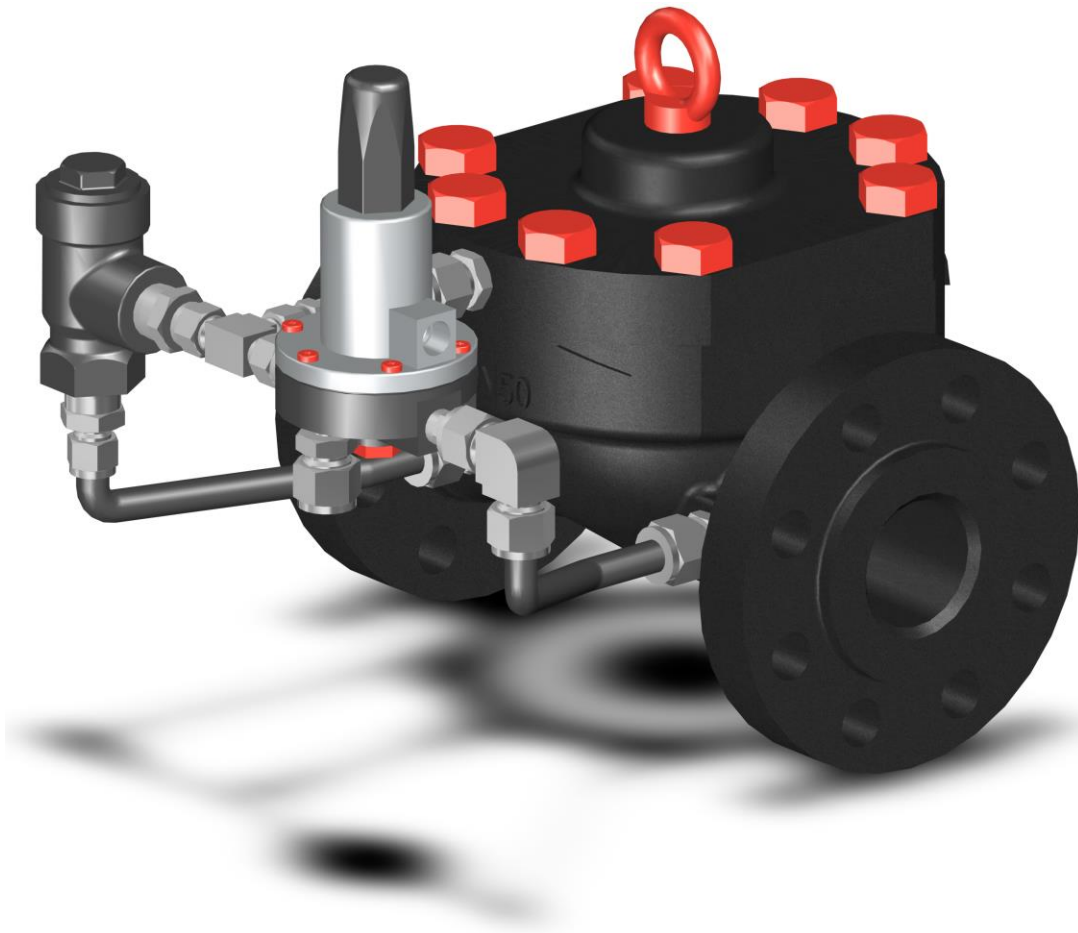


Honeywell



HON 5020 gas pressure regulator with HON 600 pilot

User and maintenance manual
Spare parts

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1 General considerations

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1.1 About this user manual

Validity and purpose	<p>This user manual applies to HON 5020 gas pressure regulators featuring an HON 600 pilot. This user manual provides all individuals with the information required for the safe handling in connection with the following tasks:</p> <ul style="list-style-type: none"> ▪ Transport ▪ Installation ▪ Start-up ▪ Set-up ▪ Maintenance ▪ Decommissioning, disassembly, renewed start-up, storage and disposal
Target group	<p>This user manual is intended for anyone working with the product:</p> <ul style="list-style-type: none"> ▪ Transportation personnel ▪ Installation personnel ▪ Set-up and operating personnel ▪ Maintenance and service personnel
Illustration	<p>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.</p>
 Safety	<p>Failing to observe the information provided in this document may lead to injuries, including death and material damages.</p> <p>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:</p> <ul style="list-style-type: none"> ▪ the chapter entitled Safety ▪ the chapters that describe the work to be done
Copyright notice	<p>Unless explicitly permitted, the disclosure as well as duplication of this document, the exploitation and communication of its contents are prohibited. Any breach or infringement will result in liability for damages. All rights reserved in the event of patent, utility model or registered design registration.</p>

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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: <ul style="list-style-type: none"> ▪ 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	  

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 with reference to 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

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Labels/Markings	9
Identifying the device	9
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2.1 Intended use

Intended use

HON 5020 gas pressure regulators featuring an HON 600 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 5020 gas pressure regulators featuring an HON 600 pilot are suitable for use with natural gas or dry, non-aggressive industrial gases.

Note: The utilization limits of the device with regard to 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 5020 actuator assembly combined with an HON 600 pilot are available in a number of versions. These versions are derived from the various possible combinations between the various pilot and actuator assembly versions.

HON 5020 actuator assembly models

The following table shows which models are available:

Nominal diameters of 1" (DN 25); 2" (DN 50); 3" (DN 80); 4" (DN 100), and 6" (DN 150) with			
Flange facing as defined by standard	Pressure rating	Maximum operating pressure [bar]	Flange facing
ASME B16.5	Class 150	20	Raised face; ring joint
DIN EN 1759-1	Class 150	20	B flange; J flange

HON 600 pilot models

The following table shows which models are available:

Description	Design	Setpoint range [bar]	Number of body sections
HON 600 LP	Low-pressure model (low pressure)	0.015 to 0.5	3
HON 600 MP	Medium-pressure model (medium pressure)	0.14 to 4.0	2
HON 600 HP	High-pressure model (high pressure)	0.7 to 8.0	2

Filter S124 is an integral part of all the pilot models above.

Versions and designs in this user manual

The *technical specifications* and the *Maintenance* section, as well as the spare parts lists and spare parts drawings in the *appendix*, describe all the gas pressure regulator versions and all the models corresponding to the standard for this device type. Special-purpose versions are identified with "SO" in the inspection certificate, which is included with the gas pressure regulator.

The remaining sections in this user manual mostly use the version with the HON 600 MP pilot as a reference. However, other versions and models will be covered specifically as well when there are important differences that need to be pointed out.

If you have trouble understanding the information in this documentation, contact the manufacturer without fail before starting any work on the device.

2.3 Labels/Markings

Illegible labels



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 5020 actuator assembly

The following labels/markings can be found on the actuator assembly's casing:

Figure	No.	Meaning
	1	Nameplate
	2	Body part number
	3	<ul style="list-style-type: none"> ▪ Batch number ▪ Foundry code
	4	CE PIN (only if the unit has been granted a CE type approval)
	5	Body nominal size
	6	Arrow indicating the direction of flow

Nameplates

For the location of the nameplates, as well as a detailed list of the information on them and what it means, please refer to:

Identifying the device (see page 9)

Labels on connection lines

Small labels must be used to color-code and explicitly name the gas pressure regulator's connection lines (measuring impulse lines and operating 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 gas pressure regulator.

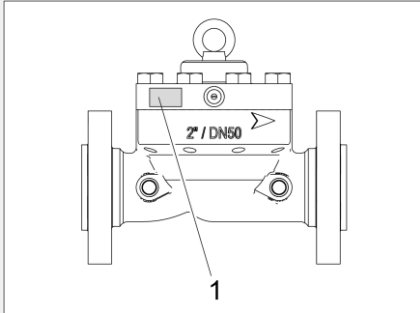
Verifying the technical specifications

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

Technical specifications (see page 15)

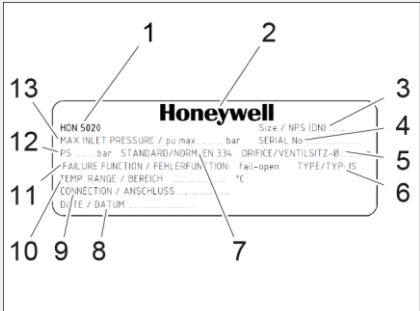
Locating the type plate of the actuator assembly

The type plate of the actuator assembly can be found here:

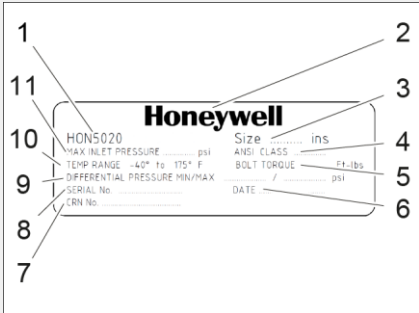
Figure	No.	Meaning
	1	Front of the actuator assembly

Interpreting the type plate of the actuator assembly

For actuator assembly models that use the metric system, the information on the name-plate will be as follows:

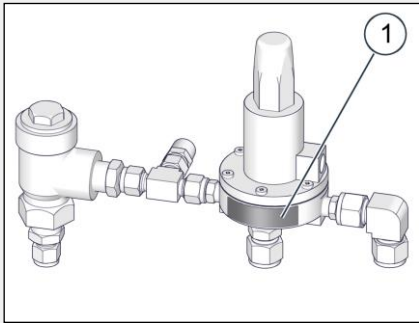
Figure	No.	Meaning
	1	Model name
	2	Manufacturer
	3	Nominal size
	4	Serial number of the device
	5	Valve seat diameter
	6	Device version (IS = version with integral overpressure protection)
	7	Standard (EN 334)
	8	Manufacturing date (month/year)
	9	Connection
	10	Temperature range
	11	Failure function (fail-open)
	12	Maximum allowable pressure
	13	Maximum allowable inlet pressure

For actuator assembly models that use the imperial system, the information on the nameplate will be as follows:

Figure	No.	Meaning
	1	Model name
	2	Manufacturer
	3	Nominal size
	4	Nominal pressure / Flange standard
	5	Tightening torque
	6	Manufacturing date (month/year)
	7	Customer reference number
	8	Serial number
	9	Differential pressure
	10	Temperature range (-40° to 175° F)
	11	Maximum allowable inlet pressure

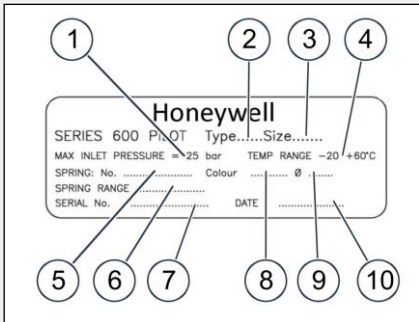
Locating the type plate of the pilot

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

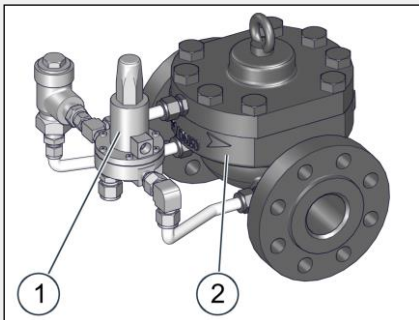
The details on the type plate have the following meaning:

Figure	No.	Meaning
	1	Maximum allowable pressure
	2	Name of the device
	3	Device size
	4	Permissible temperature range
	5	Pilot spring number
	6	Pilot spring setpoint range
	7	Serial number
	8	Pilot spring color
	9	Pilot spring wire diameter
	10	Manufacturing date

2.5 Layout and operation

Figure

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

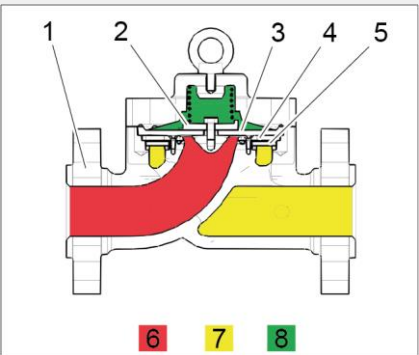
Figure	No.	Description
	1	HON 600 pilot
	2	HON 5020 actuator assembly

How it works

- Gas pressure regulators consisting of an HON 5020 actuator assembly combined with an HON 600 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 outlet pressure that needs to be regulated is fed to the pilot via the measuring line. The diaphragm system in the pilot determines the pressure actual 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 actuator assembly's regulating diaphragm will be changed by adjusting the motorization pressure so that the pressure being regulated (actual value) will change to match the setpoint. When there is zero pressure flow, the device seals tightly.

