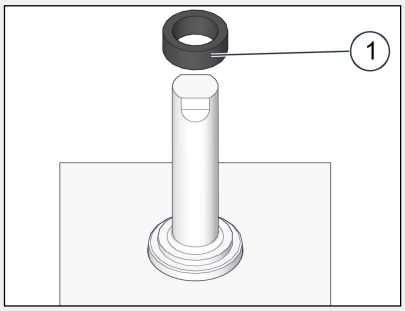
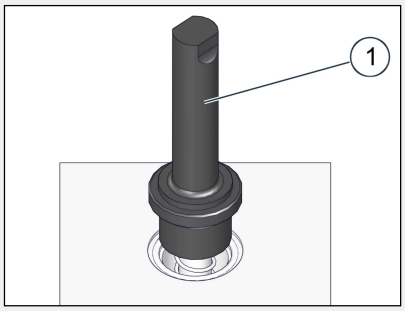
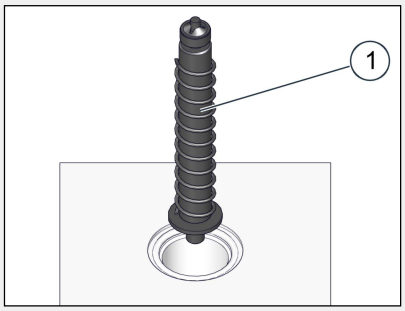
Cleaning

Observe the following cleaning instructions:

- Before assembly, all parts must be cleaned to remove any foreign particles (swarf) and soiling.
- If screws, bolts, or washers are replaced with identical new parts, any oil on these new parts must first be removed.

Removing the position indicator

Proceed as follows:

Figure	Step	Description
	**1**	Remove the visual position indicator's retaining ring (1).
	**2**	Remove the cover ring (1) and the sight glass (2).
	**3**	Remove the magnetic ring (1).
	**4**	Use an open-end wrench to unscrew the position indicator's housing (1).
	**5**	Remove the indicator pin, including the spring (1).

Thread locker

Observe the thread locker specifications below when following the instructions in this section:

Part	Thread locker	Step
Diaphragm	LOCTITE 243	33 and 34

Tightening torques

When screwing the regulator's lower and upper covers, make sure to observe the following tightening torques:

Nominal size	Step	Screw specifications	Sty	Tightening torque
1"	38	UNC 3/8 - 16 x 2 ½"	4	30 Nm (22 ft lbs)
	39	UNC 1/2 - 11 x 2 ½"	12	120 Nm (89 ft lbs)
2"	38	UNC 1/2 - 13 x 2 ¾"	4	80 Nm (59 ft lbs)
	39	UNC 1/2 - 13 x 2 ½"	16	120 Nm (89 ft lbs)
3"	38	UNC 5/8 - 11 x 3"	6	120 Nm (89 ft lbs)
	39	UNC 5/8 - 11 x 3 ¼"	16	230 Nm (170 ft lbs)
4"	38	UNC 3/4 - 10 x 4"	6	160 Nm (118 ft lbs)
	39	UNC 3/4 - 10 x 3 ¾"	16	400 Nm (295 ft lbs)
6"	38	UNC 3/4 - 10 x 4 ½"	8	160 Nm (118 ft lbs)
	39	UN 1 ⅛ - 8 x 5 ½"	16	1400 Nm (295 ft lbs)
8"	38	UNC 3/4 - 10 x 4 ½"	10	160 Nm (118 ft lbs)
	39	UN 1 ⅛ - 8 x 5 ½"	16	1400 Nm (295 ft lbs)

Maintaining the regulator

Proceed as follows:

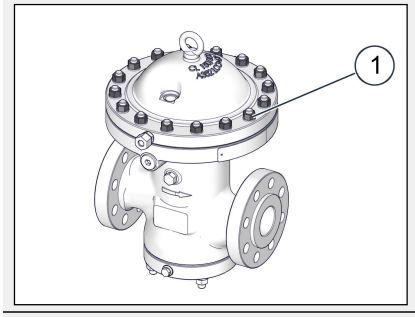
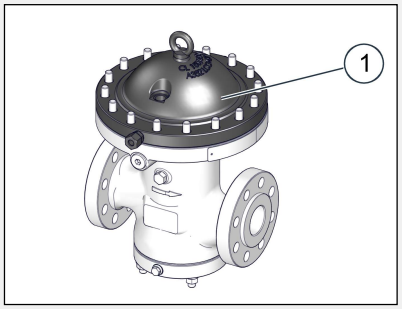
Figure	Step	Description
	**1**	Unscrew the dome's nuts (1). **Caution!** The lid is spring-loaded. Risk of injury due to bouncing up when the nuts are unscrewed. Hold the cover down when unscrewing the nuts.
	**2**	Remove the dome (1).

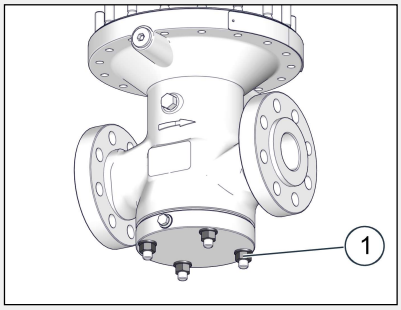
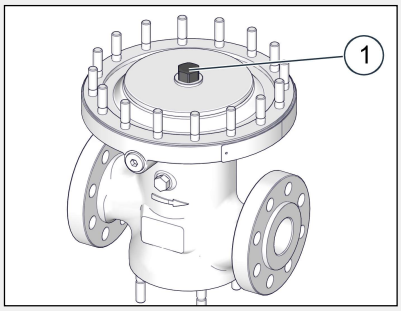
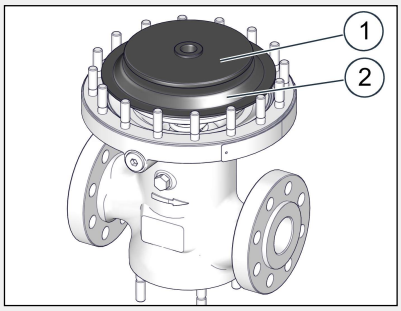
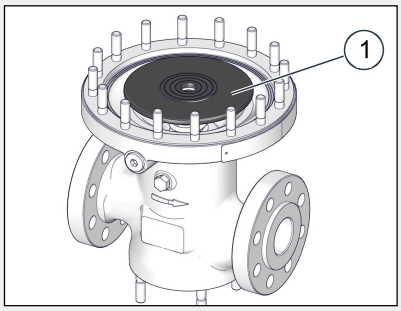
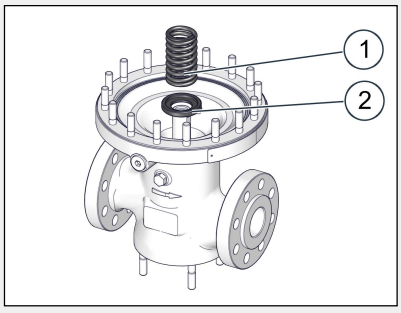
Figure	Step	Description
	**3**	Unscrew the bottom cover's nuts (1). Remove the cover. **Caution!** Parts from the inside may fall out.
	**4**	Unscrew the securing rode used to secure the diaphragm (1). While doing so, secure the valve shank from below.
	**5**	Remove the upper diaphragm plate (1) and the diaphragm (2).
	**6**	Remove the lower diaphragm plate (1).
	**7**	Remove the compression spring (1) and the spring plate (2).

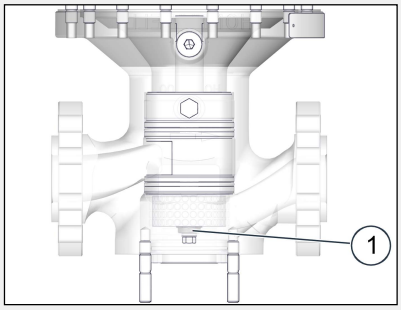
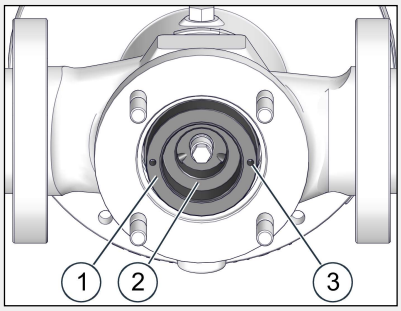
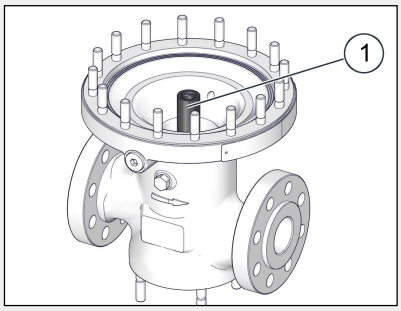
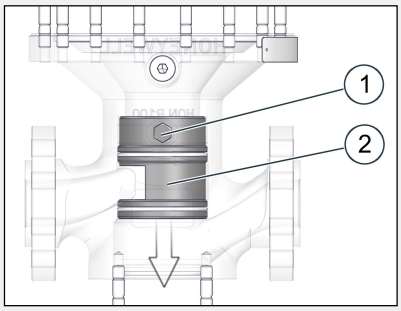
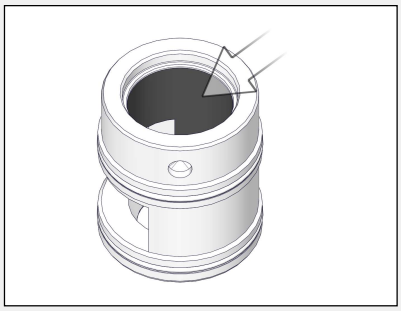
Figure	Step	Description
	**8**	Unscrew the valve plate's locknut (1) from below. While doing so, secure the valve shank from above.
	**9**	From below, remove the support cage (1) and the valve plate (2). To do so, use the holes in the support cage (3). **Important!** Both components feature sealing edges that must not be damaged!
	**10**	Pull out the valve shank, including the compensating plate, upward.
	**11**	Hold the guide bush (2) in place from below. Unscrew the hold screw (1). Remove the guide bush. Use a rubber mallet if necessary. **Important!** Make sure not to damage the guide bush – especially the sealing edges.
	**12**	Check the guide bush's sealing face for damage. The sealing face must not have any scratches or dents. If necessary, replace the guide bush with a new one.

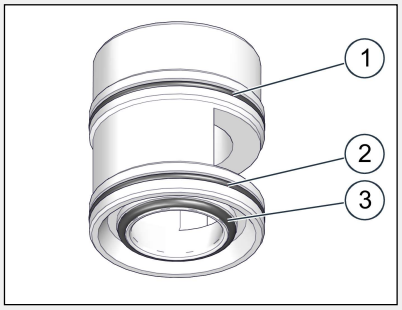
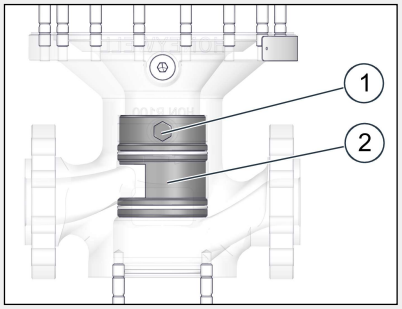
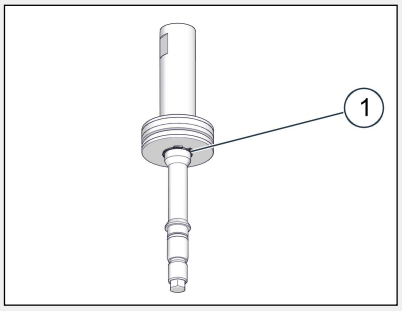
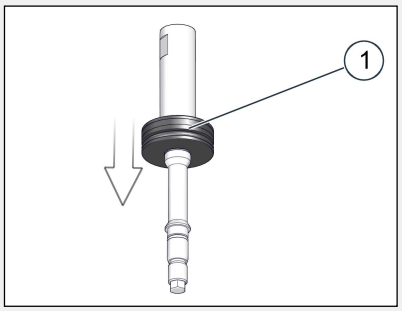
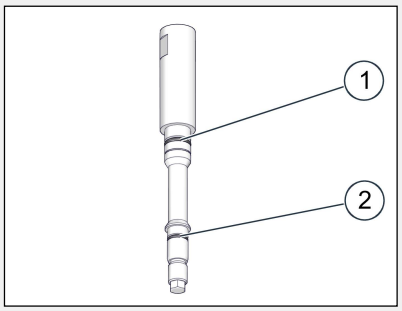
Figure	Step	Description
	**13**	Take the guide bush. Replace the O-rings (1, 2, 3) with new, lubricated O-rings.
	**14**	Insert the guide bush (2) back into the body. Make sure it is in its correct installation position. The opening on the side must point towards the gas inlet side. Make sure not to damage the O-rings when inserting the sliding bushing.
	15	Secure the guide bush (2) with the hold screw (1). The hold screw needs to be screwed in all the way without fail. If you are unable to screw the hold screw in all the way, correct the guide bush's position until you are able to screw the hold screw in all the way.
	**16**	Take the valve shank. Remove the retaining ring (1) below the compensating plate.
	**17**	Pull the compensating plate (1) down and off.
	**18**	Replace the O-rings (1, 2) on the valve shank with new, lubricated O-rings.