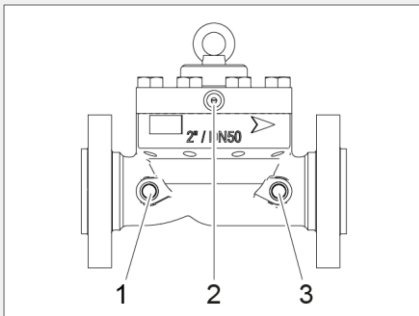
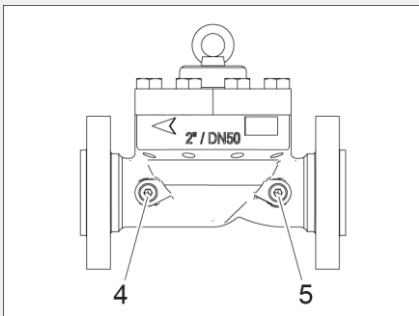
Actuator assembly configuration

Actuator assembly configuration:

Figure	No.	Meaning
	1	Actuator body
	2	Diaphragm assembly
	3	Flow restrictor
	4	Noise reduction element
	5	Support disc
	6	Inlet pressure
	7	Outlet pressure
	8	Motorization pressure

Actuator assembly connection lines

Actuator assembly connection lines:

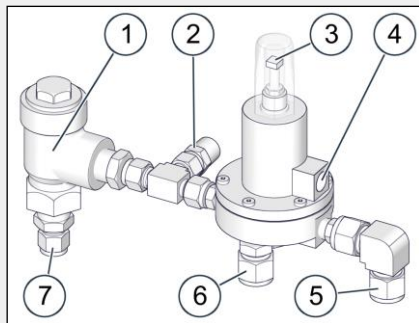
Figure	No.	Connection
Front:		
	1	Inlet pressure
	2	Motorization pressure
	3	Outlet pressure / feedback
Back:		
	4	Outlet pressure
	5	Inlet pressure

The actuator assembly's connections have the following dimensions:

- **M 14 x 1.5** if the pilot being connected uses the metric system
- **3/8 NPT** if the pilot being connected uses the imperial system

HON 600 layout

The HON 600 pilot features the following layout and fittings:

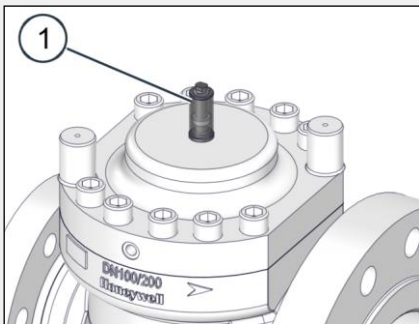
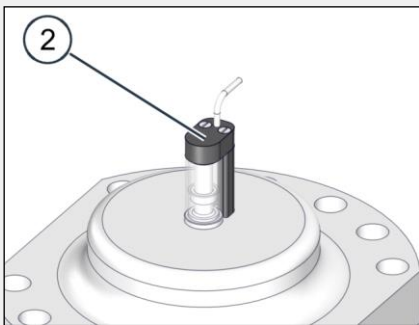
Figure	No.	Description
	1	Filter
	2	Motorization pressure fitting
	3	Spring adjuster (underneath cap)
	4	Breather line fitting (ambient pressure compensation)
	5	Port for outlet pressure process line
	6	Measuring impulse line connection
	7	Inlet pressure fitting

How the HON 600 pilot works

- The inlet pressure is conveyed into the pilot through the filter.
- The outlet pressure is conveyed into the pilot from the other side and produces a force component that acts on the diaphragm inside the pilot.
- The pilot's set screw is used to tighten the pilot spring, producing an additional force component that acts on the diaphragm inside the pilot.
- The force components acting on the diaphragm are used by the diaphragm in order to compare the setpoint and the process value.
- Depending on the gas pressure and on the set setpoint, the resulting motorization pressure will vary.
- The motorization pressure causes the gas pressure regulator being operated to open and close as appropriate.

Travel indication option

The numbers have the following meaning:

Figure	No.	Description
	1	Optical travel indicator
	2	Optical travel indicator with remote control

How the travel indication option works

Optical travel indicator

- The regulator is in the closed position when the magnet is located completely behind the diffuse surface.
- When the travel position is in the open position, this is not a position indicator, but only shows that the regulator is in operation.

Optical travel indicator with remote control

- The optical travel indication can also be equipped with a remote indication.
- The positions open and closed are switched by means of a reed contact.
- The remote indication is also not a position indicator, but only shows whether or not the regulator is in operation.

2.6 Technical specifications

Materials

Criterion	Value
Actuator assembly materials	Case: Steel Internal parts: Steel Diaphragm: Elastomer Gaskets: Elastomer
Pilot materials	Case: Aluminum alloy Internal parts: Aluminum alloy/steel Diaphragms: NBR Gaskets: NBR

Environmental conditions

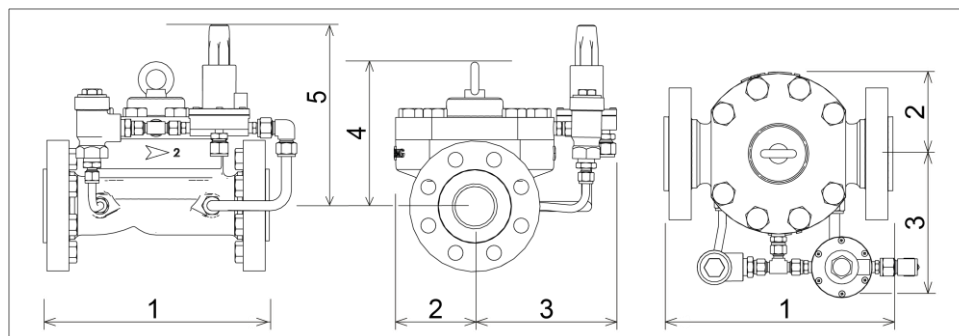
Criterion	Value
Temperature range	-20 to +60 °C (-4 to +140 °F)

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), and 6" (DN 150), as specified in the following standards:

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

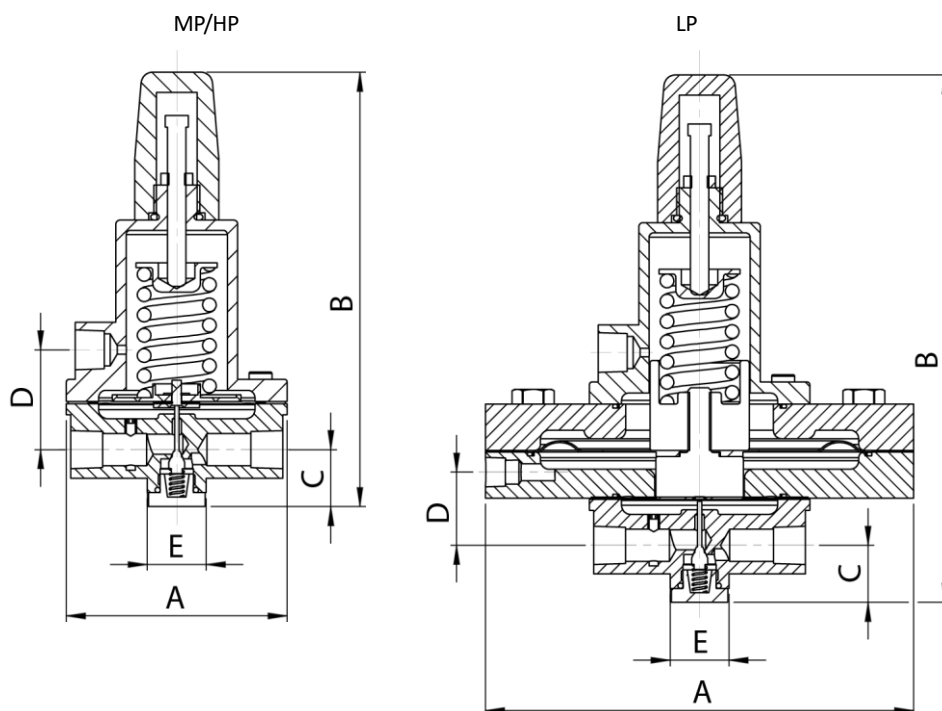
HON 5020 dimensions and weights when using HON 600 MP pilot as a reference



Size	Class	1 inch (mm)	2 inch (mm)	3 inch (mm)	4 inch (mm)	5 inch (mm)	Weight* lbs (kg)
1" (DN 25)	150	7.24 (184)	2.83 (72)	5.94 (151)	6.46 (164)	8.19 (208)	29.3 (13.3)
2" (DN 50)	150	10.00 (254)	3.23 (82)	6.34 (161)	7.17 (182)	8.98 (228)	46.7 (21.2)
3" (DN 80)	150	11.73 (298)	4.80 (122)	8.08 (205)	8.70 (221)	9.45 (240)	96.6 (43.8)
4" (DN 100)	150	13.86 (352)	5.71 (145)	8.89 (226)	10.04 (255)	10.63 (270)	149.9 (68)
6" (DN 150)	150	17.76 (451)	7.56 (192)	10.67 (271)	11.85 (301)	12.25 (311)	288.8 (131)

*The HON 600 MP pilot used in this example weighs: 1.1 lbs (0.5 kg)

Pilot dimensions and weights



Imperial system:

Design	Weight [lbs]	A [in]	B [in]	C [in]	D [in]	E [in]
MP/HP	1.1	3	6	1.34	0.78	0.87
LP	3.9	5.8	7.16	0.98	0.78	0.87

Metric system:

Design	Weight [kg]	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
MP/HP	0.5	76	150	34	20	22
LP	1.75	148	182	25	20	22

Operating pressure, Class 150

Criterion	Value
Nominal diameter	1" (DN 25), 2" (DN 50), 3" (DN 80), 4" (DN 100), 6" (DN 150)
Maximum operating pressure	285 psi (19.65 bar)

Accuracy class AC and look-up pressure class SG

Design	Outlet pressure range p_d range [bar]	Accuracy class AC	Look-up pressure class SG
HON 600 LP	0.015 to 0.5	10	15
HON 600 MP	0.14 to 4.0	5	10
HON 600 HP	0.7 to 8.0	2.5	10

Pilot springs

Pilot	Specific set range W_{ds}	Pilot spring		
		No.	Color	Wire diameter [mm]
HON 600 LP	0.22 – 2 psi (0.015 – 0.14 bar)	1047	purple	2.29
	0.36 – 2.9 psi (0.025 – 0.2 bar)	TX002	silver	3.7
	2.2 – 7.25 psi (0.15 – 0.5 bar)	TX003	light blue	4.5
HON 600 MP	2 – 5 psi (0.14 – 0.35 bar)	1047	purple	2.29
	3.6 – 29 psi (0.25 – 2.0 bar)	TX002	silver	3.7
	21.75 – 58 psi (1.5 – 4.0 bar)	TX003	light blue	4.5
HON 600 HP	10 – 58 psi (0.7 – 4.0 bar)	TX002	silver	3.7
	50.7 – 116 psi (3.5 – 8.0 bar)	TX003	light blue	4.5

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

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Requirements concerning the workforce, personal protective gear, workplaces	19

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	<p>Observe the following rules:</p> <ul style="list-style-type: none"> ▪ 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	<p>Observe the following rules:</p> <ul style="list-style-type: none"> ▪ 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. In particular, 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. In particular, 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 at all times.
- 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. In spite of 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Professional training ▪ Knowledge of the relevant standards and regulations ▪ Ability to identify and avoid dangers autonomously
Carrier	Company-to-company transport	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Initial start-up ▪ Renewed start-up 	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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: <ul style="list-style-type: none"> ▪ Fault finding ▪ Maintenance ▪ Repairs 	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ 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
<ul style="list-style-type: none"> ▪ 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

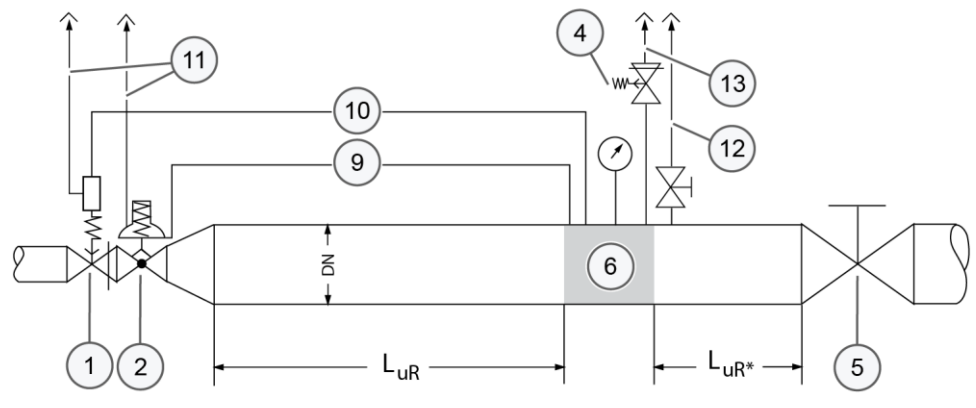
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4.1 Installation examples

Gas pressure regulating line - example 1

Configuration:

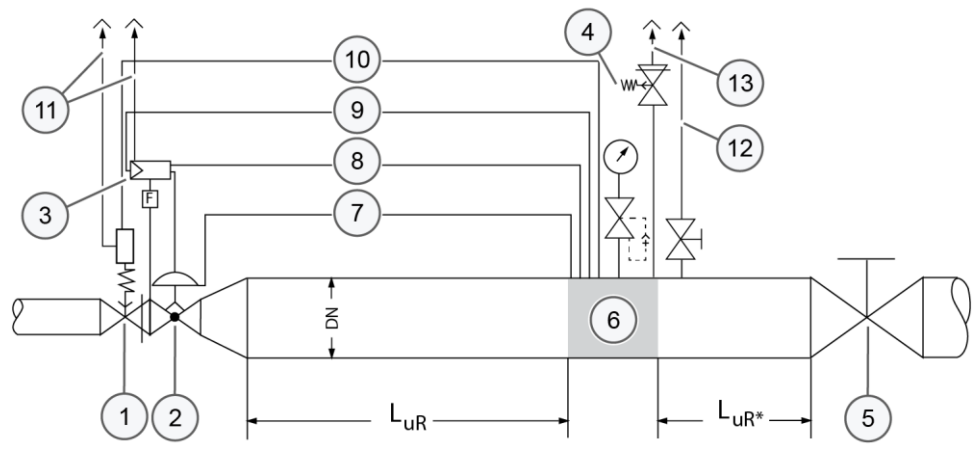
- Direct acting gas pressure regulator (non-piloted)
- With expander without noise reduction element downstream of the gas pressure regulator



Gas pressure regulating line - example 2

Configuration:

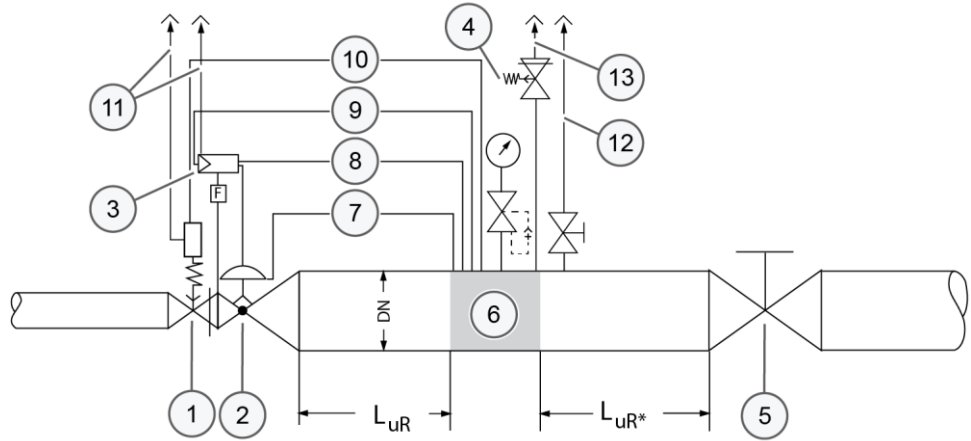
- Indirect acting gas pressure regulator (pilot-operated)
- With expander without noise reduction element downstream of the gas pressure regulator
- Outlet pressure gauge with protection against overpressure



Gas pressure regulating line - example 3

Configuration:

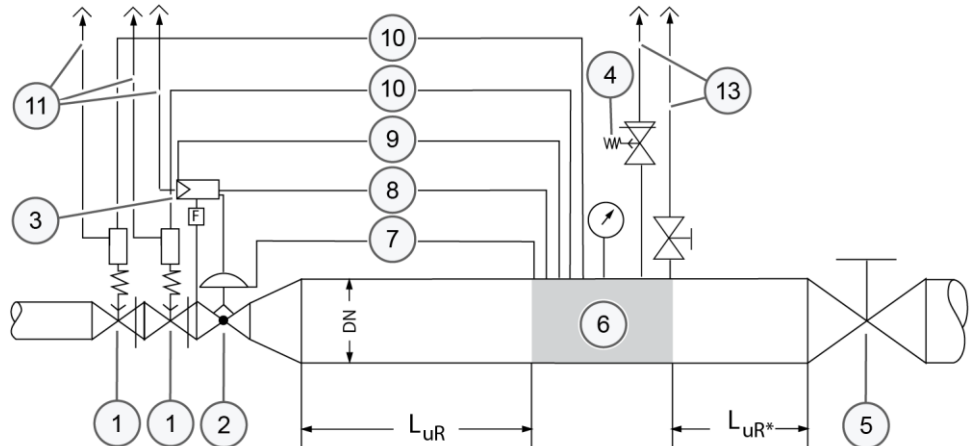
- Indirect acting gas pressure regulator (pilot-operated)
- With expander and integrated noise reduction element
- Outlet pressure gauge with protection against overpressure



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:

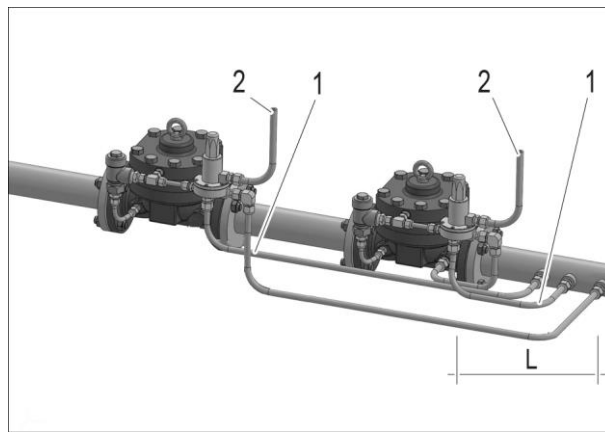
Acr.	Meaning
DN	Nominal size of pipe
L _{UR}	Undisturbed length of pipe

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

4.2 Alternative installation example: Active monitor regulator

Overview

Active monitor regulator with HON 5020 monitor regulator unit (left) and HON 5020 active regulator unit (right) (schematic diagram; measuring line (1), vent line (2)):



How it works

Active regulator unit:

The 600 pilot of the active regulator compares the actual value of the outlet pressure with the set target value and uses the resulting motorization pressure to control the movement of the regulator diaphragm on the flow restrictor in the regulator unit. This maintains the outlet pressure constant, irrespective of changes in the inlet pressure or changes in the discharge. If the consumption is zero, the built up motorization pressure pushes the diaphragm onto the seat edge surrounding the flow restrictor by means of the closing spring.

Monitor regulator unit:

The outlet pressure is monitored by the upstream monitor regulator unit in addition to the active regulator unit. The setpoint on the monitor regulator unit is set to a value higher than the setpoint for the active regulator unit being controlled, 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.

Measuring line connection

The measuring impulse line must be positioned at least five times the nominal diameter of the pipework from the regulator outlet flange (see figure above).

4.3 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 $(2.5 \text{ to } 5) \times \text{DN}$ of the pipe, with the specifics depending on the gas pressure regulator model and whether or not 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	$L_{UR} \text{ min. } 2.5 \times \text{DN}$
	The nominal size of the pipe is the next larger standard nominal size	$L_{UR} \text{ min. } 3 \times \text{DN}$
	The nominal size of the pipe is two standard nominal size increments larger	$L_{UR} \text{ min. } 4 \times \text{DN}$
	The nominal size of the pipe is more than two standard nominal size increments larger	$L_{UR} \text{ min. } 5 \times \text{DN}$
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	$L_{UR} \text{ min. } 4 \times \text{DN}$
	The nominal size of the pipe is two standard nominal size increments larger	$L_{UR} \text{ min. } 5 \times \text{DN}$

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 considered to be 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 taken into account based on system conditions if applicable.

4.4 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.
-

5 Transport and installation

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5.1 Transporting the gas pressure regulator

Heavy transport units



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



Risk of serious injury in the event that 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 intraplant 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

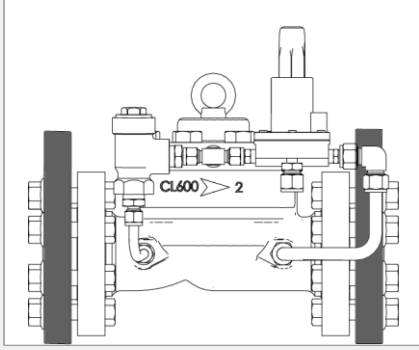
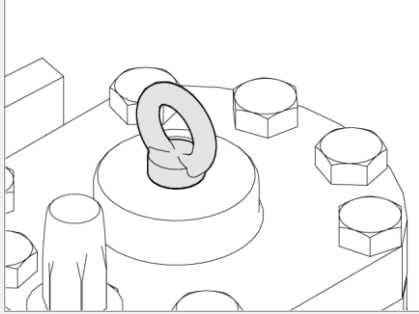
Make sure that the following requirements are met before transportation:

- You have seen and taken into account 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 of 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.

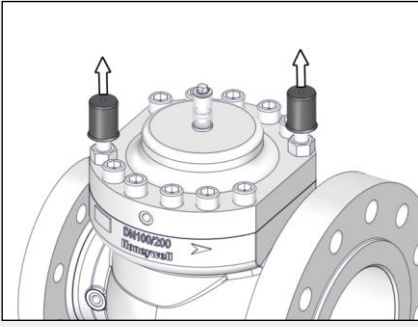
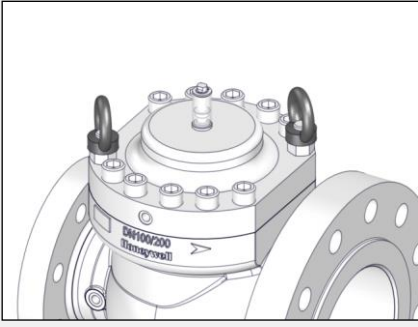
- There is enough space for unpacking and installing the device at the installation location.

Transporting the device

Proceed as follows:

Figure	Step	Description
	1	Leave the flange protective plates on the HON 5020 during transport.
	2	Hook the sling into the eye bolt.
	3	Lift the HON 5020. Slowly and carefully transport the HON 5020 to the location where it will be installed.

If the travel indication option is present, proceed as follows:

	1	Remove the protective caps.
	2	Install the ring bolts included in delivery and attach the slings to the ring bolts.
	3	Lift the HON 5020. Slowly and carefully transport the HON 5020 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

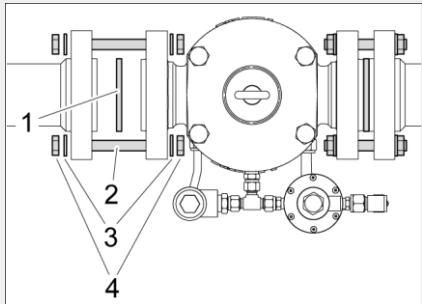
The quantity and size are dependent on the following criteria:

- Design and size of the flange

Assessing the situation

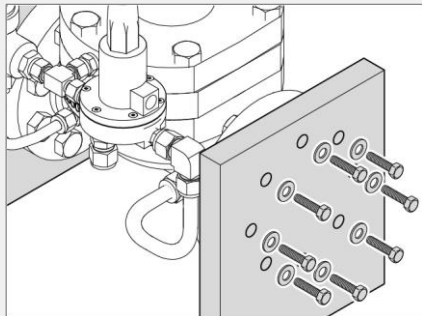
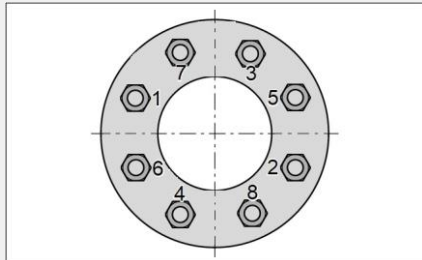
Assess the installation situation.

The numbers have the following meaning:

Figure	No.	Meaning
	1	Flange gasket
	2	Threaded bolts
	3	Washer
	4	Nut

Mounting the actuator assembly

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. <ul style="list-style-type: none"> ▪ 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.
	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

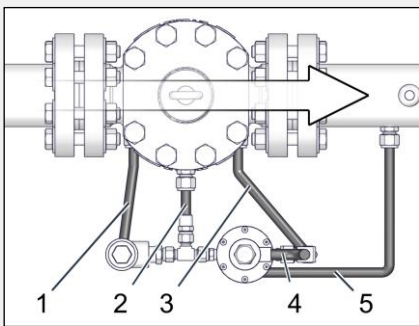
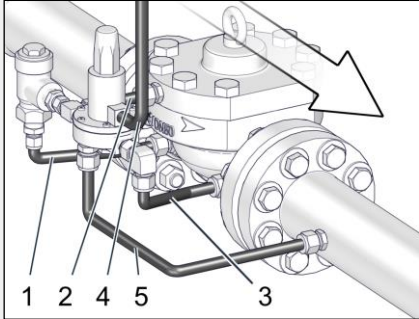
Proceed as follows:

Installing the device connections (see page 31)

5.3 Installing the device connections

HON 600 operating and measuring impulse 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
	1	Inlet pressure line, operating line, pre-installed
	2	Motorization line, operating line, pre-installed
	3	Outlet pressure bleed line, operating line, pre-installed
	4	Vent line, operating line, needs to be installed
	5	Outlet pressure measuring impulse line, measuring impulse 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 15)
- Shut-off devices for the operating and measuring impulse lines, as well as other accessories, as required, as per the *Basics for installing the device in a pipe* (see page 22) section.