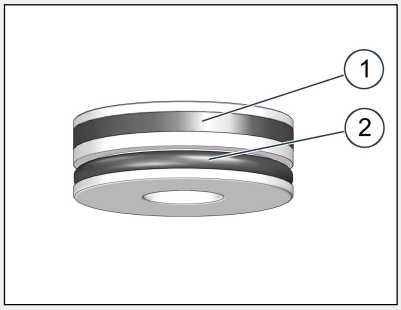
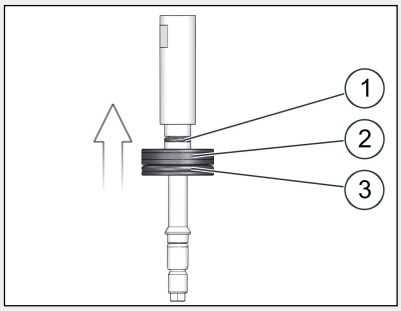
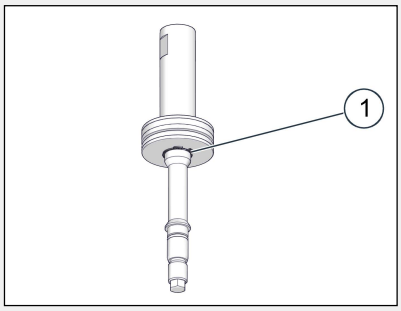
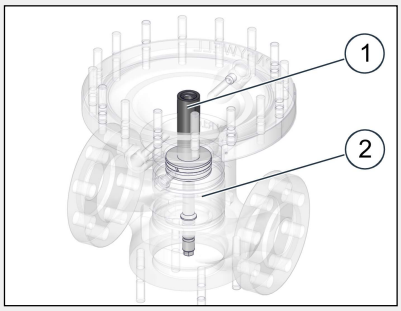
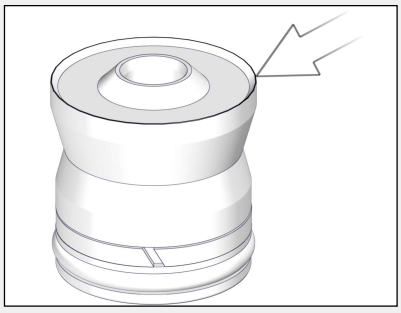
Figure	Step	Description
	**19**	Take the compensating plate. Replace the O-ring (2) with a new, greased O-ring. Check the sliding ring (1) for damage. Replace it if necessary.
	**20**	Slide the compensating plate onto the valve shank all the way to the stop. **Important!** Make sure not to damage the O-ring (1) or change its position. Make sure that the compensating plate is positioned correctly. The sliding ring (2) should be on top and the O-ring (3) underneath it.
	**21**	Secure the compensating plate with a new retaining ring (1).
	**22**	Insert the valve shank (1) back into the regulator from above. The compensating plate should sit tightly inside the upper part of the guide bush (2).
	**23**	Take the valve plate. Check the sealing edge for damage. The sealing edge must not have any scratches or dents. If necessary, replace the valve plate with a new one.

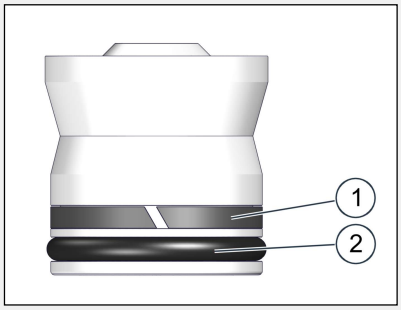
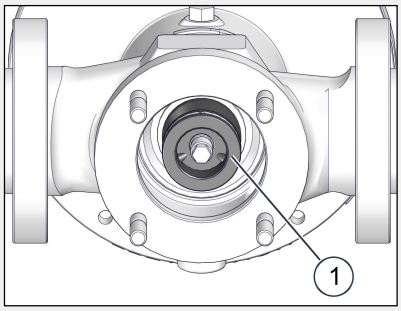
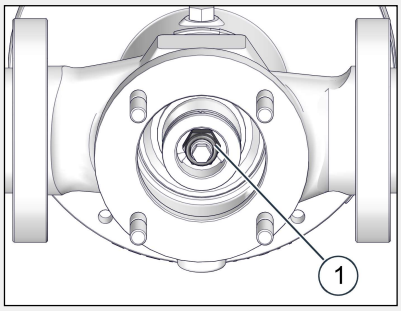
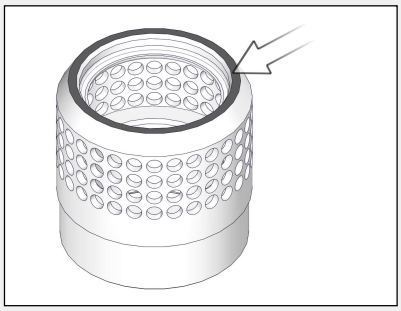
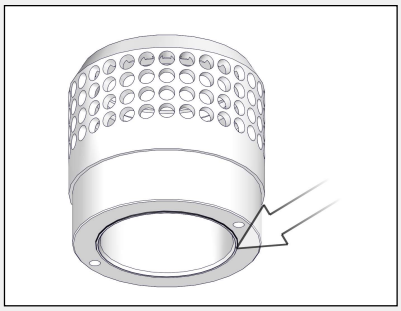
Figure	Step	Description
	**24**	Check the sliding ring (1) for damage. Replace it with a new one if necessary. Replace the O-ring (2) with a new one.
	**25**	Slide the valve plate (1) onto the valve shank all the way to the stop. **Important!** Make sure not to damage the O-ring on the valve shank or change its position.
	**26**	Screw the locknut (1) all the way onto the valve shank. While doing so, secure the valve shank from above.
	**27**	Take the support cage. Check the support cage for damage. The upper sealing edge must not have any scratches or dents. If necessary, replace the support cage with a new one.
	**28**	Check the lower sealing lip for damage. The lower sealing lip must not have any scratches or dents. If necessary, replace the support cage with a new one.

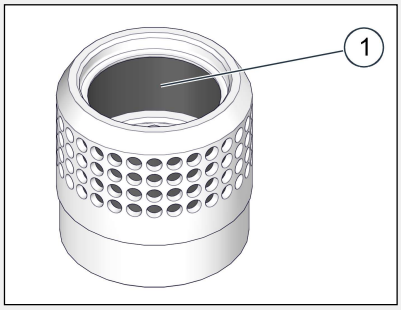
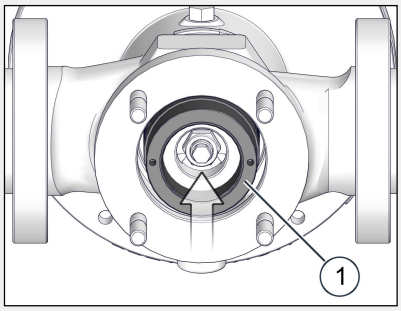
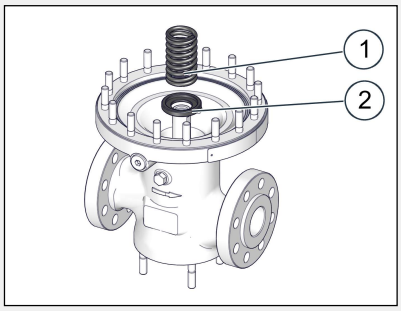
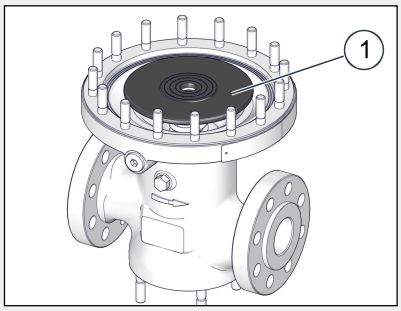
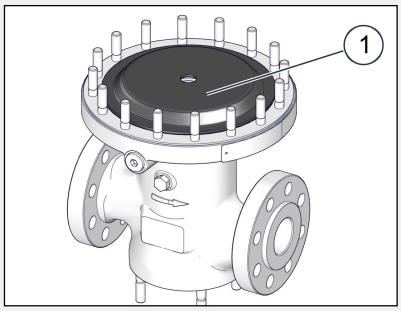
Figure	Step	Description
	**29**	Check the metal foam insert (1) on the inside for damage and soiling. Replace it with a new one if necessary.
	**30**	Insert the support cage (1), including the metal foam insert, back into the body from below.
	**31**	Insert the spring plate (2) back into the guide bush from above, making sure that the plate opens upwards. Insert the compression spring (1).
	**32**	Insert the lower diaphragm plate (1).
	**33**	Insert a new diaphragm. Glue the surfaces to the diaphragm plate and to the body's contact surfaces. Make sure that the bulge points upwards.

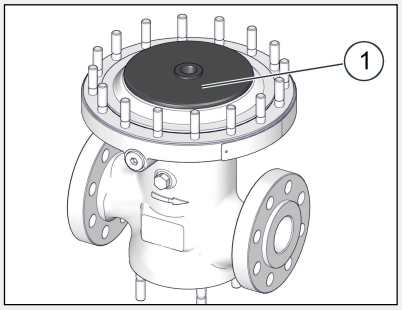
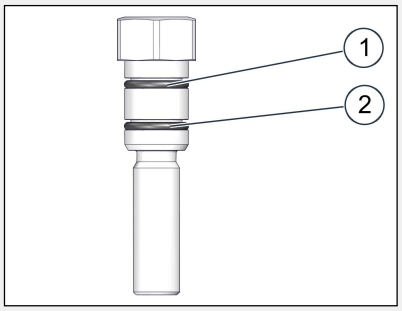
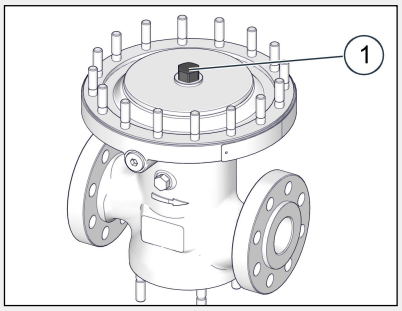
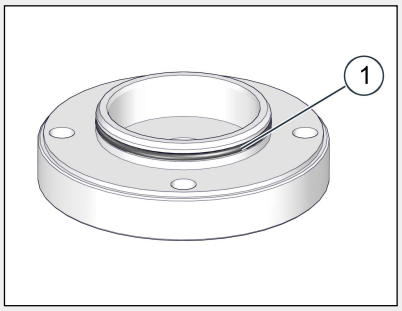
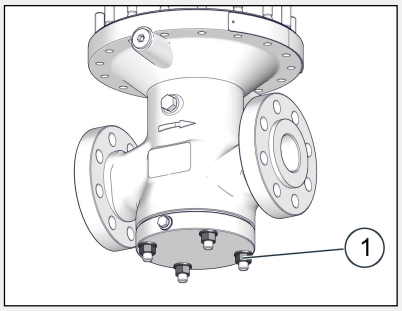
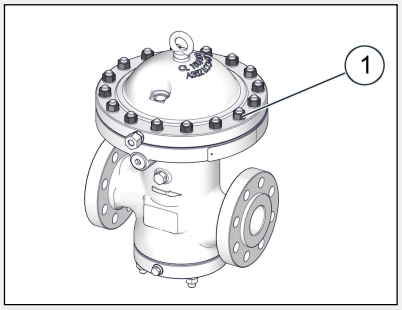
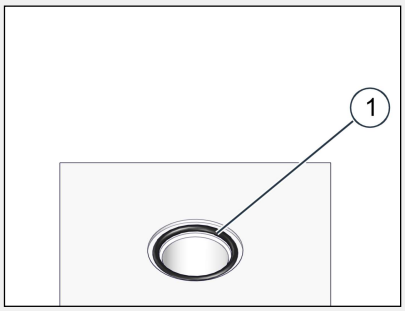
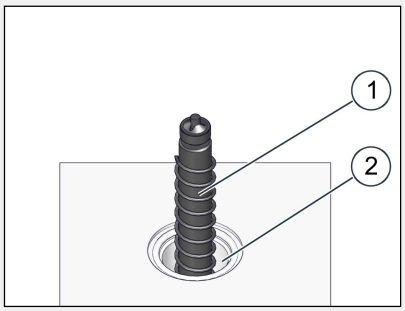
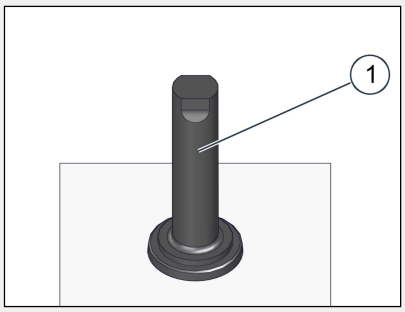
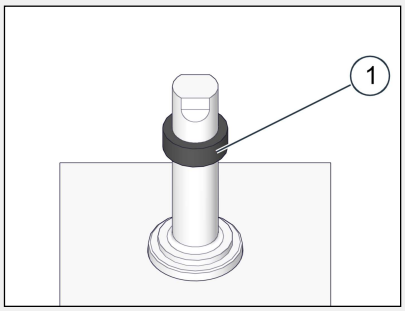
Figure	Step	Description
	**34**	Insert the upper diaphragm plate (1) and glue the diaphragm in place there as well.
	**35**	Take the securing rode used to secure the diaphragm. Replace the O-rings (1, 2) with new, lubricated O-rings.
	**36**	Secure the diaphragm unit by screwing in the securing rode used to secure the diaphragm (1) all the way into the valve shank. While doing so, secure the valve shank from below.
	**37**	Take the bottom cover. Replace the O-ring (1) with a new, greased O-ring. Skip this step for devices with a nominal diameter of 1".
	**38**	Put the bottom cover back in place. Tighten the nuts (1) in a crisscross sequence. Observe the tightening torque information provided in the table before this section.

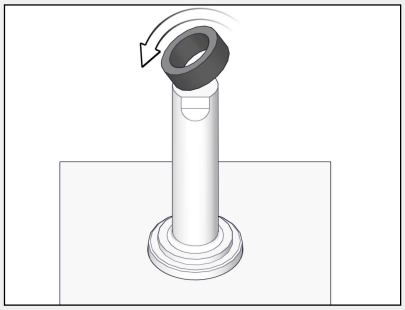
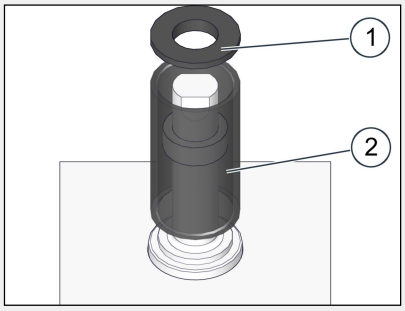
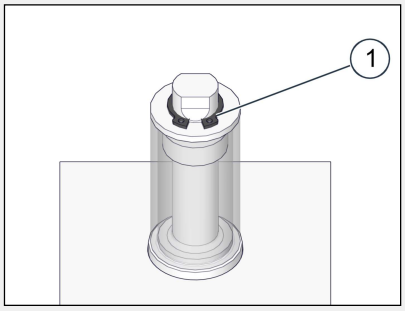
Figure	Step	Description
	**39**	Put the dome back in place. Tighten the nuts (1) in a crisscross sequence. Observe the tightening torque information provided in the table before this section.

Maintaining and installing the position indicator

Proceed as follows:

Figure	Step	Description
	**1**	Replace the O-ring (1) in the body hole intended for the position indicator with a new, greased O-ring.
	**2**	Insert the inner pin, including the spring (1), back into the hole (2) for the position indicator.
	**3**	Use an open-end wrench to screw the position indicator's housing (1) back in place.
	**4**	Pull the magnetic ring (1) over the position indicator's housing. The magnetic ring position shown in the figure to the left shows the correct installation height.

If …	then …
The magnetic ring is resting over the position indicator's housing in the position shown in step 4	proceed with step 6.
The magnetic ring is NOT resting over the position indicator's housing in the position shown in step 4, but is instead in a higher or lower position	proceed with step 5.

Figure	Step	Description
	**5**	Remove the magnetic ring from the position indicator's housing, turn it 180°, and place it back over the housing.
	**6**	Place the sight glass (2) and the cover ring (1) back on the position indicator's housing. Make sure that the magnetic ring stays in the required position.
	**7**	Install the retaining ring (1).

Next task

Depending on what you will be doing next, proceed as indicated in the relevant section:

- *Completing the maintenance* (see page 78)
- *Maintaining the pilot* (see page 64)
- *Storing the device* (see page 80)

8.5 Maintaining the pilot

Contents

8.5.1 Maintaining the HON P095NG-HP pilot

Falling components

⚠CAUTION

Crush and impact hazard posed by components falling or toppling over accidentally.

When working with heavy components that have been removed or are yet to be installed, injury may result if the components start moving in an uncontrolled manner, e.g., fall from the working surface or topple over.

- ⇨ Place removed components exclusively on level, horizontal working surfaces with enough load-bearing capacity.
- ⇨ If necessary, secure removed components so that they will not fall or topple over.
- ⇨ Wear the required personal protective equipment.
- ⇨ Exercise caution when performing the relevant tasks.

Cleaning

Observe the following cleaning instructions:

- Before assembly, all parts must be cleaned in order to remove any foreign particles (swarf) and soiling.
- If screws, bolts, or washers are replaced with identical new parts, any oil on these new parts must first be removed.

Tightening torques

Observe the tightening torques below when following the instructions in this section:

Part	Tightening torque	Step
Screws	47 Nm	42

Maintaining the HON P095NG-HP pilot

Proceed as follows:

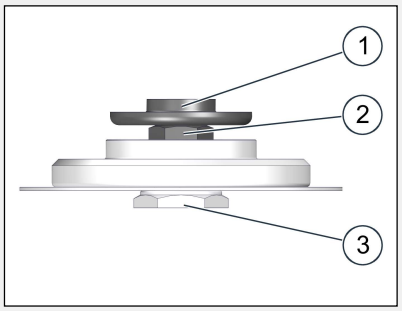
Figure	Step	Description
	1-33	As indicated in Maintaining the HON P095NG-HP pilot.
	**34**	Take the diaphragm unit for the second pressure stage. Unscrew the upper diaphragm plate (1) and the hex nut (2) from the pin (3).

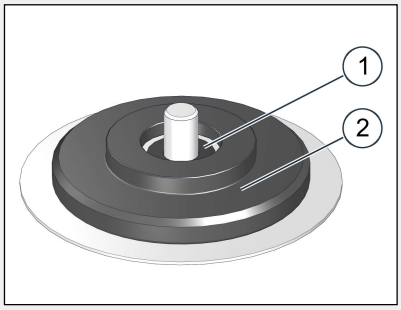
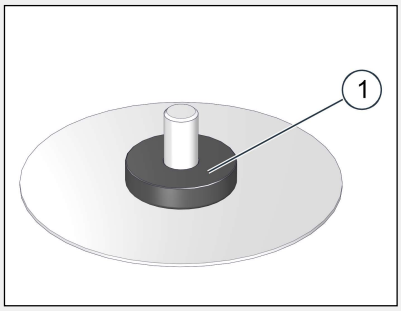
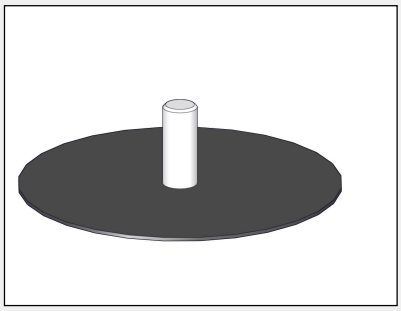
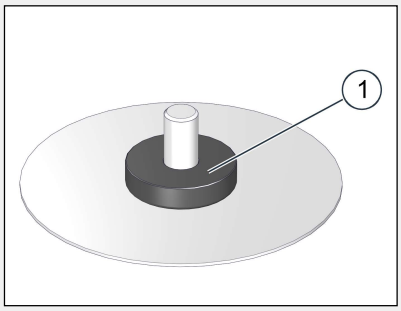
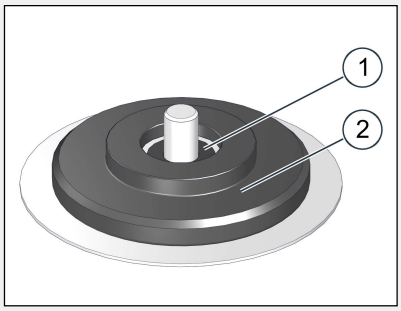
Figure	Step	Description
	**35**	Remove the washer (1) and the reduction ring (2).
	**36**	Remove the lower diaphragm plate (1).
	**37**	Replace the diaphragm with a new one.
	**38**	Put the lower diaphragm plate (1) back in place.
	**39**	Put the washer (1) and the reduction ring (2) back in place.

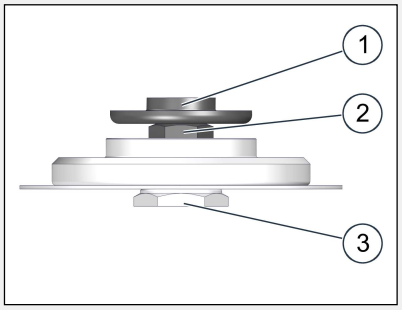
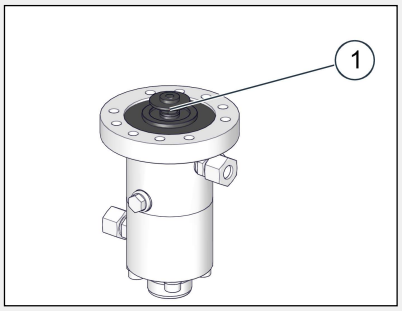
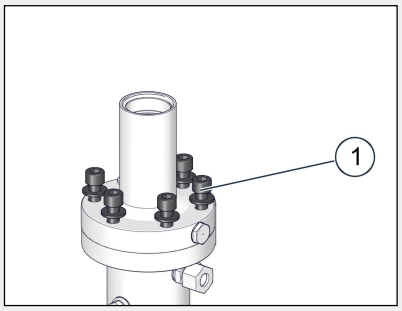
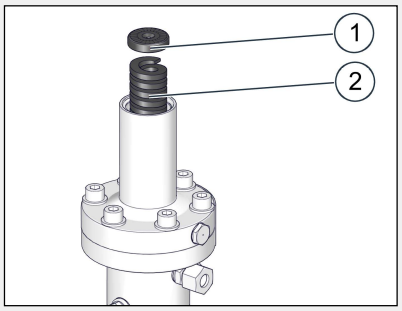
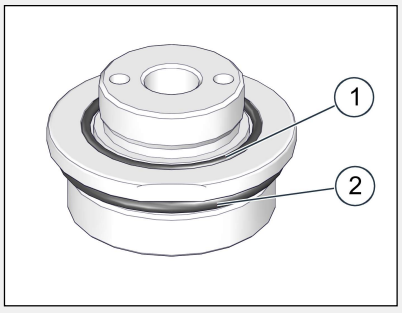
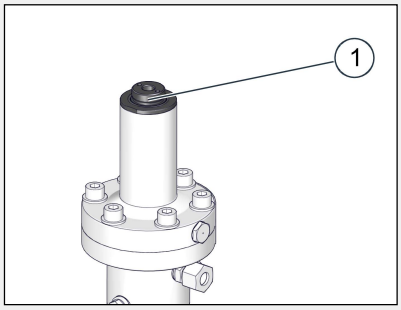
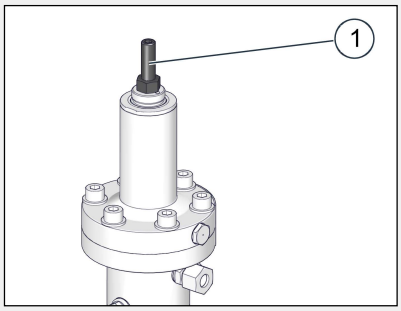
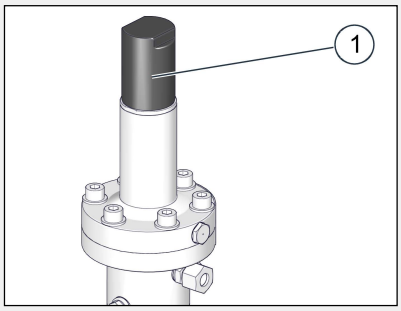
Figure	Step	Description
	**40**	Screw the hex nut (2) and the upper diaphragm plate (1) back on the pin (3). Use thread locker as specified in the list in the appendix.
	**41**	Insert the diaphragm unit (1) back into the second pressure stage's housing.
	**42**	Put the spring housing back in place, Tighten the screws (1), including the washers, in a crisscross sequence. Refer to the additional tightening torque information at the beginning of this topic.
	**43**	Insert the compression spring (2) and the spring plate (1) back in.
	**44**	Take the lock nut. Replace the O-rings (1, 2) with new, lubricated O-rings.

Figure	Step	Description
	**45**	Screw the locknut (1) back in place all the way.
	**46**	Screw the set screw (1), including the hex nut, back in.
	**47**	Screw the cap (1) back on.

Next task

Proceed as follows:

- *Maintaining the adjustable restrictor* (see page 77)
- *Completing the maintenance* (see page 78)
- *Maintaining the regulator* (see page 52)
- *Storing the device* (see page 80)

8.5.2 Maintaining the HON P095NG-MP pilot

Falling components

⚠CAUTION

Crush and impact hazard posed by components falling or toppling over accidentally.