Installing the operating and measuring impulse lines

The installation of the operating and measuring impulse 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 22) section for more information on what needs to be ensured without fail in the corresponding design and implementation.

Final checks

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

- All threaded joints on the connection lines have been checked to ensure that they have a secure fit.

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 32)

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	Bubble 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



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



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.

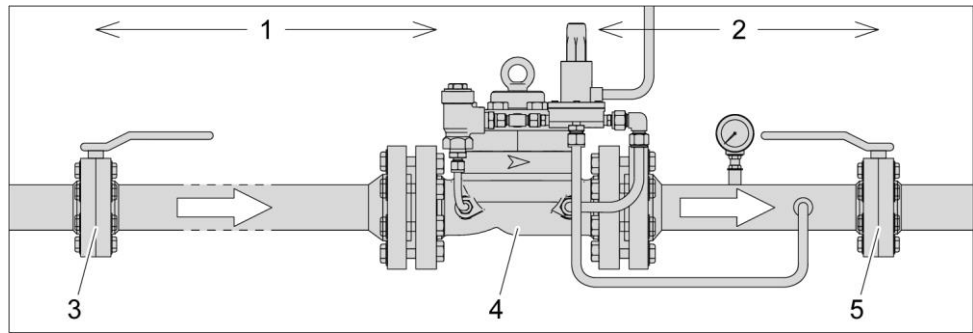
- ⇒ Pressurize the system only on the inlet side.

Details about the operating pressure can be found in the technical specifications.

Technical specifications (see page 15)

Test configuration

The test setup is as follows (schematic diagram, using the HON 600 MP as a reference):



The numbers have the following meaning:

No.	Meaning
1	Inlet chamber
2	Outlet chamber
3	Inlet stop valve armature
4	Gas pressure regulator
5	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	<ul style="list-style-type: none"> ▪ the system is leak-proof. ▪ the system may be put into operation.
foam or bubbles are formed	<ul style="list-style-type: none"> ▪ 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.

6 Adjusting the settings of the device

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6.1 Setting the target pressure

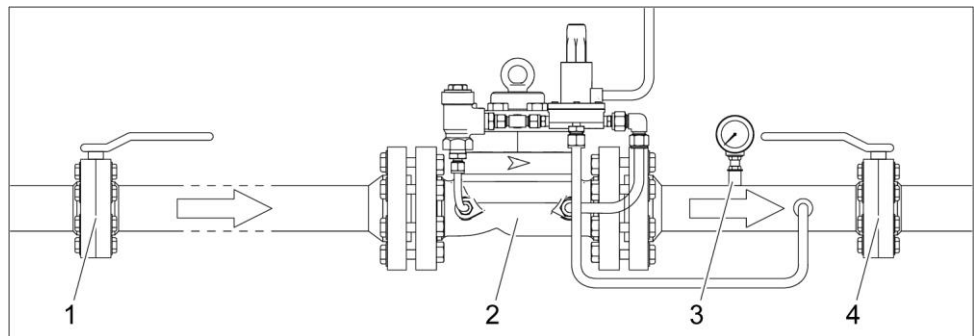
Requirements

Make sure that the following requirements are met:

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

Design of the system

The system setup is as follows (schematic diagram, using the HON 600 MP as a reference):



The numbers have the following meaning:

No.	Description
1	Inlet stop valve armature
2	Gas pressure regulator
3	Outlet pressure gauge
4	Outlet stop valve armature

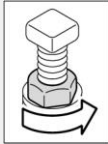
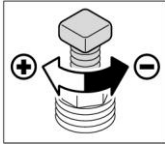

Making the set screw accessible

Proceed as follows:

Figure	Step	Description
	1	<p>Unscrew the set screw cap (1) from the pilot by turning the cap counterclockwise. The set screw (2) is accessible.</p> <p>Important! Make sure not to lose the O-ring (between the set screw cap and the body).</p>

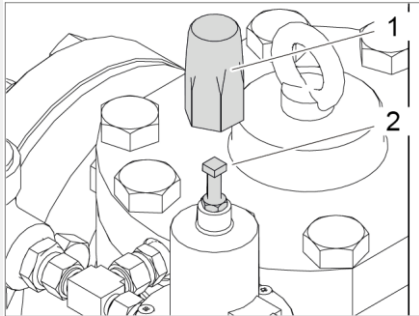
Setting the target pressure

Proceed as follows:

Figure	Step	Description
	1	Unscrew the lock nut of the set screw.
	2	Turn the set screw in counterclockwise direction (-) to release the tension from the pilot spring.
	3	Open the inlet shut-off valve to pressurize the pilot with the operating pressure.
	4	Turn the set screw in clockwise direction (+) until the pressure regulator displays the target value.
	5	Slowly open the outlet valve.
	6	Correct the setting of the set screw as necessary.
	7	Secure the setting of the set screw by tightening the lock nut.

Completing the setting of the target value

Proceed as follows:

Figure	Step	Description
	1	Screw the cap (1) of the set screw (2) back onto the pilot.

7 Malfunctions

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7.1 Malfunctions

Pressurized parts



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.

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
The regulator unit does not open	Filter: The filter is dirty	Clean the filter insert as specified in <i>Maintaining the pilot</i> (see page 44)
	Pilot: The diaphragm is defective	Replace the diaphragm as specified in <i>Maintaining the pilot</i> (see page 44)
	Actuator assembly: The diaphragm of the regulator unit is defective	Replace the actuator assembly diaphragm as specified in <i>Maintaining the actuator assembly</i> (see page 41)
The pressure that needs to be regulated is not being regulated	Check the setting of the target value	Check the setpoint as specified in the <i>Adjusting the settings of the device</i> (see page 34) section
	The pilot is defective	Check the pilot and replace it with a new pilot if necessary as specified in <i>Maintaining the pilot</i> (see page 44)
The sealing pressure is too high	The regulator unit is leaking due to contamination or damage	Perform maintenance on the actuator assembly as specified in <i>Maintaining the actuator assembly</i> (see page 41)

8 Maintenance

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8.1 Maintenance schedule

Meaning

The maintenance schedule provides an overview of the periodically required maintenance and repairs and makes reference 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 based on the relevant operating requirements and experience. Maintenance must be carried out in compliance with all federal and state laws and regulations, as well as with the local rules and regulations set forth by the relevant utilities and authorities and any other applicable regulations.

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 5 years
Maintaining the pilot	<i>Maintaining the pilot</i> (see page 44)			●	
Maintaining the actuator assembly	<i>Maintaining the actuator assembly</i> (see page 41)			●	
Setting the target pressure	<i>Setting the target pressure</i> (see page 34)			●	

8.2 Preparing for the maintenance

Preparation work for maintenance

Proceed as follows:

Step	Description	Explanation
1	Have the maintenance and servicing parts ready	<p>Please refer to <i>Additional information regarding spare parts</i> (see page 58) to find out which spare part drawings correspond your specific gas pressure regulator model and have the corresponding maintenance parts and servicing parts ready to go before maintenance.</p> <ul style="list-style-type: none"> ▪ The spare parts that are always required for the pilot's maintenance are listed in the spare parts kits for the pilot. ▪ The spare parts that are always required for the actuator assembly's maintenance are listed in the spare parts kits for the actuator assembly. ▪ The spare parts always required for maintenance of the travel indication (optional) are defined in the list of maintenance and servicing parts. ▪ Spare part drawings and bills of materials are listed in the <i>appendix</i> (see page 58). <p>In addition to these maintenance parts, there are also servicing parts that need to be checked during maintenance in order to make sure that they are in working condition. and they must be replaced if necessary. Because of this, it is recommended to have the following servicing parts ready for maintenance in order to avoid downtimes:</p> <p>For the pilot:</p> <ul style="list-style-type: none"> ▪ Compression spring ▪ Nozzle unit ▪ Complete filter <p>For the actuator assembly:</p> <ul style="list-style-type: none"> ▪ Closing spring ▪ Flow restrictor
2	Preparing lubricants	For specifications concerning the lubricants that must be used, please refer to the <i>Lubricants</i> (see page 65) section.

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

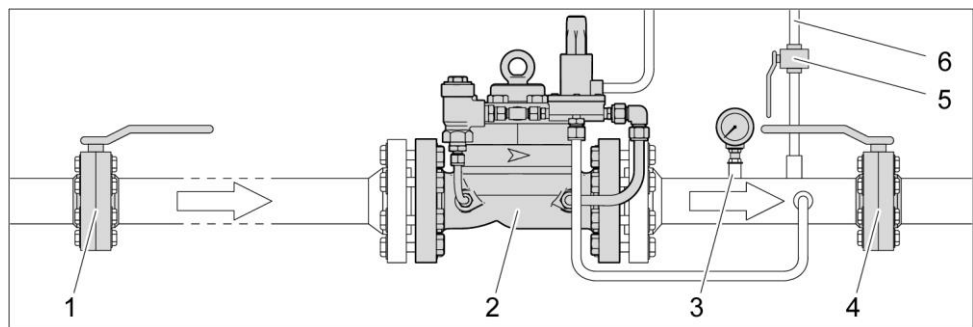
Risk of serious injury posed by pressurized components moving in an uncontrolled manner when handled improperly.

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, using the HON 600 MP as a reference:



The numbers have the following meaning:

No.	Meaning
1	Inlet stop valve armature
2	Gas pressure regulator
3	Pressure gauge
4	Outlet stop valve armature
5	Valve for blowdown line
6	Blowdown line

Establishing the depressurized status

Proceed as follows:

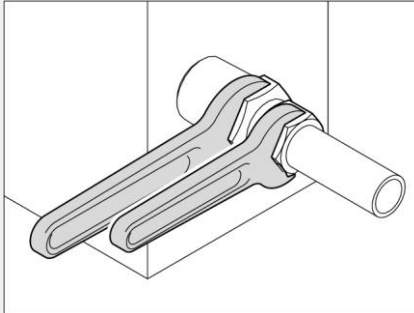
Step	Description
1	Close the outlet stop valve armature (4).
2	Close the inlet stop valve armature (1).
3	Depressurize the pilot. Turn the set screw on the pilot in clockwise direction until the gas pressure equalizes across the regulator.
4	Open the valve (5) in the blowdown line (6) to discharge the pressure between the inlet and the outlet valves.

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

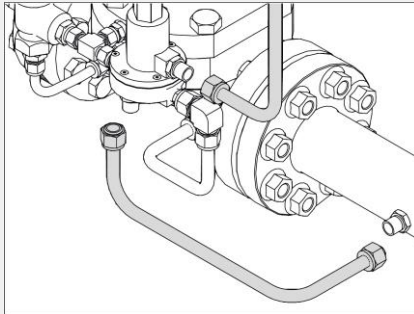
When conducting work involving the pipework, please always observe the following:

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

Removing components

If ...	then ...
<p>You want to perform maintenance on the pilot only</p>	<ul style="list-style-type: none"> ▪ The bleed line and the vent line on the pilot need to be uninstalled. ▪ The pilot, including the pipes on the actuator assembly, can remain installed. ▪ The actuator assembly, including the pipes, can remain in the gas regulating line.
<p>You want to perform maintenance on the actuator assembly only</p>	<ul style="list-style-type: none"> ▪ The motorization line between the pilot and the actuator assembly needs to be uninstalled. ▪ The actuator assembly can remain in the gas regulating line. ▪ The pilot, including the remaining pipes (with the exception of the motorization line), can remain in the gas regulating line.
<p>You want to perform maintenance on both the actuator assembly and the pilot</p>	<ul style="list-style-type: none"> ▪ The bleed line and the vent line on the pilot need to be uninstalled. ▪ The motorization line between the pilot and the actuator assembly needs to be uninstalled. ▪ The actuator assembly, including the remaining pipes (with the exception of the motorization line), can remain in the gas regulating line.

Proceed as follows:

Figure	Step	Description
	<p>1</p>	<p>Uninstall all the pipes that need to be uninstalled based on the maintenance work you are carrying out.</p>

8.4 Maintaining the actuator assembly

Contents

Topic	Page
Maintaining the actuator assembly	41

8.4.1 Maintaining the actuator assembly

Requirements

Make sure that the following requirements are met:

- The system is not pressurized, see *Starting maintenance* (see page 39).
WARNING! Mortal danger associated with pressurized components.