When working with heavy components that have been removed or are yet to be installed, injury may result if the components start moving in an uncontrolled manner, e.g., fall down from the working surface or topple over.

⇨ Place removed components exclusively on level, horizontal working surfaces with enough load-bearing capacity.

⇨ If necessary, secure removed components so that they will not fall or topple over.

⇨ Wear the required personal protective equipment.

⇨ Exercise caution when performing the relevant tasks.

Cleaning

Observe the following cleaning instructions:

- Before assembly, all parts must be cleaned in order to remove any foreign particles (swarf) and soiling.
- If screws, bolts, or washers are replaced with identical new parts, any oil on these new parts must first be removed.

Tightening torques

Observe the tightening torques below when following the instructions in this section:

Part	Tightening torque	Step
Screws	25 Nm	26
Screws	50 Nm	40

Maintaining the HON P095NG-MP pilot

Proceed as follows:

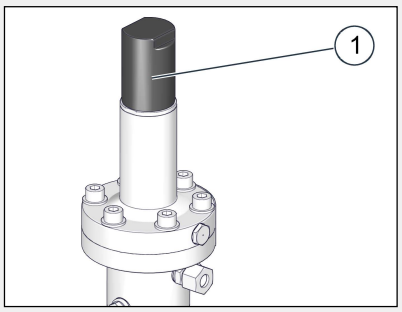
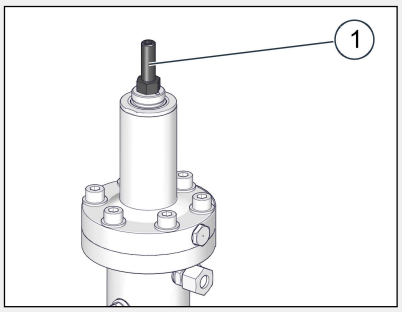
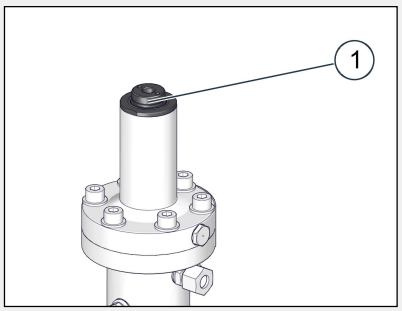
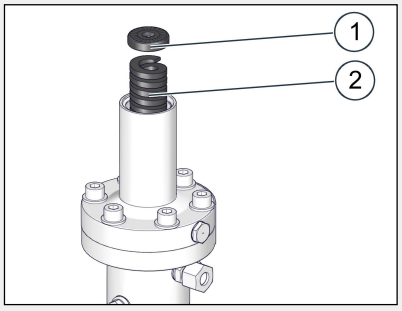
Figure	Step	Description
	**1**	Unscrew the cap (1).
	**2**	Unscrew the set screw, including the hex nut.
	**3**	Unscrew the lock nut (1). Remove the lock nut.
	**4**	Remove the spring plate (1) and the compression spring (2).

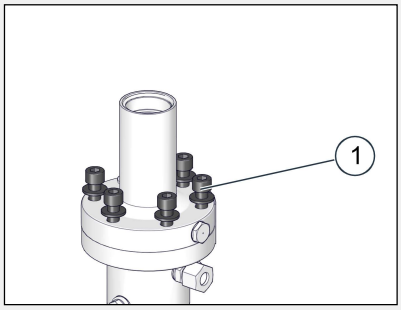
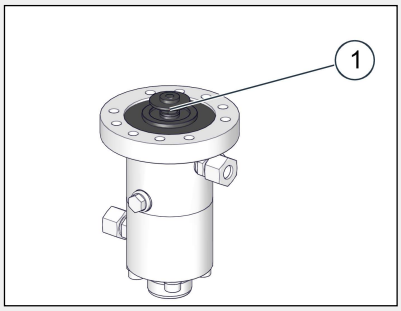
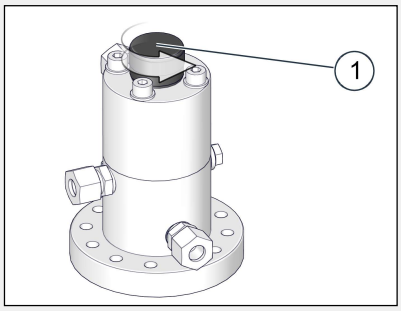
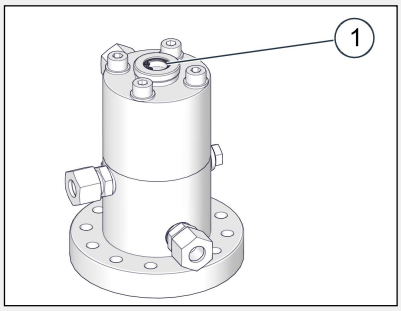
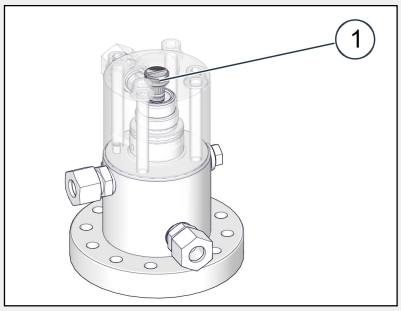
Figure	Step	Description
	**5**	Unscrew the spring housing's screws (1) in a crisscross sequence. Remove the spring housing.
	**6**	Remove the diaphragm unit (1).
	**7**	Turn the pilot over. Important! The valve rod and the valve rod's compression spring may fall out. Set them aside if they do. Unscrew the cap (1).
	**8**	Remove the retaining ring (1).
	**9**	Unscrew the stabilizer seat (1).

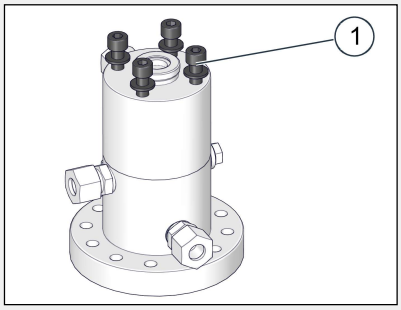
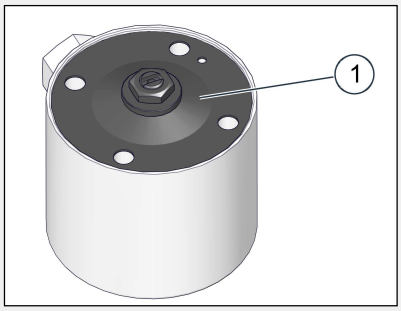
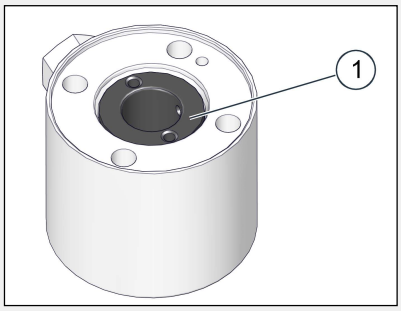
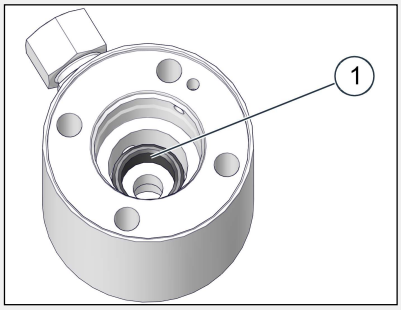
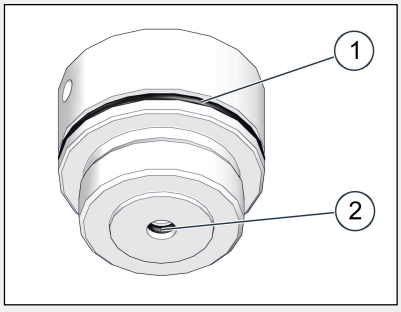
Figure	Step	Description
	**10**	Unscrew the screws (1) at the bottom of the pilot. Remove the upstream pressure stage housing.
	**11**	Remove the lower diaphragm unit (1), including the compression spring, from the upstream pressure stage housing.
	**12**	Loosen the guide (1). Remove the guide.
	**13**	Remove the filter (1). Replace the filter with a new one.
	**14**	Take the guide. Replace the guide's O-rings (1, 2) with new, lubricated O-rings.

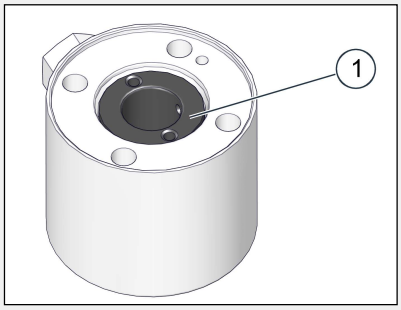
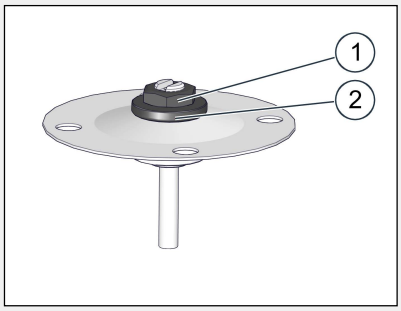
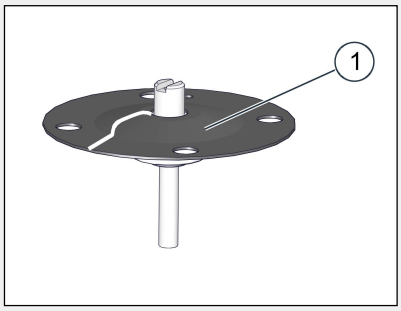
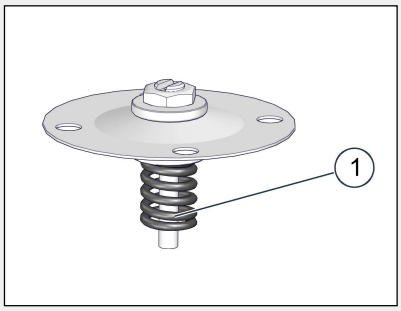
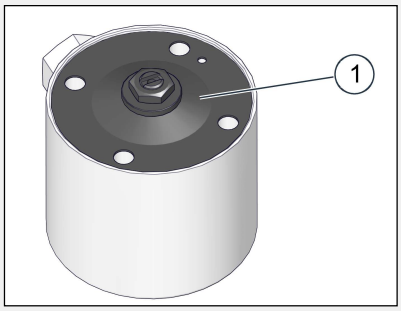
Figure	Step	Description
	**15**	Screw the guide (1) back into the upstream pressure stage housing.
	**16**	Take the lower diaphragm unit. Unscrew the nut (1) and remove the spring plate (2).
	**17**	Replace the diaphragm (1) with a new one. Make sure that the bulge points upwards. Re-assemble the diaphragm unit. Use thread locker as specified in the list in the appendix.
	**18**	Put the compression spring (1) back on the diaphragm unit.
	**19**	Insert the lower diaphragm unit (1), including the compression spring, back into the upstream pressure stage housing. Make sure that the holes and the diaphragm's holes are aligned.

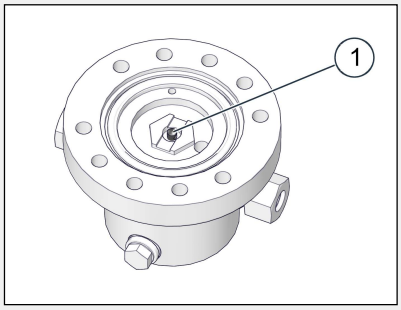
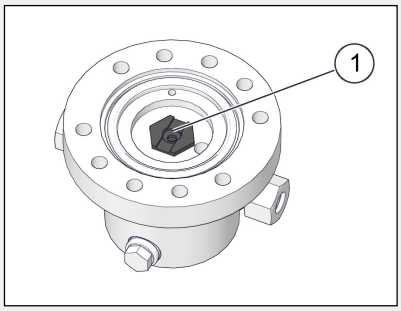
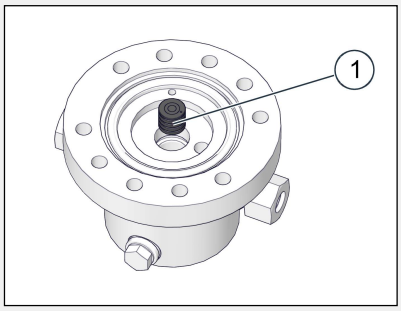
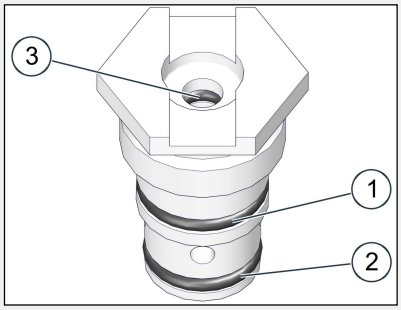
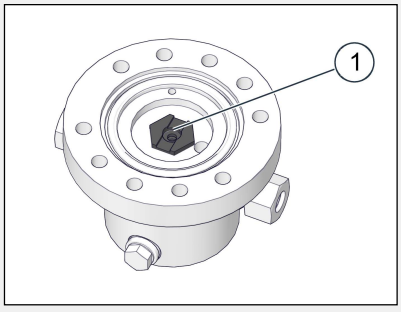
Figure	Step	Description
	**20**	Take the second pressure stage's housing. Turn the housing over. Remove the valve rod (1) and the valve rod compression spring underneath it (provided you have not already set them aside in a previous step).
	**21**	Unscrew the guide (1) from the housing.
	**22**	Remove the valve (1). Replace the valve, including the O-ring, with a new one. Insert the new valve into the housing.
	**23**	Take the guide. Replace the O-rings (1, 2, and 3) with new, lubricated O-rings.
	**24**	Screw the guide (1) back into the housing.

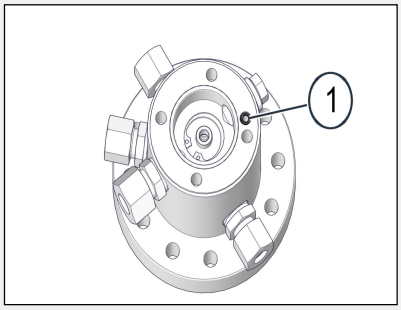
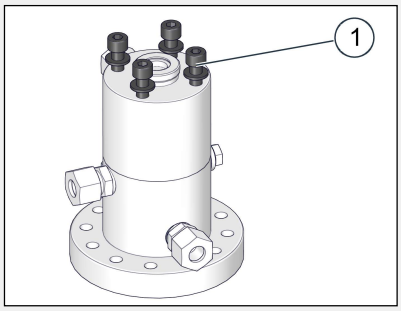
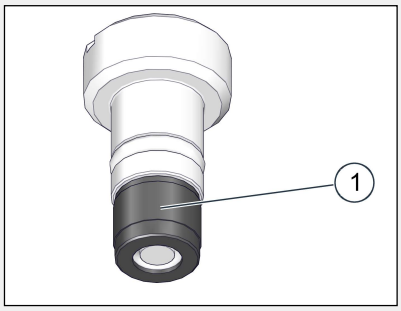
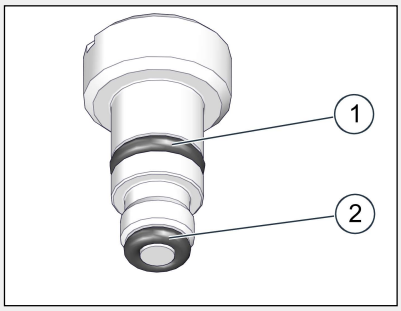
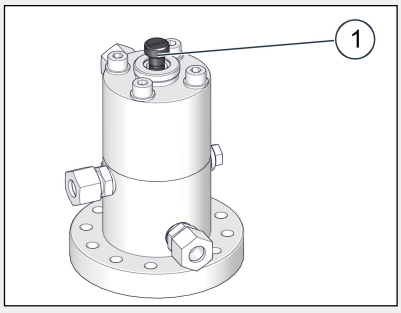
Figure	Step	Description
	**25**	Turn the housing over. Replace the O-ring (1) with a new, greased O-ring.
	**26**	Put the upstream pressure stage housing back on the second pressure stage's housing. Make sure that the diaphragm unit does not fall out! Tighten the screws (1), including the washers, in a crisscross sequence. Observe the tightening torque information provided in the table before this section.
	**27**	Replace the stabilizer seat with a new one. Unscrew the nut (1).
	**28**	Insert new, greased O-rings (1, 2). Screw the nut back on.
	**29**	Screw the stabilizer seat (1) back into the housing.

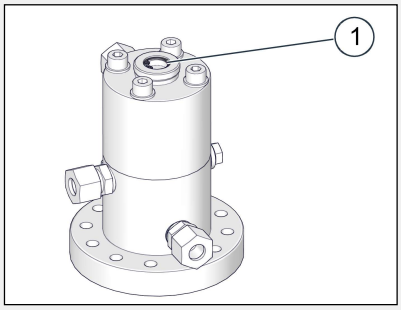
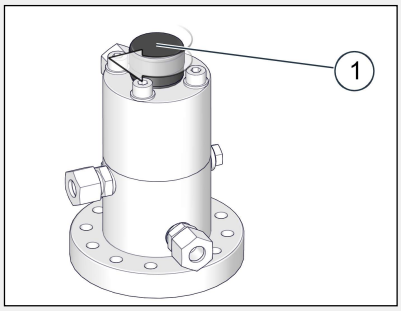
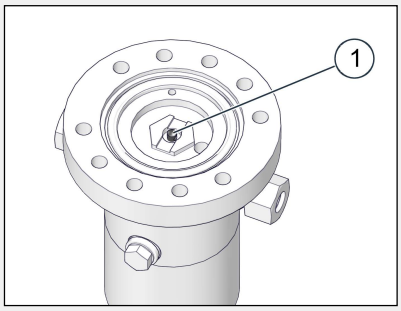
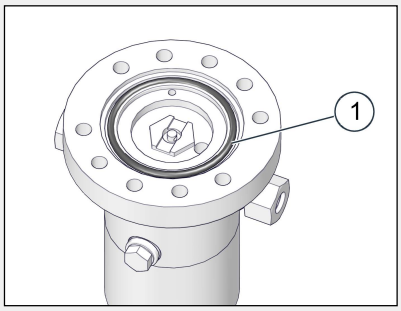
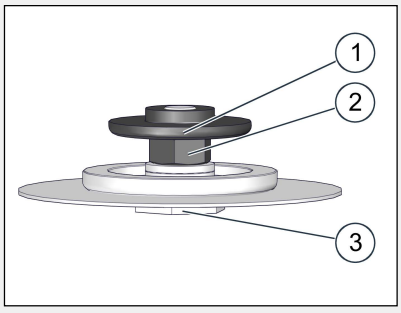
Figure	Step	Description
	**30**	Put the retaining ring (1) back in place.
	**31**	Screw the grommet nut (1) back on.
	**32**	Turn the housing over. Insert the valve rod's compression spring and the valve rod (1) back into the guide.
	**33**	Replace the O-ring (1) with a new, greased O-ring.
	**34**	Take the diaphragm unit for the second pressure stage. Unscrew the upper diaphragm plate (1) and the hex nut (2) from the pin (3).

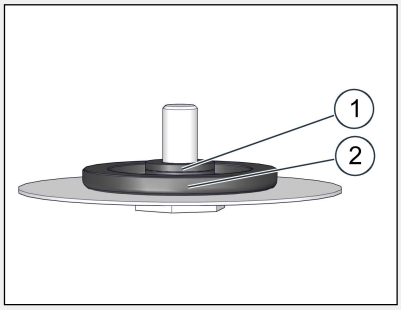
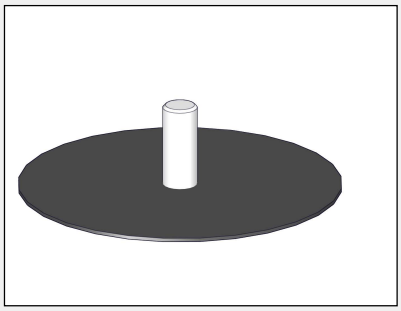
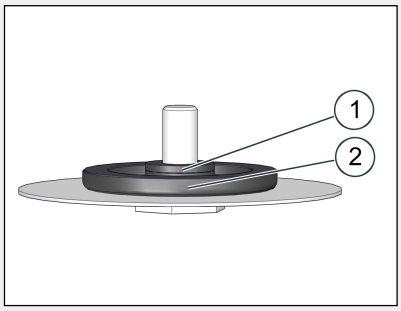
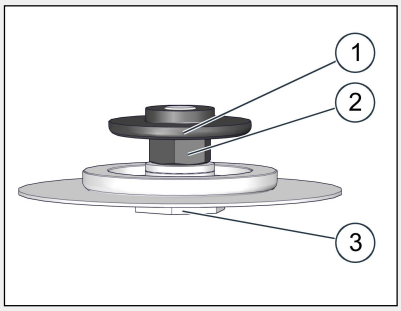
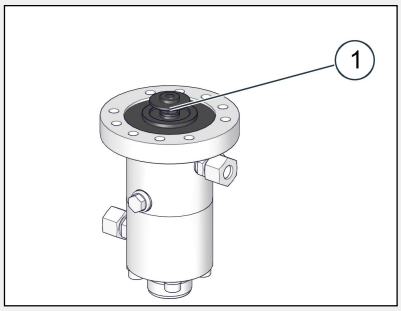
Figure	Step	Description
	**35**	Remove the washer (1) and the lower diaphragm plate (2).
	**36**	Replace the diaphragm with a new one.
	**37**	Put the lower diaphragm plate (2) and the washer (1) back in place.
	**38**	Screw the hex nut (2) and the upper diaphragm plate (1) back on the pin (3). Use thread locker as specified in the list in the appendix.
	**39**	Insert the diaphragm unit (1) back into the second pressure stage's housing.

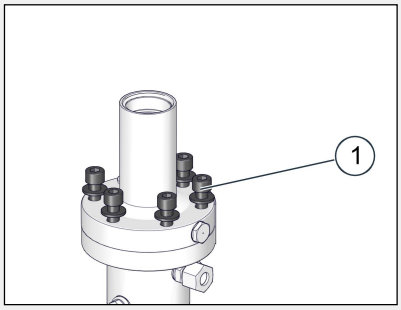
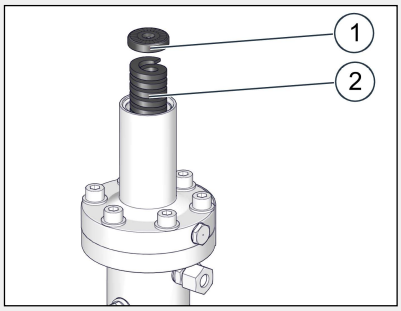
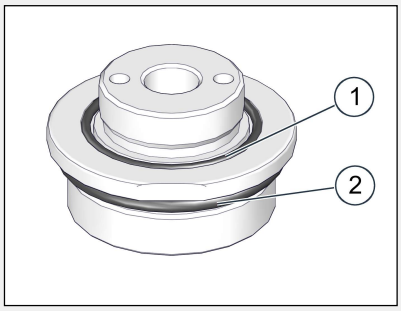
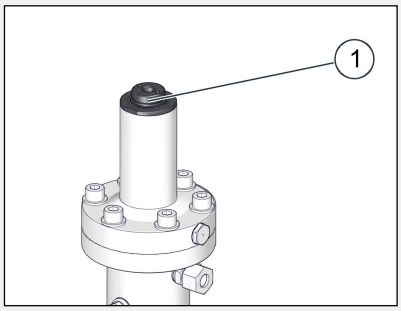
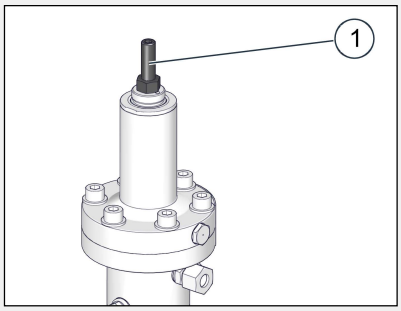
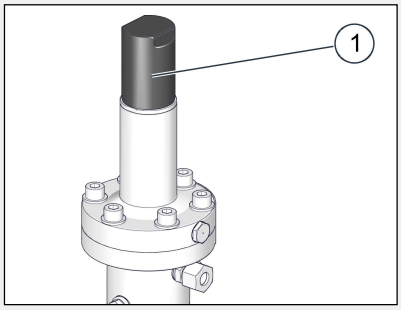
Figure	Step	Description
	**40**	Put the spring housing back in place, Tighten the screws (1), including the washers, in a crisscross sequence. Observe the tightening torque information provided in the table before this section.
	**41**	Insert the compression spring (2) and the spring plate (1) back in.
	**42**	Take the lock nut. Replace the O-rings (1, 2) with new, lubricated O-rings.
	**43**	Screw the locknut (1) back in place all the way.
	**44**	Screw the set screw (1), including the hex nut, back in.

Figure	Step	Description
	**45**	Screw the cap (1) back on.

Next task

Proceed as follows:

- Maintaining the *adjustable restrictor* (see page 77)
- *Completing the maintenance* (see page 78)
- *Maintaining the regulator* (see page 52)
- *Storing the device* (see page 80)

8.5.3 Maintaining the P095 pilot's adjustable restrictor

Cleaning

Observe the following cleaning instructions:

- Before assembly, all parts must be cleaned in order to remove any foreign particles (swarf) and soiling.
- If screws, bolts, or washers are replaced with identical new parts, any oil on these new parts must first be removed.