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

Tightening torques of the bolts securing the regulator top cover are as follows:

Nominal size	Pressure rating	Screw specifications	Tightening torque
1" (DN 25)	Class 150/300/600	5/8" UNC grade 7	203 Nm (150 ft lbs)
	PN 16/25/40	M16	
2" (DN 50)	Class 150/300/600	5/8" UNC grade 7	203 Nm (150 ft lbs)
	PN 16/25/40	M16	
3" (DN 80)	Class 150	5/8" UNC grade 7	203 Nm (150 ft lbs)
	PN 16	M16	
3" (DN 80)	Class 300/600	3/4" UNC grade 7	353 Nm (260 ft lbs)
	PN 25/40	M20	
4" (DN 100)	Class 150	5/8" UNC grade 7	203 Nm (150 ft lbs)
	PN 16	M16	
4" (DN 100)	Class 300/600	3/4" UNC grade 7	353 Nm (260 ft lbs)
	PN 25/40	M20	
6" (DN 150)	Class 150	5/8" UNC grade 7	203 Nm (150 ft lbs)
	PN 16	M16	
6" (DN 150)	Class 300	3/4" UNC grade 7	353 Nm (260 ft lbs)
	PN 25/40	M20	
6" (DN 150)	Class 600	1" UNC grade 7	705 Nm (520 ft lbs)
		M24	

Maintaining the actuator assembly

Proceed as follows:

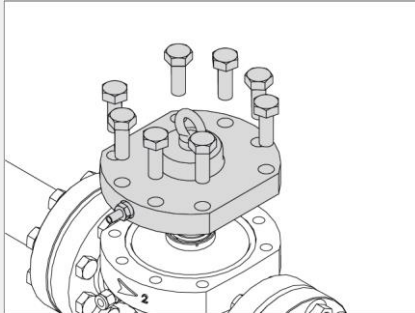
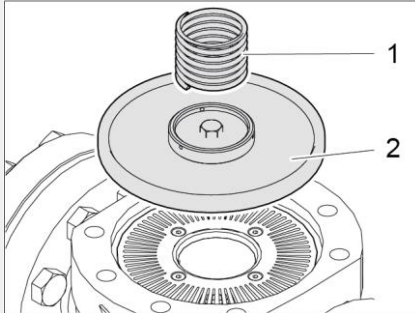
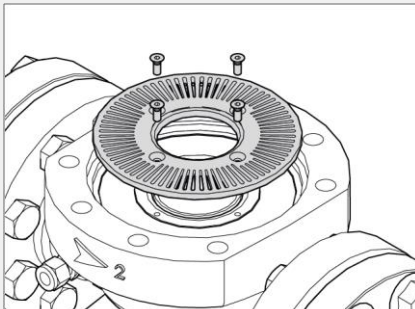
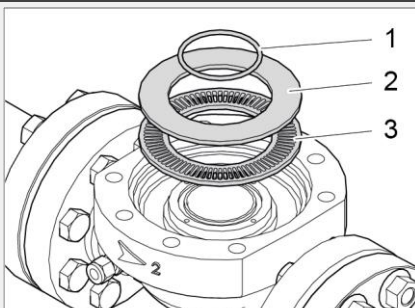
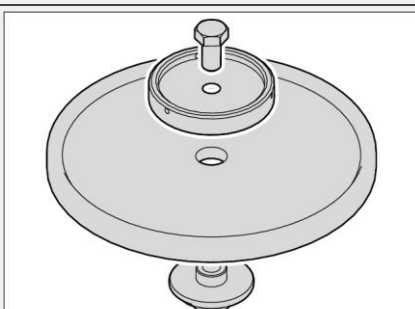
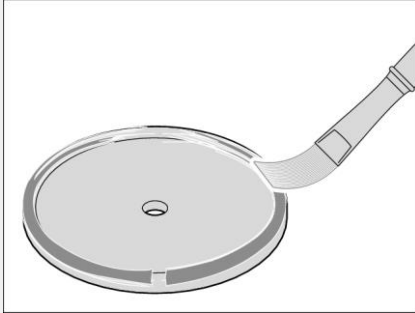
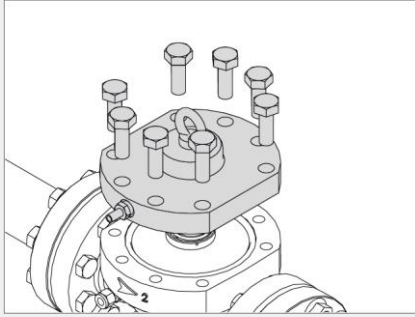
Figure	Step	Description
	<p>1</p>	<p>Disassemble the lid. CAUTION! The lid is spring-loaded. Risk of injury due to bouncing up when the screws are unscrewed. Push the lid down when unscrewing the screws.</p>
	<p>2</p>	<p>Remove the closing spring (1) and the diaphragm unit (2).</p>
	<p>3</p>	<p>Remove the flow restrictor. If the flow restrictor is damaged: Replace the flow restrictor with a new one.</p>
	<p>4</p>	<p>Remove the O-ring (1), the noise reduction element (2), and the supporting shim (3). Replace the O-ring with a new, lubricated O-ring. Check the noise reduction element and the support disc for damage and replace them if necessary.</p>
	<p>5</p>	<p>If the diaphragm is damaged: Dismantle the diaphragm unit. Replace the diaphragm with a new diaphragm.</p>

Figure	Step	Description
	6	Lightly grease the inside and outside edge of the new diaphragm.
	7	Re-assemble the diaphragm unit.
	8	<p>Re-assemble the regulator unit.</p> <p>Push the lid down when screwing down the screws until they are completely secured. Refer to the additional tightening torque information at the beginning of this topic. Tighten the screws in a criss-cross sequence.</p>

Next task

Depending on what you want to do next, proceed as indicated in the relevant section:

- *Maintaining the pilot* (see page 44)
- *Completing the maintenance* (see page 54)

8.5 Maintaining the pilot

Contents

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Maintaining the filter	44
Maintaining the HON 600 MP/HP pilot	45
Maintaining the HON 600 LP pilot	49

8.5.1 Maintaining the filter

Requirements

Make sure that the following requirements are met:

- The system is not pressurized, see *Starting maintenance* (see page 39).
- WARNING!** Mortal danger associated with pressurized components.

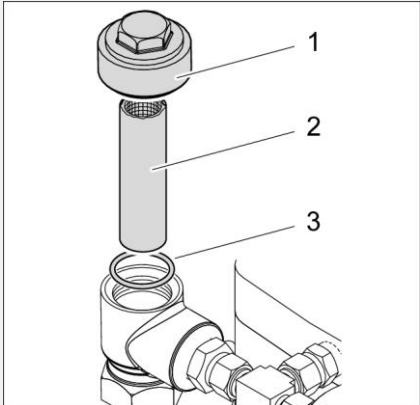
Cleaning

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 filter

Proceed as follows:

Figure	Step	Description
	1	Unscrew the cap (1).
	2	Check the filter insert (2) and the O-ring (3) for damage. Clean the filter insert.
	3	Put the filter back together or, if necessary, replace it with a new one.

Next task

Depending on the specific pilot model, proceed as indicated in the relevant section:

Maintaining the HON 600 MP/HP pilot (see page 45)

Maintaining the HON 600 LP pilot (see page 49)

8.5.2 Maintaining the HON 600 MP/HP pilot

Requirements

Make sure that the following requirements are met:

- The system is not pressurized, see *Starting maintenance* (see page 39).
WARNING! Mortal danger associated with pressurized components.

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 pilot

Proceed as follows:

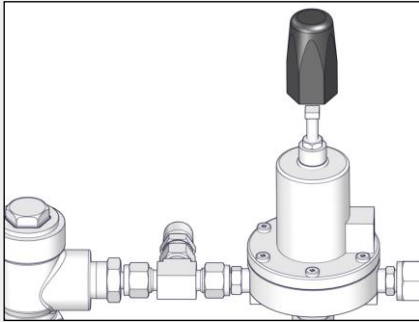
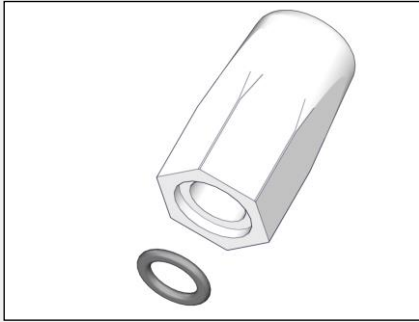
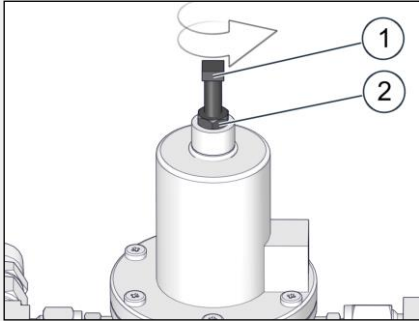
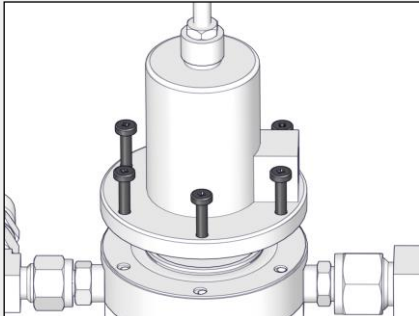
Figure	Step	Description
	1	Unscrew the cap for the set screw.
	2	Replace the O-ring with a new, greased O-ring.
	3	Unscrew the lock nut (2). Turn the set screw (1) counterclockwise until the pilot spring's counterpressure has completely subsided. Hint: Record the number of revolutions. This will help with the presetting for the renewed start-up.
	4	Unscrew the screws. Remove the spring housing.

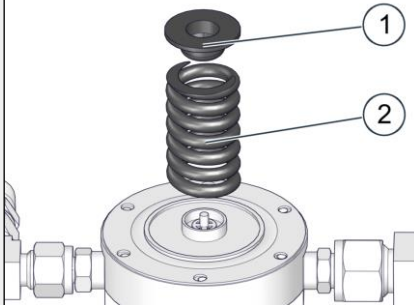
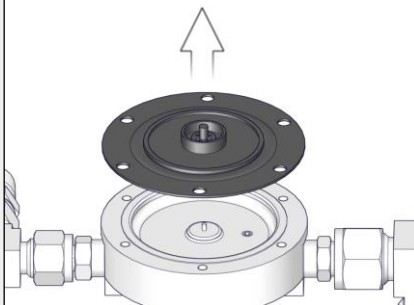
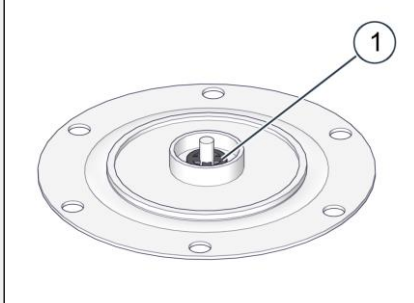
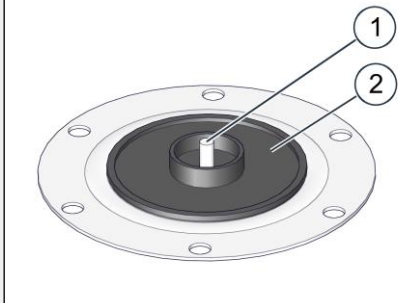
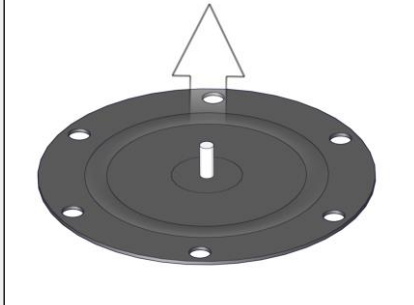
Figure	Step	Description
	5	Remove the spring plate (1) and the pilot spring (2).
	6	Remove the diaphragm unit.
	7	Remove the clamping ring (1) on the upper side of the diaphragm unit.
	8	Remove the diaphragm support plate (2) from the diaphragm retainer (1).
	9	Lift off the diaphragm.