Maintaining the adjustable restrictor

Proceed as follows:

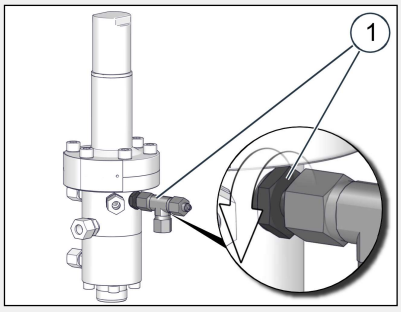
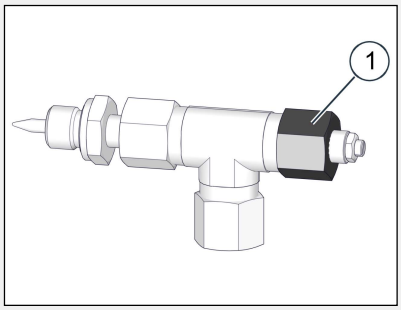
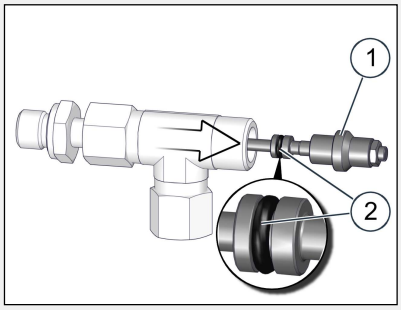
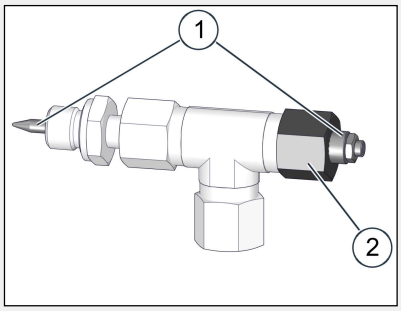
Figure	Step	Description
	**1**	Unscrew the adjustable restrictor (1) from the pilot.
	**2**	Unscrew the sleeve nut (1) and remove it.

Figure	Step	Description
	3	▪ Remove the assembly (1) with the needle. ▪ Replace the O-ring (2) with a new, greased O-ring.
	4	▪ Slide the assembly (1) with the needle back into the adjustable restrictor housing. ▪ Put the sleeve nut (2) back in place and tighten it. ▪ Install the adjustable restrictor back on the pilot.

Next task

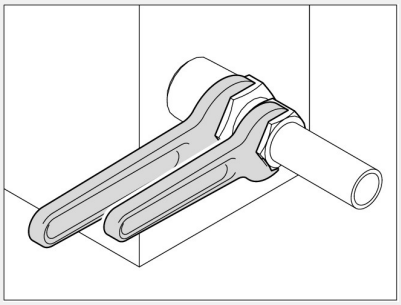
Proceed as follows:

- *Completing the maintenance* (see page 78)
- *Maintaining the regulator* (see page 52)
- *Storing the device* (see page 80)

8.6 Completing the maintenance

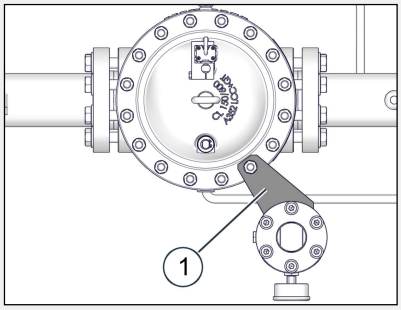
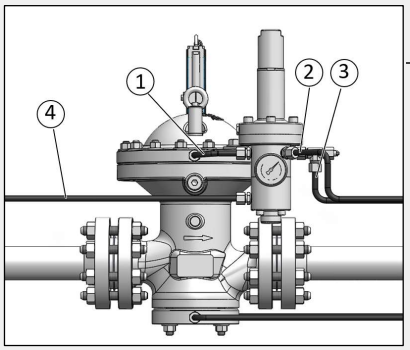
Protecting the pipe connections from being twisted

When conducting work involving the pipework, please always observe the following:

Figure	Description
	Do not twist the pipe connections in the assemblies. Use a second spanner wrench for securing when loosening and tightening pipe joints.

Installing components

Proceed as follows:

Figure	Step	Description
	**1**	Use the connecting plate (1) to secure the pilot on the regulator.
	**2**	Reinstall all the lines (1, 2, 3, 4) you removed previously on the pilot.
	3	Reinstall all the lines you removed previously on the regulator and the pipes. **Result:** The pilot is now installed on the regulator and in the gas regulating line.

To install, follow the same steps for removal but in opposite order. Please refer to *Starting maintenance* (see page 47) for information on how to remove the pilot and the regulator.

Next task

Proceed as follows:

Checking the system for leaks (see page 38)

9 Decommissioning, storage, renewed start-up, disposal

Contents

9.1 Disassembling the device

Disassembling the device

Remove the pilot, the regulator, or the gas pressure regulator as indicated in *Starting maintenance* (see page 47).

9.2 Storing the device

Storage of the packing units

Observe the following rules:

- Do not store the device outdoors.
- Store the device in a dry and dust-free environment on a flat surface.
- Do not expose the device to any aggressive media, ozone or ionizing radiation or to direct heat sources.
- Storage conditions:
  - Temperature: 0 °C to 25 °C (32 °F to 77 °F)
  - Relative humidity: < 55%.
- Avoid mechanical vibrations.
- Storage periods:
  - When storing the device for up to one year:
    Store the device in its original packaging and in the same condition it was delivered. All protective caps of the device must remain in place.
  - When storing the device for more than one year (e.g., as a backup device):
    Store the device in its original packaging and in the same condition it was delivered and check it annually for damage and soiling. Consider the storage period in the maintenance cycles.

Note: Please also observe any storage information provided on the packaging.

Storage of spare parts

The following rules apply to the storage of spare parts:

- Apply an appropriate protective agent to assemblies at risk of corrosion.
- If stored correctly, O-rings and gaskets should not be kept longer than 7 years.
- Store the spare parts in the original package until they are used.

Storing devices that have already been in operation and that are intended to be put back into operation later on

Observe the following rules:

- All device openings and fittings must be sealed and protected from soiling and damage.
- The device's maintenance condition must be indicated with a label:
  - Date when maintenance was last performed
  - Operating times and operation cycles since the last time maintenance was performed
- Do not store the device outdoors.
- Store the device in a dry and dust-free environment on a flat surface.
- Do not expose the device to any aggressive media, ozone or ionizing radiation or to direct heat sources.
- Storage conditions:
  - Temperature: 0 °C to 25 °C (32 °F to 77 °F)
  - Relative humidity: < 55%.
- Avoid mechanical vibrations.
- Storage periods: Check the device for damage and soiling at least annually. When it comes to maintenance cycles, take the preceding operating time into account in addition to the storage time.

9.3 Putting the gas pressure regulator back into operation

Pressurized parts

⚠WARNING

Risk of injury posed by bursting parts if they are subjected to pressure in the wrong direction

The device has been designed for a specific direction of flow, which is labeled on the device. Subjecting the device to pressure in the wrong direction may result in serious injury caused by bursting parts.

⇨ Pressurize the system only on the inlet side.

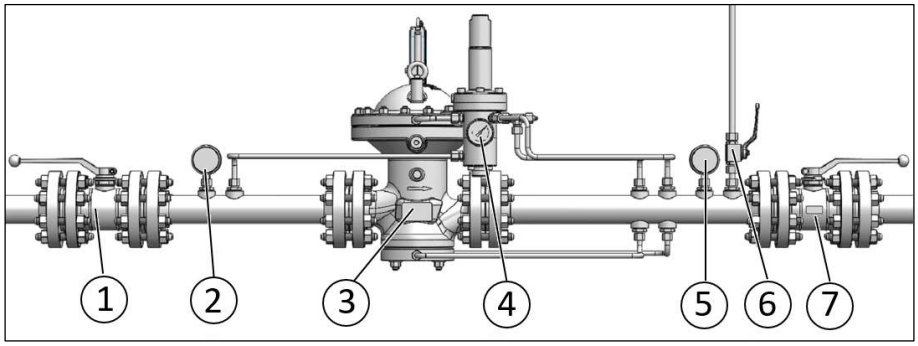
Putting the valve back into operation

This procedure can be used if the pilot's required set points are known, they were already set during earlier commissioning, and redoing or adjusting the settings is out of the question.

Basic pointers

After being in a depressurized state, the adjustment process for the gas pressure regulator will be relatively sluggish. During commissioning, always make sure to wait between the individual steps until the desired state is reached.

Gas regulating line components



The numbers have the following meaning:

No.	Meaning
1	Inlet stop valve armature
2	Inlet pressure gauge
3	Gas pressure regulator

No.	Meaning
4	Loading pressure gauge
5	Outlet pressure gauge
6	Blowdown line shut-off device
7	Outlet stop valve armature

Requirements

Make sure that the following requirements are met:

- The device has been checked with regard to its maintenance condition as indicated in the *Maintenance* (see page 46) chapter.
- The system has been checked, is fully functional, and has no leaks.
- The inlet and outlet shut-off devices for the gas regulating line section are closed.
- The shut-off devices for the blowdown lines are closed.
- The inlet pressure is present upstream of the inlet shut-off device. Details about the operating pressure can be found in the *technical specifications* (see page 18).
- The system is depressurized between the inlet shut-off device and the outlet shut-off device.

Adjusting the gas pressure regulator

Proceed as follows:

Step	Description
1	**Slowly** open the inlet shut-off device to pressurize the inlet pressure area.
2	The outlet pressure will slowly increase. Once this pressure matches the pilot's set point, slowly open the outlet shut-off device.

If problems occur when putting the device back into operation, please refer to the *Malfunctions* (see page 44) chapter for more information.

9.4 Disposing of the device

Appropriate disposal

Comply with the legally stipulated disposal rules. Observe the following details pertaining to the appropriate disposal (not all the items may be applicable to your device):

- Dispose of the metals according to their types and grades (steel scrap, cast iron scrap, light alloy scrap, nonferrous heavy metal scrap, synthetic rubber scrap, electronic scrap).
- Recycle elements made of synthetic materials.
- Dispose of any other components according to the quality of the materials.

10 Appendix

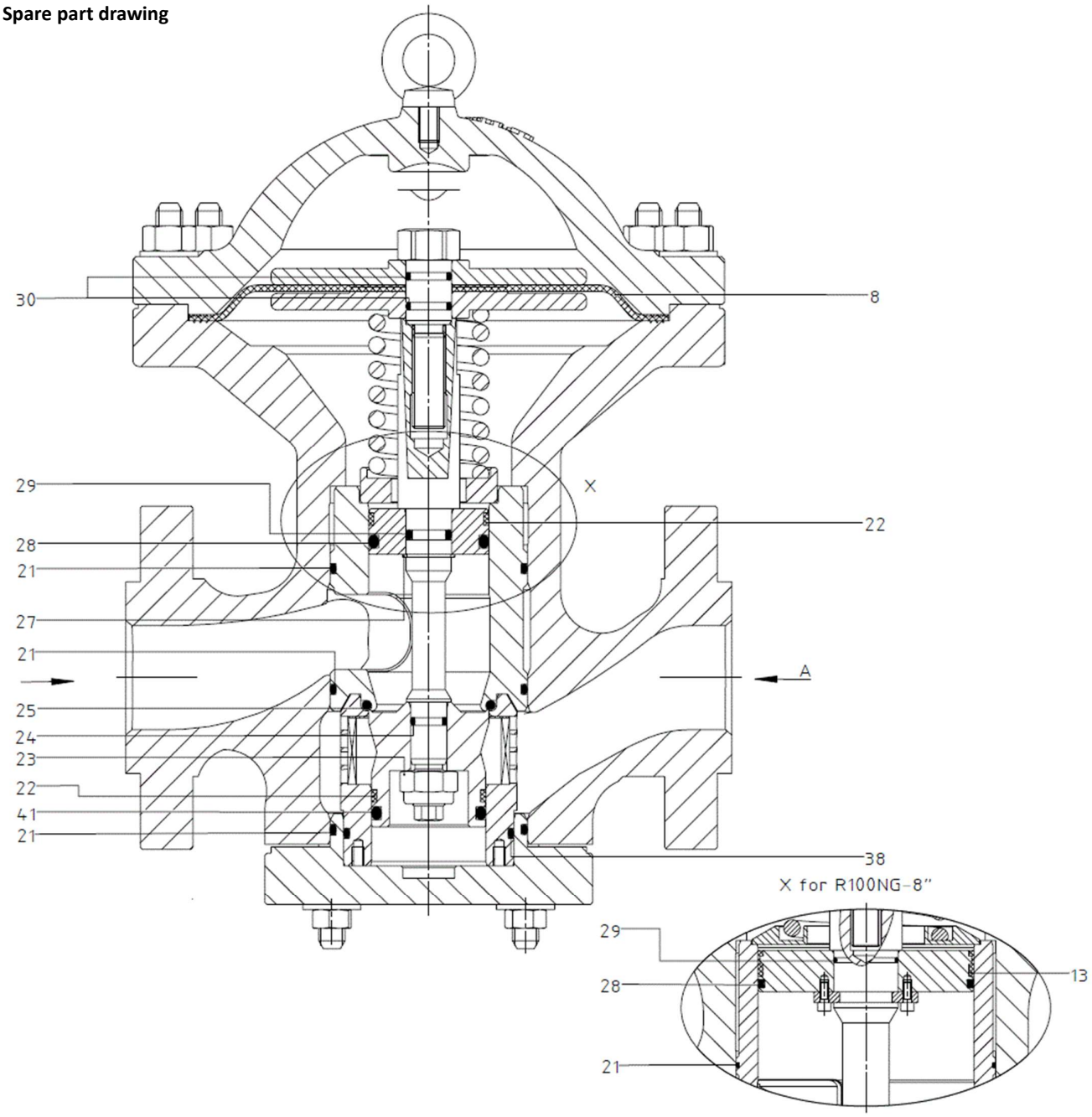
Contents

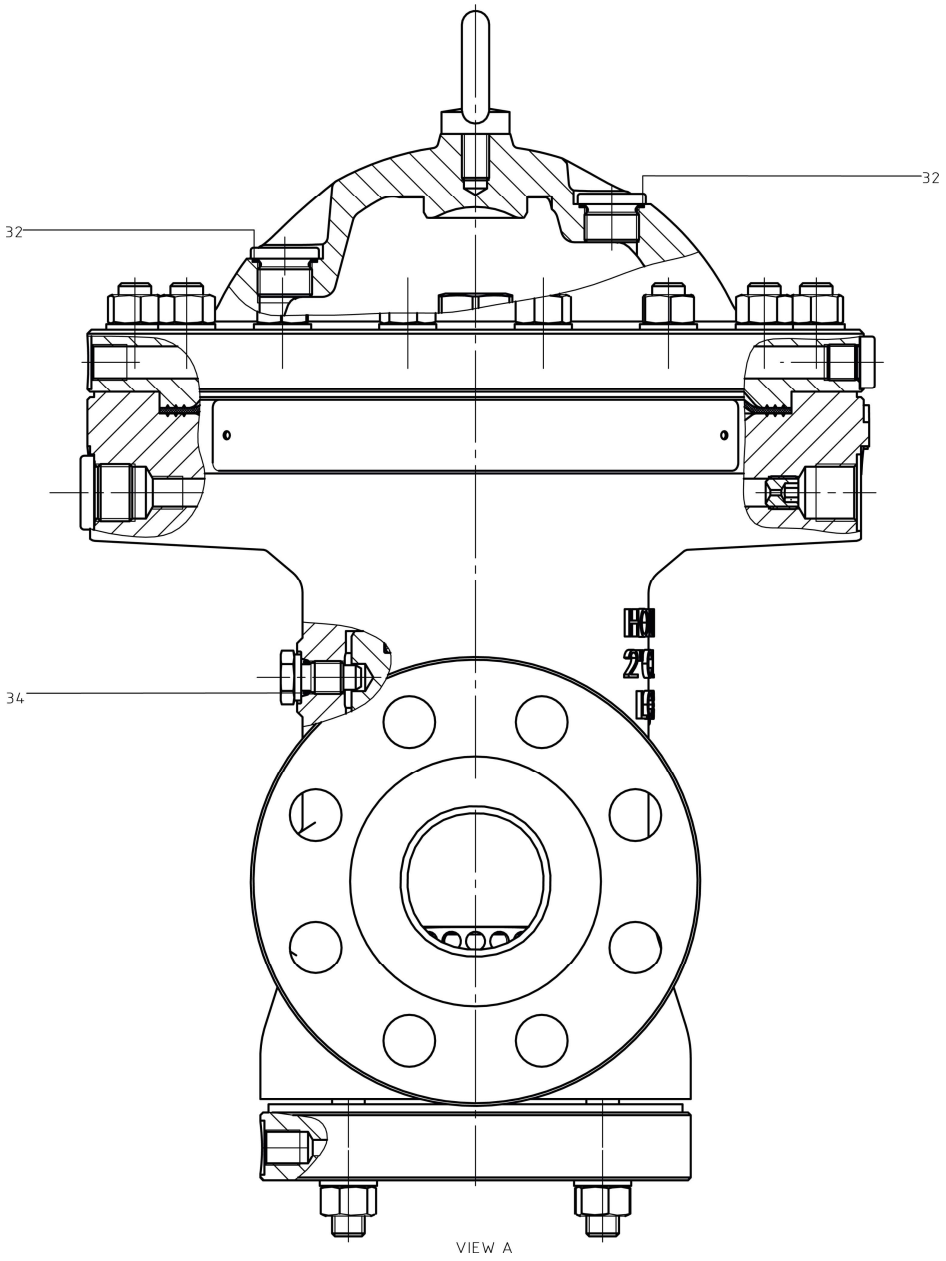
10.1 Additional information regarding spare parts

Number of spare parts	The required number of spare parts is indicated under the part number in the “Part No.” column. If no quantity is specified, this means that only one unit is required.
Spare parts kits	The spare parts always required for maintenance are grouped together into spare parts kits appropriate for the device in question. Each spare parts kit has its own part number.

10.2 Spare parts for HON R100NG

Spare part drawing





Spare parts kits (NBR O-ring)

Name	Part no.
HON R100NG-1" kit	KR100NG-001
HON R100NG-2" kit	KR100NG-002
HON R100NG-3" kit	KR100NG-003
HON R100NG-4" kit	KR100NG-004
HON R100NG-6" kit	KR100NG-006
HON R100NG-8" kit	KR100NG-008

Bill of materials

HON R100NG 1" – 3"

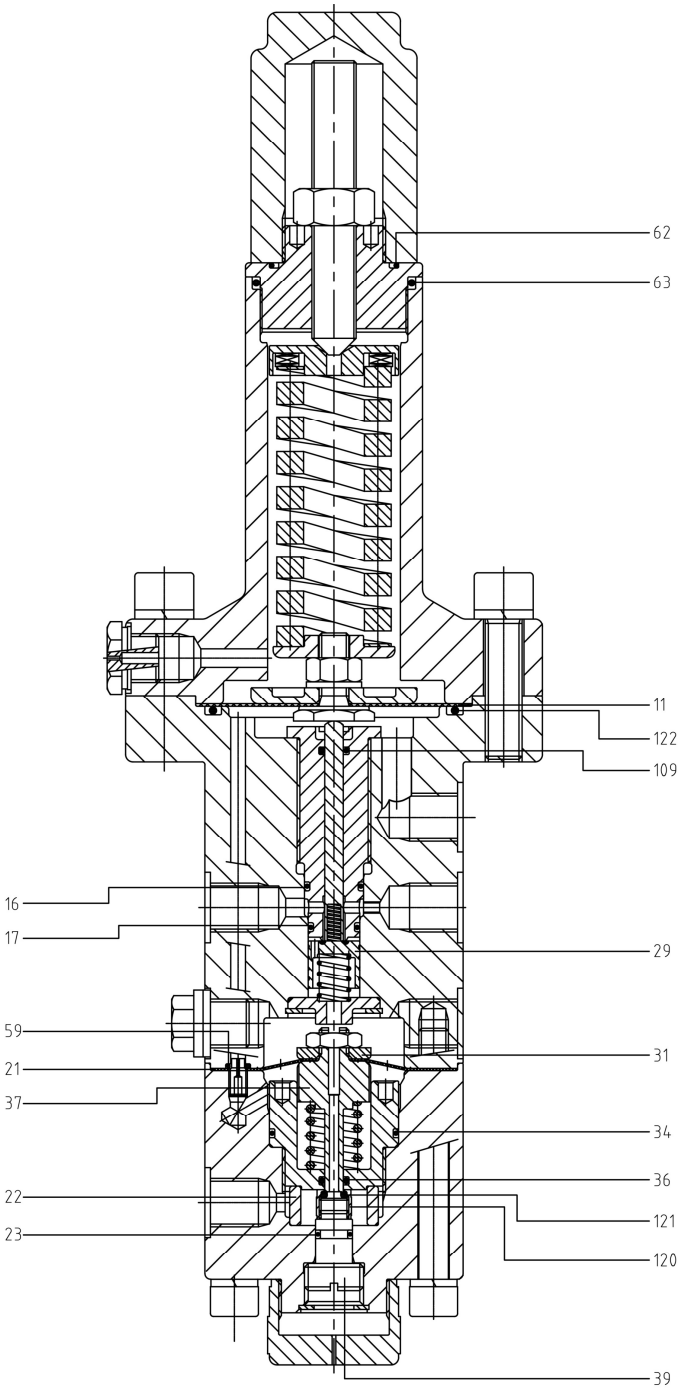
No.	Name	1" Part no.	2" Part no.	3" Part no.
8	Diaphragm	9301004124240	8304000215410	8304000215420
21	O-ring	8401050502136 (3 units)	8401088503238 (3 units)	8401117103247 (3 units)
22	Guide ring	8312021368830 (2 units)	8312021368840 (2 units)	8312020123180 (2 units)
23	Locknut	8212410100001	8212300160001	8212300200001
24	O-ring	8401009301012	8401012402112	8401015602114
25	O-ring	8401029703217	8401053304330	8401081904339
27	Circlip	8236000017001	8236000022001	8236000028001
28	Quad-ring	8401028302121	8401050204328	8401078704337
29	O-ring	8401012402112	8401015503208	8401021803212
30	O-ring	8401014001015 (2 units)	8401017102115 (2 units)	8401017102115 (2 units)
32	O-ring	8401020401019 (2 units)	8401020401019 (2 units)	8401020401019 (2 units)
34	O-ring	20419	20419	20419
38	O-ring	-	8401075803234	8401101203242
41	Quad-ring	8401025102119	8409043804327	8401075604336

HON R100NG 4" – 8"

No.	Name	4" Part no.	6" Part no.	8" Part no.
8	Diaphragm	8304000215430	8304000215440	8304000215440
13	Guide ring	-	-	8312020121410
21	O-ring	8401136103253 (3 units)	8401183703263 (3 units)	8401240903272 (3 units)
22	Guide ring	8312020123230 (2 units)	8312020121330 (2 units)	8312020121400
23	Locknut	8212300270001	8212300360001	8212300420001
24	O-ring	8401023502119	8401031303218	8401037703222
25	O-ring	8401104104346	8401151804361	8401202604369
27	Circlip	8236000035001	8236000045001	-
28	Quad-ring	8450097704344	8450145405434	8450196205443
29	O-ring	8401028203216	8401037803222	8401053603227
30	O-ring	8401021902118 (2 units)	8401029902123 (2 units)	8401029802123 (2 units)
32	O-ring	8401020401019 (2 units)	8401020401019 (2 units)	8401020401019 (2 units)
34	O-ring	8401013330000	8401013330000	8401013330000
38	O-ring	8401123403249	8401171003261	20843-RMK
41	Quad-ring	8450094604343	8450142205433	8450189805443