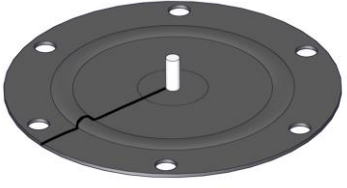
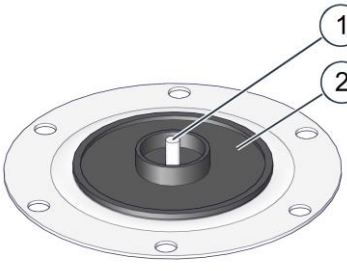
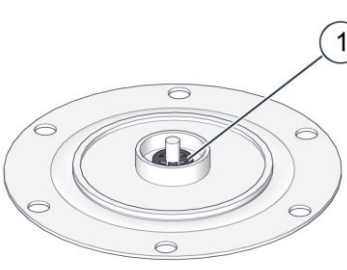
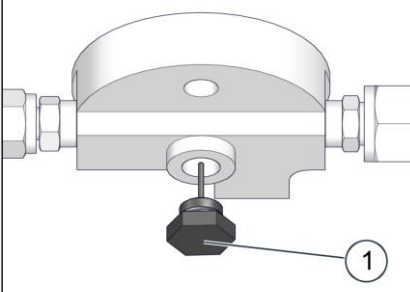
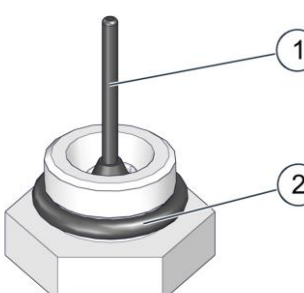
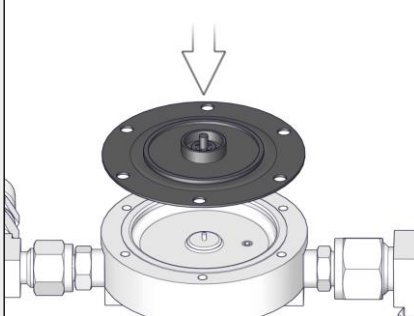
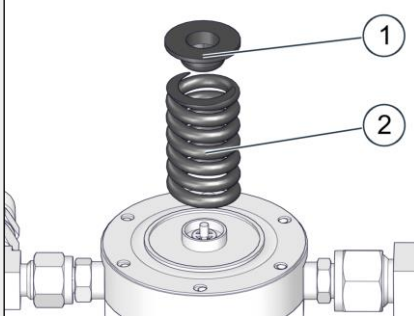
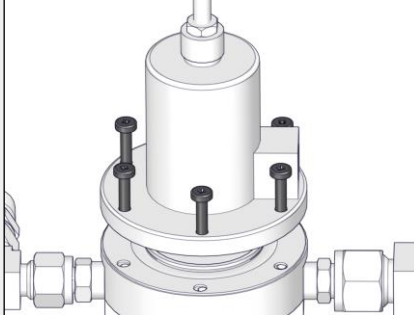
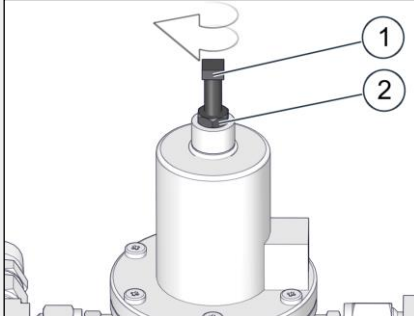
Figure	Step Description
	<p>10 Replace the diaphragm with a new, greased diaphragm. Insert the diaphragm. Make sure that the diaphragm is aligned correctly: The side of the diaphragm that has a depression at the center should be facing upward.</p>
	<p>11 Put the diaphragm support plate (2) back on the diaphragm retainer (1).</p>
	<p>12 Secure the diaphragm unit with a new clamping ring (1).</p>
	<p>13 On the underside of the pilot, unscrew the locking screw (1) for the lower housing section. Important! The valve and the valve spring may fall out.</p>
	<p>14 Replace the valve (1) with a new one. Replace the O-ring (2) with a new, greased O-ring. From the underside of the pilot, screw the locking screw back in.</p>

Figure	Step	Description
	15	Put the diaphragm unit back in place.
	16	Put the pilot spring (2) and the spring plate (1) back in place.
	17	Put the spring housing back in place, making sure that the fitting for the breather line is properly aligned.
	18	Tighten the screws, including the washers, in a criss-cross sequence. Refer to the additional tightening torque information at the beginning of this topic.
	19	<p>Turn the set screw (1) clockwise the recorded number of turns.</p> <p>Tighten the lock nut (2) and screw the cap for the set screw back in place.</p> <p>The correct setpoint adjustment cannot be carried out until before commissioning with the pilot installed.</p>

Next task

Depending on what you want to do next, proceed as indicated in the relevant section:

- *Maintaining the actuator assembly* (see page 41)
- *Completing the maintenance* (see page 54)

8.5.3 Maintaining the HON 600 LP pilot

Requirements

Make sure that the following requirements are met:

- The system is not pressurized, see *Starting maintenance* (see page 39).
WARNING! Mortal danger associated with pressurized components.

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 pilot

Proceed as follows:

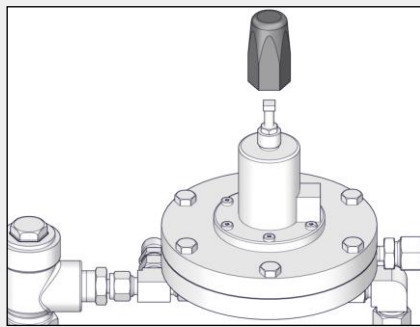
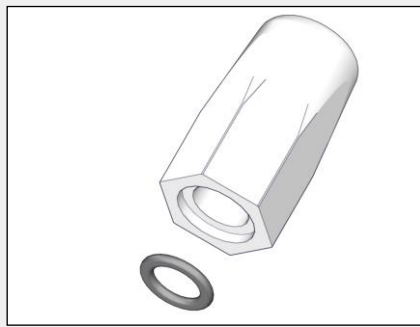
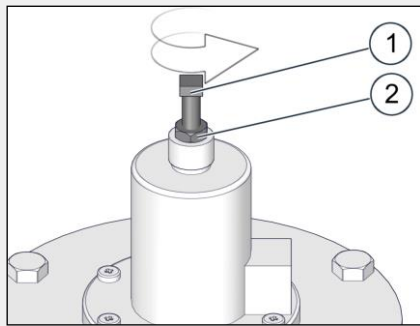
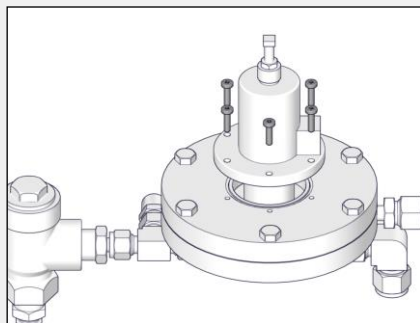
Figure	Step	Description
	1	Unscrew the cap for the set screw.
	2	Replace the O-ring with a new, greased O-ring.
	3	Unscrew the lock nut (2). Turn the set screw (1) counterclockwise until the pilot spring's counterpressure has completely subsided. Hint: Record the number of revolutions. This will help with the presetting for the renewed start-up.
	4	Unscrew the screws. Remove the spring housing.

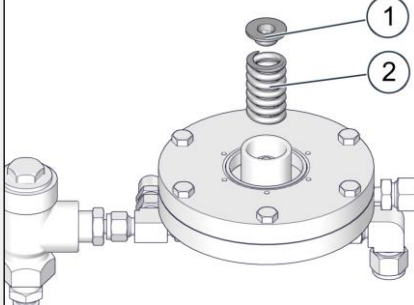
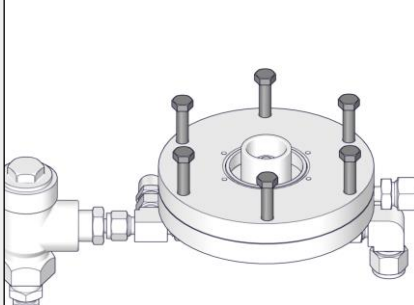
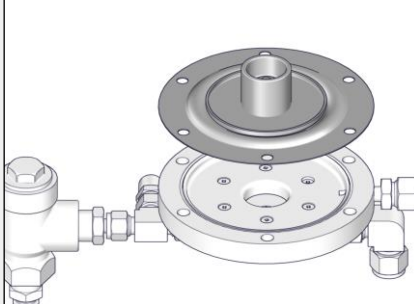
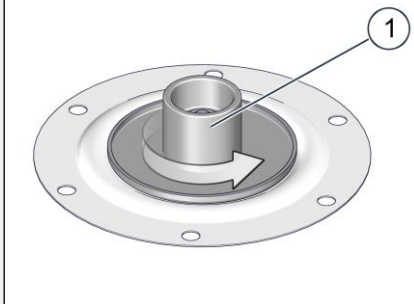
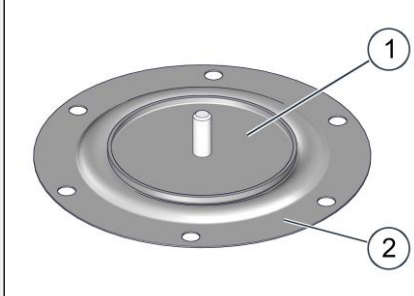
Figure	Step	Description
	5	Remove the upper spring plate (1) and the pilot spring (2).
	6	Unscrew the screws. Remove the top diaphragm housing.
	7	Remove the diaphragm unit.
	8	Take the diaphragm unit. Unscrew the spring plate (1) from the diaphragm retainer.
	9	Remove the diaphragm support plate (1) and the diaphragm (2).

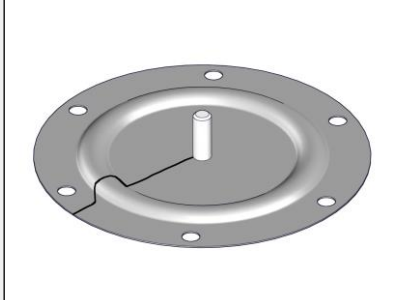
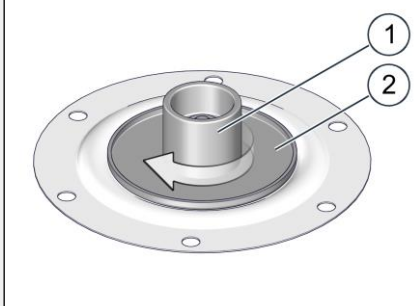
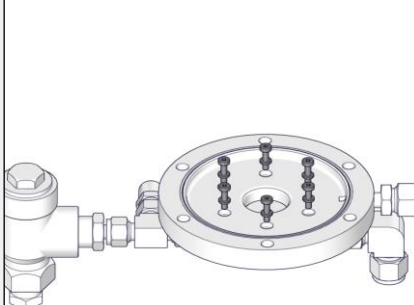
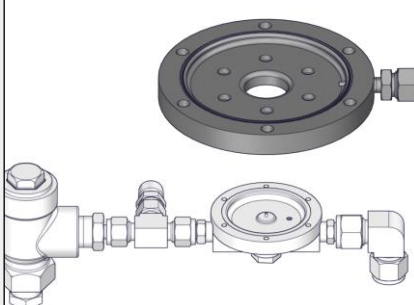
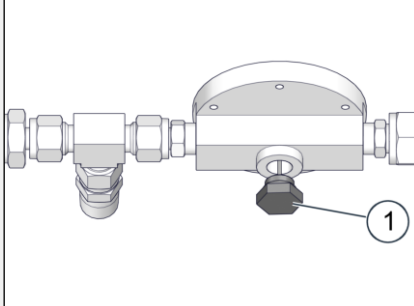
Figure	Step Description
	<p>10 Replace the diaphragm with a new, greased diaphragm. Insert the diaphragm. Make sure that the diaphragm is aligned correctly: The side of the diaphragm that has a depression at the center should be facing upward.</p>
	<p>11 Put the diaphragm support plate (2) back in place. Screw the spring plate (1) back onto the diaphragm retainer.</p>
	<p>12 Unscrew the screws, including the corresponding washers. Important! The bottom diaphragm housing will come loose.</p>
	<p>13 Remove the bottom diaphragm housing.</p>
	<p>14 On the underside of the pilot, unscrew the locking screw (1) for the lower housing section. Important! The valve and the valve spring may fall out.</p>

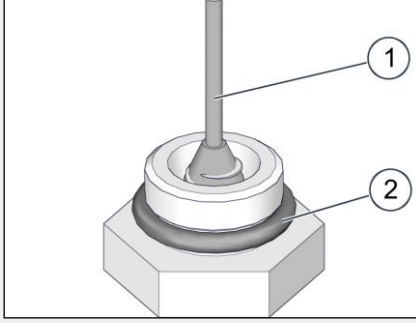
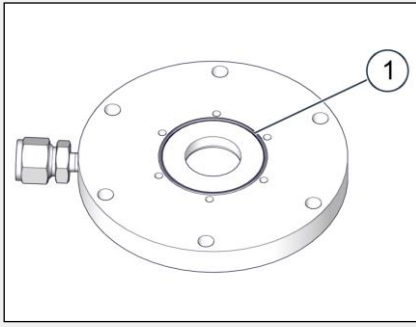
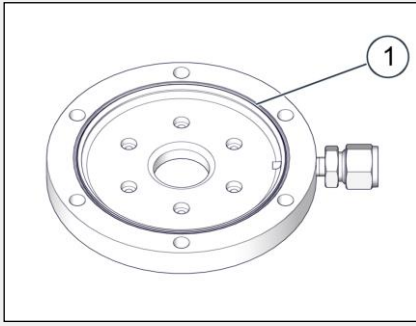
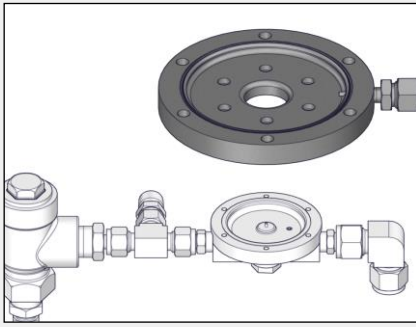
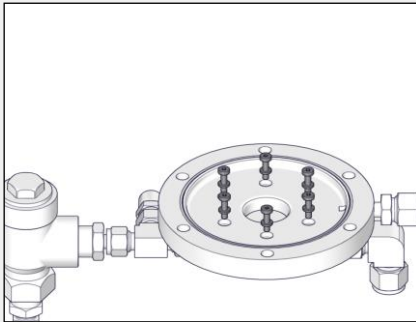
Figure	Step	Description
	<p>15</p>	<p>Replace the valve (1) with a new one. Replace the O-ring (2) with a new, greased O-ring. From the underside of the pilot, screw the locking screw back in.</p>
	<p>16</p>	<p>Take the bottom diaphragm housing. Replace the O-ring (1) with a new, greased O-ring.</p>
	<p>17</p>	<p>Turn the bottom diaphragm housing. Replace the O-ring (1) with a new, greased O-ring.</p>
	<p>18</p>	<p>Put the bottom diaphragm housing back in place, making sure that the fitting for the measuring impulse line is correctly aligned.</p>
	<p>19</p>	<p>Tighten the screws, including the washers, in a criss-cross sequence.</p>

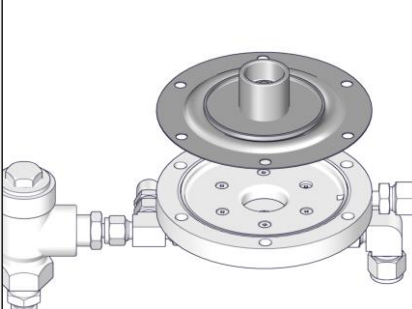
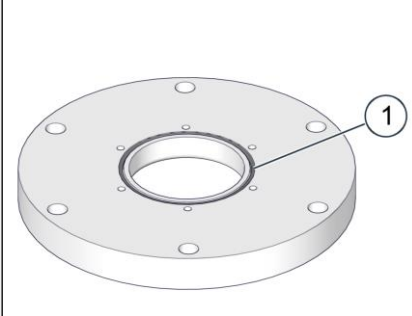
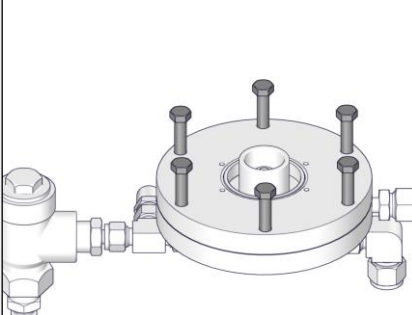
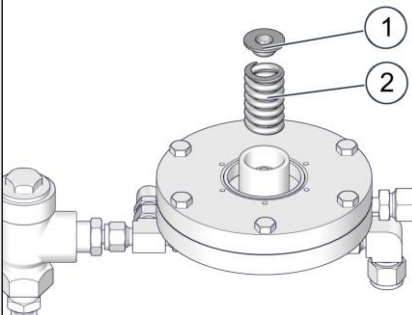
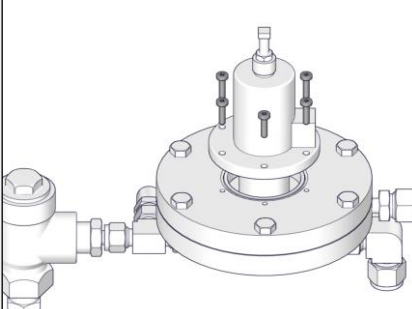
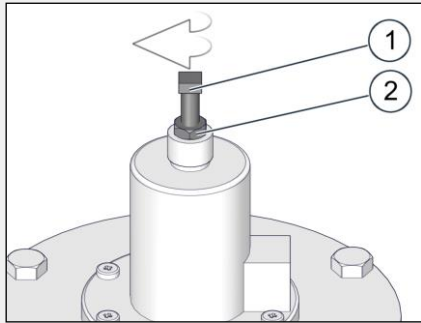
Figure	Step	Description
	20	Put the diaphragm unit back in place.
	21	Take the top diaphragm housing. Replace the O-ring (1) with a new, greased O-ring.
	22	Put the top diaphragm housing back in place. Tighten the screws, including the washers, in a criss-cross sequence.
	23	Put the spring (2) and the upper spring plate (1) back in place.
	24	Put the spring housing back in place, making sure that the fitting for the breather line is properly aligned.
	25	Tighten the screws, including the washers, in a criss-cross sequence.

Figure	Step	Description
	26	<p>Turn the set screw (1) clockwise the recorded number of turns.</p> <p>Tighten the lock nut (2) and screw the cap for the set screw back in place.</p> <p>The correct setpoint adjustment cannot be carried out until before commissioning with the pilot installed.</p>

Next task

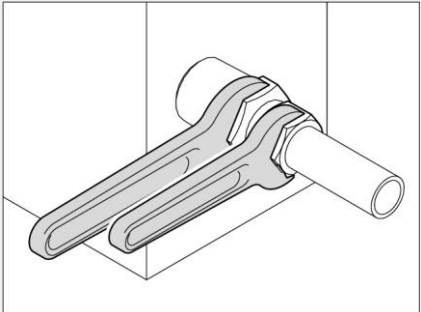
Depending on what you want to do next, proceed as indicated in the relevant section:

- *Maintaining the actuator assembly* (see page 41)
- *Completing the maintenance* (see page 54)

8.6 Completing the maintenance

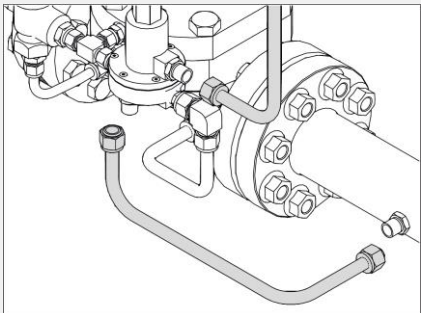
Protecting the pipe connections from being twisted

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

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

Installing components

Proceed as follows:

Figure	Step	Description
	1	Reinstall all the pipes you removed previously on the actuator assembly.
	2	Reinstall all the pipes you removed previously on the pilot.
		<p>Result:</p> <p>The pilot is now installed on the actuator assembly and in the gas regulating line.</p>

Next task

Proceed as follows:

Checking the system for leaks (see page 32)

9 Storage, removal, and disposal

Contents

Topic	Page
Storing the device	55
Disassembling the device	56
Disposing of the device	57

9.1 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: 32 °F to 77 °F (0 °C to 25 °C)
 - 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.
-

9.2 Disassembling the device

Pressurized parts

WARNING

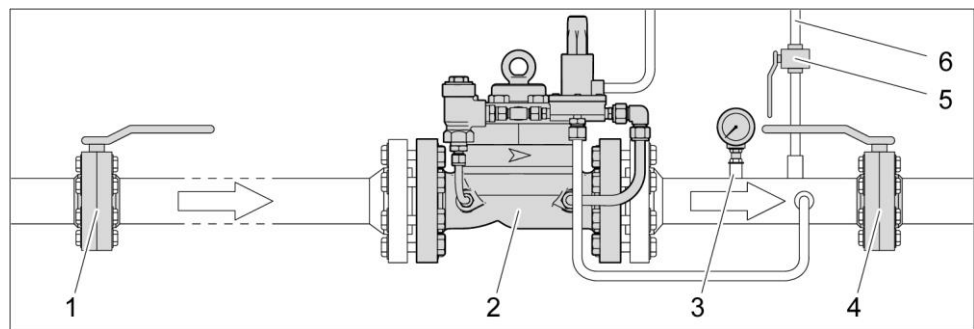
Risk of serious injury posed by pressurized components moving in an uncontrolled manner when handled improperly.

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, using the HON 600 MP as a reference:



The numbers have the following meaning:

No.	Meaning
1	Inlet stop valve armature
2	Gas pressure regulator
3	Pressure gauge
4	Outlet stop valve armature
5	Valve for blowdown line
6	Blowdown line

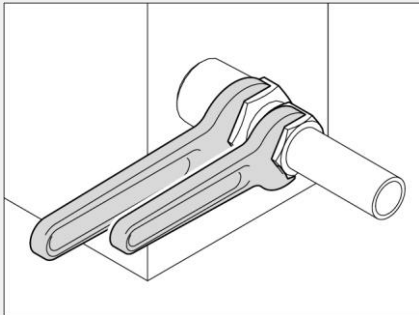
Establishing the depressurized status

Proceed as follows:

Step	Description
1	Close the outlet stop valve armature (4).
2	Close the inlet stop valve armature (1).
3	Depressurize the pilot. Turn the set screw on the pilot in clockwise direction until the gas pressure equalizes across the regulator.
4	Open the valve (5) in the blowdown line (6) to discharge the pressure between the inlet and the outlet valves.

Protecting the pipe connections from being twisted

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

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

Purging the lines with nitrogen

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

Disassembling the device

Proceed as follows:

Step	Description
1	Disassemble the device. Observe the information and instructions in the <i>Transport and installation</i> (see page 28) section when doing so.

9.3 Disposing of the device

Appropriate disposal

Comply with the legally stipulated disposal rules. Observe the following details pertaining to the appropriate disposal (not all of 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

Topic	Page
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Spare parts for the HON 5020 actuator assembly	59
Spare parts for HON 600 pilot	62
Spare parts for travel indication option	64
Lubricants	65

10.1 Additional information regarding spare parts

Spare parts categories

Spare parts fall into the following categories:

Spare parts category	Definition
Maintenance part	Spare parts that always have to be replaced during maintenance.
Servicing parts	Spare parts that need to be checked during maintenance and that must be replaced if necessary due to their condition.
	Spare parts that qualified personnel employed by the company operating the device is allowed to replace in order to convert the device (e.g., when changing the pressure range).
Miscellaneous spare part	Spare parts that qualified personnel employed by the company operating the device is allowed to replace in the event of a fault or defect.
	Parts that are listed in the spare part drawings in addition to maintenance and servicing parts so as to improve communications between the customer and the manufacturer, but that are not allowed to be ordered or replaced without first contacting the manufacturer.

Maintenance and servicing parts for actuator assembly

- The spare parts always required for the actuator assembly's maintenance are grouped together into spare parts kits appropriate for the device in question. Each spare parts kit has its own part number.
- Individual servicing parts can be ordered by using the corresponding part number, which is specified in the bill of materials for the actuator assembly. The required number of parts is specified in the "Quantity" column.

Maintenance and servicing parts for pilot

- The spare parts always required for the pilot's maintenance are grouped together into spare parts kits appropriate for the device in question. Each spare parts kit has its own part number.
- Individual servicing parts can be ordered by using the corresponding part number, which is specified in the bill of materials for the pilot. The required number of maintenance and/or servicing parts is specified under the relevant part number in the "Part No." column. If no quantity is specified, this means that only one unit is required.

Maintenance and servicing parts for travel indication (optional)

- The bill of materials for the travel indication is broken down into maintenance parts and servicing parts.
- The required number of maintenance or servicing parts is indicated under the relevant part number in the "Part No." column. If no quantity is specified, this means that only one unit is required.