10.3 Spare parts for HON P095NG pilot

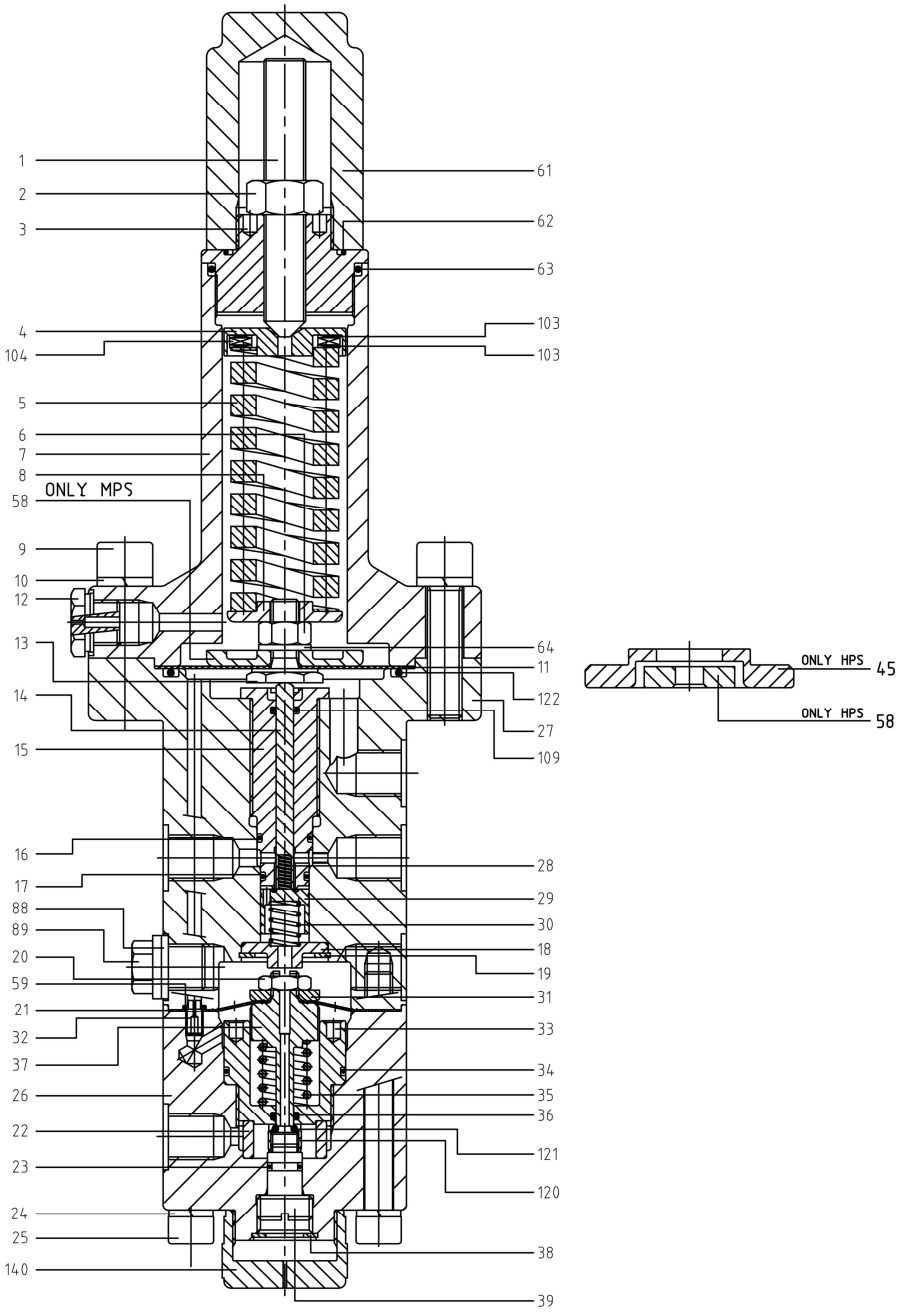
Spare parts kits drawing



Spare parts kits

Name	Regulator Size	Part no.
Spare parts HON P095NG-HPS/MPS V20-00-N2	FC 1” to 8” FO 1” to 4”	939401S216040
Spare parts HON P095NG-HPS/MPS V35-00-N2	FO 6”, 8”	939401S216050

Spare part drawing



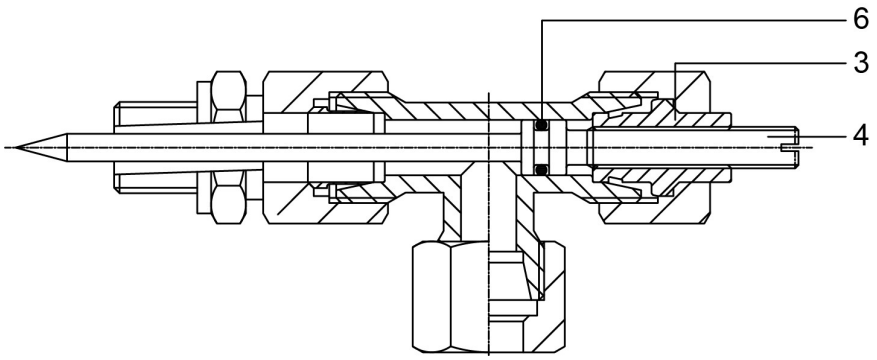
Bill of materials

No.	Name	Part no.
1	Set screw	8303010000031
2	Hex nut	8201340120125
3	Locknut	8103004114690
4	Spring plate	8103004135980
5	Compression spring	Please refer to the “Pilot springs” section in “Technical specifications”
6	Hex nut	8251080080001

No.	Name	Part no.
7	Spring housing	8103203133680
8	Spring plate	8103004114670
9	Screw	8207160100040
10	Washer	8238093100001
11	Diaphragm	8103004112450
12	Dummy plug	8103000112330
13	Stud	8103004111840
14	Pin	8103202133690
15	Control valve body	8103004111850
16	O-ring	8401012401014
17	O-ring	8401010801013
18	Spring plate	8103004111880
19	Circlip	8236050025001
20	Hex nut	8251090080001
21	Diaphragm	8103004151780
22	Filter	8103004112130
23	O-ring	8401006801000
24	Washer	8238093080001
25	Screw	8207160080070
26	Upstream pressure stage housing	8611189018000
27	Control stage housing	8103200215950
28	Compression spring	8501210109700
29	Control valve (2mm) hole	8103504207260
	Control valve (3.5mm) hole	8103504207280
30	Control valve compression spring	8501220217600
31	Diaphragm plate	8103004112110
32	Restrictor	8103000114650
33	Guide bushing	8103004111900
34	O-ring	8401031501026
35	O-ring	8501220228900
36	O-ring	8401004501008
37	Upstream pressure valve	8103004133530
38	Circlip	8251437018001
39	Adjusting screw	8103004142690
44	Drive screw	8227410025004

No.	Name	Part no.
45	Reducing bush (HON P095NG-HP)	8103004114660
58	Diaphragm plate (HON P095NG-MP)	8103004116530
	Diaphragm plate (HON P095NG-HP)	8103004141480
59	O-ring	8401003701007
61	Protective cap	8103004114700
62	O-ring	8401031501026
63	O-ring	8401039402129
64	Washer	8251930080001
88	Washer	8207670063001
89	Blind plug	8250302130018
103	Bearing shell	8302010000006
104	Axial bearing	8302010000004
109	O-ring	8401004501008
120	Locknut	8103004142700
121	O-ring	8405003701007
122	O-ring	8401059903229
140	Protective cap	8103000161670

Spare part and maintenance drawing for adjustable restrictor



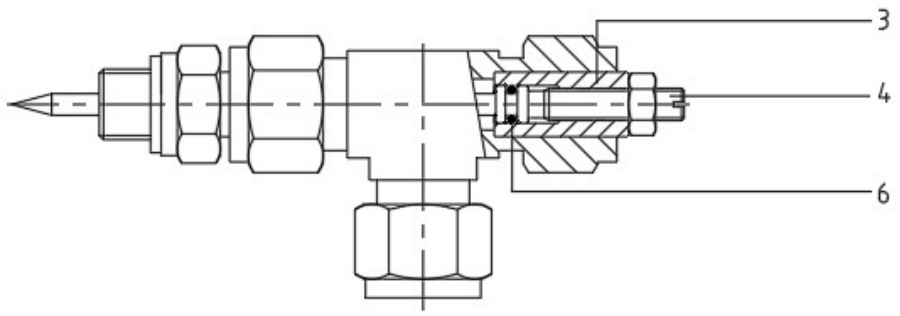
Bill of materials

EO-10mm

No.	Name	Part no.
3	Dummy plug with Ø10 threaded hole	8106000211640
4	Ø10 dosing needle	8106000211700
6	O-ring	8401004501008

EO-12mm

No.	Name	Part no.
3	Dummy plug with Ø12 threaded hole	8106000217090
4	Ø12 dosing needle	8106000217110
6	O-ring	8401006101010



SW-12mm

No.	Name	Part no.
3	Dummy plug with Ø12 threaded hole	8106004211760
4	Ø12 dosing needle	8106004211740
6	O-ring	8401003701007

SW-1/2inch

No.	Name	Part no.
3	Dummy plug with ½" threaded hole	8106004211760
4	½" dosing needle	8106004211740
6	O-ring	8401003701007

10.4 Lubricants and thread lockers

Lubricants

Important! All parts must be slightly greased.

Use the following lubricants:

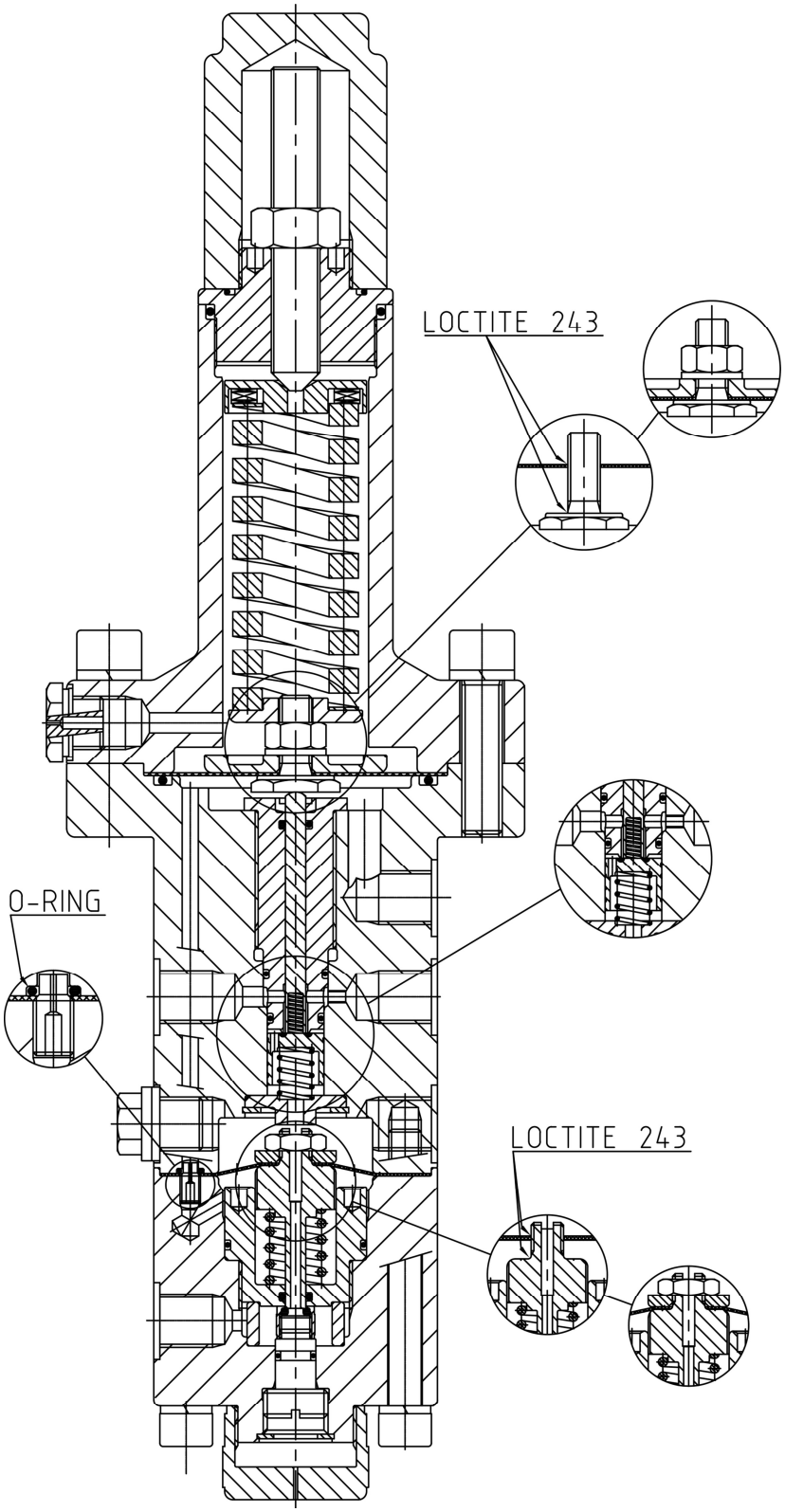
Application	Remark	Lubricant	Part no.
O-rings Stationary and moving		**Standard model:**	
Flat gaskets		Silicone grease (jar)	27079
Diaphragms	Grease the diaphragm grip body on all sides	Silicone grease (tube)	27081
	Do NOT grease the flat grip		
Valve shank sliding surfaces	Grease film only	**Low-temperature model:**	
Sliding guides		Silicone grease (jar)	27993
Guide bushings			
Moving parts in SAV controlgear and switchgear		**High-temperature model:**	
Switch jacks and locking sleeves		PFPE grease	102389
Control balls and control rollers			
Ball bearing			
Valve sleeves and valve sleeve gaskets in gas pressure regulators		Silicone grease	27052
Set point set screws Power screws		Assembly paste	27091

Application	Remark	Lubricant	Part no.
Thread material combination: Al/Al			
Screw-in fittings and fastening screws			
Spring plate depressions (pilot)			
Devices for oxygen **Important!** Oil-free and grease-free installation; only antiseize agents are permissible	Upper oxygen pressure limit: 260 bar at 60 °C	Antiseize agent	28211
Devices for ammonia		Antiseize agent	28211

Threadlocker

Application	Remark	Threadlocker	Part no.
Maintenance (see page 46) section	Diaphragm units	LOCTITE	26688

HON P095NG pilot thread locker drawing



Subject to change without notice

Scan these QR Codes to see how Honeywell's integrated gas solutions can help you to better manage your gas assets and optimize your value chain.

Additional information

To learn more about Honeywell's product contact your Honeywell Process Solutions representative, or visit www.honeywellprocess.com or www.hongastec.de.

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