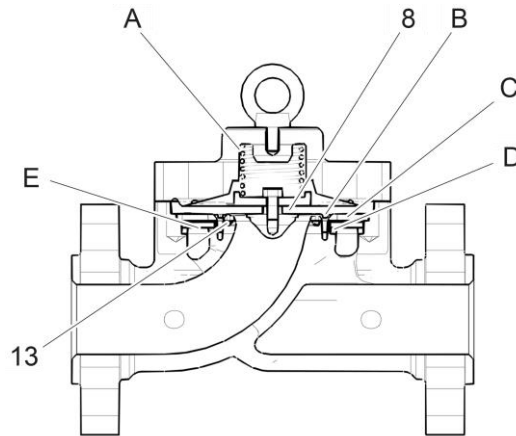
Overview of spare parts drawings

The spare parts drawings are subdivided as follows:

- HON 5020 actuator assembly
- HON 600 MP/HP pilot
- HON 600 LP pilot
- Travel indication option

10.2 Spare parts for the HON 5020 actuator assembly

Spare parts drawing for actuator assembly



Maintenance and servicing parts for actuator assembly

Nominal size	No. / Letter	Qty	Name	Part no.
1"	8	1	Diaphragm, up to 50 bar DP	201/MJ/001
1"	8	1	Diaphragm, up to 70 bar DP	201/MJ/004
1"	13	1	O-ring	730ODVN224
1"	A	1	Closing spring	18358049
1"	B	4	Screws	710BCFE03010
1"	C	1		
			Flow restrictor, 100%	201/MZ/001
			Flow restrictor, 75%	201/MZ/004
			Flow restrictor, 50%	201/MZ/006
			Flow restrictor 25%	201/MZ/008
1"	D	1	Carrier plate	201/MN/001
1"	E	1	Metal foam	201/MF/001
2"	8	1	Diaphragm, up to 50 bar DP	202/MJ/012
2"	8	1	Diaphragm, up to 70 bar DP	202/MJ/013
2"	13	1	O-ring	730ODVN229
2"	A	1	Closing spring	SS1075
2"	B	4	Screws	710BCFE03010
2"	C	1		
			Flow restrictor, 100%	202/MZ/011

Nominal size	No. / Letter	Qty	Name	Part no.
			Flow restrictor, 75%	202/MZ/019
			Flow restrictor, 50%	202/MZ/013
			Flow restrictor 25%	202/MZ/020
2"	D	1	Carrier plate	202/MN/001
2"	E	1	Metal foam	202/MF/001
3"	8	1	Diaphragm, up to 50 bar DP	203/MJ/013
3"	8	1	Diaphragm, up to 70 bar DP	203/MJ/014
3"	13	1	O-ring	730ODVN238
3"	A	1	Closing spring	SS1293
3"	B	6	Screws	710BCFE03010
3"	C	1		
			Flow restrictor, 100%	203/MZ/010
			Flow restrictor, 75%	203/MZ/018
			Flow restrictor, 50%	203/MZ/012
			Flow restrictor 25%	203/MZ/019
3"	D	1	Carrier plate	203/MN/001
3"	E	1	Metal foam	203/MF/001
4"	8	1	Diaphragm, up to 50 bar DP	204/MJ/003
4"	8	1	Diaphragm, up to 70 bar DP	204/MJ/004
4"	13	1	O-ring	730ODVN244
4"	A	1	Closing spring	10024055
4"	B	6	Screws	710BCFE03010
4"	C	1		
			Flow restrictor, 100%	204/MZ/010
			Flow restrictor, 75%	204/MZ/016
			Flow restrictor, 50%	204/MZ/012
			Flow restrictor 25%	204/MZ/017
4"	D	1	Carrier plate	204/MN/002
4"	E	1	Metal foam	204/MF/001
6"	8	1	Diaphragm 50/70 bar DP	10011307
6"	13	1	O-ring	730ODVN261
6"	A	1	Closing spring	10011249
6"	B	6	Screws	710BCFE03010
6"	C	1		
			Flow restrictor, 100%	206/MZ/002

Nominal size	No. / Letter	Qty	Name	Part no.
			Flow restrictor, 75%	206/MZ/010
			Flow restrictor, 50%	206/MZ/006
			Flow restrictor 25%	206/MZ/011
6"	D	1	Carrier plate	206/MN/001
6"	E	1	Metal foam	206/MF/001

Spare part kits for the actuator assembly

Nominal size	No. / Letter	Qty	Name	Part no.
1"			1" Class 150/300, PN 16/25/40 series 5020 IGP spare parts kit	201/MS-001
	8	1	Diaphragm, up to 50 bar DP	201/MJ/001
	13	1	O-ring	730ODVN224

Nominal size	No. / Letter	Qty	Name	Part no.
2"			2" Class 150/300, PN 16/25/40 series 5020 IGP spare parts kit	202/MS-008
	8	1	Diaphragm, up to 50 bar DP	202/MJ/012
	13	1	O-ring	730ODVN229

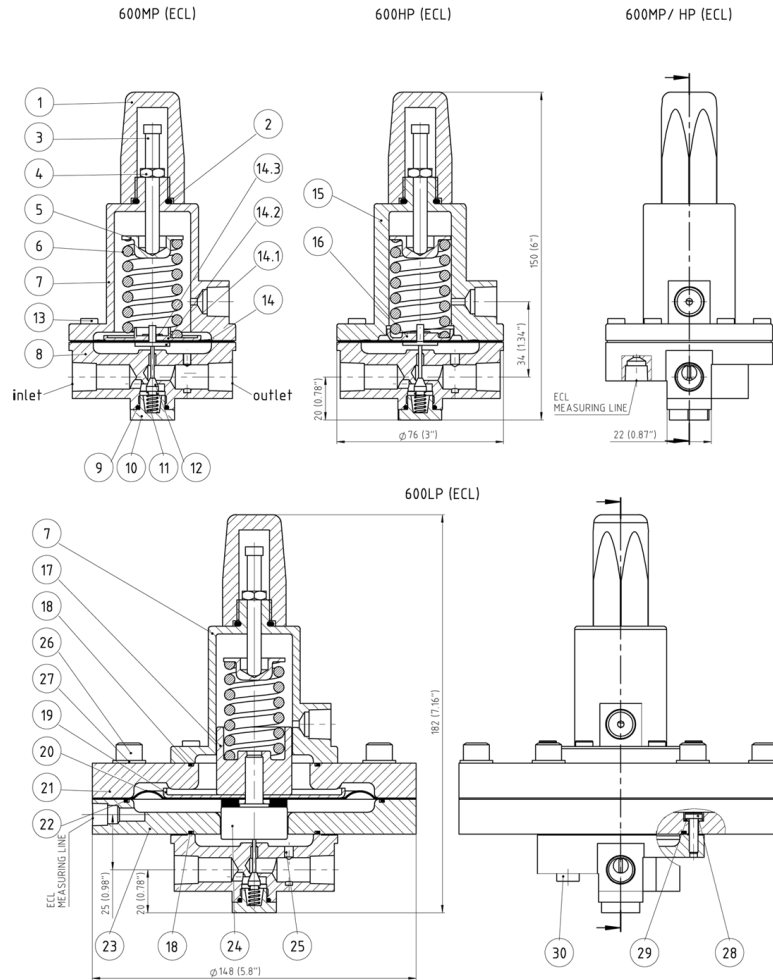
Nominal size	No. / Letter	Qty	Name	Part no.
3"			3" Class 150/300, PN 16/25/40 series 5020 IGP spare parts kit	203/MS-006
	8	1	Diaphragm, up to 50 bar DP	203/MJ/013
	13	1	O-ring	730ODVN238

Nominal size	No. / Letter	Qty	Name	Part no.
4"			4" Class 150/300, PN 16/25/40 series 5020 IGP spare parts kit	204/MS-008
	8	1	Diaphragm, up to 50 bar DP	204/MJ/003
	13	1	O-ring	730ODVN244

Nominal size	No. / Letter	Qty	Name	Part no.
6"			6" Class 150/300/600, PN 16/25/40 series 5020 IGP spare parts kit	206/MS-001
	8	1	Diaphragm 50/70 bar DP	10011307
	13	1	O-ring	730ODVN261

10.3 Spare parts for HON 600 pilot

Spare part drawings



Spare parts kits

HON 600 LP

Name	Description	Part no.
Spare parts kit for 600 LP pilot	Consisting of: <ul style="list-style-type: none"> One each of Nos. 2, 9, 12, 20, 22 Two of No. 18 	200/GS-006

HON 600 MP and HP

Name	Description	Part no.
Spare parts kit for 600 MP and HP pilots	Consisting of: <ul style="list-style-type: none"> One each of Nos. 2, 9, 12, 14, 14.3 	200/GS-007

Filter servicing part

Name	Description	Part no.
Filter S124	-	124--2525BC---S

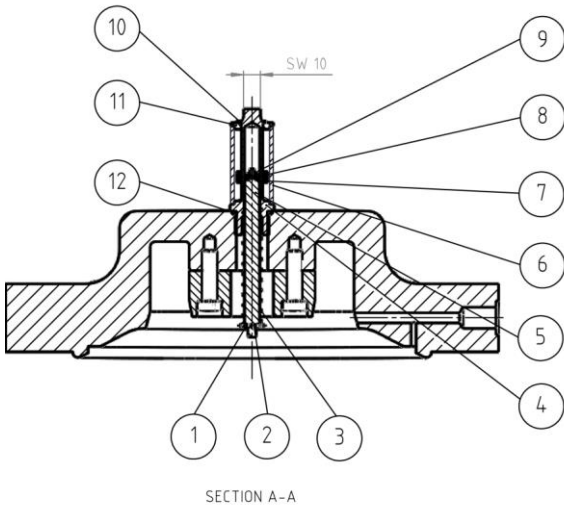
Maintenance and servicing parts for pilot

No.	Name	Part no.		
		HON 600 LP	HON 600 MP	HON 600 HP
2	O-ring	730ODVN115	730ODVN115	730ODVN115
6	Pilot spring			
	W _d 0.14 - 0.35 bar (2 - 5 psi)	-	1047	-
	W _d 0.015 - 0.14 bar (0.22 - 2 psi)	1047	-	-
6	Pilot spring			
	W _d 0.25 – 2 bar (3.6 – 29 psi)	-	TX002	-
	W _d 0.7 – 4 bar (10 – 58 psi)	-	-	TX002
	W _d 0.025 – 0.2 bar (0.36 – 2.9 psi)	TX002	-	-
6	Pilot spring			
	W _d 1.5 – 4 bar (21.75 – 58 psi)	-	TX003	-
	W _d 3.5 – 8 bar (50.7 – 116 psi)	-	-	TX003
	W _d 0.15 – 0.5 bar (2.17 – 7.25 psi)	TX003	-	-
9	O-ring	730ODVN014	730ODVN014	730ODVN014
12	Valve	731SGWZTN-003	731SGWZTN-003	731SGWZTN-003
14	Diaphragm	-	731SGWZTJ/004	731SGWZTJ/004
14.3	Clamping ring	-	731SGWZ5115-12	731SGWZ5115-12
18	O-ring	730ODVN035 (2 units)	-	-
20	600 LP diaphragm	201/WJ/310	-	-
22	O-ring	730ODVN047	-	-

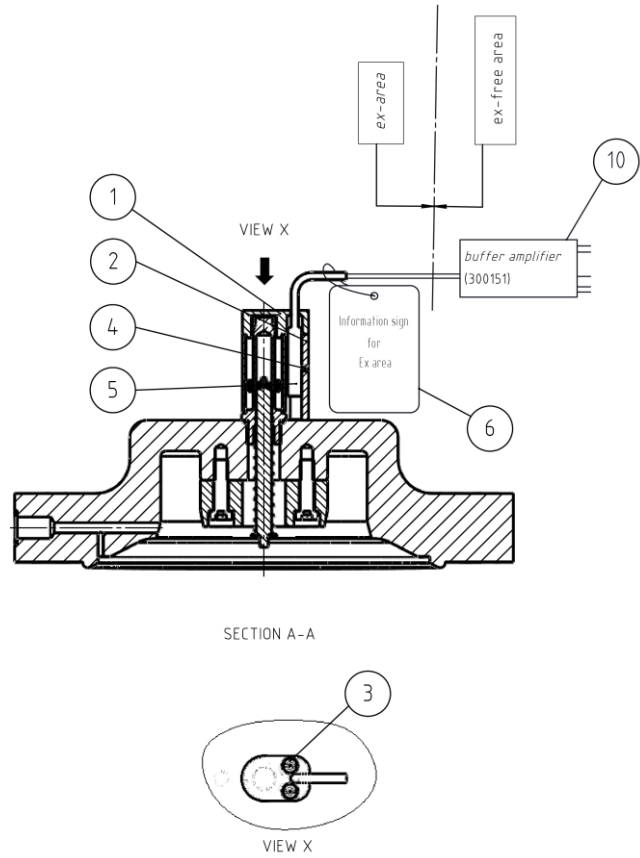
10.4 Spare parts for travel indication option

Spare part drawings

Optical travel indicator



Optical travel indicator with remote control



Maintenance and servicing parts

No.	Qty	Name	NBR Part no.	FKM Part no.
12	1	O-Ring	100448-RMK	20823

10.5 Lubricants

Lubricants

Important! All parts must be slightly greased.

Use the following **lubricants for the pilot:**

Application	Remark	Lubricant	Part no.
O-rings Stationary and moving		Standard model:	
Flat gaskets		Silicone grease (jar)	27 079
Diaphragms	Grease the diaphragm grip body on all sides Do NOT grease the flat grip	Silicone grease (tube)	27 081
Valve rod sliding surfaces		Low-temperature model:	
Sliding guides		Silicone grease (jar)	27 993
Guide bushings	Grease film only		
Control balls and control rollers		High-temperature model:	
Ball bearing		PFPE grease	102 389
Setpoint set screws Power screws			
Thread material combination: Al/Al		Assembly paste	27 091
Screw-in fittings and fastening screws			

Use the following lubricants **for the actuator assembly:**

Components	Remark	Lubricant	Part no.
O-rings			
Diaphragm grip body	Grease the diaphragm grip body on all sides	Silicone grease	27 052
All fastening screws			
All fittings		Assembly lubricant	27 091

Subject to change without notice



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